

Texas Storm List Appendix F

This appendix contains all the storm data used to adjust each storm in-place. Information is provided for each storm including the SPAS analyzed data, the information used to locate the storm representative dew point/SST location, and other pertinent information regarding the in-place storm representative dew point/SST, and rainfall. The adjustments applied to each storm to each grid point to calculate the MTF, GTF, and TAF over the entire project domain are contained in the PMP Tool database as described in the calculation.

Each storm description in this appendix provides information on the location of the storm representative dew point/SST location (in latitude and longitude) and the value derived at that location. All storm representative values have been reviewed and accepted as appropriate by the Review Board of this study and previous studies. To complete the in-place maximization factor (IPMF) calculation, the climatological maximum dew point/SST value at the same location as the storm representative value must be determined after applying the 15 day towards the warm season (if appropriate) temporal adjustment (see Equation 9.2 of the calculation). This calculation was completed for this study using an automated process in GIS to derive the climatological maximum dew point/SST data included in this calculation. As an alternative, a user can utilize the maps in Appendices A and B. All maps are developed as representing the 15th of the month. In this scenario, the user would note the latitude and longitude location of the storm representative value and the temporal transposition date. Then, go to the map or maps representing the temporal transposition date noting again that each map represents the 15th of the month. For example, if the temporal transposition date was September 15th for a given storm, only the September monthly data would be required. However, if the temporal transposition date was October 5th, then both the September and October monthly maps would be required and the climatological maximum value would represent 1/3rd October and 2/3rd September.

In this appendix, daily synoptic weather maps are provided for a period starting a few days before each storm and continuing to a few days after each storm. Daily weather maps covering the period from 1871 through 2002 are from the U.S. Daily Weather Maps Archive, [NOAA Climate Database Modernization Program \(CDMP\)](#), National Climatic Data Center, Asheville, NC, and the NOAA Central Library Data Imaging Project. Daily synoptic weather maps from 2002 through 2016 are from the NOAA Weather Prediction Center Daily Weather Maps web page, <http://www.hpc.ncep.noaa.gov/dailywxmap/index.html>.

For all storms which had a USACE Storm Studies analysis completed, those pertinent data sheet pages are included. These data came from the USACE Storm Rainfall in the United States, Depth-Area-Duration Data files. In addition, there are several storms which include a hand drawn transposition limit map complete by the NWS. These are included for reference to give context of various transposition limits assigned by the NWS. These maps were recovered from the HydroMeteorological Design Studies Center office in Silver Spring, MD and are archived on AWA's server.

Table F.1 Short storm list used for PMP Development-general storms. Max_PPT is the location with the largest rainfall accumulation for the total storm duration.

SPAS_ID	NAME	STATE	LAT	LON	YEAR	MONTH	DAY	MAX_PPT	ELEV_FT	DURATION
SPAS_1591_1	HEARNE	TX	30.8400	-96.5700	1899	6	27	34.53	276	72
SPAS_1428_1	FAIRFIELD	TX	31.6792	-96.1292	1932	9	2	19.58	462	24
SPAS_1311_1	MCKENZIE	TN	36.4375	-87.9125	1937	1	5	19.86	568	486
SPAS_1430_1	HEMPSTEAD	TX	30.1292	-96.0542	1940	11	22	21.29	205	24
SPAS_1587_1	PRAIRIEVIEW	NM	33.1375	-103.0792	1941	5	20	11.08	3,805	72
SPAS_1486_1	MCCOLLEUM RANCH	NM	32.1458	-104.7458	1941	9	20	21.81	5,840	72
SPAS_1431_1	WARNER	OK	35.4792	-95.3292	1943	5	6	25.24	579	72
SPAS_1583_1	COUNCIL GROVE	KS	38.6458	-96.6208	1951	7	9	18.56	1,434	72
SPAS_1435_1	HARRISONBURG DAM	LA	31.7875	-91.8167	1953	5	11	25.35	171	24
SPAS_1251_1	LAKE MALOYA	NM	37.0090	-104.3410	1955	5	19	14.82	7,944	24
SPAS_1278_1	MADISONVILLE	KY	37.3458	-87.4958	1964	3	8	11.67	449	120
SPAS_1181_1	GLADEWATER	TX	32.8029	-94.7050	1966	4	27	25.28	278	216
SPAS_1357_1	GLEN	MS	34.8375	-88.3958	1973	3	14	12.15	588	24
SPAS_1227_1	LOUISVILLE	MS	33.1040	-88.8880	1979	4	12	22.07	501	96
SPAS_1219_1	BIG FORK	AR	35.8708	-92.1208	1982	12	1	15.92	764	120
SPAS_1277_1	GILBERTSVILLE	KY	36.9958	-88.2625	1989	2	12	13.20	466	120
SPAS_1244_1	LOUISVILLE	KY	38.1000	-85.6700	1997	2	28	13.51	550	24
SPAS_1228_1	FALL RIVER	KS	37.6300	-96.0500	2007	6	30	25.50	900	96
SPAS_1242_1	ALLEY SPRING	MO	37.1600	-91.4500	2008	3	17	15.10	946	24
SPAS_1218_1	DOUGLASVILLE	GA	33.8700	-84.7600	2009	9	19	25.37	950	72
SPAS_1208_1	WARNER PARK	TN	36.0611	-86.9056	2010	5	1	19.71	600	60
SPAS_1530_1	GUADALUPE PASS	TX	32.0350	-104.5550	2013	9	10	18.34	3,986	84
SPAS_1530_2	SUMNER LAKE	NM	34.5950	-104.4750	2013	9	10	9.63	4,284	84
SPAS_1530_4	CHAPARRAL	NM	32.1450	-105.9950	2013	9	10	11.94	4,718	84
SPAS_1597_1	SILVERHILL	AL	30.3750	-87.5850	2014	4	29	25.42	13	6

Table F.2 Short storm list used for PMP Development-local storms. Max_PPT is the location with the largest rainfall accumulation for the total storm duration.

SPAS_ID	NAME	STATE	LAT	LON	YEAR	MONTH	DAY	MAX_PPT	ELEV_FT	DURATION
SPAS_1494_1	MOUNTAIN HOME	TX	30.1708	-99.3792	1932	6	30	35.56	1,915	36
SPAS_1495_1	CHEYENNE	OK	35.6208	-99.6792	1934	4	3	23.11	1,930	6
SPAS_1295_3	HALE	CO	39.6125	-102.2625	1935	5	30	18.00	3,700	6
SPAS_1496_1	WOODWARD RANCH	TX	29.4792	-99.3875	1935	5	31	21.93	1,175	6
SPAS_1485_1	LAS CRUCES	NM	32.3042	-106.7958	1935	8	30	10.03	3,890	6
SPAS_1429_2	HALLETT	OK	36.2458	-96.6125	1940	9	2	24.00	871	6
SPAS_1432_1	MOUNDS	OK	35.8458	-96.0708	1943	5	16	19.27	766	12
SPAS_1558_1	ROCK SPRINGS	TX	29.9120	-99.9960	1955	9	23	24.09	2,001	24
SPAS_1293_1	HOLLY	CO	37.7125	-102.4042	1965	6	16	19.18	4,100	24
SPAS_1034_1	ENID	OK	36.3805	-97.8683	1973	10	10	19.45	1,206	24
SPAS_1487_1	WHITE SANDS	NM	32.3874	-106.5292	1978	8	19	10.43	4,604	6
SPAS_1247_1	FRIJOLE CREEK	CO	37.0960	-104.3790	1981	7	3	16.33	5,728	6
SPAS_1185_1	CORRIGAN	TX	30.2600	-94.8900	1994	10	16	30.90	125	95
SPAS_1528_1	EL PASO	TX	31.9350	-106.5150	2006	8	1	10.25	4,818	24
SPAS_1595_1	SPEARMAN	TX	36.1350	-101.4950	2010	6	13	13.89	3,263	6
SPAS_1557_1	GAIL	TX	32.7250	-101.4050	2014	9	21	13.96	2,575	6
SPAS_1588_1	TAHOKA	TX	33.1050	-101.8250	2015	5	5	10.51	3,002	12
SPAS_1589_1	ABILENE	TX	31.4350	-99.1150	2015	7	7	10.91	1,310	6
SPAS_1590_1	DAWSON	TX	31.8950	-96.6450	2015	10	23	32.92	450	72

Table F.3 Short storm list used for PMP Development-tropical storms. Max_PPT is the location with the largest rainfall accumulation for the total storm duration.

SPAS_ID	NAME	STATE	LAT	LON	YEAR	MONTH	DAY	MAX_PPT	ELEV_FT	DURATION
SPAS_1582_1	BROOME	TX	31.7875	-100.8542	1936	9	13	30.34	2,260	72
SPAS_1582_2	ROOSEVELT	TX	30.4542	-100.0375	1936	9	13	30.13	2,175	72
SPAS_1596_1	MILLER ISLAND	LA	29.8542	-92.2458	1940	8	6	37.85	2	24
SPAS_1601_1	SOMBRERETILLO	MX	26.2792	-99.9208	1967	9	19	35.87	1,425	24
SPAS_1601_2	DINERO	TX	28.2542	-97.9042	1967	9	19	35.01	217	24
SPAS_1600_1	MEDINA	TX	29.8875	-99.3208	1978	8	1	48.97	1,981	52
SPAS_1179_1	ALBANY	TX	32.7375	-99.3292	1978	8	3	32.51	1,500	12
SPAS_1463_1	ALVIN	TX	29.4292	-95.2708	1979	7	25	45.49	62	24
SPAS_1184_1	CLYDE	TX	32.4790	-99.4790	1981	10	10	23.00	2,000	93
SPAS_1317_1	AMERICUS	GA	32.0958	-84.2292	1994	7	4	28.09	392	144
SPAS_1569_1	DAUPHIN ISLAND	AL	30.3150	-88.0350	1997	7	19	45.27	0	24
SPAS_1593_1	MUNSON	FL	30.8550	-87.7250	1998	9	24	24.92	220	24
SPAS_1599_1	GONZALEZ	MX	22.7626	-98.6125	2000	10	5	24.83	194	24
SPAS_1464_1	HOUSTON	TX	29.7550	-95.2750	2001	6	5	40.97	53	24
SPAS_1529_1	SUNSPOT	NM	33.3350	-105.7950	2008	7	26	8.81	9,339	48
SPAS_1182_1	LARTO LAKE	LA	31.2200	-92.1300	2008	9	1	23.31	60	96
SPAS_1598_1	ESTANZUELA_COAHUIL	MX	25.5958	-100.2042	2010	6	29	36.87	2,024	24
SPAS_1531_1	THE BOWL	TX	31.9350	-104.8250	2014	9	21	10.83	8,008	6

Table F.4 Short storm list used for PMP Development-hybrid storms. Max_PPT is the location with the largest rainfall accumulation for the total storm duration.

SPAS_ID	NAME	STATE	LAT	LON	YEAR	MONTH	DAY	MAX_PPT	ELEV_FT	DURATION
SPAS_1592_1	THRALL	TX	30.6292	-97.3875	1921	9	9	39.90	600	24
SPAS_1560_1	CONWAY	TX	35.2208	-101.3958	1951	5	13	15.21	3,450	168
SPAS_1602_1	VIC PIERCE	TX	30.4042	-101.4375	1954	6	23	35.79	2,280	24
SPAS_1568_1	CARLSBAD	NM	32.2542	-104.6125	1966	8	22	17.35	4,360	96
SPAS_1180_1	NEW BRAUNFELS	TX	29.7750	-98.0450	1998	10	17	35.43	650	91
SPAS_1594_1	HELOTES	TX	29.8550	-98.8850	2002	6	30	38.55	1,998	196

Table F.5 Precipitable Water Table

Elev_FT	60	60.5	61	61.5	62	62.5	63	63.5	64	64.5	65	65.5	66	66.5	67	67.5	68	68.5	69	69.5	70	70.5	71	71.5	72	72.5	73	73.5	74	74.5	75	
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
100	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03	
200	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	
300	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.08	0.08	
400	0.06	0.06	0.06	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.09	0.09	0.09	0.09	0.09	0.09	0.10	0.10	0.10	0.10	0.10	0.10	
500	0.08	0.08	0.08	0.08	0.08	0.09	0.09	0.09	0.09	0.09	0.09	0.10	0.10	0.10	0.10	0.10	0.10	0.11	0.11	0.11	0.11	0.11	0.11	0.12	0.12	0.12	0.12	0.12	0.12	0.13	0.13	
600	0.09	0.10	0.10	0.10	0.10	0.10	0.10	0.11	0.11	0.11	0.11	0.11	0.11	0.12	0.12	0.12	0.12	0.13	0.13	0.13	0.13	0.13	0.13	0.14	0.14	0.14	0.14	0.15	0.15	0.15	0.15	
700	0.11	0.11	0.11	0.12	0.12	0.12	0.12	0.12	0.12	0.13	0.13	0.13	0.13	0.14	0.14	0.14	0.14	0.15	0.15	0.15	0.15	0.16	0.16	0.16	0.16	0.16	0.17	0.17	0.17	0.17	0.18	0.18
800	0.12	0.13	0.13	0.13	0.13	0.14	0.14	0.14	0.14	0.15	0.15	0.15	0.15	0.16	0.16	0.16	0.16	0.17	0.17	0.17	0.17	0.18	0.18	0.18	0.18	0.19	0.19	0.20	0.20	0.20	0.20	
900	0.14	0.14	0.14	0.15	0.15	0.15	0.15	0.16	0.16	0.16	0.16	0.17	0.17	0.17	0.17	0.18	0.18	0.19	0.19	0.19	0.19	0.20	0.20	0.21	0.21	0.21	0.21	0.22	0.22	0.23	0.23	
1,000	0.15	0.16	0.16	0.16	0.16	0.17	0.17	0.17	0.17	0.18	0.18	0.19	0.19	0.19	0.19	0.20	0.20	0.21	0.21	0.21	0.21	0.22	0.22	0.23	0.23	0.23	0.23	0.24	0.24	0.25	0.25	
1,500	0.22	0.23	0.23	0.24	0.24	0.25	0.25	0.26	0.26	0.27	0.27	0.27	0.27	0.28	0.28	0.29	0.29	0.30	0.30	0.31	0.31	0.32	0.32	0.33	0.34	0.35	0.35	0.36	0.36	0.37	0.37	
2,000	0.29	0.30	0.30	0.31	0.31	0.32	0.32	0.33	0.34	0.35	0.35	0.36	0.36	0.37	0.37	0.38	0.38	0.39	0.40	0.41	0.41	0.42	0.42	0.43	0.44	0.45	0.45	0.46	0.47	0.48	0.48	
2,500	0.36	0.37	0.37	0.38	0.38	0.39	0.40	0.41	0.42	0.43	0.43	0.44	0.44	0.45	0.46	0.47	0.47	0.48	0.49	0.50	0.50	0.51	0.52	0.53	0.54	0.55	0.56	0.57	0.58	0.59	0.60	
3,000	0.42	0.43	0.43	0.44	0.45	0.46	0.47	0.48	0.49	0.50	0.50	0.51	0.52	0.53	0.54	0.55	0.55	0.56	0.57	0.58	0.59	0.60	0.61	0.63	0.64	0.65	0.66	0.67	0.68	0.69	0.70	
3,500	0.48	0.49	0.50	0.51	0.51	0.52	0.53	0.54	0.55	0.56	0.57	0.58	0.59	0.60	0.61	0.63	0.64	0.65	0.66	0.67	0.68	0.69	0.70	0.72	0.73	0.74	0.75	0.77	0.78	0.80	0.81	
4,000	0.53	0.54	0.55	0.56	0.57	0.59	0.60	0.61	0.62	0.63	0.64	0.65	0.66	0.68	0.69	0.70	0.71	0.72	0.73	0.75	0.76	0.78	0.79	0.81	0.82	0.83	0.84	0.86	0.87	0.89	0.90	
4,500	0.59	0.60	0.61	0.62	0.63	0.65	0.66	0.67	0.68	0.70	0.71	0.72	0.73	0.75	0.76	0.78	0.79	0.80	0.81	0.83	0.84	0.86	0.87	0.89	0.90	0.92	0.93	0.95	0.97	0.99	1.00	
5,000	0.64	0.65	0.66	0.68	0.69	0.70	0.71	0.73	0.74	0.76	0.77	0.79	0.80	0.81	0.82	0.84	0.86	0.87	0.88	0.90	0.92	0.94	0.95	0.97	0.98	1.00	1.02	1.04	1.05	1.07	1.09	
5,500	0.69	0.70	0.71	0.73	0.74	0.76	0.77	0.79	0.80	0.82	0.83	0.85	0.86	0.88	0.89	0.91	0.92	0.94	0.95	0.97	0.99	1.01	1.03	1.05	1.06	1.08	1.10	1.12	1.14	1.16	1.18	
6,000	0.73	0.75	0.76	0.78	0.79	0.81	0.82	0.84	0.85	0.87	0.89	0.91	0.92	0.94	0.95	0.97	0.99	1.01	1.02	1.04	1.06	1.08	1.10	1.12	1.14	1.16	1.18	1.20	1.22	1.25	1.27	
6,500	0.78	0.80	0.81	0.83	0.84	0.86	0.87	0.89	0.91	0.93	0.94	0.96	0.97	0.99	1.01	1.03	1.05	1.07	1.09	1.11	1.13	1.15	1.17	1.19	1.21	1.23	1.25	1.28	1.30	1.33	1.35	
7,000	0.82	0.84	0.85	0.87	0.88	0.90	0.92	0.94	0.95	0.97	0.99	1.01	1.03	1.05	1.07	1.09	1.11	1.13	1.15	1.17	1.19	1.22	1.24	1.26	1.28	1.31	1.33	1.36	1.38	1.41	1.43	
7,500	0.86	0.88	0.89	0.91	0.93	0.95	0.96	0.98	1.00	1.02	1.04	1.06	1.08	1.10	1.12	1.15	1.17	1.19	1.21	1.23	1.25	1.28	1.30	1.33	1.35	1.38	1.40	1.43	1.45	1.48	1.50	
8,000	0.89	0.91	0.93	0.95	0.97	0.99	1.01	1.03	1.05	1.07	1.09	1.11	1.13	1.15	1.17	1.20	1.22	1.24	1.26	1.29	1.31	1.34	1.36	1.39	1.41	1.44	1.46	1.49	1.52	1.55	1.57	
8,500	0.93	0.95	0.97	0.99	1.01	1.03	1.05	1.07	1.09	1.11	1.13	1.16	1.18	1.20	1.22	1.25	1.27	1.30	1.32	1.35	1.37	1.40	1.42	1.45	1.47	1.50	1.53	1.56	1.59	1.62	1.64	
9,000	0.96	0.98	1.00	1.02	1.04	1.07	1.09	1.11	1.13	1.15	1.17	1.20	1.22	1.25	1.27	1.30	1.32	1.35	1.37	1.40	1.42	1.45	1.48	1.51	1.53	1.56	1.59	1.62	1.65	1.68	1.71	
9,500	0.99	1.01	1.03	1.06	1.08	1.10	1.12	1.15	1.17	1.19	1.21	1.24	1.26	1.29	1.31	1.34	1.37	1.40	1.42	1.45	1.47	1.50	1.53	1.56	1.59	1.62	1.65	1.68	1.71	1.75	1.78	
10,000	1.02	1.05	1.07	1.09	1.11	1.13	1.14	1.17	1.20	1.23	1.25	1.28	1.30	1.33	1.35	1.38	1.41	1.44	1.46	1.49	1.52	1.55	1.58	1.61	1.64	1.67	1.70	1.74	1.77	1.81	1.84	
10,500	1.05	1.07	1.09	1.12	1.14	1.17	1.19	1.22	1.24	1.27	1.29	1.32	1.34	1.37	1.39	1.42	1.45	1.48	1.51	1.54	1.57	1.60	1.63	1.66	1.69	1.73	1.76	1.80	1.83	1.87	1.90	
11,000	1.08	1.10	1.12	1.15	1.17	1.20	1.22	1.25	1.27	1.30	1.32	1.35	1.38	1.41	1.43	1.46	1.49	1.52	1.55	1.58	1.61	1.65	1.68	1.71	1.74	1.78	1.81	1.85	1.88	1.92	1.95	
11,500	1.10	1.13	1.15	1.18	1.20	1.23	1.25	1.28	1.30	1.33	1.35	1.38	1.41	1.44	1.47	1.50	1.53	1.56	1.59	1.62	1.65	1.69	1.72	1.76	1.79	1.83	1.86	1.90	1.93	1.97	2.01	
12,000	1.12	1.15	1.17	1.20	1.22	1.25	1.27	1.30	1.33	1.36	1.39	1.42	1.44	1.47	1.50	1.54	1.57	1.60	1.63	1.66	1.69	1.73	1.76	1.80	1.83	1.87	1.90	1.94	1.98	2.02	2.06	
12,500	1.15	1.17	1.19	1.22	1.25	1.28	1.30	1.33	1.36	1.39	1.41	1.44	1.47	1.51	1.54	1.57	1.60															

Elev_FT	75.5	76	76.5	77	77.5	78	78.5	79	79.5	80	80.5	81	81.5	82	82.5	83	83.5	84	84.5	85	85.5	86	86.5	87	87.5	88	88.5	89	89.5	90
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
100	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	
200	0.05	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	
300	0.08	0.08	0.08	0.08	0.08	0.08	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.10	0.10	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	
400	0.11	0.11	0.11	0.11	0.11	0.11	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.13	0.13	0.14	0.14	0.14	0.14	0.14	0.15	0.15	0.15	0.15	0.15	0.15	0.15	
500	0.13	0.13	0.14	0.14	0.14	0.14	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.16	0.17	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.19	
600	0.16	0.16	0.16	0.16	0.17	0.17	0.17	0.17	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.19	0.20	0.21	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	
700	0.18	0.18	0.19	0.19	0.19	0.19	0.20	0.20	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.22	0.23	0.24	0.25	0.25	0.25	0.25	0.25	0.26	0.26	0.26	0.26	0.26	0.27	
800	0.21	0.21	0.21	0.21	0.22	0.22	0.23	0.23	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.25	0.26	0.27	0.28	0.28	0.29	0.29	0.29	0.29	0.30	0.30	0.30	0.31	0.31	
900	0.23	0.23	0.24	0.24	0.25	0.25	0.26	0.26	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.28	0.29	0.30	0.31	0.32	0.32	0.32	0.33	0.33	0.34	0.34	0.35	0.35	0.36	
1,000	0.26	0.26	0.27	0.27	0.28	0.28	0.28	0.28	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.31	0.32	0.33	0.34	0.35	0.35	0.36	0.37	0.37	0.38	0.39	0.39	0.40	0.41	
1,500	0.38	0.38	0.39	0.39	0.40	0.41	0.42	0.42	0.43	0.43	0.45	0.45	0.45	0.45	0.45	0.46	0.47	0.48	0.50	0.51	0.52	0.53	0.54	0.55	0.56	0.57	0.58	0.59	0.61	
2,000	0.49	0.50	0.51	0.52	0.53	0.53	0.54	0.55	0.56	0.57	0.58	0.60	0.60	0.60	0.60	0.61	0.62	0.63	0.65	0.66	0.67	0.67	0.68	0.68	0.68	0.69	0.70	0.71	0.72	
2,500	0.61	0.62	0.63	0.64	0.65	0.66	0.67	0.68	0.69	0.70	0.72	0.73	0.73	0.74	0.75	0.76	0.77	0.78	0.80	0.81	0.82	0.82	0.82	0.82	0.83	0.83	0.84	0.84	0.85	
3,000	0.72	0.73	0.74	0.75	0.77	0.78	0.79	0.80	0.82	0.83	0.84	0.85	0.87	0.89	0.90	0.91	0.92	0.93	0.95	0.97	0.98	1.00	1.02	1.03	1.05	1.07	1.08	1.10	1.12	
3,500	0.82	0.83	0.85	0.86	0.88	0.89	0.91	0.92	0.94	0.95	0.96	0.98	1.00	1.02	1.04	1.05	1.07	1.08	1.10	1.12	1.14	1.15	1.17	1.19	1.21	1.23	1.24	1.26	1.28	
4,000	0.92	0.94	0.96	0.97	0.99	1.00	1.02	1.03	1.05	1.07	1.08	1.10	1.12	1.14	1.16	1.18	1.20	1.23	1.24	1.25	1.27	1.28	1.29	1.31	1.32	1.33	1.34	1.36	1.37	
4,500	1.02	1.04	1.06	1.07	1.09	1.11	1.13	1.14	1.16	1.18	1.19	1.22	1.24	1.26	1.28	1.30	1.32	1.35	1.37	1.39	1.41	1.43	1.45	1.47	1.49	1.51	1.53	1.55	1.57	
5,000	1.11	1.13	1.15	1.17	1.19	1.21	1.23	1.25	1.27	1.29	1.31	1.34	1.36	1.38	1.40	1.42	1.44	1.47	1.49	1.51	1.53	1.55	1.58	1.60	1.62	1.64	1.66	1.69	1.71	
5,500	1.20	1.22	1.25	1.27	1.29	1.31	1.33	1.35	1.38	1.40	1.43	1.46	1.48	1.50	1.52	1.54	1.56	1.59	1.61	1.64	1.66	1.69	1.71	1.74	1.77	1.79	1.82	1.84	1.87	
6,000	1.29	1.31	1.34	1.36	1.39	1.41	1.43	1.45	1.48	1.50	1.55	1.57	1.59	1.61	1.64	1.66	1.68	1.71	1.74	1.77	1.80	1.83	1.87	1.90	1.93	1.96	1.99	2.03	2.06	
6,500	1.38	1.40	1.43	1.45	1.48	1.50	1.53	1.55	1.58	1.60	1.64	1.66	1.68	1.70	1.73	1.76	1.79	1.82	1.86	1.89	1.92	1.95	1.99	2.02	2.05	2.08	2.12	2.15	2.18	
7,000	1.46	1.48	1.51	1.53	1.56	1.59	1.62	1.64	1.67	1.70	1.73	1.76	1.78	1.81	1.84	1.88	1.91	1.94	1.98	2.01	2.04	2.07	2.11	2.14	2.17	2.20	2.24	2.27	2.30	
7,500	1.53	1.56	1.59	1.61	1.64	1.67	1.70	1.73	1.76	1.79	1.82	1.85	1.88	1.91	1.95	1.98	2.01	2.05	2.08	2.11	2.14	2.18	2.21	2.24	2.28	2.31	2.34	2.37	2.41	
8,000	1.60	1.63	1.66	1.69	1.72	1.74	1.78	1.82	1.85	1.88	1.91	1.94	1.98	2.01	2.04	2.08	2.11	2.14	2.18	2.21	2.24	2.27	2.31	2.34	2.37	2.41	2.44	2.47	2.50	
8,500	1.68	1.71	1.74	1.77	1.81	1.84	1.87	1.90	1.94	1.97	2.00	2.04	2.08	2.12	2.16	2.20	2.23	2.26	2.30	2.33	2.36	2.39	2.43	2.46	2.49	2.53	2.56	2.59	2.62	
9,000	1.75	1.78	1.81	1.84	1.88	1.91	1.95	1.98	2.02	2.05	2.09	2.13	2.17	2.21	2.26	2.29	2.32	2.35	2.39	2.43	2.47	2.51	2.55	2.59	2.63	2.67	2.71	2.75	2.79	
9,500	1.81	1.84	1.88	1.91	1.95	1.98	2.02	2.06	2.10	2.13	2.17	2.22	2.26	2.30	2.35	2.38	2.41	2.44	2.48	2.53	2.57	2.62	2.66	2.70	2.74	2.79	2.83	2.87	2.91	
10,000	1.88	1.91	1.95	1.98	2.02	2.06	2.10	2.13	2.17	2.21	2.25	2.30	2.34	2.39	2.43	2.46	2.50	2.53	2.57	2.62	2.66	2.71	2.75	2.79	2.83	2.88	2.92	2.96	3.01	
10,500	1.94	1.97	2.01	2.04	2.08	2.12	2.16	2.20	2.24	2.28	2.32	2.36	2.40	2.45	2.49	2.53	2.58	2.62	2.66	2.71	2.75	2.80	2.84	2.88	2.93	2.97	3.01	3.06	3.10	
11,000	1.99	2.03	2.07	2.11	2.15	2.19	2.23	2.27	2.31	2.35	2.40	2.45	2.49	2.54	2.58	2.62	2.67	2.71	2.75	2.80	2.84	2.89	2.93	2.97	3.02	3.06	3.10	3.15	3.19	
11,500	2.05	2.09	2.13	2.17	2.21	2.25	2.29	2.33	2.38	2.42	2.47	2.52	2.56	2.60	2.65	2.70	2.75	2.80	2.84	2.89	2.93	2.98	3.02	3.06	3.11	3.15	3.20	3.24	3.29	
12,000	2.10	2.14	2.18	2.22	2.27	2.31	2.36	2.40	2.45	2.49	2.53	2.58	2.62	2.66	2.71	2.77	2.82	2.87	2.92	2.97	3.02	3.07	3.11	3.16	3.21	3.26	3.30	3.35	3.40	
12,500	2.15	2.19	2.24	2.28	2.33	2.37	2.42	2.46	2.51	2.55	2.59	2.64	2.68	2.73	2.77	2.83	2.88	2.94	2.99	3.05	3.10	3.16	3.21	3.26	3.32	3.37	3.43	3.48	3.54	
13,000	2.20	2.24	2.29	2.33	2.38	2.42	2.47	2.51	2.56	2.61	2.65	2.70	2.76	2.81	2.86	2.92	2.97	3.03	3.08	3.14	3.19	3.25	3.30	3.35	3.41	3.46	3.52	3.57	3.63	
13,500	2.25	2.29	2.34	2.38	2.43	2.48	2.53	2.57	2.62	2.67	2.71	2.77	2.82	2.88	2.93	2.98	3.04	3.09	3.15	3.20	3.26	3.31	3.37	3.42	3.48	3.53	3.59	3.64	3.70	
14,000	2.29	2.33	2.38	2.43	2.48	2.53	2.58	2.62	2.68	2.73	2.77	2.83	2.88	2.94	2.99	3.04	3.10	3.15	3.21	3.26	3.32	3.37	3.43	3.48	3.54	3.59	3.65	3.70	3.76	
14,500	2.33	2.38	2.43	2.47	2.52	2.57	2.62	2.67	2.73	2.78	2.83	2.89	2.94	3.00	3.05	3.10	3.16	3.21	3.27	3.33	3.38	3.44	3.49	3.55	3.60	3.66	3.72	3.77	3.83	
15,000	2.37	2.42	2.47	2.																										

Table of Contents

GENERAL STORMS	9
STORM PRECIPITATION ANALYSIS SYSTEM (SPAS) FOR STORM #1591	10
STORM PRECIPITATION ANALYSIS SYSTEM (SPAS) FOR STORM #1428	22
STORM PRECIPITATION ANALYSIS SYSTEM (SPAS) FOR STORM #1311	32
STORM PRECIPITATION ANALYSIS SYSTEM (SPAS) FOR STORM #1430	45
STORM PRECIPITATION ANALYSIS SYSTEM (SPAS) FOR STORM #1587	56
STORM PRECIPITATION ANALYSIS SYSTEM (SPAS) FOR STORM #1486	67
STORM PRECIPITATION ANALYSIS SYSTEM (SPAS) FOR STORM #1431	79
STORM PRECIPITATION ANALYSIS SYSTEM (SPAS) FOR STORM #1583	90
STORM PRECIPITATION ANALYSIS SYSTEM (SPAS) FOR STORM #1435	99
STORM PRECIPITATION ANALYSIS SYSTEM (SPAS) FOR STORM #1251	107
STORM PRECIPITATION ANALYSIS SYSTEM (SPAS) FOR STORM #1278	113
STORM PRECIPITATION ANALYSIS SYSTEM (SPAS) FOR STORM #1181	119
STORM PRECIPITATION ANALYSIS SYSTEM (SPAS) FOR STORM #1357	125
STORM PRECIPITATION ANALYSIS SYSTEM (SPAS) FOR STORM #1227	130
STORM PRECIPITATION ANALYSIS SYSTEM (SPAS) FOR STORM #1219	136
STORM PRECIPITATION ANALYSIS SYSTEM (SPAS) FOR STORM #1277	142
STORM PRECIPITATION ANALYSIS SYSTEM (SPAS) FOR STORM #1244	148
STORM PRECIPITATION ANALYSIS SYSTEM (SPAS) FOR STORM #1228	154
STORM PRECIPITATION ANALYSIS SYSTEM (SPAS) FOR STORM #1242	160
STORM PRECIPITATION ANALYSIS SYSTEM (SPAS) FOR STORM #1218	166
STORM PRECIPITATION ANALYSIS SYSTEM (SPAS) FOR STORM #1208	172
STORM PRECIPITATION ANALYSIS SYSTEM (SPAS) FOR STORM #1530	178
STORM PRECIPITATION ANALYSIS SYSTEM (SPAS) FOR STORM #1530	185
STORM PRECIPITATION ANALYSIS SYSTEM (SPAS) FOR STORM #1530	192
STORM PRECIPITATION ANALYSIS SYSTEM (SPAS) FOR STORM #1597	199
LOCAL STORMS	205
STORM PRECIPITATION ANALYSIS SYSTEM (SPAS) FOR STORM #1494	206
STORM PRECIPITATION ANALYSIS SYSTEM (SPAS) FOR STORM #1495	216
STORM PRECIPITATION ANALYSIS SYSTEM (SPAS) FOR STORM #1295	226
STORM PRECIPITATION ANALYSIS SYSTEM (SPAS) FOR STORM #1496	238
STORM PRECIPITATION ANALYSIS SYSTEM (SPAS) FOR STORM #1485	247

STORM PRECIPITATION ANALYSIS SYSTEM (SPAS) FOR STORM #1429	254
STORM PRECIPITATION ANALYSIS SYSTEM (SPAS) FOR STORM #1432	266
STORM PRECIPITATION ANALYSIS SYSTEM (SPAS) FOR STORM #1558	277
STORM PRECIPITATION ANALYSIS SYSTEM (SPAS) FOR STORM # 1293	283
STORM PRECIPITATION ANALYSIS SYSTEM (SPAS) FOR STORM #1034	289
STORM PRECIPITATION ANALYSIS SYSTEM (SPAS) FOR STORM #1487	296
STORM PRECIPITATION ANALYSIS SYSTEM (SPAS) FOR STORM #1247	302
STORM PRECIPITATION ANALYSIS SYSTEM (SPAS) FOR STORM #1185	308
STORM PRECIPITATION ANALYSIS SYSTEM (SPAS) FOR STORM #1528	314
STORM PRECIPITATION ANALYSIS SYSTEM (SPAS) FOR STORM #1595	320
STORM PRECIPITATION ANALYSIS SYSTEM (SPAS) FOR STORM #1557	326
STORM PRECIPITATION ANALYSIS SYSTEM (SPAS) FOR STORM #1588	332
STORM PRECIPITATION ANALYSIS SYSTEM (SPAS) FOR STORM #1589	338
STORM PRECIPITATION ANALYSIS SYSTEM (SPAS) FOR STORM #1590	344
TROPICAL STORMS	350
STORM PRECIPITATION ANALYSIS SYSTEM (SPAS) FOR STORM #1582	351
STORM PRECIPITATION ANALYSIS SYSTEM (SPAS) FOR STORM #1582	362
STORM PRECIPITATION ANALYSIS SYSTEM (SPAS) FOR STORM #1596	371
STORM PRECIPITATION ANALYSIS SYSTEM (SPAS) FOR STORM #1601	380
STORM PRECIPITATION ANALYSIS SYSTEM (SPAS) FOR STORM #1601	388
STORM PRECIPITATION ANALYSIS SYSTEM (SPAS) FOR STORM #1600	396
STORM PRECIPITATION ANALYSIS SYSTEM (SPAS) FOR STORM #1179	402
STORM PRECIPITATION ANALYSIS SYSTEM (SPAS) FOR STORM #1463	408
STORM PRECIPITATION ANALYSIS SYSTEM (SPAS) FOR STORM #1184	414
STORM PRECIPITATION ANALYSIS SYSTEM (SPAS) FOR STORM #1317	419
STORM PRECIPITATION ANALYSIS SYSTEM (SPAS) FOR STORM #1569	425
STORM PRECIPITATION ANALYSIS SYSTEM (SPAS) FOR STORM #1593	431
STORM PRECIPITATION ANALYSIS SYSTEM (SPAS) FOR STORM #1599	437
STORM PRECIPITATION ANALYSIS SYSTEM (SPAS) FOR STORM #1464	443
STORM PRECIPITATION ANALYSIS SYSTEM (SPAS) FOR STORM #1529	449
STORM PRECIPITATION ANALYSIS SYSTEM (SPAS) FOR STORM #1182	455
STORM PRECIPITATION ANALYSIS SYSTEM (SPAS) FOR STORM #1598	460
STORM PRECIPITATION ANALYSIS SYSTEM (SPAS) FOR STORM #1531	466
HYBRID STORMS	472
STORM PRECIPITATION ANALYSIS SYSTEM (SPAS) FOR STORM #1592	473

STORM PRECIPITATION ANALYSIS SYSTEM (SPAS) FOR STORM #1560	485
STORM PRECIPITATION ANALYSIS SYSTEM (SPAS) FOR STORM #1602	491
STORM PRECIPITATION ANALYSIS SYSTEM (SPAS) FOR STORM #1568	500
STORM PRECIPITATION ANALYSIS SYSTEM (SPAS) FOR STORM #1180	506
STORM PRECIPITATION ANALYSIS SYSTEM (SPAS) FOR STORM #1594	511

General Storms

Storm Precipitation Analysis System (SPAS) For Storm #1591

General Storm Location: Hearne, TX

Storm Dates: June 26 – July 1, 1899

Event: Tropical Storm One

DAD Zone 1

Latitude: 30.8458

Longitude: -96.5708

Max. Grid/Radar Rainfall Amount: 34.53"

Max. Observed Rainfall Amount: 34.43"

Number of Stations: 54 Stations

SPAS Version: 10.0

Base Map Used: USDA Weather Bureau Isohyetal Image

Spatial resolution: 0.2839

Radar Included: No

Depth-Area-Duration (DAD) analysis: Yes

Reliability of Results: This analysis was based on hourly data, daily data, and supplemental station data. We have a high degree of confidence in the station based storm total results. The spatial pattern is dependent on the USDA Isohyetal basemap, and the timing is based on hourly and hourly pseudo stations. An additional 31 supplemental stations were created to ensure data consistency.

NAME	LON	LAT	ELEV Round	Storm Representative				Climatological Maximum				IPMF
				T _d	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	T _d	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	
HEARNE	-96.570	30.840	300	83.50	4.21"	0.10"	4.110	86.0	4.67"	0.11"	4.560	1.11

Storm 1591 - June 26 (0700 UTC) - July 2 (0600 UTC), 1899																
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)																
Area (mi ²)	Duration (hours)															
	1	2	3	4	5	6	12	18	24	36	48	72	96	120	144	Total
0.4	1.37	2.63	3.94	5.02	6.11	7.19	12.93	18.63	24.15	28.86	31.02	34.40	34.53	34.53	34.53	34.53
1	1.36	2.62	3.93	5.00	6.08	7.17	12.93	18.57	24.10	28.80	30.92	34.29	34.45	34.45	34.45	34.45
10	1.33	2.60	3.90	4.95	6.02	7.10	12.80	18.43	23.89	28.56	30.68	34.03	34.16	34.16	34.15	34.15
25	1.32	2.59	3.89	4.93	6.00	7.08	12.75	18.38	23.81	28.46	30.59	33.92	34.04	34.04	34.03	34.03
50	1.31	2.58	3.88	4.91	5.98	7.06	12.71	18.34	23.74	28.39	30.51	33.85	33.95	33.95	33.93	33.93
100	1.29	2.58	3.87	4.90	5.96	7.04	12.68	18.29	23.68	28.32	30.44	33.77	33.87	33.87	33.84	33.84
150	1.29	2.57	3.86	4.89	5.95	7.02	12.65	18.27	23.64	28.28	30.40	33.72	33.82	33.82	33.79	33.79
200	1.28	2.56	3.84	4.88	5.95	7.02	12.64	18.25	23.62	28.25	30.37	33.69	33.78	33.78	33.75	33.75
300	1.27	2.53	3.80	4.85	5.89	6.94	12.50	18.06	23.39	28.00	30.18	33.55	33.73	33.73	33.70	33.70
400	1.26	2.51	3.77	4.80	5.83	6.87	12.33	17.85	23.11	27.68	29.82	33.16	33.40	33.41	33.41	33.41
500	1.24	2.48	3.72	4.75	5.78	6.81	12.13	17.57	22.75	27.31	29.47	32.86	33.12	33.13	33.13	33.13
1,000	1.17	2.34	3.50	4.48	5.45	6.40	11.09	16.23	21.02	25.45	27.63	31.10	31.90	31.91	31.91	31.91
2,000	1.04	2.09	3.13	4.01	4.88	5.72	9.20	13.83	17.91	22.19	24.66	28.58	29.75	29.79	29.79	29.79
3,500	0.88	1.75	2.63	3.37	4.12	4.84	7.76	11.57	14.97	19.07	21.95	26.08	27.38	27.44	27.44	27.44
5,000	0.78	1.55	2.33	3.00	3.66	4.32	6.90	10.04	12.97	16.98	20.10	24.19	25.49	25.60	25.60	25.60
7,500	0.68	1.35	2.03	2.60	3.19	3.78	5.86	8.32	10.78	14.66	17.82	21.85	23.08	23.26	23.27	23.27
10,000	0.61	1.22	1.82	2.35	2.89	3.43	5.11	7.23	9.39	12.90	16.02	19.97	21.18	21.39	21.39	21.39
15,000	0.52	1.04	1.56	2.01	2.46	2.94	4.59	5.94	7.45	10.48	13.29	17.19	18.24	18.76	18.77	18.77
20,000	0.46	0.91	1.37	1.77	2.17	2.58	4.20	5.45	6.61	8.92	11.77	15.29	16.39	17.02	17.03	17.03
35,000	0.35	0.66	0.99	1.28	1.56	1.85	3.34	4.39	5.31	7.06	9.07	11.73	12.75	13.32	13.33	13.33
50,000	0.28	0.51	0.78	0.98	1.19	1.42	2.67	3.53	4.27	5.72	7.39	9.50	10.44	10.88	10.89	10.89
75,000	0.21	0.39	0.59	0.72	0.87	1.04	1.95	2.59	3.13	4.28	5.41	7.00	7.70	8.08	8.10	8.10
91,238	0.18	0.33	0.50	0.62	0.75	0.90	1.66	2.20	2.67	3.66	4.65	6.04	6.63	6.97	6.98	6.98

Figure 1: Depth-area-duration values for Hearne, TX June 1899

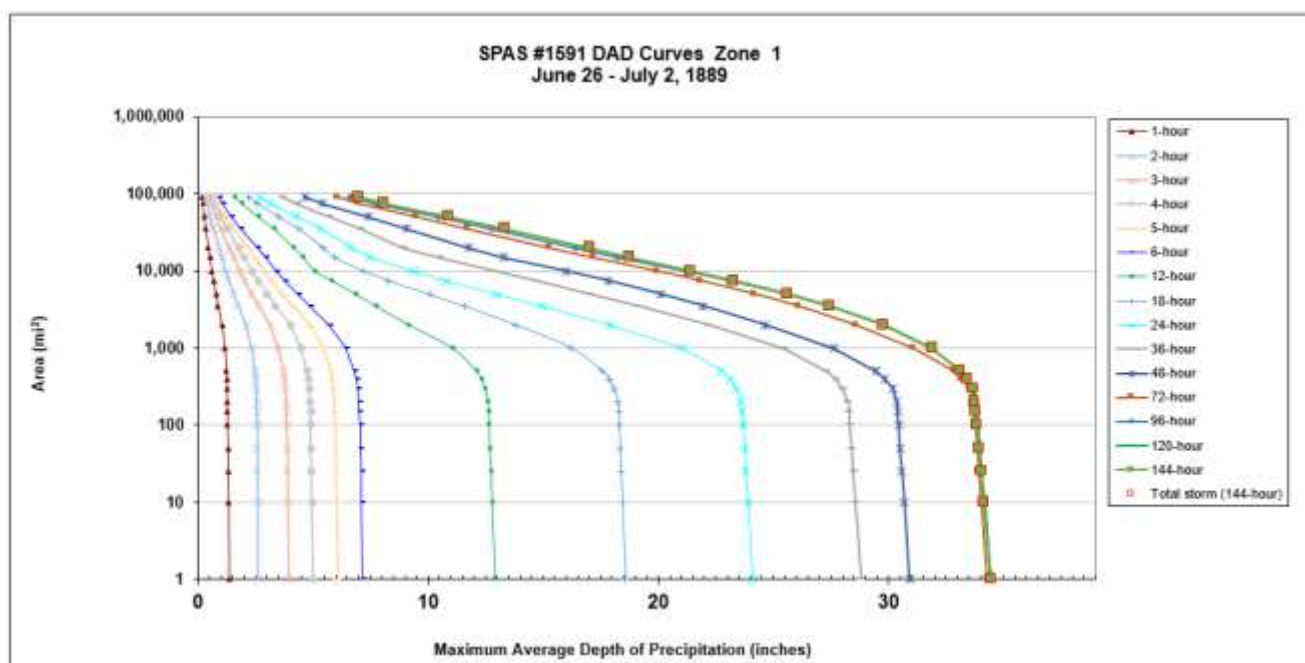


Figure 2: Depth-area-duration chart for Hearne, TX June 1899

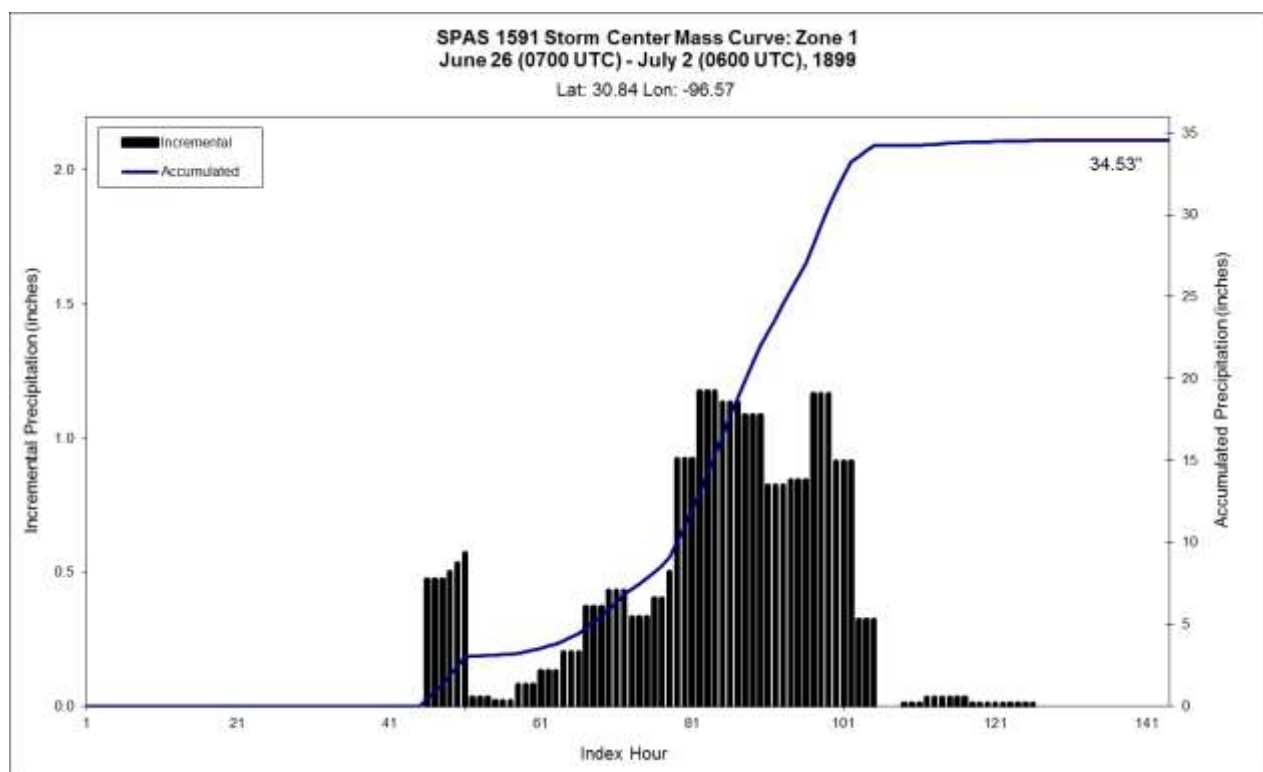


Figure 3: Mass curve chart for Hearne, TX June 1899

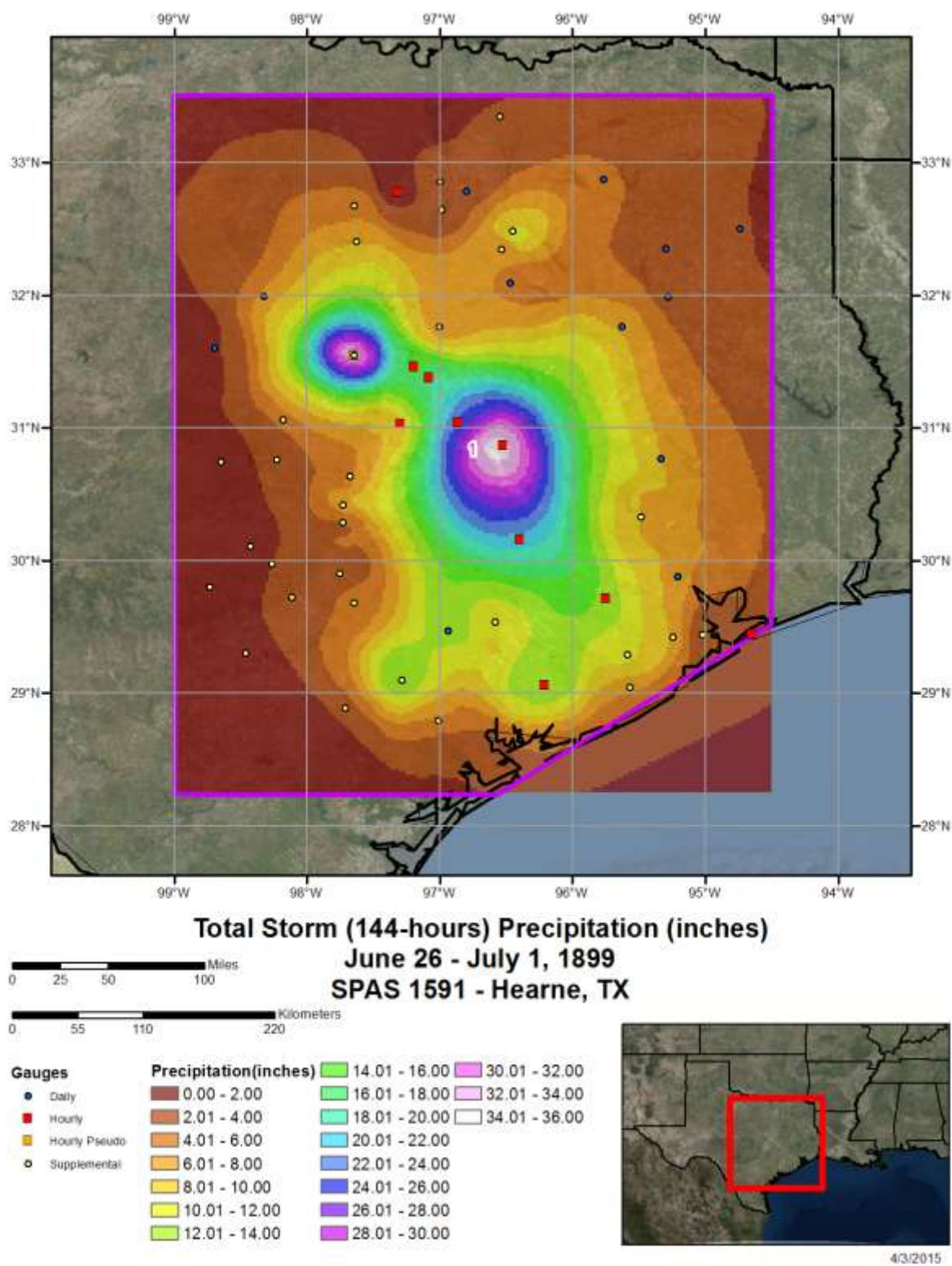
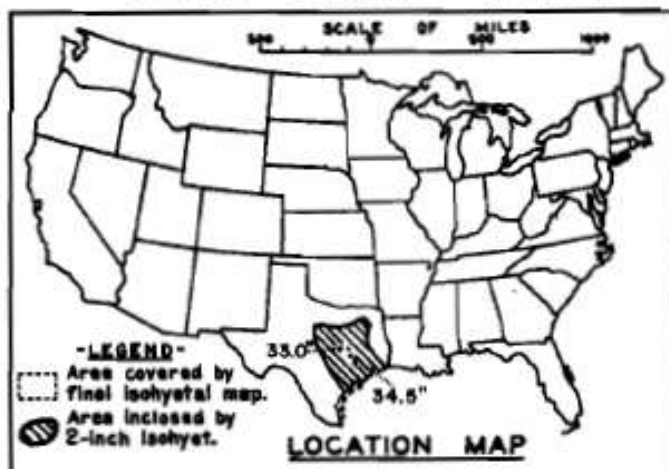


Figure 4: Total storm isohyetal analysis for Hearne, TX June 1899

WAR DEPARTMENT

CORPS OF ENGINEERS, U. S. ARMY

STORM STUDIES - PERTINENT DATA SHEET

Storm of 27 June-1 July 1899

Assignment GE 3-4

Location Texas

Study Prepared by:

Southwestern Division

Galveston District Office

Part I Reviewed by H. M. Sec. of Weather Bureau, 10/1/46

Part II Approved by Office, Chief of Engineers for Distribution of Factual Data, 5/12/47

Remarks: Center at Hearne and Turneraville, Texas

DATA AND COMPUTATIONS COMPILED**PART I**

Preliminary isohyetal map, in 1 sheet, scale 1:2,500,000

Precipitation data and mass curves:

(Number of Sheets)

Form 5001-C (Hourly precip. data)----- 2

Form 5001-B (24-hour " " " ")----- 21

Form 5001-D (" " " " " ")----- -

Misc. precip. records, meteorological data, etc.----- 22

Form 5002 (Mass rainfall curves)----- 21

PART II

Final isohyetal maps, in 1 sheet, scale 1:1,000,000

Data and computation sheets:

Form S-10 (Data from mass rainfall curves)----- 2

Form S-11 (Depth-area data from isohyetal map)----- 1

Form S-12 (Maximum depth-duration data)----- 5

Maximum duration-depth-area curves----- 1

Data relating to periods of maximum rainfall----- 2

MAXIMUM AVERAGE DEPTH OF RAINFALL IN INCHES

Area in Sq. Mi.	Duration of Rainfall in Hours										
	6	12	18	24	30	36	48	60	72	96	108
10	6.9	12.6	18.6	24.1	26.4	29.0	30.8	34.0	34.5	34.5	34.5
100	6.3	12.1	18.1	23.3	25.7	28.2	30.0	32.8	33.6	33.6	33.6
200	6.2	11.8	17.8	23.0	25.3	27.8	29.5	32.2	33.1	33.1	33.1
500	5.8	11.3	17.2	22.2	24.5	26.9	28.5	31.2	32.0	32.0	32.0
1,000	5.5	10.8	16.3	21.1	23.1	25.6	27.1	29.7	30.4	30.5	30.5
2,000	5.1	9.8	14.6	19.0	20.8	23.1	24.8	27.4	28.1	28.5	28.5
5,000	4.2	7.9	11.4	14.7	16.4	18.7	20.7	23.6	24.4	25.1	25.3
10,000	3.5	6.0	8.7	11.2	13.1	15.1	17.4	20.5	21.3	22.1	22.5
20,000	2.8	4.5	6.3	8.2	9.7	11.6	13.8	16.5	17.6	18.6	19.0
50,000	1.9	2.7	3.7	4.8	5.6	6.9	8.5	9.9	11.0	12.0	12.4
78,000	1.2	1.9	2.5	3.2	3.8	4.5	5.9	6.8	7.6	8.7	9.1

Form S-2

Figure 5: USACE Depth-area-duration values for Hearne, TX June 1899

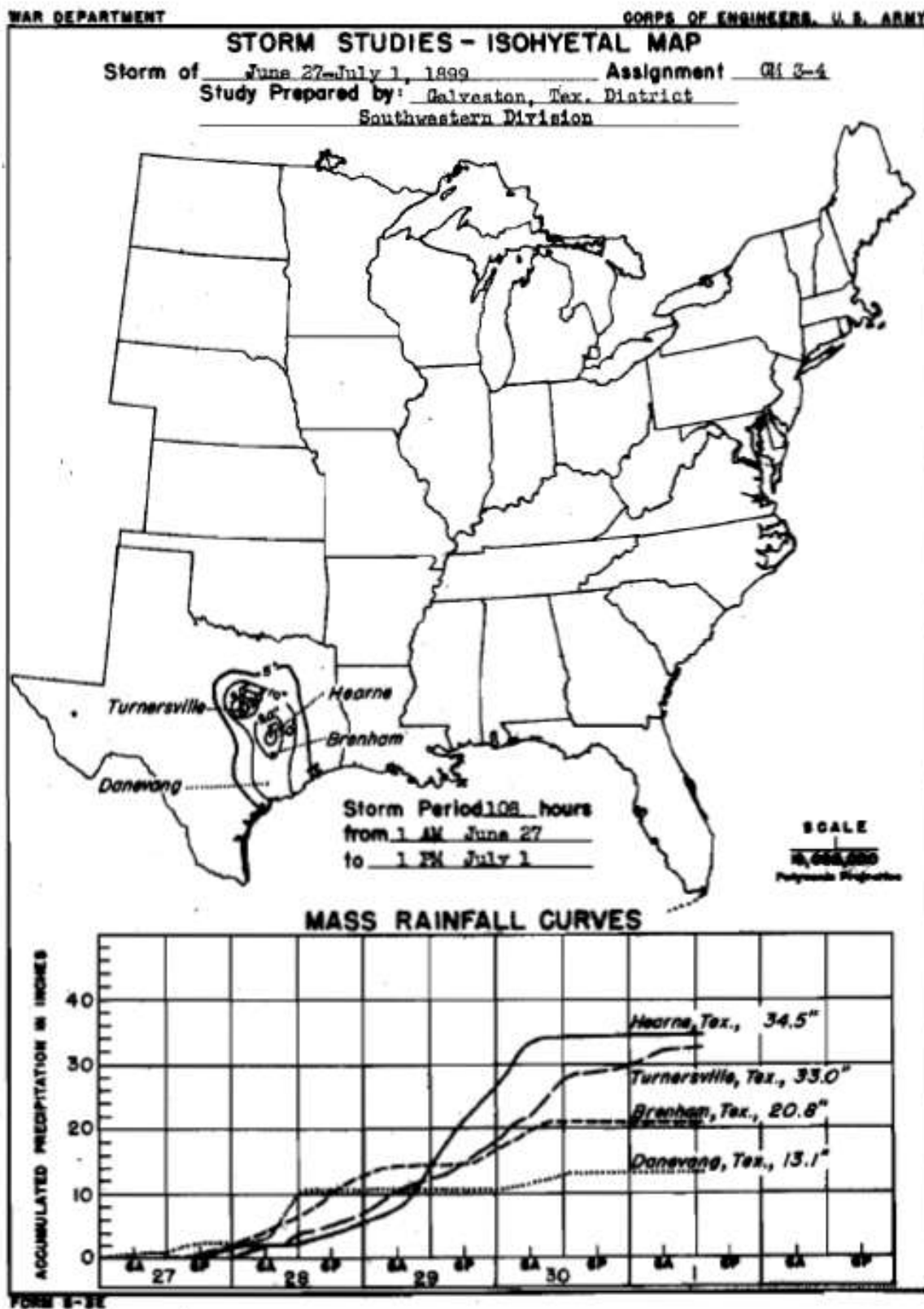


Figure 6: USACE Total storm isohyetal and mass curve chart for Hearne, TX June 1899

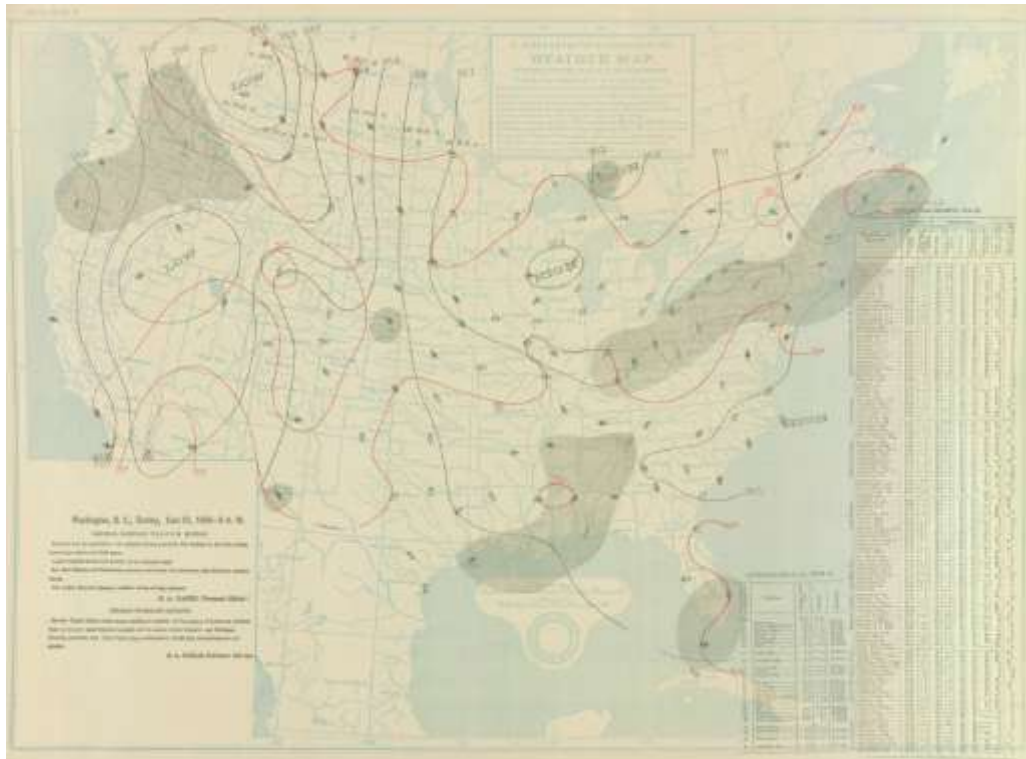


Figure 7: Daily Weather Map for Hearne, TX June 25, 1899

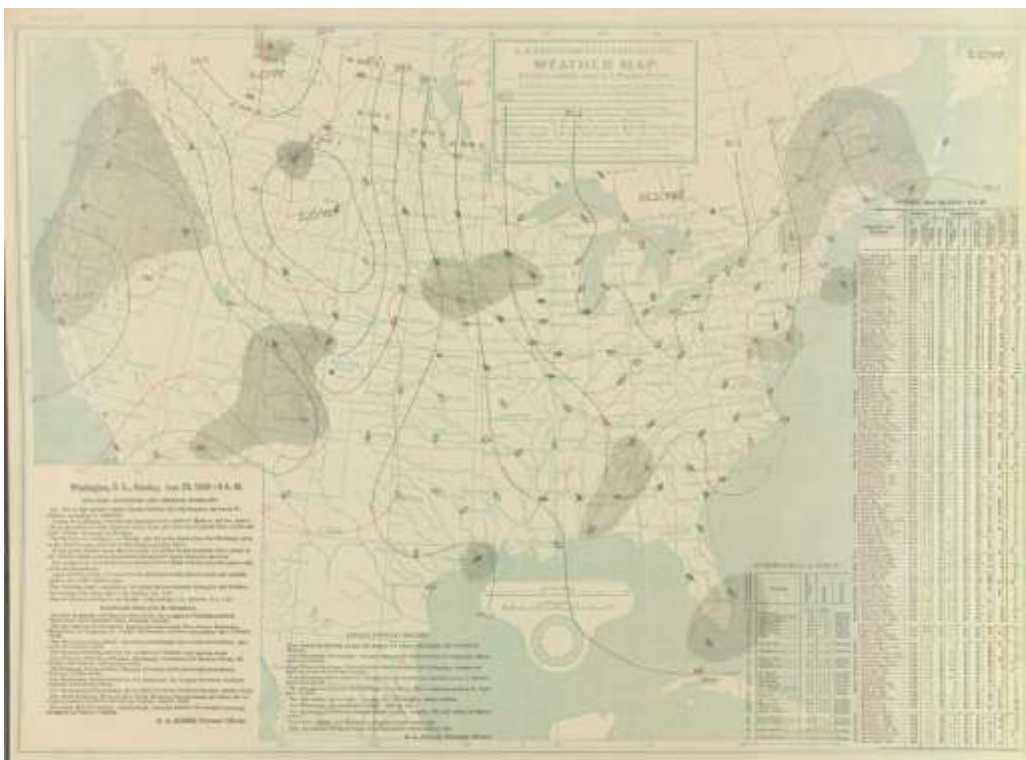


Figure 8: Daily Weather Map for Hearne, TX June 26, 1899

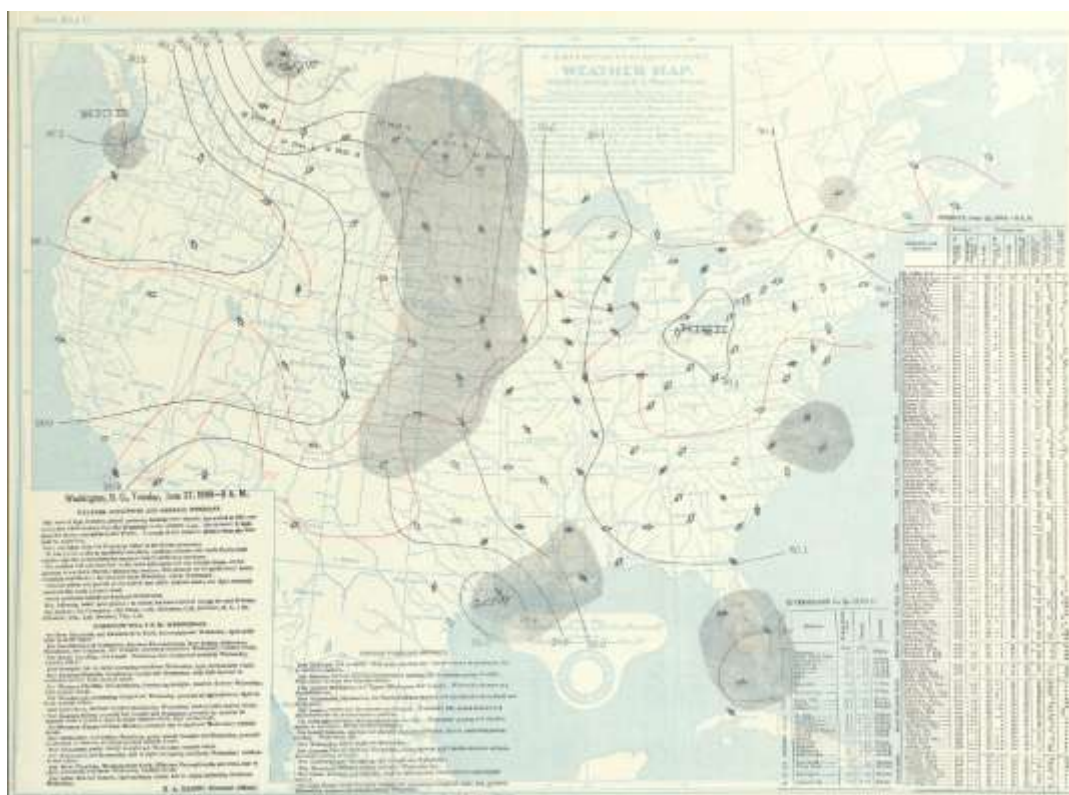


Figure 9: Daily Weather Map for Hearne, TX June 27, 1899

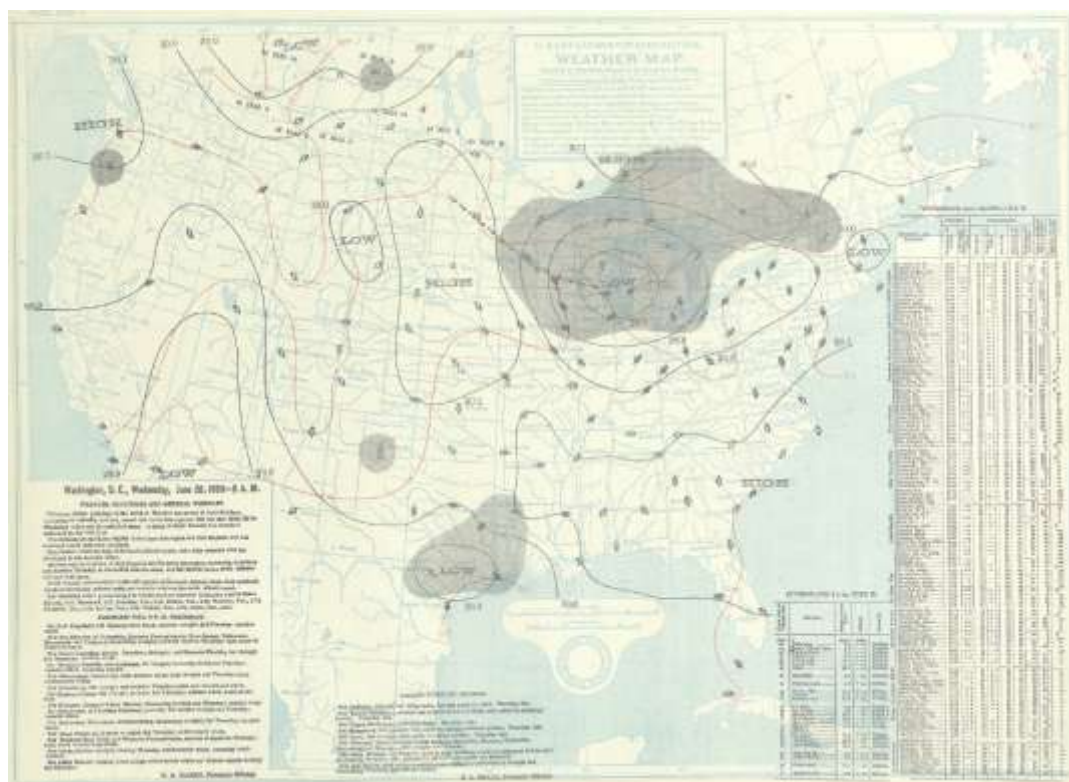


Figure 10: Daily Weather Map for Hearne, TX June 28, 1899

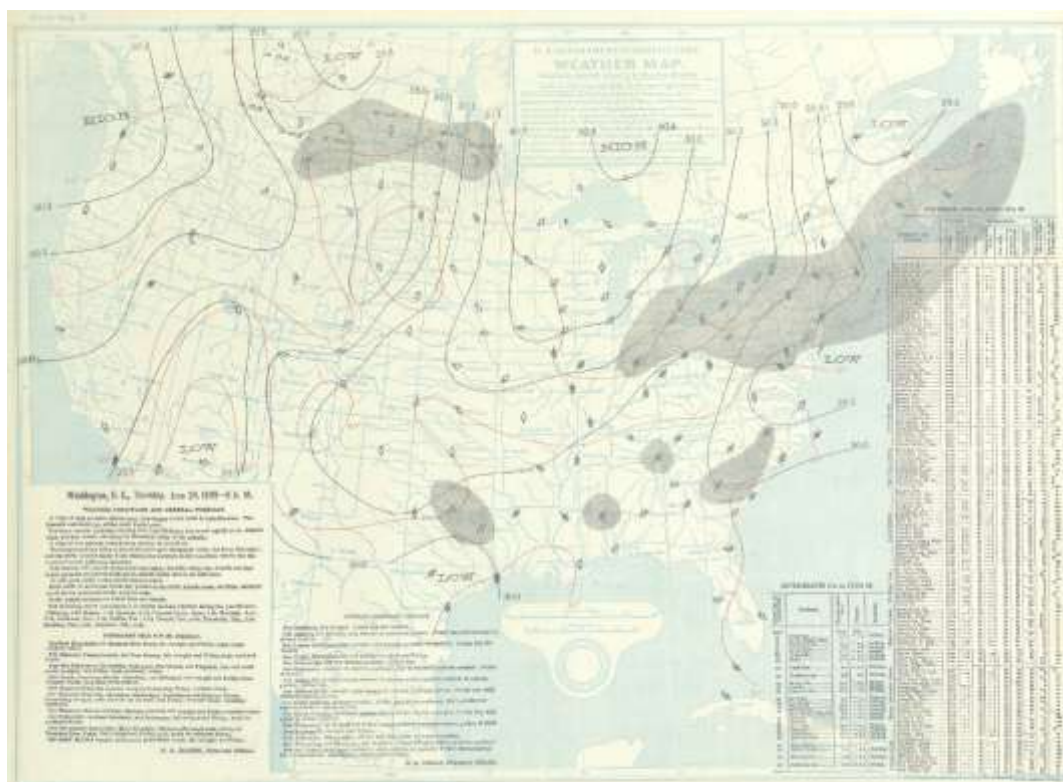


Figure 11: Daily Weather Map for Hearne, TX June 29, 1899

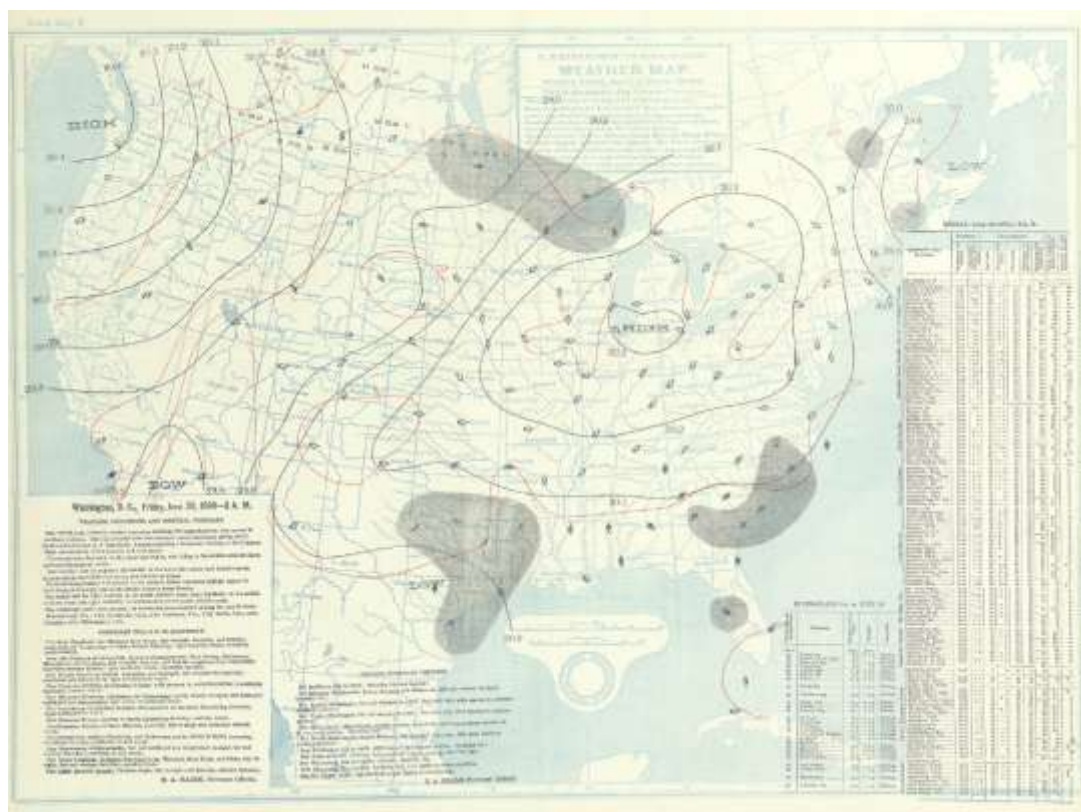


Figure 12: Daily Weather Map for Hearne, TX June 30, 1899

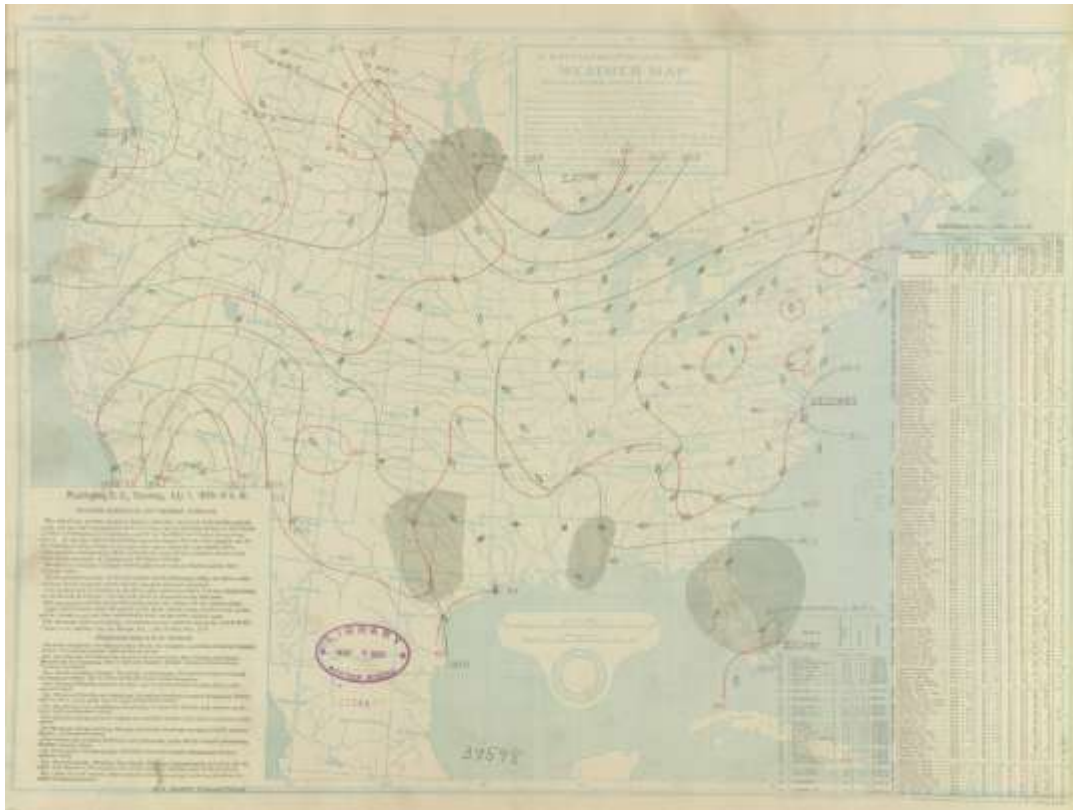


Figure 13: Daily Weather Map for Hearn, TX July 1, 1899

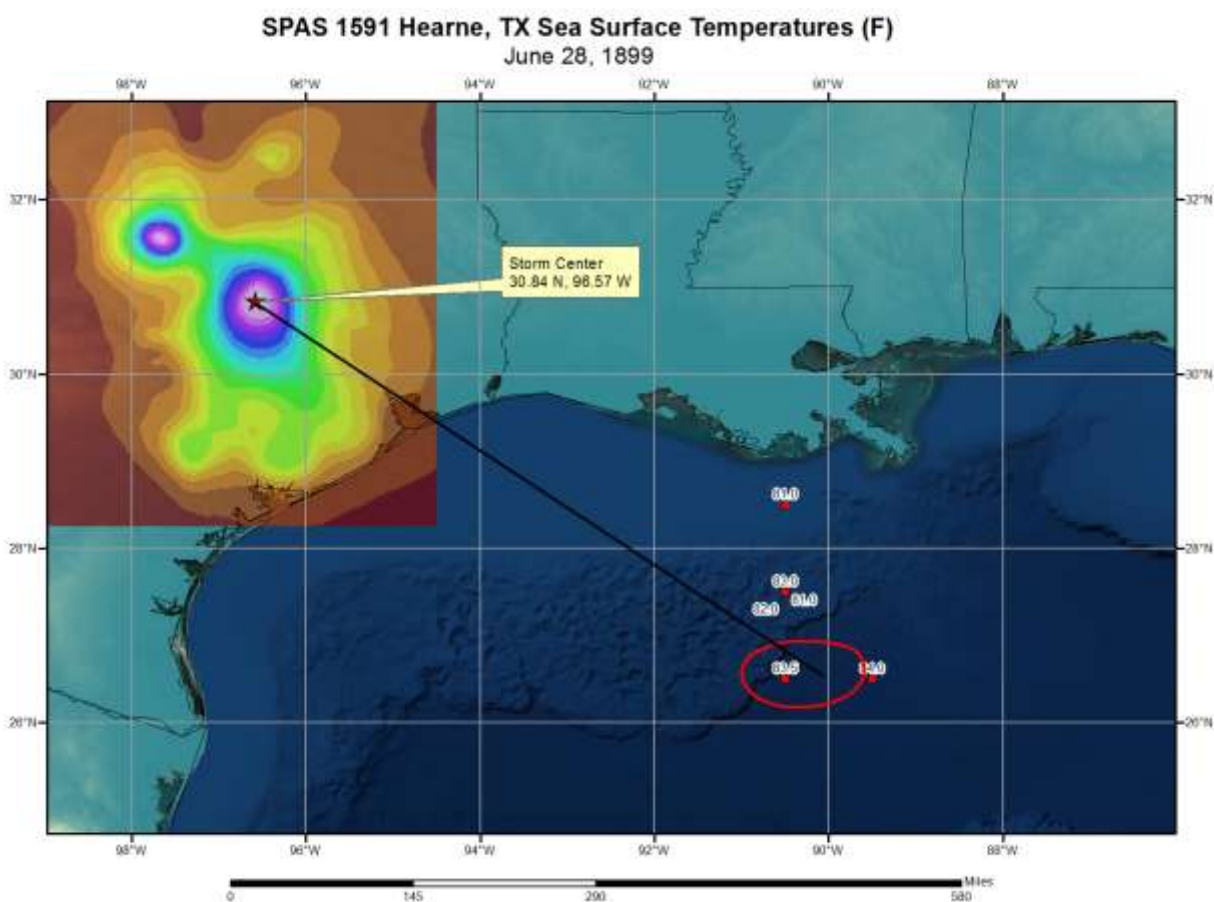


Figure 14: In-place storm representative SST analysis for Hearne, TX June 28, 1899

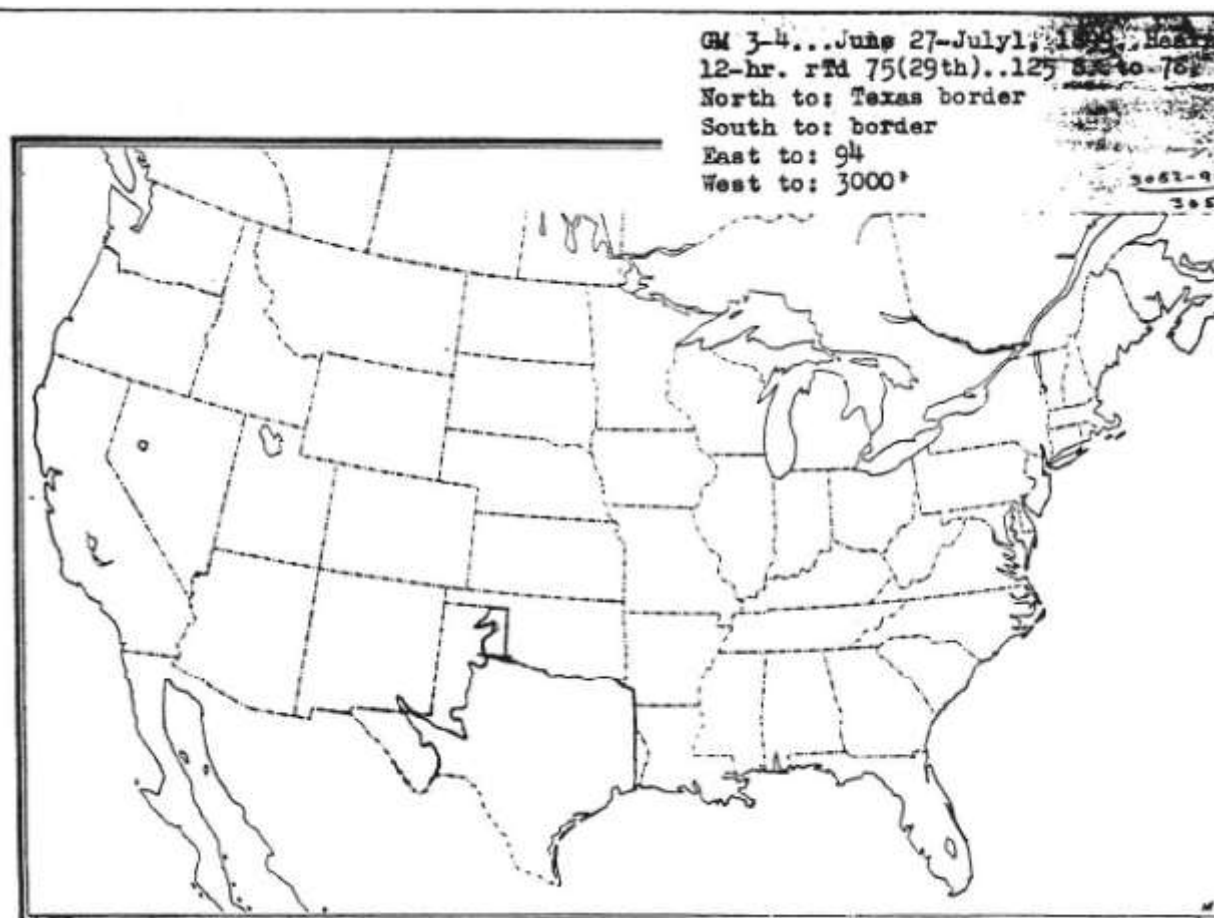


Figure 15: NWS Transposition Limit Map for Hearne, TX June 1899

Storm Precipitation Analysis System (SPAS) For Storm #1428

General Storm Location: Northeastern Texas

Storm Dates: September 2 – 5, 1932

Event: Extreme Precipitation Event

DAD Zone 1

Latitude: 31.6792

Longitude: -96.1292

Max. Grid/Radar Rainfall Amount: 19.58"

Max. Observed Rainfall Amount: 19.50"

Number of Stations: 84 Stations

SPAS Version: 10.0

Base Map Used: Continental United States 2 year 6 hour (conus_0002yr06h)

Spatial resolution: 0.2812

Radar Included: No

Depth-Area-Duration (DAD) analysis: Yes

Reliability of Results: In addition to the NCDC stations, thirty-four supplemental stations were added to ensure the data consistency. Due to the amount and integrity of the U.S. Army Corps of Engineers (USACE), three hourly stations were digitized based on the mass rainfall curves. With the density of stations available and the consistency of the resulting SPAS analysis to the U.S. Army Corps of Engineers report, this analysis is deemed quite reliable.

SPAS Storm ID	NAME	LON	LAT	ELEV Round	Storm Representative				Climatological Maximum				IPMF
					T _d	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	T _d	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	
1428_1	FAIRFIELD	-96.129	31.679	400	77.50	3.22"	0.11"	3.105	80.0	3.60"	0.12"	3.480	1.12

Storm 1428 - September 2 (0700 UTC) - September 6 (0600 UTC), 1932															
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)															
Area (mi ²)	Duration (hours)														
	1	2	3	4	5	6	12	18	24	30	36	48	72	96	Total
0.4	2.01	4.01	5.02	7.02	9.03	10.03	14.04	16.90	18.56	19.36	19.58	19.58	19.58	19.58	19.58
1	2.00	4.00	5.00	7.00	9.00	10.00	14.01	16.86	18.51	19.31	19.51	19.51	19.51	19.51	19.51
10	1.99	3.97	4.97	6.96	8.94	9.94	13.91	16.75	18.39	19.18	19.39	19.39	19.39	19.38	19.38
25	1.98	3.96	4.95	6.94	8.92	9.91	13.87	16.71	18.34	19.13	19.34	19.34	19.34	19.33	19.33
50	1.98	3.96	4.94	6.92	8.90	9.89	13.85	16.67	18.31	19.09	19.30	19.30	19.30	19.30	19.30
100	1.97	3.95	4.93	6.91	8.88	9.87	13.82	16.64	18.27	19.06	19.26	19.26	19.26	19.26	19.26
150	1.97	3.94	4.93	6.90	8.87	9.86	13.80	16.62	18.25	19.03	19.24	19.24	19.24	19.24	19.24
200	1.97	3.94	4.92	6.89	8.86	9.85	13.79	16.61	18.24	19.02	19.22	19.22	19.22	19.22	19.22
300	1.96	3.93	4.91	6.87	8.84	9.82	13.75	16.54	18.17	18.96	19.15	19.15	19.15	19.15	19.15
400	1.94	3.87	4.84	6.77	8.71	9.68	13.55	16.31	17.92	18.69	18.89	18.89	18.89	18.89	18.89
500	1.90	3.80	4.75	6.65	8.55	9.50	13.31	16.02	17.60	18.36	18.55	18.56	18.56	18.56	18.56
1,000	1.66	3.32	4.17	5.81	7.48	8.32	11.66	14.06	15.45	16.14	16.33	16.36	16.36	16.36	16.36
2,000	1.27	2.51	3.23	4.45	5.64	6.29	8.87	10.77	11.88	12.41	12.71	12.99	13.09	13.09	13.09
3,500	1.05	1.97	2.67	3.64	4.27	4.76	7.17	8.65	9.53	9.92	10.39	10.72	10.88	10.88	10.88
5,000	0.92	1.70	2.33	3.18	3.60	3.99	6.15	7.41	8.11	8.59	8.97	9.44	9.60	9.60	9.60
7,500	0.77	1.42	1.97	2.68	3.02	3.37	5.11	6.14	6.68	7.15	7.49	7.95	8.12	8.12	8.12
10,000	0.67	1.22	1.71	2.31	2.63	2.93	4.40	5.28	5.75	6.20	6.48	7.04	7.21	7.21	7.21
15,000	0.54	0.96	1.36	1.84	2.08	2.32	3.57	4.28	4.66	5.01	5.30	5.82	5.98	5.98	5.98
20,000	0.45	0.79	1.13	1.52	1.76	1.95	3.07	3.68	3.96	4.31	4.61	5.08	5.23	5.23	5.23
35,000	0.31	0.52	0.75	1.02	1.16	1.29	2.06	2.47	2.75	2.99	3.35	3.81	4.01	4.01	4.01
50,000	0.24	0.40	0.57	0.79	0.88	0.99	1.58	1.90	2.13	2.36	2.65	3.02	3.16	3.16	3.16
71,257	0.17	0.30	0.43	0.58	0.67	0.75	1.22	1.47	1.65	1.87	2.10	2.39	2.50	2.50	2.50

Figure: 16 Depth-area-duration values for Fairfield, TX September 1932

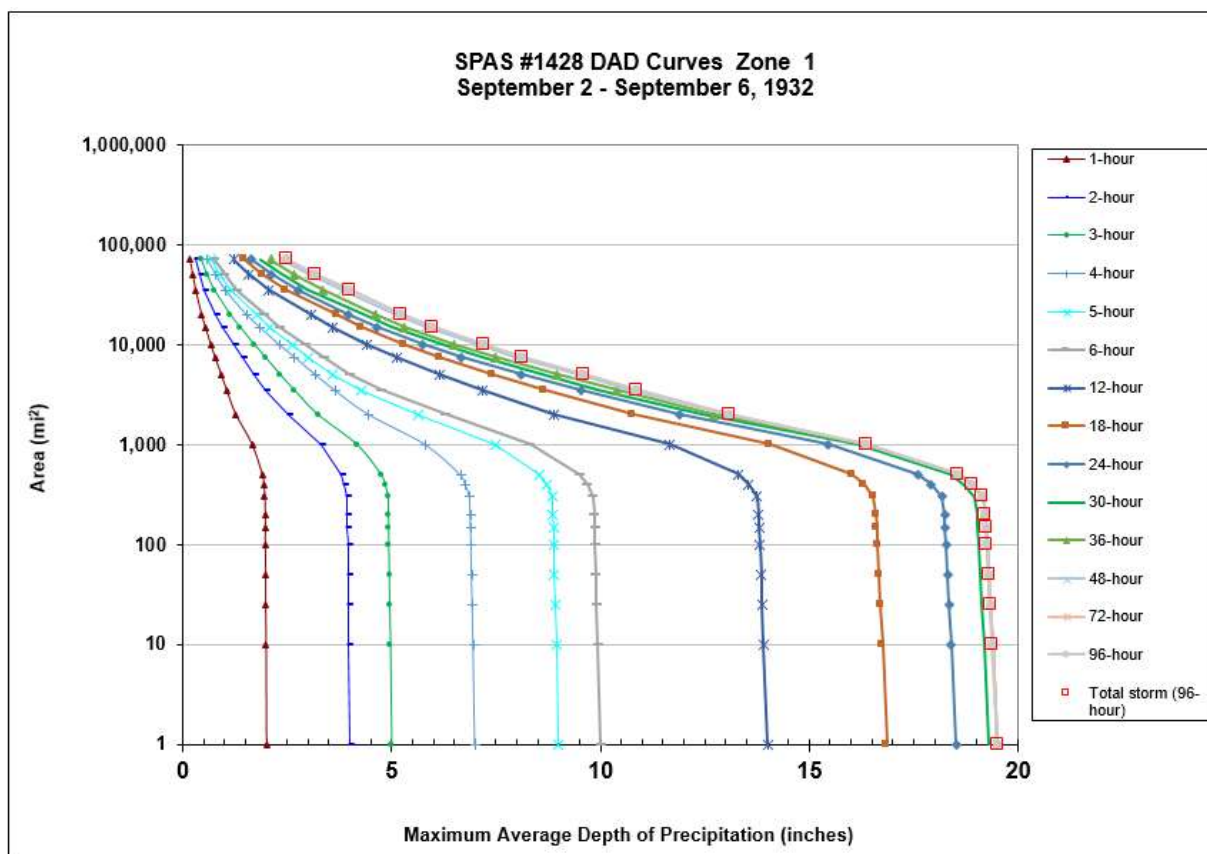


Figure 17: Depth-area-duration chart for Fairfield, TX September 1932

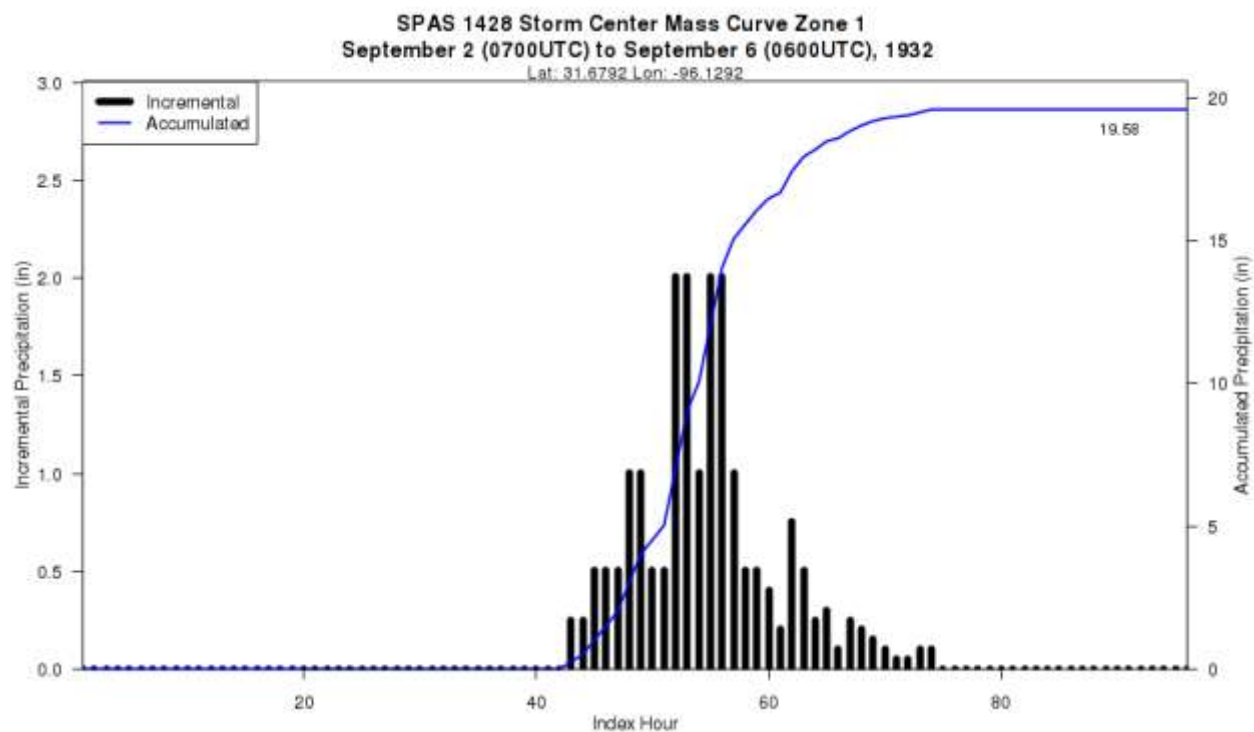


Figure 18: Mass curve chart for Fairfield, TX September 1932

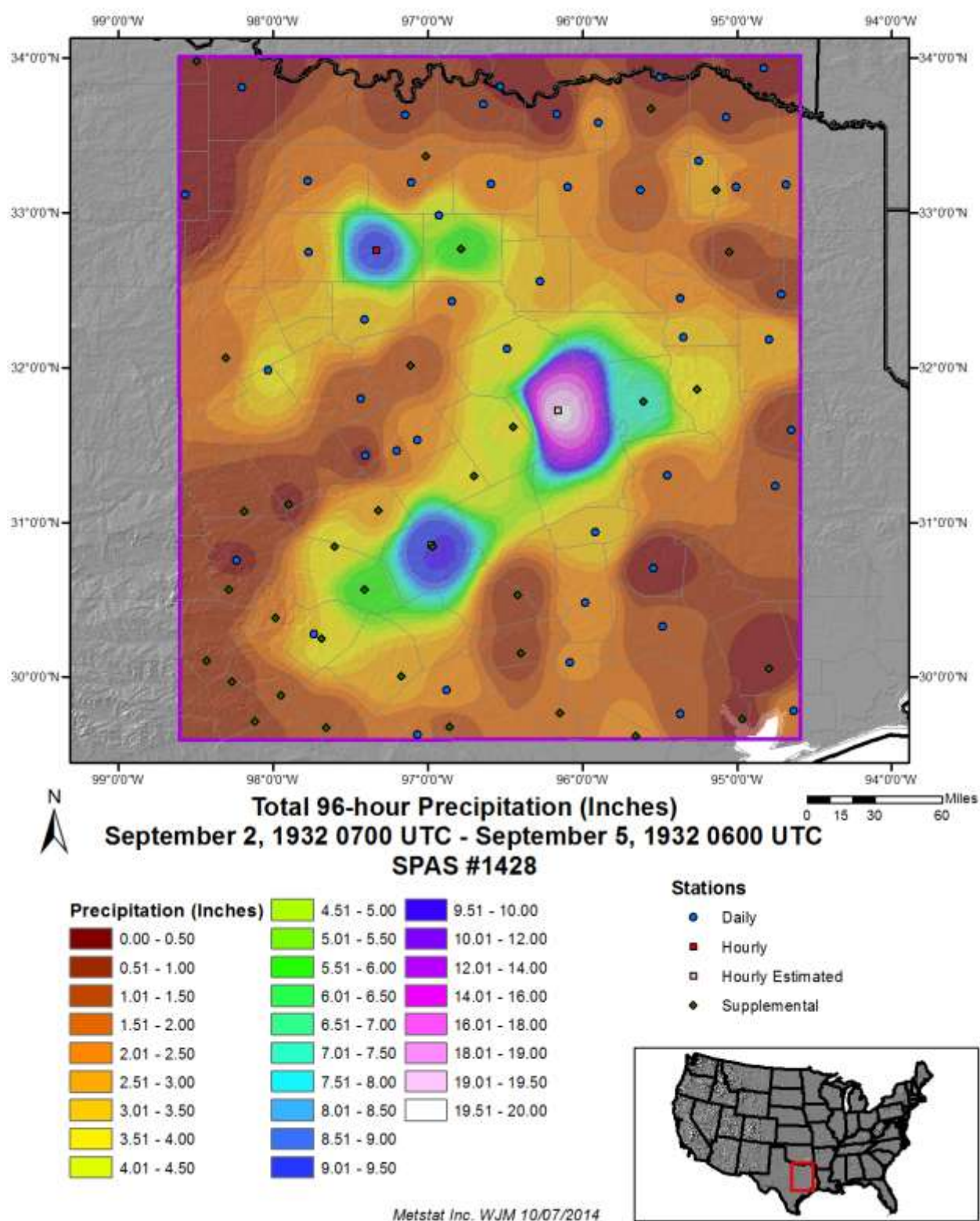


Figure 19: Total storm isohyetal analysis for Fairfield, TX September 1932

DEPARTMENT OF THE ARMY

CORPS OF ENGINEERS

STORM STUDIES - PERTINENT DATA SHEET

Storm of 30 Aug-5 Sept 1932

Assignment CM 5-16A

Location Texas

Study Prepared by:

Southwestern Division

Galveston District Office

Part I Reviewed by H. M. Sec. of
Weather Bureau, 5-22-44Part II Approved by Office, Chief
of Engineers for Distribution
of Factual Data, 12/2/47Remarks: Centers at
Fairfield and near Rock
Springs, Texas

Dewpt. 76° - Ref. Pt. 340 S

Grid I-15

DATA AND COMPUTATIONS COMPILED**PART I**

Preliminary isohyetal map, in 2 sheets, scale 1:1,000,000

Precipitation data and mass curves:

(Number of Sheets)

Form 5001-C (Hourly precip. data)-----	20
Form 5001-B (24-hour " " " ")-----	79
Form 5001-D (" " " " " ")-----	-
Miscl. precip. records, meteorological data, etc.-----	16
Form 5002 (Mass rainfall curves)-----	53

PART II

Final isohyetal maps, in 1 sheet, scale 1:1,000,000

Data and computation sheets:

Form S-10 (Data from mass rainfall curves)-----	4
Form S-11 (Depth-area data from isohyetal map)-----	2
Form S-12 (Maximum depth-duration data)-----	5
Maximum duration-depth-area curves-----	1
Data relating to periods of maximum rainfall-----	2

MAXIMUM AVERAGE DEPTH OF RAINFALL IN INCHES

Area in Sq. Mi.	Duration of Rainfall in Hours										
	6	12	18	24	30	36	48	72	96	120	144
10	10.0	13.8	16.4	18.3	18.9	19.3	19.5	19.5	19.5	19.5	19.5
100	8.2	12.8	15.9	18.0	18.4	18.5	18.7	18.7	18.7	18.7	18.7
200	7.6	12.4	15.5	17.4	17.9	17.9	18.1	18.1	18.1	18.1	18.1
500	6.9	11.8	14.6	16.2	16.6	16.6	16.8	16.8	16.8	16.8	16.8
1,000	6.3	11.0	13.6	14.8	15.0	15.1	15.2	15.2	15.2	15.2	15.2
2,000	5.8	9.8	11.9	12.8	13.0	13.1	13.1	13.2	13.5	13.6	13.7
5,000	4.2	6.5	8.1	8.8	9.7	10.0	10.3	10.4	10.8	11.3	11.6
10,000	2.5	4.3	5.4	6.4	7.4	7.8	8.3	8.4	8.8	9.3	9.7
20,000	1.6	2.7	3.7	4.5	5.3	5.9	6.4	6.6	7.0	7.5	7.9
50,000	0.7	1.3	2.0	2.5	3.0	3.6	4.3	4.7	5.0	5.3	5.8
116,000	0.4	0.7	1.0	1.3	1.5	1.7	1.9	2.3	3.0	3.9	4.4

Form S-2

Figure 20: USACE Depth-area-duration values for Fairfield, TX September 1932

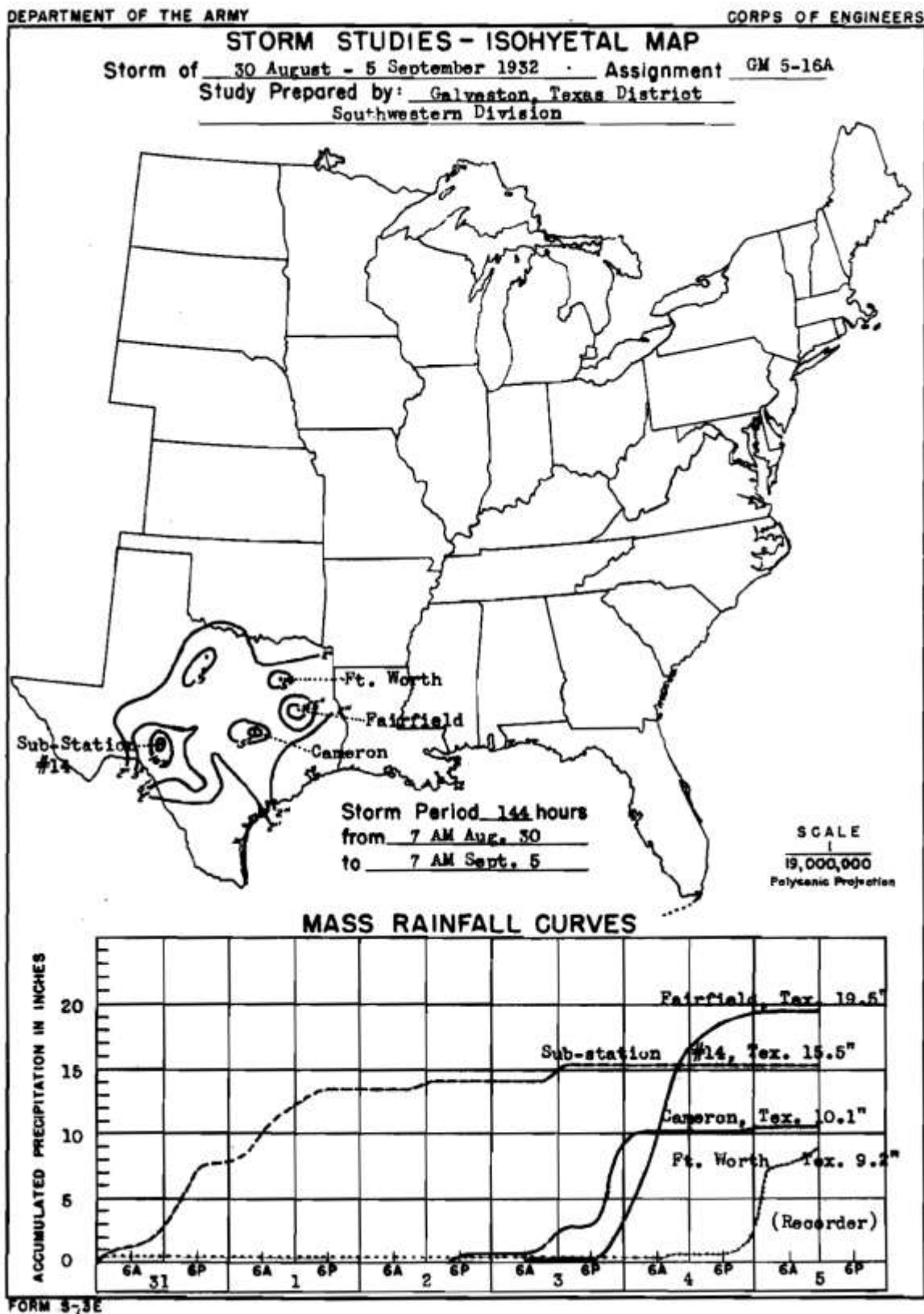


Figure 21: USACE Total storm isohyetal and mass curve chart for Fairfield, TX September 1932



Figure 22 Daily Weather Map for Fairfield, TX August 31, 1932

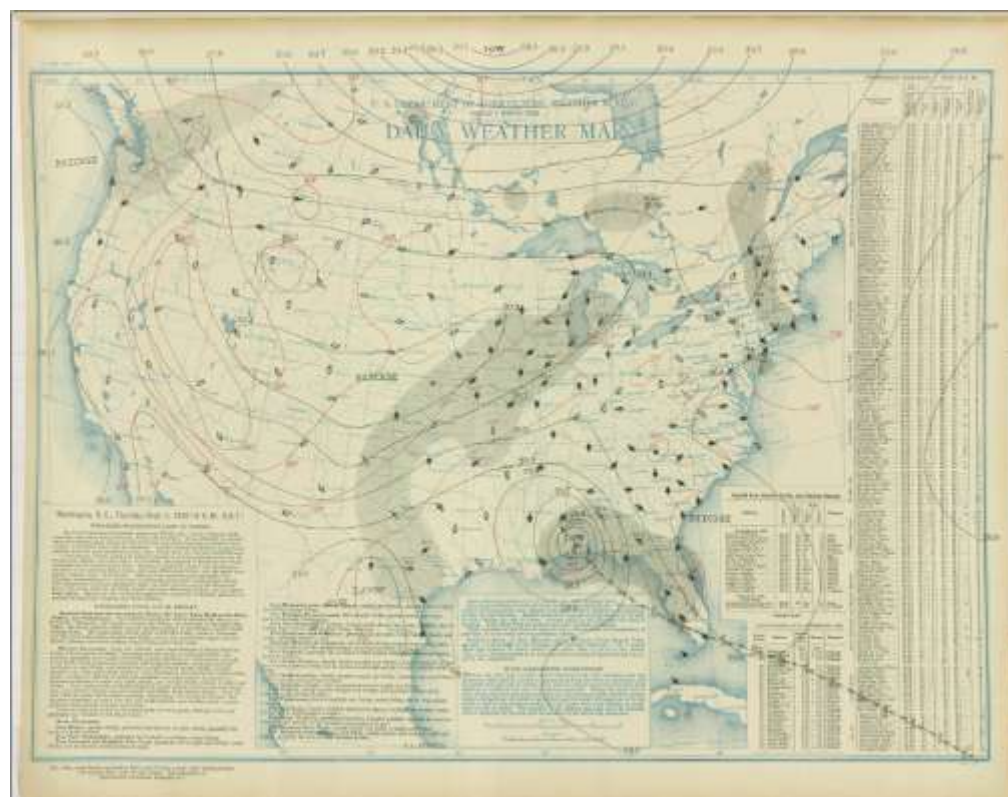


Figure 23 Daily Weather Map for Fairfield, TX September 1, 1932



Figure 24 Daily Weather Map for Fairfield, TX September 2, 1932

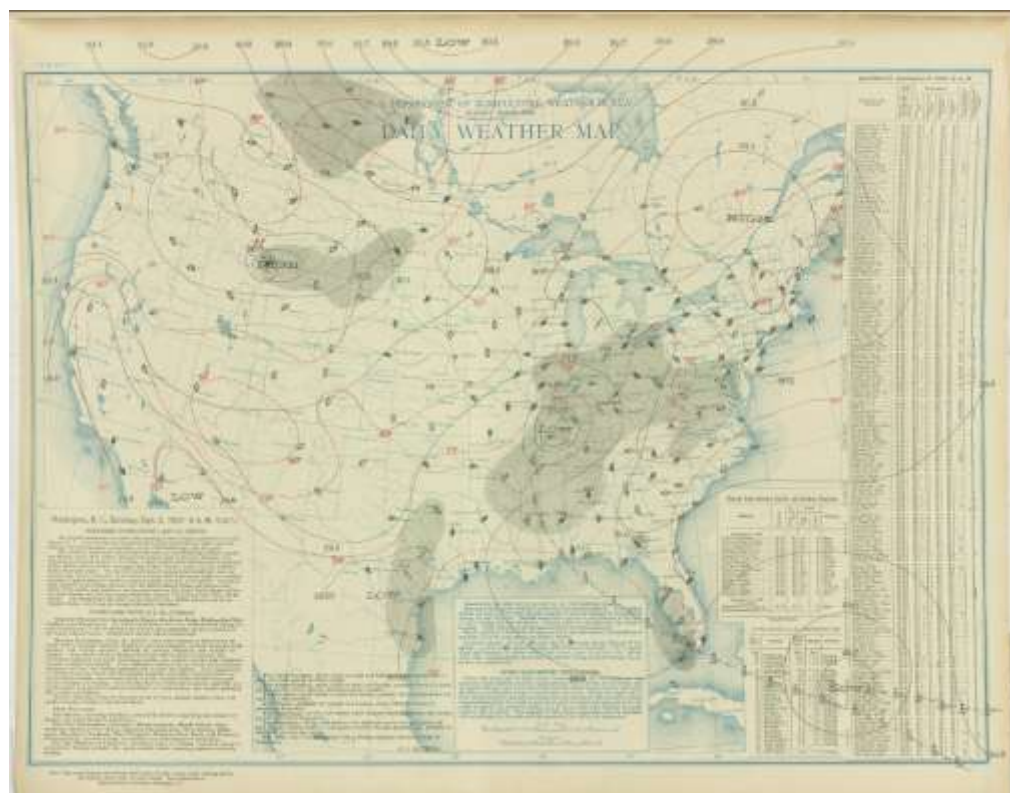


Figure 25 Daily Weather Map for Fairfield, TX September 3, 1932

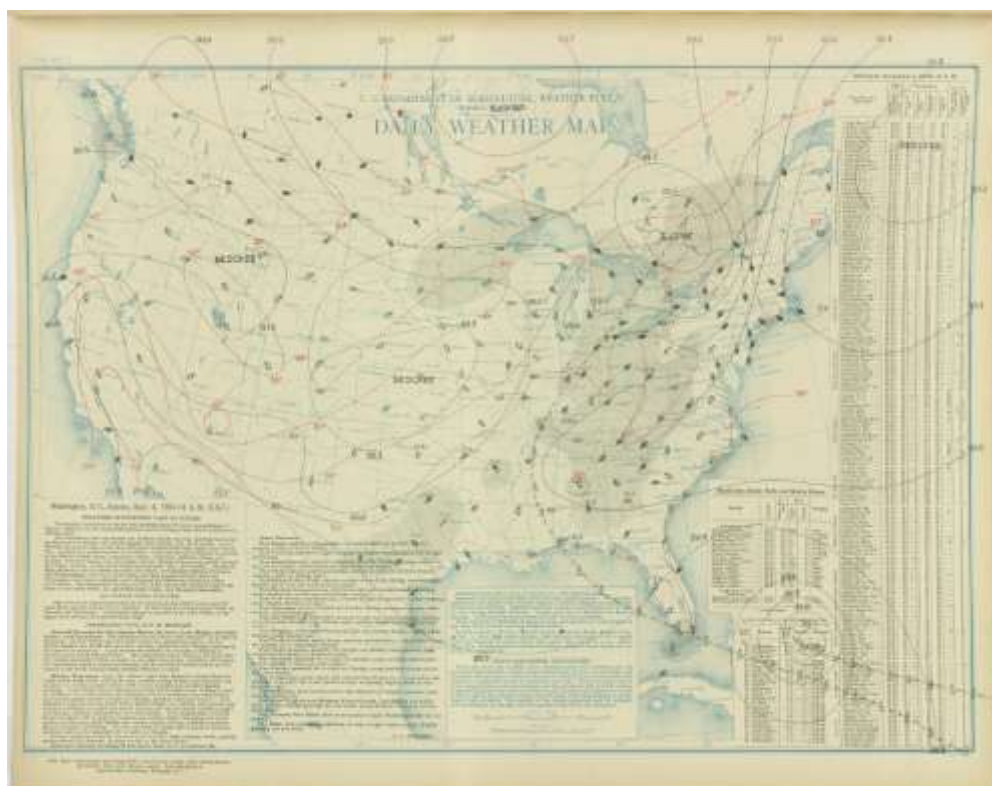


Figure 26 Daily Weather Map for Fairfield, TX September 4, 1932

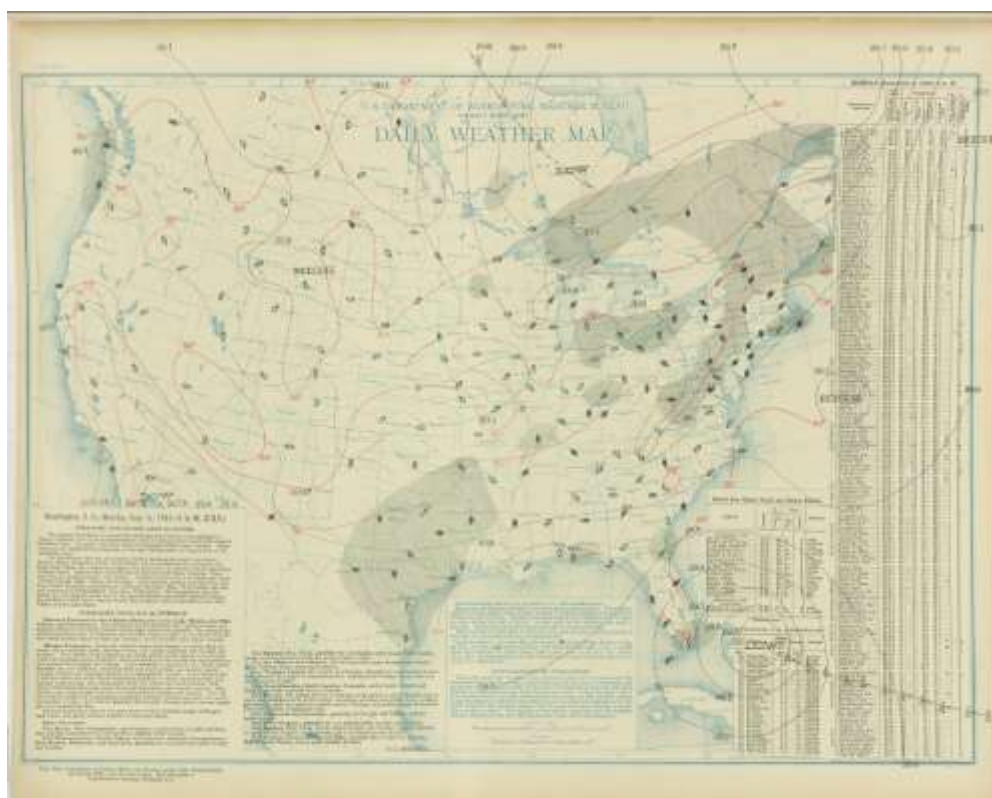


Figure 27 Daily Weather Map for Fairfield, TX September 5, 1932

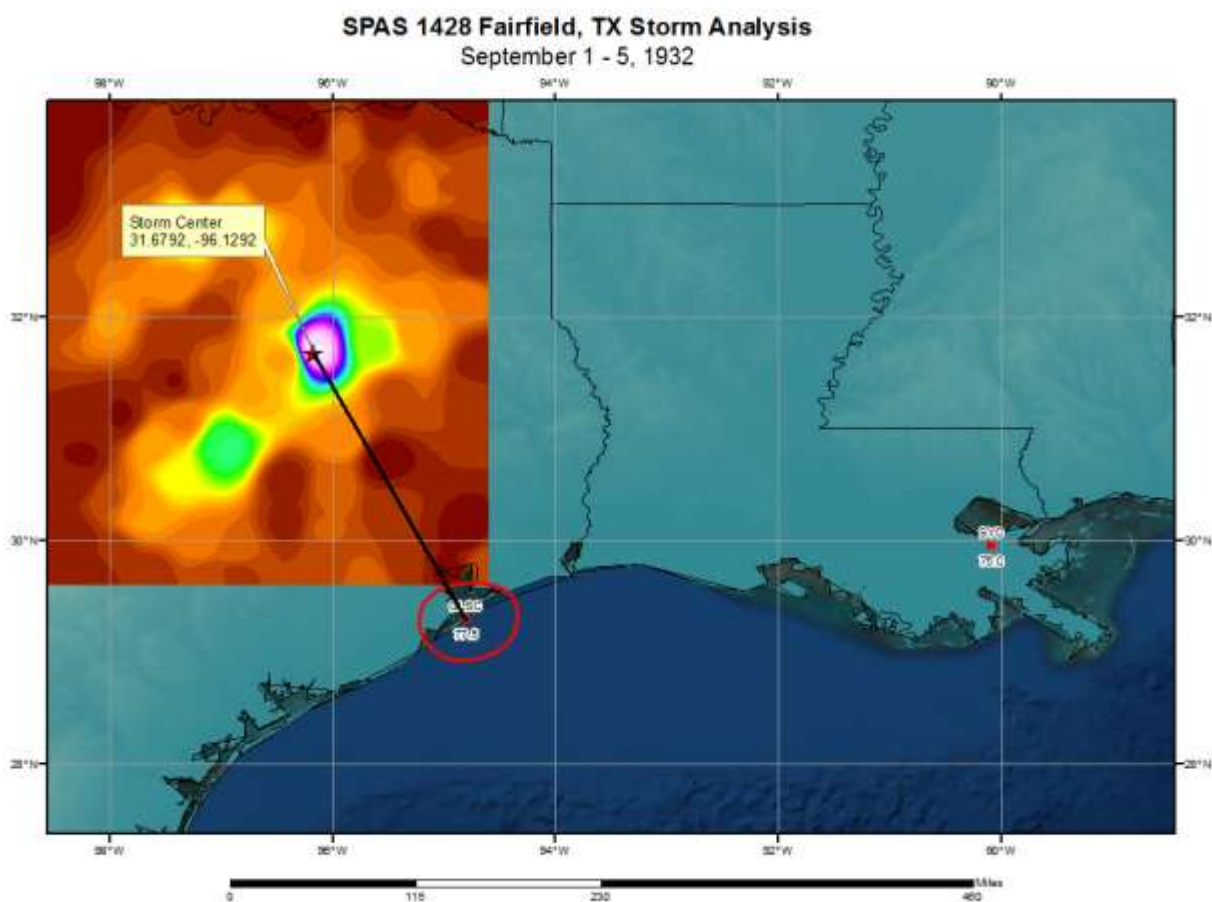


Figure 28: In-place storm representative dew point analysis for Fairfield, TX September 1-5, 1932

Storm Precipitation Analysis System (SPAS) For Storm #1311

General Storm Location: Ohio River Basin

Storm Dates: January 17-25, 1937

Event: Frontal activity accompanied by almost continuous rain

DAD Zone 1

Latitude: 36.4375

Longitude: -87.9125

Max. Grid rainfall amount: 19.86"

Max. Observed rainfall amount: 19.75" (DOVER 1 NW, TN)

Number of Stations: 995

SPAS Version: 9.5

Base Map Used: Digitized TVA Isohyetal Map (storm total Jan 16-25)

Spatial resolution: 30 seconds

Radar Included: No

Depth-Area-Duration (DAD) analysis: Yes

Reliability of Results: Although only 13 hourly stations were available, they resided at locations in/near the storm center, therefore increasing confidence amongst the heaviest precipitation. Given this was a synoptic storm with large areas of nearly continuous precipitation (rainfall), it's believed the temporal distribution of precipitation is reliable. A surprisingly high number (979) of daily and hourly stations, coupled with a total storm map prepared by TVA, provides a high degree of confidence in the spatial patterns and magnitude of precipitation.

SPAS Storm ID	NAME	LON	LAT	ELEV Round	Storm Representative				Climatological Maximum				IPMF
					T _d	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	T _d	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	
1311_1	MCKENZIE	-87.913	36.438	600	65.50	1.82"	0.11"	1.705	67.5	2.00"	0.12"	1.880	1.10

Storm 1311 - January 17 (0700 UTC) - January 27 (0600 UTC), 1937																		
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)																		
Area (mi ²)	Duration (hours)																	
	1	2	3	4	5	6	12	18	24	36	48	72	96	120	144	216	240	Total
0.4	1.68	2.32	3.19	3.78	4.02	4.03	4.78	5.60	6.32	8.43	9.71	12.91	14.22	15.11	17.39	19.86	19.86	19.86
1	1.67	2.31	3.18	3.76	4.00	4.01	4.76	5.58	6.29	8.39	9.66	12.84	14.17	15.04	17.34	19.84	19.84	19.84
10	1.66	2.29	3.15	3.72	3.95	3.96	4.71	5.49	6.21	8.29	9.55	12.68	14.03	14.88	17.21	19.68	19.68	19.68
25	1.65	2.28	3.13	3.70	3.93	3.94	4.68	5.46	6.18	8.25	9.51	12.62	13.98	14.81	17.16	19.62	19.62	19.62
50	1.64	2.21	3.04	3.61	3.84	3.86	4.67	5.38	6.09	8.15	9.38	12.47	13.94	14.77	17.13	19.57	19.57	19.57
100	1.61	2.15	2.80	3.32	3.61	3.84	4.65	5.17	5.87	7.89	9.12	12.08	13.90	14.72	17.09	19.52	19.52	19.52
150	1.54	2.05	2.53	3.12	3.57	3.80	4.65	5.06	5.85	7.68	8.98	11.83	13.88	14.69	17.07	19.50	19.50	19.50
200	1.44	1.92	2.40	3.07	3.51	3.74	4.64	5.06	5.85	7.55	8.96	11.65	13.77	14.67	17.05	19.48	19.48	19.48
300	1.30	1.76	2.32	2.96	3.38	3.61	4.63	5.05	5.84	7.42	8.84	11.42	13.53	14.60	17.03	19.45	19.45	19.45
400	1.24	1.66	2.25	2.87	3.28	3.50	4.61	5.04	5.83	7.34	8.75	11.30	13.28	14.47	17.01	19.43	19.43	19.43
500	1.20	1.59	2.18	2.79	3.19	3.41	4.58	5.02	5.83	7.27	8.69	11.21	13.09	14.37	17.00	19.41	19.41	19.41
1,000	1.08	1.42	1.98	2.51	2.89	3.14	4.47	4.91	5.70	7.07	8.40	10.94	12.41	14.03	16.72	19.11	19.11	19.11
2,000	0.96	1.28	1.81	2.26	2.63	2.91	4.17	4.62	5.42	6.86	8.06	10.63	11.77	13.64	16.16	18.49	18.49	18.49
3,500	0.82	1.18	1.67	2.08	2.42	2.69	3.73	4.27	5.11	6.66	7.77	10.29	11.25	13.27	15.44	17.81	17.81	17.81
5,000	0.76	1.10	1.62	1.97	2.29	2.53	3.36	4.04	4.89	6.53	7.63	10.05	10.92	12.99	14.95	17.36	17.36	17.36
7,500	0.70	1.06	1.56	1.81	2.11	2.32	3.19	3.78	4.62	6.35	7.45	9.77	10.57	12.59	14.34	16.81	16.81	16.81
10,000	0.63	1.02	1.51	1.67	1.95	2.15	3.10	3.60	4.40	6.22	7.29	9.55	10.33	12.31	13.89	16.41	16.41	16.41
15,000	0.54	0.96	1.42	1.54	1.71	1.89	2.92	3.43	4.08	6.00	7.05	9.21	9.98	11.89	13.24	15.76	15.76	15.76
20,000	0.48	0.91	1.35	1.46	1.57	1.73	2.78	3.32	3.92	5.82	6.86	8.98	9.71	11.59	12.78	15.20	15.20	15.20
35,000	0.41	0.79	1.16	1.26	1.37	1.47	2.42	3.01	3.60	5.35	6.41	8.42	9.01	10.90	11.77	14.15	14.15	14.15
50,000	0.36	0.69	1.01	1.11	1.22	1.33	2.17	2.74	3.33	4.96	6.01	7.97	8.42	10.25	11.02	13.24	13.24	13.24
75,000	0.30	0.57	0.83	0.93	1.05	1.15	1.85	2.40	2.93	4.39	5.41	7.14	7.52	9.25	9.88	11.94	11.94	11.94
100,000	0.25	0.48	0.70	0.80	0.92	1.02	1.63	2.13	2.61	3.93	4.87	6.45	6.79	8.38	8.91	10.85	10.85	10.85
504,363	0.06	0.12	0.18	0.21	0.25	0.29	0.49	0.66	0.86	1.26	1.67	2.30	2.53	3.23	3.51	4.52	4.55	4.55

Figure 29: Depth-area-duration values for McKenzie, TN January 1937

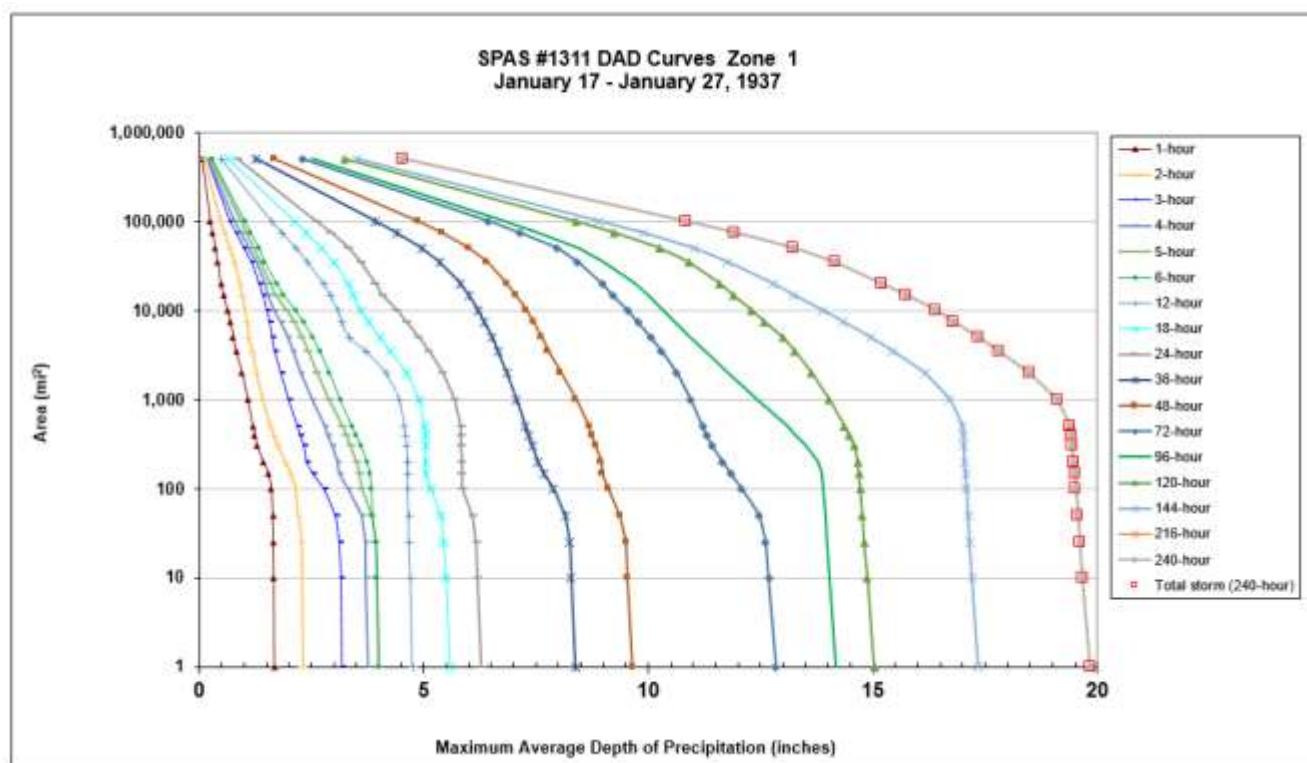


Figure 30: Depth-area-duration chart for McKenzie, TN January 1937

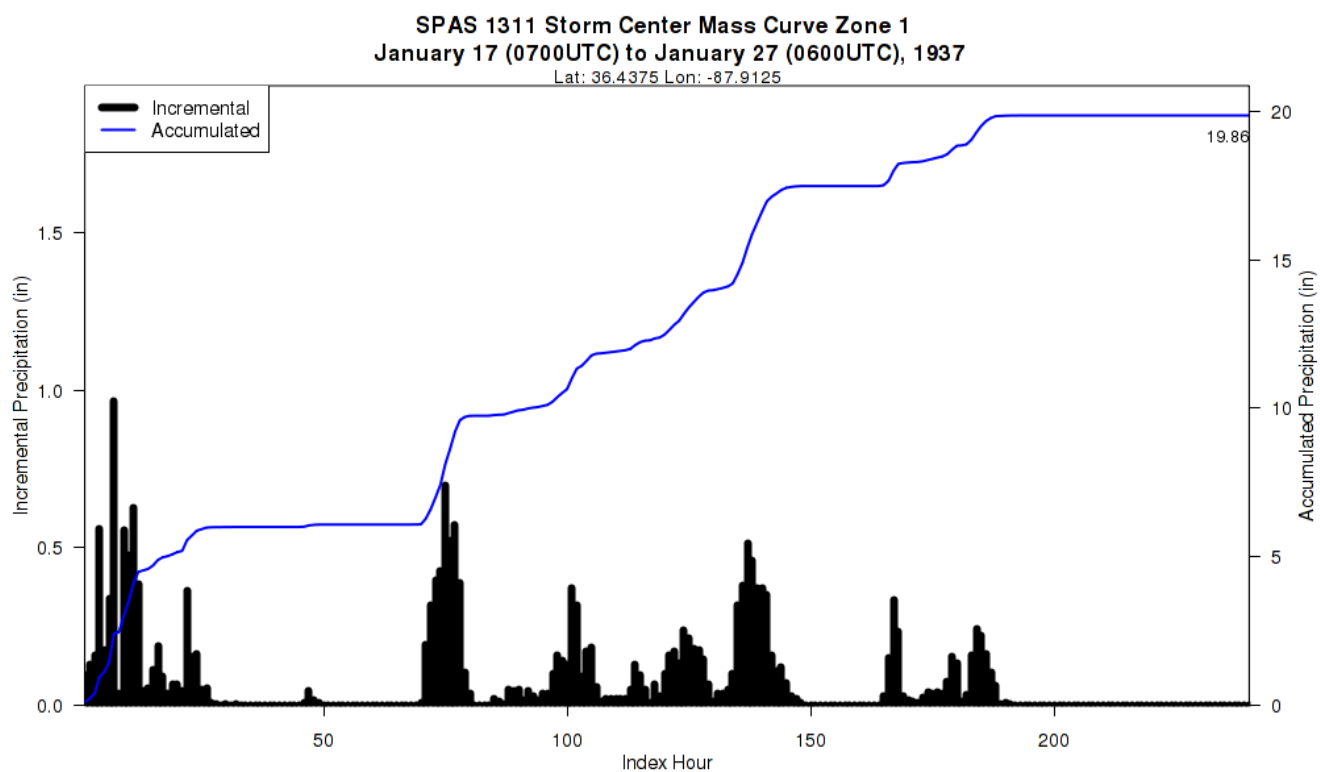


Figure 31: Mass curve chart for McKenzie, TN January 1937

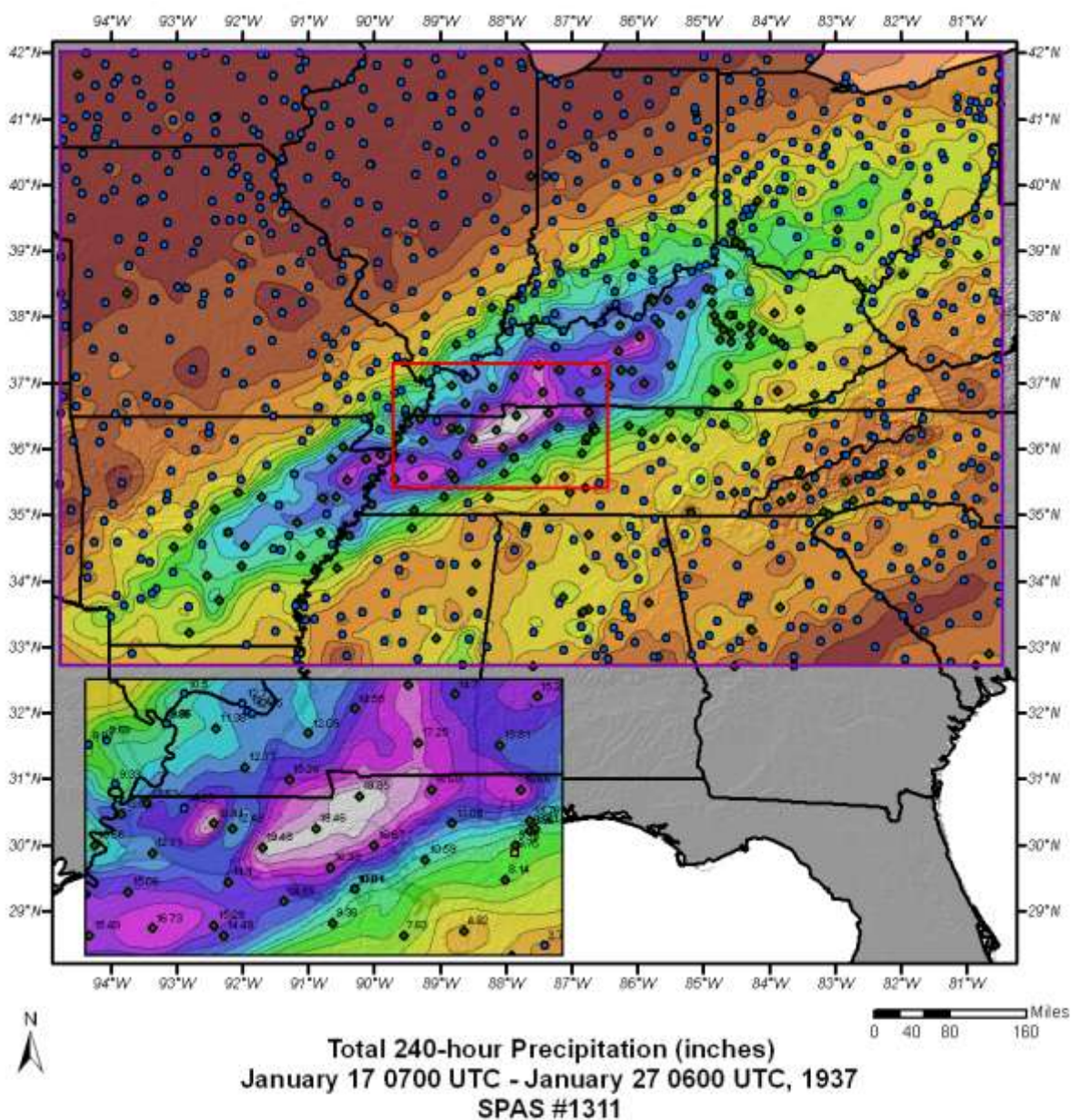


Figure 32: Total storm isohyetal analysis for McKenzie, TN January 1937

DEPARTMENT OF THE ARMY

CORPS OF ENGINEERS

STORM STUDIES - PERTINENT DATA SHEET

Storm of 5-25 January 1937
 Assignment OR 5-6
 Location Ky., Tenn.
 Study Prepared by:
 Ohio River Division
 Louisville District Office

Part I Reviewed by H. M. Sec. of
 Weather Bureau, 11/22/46
 Part II Approved by Office, Chief
 of Engineers for Distribution
 of Factual Data, 9/20/49
 Remarks: Center near
 McKenzie, Tenn.
 Dmpt. 66° - Ref. Pt. 250 SE
 Grid G-11

DATA AND COMPUTATIONS COMPILED**PART I**

Preliminary isohyetal map, in 1 sheet, scale 1: 1,000,000

Precipitation data and mass curves:

(Number of Sheets)

Form 5001-C (Hourly precip. data).....	71
Form 5001-B (24-hour " " " ").....	199
Form 5001-D (" " " " " ").....	0
Misc. precip. records, meteorological data, etc.....	2
Form 5002 (Mass rainfall curves).....	113

PART II

Final isohyetal maps, in 1 sheet, scale 1: 1,000,000

Data and computation sheets:

Form S-10 (Data from mass rainfall curves).....	10
Form S-11 (Depth-area data from isohyetal map).....	6
Form S-12 (Maximum depth-duration data).....	49
Maximum duration-depth-area curves.....	1
Data relating to periods of maximum rainfall.....	12

MAXIMUM AVERAGE DEPTH OF RAINFALL IN INCHES

Area in Sq. Mi.	Duration of Rainfall in Hours										
	6	12	24	48	72	96	120	168	264	360	486
10	3.4	4.4	6.6	9.3	11.2	13.9	14.7	17.8	21.0	21.8	22.6
100	3.2	4.4	6.2	9.2	11.1	13.5	14.5	17.5	20.7	21.7	22.5
200	3.1	4.3	6.1	9.1	11.1	13.2	14.4	17.3	20.6	21.6	22.5
500	3.0	4.2	5.9	9.0	11.0	12.8	14.0	17.1	20.4	21.5	22.5
1,000	2.9	4.1	5.7	8.8	10.7	12.5	13.7	16.9	20.2	21.4	22.4
2,000	2.7	3.9	5.5	8.5	10.3	12.1	13.3	16.5	19.9	21.2	22.2
5,000	2.4	3.4	4.8	8.0	9.6	11.4	12.8	15.3	18.6	20.0	21.3
10,000	2.1	3.0	4.3	7.5	9.2	10.9	12.2	14.1	17.5	18.7	20.5
20,000	1.7	2.6	4.0	7.1	8.7	10.3	11.5	12.9	16.5	17.6	19.6
50,000	1.2	2.1	3.4	6.1	7.6	8.7	10.0	11.3	14.9	16.0	17.8
100,000	0.9	1.6	2.7	4.7	6.2	7.0	8.2	9.2	12.6	13.6	15.6
133,000	0.7	1.3	2.2	4.0	5.4	6.0	7.2	8.1	11.4	12.4	14.4

Form 5-2

Figure 33: USACE Depth-area-duration values for McKenzie, TN January 1937

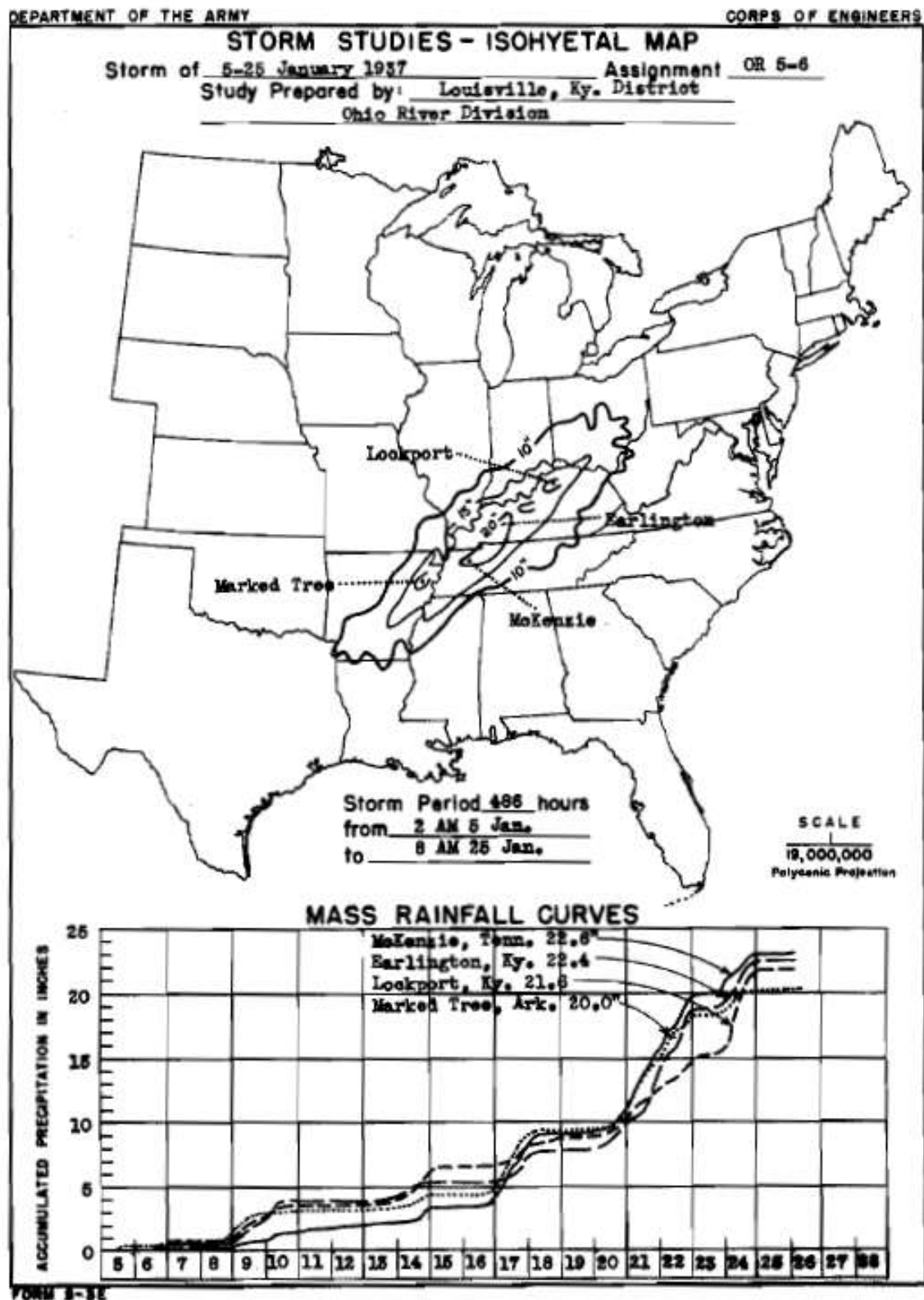


Figure 34: USACE Total storm isohyetal and mass curve chart for McKenzie, TN January 1937



Figure 35: Daily Weather Map for January 15, 1937

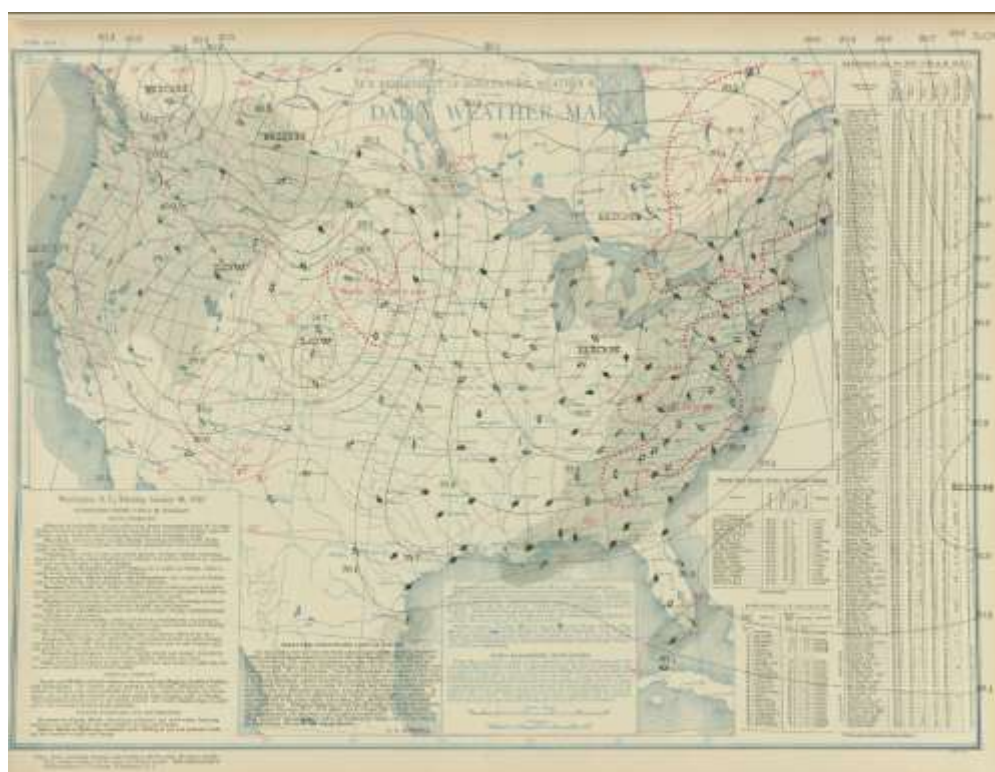


Figure 36: Daily Weather Map for January 16, 1937

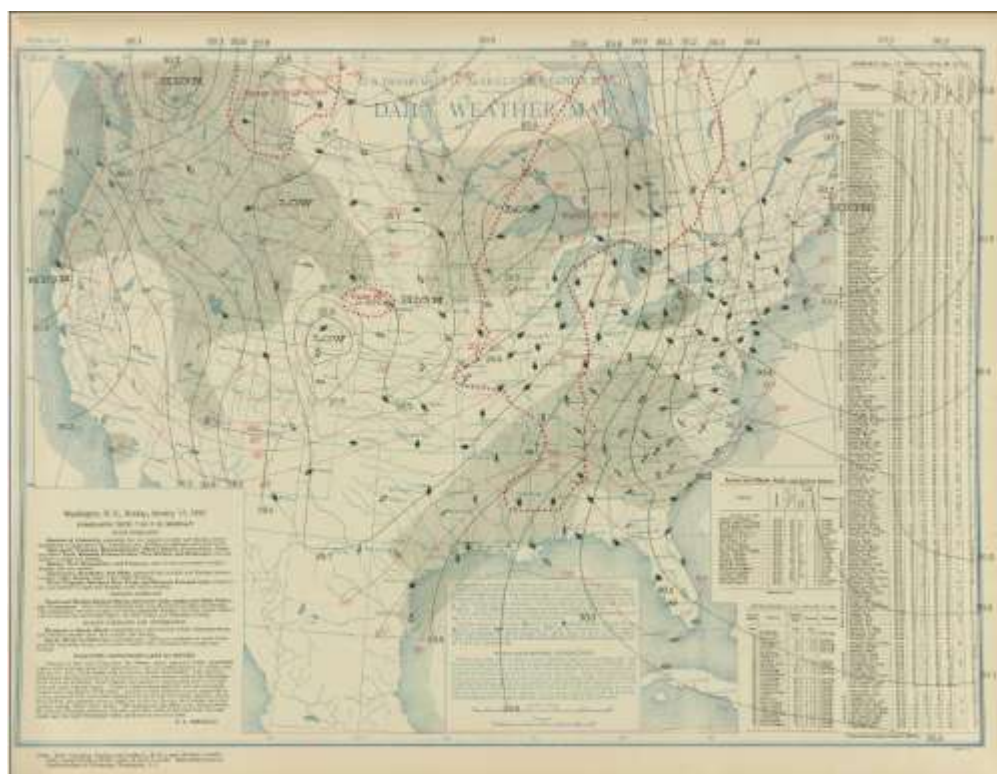


Figure 37: Daily Weather Map for January 17, 1937

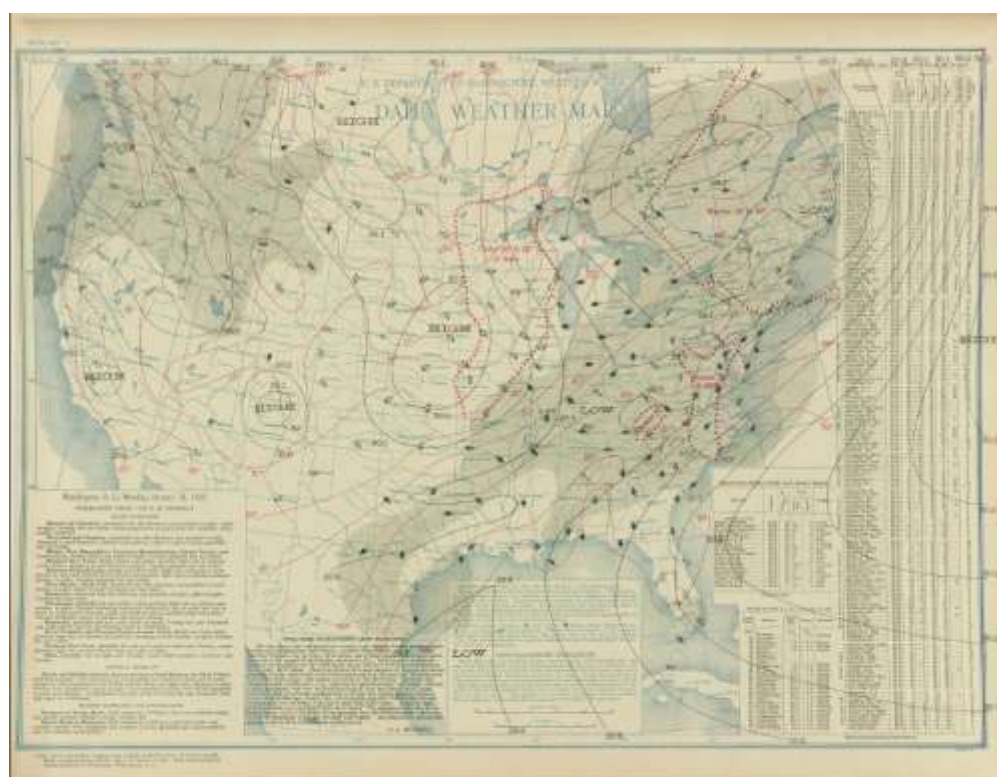


Figure 38: Daily Weather Map for January 18, 1937

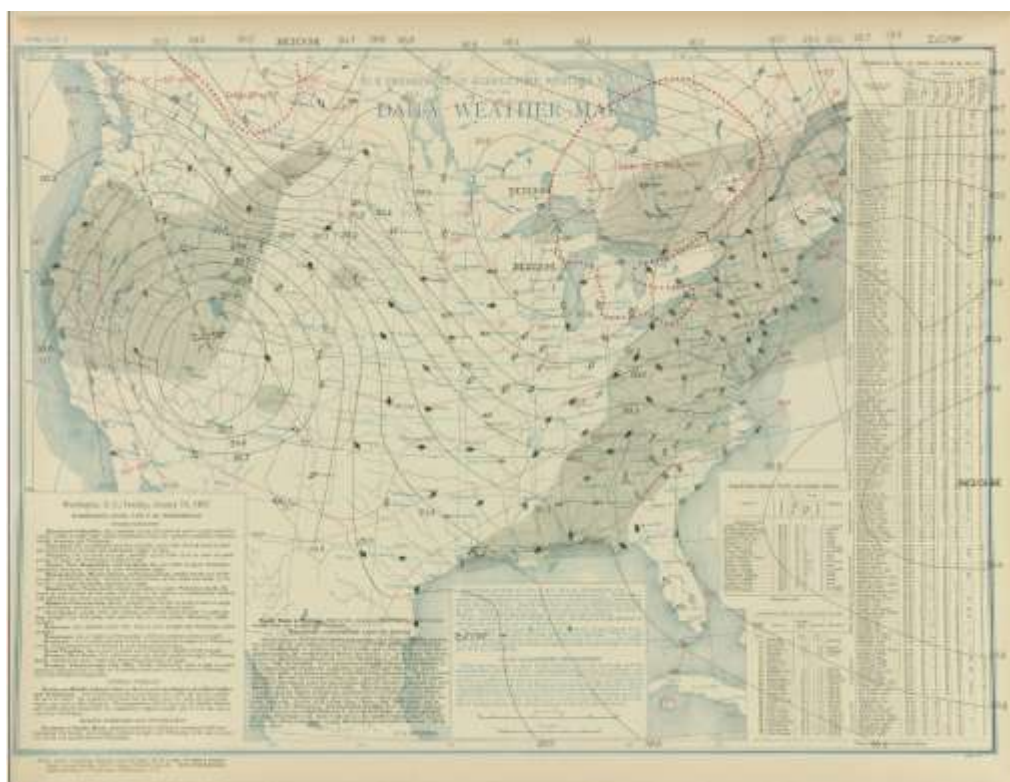


Figure 39: Daily Weather Map for January 19, 1937



Figure 40: Daily Weather Map for January 20, 1937

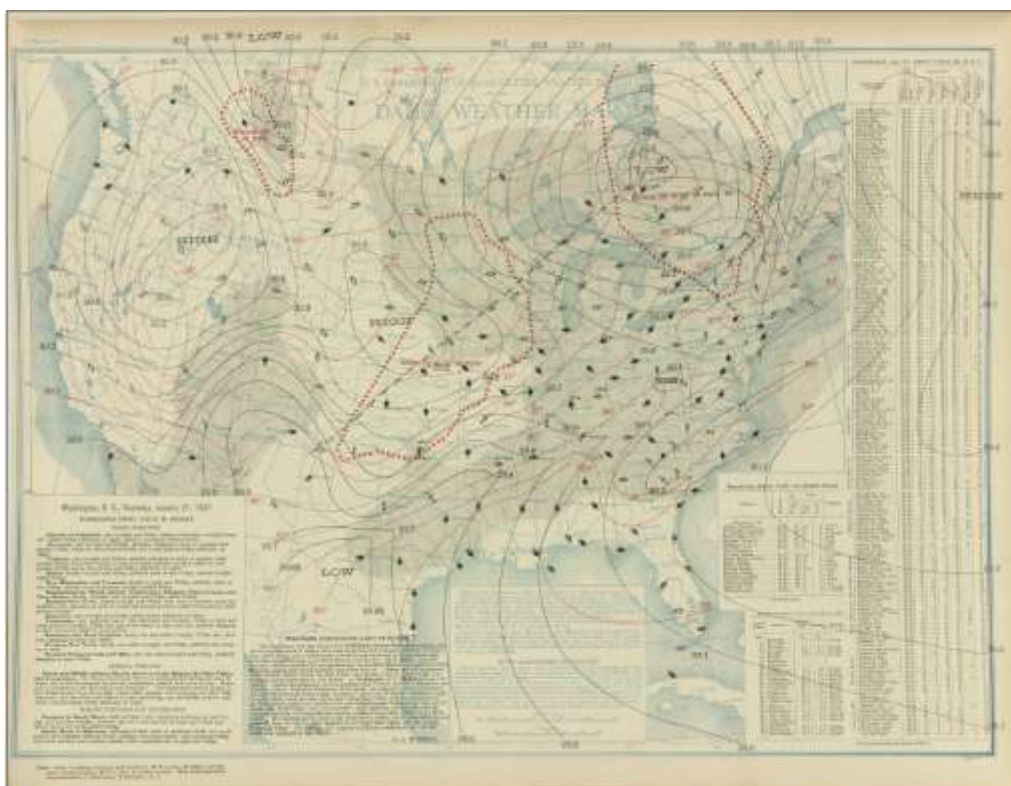


Figure 41: Daily Weather Map for January 21, 1937

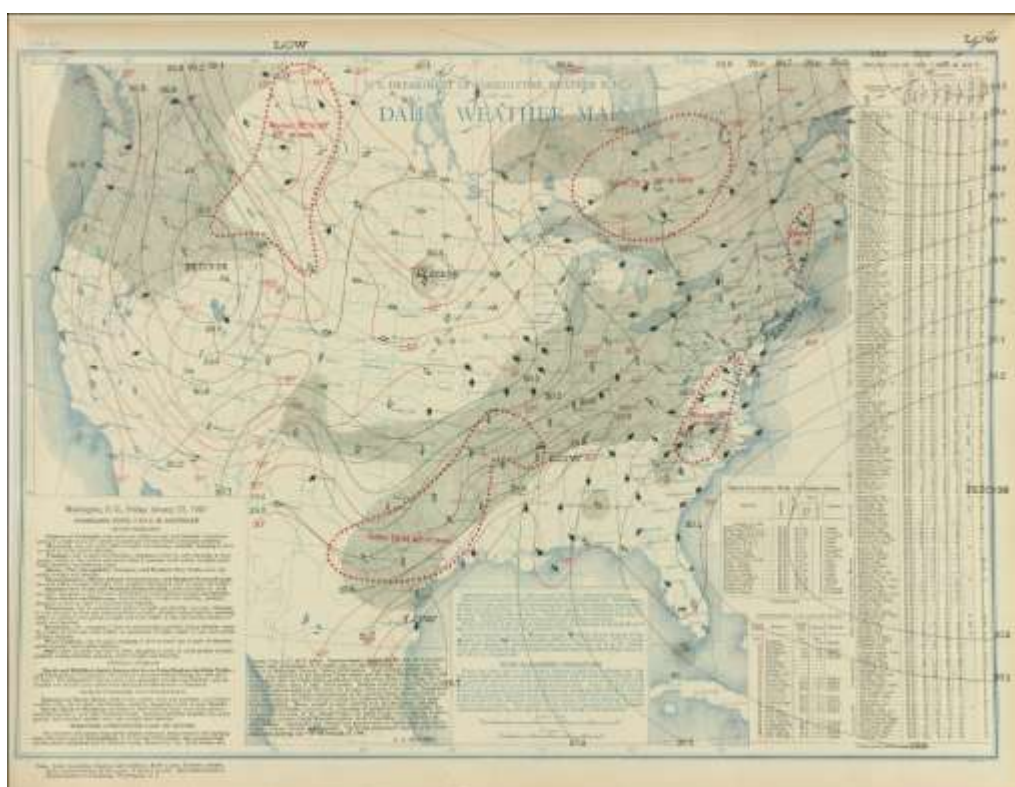


Figure 42: Daily Weather Map for January 22, 1937

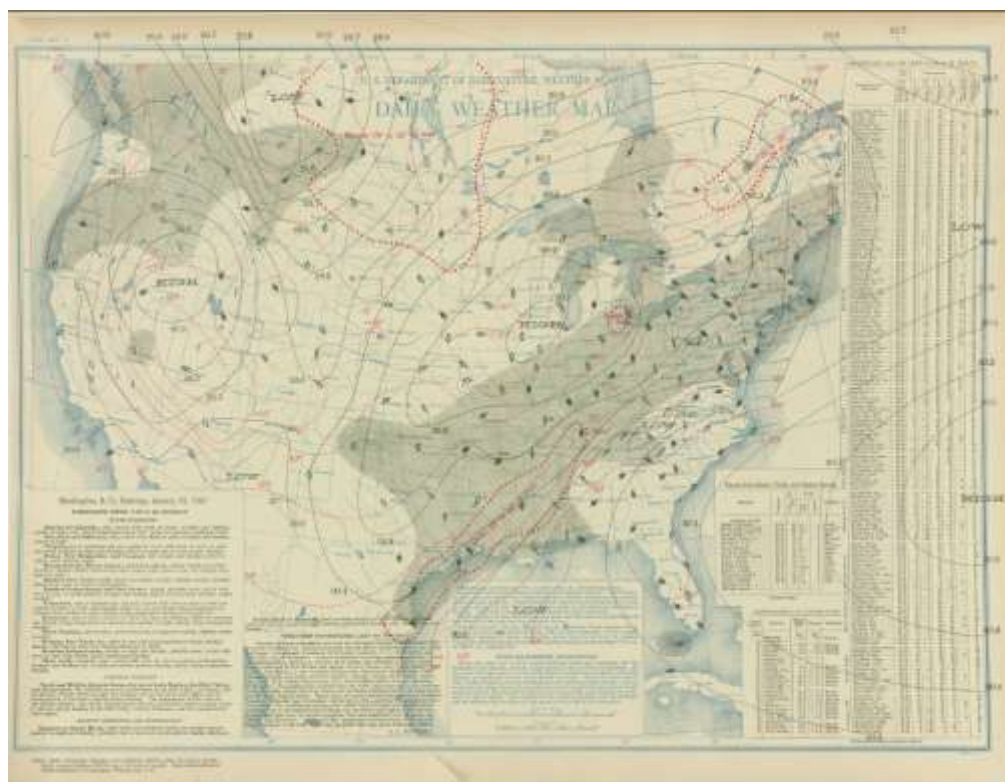


Figure 43: Daily Weather Map for January 23, 1937

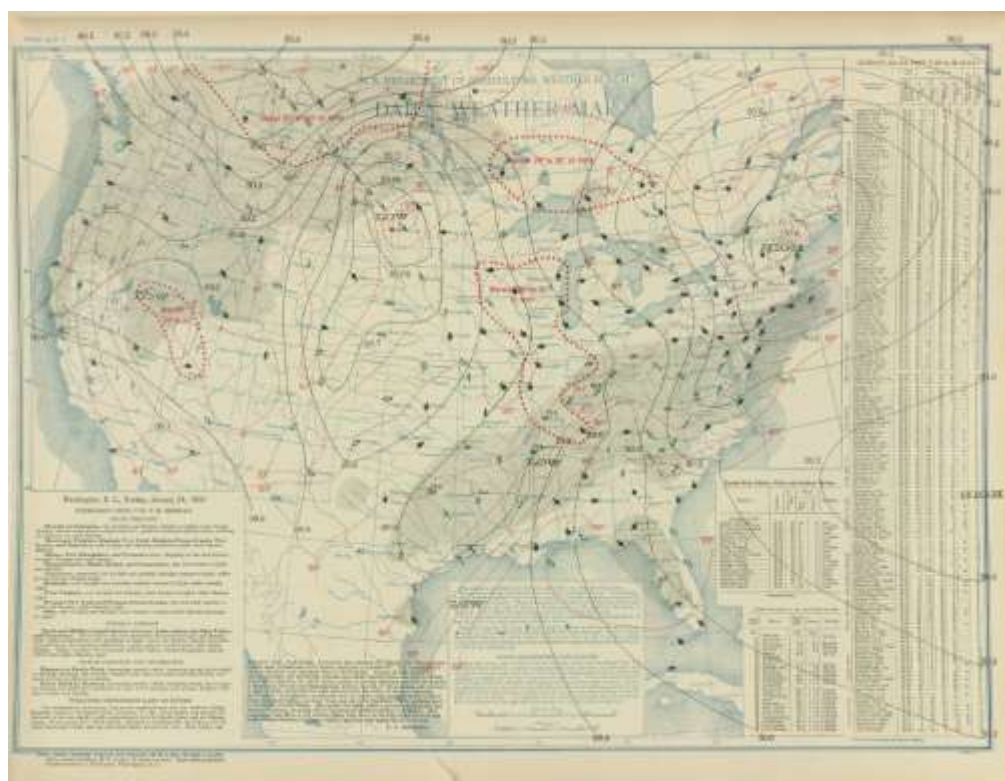


Figure 44: Daily Weather Map for January 24, 1937



Figure 45: Daily Weather Map for January 25, 1937

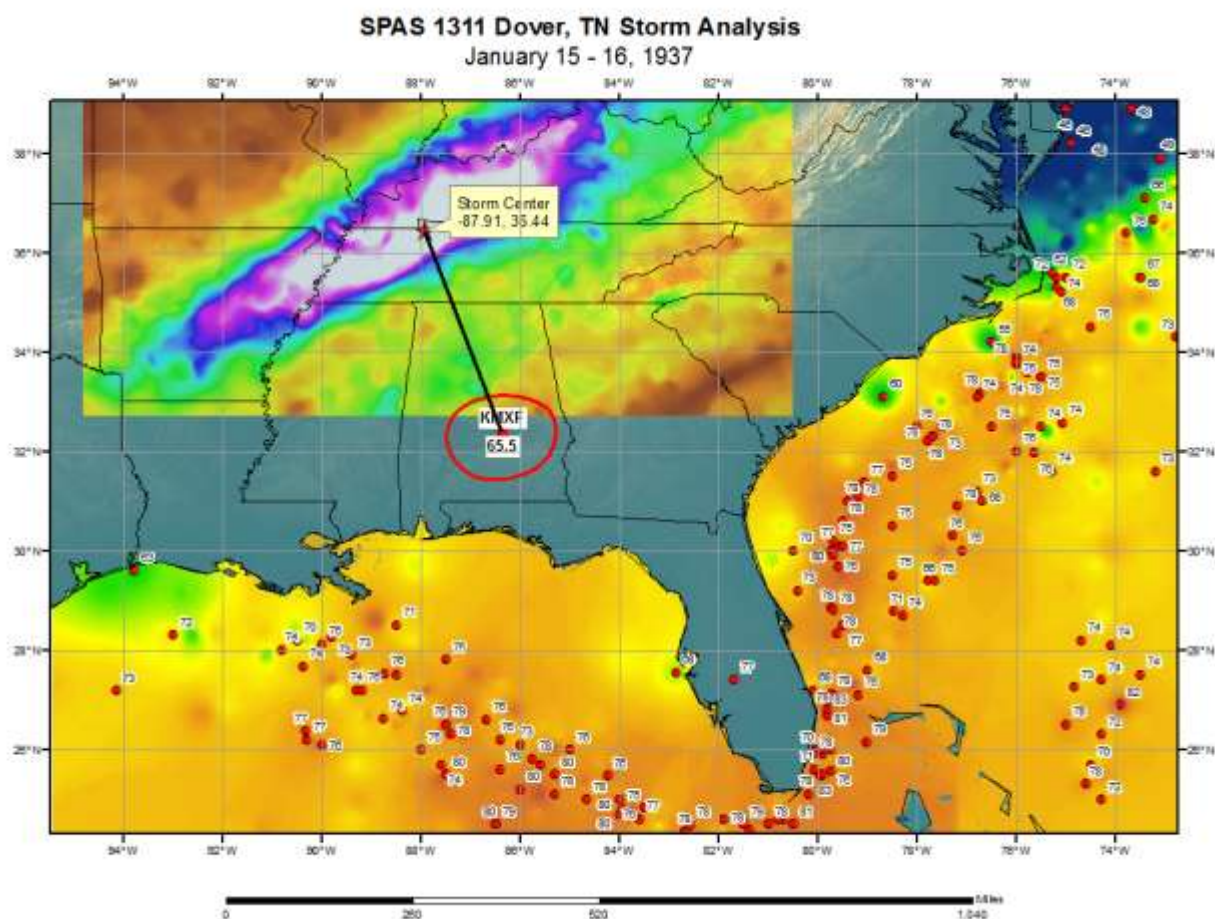


Figure 46: In-place storm representative SST analysis for Mckenzie, TN January 15-16, 1937

Storm Precipitation Analysis System (SPAS) For Storm #1430

General Storm Location: Southeastern Texas/Louisiana border 32.7, -97.5, 28.6, -93.0

Storm Dates: November 22 – November 25, 1940

Event: CORPS of Engineers, US Army Assignment CM 5 – 13

DAD Zone 1

Latitude: 30.1292

Longitude: -96.0542

Max. Grid rainfall amount: 21.29"

Max. Observed rainfall amount: 21.1" (Hempstead, TX)

Number of Stations: 133

SPAS Version: 10.0

Base Map Used: Manually digitized contours using Monthly Weather Review's isohyetal map from a report on this storm.

Spatial resolution: 0.2846

Radar Included: No

Depth-Area-Duration (DAD) analysis: Yes

Reliability of Results: Of the 19 hourly stations used in this analysis, six were manually digitized from either the Army CORPS of Engineers' pertinent data report or from a USGS report of the storm. This provided very high accuracy of the hourly data, which is essential in the timing of the daily and supplemental stations. Of the 55 supplemental stations, 32 were formatted as daily stations. These stations were in the supplemental file due to there being more data on either end of the storm duration as defined for this analysis. For example, if the daily station took measurements in the morning, then there may have been more precipitation reported for the remainder of the storm that was actually part of the following day's observation. Alternatively, if a station had an observation time in the evening then there could have been data not used from the day before that was valid for the period of the storm and could be added to the analysis. With all of the data being thoroughly inspected, the DAD and precipitation pattern following closely to the Army CORPS of Engineers report, and the precipitation totals for various periods throughout the storm being consistent with previous reports, this analysis is considered to be reliable.

					Storm Representative				Climatological Maximum				
SPAS Storm ID	NAME	LON	LAT	ELEV Round	T _a	Precip. Water @	Precip. Water @	Avail. Moisture	T _a	Precip. Water @	Precip. Water @	Avail. Moisture	IPMF
						30,000'	Storm Elev.			30,000'	Storm Elev.		
1430_1	HEMPSTEAD	-96.054	30.129	200	70.50	2.31"	0.05"	2.260	73.5	2.67"	0.05"	2.615	1.16

Storm 1430 - November 22 (0700 UTC) - November 26 (0600 UTC), 1940														
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)														
Area (mi ²)	Duration (hours)													
	1	2	3	4	5	6	12	18	24	36	48	72	96	Total
0.4	4.72	6.46	7.23	7.96	8.35	8.83	11.61	15.91	18.85	21.20	21.26	21.29	21.29	21.29
1	4.70	6.44	7.20	7.94	8.32	8.80	11.57	15.83	18.77	21.10	21.17	21.18	21.18	21.18
10	4.67	6.37	7.13	7.85	8.23	8.72	11.45	15.65	18.56	20.87	20.96	20.97	20.96	20.96
25	4.65	6.34	7.10	7.82	8.19	8.69	11.41	15.58	18.48	20.78	20.88	20.88	20.88	20.88
50	4.64	6.32	7.08	7.80	8.17	8.66	11.38	15.52	18.42	20.71	20.81	20.82	20.81	20.81
100	4.57	6.25	7.01	7.71	8.11	8.53	11.21	15.29	18.15	20.49	20.59	20.64	20.64	20.64
150	4.47	6.12	6.87	7.57	7.97	8.38	11.03	15.06	17.89	20.19	20.30	20.38	20.40	20.40
200	4.35	5.97	6.70	7.41	7.80	8.23	10.82	14.81	17.57	19.91	20.04	20.20	20.22	20.22
300	4.09	5.63	6.34	7.03	7.41	8.00	10.52	14.53	17.03	19.37	19.63	19.93	19.98	19.98
400	3.80	5.25	5.97	6.61	7.18	7.82	10.29	14.32	16.61	18.91	19.34	19.70	19.75	19.75
500	3.54	4.90	5.61	6.41	7.04	7.66	10.09	14.11	16.25	18.55	19.04	19.53	19.57	19.57
1,000	2.76	4.09	4.96	5.78	6.35	6.91	9.25	13.30	15.05	17.23	17.90	18.79	18.84	18.84
2,000	2.03	3.35	4.08	4.76	5.23	5.70	8.23	11.90	13.38	15.58	16.36	17.77	17.87	17.87
3,500	1.65	2.73	3.33	3.89	4.28	4.69	7.11	10.19	11.61	14.01	14.94	16.83	16.96	16.96
5,000	1.41	2.34	2.87	3.37	3.74	4.11	6.26	8.95	10.37	12.85	14.16	16.20	16.34	16.34
7,500	1.15	1.91	2.39	2.84	3.19	3.52	5.35	7.64	9.10	11.37	13.28	15.42	15.57	15.57
10,000	0.97	1.60	2.06	2.46	2.84	3.15	4.84	6.82	8.37	10.58	12.65	14.71	14.88	14.88
15,000	0.73	1.25	1.66	2.01	2.31	2.59	4.26	5.89	7.27	9.52	11.45	13.48	13.68	13.68
20,000	0.58	0.98	1.38	1.67	1.98	2.24	3.88	5.24	6.48	8.65	10.51	12.47	12.70	12.70
35,000	0.38	0.60	0.86	1.09	1.25	1.47	2.82	3.94	4.98	7.01	8.67	10.50	10.74	10.74
50,000	0.27	0.44	0.63	0.81	0.95	1.12	2.17	3.16	4.11	5.92	7.45	9.23	9.44	9.44
75,000	0.18	0.31	0.45	0.56	0.69	0.82	1.53	2.26	2.99	4.35	5.56	7.47	7.64	7.64
75,682	0.18	0.31	0.45	0.55	0.68	0.81	1.52	2.25	2.96	4.32	5.52	7.43	7.60	7.60

Figure 47: Depth-area-duration values for Hempstead, TX November 1940

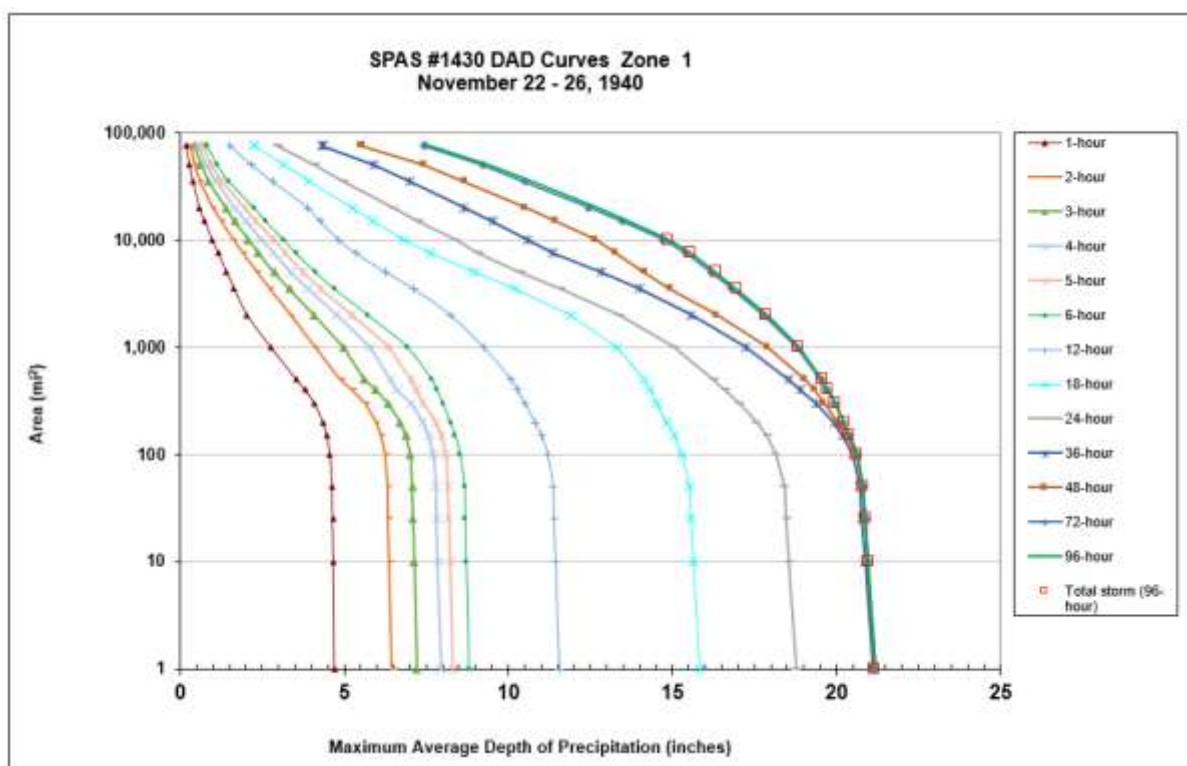


Figure 48: Depth-area-duration chart for Hempstead, TX November 1940

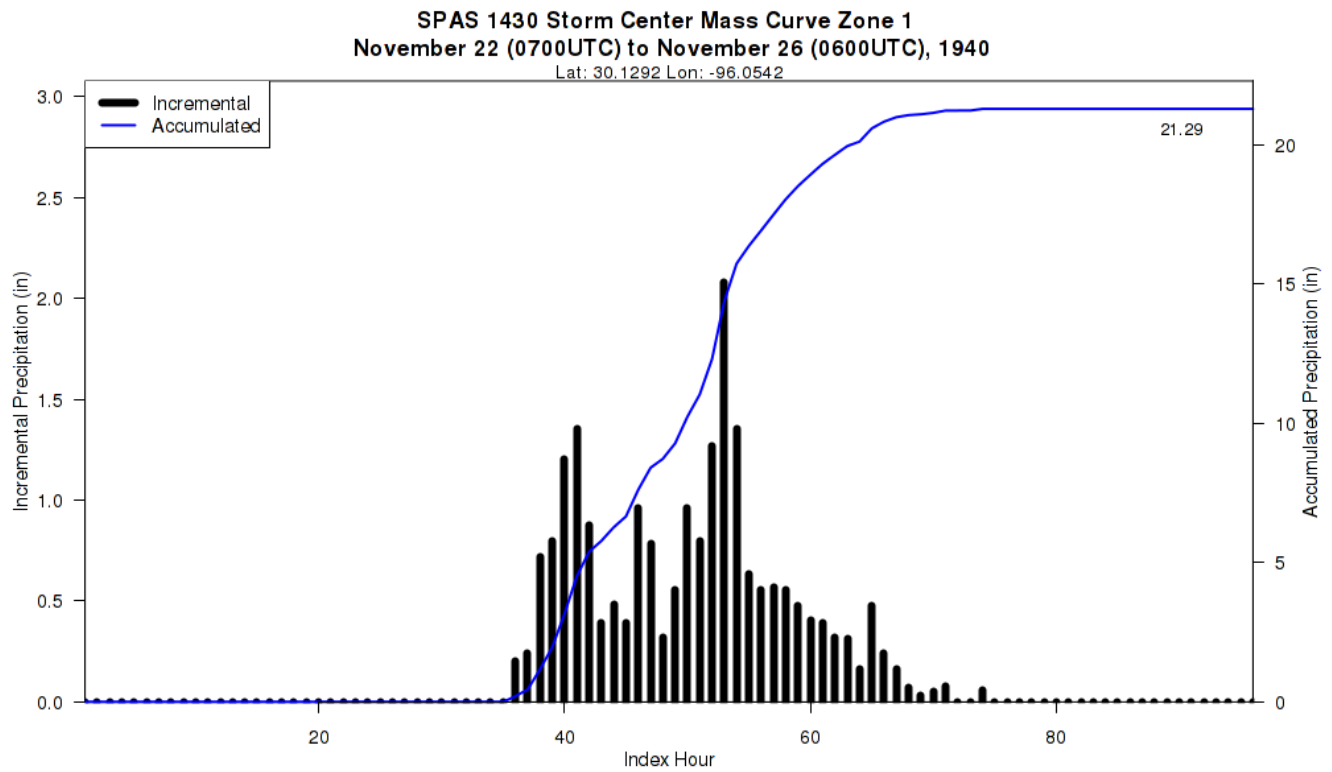


Figure 49: Mass curve chart for Hempstead, TX November 1940

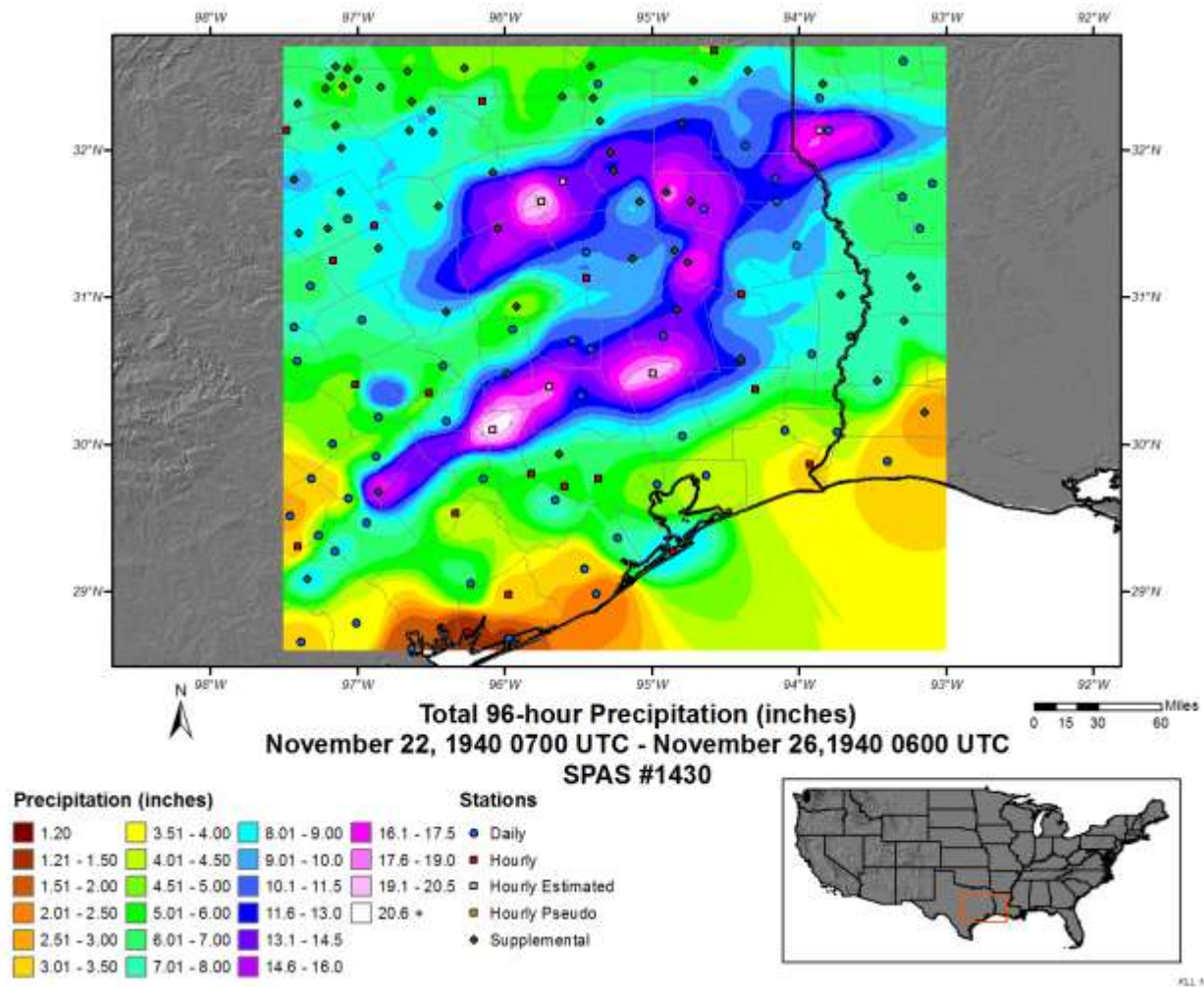


Figure 50: Total storm isohyetal analysis for Hempstead, TX November 1940

DEPARTMENT OF THE ARMY

CORPS OF ENGINEERS

STORM STUDIES - PERTINENT DATA SHEET

Storm of 22-25 November 1940
 Assignment CM 5-13
 Location Texas, Louisiana & Miss.
 Study Prepared by:
 Southwestern Division
 Galveston District

Part I Reviewed by H. M. Sec. of
 Weather Bureau, 3-17-47
 Part II Approved by Office, Chief
 of Engineers for Distribution
 of Factual Data, 3-20-50
 Remarks: Center at Hempstead,
 Texas
 Dewpt. 70°-Ref. Pt. 125 E
 Grid. J-15

DATA AND COMPUTATIONS COMPILED**PART I**

Preliminary isohyetal map, in 1 sheet, scale 1: 1,000,000

Precipitation data and mass curves:

(Number of Sheets)

Form 5001-C (Hourly precip. data)-----	109
Form 5001-B (24-hour " " " ")-----	127
Form 5001-D (" " " " ")-----	0
Misc. precip. records, meteorological data, etc.-----	24
Form 5002 (Mass rainfall curves)-----	127

PART II

Final isohyetal maps, in 1 sheet, scale 1: 1,000,000

Data and computation sheets:

Form S-10 (Data from mass rainfall curves)-----	8
Form S-11 (Depth-area data from isohyetal map)-----	1
Form S-12 (Maximum depth-duration data)-----	15
Maximum duration-depth-area curves-----	1
Data relating to periods of maximum rainfall-----	2

MAXIMUM AVERAGE DEPTH OF RAINFALL IN INCHES

Area in Sq. Mi.	Duration of Rainfall in Hours									
	6	12	18	24	30	36	48	60	72	78
10	9.0	10.5	16.0	18.6	20.2	20.4	20.6	20.8	21.1	21.1
100	7.5	10.0	14.6	17.6	19.1	19.3	19.5	19.7	20.2	20.2
200	7.0	9.7	13.6	16.8	18.4	18.7	18.9	19.1	19.6	19.7
500	6.4	9.2	12.2	15.5	17.0	17.6	17.8	18.2	18.7	18.8
1,000	5.8	8.6	11.1	14.2	15.6	16.3	16.7	17.5	18.0	18.1
2,000	5.0	7.6	10.0	12.7	14.0	14.8	15.7	16.7	17.3	17.5
5,000	3.8	6.0	8.4	10.6	11.7	12.4	14.1	16.4	16.1	16.3
10,000	3.0	4.8	7.0	8.8	9.7	10.5	12.8	14.3	14.8	15.1
20,000	2.0	3.6	5.3	6.7	7.6	8.7	11.0	12.5	13.0	13.2
50,000	1.2	2.4	3.4	4.4	5.3	6.3	8.0	9.2	9.9	10.0
78,000	1.0	1.9	2.8	3.6	4.4	5.2	6.6	7.8	8.4	8.5

Form S-2

Figure 51: USACE Depth-area-duration values for Hempstead, TX November 1940

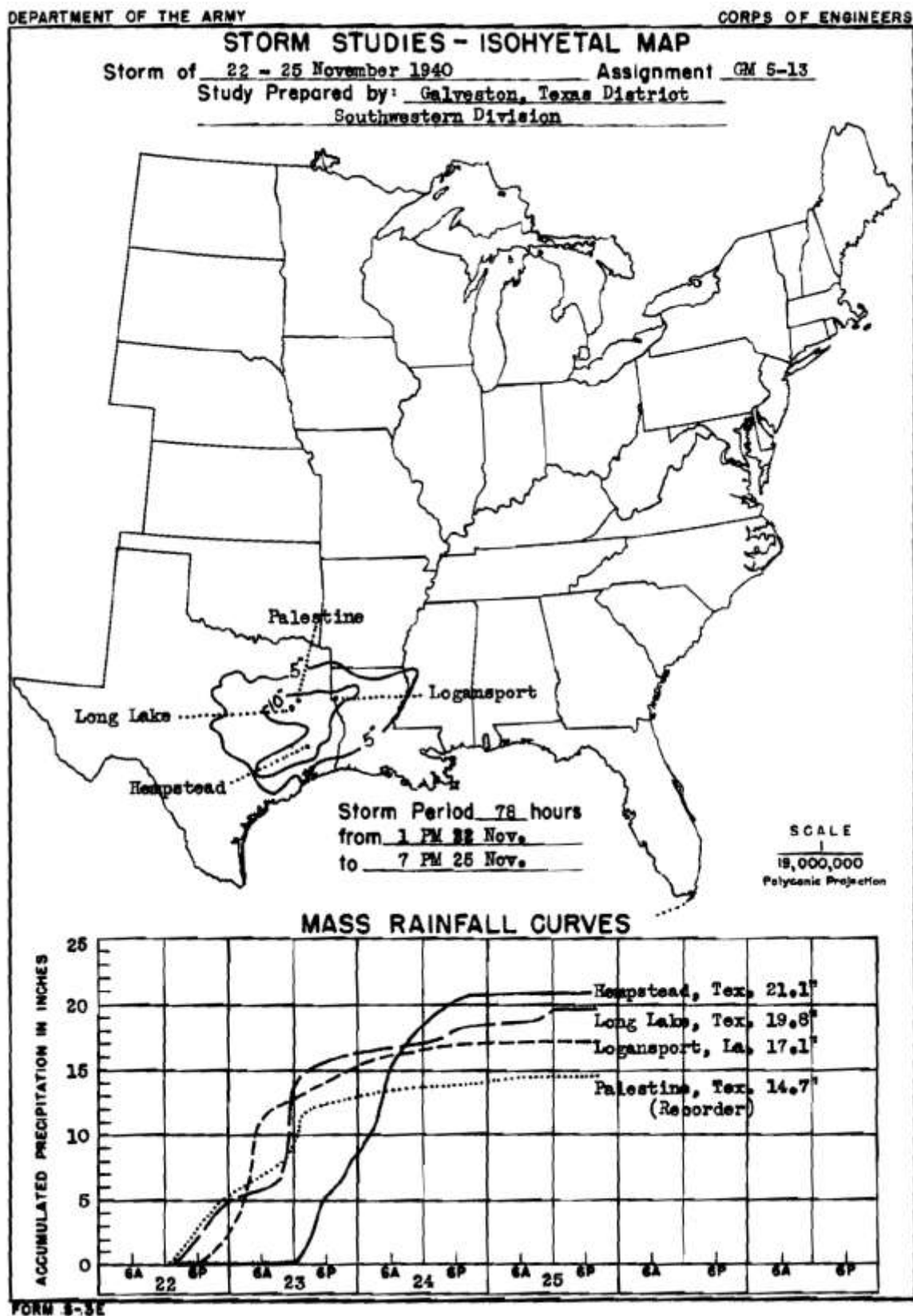


Figure 52: USACE Total storm isohyetal and mass curve chart for Hempstead, TX November 1940

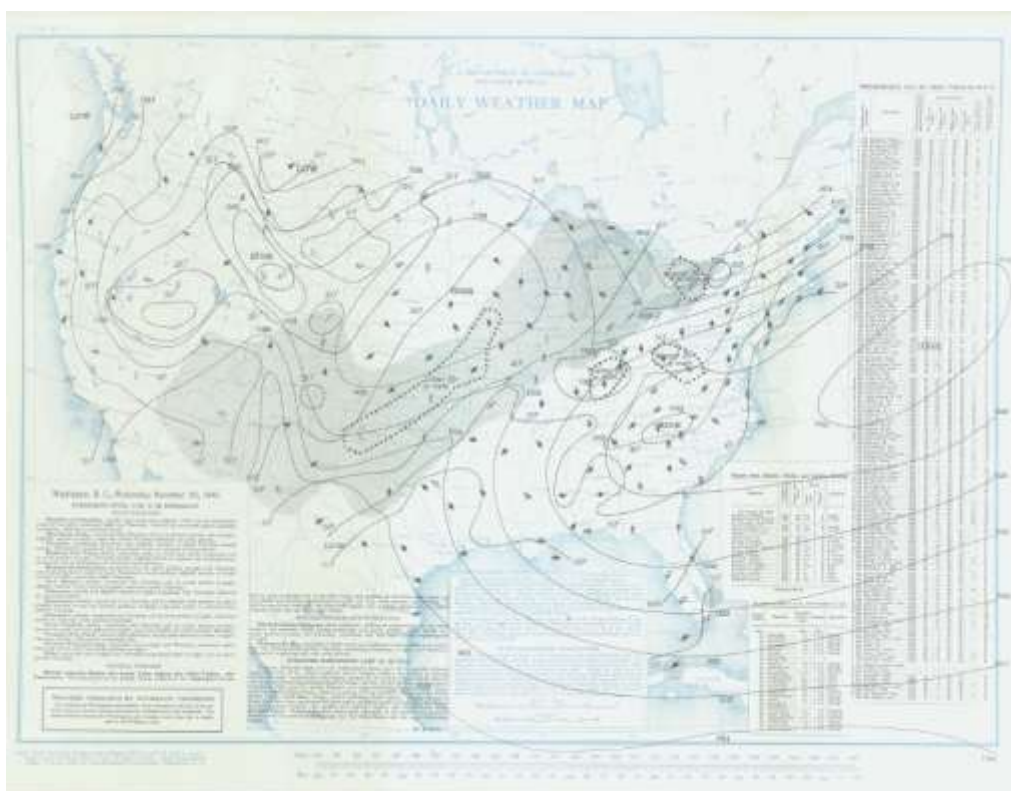


Figure 53 Daily Weather Map for November 20, 1940

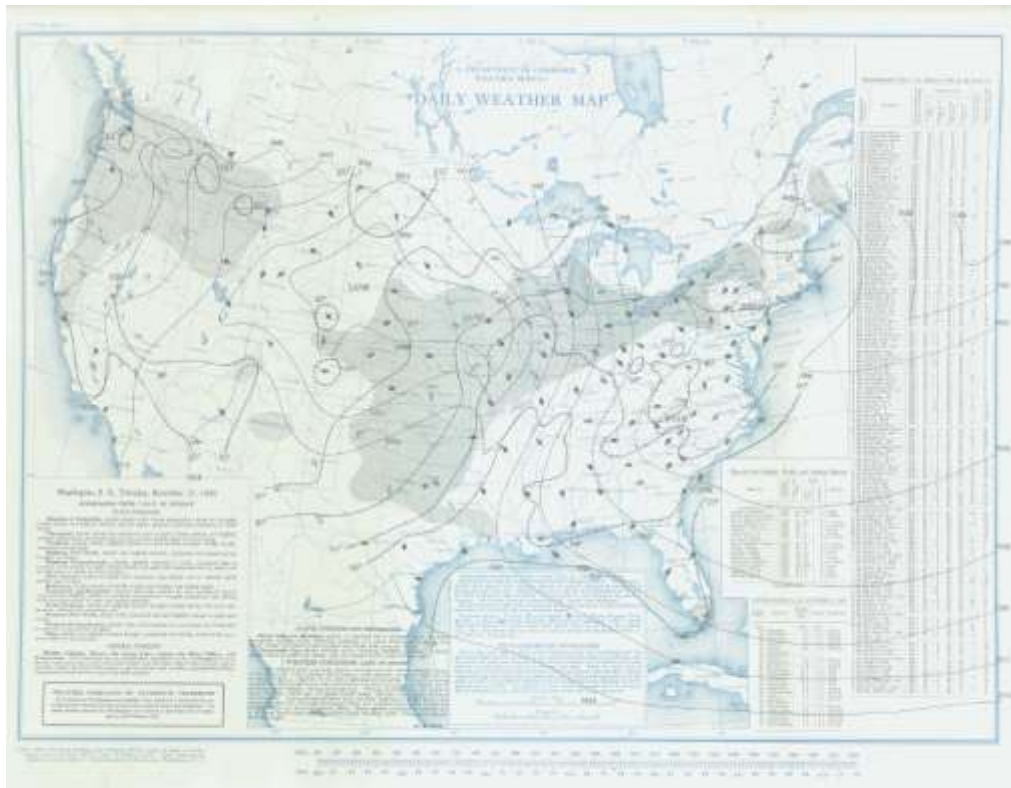


Figure 54 Daily Weather Map for November 21, 1940

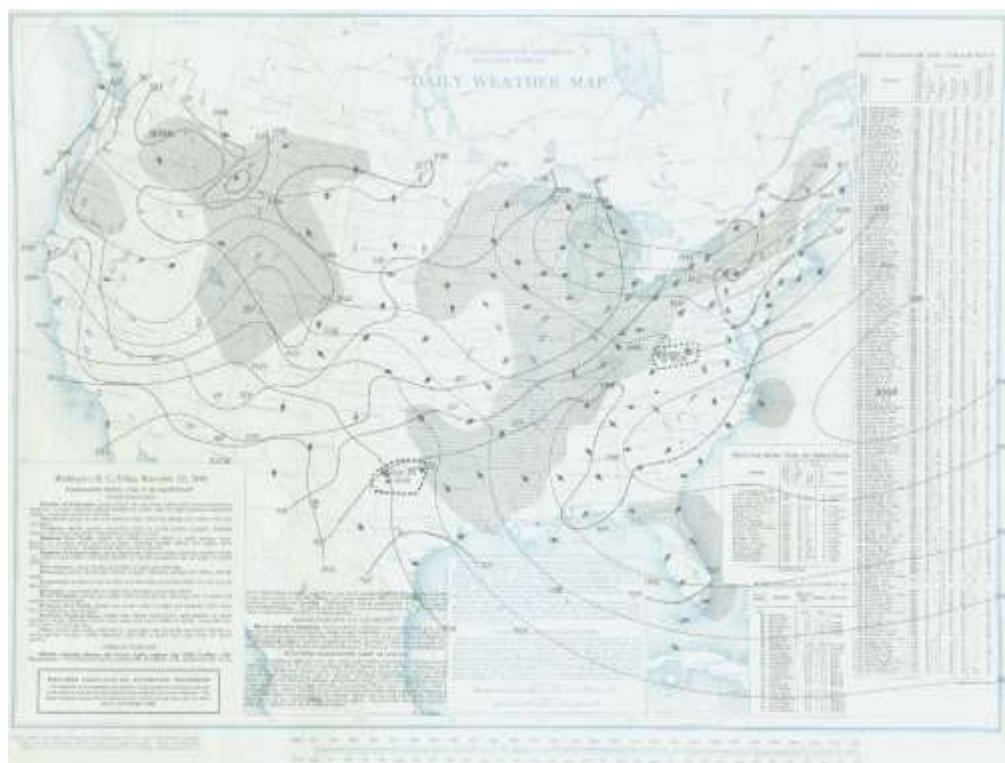


Figure 55 Daily Weather Map for November 22, 1940

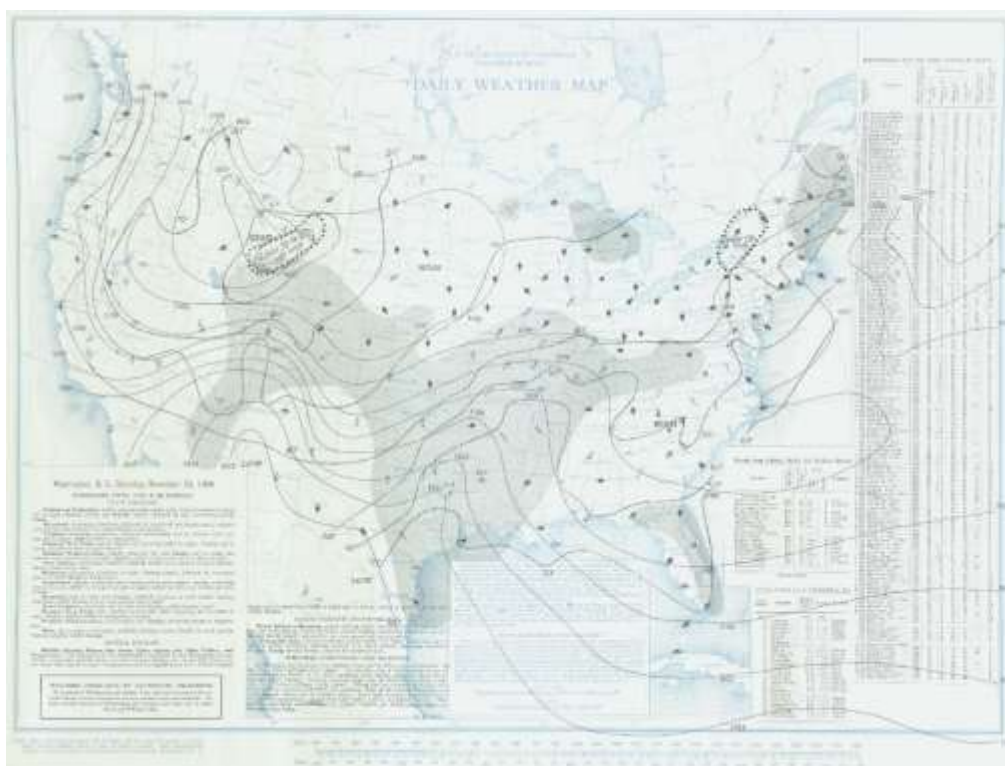


Figure 56 Daily Weather Map for November 23, 1940

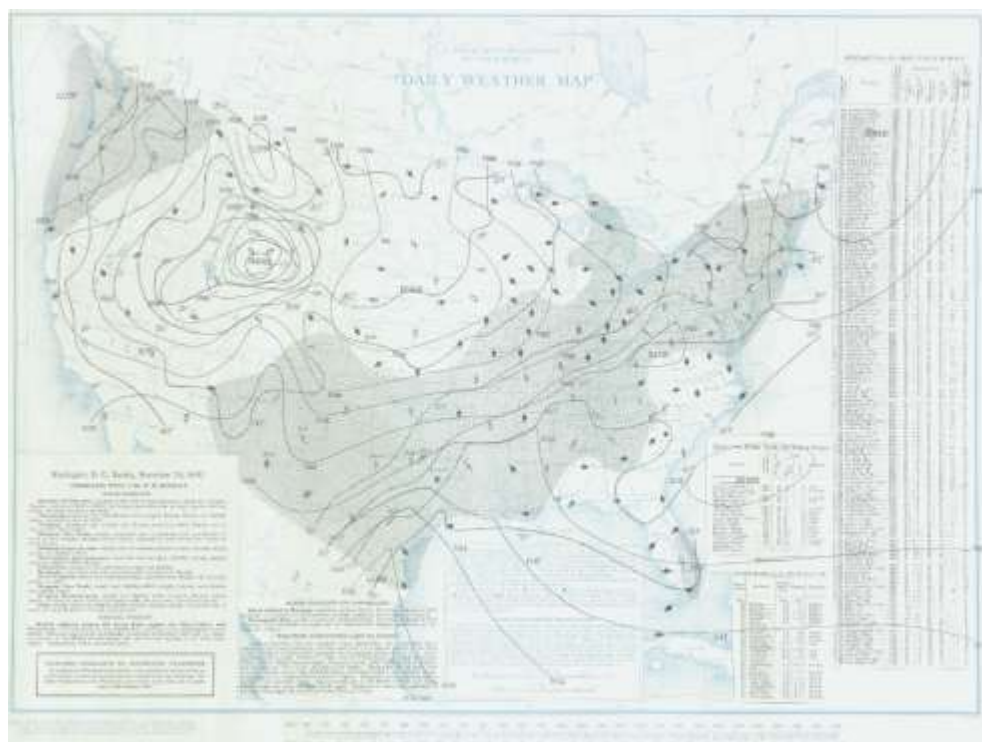


Figure 57 Daily Weather Map for November 24, 1940

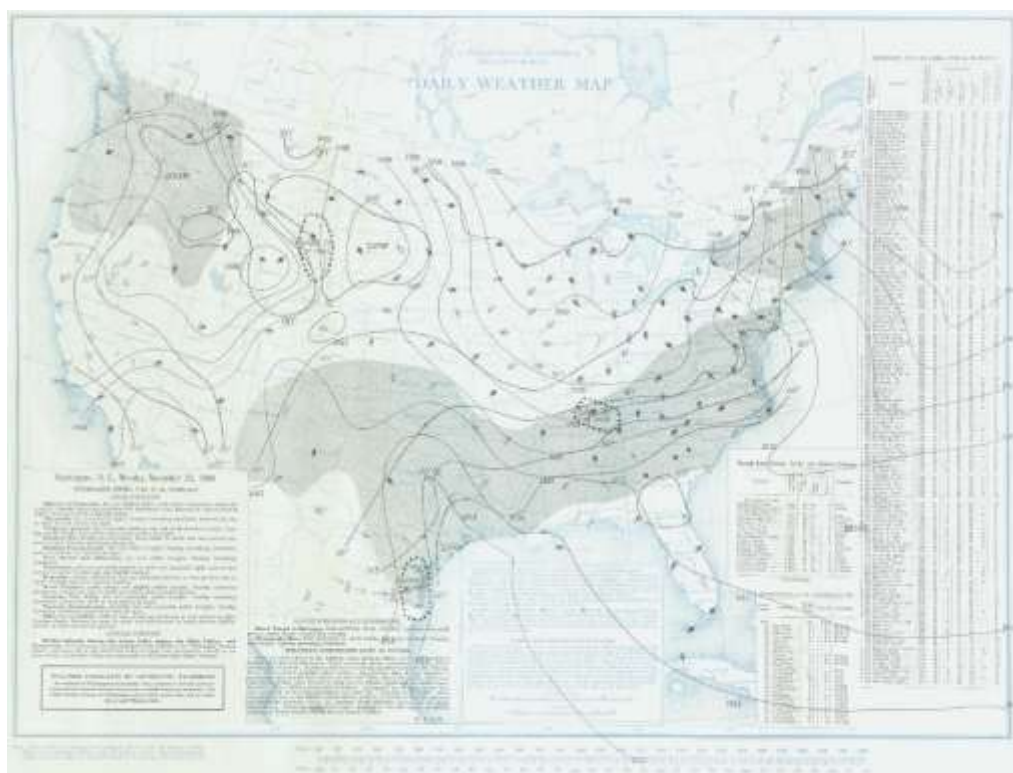


Figure 58 Daily Weather Map for November 25, 1940

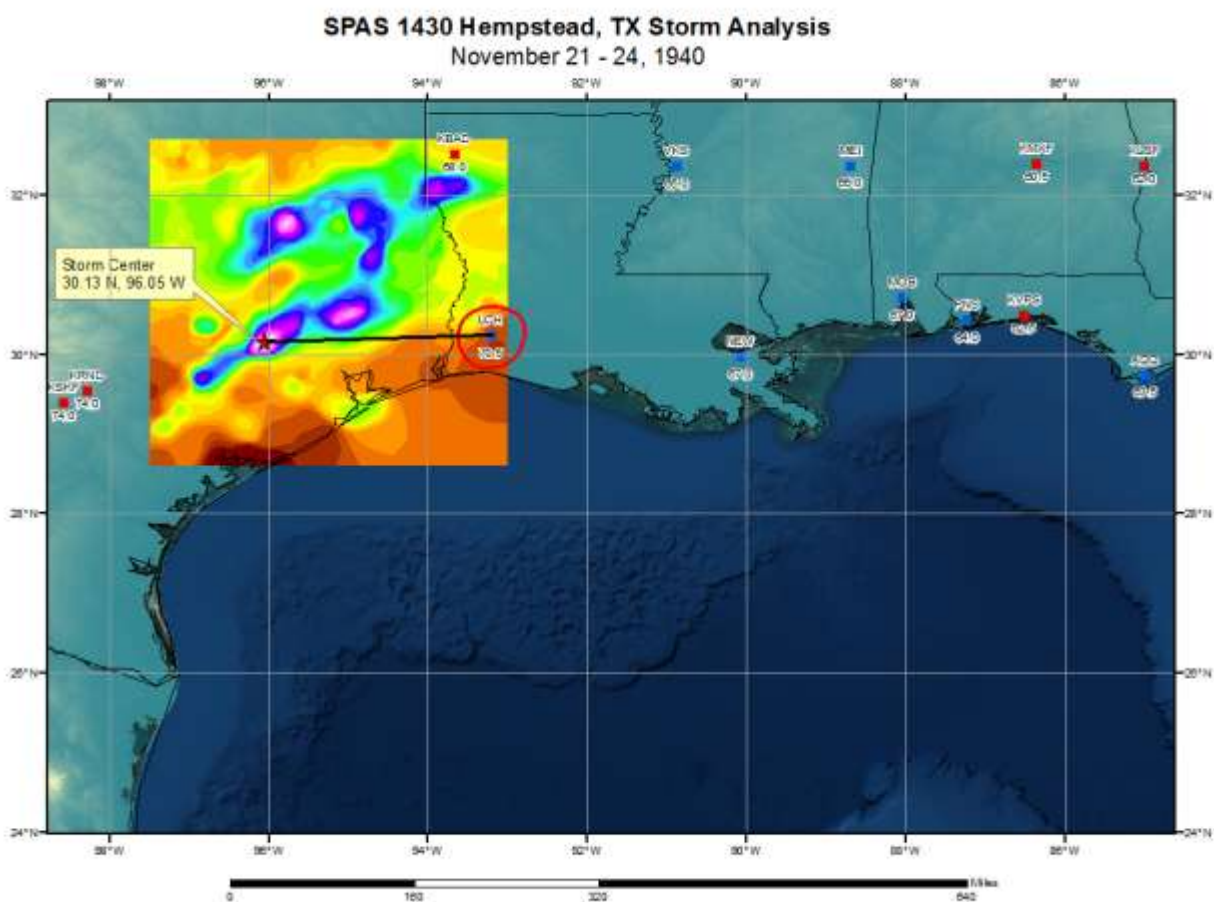


Figure 59: In-place storm representative dew point analysis for Hempstead, TX November 21-24, 1940

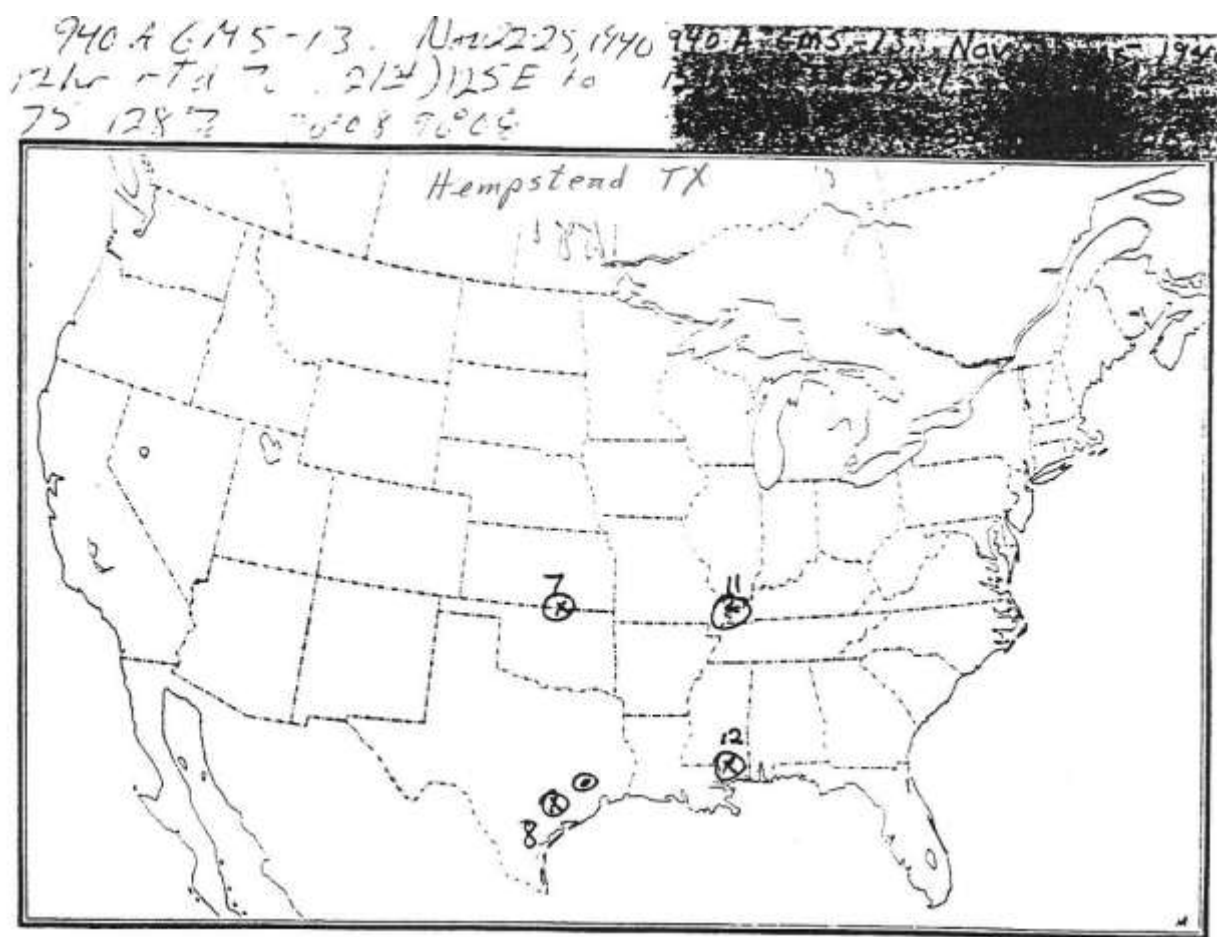


Figure 60: NWS Transposition Map for Hempstead, TX November 1940

Storm Precipitation Analysis System (SPAS) For Storm #1587

General Storm Location: Prairieview, NM

Storm Dates: May 21 – May 26, 1941

Event: Mid-latitude cyclone (MLC)

DAD Zone 1

Latitude: 33.1375

Longitude: -103.0792

Max. Grid rainfall amount: 11.08"

Max. Observed rainfall amount: 10.79"

Number of Stations: 665

SPAS Version: 10.0

Base Map Used: Mean annual maximum 48-hour precipitation associated with MLCs

Spatial resolution: 0.2735

Radar Included: No

Depth-Area-Duration (DAD) analysis: Yes

Reliability of Results: In addition to the NCDC stations, there were also four hourly stations added via digitizing some of the stations listed in the ACE report. With the density of stations available for this storm and with how closely the resulting SPAS analysis was to the ACE report, this analysis is deemed quite reliable.

SPAS Storm ID	NAME	LON	LAT	ELEV Round	Storm Representative				Climatological Maximum				IPMF
					T _a	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	T _a	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	
1587_1	PRAIRIEVIEW	-103.079	33.138	3,800	71.00	2.36"	0.75"	1.610	78.5	3.37"	0.98"	2.390	1.48

Storm 1587 - May 20 (0700 UTC) - May 27 (0600 UTC), 1941																	
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)																	
Area (mi ²)	Duration (hours)																
	1	2	3	4	5	6	12	18	24	36	48	72	96	120	144	168	Total
0.4	1.90	2.60	3.40	3.66	3.80	3.86	4.40	5.54	6.01	7.44	8.20	10.55	10.85	11.08	11.06	11.08	11.08
1	1.90	2.59	3.39	3.65	3.78	3.84	4.39	5.52	6.00	7.42	8.17	10.50	10.81	11.05	11.03	11.05	11.05
10	1.90	2.56	3.36	3.61	3.74	3.81	4.34	5.46	5.94	7.32	8.11	10.38	10.69	10.95	10.94	10.95	10.95
25	1.89	2.55	3.35	3.59	3.72	3.79	4.32	5.43	5.92	7.29	8.08	10.33	10.64	10.91	10.90	10.91	10.91
50	1.88	2.54	3.31	3.58	3.70	3.77	4.31	5.41	5.90	7.26	8.06	10.29	10.61	10.88	10.88	10.88	10.88
100	1.88	2.53	3.22	3.47	3.60	3.66	4.27	5.38	5.88	7.21	8.05	10.21	10.51	10.85	10.85	10.85	10.85
150	1.87	2.49	3.13	3.37	3.49	3.55	4.22	5.31	5.77	7.11	8.03	10.07	10.38	10.83	10.83	10.84	10.84
200	1.87	2.44	3.05	3.28	3.40	3.48	4.18	5.25	5.66	7.05	7.99	9.97	10.29	10.82	10.82	10.83	10.83
300	1.87	2.35	2.93	3.16	3.27	3.42	4.10	5.15	5.58	6.91	7.86	9.78	10.17	10.79	10.80	10.80	10.80
400	1.86	2.27	2.85	3.07	3.18	3.37	4.05	5.08	5.51	6.80	7.72	9.64	10.06	10.68	10.69	10.69	10.69
500	1.85	2.23	2.79	3.00	3.11	3.33	4.00	5.02	5.44	6.73	7.61	9.53	9.98	10.59	10.60	10.60	10.60
1,000	1.70	2.08	2.60	2.79	2.95	3.19	3.84	4.80	5.20	6.46	7.25	9.09	9.69	10.20	10.22	10.22	10.22
2,000	1.33	1.79	2.38	2.56	2.77	3.00	3.63	4.47	4.88	6.09	6.85	8.47	9.29	9.74	9.78	9.79	9.79
3,500	1.07	1.59	2.12	2.38	2.57	2.77	3.38	4.11	4.54	5.69	6.51	7.84	8.94	9.38	9.43	9.45	9.45
5,000	1.02	1.52	1.94	2.23	2.40	2.60	3.18	3.84	4.27	5.41	6.25	7.46	8.63	9.16	9.21	9.23	9.23
7,500	0.95	1.40	1.79	2.05	2.19	2.38	2.92	3.49	3.94	5.00	5.83	6.94	8.19	8.66	8.94	8.97	8.97
10,000	0.87	1.29	1.64	1.87	1.99	2.17	2.68	3.19	3.67	4.64	5.48	6.55	7.89	8.58	8.69	8.72	8.72
15,000	0.75	1.10	1.38	1.57	1.67	1.83	2.33	2.73	3.28	4.04	4.85	5.94	7.31	8.00	8.20	8.24	8.24
20,000	0.64	0.94	1.18	1.34	1.45	1.59	2.09	2.42	2.95	3.61	4.37	5.42	6.79	7.52	7.73	7.78	7.78
35,000	0.44	0.65	0.83	0.93	1.04	1.12	1.60	1.94	2.26	2.75	3.42	4.42	5.63	6.29	6.62	6.69	6.69
50,000	0.32	0.48	0.60	0.71	0.78	0.85	1.30	1.66	1.84	2.32	2.84	3.83	4.83	5.44	5.77	5.84	5.84
75,000	0.22	0.33	0.41	0.51	0.57	0.61	0.95	1.32	1.45	1.86	2.35	3.14	3.91	4.49	4.77	4.86	4.86
100,000	0.17	0.25	0.32	0.39	0.44	0.47	0.75	1.10	1.21	1.56	2.00	2.67	3.29	3.78	4.02	4.13	4.13
126,432	0.13	0.20	0.26	0.31	0.35	0.38	0.62	0.92	1.02	1.31	1.69	2.24	2.75	3.18	3.40	3.52	3.52

Figure 61: Depth-area-duration values for Prairieview, NM May 1941

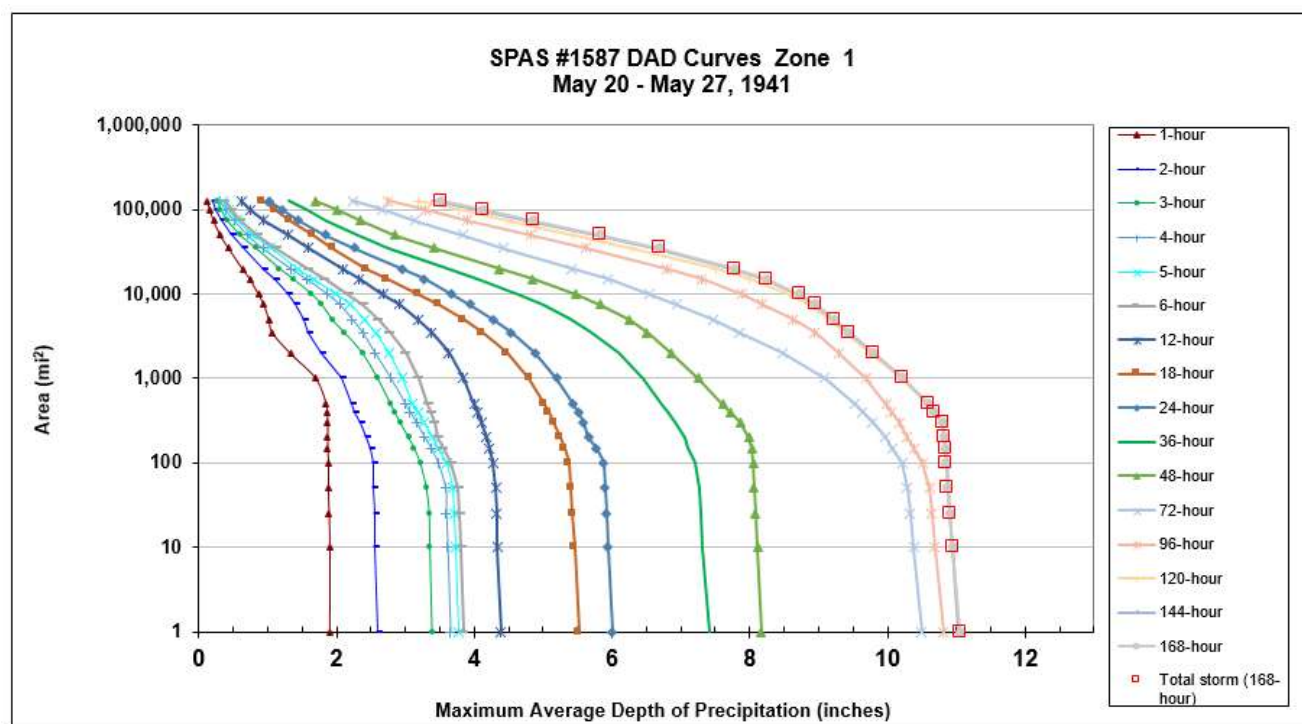


Figure 62: Depth-area-duration chart for Prairieview, NM May 1941

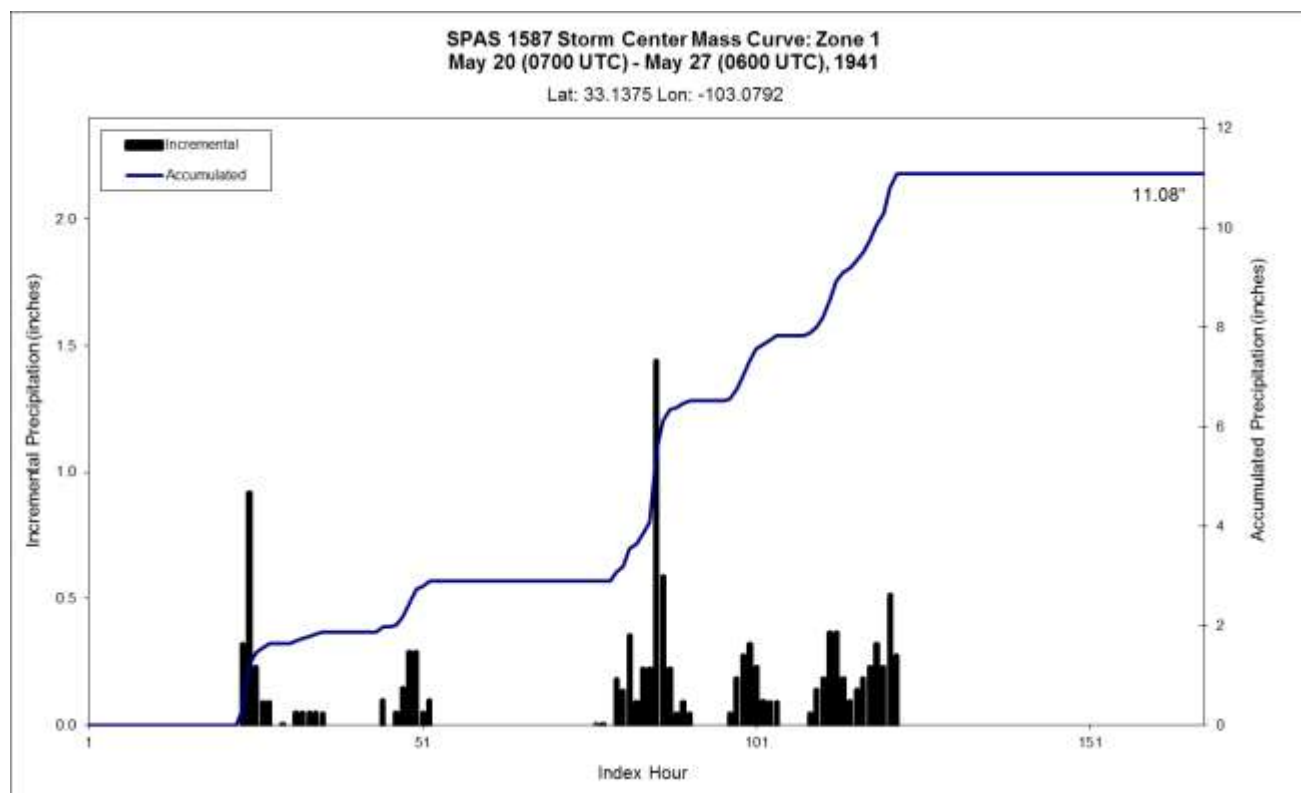


Figure 63: Mass curve chart for Prairieview, NM May 1941

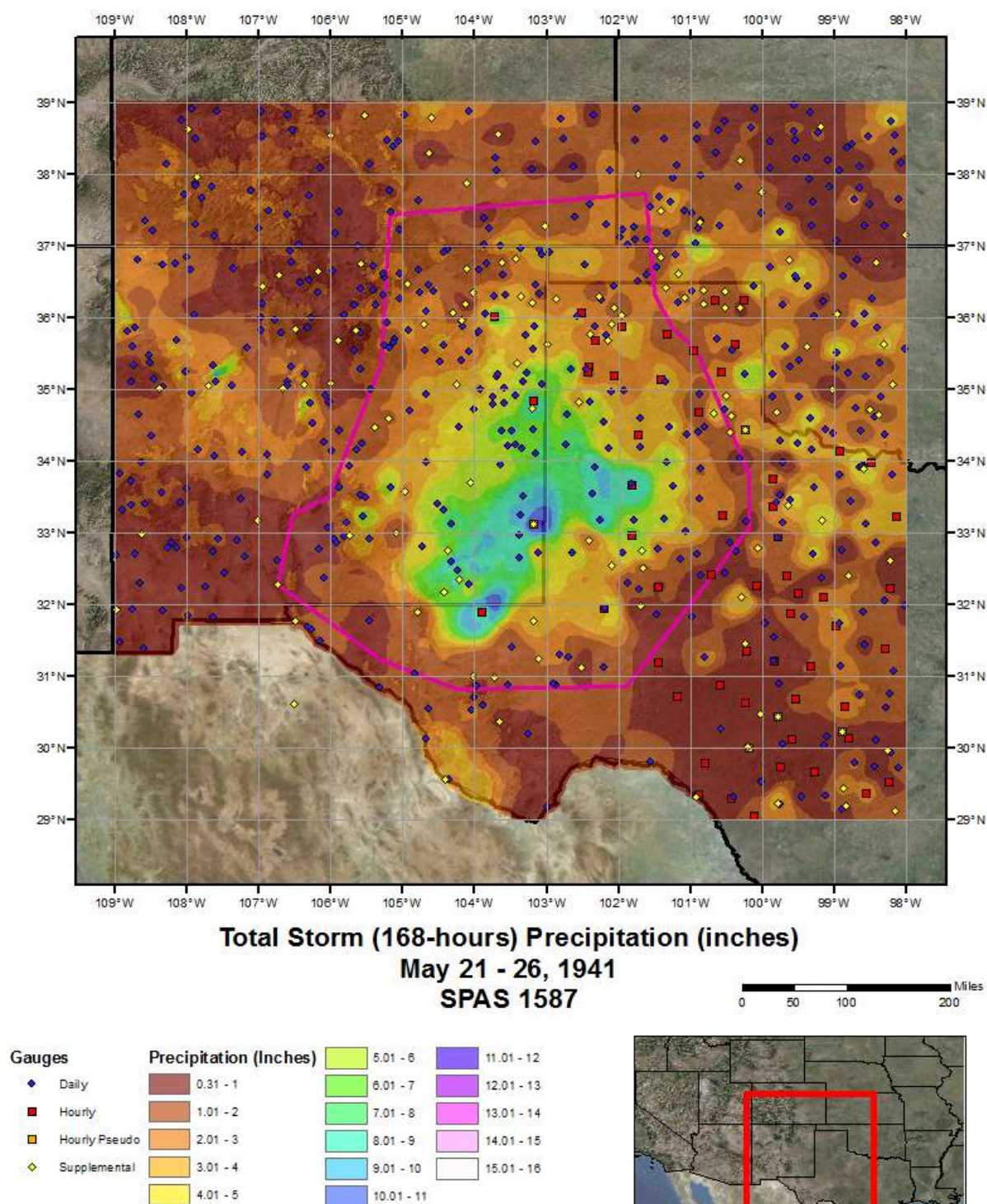


Figure 64: Total storm isohyetal analysis for Prairieview, NM May 1941

WAR DEPARTMENT

CORPS OF ENGINEERS, U.S. ARMY

STORM STUDIES - PERTINENT DATA SHEET

Storm of May 20-25, 1941
 Assignment GM 5-18
 Location Texas and New Mexico
 Study Prepared by:
 Southwestern Division
 Galveston District Office

Part I Reviewed by H. M. Sec. of
 Weather Bureau, 7/18/43
 Part II Approved by Office, Chief
 of Engineers for Distribution
 of Factual Data, 2/18/44
 Remarks: Center at
 Prairieview, New Mexico

DATA AND COMPUTATIONS COMPILED**PART I**

Preliminary isohyetal map, in 1 sheet, scale 1:1,000,000

Precipitation data and mass curves:

(Number of Sheets)

Form 5001-C (Hourly precip. data)-----	76
Form 5001-B (24-hour " " " ")-----	-
Form 5001-D (" " " " " ")-----	26
Misc. precip. records, meteorological data, etc. (Hydrologic Network Special Supp.)-----	10
Form 5002 (Mass rainfall curves)-----	78

PART II

Final isohyetal maps, in 1 sheet, scale 1:1,000,000

Data and computation sheets:

Form S-10 (Data from mass rainfall curves)-----	4
Form S-11 (Depth-area data from isohyetal map)-----	2
Form S-12 (Maximum depth-duration data)-----	15
Maximum duration-depth-area curves-----	1
Data relating to periods of maximum rainfall-----	2

MAXIMUM AVERAGE DEPTH OF RAINFALL IN INCHES

Area in Sq. Mi.	Duration of Rainfall in Hours										
	6	12	18	24	30	36	48	60	72	96	108
10	3.8	4.8	6.0	6.5	6.9	7.0	7.4	7.4	8.4	9.3	10.0
100	3.0	4.0	5.2	6.3	6.7	6.8	6.9	7.0	8.1	9.0	9.6
200	2.7	3.7	4.7	6.0	6.4	6.6	6.7	6.9	8.0	8.8	9.5
500	2.3	3.3	4.1	5.4	5.8	6.1	6.4	6.7	7.7	8.6	9.2
1,000	2.1	3.0	3.7	4.9	5.3	5.7	6.1	6.4	7.5	8.4	9.0
2,000	1.8	2.7	3.2	4.3	4.7	5.2	5.7	6.1	7.2	8.1	8.7
5,000	1.4	2.2	2.7	3.5	3.9	4.4	5.0	5.6	6.6	7.6	8.2
10,000	1.2	1.9	2.2	2.9	3.2	3.7	4.4	5.0	5.9	7.0	7.6
20,000	0.9	1.5	1.8	2.3	2.6	3.0	3.7	4.3	5.1	6.2	6.7
44,000	0.6	1.1	1.3	1.5	1.8	2.1	2.7	3.4	3.9	4.9	5.2

Form 3-2

Figure 65: USACE Depth-area-duration values for Prairieview, NM May 1941

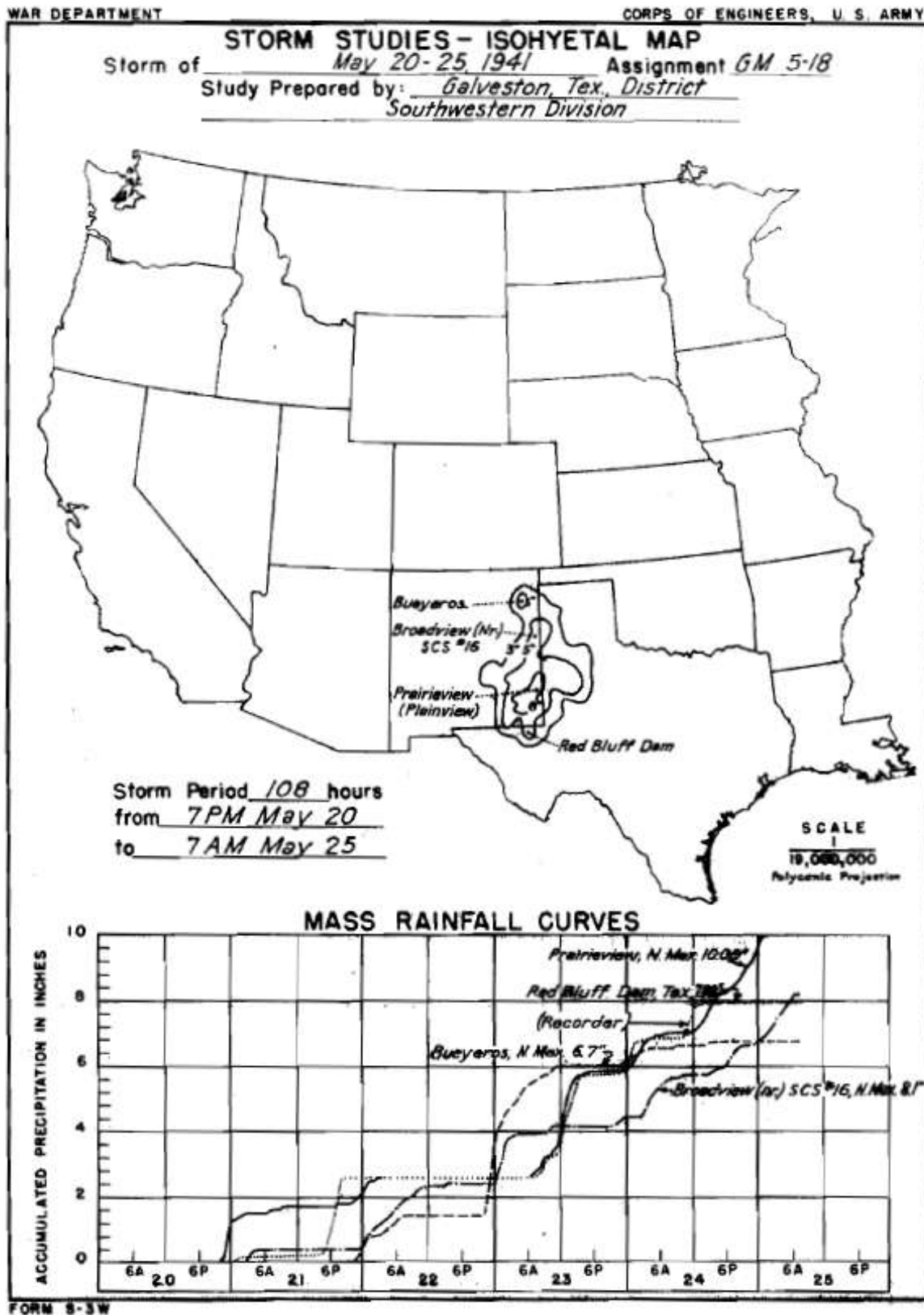


Figure 66: USACE Total storm isohyetal and mass curve chart for Prairieview, NM May 1941

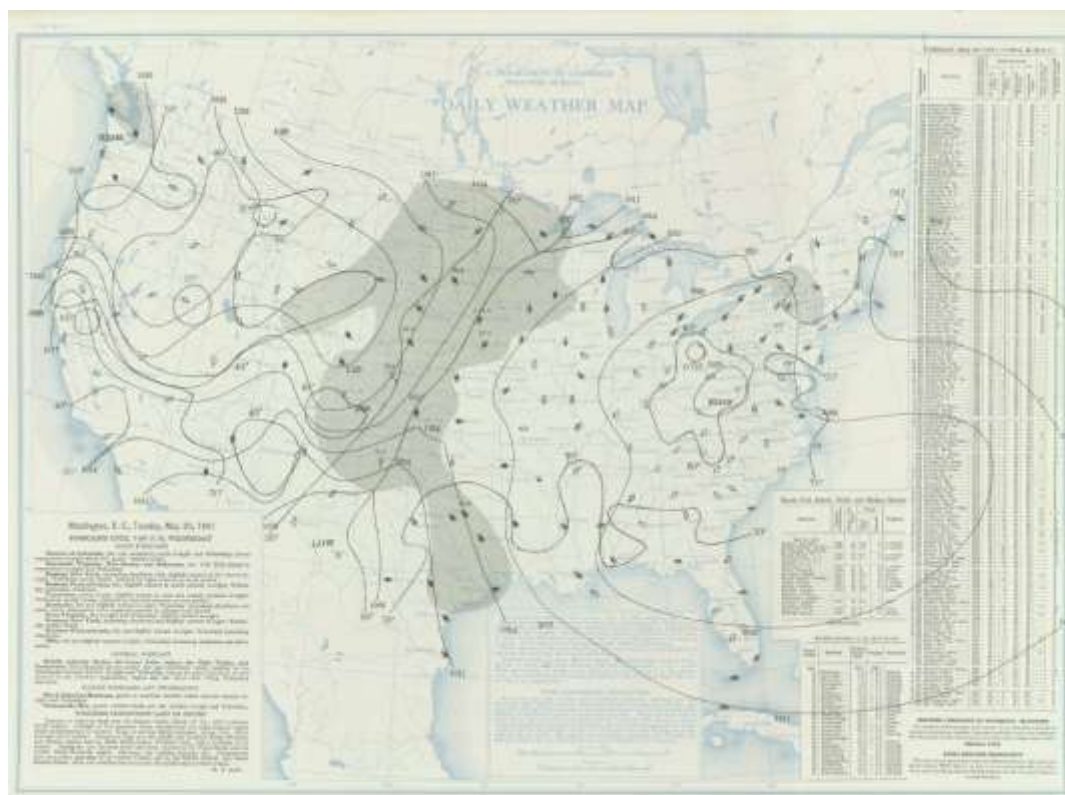


Figure 67: Daily weather map for Prairieview, NM May 20, 1941

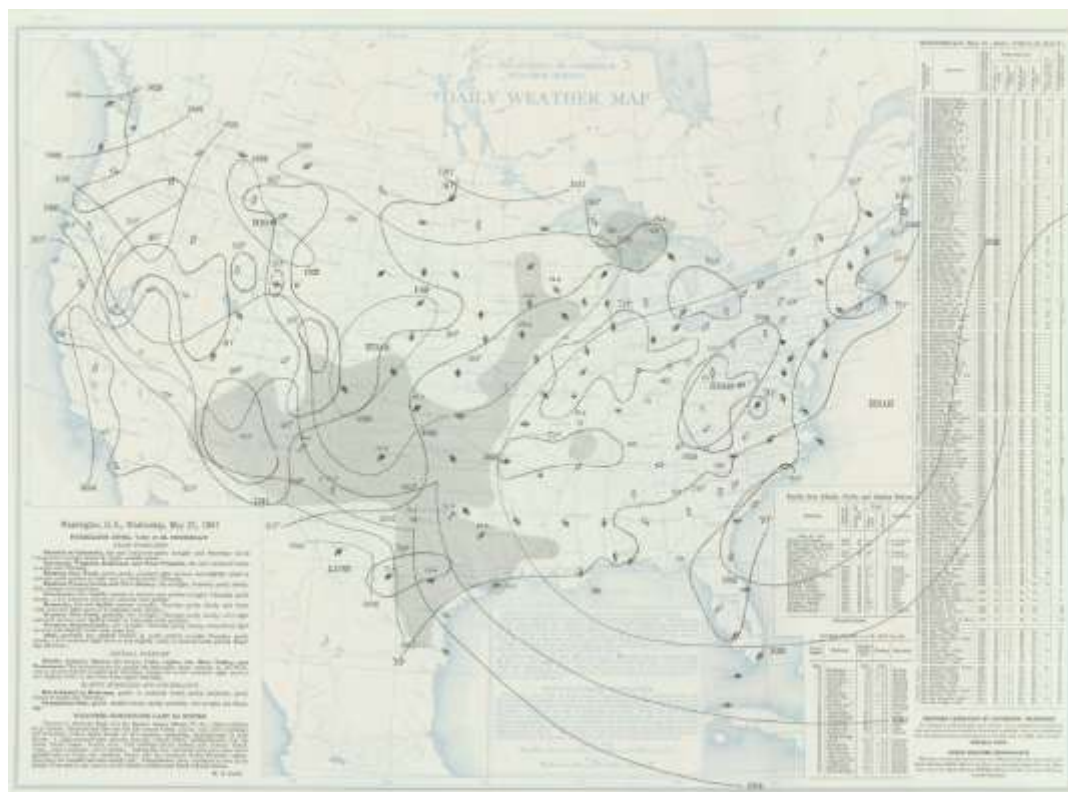


Figure 68: Daily weather map for Prairieview, NM May 21, 1941

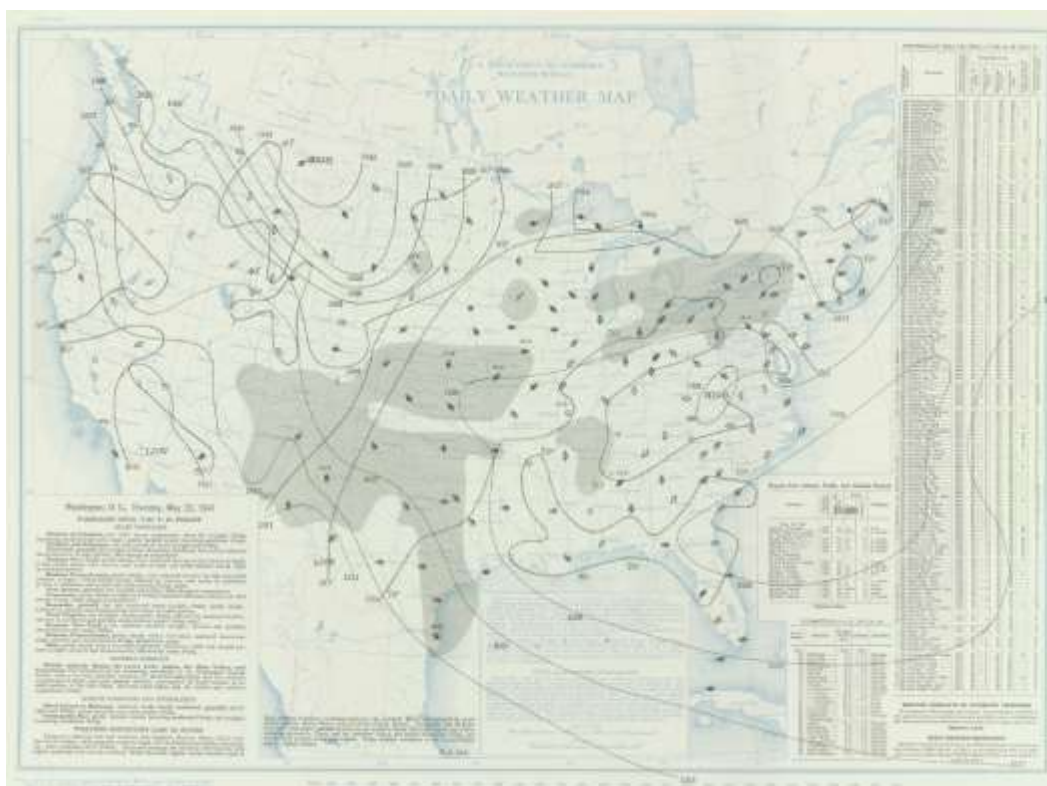


Figure 69: Daily weather map for Prairieview, NM May 22, 1941

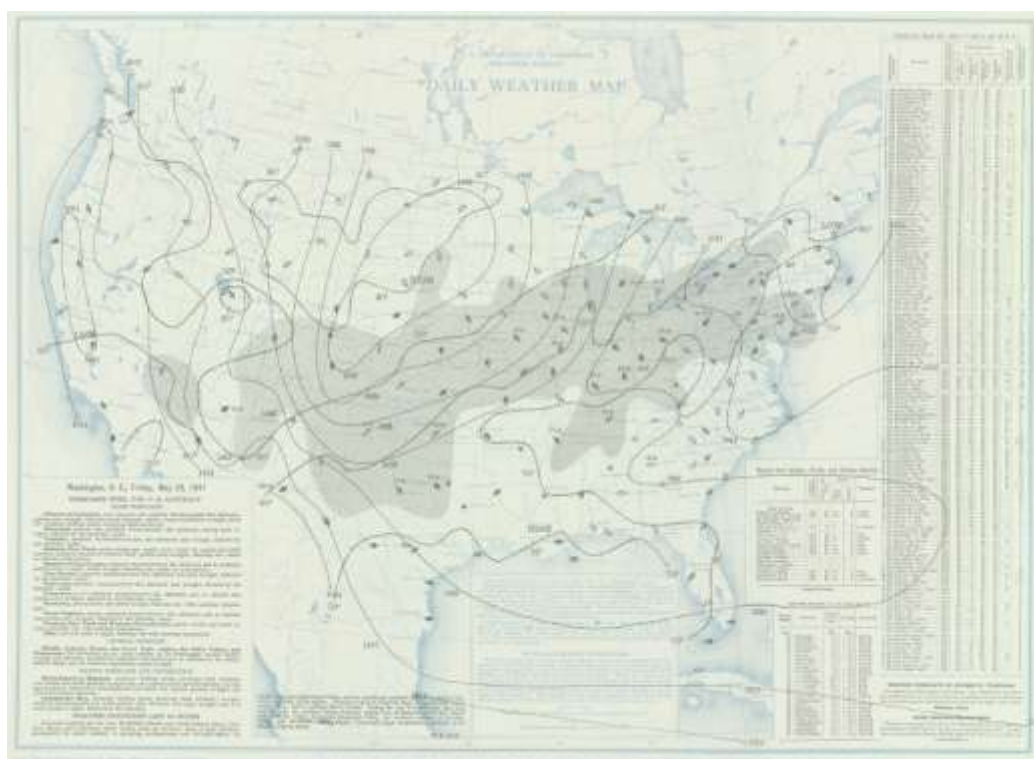


Figure 70: Daily weather map for Prairieview, NM May 23, 1941

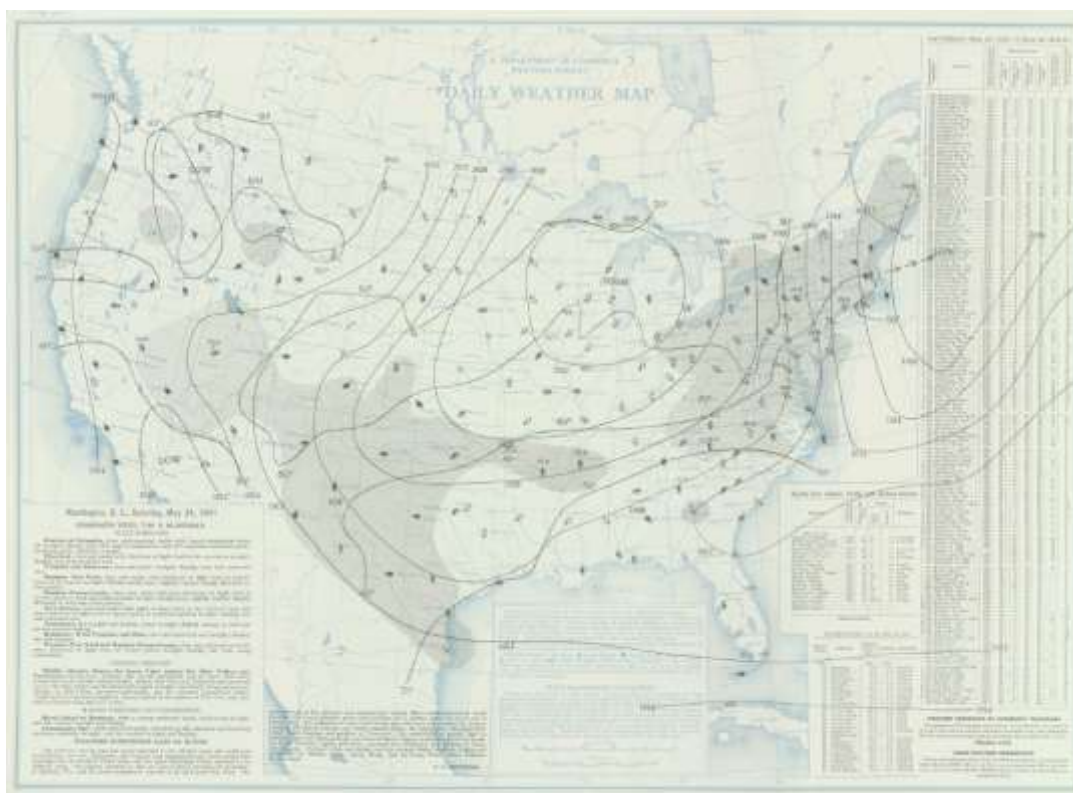


Figure 71: Daily weather map for Prairieview, NM May 24, 1941

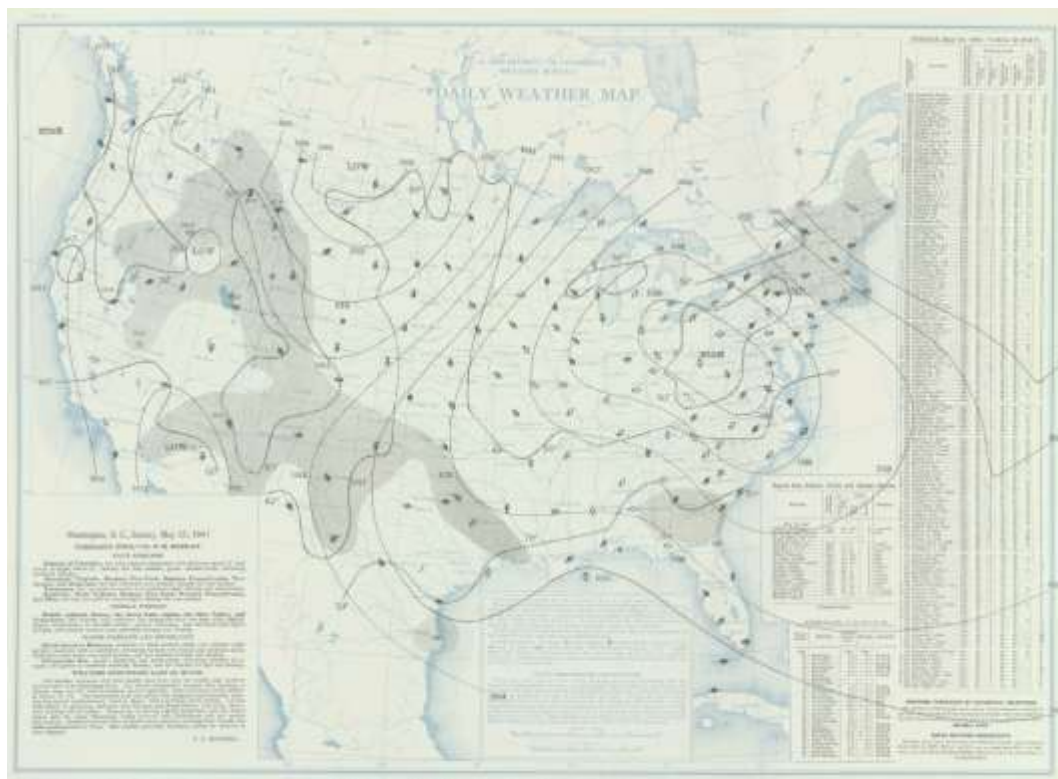


Figure 72: Daily weather map for Prairieview, NM May 25, 1941

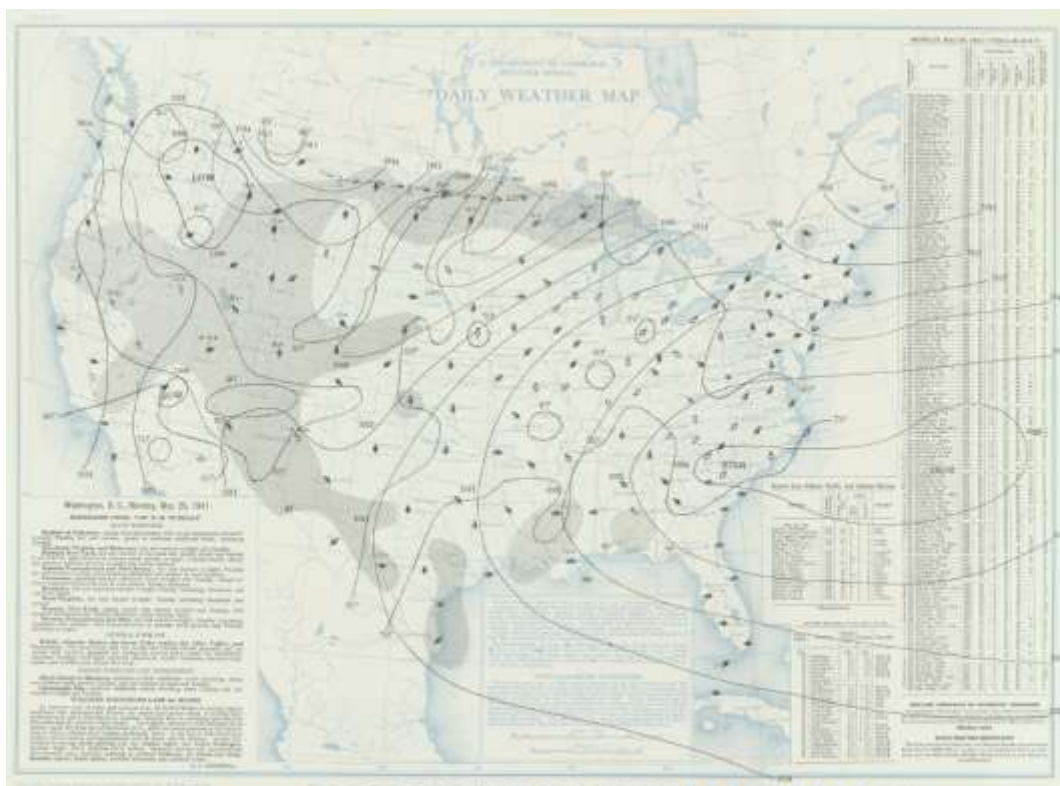


Figure 73: Daily weather map for Prairieview, NM May 26, 1941

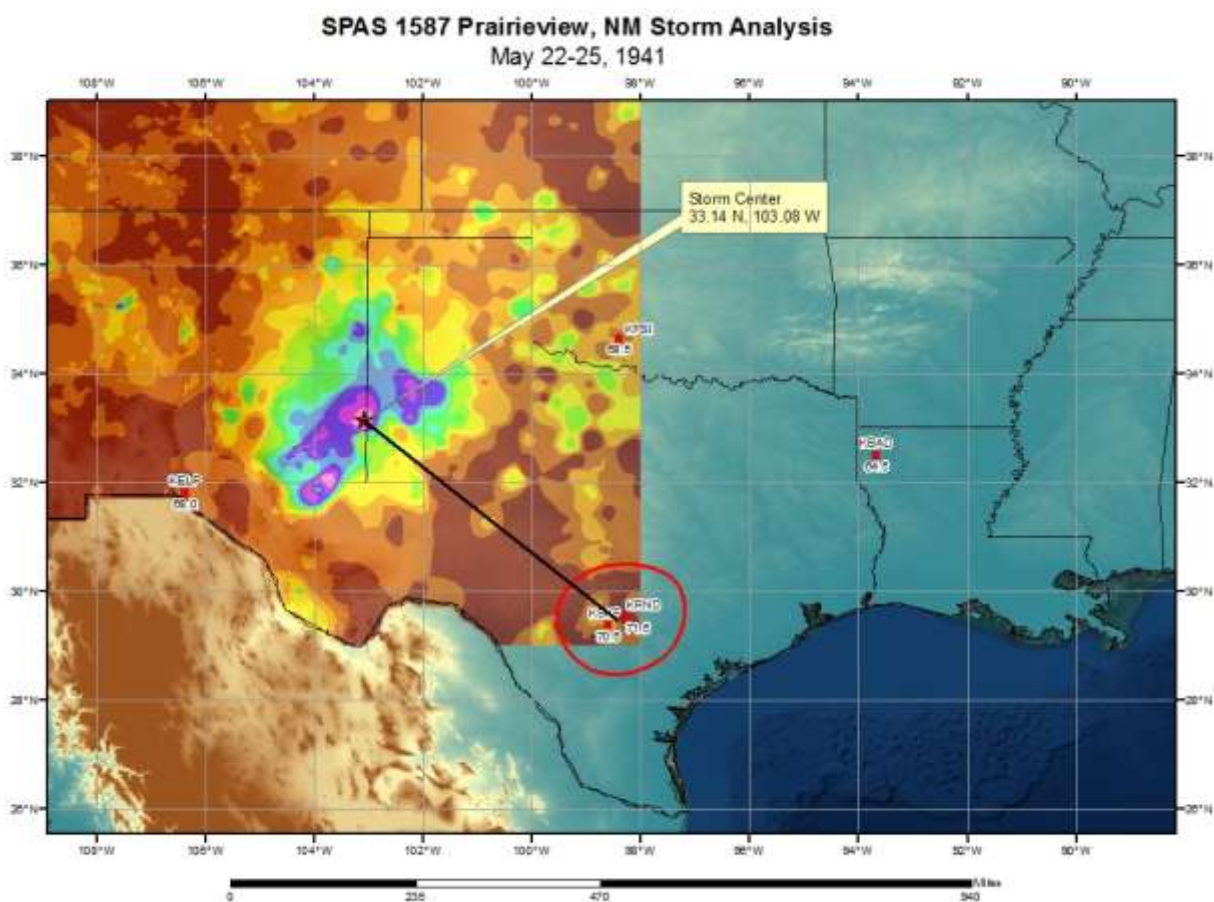


Figure 74: In-place storm representative dew point analysis for Prairieview, NM May 22-25, 1941

Storm Precipitation Analysis System (SPAS) For Storm #1486

General Storm Location: McColleum Ranch, NM

Storm Dates: September 19-24, 1941

Event: Extreme Precipitation Event

DAD Zone 1

Latitude: 32.1458

Longitude: -104.7458

Max. Grid Rainfall Amount: 21.81"

Max. Observed Rainfall Amount: 21.25"

Number of Stations: 317

SPAS Version: 10.0

Basemap: PRISM Monthly Basemap for September 1941

Radar Included: No

Depth-Area-Duration (DAD) analysis: Yes

SPAS Storm ID	NAME	LON	LAT	ELEV Round	Storm Representative				Climatological Maximum				IPMF
					T _d	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	T _d	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	
1486_1	MCCOLLEUM RANCH	-104.746	32.146	6,000	74.00	2.73"	1.22"	1.510	78.0	3.29"	1.41"	1.880	1.25

Storm 1486 - September 19 (0700 UTC) - September 25 (0600 UTC), 1941																
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)																
Area (mi ²)	Duration (hours)															
	1	2	3	4	5	6	12	18	24	36	48	60	72	96	120	144
0.4	3.23	5.84	8.40	9.78	10.54	10.85	11.67	11.77	12.04	16.64	17.40	19.35	21.40	21.81	21.81	21.81
1	3.21	5.80	8.35	9.71	10.48	10.79	11.59	11.70	11.97	16.53	17.30	19.24	21.26	21.62	21.62	21.62
10	3.16	5.69	8.19	9.55	10.29	10.59	11.40	11.49	11.74	16.24	16.99	18.87	20.89	21.23	21.23	21.23
25	3.12	5.39	7.75	9.03	9.73	10.02	10.78	10.87	11.12	15.36	16.07	17.86	19.76	20.09	20.09	20.09
50	3.06	4.76	6.84	7.96	8.59	8.84	9.50	9.59	9.82	13.55	14.19	15.78	17.46	17.73	17.73	17.73
100	2.91	4.02	5.78	6.73	7.26	7.47	8.04	8.13	8.29	11.46	11.99	13.34	14.77	15.02	15.02	15.02
150	2.76	3.69	5.31	6.17	6.66	6.86	7.37	7.51	7.72	10.52	11.02	12.28	13.64	13.86	13.89	13.89
200	2.63	3.50	5.03	5.85	6.31	6.50	7.12	7.50	7.71	9.99	10.47	11.68	13.08	13.31	13.39	13.39
300	2.45	3.24	4.66	5.43	5.85	6.03	6.99	7.37	7.59	9.29	9.74	10.89	12.32	12.57	12.71	12.72
400	2.32	3.07	4.42	5.14	5.55	5.71	6.82	7.22	7.48	8.82	9.25	10.37	11.81	12.07	12.26	12.27
500	2.21	2.94	4.24	4.93	5.32	5.48	6.63	7.06	7.36	8.48	8.88	10.01	11.43	11.70	11.91	11.93
1,000	1.85	2.52	3.63	4.24	4.58	4.71	5.81	6.41	6.83	7.35	7.72	9.05	10.32	10.61	10.91	10.93
2,000	1.45	1.85	2.85	3.08	3.33	3.43	4.95	5.64	6.40	6.79	7.02	8.18	9.37	9.65	9.99	10.01
3,500	1.13	1.52	2.00	2.40	2.69	2.95	4.33	5.10	5.90	6.31	6.54	7.75	8.71	8.99	9.28	9.31
5,000	0.94	1.35	1.80	2.20	2.46	2.67	4.01	4.76	5.60	5.99	6.24	7.41	8.32	8.60	8.85	8.88
7,500	0.76	1.18	1.60	1.96	2.19	2.37	3.62	4.38	5.21	5.62	5.88	7.03	7.90	8.17	8.39	8.41
10,000	0.64	1.06	1.42	1.78	2.00	2.17	3.34	4.10	4.95	5.36	5.62	6.67	7.56	7.84	8.07	8.10
15,000	0.50	0.88	1.21	1.51	1.70	1.87	2.97	3.72	4.52	4.99	5.25	6.18	6.89	7.15	7.37	7.42
20,000	0.43	0.76	1.05	1.33	1.52	1.68	2.72	3.43	4.23	4.69	4.99	5.79	6.44	6.69	6.89	6.95
35,000	0.31	0.56	0.79	1.00	1.13	1.28	2.25	2.90	3.59	4.06	4.33	5.02	5.56	5.81	6.06	6.10
50,000	0.24	0.43	0.61	0.81	0.94	1.07	1.95	2.57	3.19	3.64	3.91	4.50	4.91	5.10	5.33	5.38
75,000	0.19	0.32	0.44	0.61	0.73	0.84	1.59	2.14	2.70	3.10	3.35	3.81	4.21	4.40	4.58	4.62
100,000	0.14	0.26	0.35	0.49	0.58	0.67	1.27	1.75	2.21	2.57	2.82	3.18	3.52	3.65	3.81	3.88
138,427	0.11	0.20	0.27	0.36	0.43	0.49	0.95	1.32	1.65	1.91	2.12	2.39	2.68	2.86	3.00	3.05

Figure 75: Depth-area-duration values for McColleum Ranch, NM September 1941

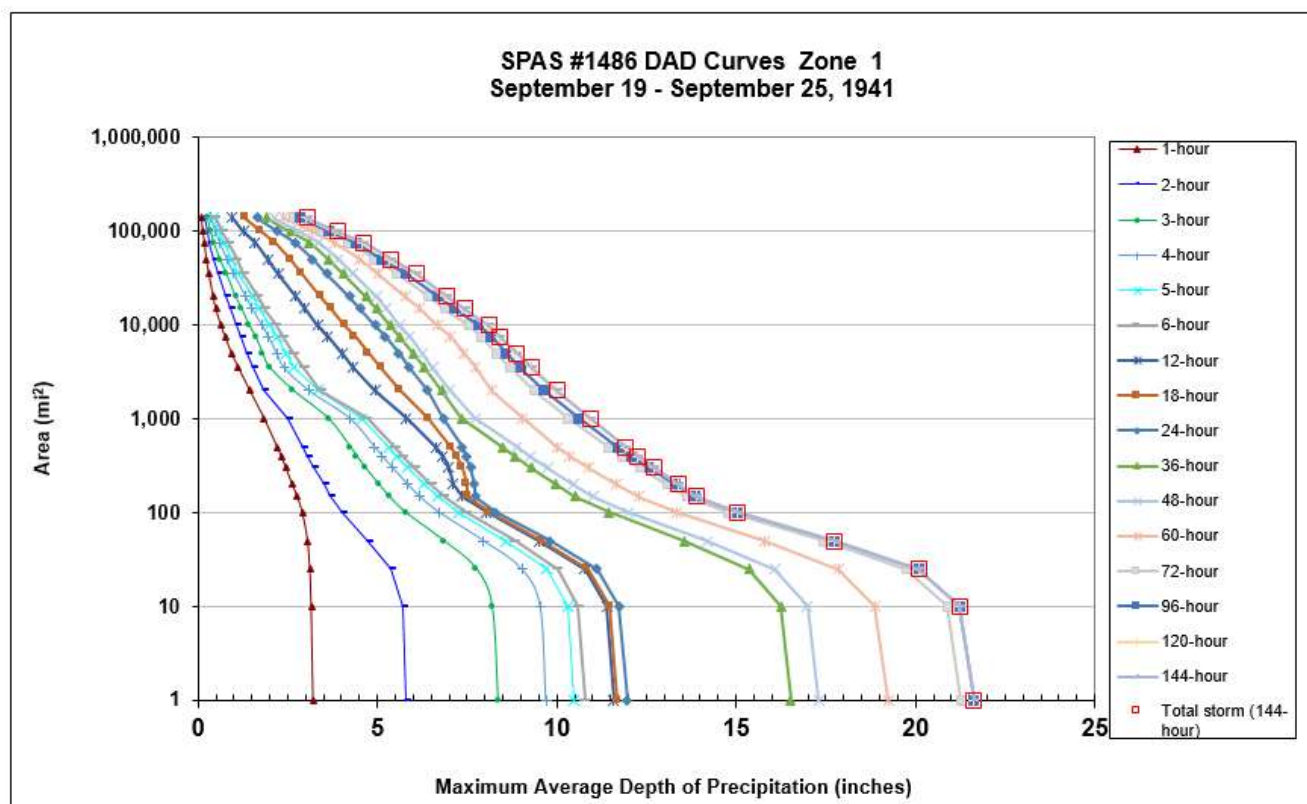


Figure 76: Depth-area-duration chart for McColleum Ranch, NM September 1941

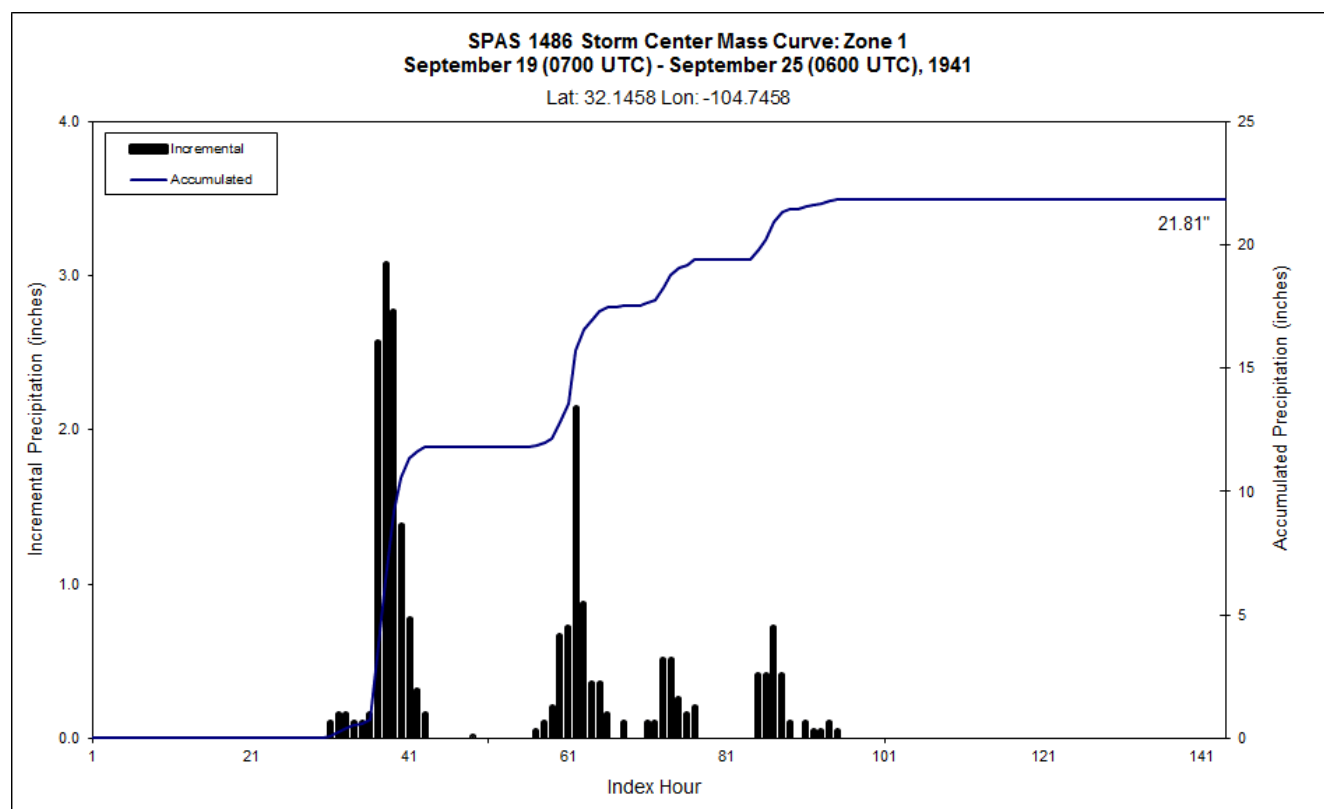


Figure 77: Mass curve chart for McColleum Ranch, NM September 1941

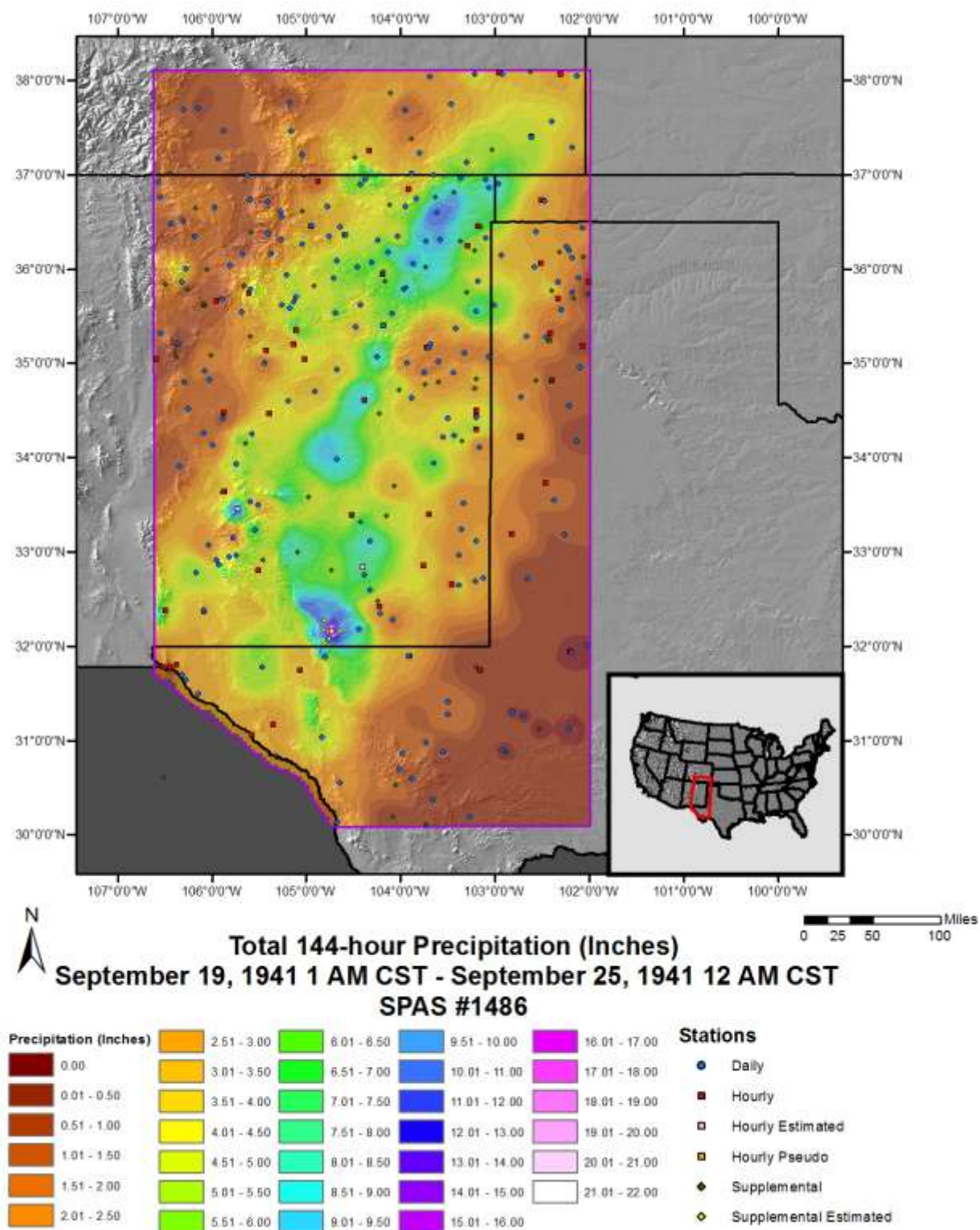
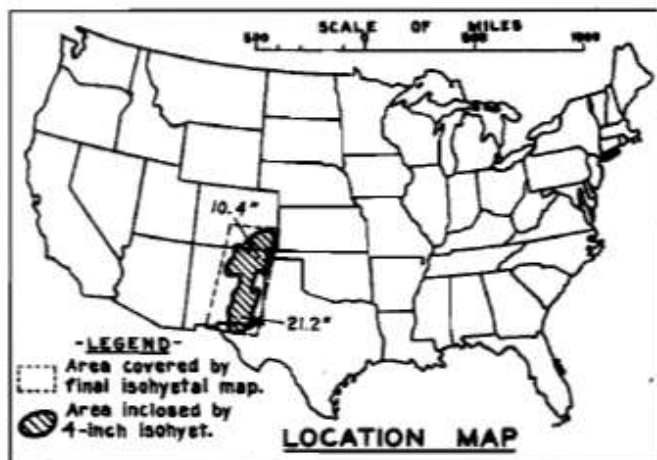


Figure 78: Total storm isohyetal analysis for McColleum Ranch, NM September 1941

WAR DEPARTMENT

CORPS OF ENGINEERS, U.S. ARMY

STORM STUDIES - PERTINENT DATA SHEET

Storm of September 20-23, 1941

Assignment GM 5-19

Location New Mexico

Study Prepared by:

Southwestern Division,
Galveston District Office.Part I Reviewed by H. M. Sec. of
Weather Bureau, 7/9/43Part II Approved by Office, Chief
of Engineers for Distribution
of Factual Data, 3/27/44

Remarks: Center at

Dave McCollum Ranch, N. Mex.

DATA AND COMPUTATIONS COMPILED**PART I**

Preliminary isohyetal map, in 1 sheet, scale 1:1,000,000

Precipitation data and mass curves:

(Number of Sheets)

Form 5001-C (Hourly precip. data)..... 64

Form 5001-B (24-hour " " " ")..... -

Form 5001-D (" " " " " ")..... 26

Misc. precip. records, meteorological data, etc..... 19

Form 5002 (Mass rainfall curves)..... 76

PART II

Final isohyetal maps, in 1 sheet, scale 1:1,000,000

Data and computation sheets:

Form S-10 (Data from mass rainfall curves)..... 4

Form S-11 (Depth-area data from isohyetal map)..... 2

Form S-12 (Maximum depth-duration data)..... 18

Maximum duration-depth-area curves..... 1

Data relating to periods of maximum rainfall..... 2

MAXIMUM AVERAGE DEPTH OF RAINFALL IN INCHES

Area in Sq. Mi.	Duration of Rainfall in Hours									
	6	12	18	24	30	36	48	60	78	
10	10.1	11.2	11.5	12.1	16.3	16.9	18.7	21.0	21.2	
100	5.9	8.3	8.7	9.0	10.1	11.7	13.0	14.7	15.0	
200	5.2	7.3	7.8	8.1	8.4	9.7	10.8	12.4	12.7	
500	4.4	6.2	6.8	6.9	7.2	7.9	9.1	10.2	10.5	
1,000	3.8	5.5	6.1	6.3	6.4	7.1	8.3	9.4	9.6	
2,000	3.3	4.8	5.5	5.6	5.8	6.4	7.5	8.6	8.8	
5,000	2.6	3.9	4.6	4.8	5.1	5.6	6.6	7.5	7.8	
10,000	2.0	3.2	4.0	4.2	4.5	4.9	5.9	6.7	7.0	
20,000	1.5	2.6	3.3	3.7	4.0	4.4	5.2	5.9	6.2	
38,000	1.1	2.0	2.7	3.2	3.6	3.9	4.6	5.4	5.5	

Form S-2

Figure 79: USACE Depth-area-duration values for McCollum Ranch, NM September 1941

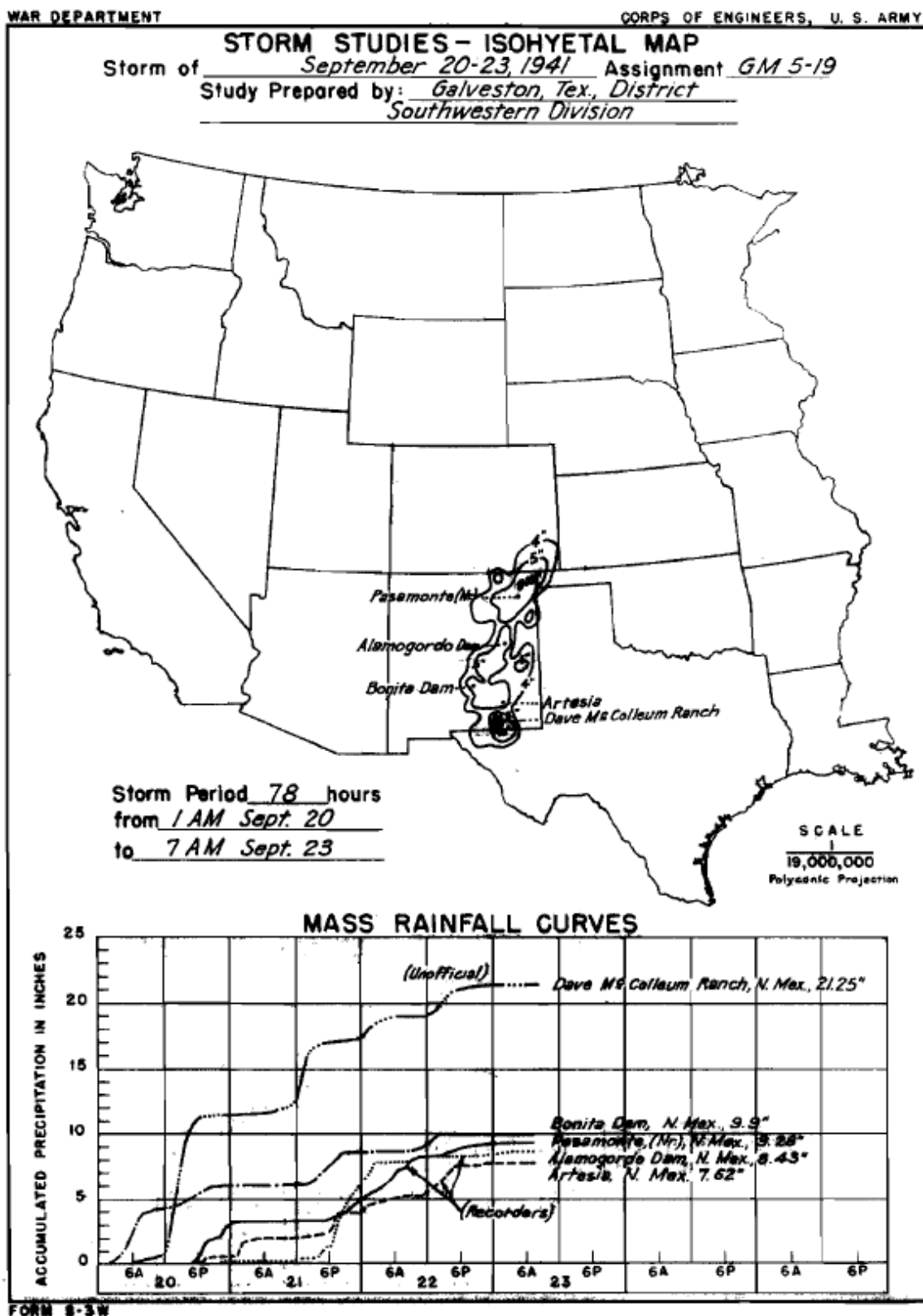


Figure 80: USACE Total storm isohyetal and mass curve chart for McColleum Ranch, NM
September 1941

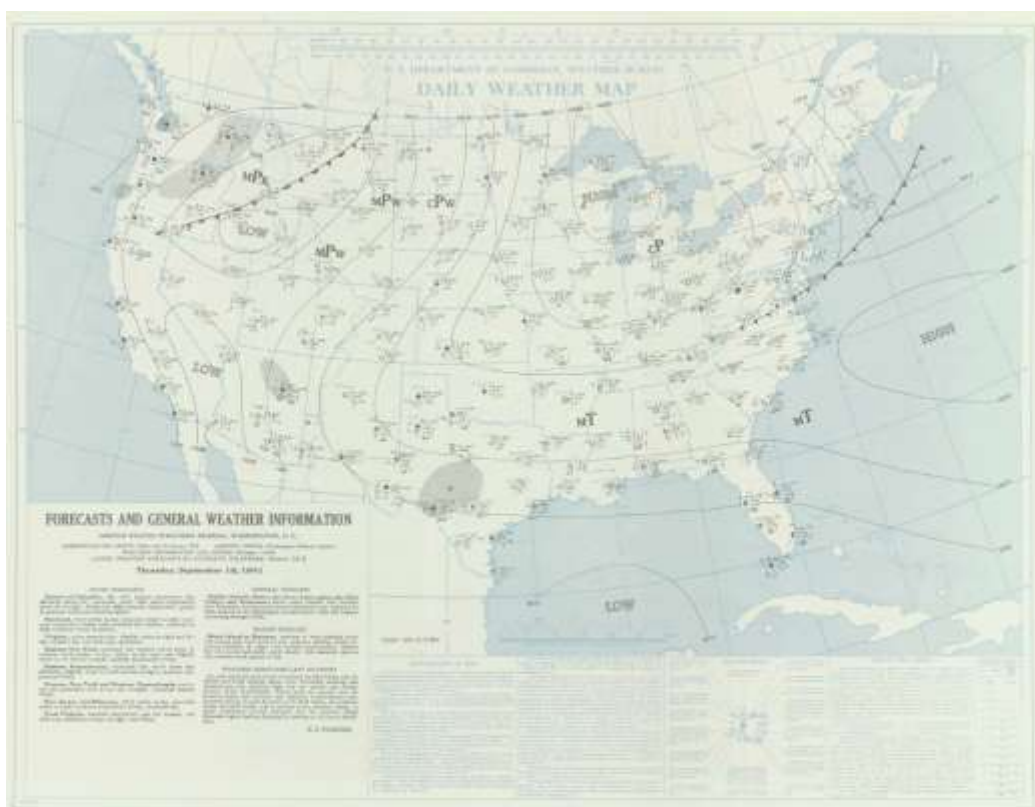


Figure 81: Daily Weather Map for McColleum Ranch, NM September 18, 1941

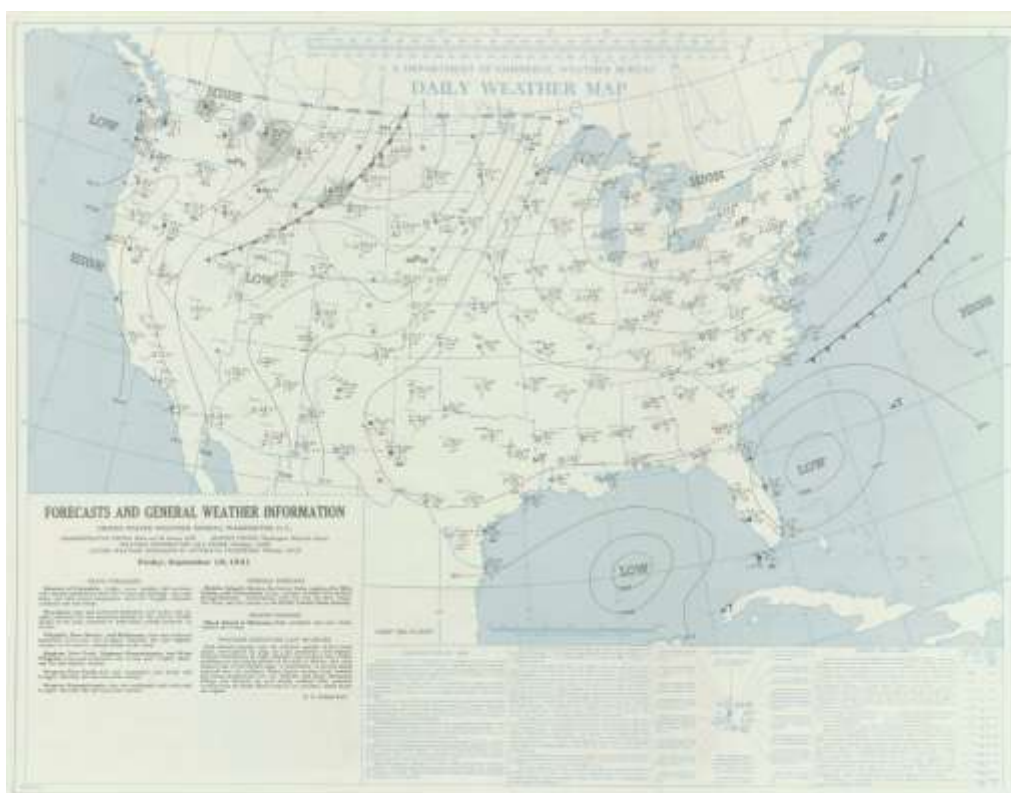


Figure 82: Daily Weather Map for McColleum Ranch, NM September 19, 1941

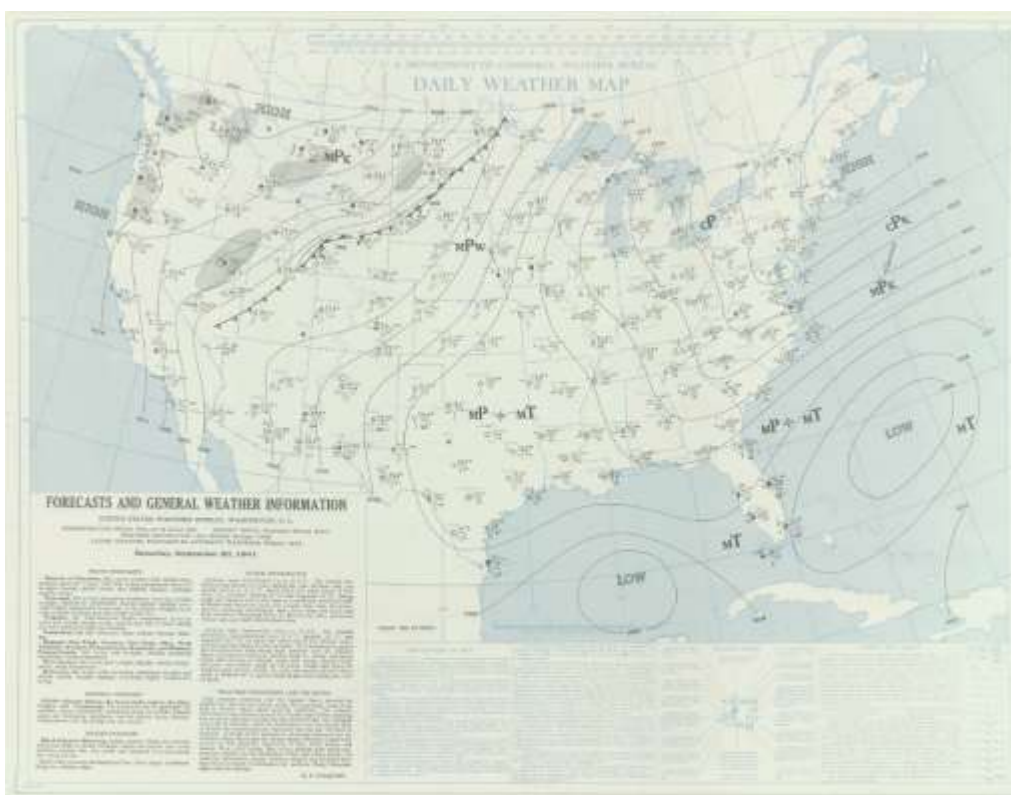


Figure 83: Daily Weather Map for McColleum Ranch, NM September 20, 1941

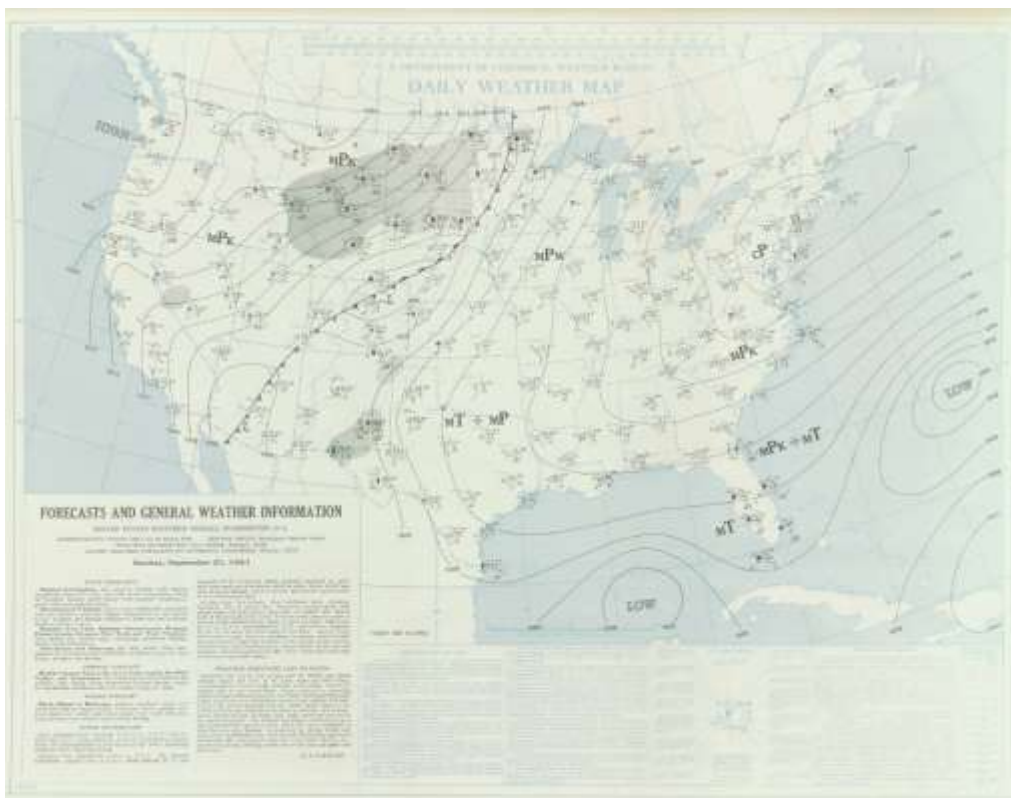


Figure 84: Daily Weather Map for McColleum Ranch, NM September 21, 1941

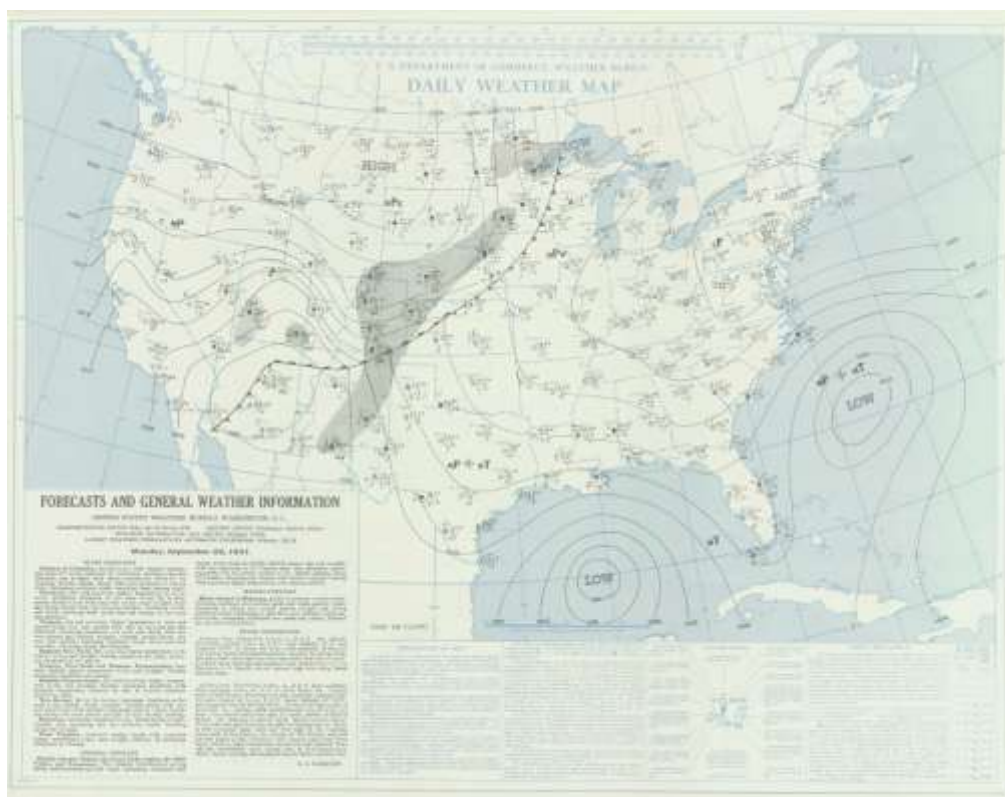


Figure 85: Daily Weather Map for McColleum Ranch, NM September 22, 1941

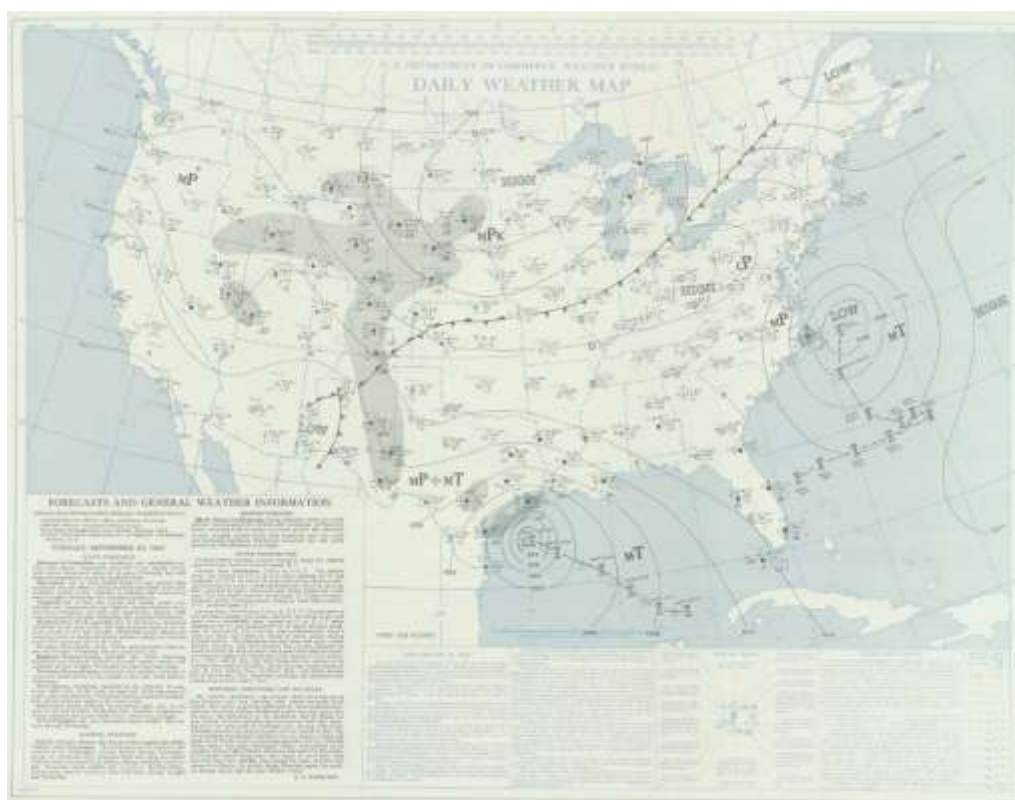


Figure 86: Daily Weather Map for McColleum Ranch, NM September 23, 1941

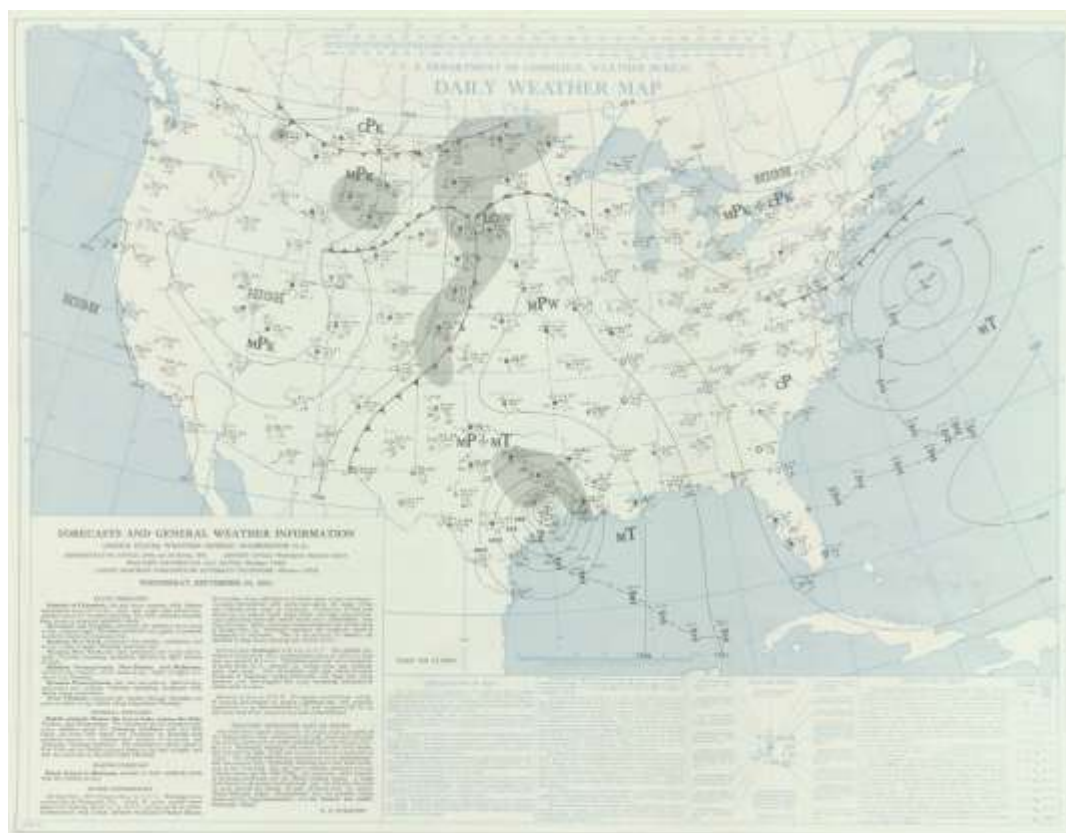
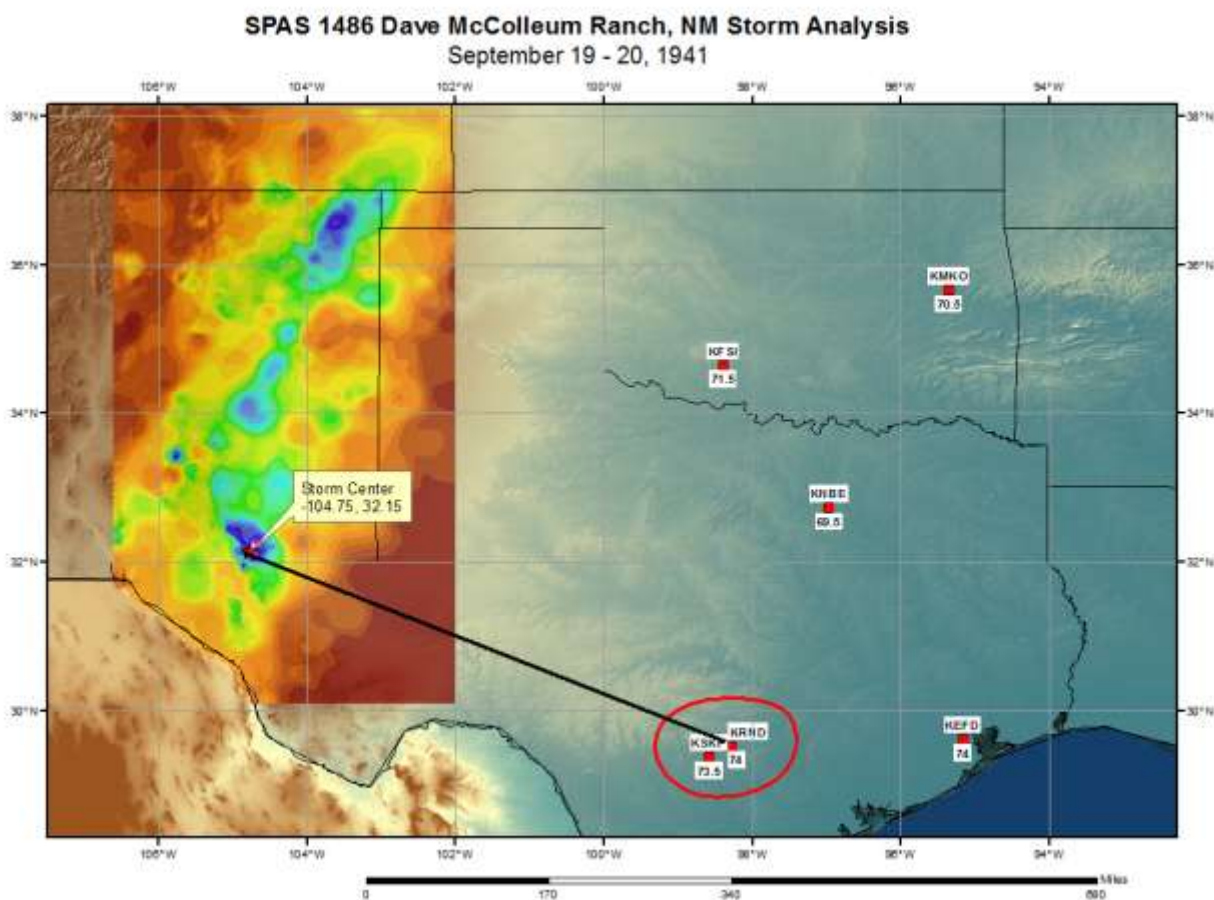


Figure 87: Daily Weather Map for McColiseum Ranch, NM September 24, 1941



**Figure 88: In-place storm representative dew point analysis for McColleum Ranch, NM
September 19-20, 1941**

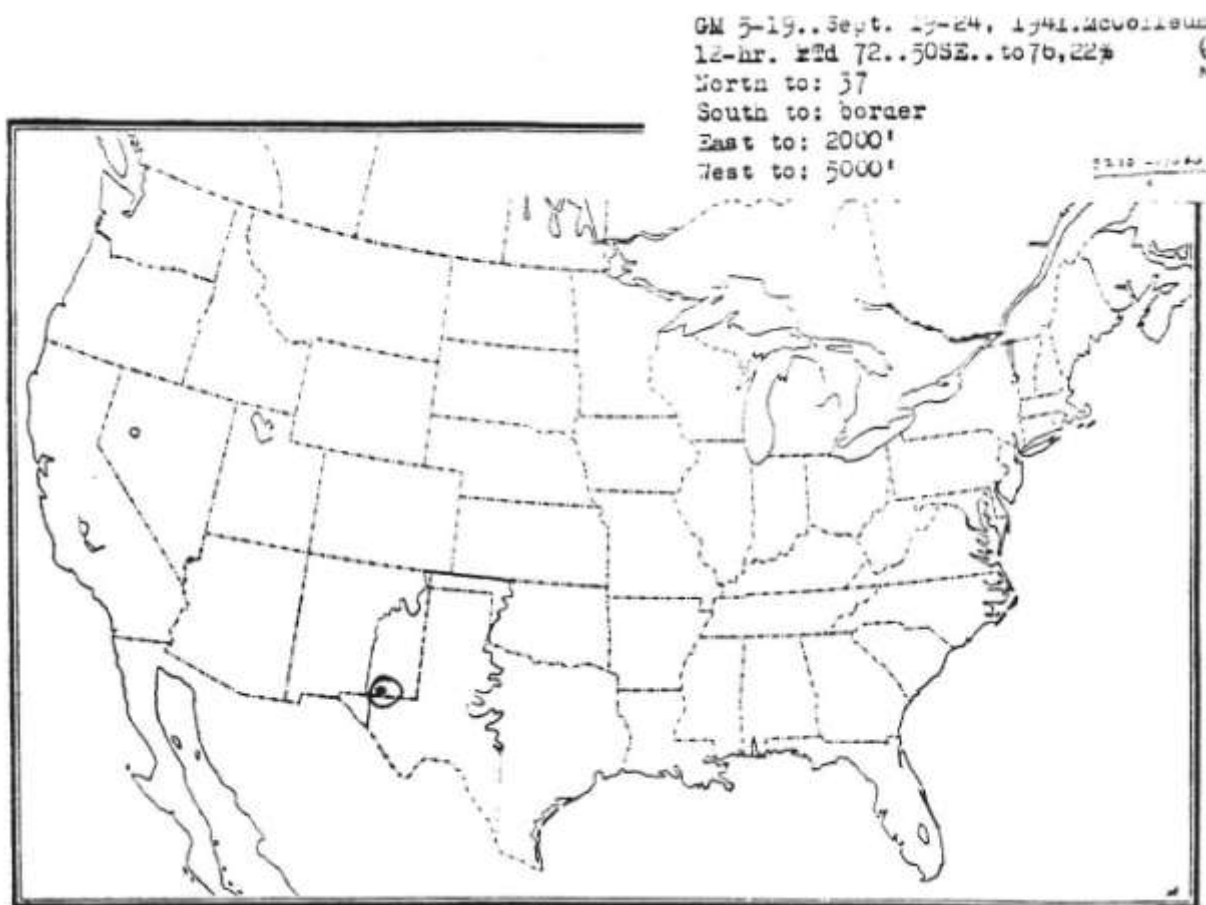


Figure 89: NWS Transposition Limit Map for McColleum Ranch, NM September 1941

Storm Precipitation Analysis System (SPAS) For Storm #1431

General Storm Location: Warner, Oklahoma (38.5, -98.9, 33.5, -91.7)

Storm Dates: May 7 – May 11, 1943

Event: Extreme Precipitation Event

DAD Zone 1

Latitude: 35.4792

Longitude: -95.3292

Max. Grid rainfall amount: 25.24"

Max. Observed rainfall amount: 25.00" (Warner, OK)

Number of Stations: 325

SPAS Version: 10.0

Base Map Used: USACE Isohyetal Map

Spatial resolution: 0.2679

Radar Included: No

Depth-Area-Duration (DAD) analysis: Yes

Reliability of Results: In addition to the NCDC stations, twenty-seven supplemental stations along with two supplemental estimated stations were added to ensure data consistency. Due to the amount and integrity of the U.S. Army Corps of Engineers (USACE), three hourly stations were digitized based on the mass rainfall curves. With the density of stations available and the consistency of the resulting SPAS analysis to the U.S. Army Corps of Engineers report, this analysis is deemed quite reliable.

SPAS Storm ID	NAME	LON	LAT	ELEV Round	Storm Representative				Climatological Maximum				IPMF
					T _g	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	T _g	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	
1431_1	WARNER	-95.329	35.479	600	71.50	2.42"	0.14"	2.280	77.5	3.22"	0.17"	3.050	1.34

Storm 1431 - May 7 (0700 UTC) - May 12 (0600 UTC), 1943																	
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)																	
Area (mi ²)	Duration (hours)																
	1	2	3	4	5	6	12	18	24	30	36	48	60	72	96	120	Total
0.4	4.53	6.22	7.52	8.83	9.64	10.07	12.59	15.21	17.73	20.14	22.05	24.77	25.24	25.24	25.24	25.24	25.24
1	4.51	6.20	7.50	8.80	9.62	10.02	12.53	15.12	17.63	20.04	21.93	24.64	25.04	25.04	25.04	25.04	25.04
10	4.45	6.14	7.44	8.73	9.53	9.88	12.36	14.91	17.39	19.77	21.63	24.30	24.69	24.69	24.69	24.69	24.69
25	4.35	6.12	7.41	8.70	9.49	9.65	12.07	14.58	17.00	19.32	21.14	23.75	24.12	24.12	24.12	24.12	24.12
50	4.24	6.11	7.39	8.68	9.46	9.26	11.59	14.02	16.33	18.57	20.31	22.81	23.17	23.17	23.17	23.17	23.17
100	4.12	5.99	7.25	8.51	9.28	8.67	10.86	13.13	15.29	17.39	19.00	21.34	21.66	21.67	21.67	21.67	21.67
150	4.01	5.83	7.05	8.27	9.02	8.18	10.27	12.45	14.47	16.49	17.98	20.16	20.46	20.46	20.46	20.46	20.46
200	3.92	5.64	6.84	8.01	8.74	7.81	9.81	11.94	13.94	15.79	17.24	19.27	19.54	19.54	19.54	19.54	19.54
300	3.74	5.29	6.42	7.53	8.21	7.30	9.30	11.27	13.24	14.80	16.20	18.00	18.23	18.25	18.25	18.25	18.25
400	3.59	5.09	6.11	7.10	7.75	7.02	8.96	10.83	12.77	14.17	15.49	17.16	17.38	17.43	17.43	17.42	17.42
500	3.44	4.94	5.88	6.78	7.40	6.81	8.70	10.46	12.39	13.73	14.99	16.53	16.75	16.82	16.82	16.80	16.80
1,000	2.93	4.25	5.13	5.92	6.48	6.19	7.97	9.40	11.07	12.46	13.61	14.74	14.94	15.06	15.06	15.02	15.02
2,000	2.55	3.65	4.46	5.18	5.68	5.61	7.23	8.48	9.91	11.28	12.36	13.46	13.62	13.70	13.71	13.71	13.71
3,500	2.26	3.28	3.99	4.69	5.13	5.14	6.54	7.77	9.08	10.36	11.49	12.63	12.79	12.90	12.91	12.91	12.91
5,000	2.07	3.00	3.65	4.30	4.71	4.74	6.02	7.24	8.51	9.77	10.96	12.12	12.28	12.41	12.43	12.43	12.43
7,500	1.85	2.66	3.24	3.80	4.16	4.23	5.43	6.58	7.78	9.18	10.27	11.51	11.68	11.88	11.91	11.91	11.91
10,000	1.68	2.40	2.92	3.42	3.75	3.82	4.97	6.12	7.30	8.67	9.72	10.96	11.14	11.40	11.45	11.45	11.45
15,000	1.41	2.02	2.45	2.87	3.20	3.30	4.37	5.42	6.56	8.00	8.99	10.24	10.43	10.71	10.76	10.76	10.76
20,000	1.20	1.73	2.11	2.49	2.78	2.88	3.98	4.97	6.03	7.55	8.50	9.75	9.95	10.25	10.29	10.29	10.29
35,000	0.78	1.19	1.49	1.78	2.09	2.23	3.19	3.97	5.10	6.42	7.26	8.59	8.82	9.12	9.19	9.19	9.19
50,000	0.59	0.93	1.17	1.40	1.64	1.78	2.77	3.46	4.39	5.56	6.33	7.78	7.99	8.23	8.30	8.30	8.30
75,000	0.43	0.69	0.89	1.06	1.25	1.37	2.22	2.81	3.63	4.58	5.24	6.43	6.62	6.83	6.93	6.93	6.93
100,000	0.35	0.57	0.73	0.88	1.03	1.11	1.77	2.38	2.99	3.79	4.38	5.47	5.62	5.87	6.01	6.00	6.00
138,971	0.26	0.43	0.56	0.67	0.80	0.86	1.36	1.82	2.37	3.01	3.46	4.31	4.44	4.63	4.73	4.73	4.73

Figure 90: Depth-area-duration values for Warner, OK May 1943

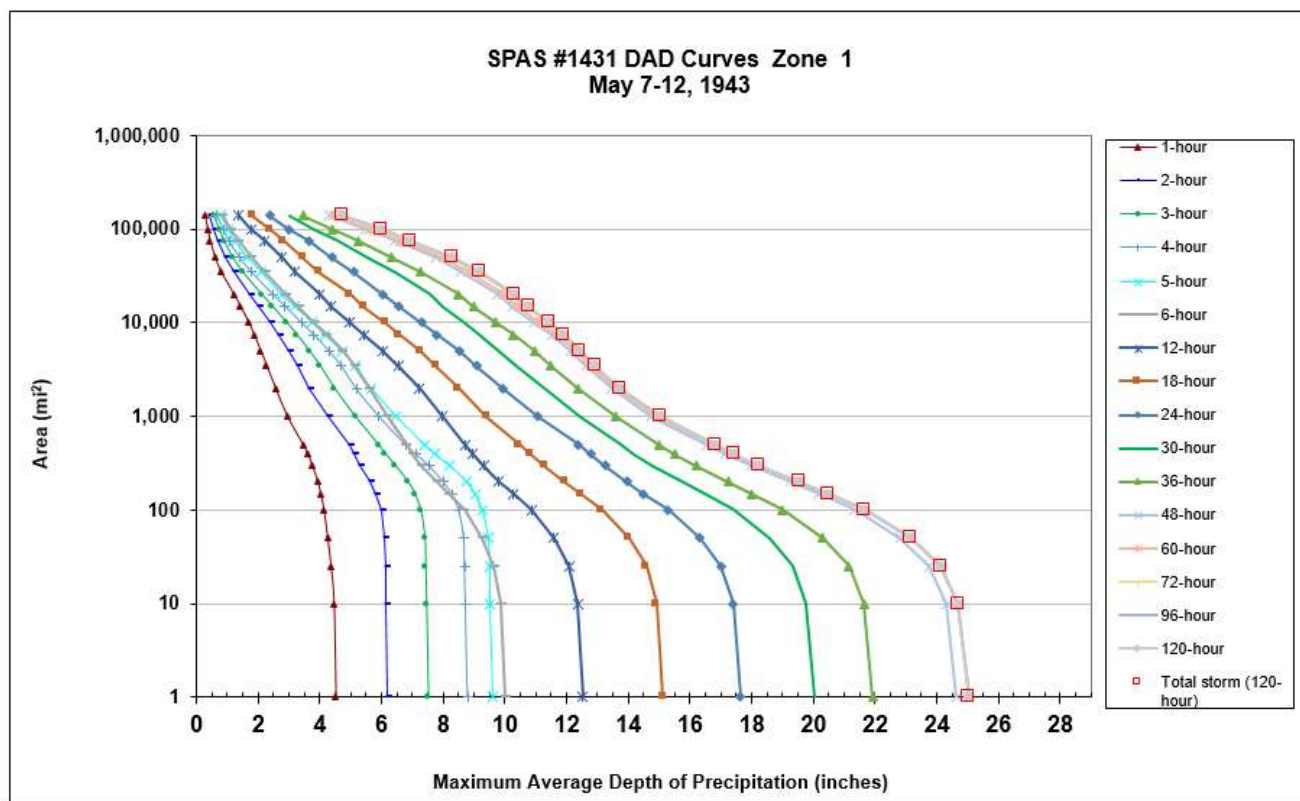


Figure 91: Depth-area-duration chart for Warner, OK May 1943

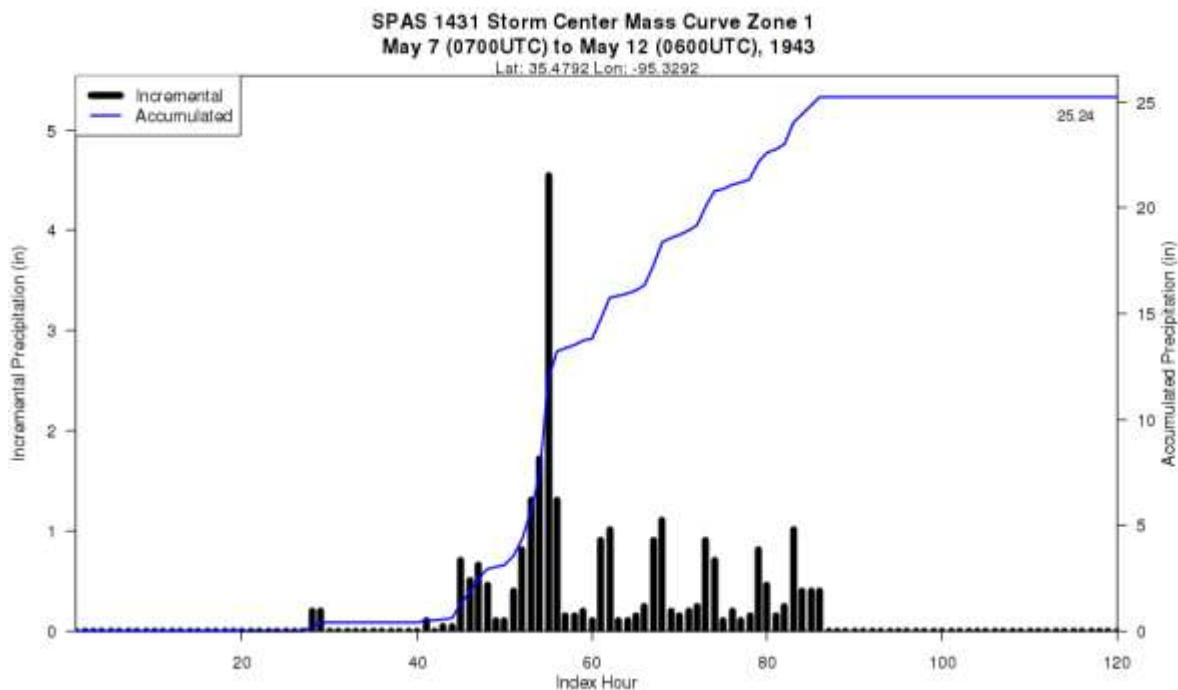


Figure 92: Mass curve chart for Warner, OK May 1943

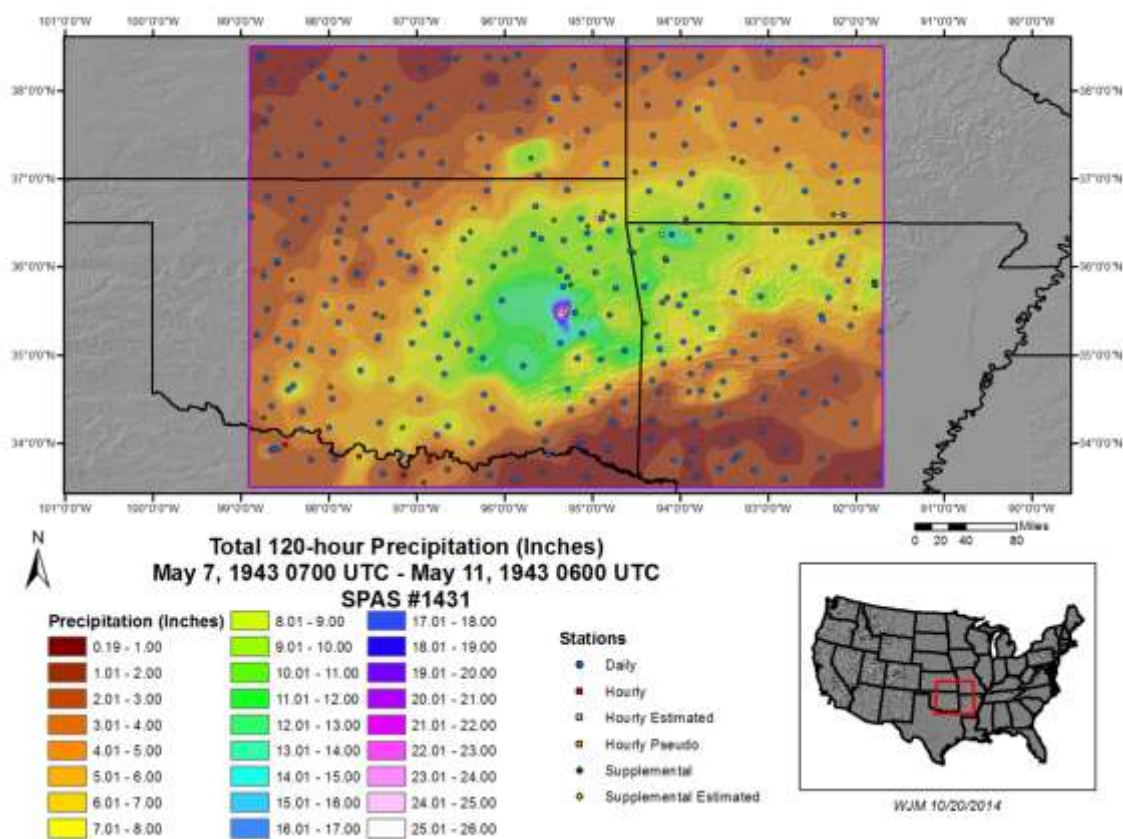


Figure 93: Total storm isohyetal analysis for Warner, OK May 1943

DEPARTMENT OF THE ARMY

CORPS OF ENGINEERS

STORM STUDIES - PERTINENT DATA SHEET

Storm of 6-12 May 1943

Assignment SW 2-20

Location N. Texas to Great Lakes

Study Prepared by:

Southwestern Division

Tulsa District Office

Part I Reviewed by H. M. Sec. of
Weather Bureau, 4-14-45Part II Approved by Office, Chief
of Engineers for Distribution
of Factual Data, 7-17-47Remarks: Center at Warner,
OklahomaDewpt. 70° - Ref. Pt. 225 SSE
Grid G-15**DATA AND COMPUTATIONS COMPILED****PART I**

Preliminary isohyetal map, in 1 sheet, scale 1:1,000,000

Precipitation data and mass curves:

(Number of Sheets)

Form 5001-C (Hourly precip. data)-----	553
Form 5001-B (24-hour " " " ")-----	-
Form 5001-D (" " " " " ")-----	178
Misc. precip. records, meteorological data, etc.-----	80
Form 5002 (Mass rainfall curves)-----	281

PART II

Final isohyetal maps, in 1 sheet, scale 1:1,000,000

Data and computation sheets:

Form S-10 (Data from mass rainfall curves)-----	42
Form S-11 (Depth-area data from isohyetal map)-----	12
Form S-12 (Maximum depth-duration data)-----	12
Maximum duration-depth-area curves-----	1
Data relating to periods of maximum rainfall-----	2

MAXIMUM AVERAGE DEPTH OF RAINFALL IN INCHES

Area in Sq. Mi.	Duration of Rainfall in Hours										
	6	12	18	24	30	36	48	60	72	96	120/
Max. Station	10.0	12.5	15.0	17.6	20.0	21.8	24.6	25.0	25.0	25.0	25.0
10	9.9	12.3	14.6	17.2	19.5	21.5	24.4	24.9	24.9	24.9	24.9
100	8.7	10.8	12.4	14.9	17.1	19.3	21.8	22.5	22.5	22.5	22.5
200	7.4	9.5	11.4	13.8	16.0	18.3	20.6	21.3	21.3	21.3	21.3
500	5.4	7.6	10.0	12.3	14.5	16.7	18.6	19.4	19.4	19.4	19.4
1,000	4.3	6.3	9.0	11.1	13.3	15.4	17.1	18.0	18.0	18.0	18.0
2,000	3.6	5.4	8.0	9.9	12.1	14.0	15.5	16.5	16.5	16.5	16.5
5,000	3.0	4.5	6.8	8.3	10.5	12.1	13.4	14.4	14.4	14.4	14.4
10,000	2.6	3.9	5.8	7.2	9.1	10.4	11.7	12.6	12.6	12.8	12.8
20,000	2.1	3.3	4.9	6.1	7.6	8.7	10.0	10.7	10.8	11.1	11.1
50,000	1.6	2.5	3.7	4.6	5.7	6.5	7.7	8.1	8.3	8.8	8.9
100,000	1.1	1.9	2.7	3.4	4.2	4.9	5.8	6.2	6.4	7.0	7.3
212,000	0.6	1.1	1.7	2.2	2.6	3.0	3.7	4.2	4.4	5.0	5.5

Form S-2

Figure 94: USACE Depth-area-duration values for Warner, OK May 1943

DEPARTMENT OF THE ARMY

CORPS OF ENGINEERS

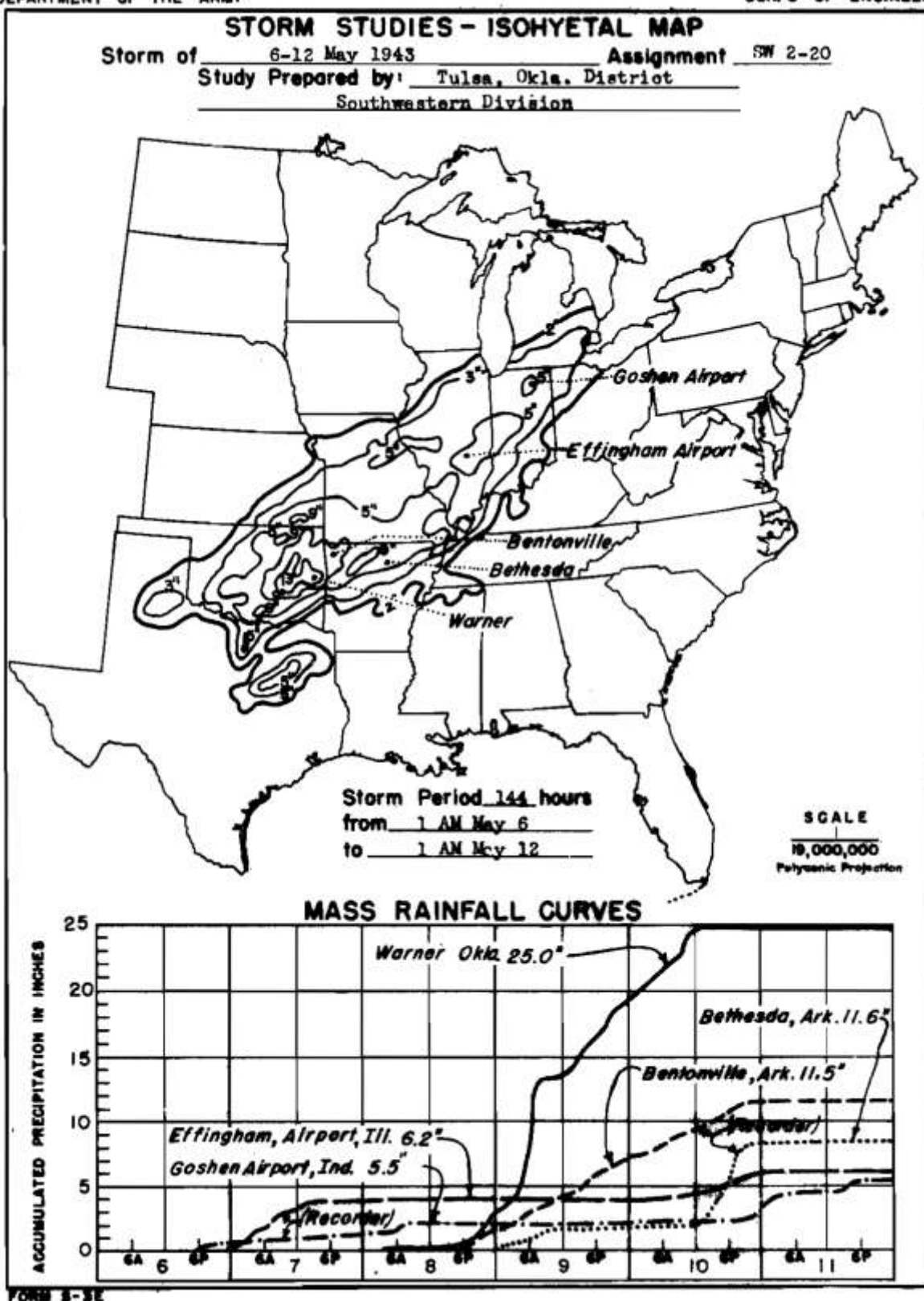


Figure 95: USACE Total storm isohyetal and mass curve chart for Warner, OK May 1943



Figure 96: Daily Weather Map for Warner, OK May 5, 1943



Figure 97: Daily Weather Map for Warner, OK May 6, 1943



Figure 98: Daily Weather Map for Warner, OK May 7, 1943

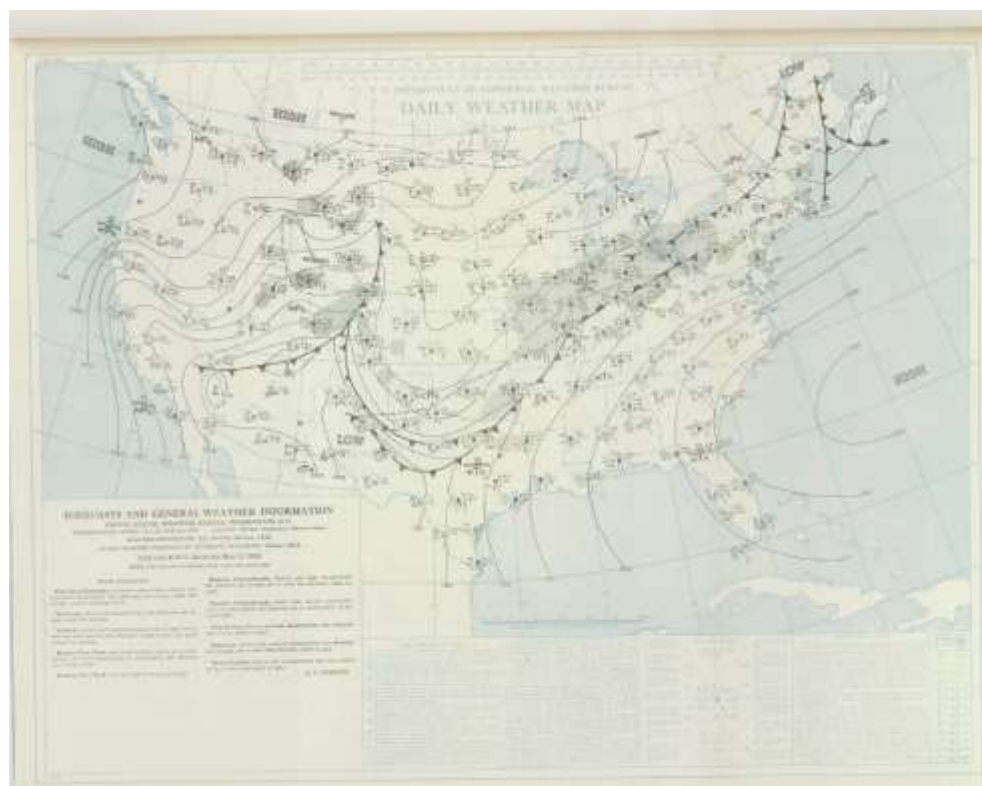


Figure 99: Daily Weather Map for Warner, OK May 8, 1943



Figure 100: Daily Weather Map for Warner, OK May 9, 1943

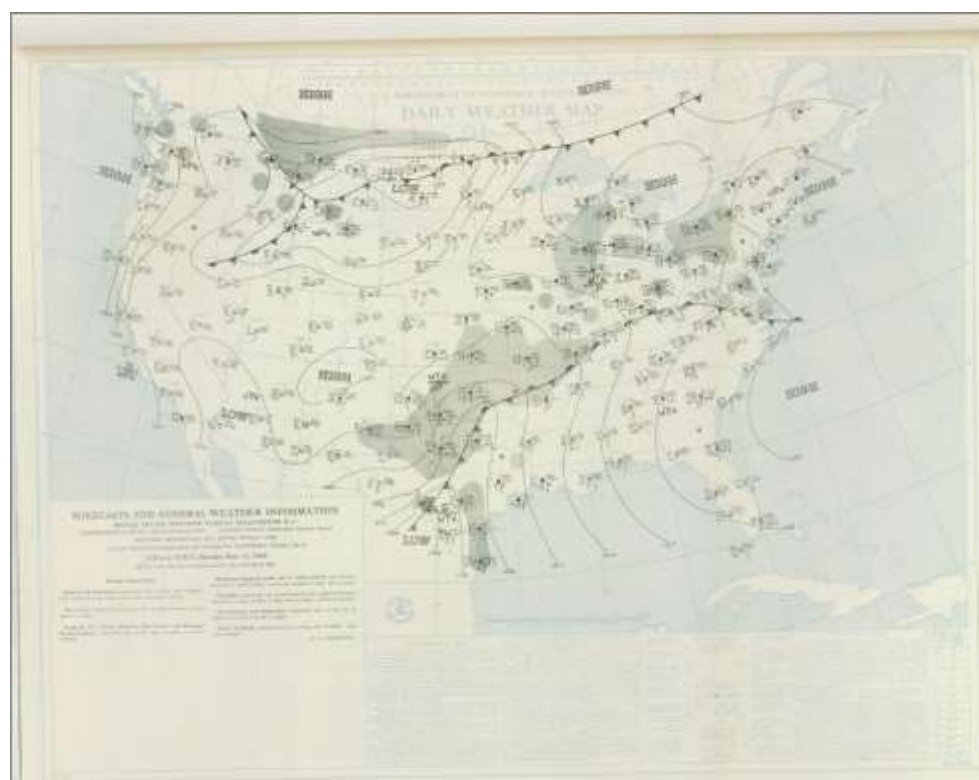


Figure 101: Daily Weather Map for Warner, OK May 10, 1943

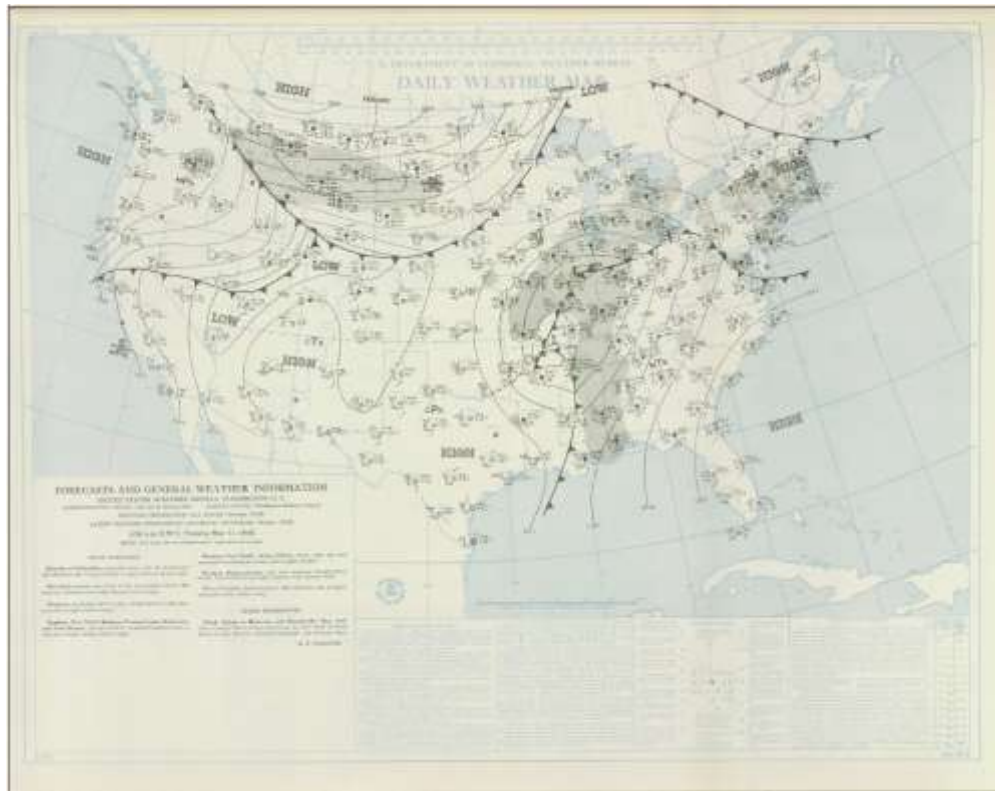


Figure 102: Daily Weather Map for Warner, OK May 11, 1943

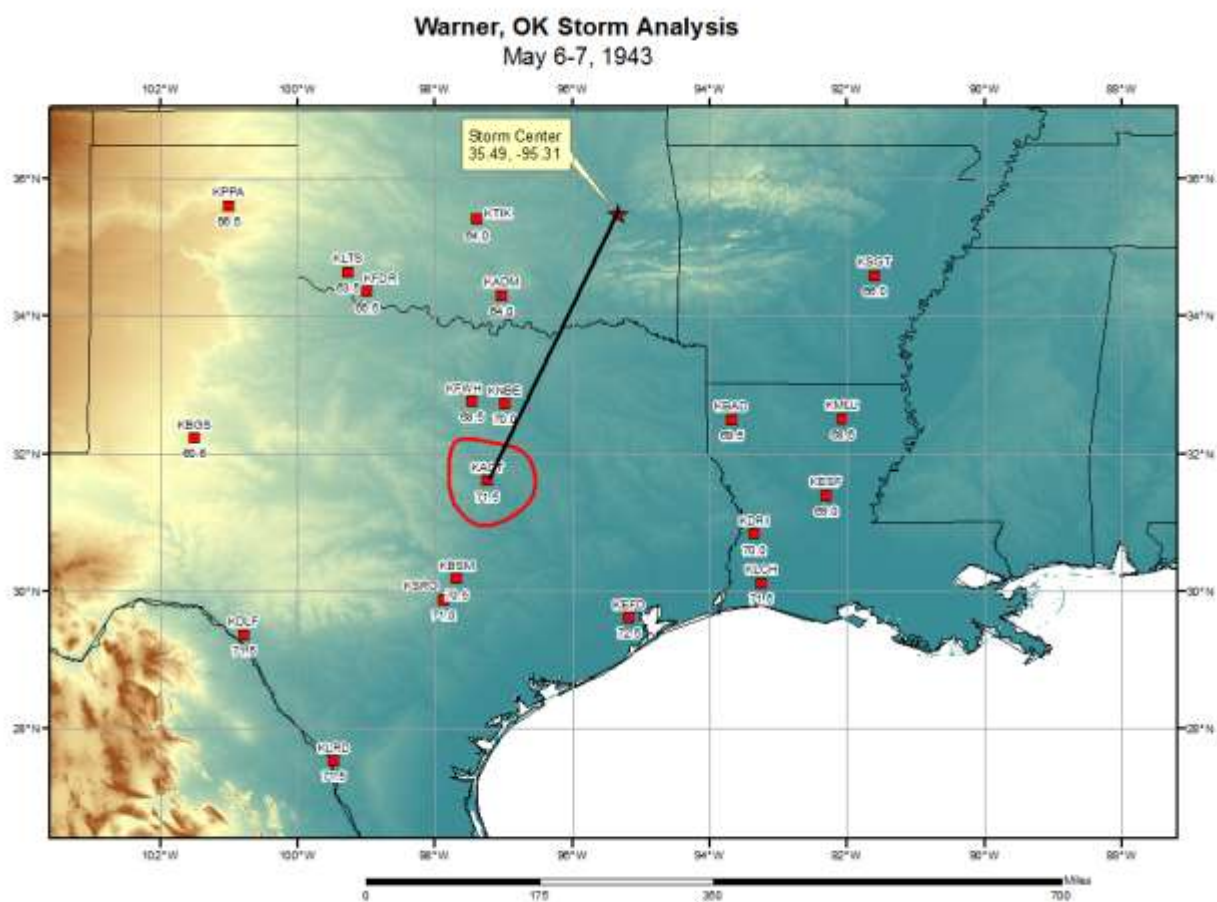


Figure 103: In-place storm representative dew point analysis for Warner, OK May 6-7, 1943

See V.A. Myers
 Paper 1966
 Texas Water
 Dept Board

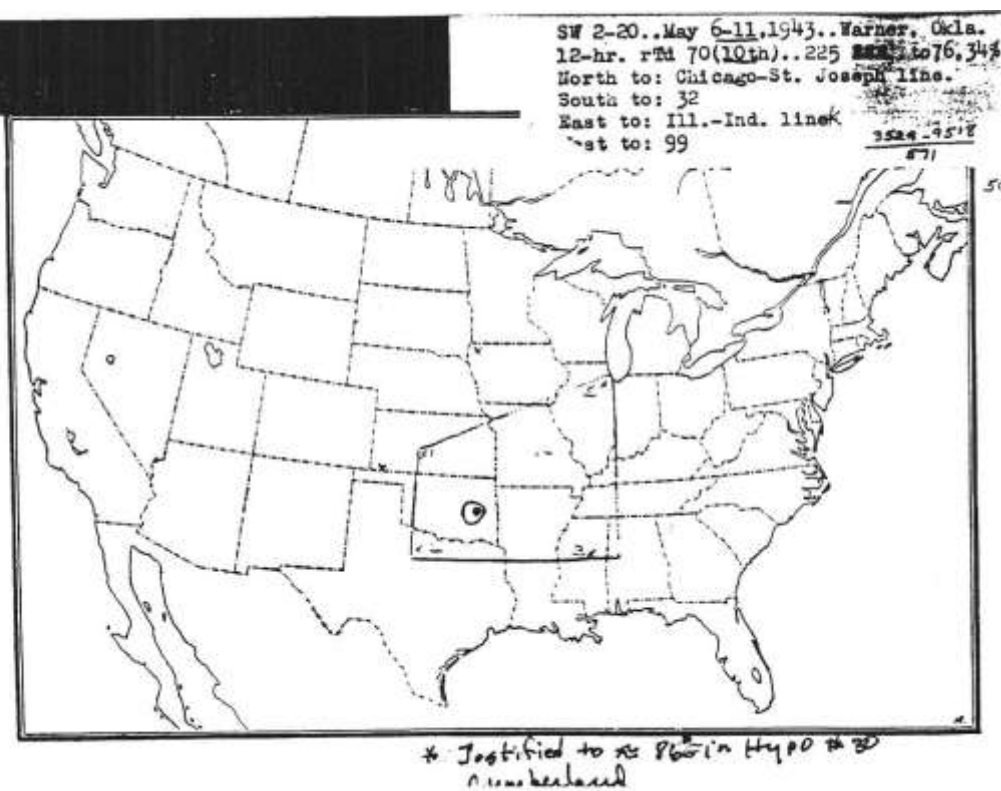


Figure 104: NWS Transposition Map for Warner, OK May 1943

Storm Precipitation Analysis System (SPAS) For Storm #1583

General Storm Location: Kansas, Oklahoma, Nebraska, Colorado, Iowa, Missouri, Arkansas (42.0, -103.4, 36.0, -91.5)

Storm Dates: July 9-13, 1951 (120-hours)

Event: Hurricane Georges

DAD Zone 1

Latitude: 38.65

Longitude: -96.62

Max. Grid rainfall amount: 18.56"

Max. Observed rainfall amount: 18.50"

Number of Stations: 985

SPAS Version: 10

Base Map Used: conus_prism_ppt_in_1971_2000_07

Spatial resolution: 00:00:30

Radar Included: No

Depth-Area-Duration (DAD) analysis: Yes

Reliability of Results: This analysis was based on hourly data (H), hourly pseudo data (HP), daily data (D) and supplemental data (S). We have a high degree of confidence in the station based storm total results. The spatial pattern is dependent on basemap, and the timing is based on hourly and hourly pseudo stations.

SPAS Storm ID	NAME	LON	LAT	ELEV Round	Storm Representative				Climatological Maximum				IPMF
					T _s	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	T _s	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	
1583_1	COUNCIL GROVE	-96.621	38.646	1,400	75.00	2.85"	0.34"	2.510	80.5	3.68"	0.42"	3.260	1.30

Storm 1583 Zone 1 - Jul. 9 (0700 UTC) - Jul. 14 (0600 UTC), 1951																	
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)																	
areasqmi	Duration (hours)																
	1	2	3	4	5	6	12	18	24	30	36	48	60	72	96	108	120
0.4	2.44	3.18	4.94	4.96	4.96	5.11	7.97	8.62	9.35	12.11	14.14	15.33	18.38	18.56	18.56	18.56	18.56
1	2.44	3.17	4.93	4.95	4.95	5.11	7.96	8.61	9.34	12.07	14.09	15.28	18.32	18.47	18.47	18.47	18.47
10	2.42	3.15	4.90	4.92	4.92	5.04	7.86	8.51	9.21	11.93	13.92	15.10	18.16	18.31	18.31	18.31	18.31
25	2.41	3.15	4.89	4.90	4.91	5.01	7.83	8.47	9.16	11.87	13.85	15.03	18.10	18.24	18.24	18.24	18.24
50	2.40	3.14	4.88	4.89	4.90	4.90	7.64	8.26	8.96	11.61	13.56	14.70	17.96	18.14	18.14	18.14	18.14
100	2.32	3.12	4.85	4.88	4.88	4.89	7.17	7.83	8.45	10.89	12.73	13.79	17.26	17.63	17.63	17.63	17.63
150	2.25	3.07	4.76	4.79	4.79	4.80	6.88	7.59	8.17	10.45	12.02	13.31	16.71	17.17	17.17	17.17	17.17
200	2.18	2.99	4.65	4.67	4.67	4.69	6.75	7.43	7.94	10.16	11.49	12.96	16.22	16.71	16.72	16.72	16.72
300	2.05	2.81	4.36	4.37	4.38	4.43	6.58	7.20	7.64	9.67	10.80	12.35	15.48	16.05	16.06	16.06	16.06
400	1.99	2.68	4.03	4.06	4.15	4.29	6.44	7.05	7.45	9.32	10.39	11.92	14.99	15.60	15.61	15.61	15.61
500	1.95	2.57	3.74	3.84	3.98	4.24	6.33	6.93	7.31	9.07	10.15	11.60	14.60	15.25	15.26	15.26	15.26
1,000	1.77	2.22	2.96	3.24	3.54	4.05	5.98	6.54	6.89	8.33	9.52	10.70	13.35	14.11	14.12	14.12	14.12
2,000	1.51	1.92	2.40	2.75	3.25	3.80	5.50	6.03	6.34	7.52	8.98	9.75	12.19	13.00	13.02	13.02	13.02
3,500	1.28	1.68	2.03	2.56	2.94	3.45	5.06	5.55	5.78	6.88	8.47	9.00	11.41	12.14	12.18	12.18	12.18
5,000	1.12	1.51	1.87	2.42	2.75	3.18	4.77	5.26	5.46	6.47	8.04	8.64	10.87	11.59	11.64	11.64	11.64
7,500	0.93	1.31	1.68	2.20	2.50	2.87	4.41	4.86	5.09	6.02	7.59	8.15	10.28	10.94	11.05	11.05	11.05
10,000	0.79	1.18	1.53	2.02	2.32	2.61	4.15	4.60	4.80	5.73	7.17	7.80	9.69	10.31	10.41	10.41	10.41
15,000	0.64	0.97	1.29	1.71	2.01	2.25	3.71	4.17	4.38	5.25	6.60	7.19	8.76	9.33	9.46	9.47	9.47
20,000	0.53	0.84	1.15	1.49	1.76	2.00	3.37	3.85	4.05	4.90	6.09	6.75	8.08	8.60	8.72	8.73	8.73
35,000	0.36	0.65	0.90	1.13	1.36	1.56	2.69	3.17	3.34	4.00	4.99	5.64	6.70	7.11	7.24	7.26	7.26
50,000	0.29	0.54	0.76	0.95	1.14	1.32	2.27	2.72	2.89	3.35	4.25	4.89	5.77	6.11	6.32	6.34	6.34
75,000	0.22	0.39	0.56	0.70	0.90	1.03	1.82	2.23	2.36	2.68	3.42	3.92	4.66	4.94	5.16	5.18	5.18
100,000	0.17	0.30	0.45	0.56	0.69	0.81	1.43	1.79	1.90	2.19	2.73	3.18	3.81	4.08	4.45	4.47	4.48
200,207	0.09	0.16	0.23	0.30	0.38	0.44	0.79	0.99	1.06	1.29	1.53	1.79	2.20	2.38	2.66	2.67	2.68

Figure 105: Depth-area-duration values for Council Grove, KS July 1951

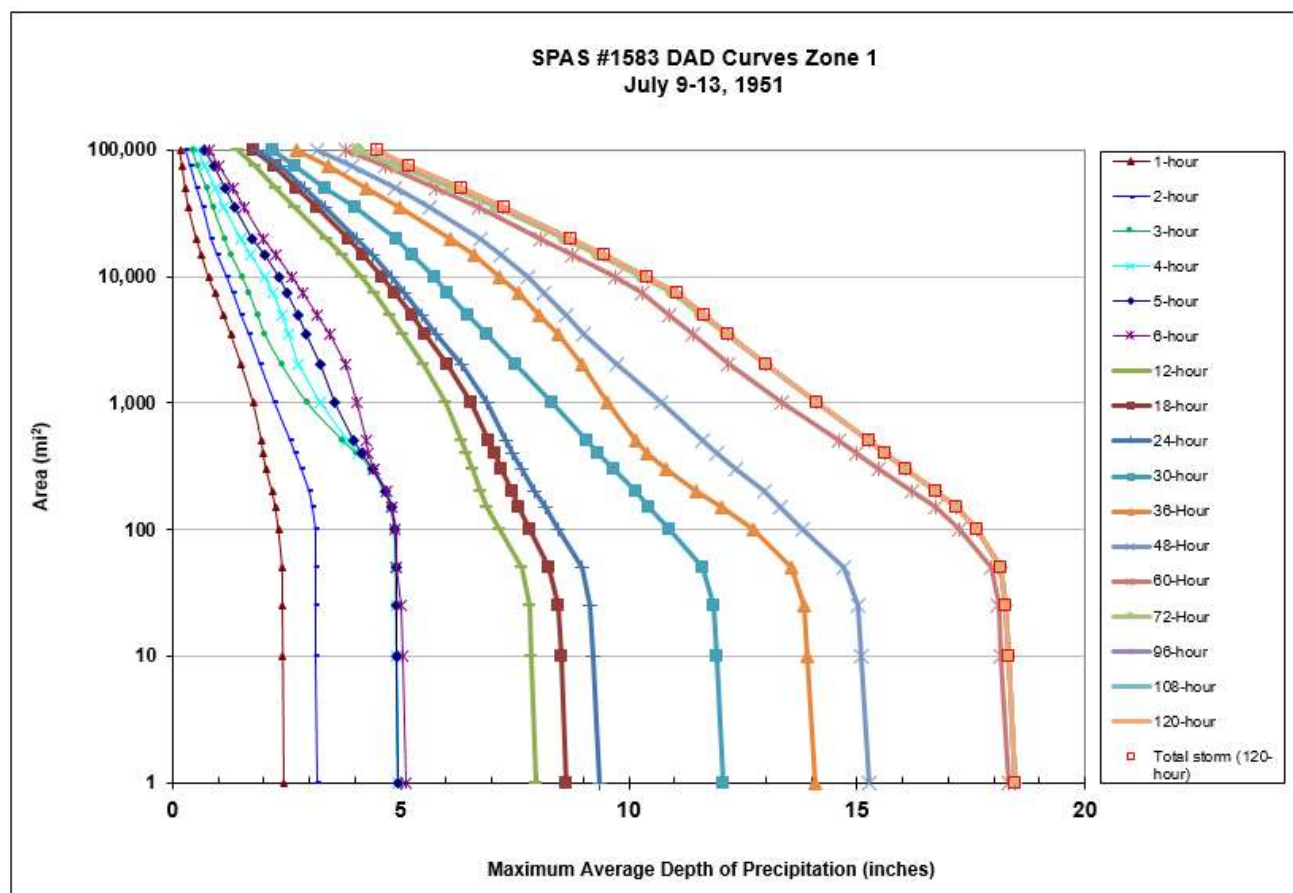


Figure 106: Depth-area-duration chart for Council Grove, KS July 1951

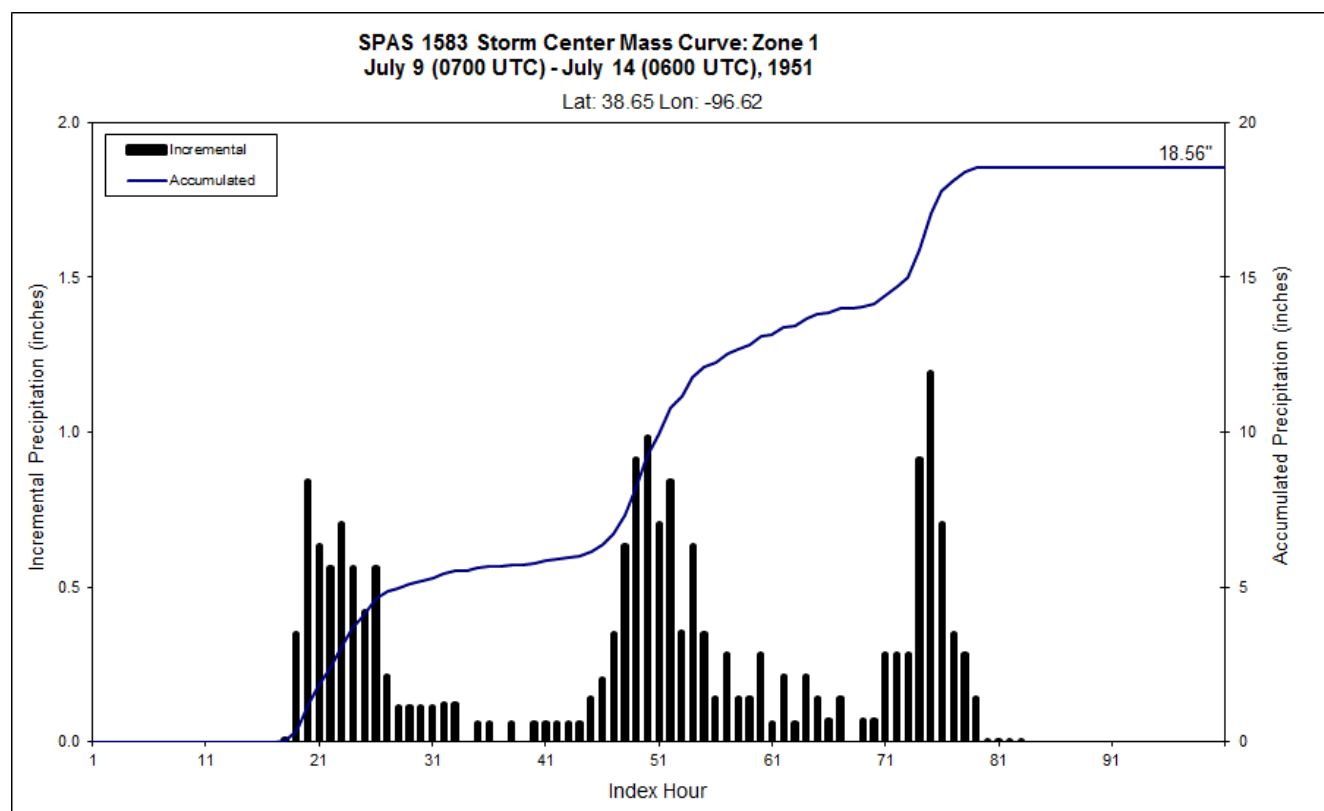


Figure 107: Mass curve chart for Council Grove, KS July 1951

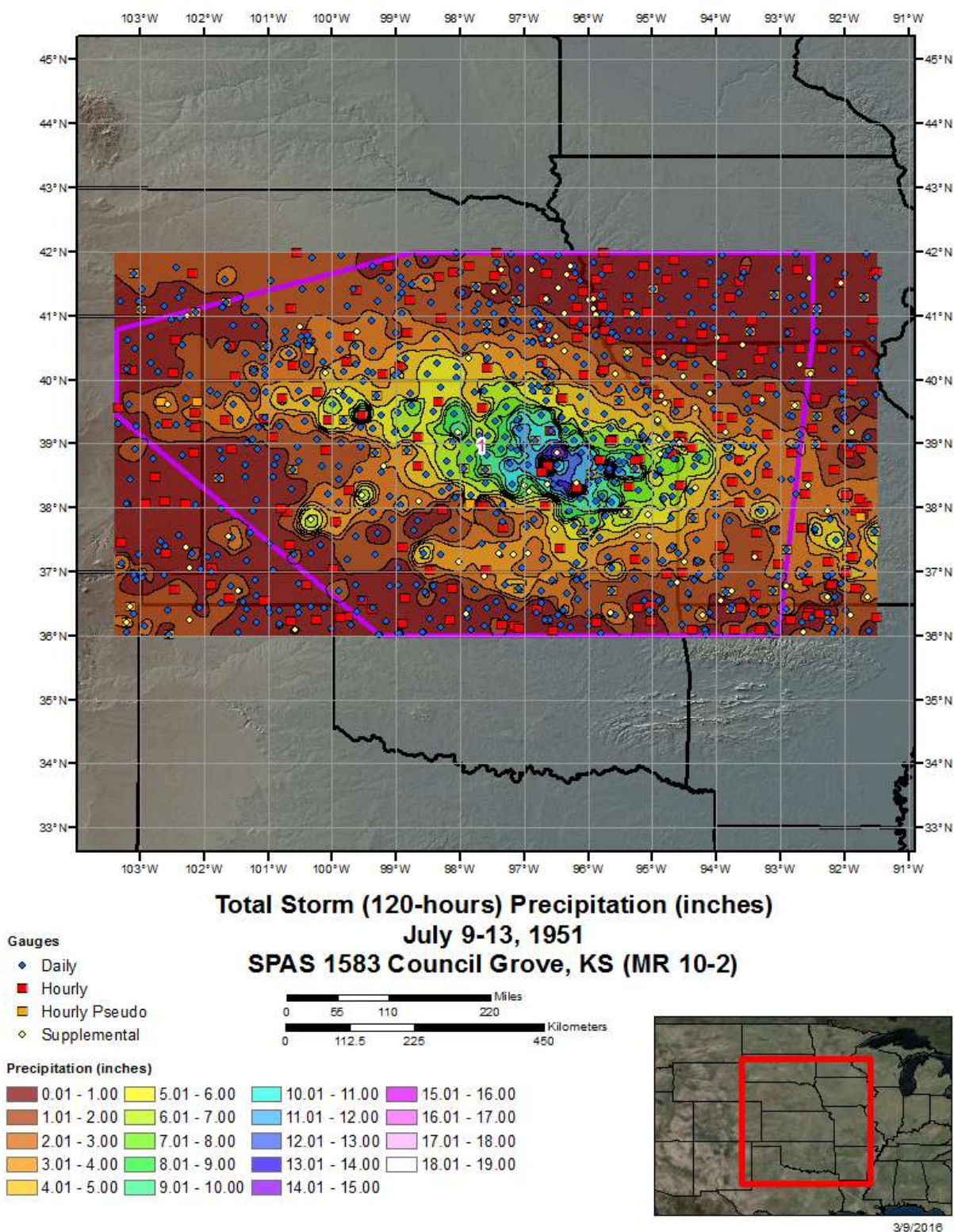


Figure 108: Total storm isohyetal analysis for Council Grove, KS July 1951

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS

STORM STUDIES - PERTINENT DATA SHEET

LOCATION MAP

Storm of 9-13 July 1951
Assignment MR 10-2
Location Kans., Nebr. Mo.
Study Prepared by:
Missouri River Division
Kansas City District Office

Part I Reviewed by H. M. Sec. of
Weather Bureau, 10/29/51
Part II Approved by Office, Chief
of Engineers for Distribution
of Factual Data, 12/10/52

Remarks: Center near
Council Grove, Kans.
Dewpt. 73°F-Ref. Pt. 205 SSW
Grid F-16

DATA AND COMPUTATIONS COMPILED

PART I

Preliminary isohyetal map, in 1 sheet, scale 1: 1,000,000

Precipitation data and mass curves: (Number of Sheets)

Form 5001-C (Hourly precip. data).....	78
Form 5001-B (24-hour " " " ").....	-
Form 5001-D (" " " ").....	2
Misc. precip. records, meteorological data, etc.....	151
Form 5002 (Mass rainfall curves).....	61

PART II

Final isohyetal maps, in 1 sheet, scale 1: 1,000,000

Data and computation sheets:

Form S-10 (Data from mass rainfall curves).....	7
Form S-11 (Depth-area data from isohyetal map).....	2
Form S-12 (Maximum depth-duration data).....	11
Maximum duration-depth-area curves.....	1
Data relating to periods of maximum rainfall.....	6

MAXIMUM AVERAGE DEPTH OF RAINFALL IN INCHES

Area in Sq. Mi.	Duration of Rainfall in Hours										
	6	12	18	24	30	36	48	60	72	96	108
Max. Station	5.8	7.5	8.2	9.3	13.1	13.5	14.4	17.9	18.5	18.5	18.5
10	5.3	7.0	7.9	8.6	11.8	13.1	14.3	17.2	18.2	18.2	18.2
100	4.7	6.4	7.4	7.9	10.6	12.4	13.8	16.3	17.5	17.5	17.5
200	4.6	6.2	7.2	7.5	10.2	12.0	13.3	15.9	17.0	17.0	17.0
500	4.3	5.8	6.7	7.0	9.5	11.3	12.4	15.0	16.2	16.2	16.2
1,000	4.0	5.5	6.3	6.6	9.0	10.5	11.5	14.2	15.5	15.5	15.5
2,000	3.8	5.1	5.9	6.2	8.3	9.6	10.5	13.1	14.6	14.6	14.6
5,000	3.4	4.5	5.1	5.4	7.2	8.4	9.3	11.7	13.0	13.1	13.1
10,000	2.9	3.9	4.4	4.8	6.2	7.3	8.2	10.4	11.4	11.5	11.5
20,000	2.4	3.2	3.7	4.1	5.1	6.1	6.9	8.6	9.4	9.6	9.6
50,000	1.3	2.0	2.5	2.8	3.4	4.0	4.7	5.8	6.3	6.5	6.5
57,000	1.1	1.7	2.3	2.5	3.0	3.8	4.4	5.4	5.9	6.0	6.0

Form S-2

Figure 109: USACE Depth-area-duration values for Council Grove, KS July 1951

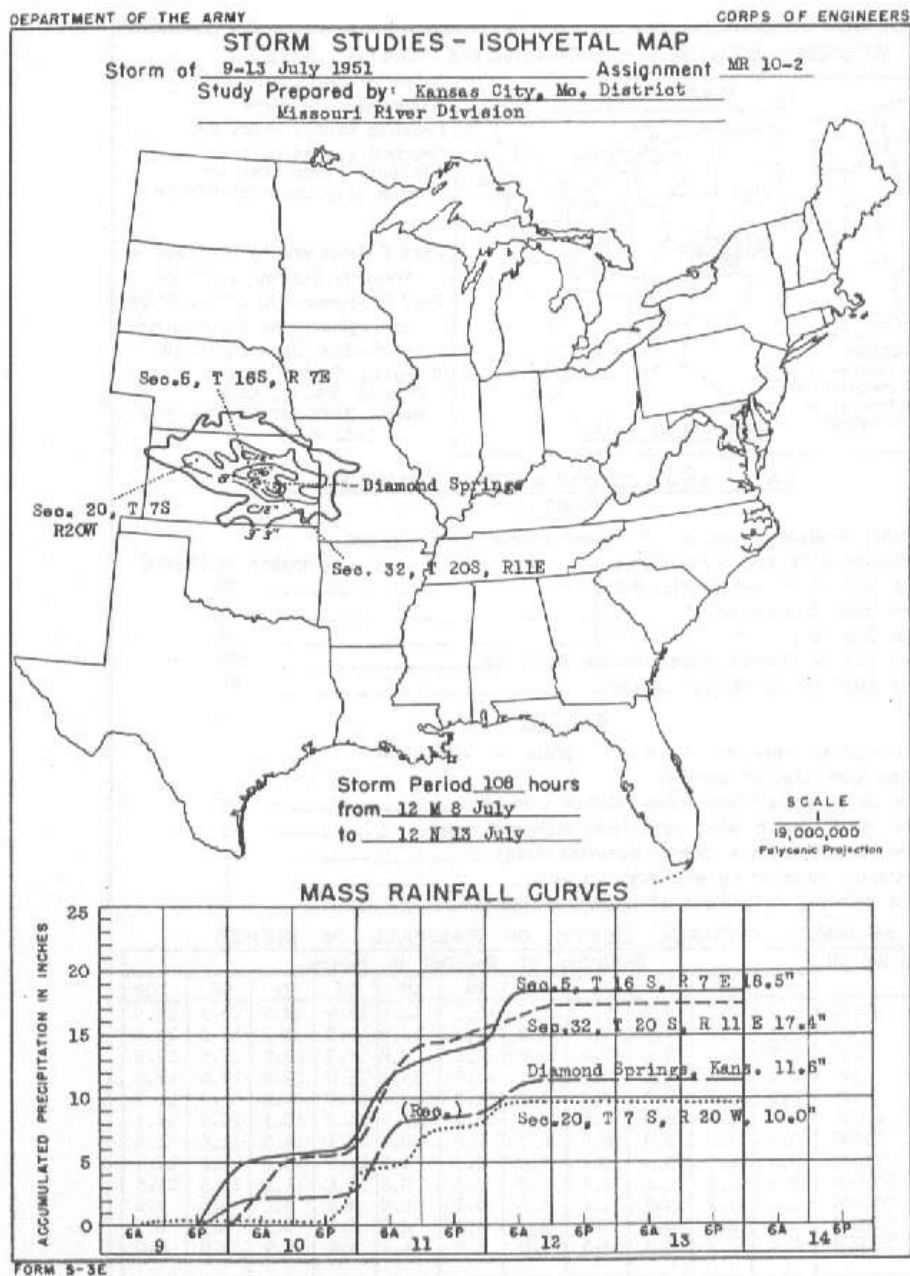


Figure 110: USACE Total storm isohyetal and mass curve chart for Council Grove, KS July 1951

NOAA HYSPLIT MODEL
 Backward trajectories ending at 1200 UTC 11 Jul 51
 CDC1 Meteorological Data

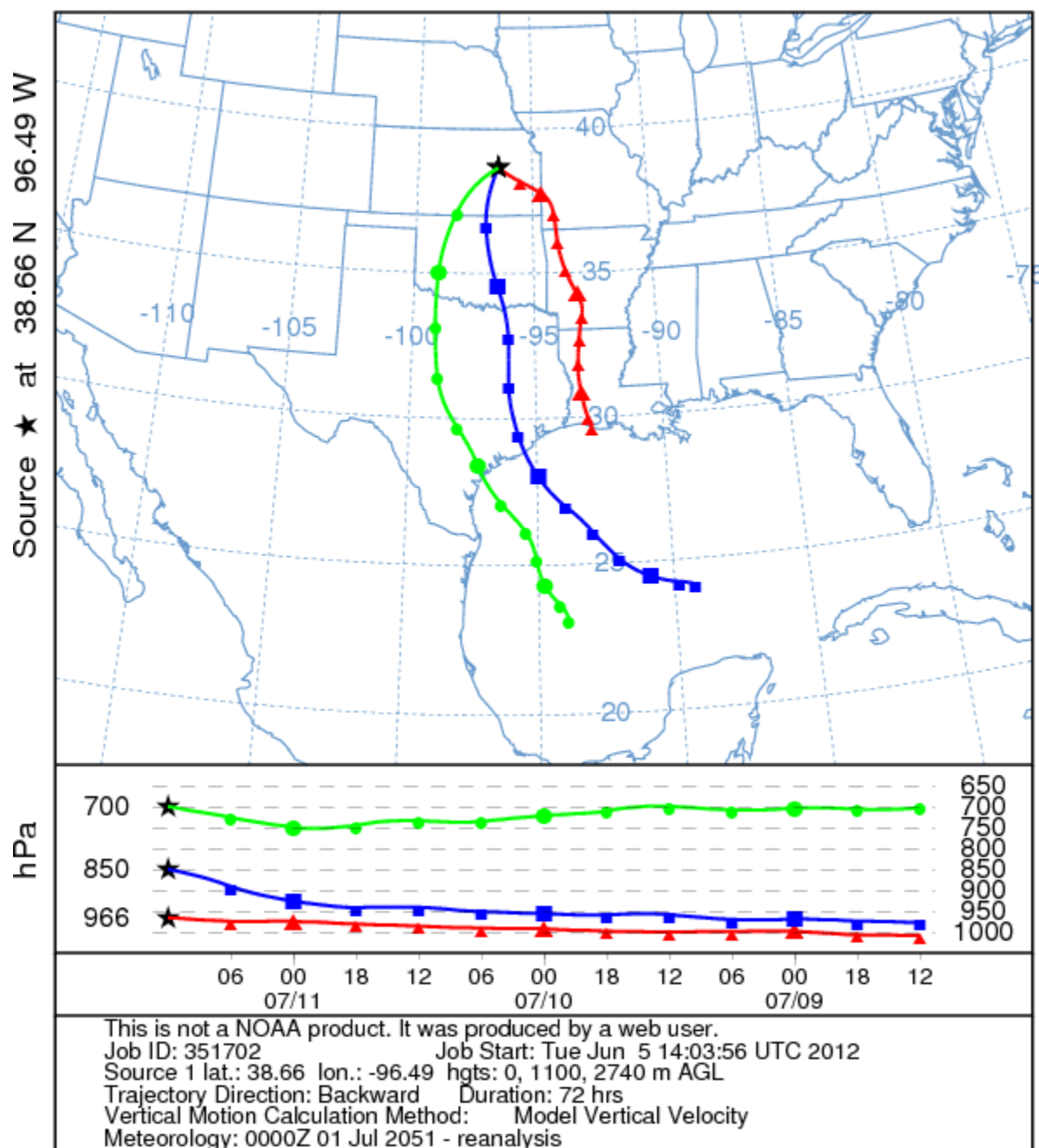


Figure 111: HYSPLIT trajectory analysis at Surface, 850mb and 700mb for Council Grove, KS July 1951

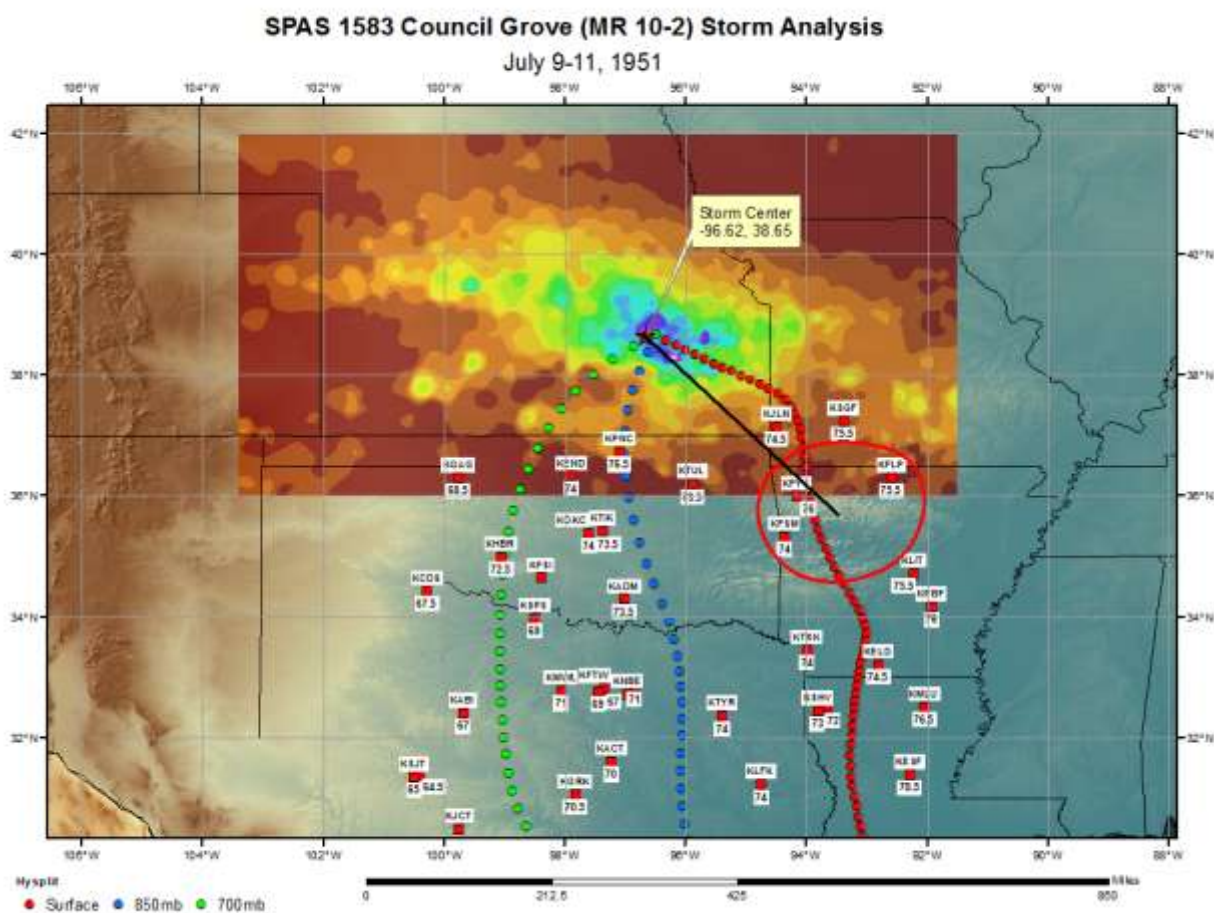


Figure 112: In-place storm representative dew point analysis for Council Grove, KS July 9-11, 1951

MR10-2 July 9-13, 1951
 Council Grove, Kansas
 Td 73°F 205556

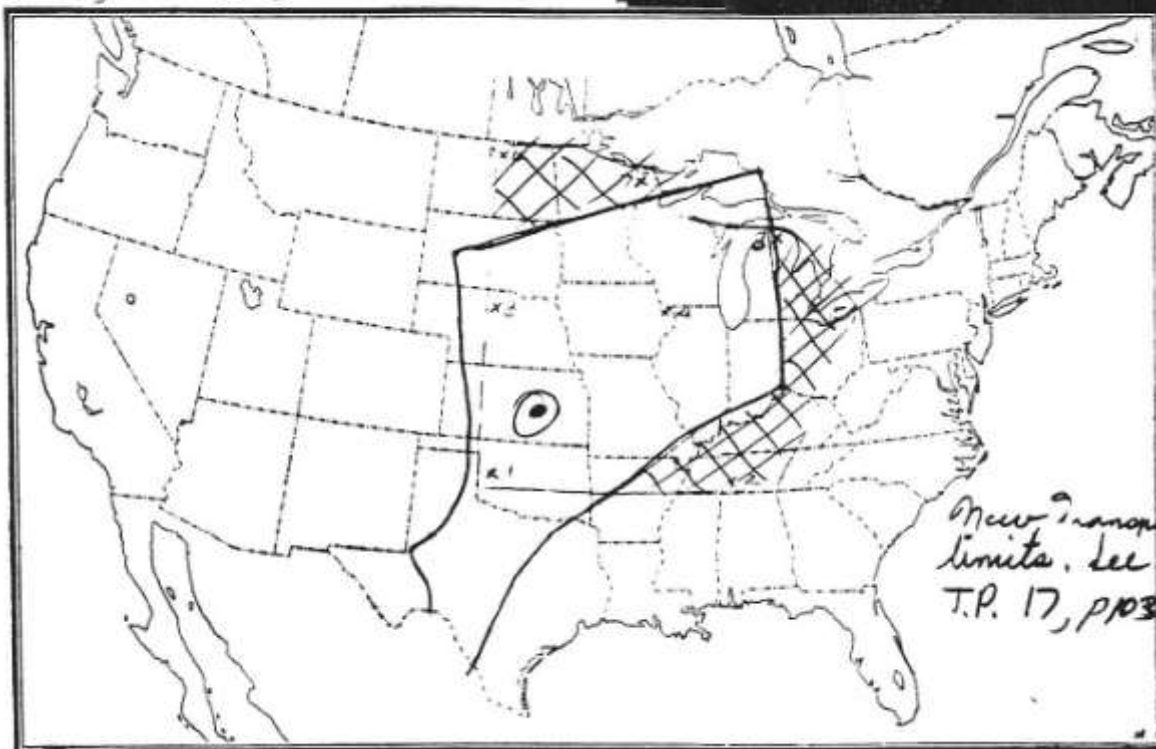


Figure 113: NWS Transposition Limit Map for Council Grove, KS July 1951

Storm Precipitation Analysis System (SPAS) For Storm #1435

General Storm Location: Lower Mississippi Valley (-94.7, 33.1, -89.5, 28.6)

Storm Dates: May 12 – May 19, 1953

Event: Mid-latitude cyclones with associated cold fronts including one stationary front

DAD Zone 1

Latitude: 31.7875

Longitude: -91.8125

Max. Grid rainfall amount: 25.35"

Max. Observed rainfall amount: 25.35" (Harrisonburg, LA)

Number of Stations: 234

SPAS Version: 9.5

Base Map Used: USGS storm total isohyets

Spatial resolution: 0.2840

Radar Included: No

Depth-Area-Duration (DAD) analysis: Yes

Reliability of Results: Two stations not found in existing NCDC data were digitized from the mass curves in the USACE report. One of them, Melville LA, had a co-located daily station which was used to anchor the hourly estimation. At the storm maximum at Harrisonburg Dam LA, hours 20 to 31 were estimated using the mass curve from the USGS report because the NCDC hourly data had an accumulated amount recorded. A map of isohyets of the storm total developed by the USGS was used as the basemap to improve spatial patterns.

The DAD estimates agree reasonably well with most being within +/- 5%. The larger differences are likely do to the fact that the current SPAS analysis was run with more data than was available to the previous publications. Slight differences in the domain (in particular the extension of the buffer area into the Gulf of Mexico) and overall time period may also contribute.

With the density of stations available and the consistency of the resulting SPAS analysis to the U.S. Army Corps of Engineers report, this analysis is deemed reliable.

SPAS Storm ID	NAME	LON	LAT	ELEV Round	Storm Representative				Climatological Maximum				IPMF
					T _g	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	T _g	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	
1435_1	HARRISONBURG DAM	-91.813	31.788	200	80.00	3.60"	0.06"	3,540	83.0	4.12"	0.06"	4,060	1.15

Storm 1435 - May 12 (0700 UTC) - May 20 (0600 UTC), 1953																
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)																
Area (mi ²)	Duration (hours)															
	1	2	3	4	5	6	12	24	36	48	72	96	120	144	168	192
0.4	4.41	5.23	6.48	7.15	7.98	9.41	11.67	17.99	19.20	19.48	20.42	21.50	23.66	25.31	25.35	25.35
1	4.39	5.21	6.45	7.12	7.96	9.37	11.60	17.89	19.10	19.38	20.31	21.39	23.54	25.18	25.15	25.15
10	4.35	5.16	6.37	7.05	7.88	9.27	11.45	17.65	18.85	19.14	20.04	21.11	23.22	24.86	24.79	24.79
25	4.34	5.13	6.34	7.02	7.84	9.23	11.39	17.56	18.75	19.04	19.94	21.00	23.10	24.74	24.65	24.65
50	4.32	5.12	6.32	7.00	7.82	9.19	11.24	17.29	18.55	18.85	19.78	20.84	22.84	24.59	24.55	24.54
100	4.31	5.10	6.10	6.88	7.67	8.88	11.20	16.68	18.01	18.37	19.27	20.36	22.18	24.26	24.32	24.30
150	4.26	5.06	5.82	6.65	7.41	8.52	11.18	16.00	17.45	17.90	18.81	19.89	21.52	24.02	24.08	24.08
200	4.22	5.01	5.55	6.42	7.17	8.12	11.08	15.38	16.96	17.52	18.46	19.56	20.99	23.87	23.92	23.92
300	4.09	4.88	5.43	6.18	6.82	7.45	10.94	14.44	16.33	17.00	17.91	19.08	20.22	23.43	23.54	23.54
400	3.94	4.71	5.27	6.00	6.55	7.01	10.83	13.83	15.86	16.58	17.52	18.73	19.66	23.08	23.20	23.20
500	3.76	4.51	5.08	5.79	6.35	6.73	10.70	13.35	15.47	16.26	17.20	18.46	19.20	22.75	22.94	22.95
1,000	2.79	3.58	4.20	5.11	5.71	6.01	10.04	12.50	14.16	15.09	16.18	17.52	18.16	21.74	22.08	22.08
2,000	1.86	2.67	3.30	4.22	4.76	5.14	8.72	11.73	12.89	14.03	15.07	16.55	17.25	20.71	21.08	21.09
3,500	1.51	2.26	2.77	3.47	3.97	4.31	7.58	10.73	12.00	13.24	14.19	15.62	16.46	19.76	20.11	20.13
5,000	1.29	1.98	2.57	3.04	3.49	3.82	6.86	9.94	11.47	12.61	13.58	14.97	15.91	19.02	19.40	19.43
7,500	1.03	1.67	2.24	2.65	2.98	3.28	6.04	8.96	10.59	11.93	12.83	14.21	15.20	18.08	18.54	18.60
10,000	0.86	1.44	1.97	2.40	2.70	2.97	5.39	8.22	9.91	11.31	12.36	13.62	14.59	17.31	17.85	17.95
15,000	0.63	1.15	1.56	1.98	2.25	2.50	4.50	7.10	8.70	10.24	11.34	12.61	13.52	16.09	16.62	16.71
20,000	0.52	0.95	1.26	1.67	1.89	2.16	3.88	6.28	7.73	9.34	10.41	11.66	12.53	14.96	15.46	15.56
35,000	0.33	0.58	0.82	1.09	1.28	1.52	2.81	4.64	5.82	7.18	8.27	9.47	10.18	12.24	12.82	12.94
50,000	0.24	0.43	0.63	0.80	0.96	1.12	2.11	3.53	4.67	5.84	6.77	8.05	8.69	10.45	11.02	11.14
75,000	0.16	0.30	0.42	0.54	0.66	0.79	1.49	2.53	3.37	4.19	5.04	6.13	6.69	8.03	8.64	8.79
78,753	0.15	0.29	0.40	0.52	0.63	0.76	1.42	2.42	3.24	4.02	4.84	5.88	6.42	7.70	8.30	8.43

Figure 114: Depth-area-duration values for Harrisonburg Dam, LA May 1953

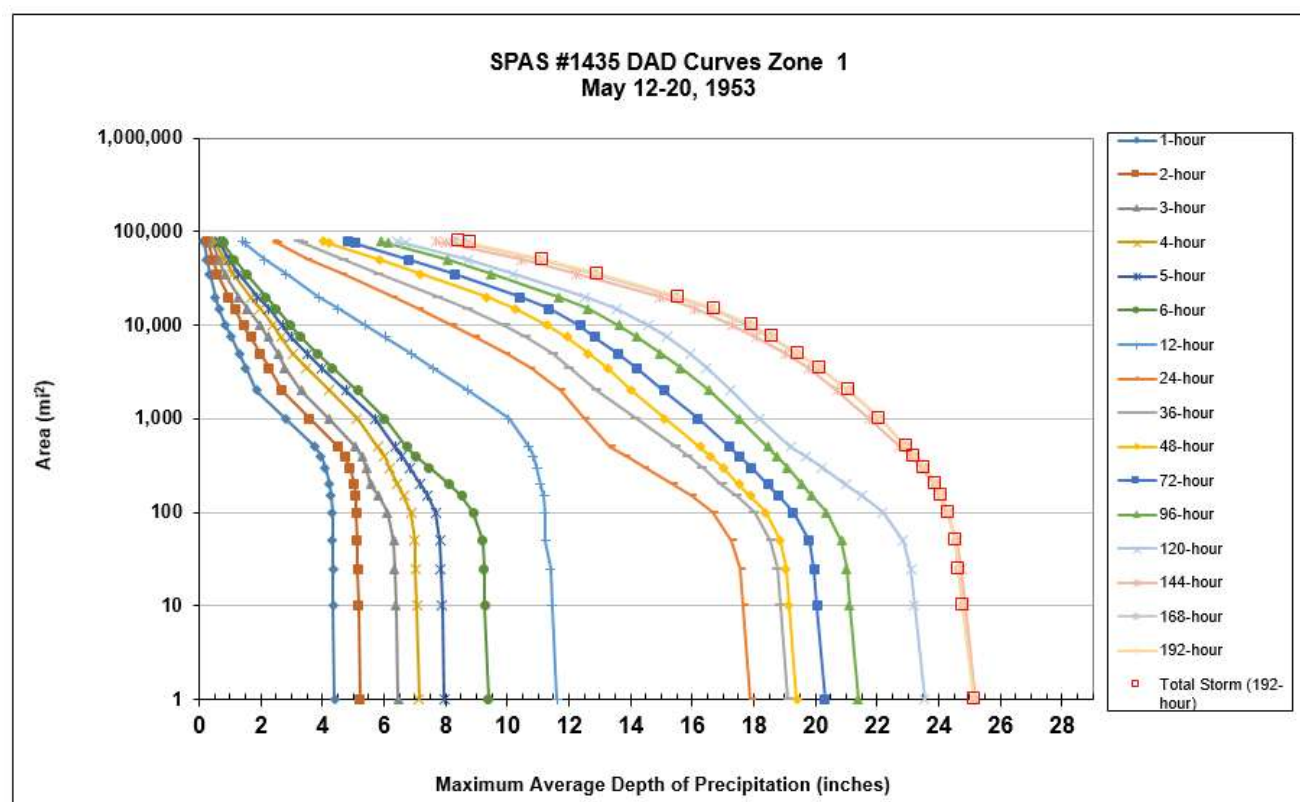


Figure 115: Depth-area-duration chart for Harrisonburg Dam, LA May 1953

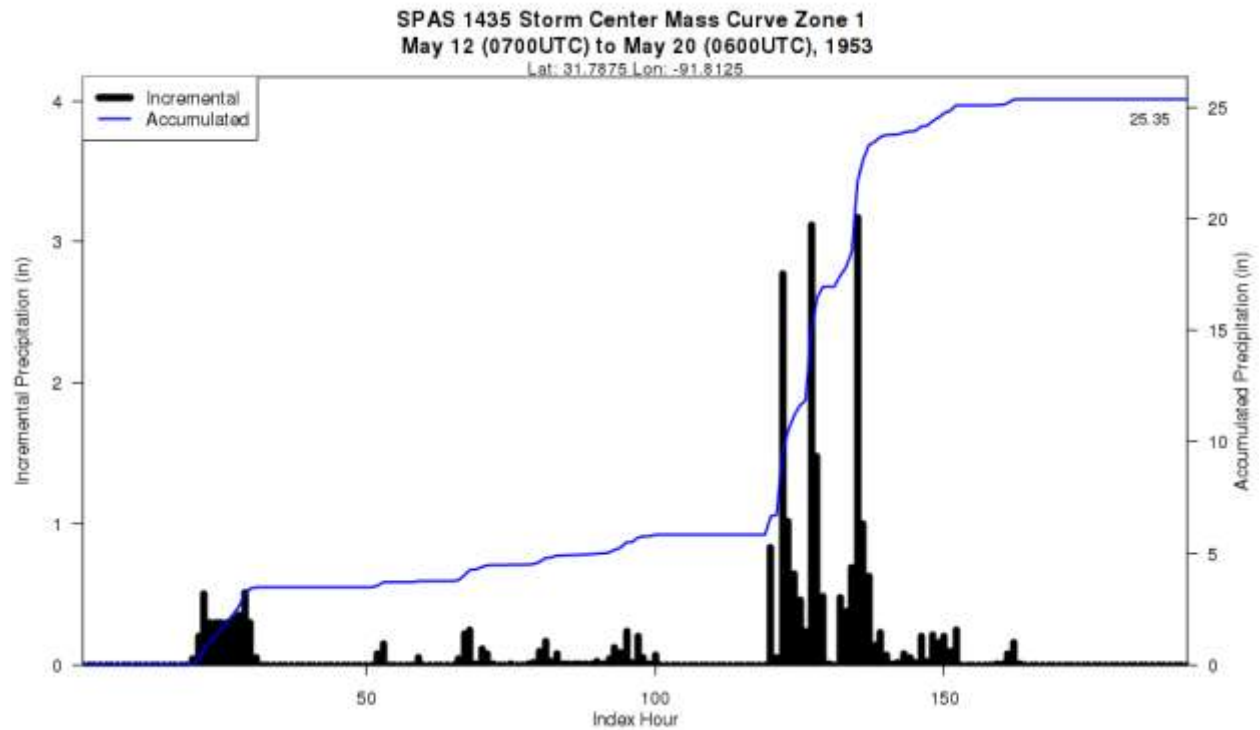
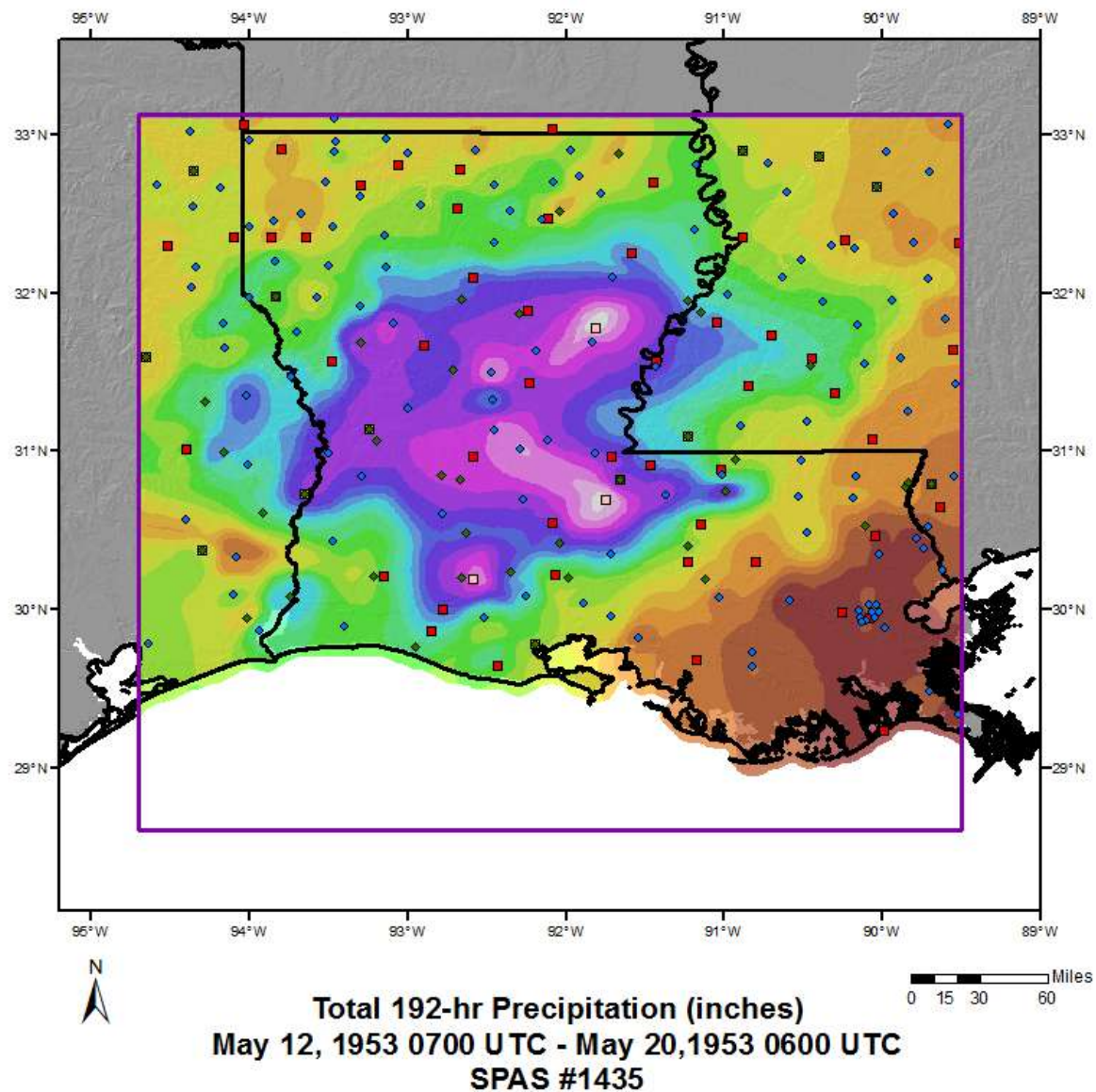


Figure 116: Mass curve chart for Harrisonburg Dam, LA May 1953

**Precipitation (inches)****Stations**

DLM 10/23/2014

Figure 117: Total storm isohyetal analysis for Harrisonburg Dam, LA May 1953

DEPARTMENT OF THE ARMY

CORPS OF ENGINEERS

STORM STUDIES - PERTINENT DATA SHEET											
						Storm of 11-19 May 1953 Assignment LHV 5-4 Location La., Miss., Tex. Study Prepared by: Lower Mississippi Valley Division, New Orleans District Office					
						Part I Reviewed by H. M. Sec. of Weather Bureau, 6-15-54 Part II Approved by Office, Chief of Engineers for Distribution of Factual Data, 6-13-61					
						Remarks: Center at Harrison- burg Dam, Louisiana Dept 74° Ref Pt 50 S of Alexandria, Louisiana Grid I-13					
						DATA AND COMPUTATIONS COMPILED					
PART I											
Preliminary Isohyetal map, in 4 sheets, scale 1:2,500,000 Precipitation data and mass curves: (Number of Sheets)											
Form 5001-C (Hourly precip. data)-----											48
Form 5001-B (24-hour " ")-----											41
Form 5001-D (" " " ")-----											-
Misc. precip. records, meteorological data, etc.-----											-
Form 5002 (Mass rainfall curves)-----											46
PART II											
Final isohyetal maps, in 1 sheet, scale 1:1,000,000 Data and computation sheets:											
Form S-10 (Data from mass rainfall curves)-----											10
Form S-11 (Depth-area data from isohyetal map)-----											2
Form S-12 (Maximum depth-duration data)-----											18
Maximum duration-depth-area curves-----											1
Data relating to periods of maximum rainfall-----											4
MAXIMUM AVERAGE DEPTH OF RAINFALL IN INCHES											
Area in Sq. Mi.	Duration of Rainfall in Hours										
	6	12	18	24	36	48	72	96	120	144	180
10	9.2	11.7	17.5	18.0	19.2	19.6	20.4	21.3	23.7	25.4	25.4
100	8.3	10.9	16.5	17.4	18.3	18.7	19.5	20.3	22.6	24.2	24.2
200	7.9	10.5	15.9	16.0	17.7	18.2	19.0	19.9	22.1	23.6	23.7
500	7.2	9.6	14.6	15.5	16.0	17.0	18.0	18.9	21.2	22.6	22.8
1,000	6.5	8.7	13.0	14.0	15.4	15.9	16.9	17.9	20.0	21.8	22.0
2,000	5.7	7.6	11.3	12.3	13.9	14.5	15.8	16.8	18.7	20.9	21.1
5,000	4.5	6.1	8.9	9.9	11.6	12.7	14.0	15.2	16.7	19.3	19.6
10,000	3.5	4.9	6.9	8.0	9.7	11.1	12.6	13.7	15.0	17.7	18.0
20,000	2.4	3.6	5.0	6.1	7.7	9.2	10.7	12.0	12.9	15.5	16.0
40,000	1.4	2.3	3.0	4.3	5.6	6.8	8.1	9.3	10.0	12.1	12.7

Form S-2

Figure 118: USACE Depth-area-duration values for Harrisonburg Dam, LA May 1953

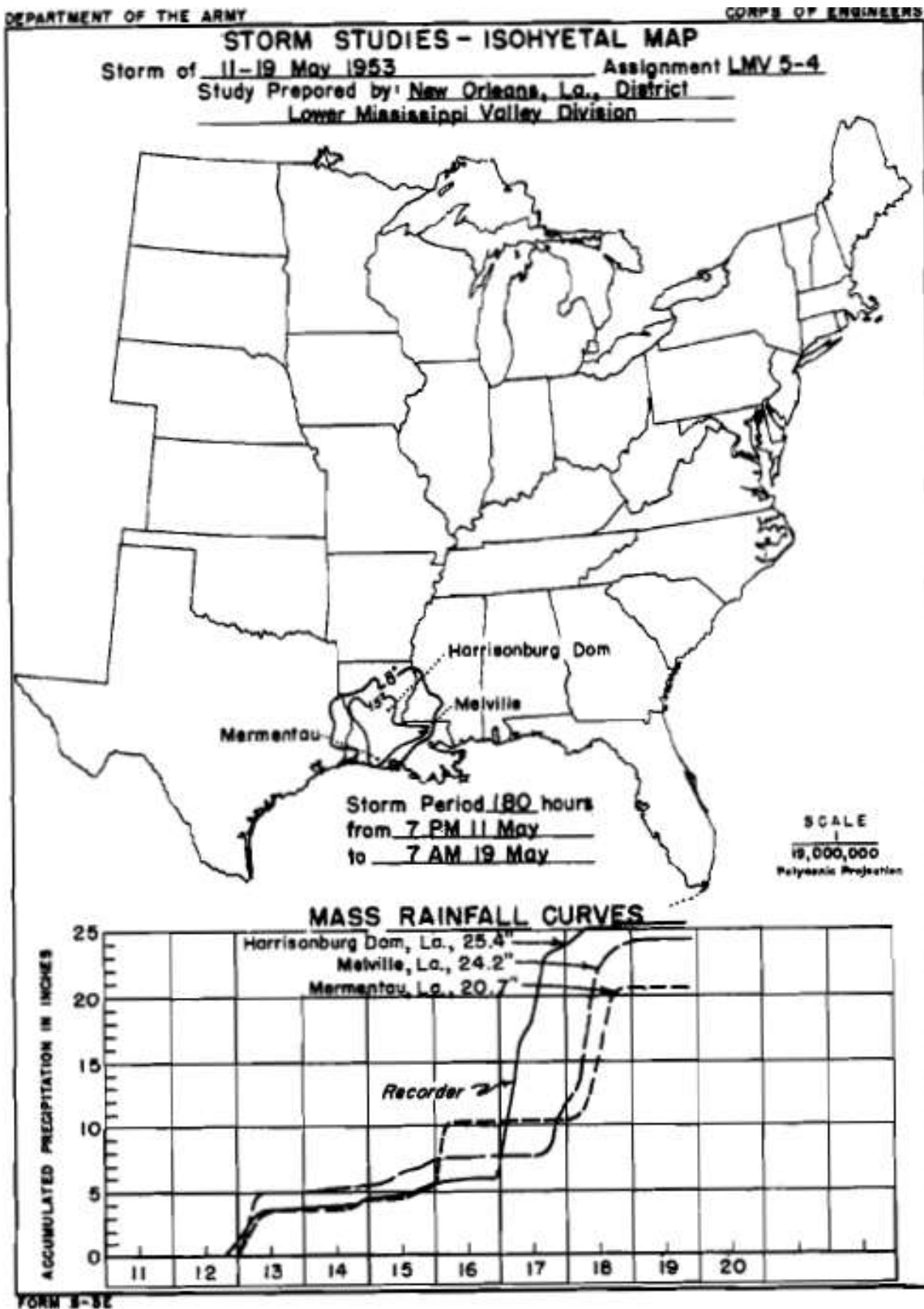


Figure 119: USACE Total storm isohyetal and mass curve chart for Harrisonburg Dam, LA May 1953

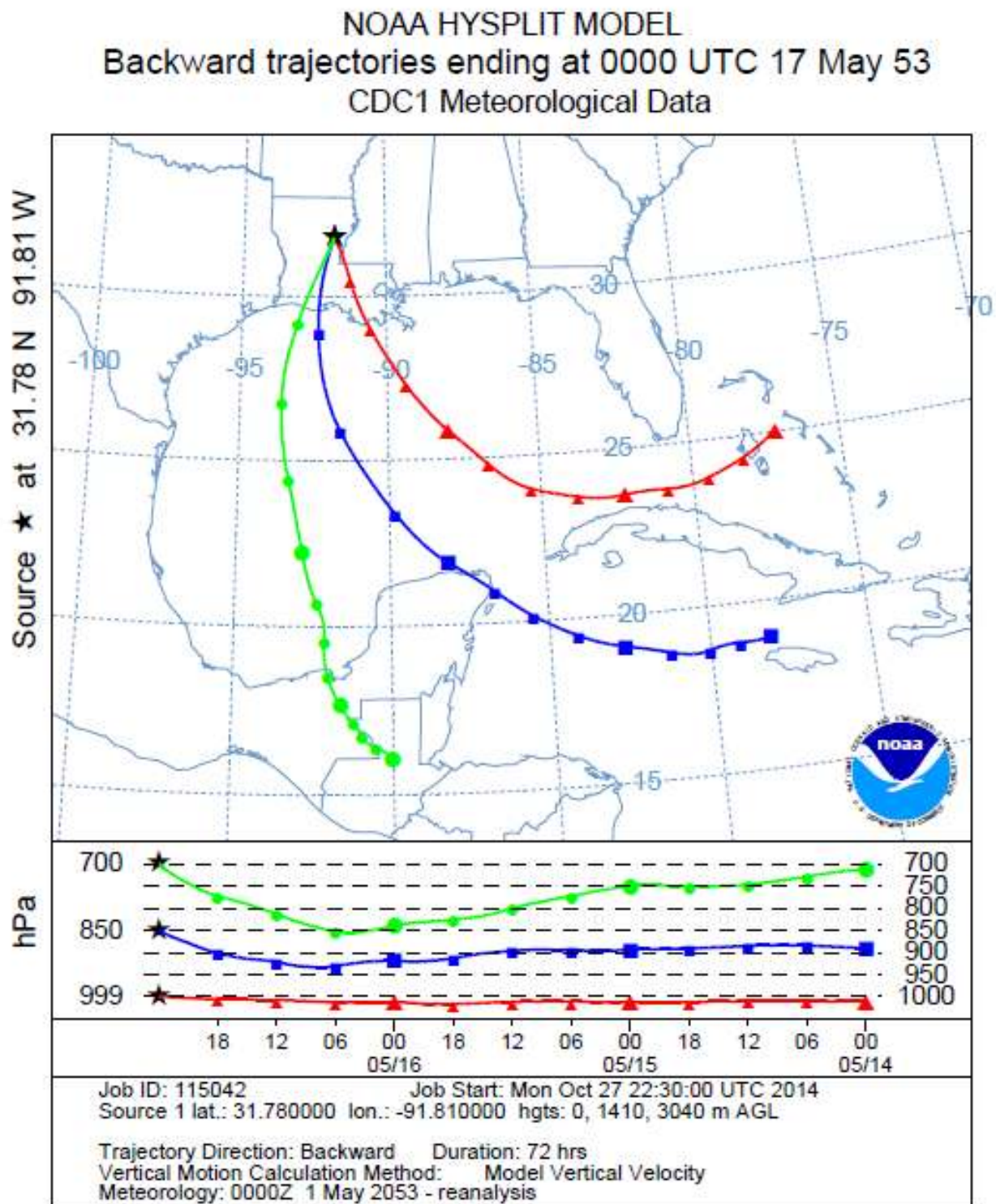


Figure 120: HYSPLIT trajectory analysis at Surface, 850mb and 700mb for Harrisonburg Dam, LA May 1953

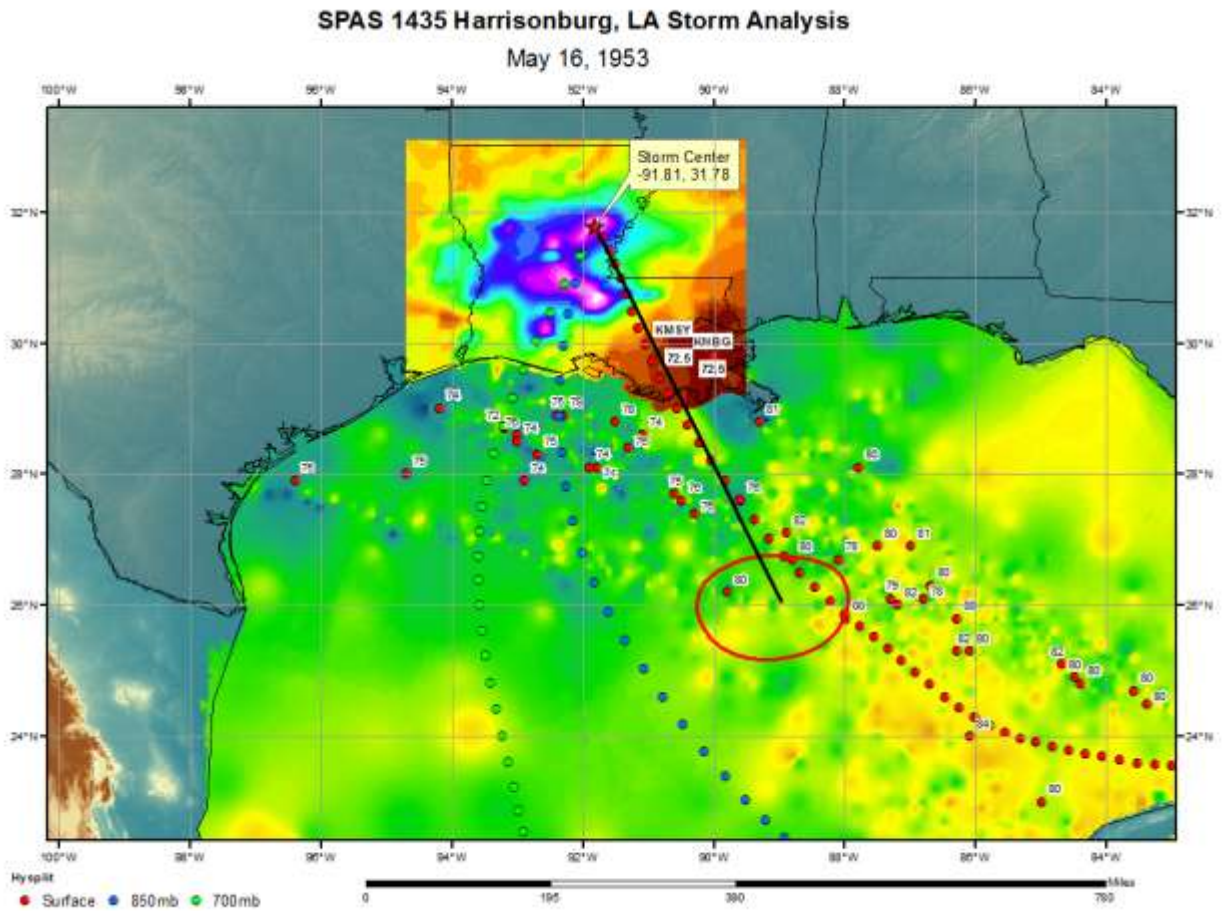


Figure 121: In-place storm representative SST analysis for Harrisonburg Dam, LA May 16, 1953

Storm Precipitation Analysis System (SPAS) For Storm #1251

General Storm Location: New Mexico and Colorado

Storm Dates: May 17-21, 1955

Event: Synoptic

DAD Zone 1

Latitude: 37.009

Longitude: -104.341

Max. Grid Rainfall Amount: 14.82"

Max. Observed Rainfall Amount: 13.69"

Number of Stations: 182 (133 Daily, 18 Hourly, 15 Hourly Pseudo, and 16 Supplemental)

SPAS Version: 9.5

Basemap: PRISM May 1955 precipitation

Spatial resolution: 00:00:30 (~ 0.30 mi²)

Radar Included: No

Depth-Area-Duration (DAD) analysis: Yes

Reliability of results: This analysis was based on hourly data, daily data, and previously analyzed isohyetal pattern. We have a high degree of confidence in the station based results, and spatial pattern is dependent on PRISM basemap.

SPAS Storm ID	NAME	LON	LAT	ELEV Round	Storm Representative				Climatological Maximum				IPMF
					T _g	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	T _g	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	
1251_1	LAKE MALOYA	-104.341	37.009	8,000	70.50	2.31"	1.34"	0.970	78.0	3.29"	1.74"	1.550	1.50

SPAS 1251 - May 17 (0800 UTC) - May 21 (0700 UTC), 1955														
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)														
Area (mi ²)	Duration (hours)													
	1	2	3	4	5	6	12	18	24	36	48	72	96	Total
0.4	1.26	1.77	2.32	2.85	3.48	3.98	7.07	9.73	11.87	13.99	14.69	14.76	14.82	14.82
1	1.25	1.75	2.30	2.84	3.45	3.96	7.03	9.67	11.79	13.88	14.57	14.65	14.65	14.65
10	1.22	1.72	2.25	2.77	3.38	3.86	6.87	9.46	11.53	13.61	14.27	14.35	14.35	14.35
25	1.18	1.68	2.16	2.66	3.25	3.70	6.61	9.14	11.13	13.25	13.94	14.02	14.02	14.02
50	1.10	1.62	2.02	2.49	3.04	3.47	6.20	8.65	10.51	12.68	13.42	13.52	13.52	13.52
100	0.99	1.53	1.82	2.26	2.73	3.12	5.61	7.92	9.59	11.82	12.63	12.73	12.73	12.73
150	0.91	1.45	1.74	2.12	2.51	2.87	5.21	7.37	8.91	11.11	11.96	12.08	12.08	12.08
200	0.85	1.38	1.67	2.01	2.35	2.68	4.88	6.90	8.33	10.57	11.42	11.54	11.54	11.54
300	0.75	1.27	1.54	1.83	2.13	2.42	4.41	6.27	7.55	9.73	10.60	10.73	10.73	10.73
400	0.69	1.19	1.45	1.70	1.98	2.25	4.08	5.81	7.00	9.16	10.02	10.14	10.14	10.14
500	0.65	1.12	1.38	1.60	1.87	2.12	3.82	5.47	6.61	8.70	9.58	9.72	9.72	9.72
1,000	0.52	0.93	1.16	1.37	1.60	1.90	3.08	4.51	5.57	7.40	8.42	8.54	8.54	8.54
2,000	0.44	0.76	0.98	1.23	1.47	1.73	2.56	3.76	4.74	6.38	7.40	7.51	7.51	7.51
3,500	0.38	0.65	0.87	1.12	1.38	1.60	2.37	3.30	4.18	5.69	6.67	6.78	6.78	6.78
5,000	0.34	0.59	0.82	1.06	1.30	1.51	2.23	3.03	3.86	5.29	6.24	6.35	6.35	6.35
7,500	0.30	0.53	0.77	1.00	1.22	1.40	2.07	2.76	3.54	4.85	5.79	5.87	5.87	5.87
10,000	0.28	0.50	0.73	0.95	1.14	1.33	1.96	2.59	3.32	4.53	5.41	5.50	5.50	5.50
15,000	0.24	0.44	0.66	0.86	1.03	1.19	1.77	2.35	3.03	4.13	4.89	5.02	5.02	5.02
20,000	0.21	0.40	0.60	0.78	0.93	1.07	1.60	2.13	2.72	3.76	4.42	4.52	4.52	4.52
35,000	0.14	0.28	0.42	0.55	0.66	0.76	1.19	1.65	2.09	2.87	3.32	3.45	3.45	3.45
35,753	0.14	0.27	0.41	0.54	0.64	0.75	1.17	1.63	2.06	2.83	3.27	3.40	3.40	3.40

Figure 122: Depth-area-duration values for Lake Maloya, NM May 1955

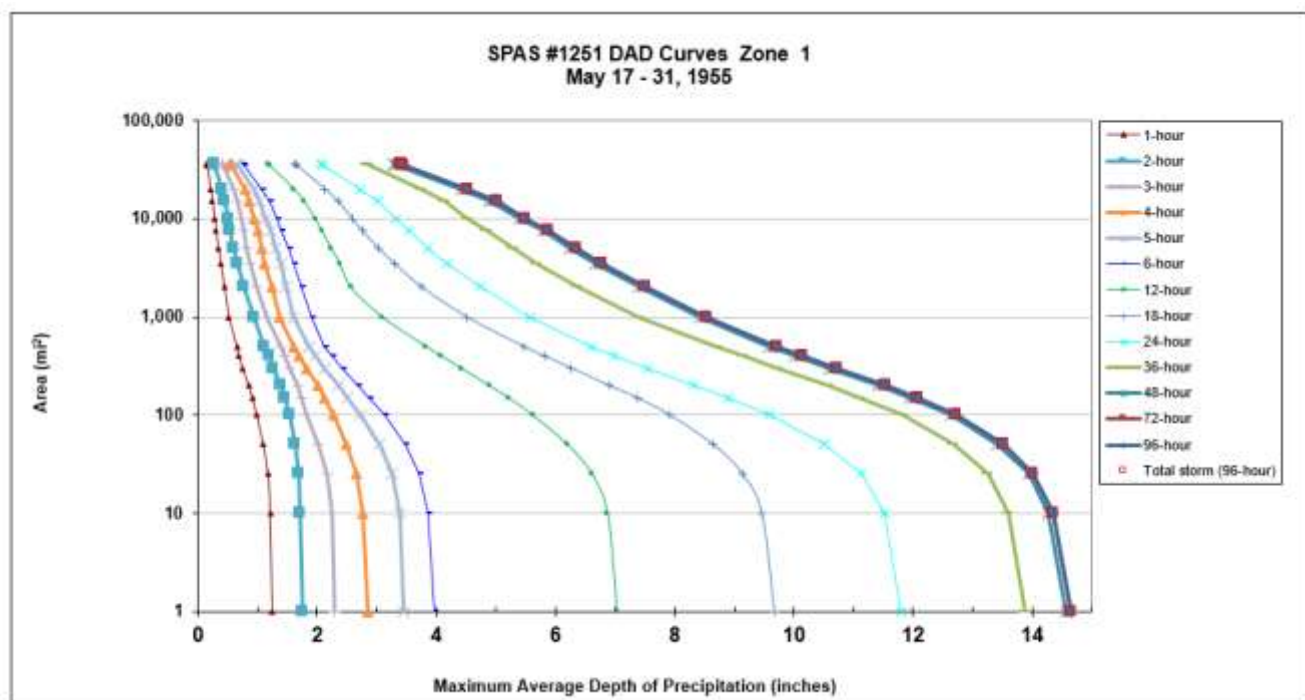


Figure 123: Depth-area-duration chart for Lake Maloya, NM May 1955

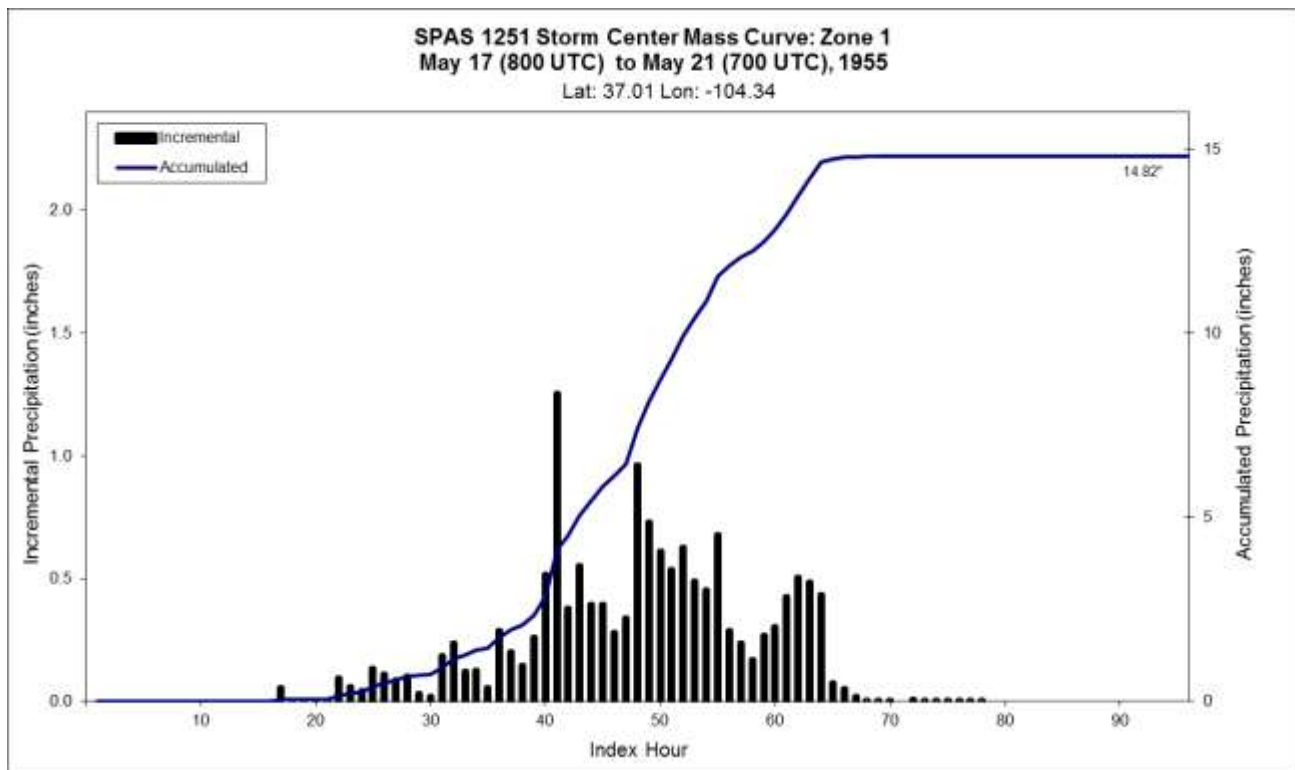
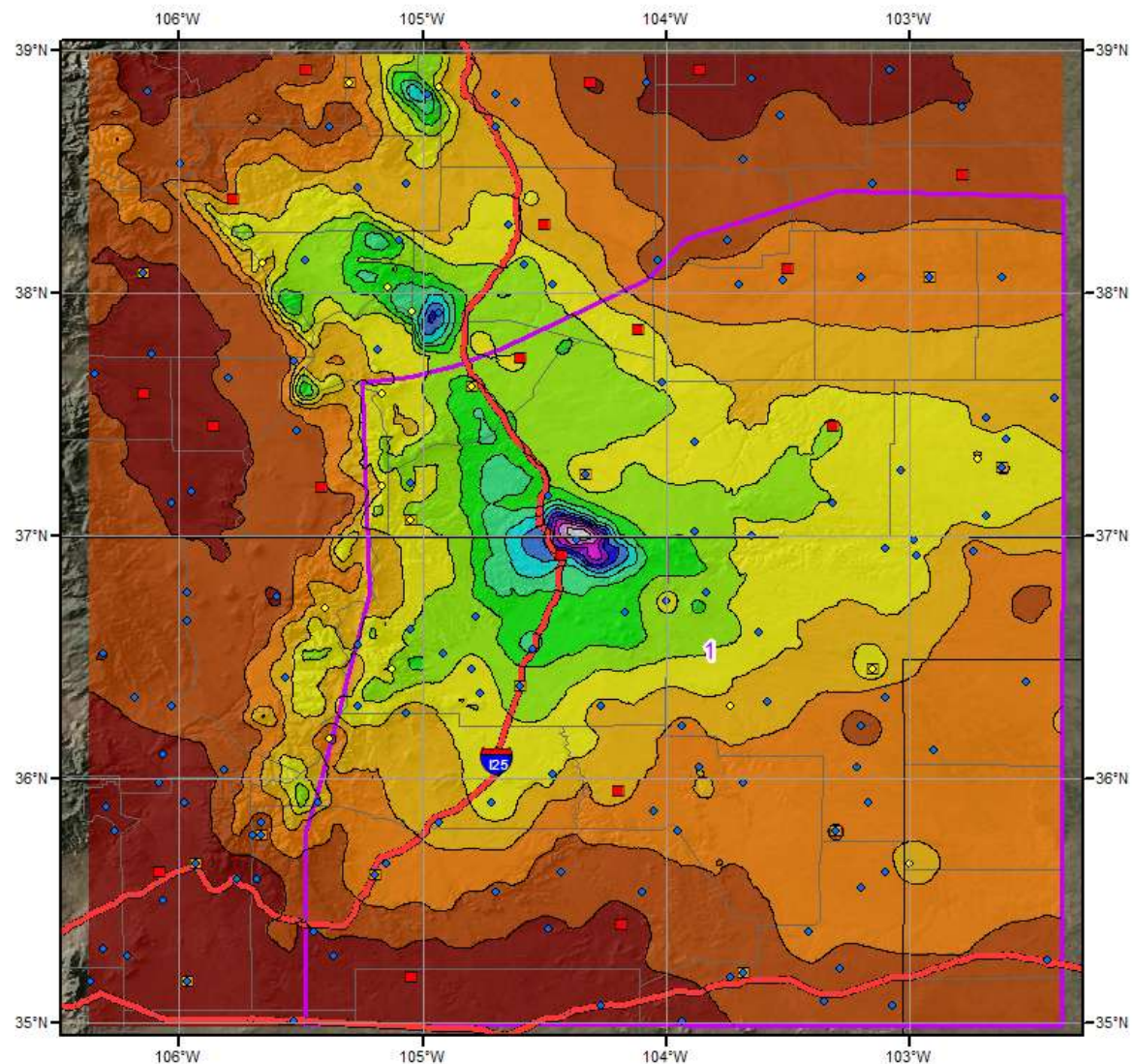


Figure 124: Mass curve chart for Lake Maloya, NM May 1955



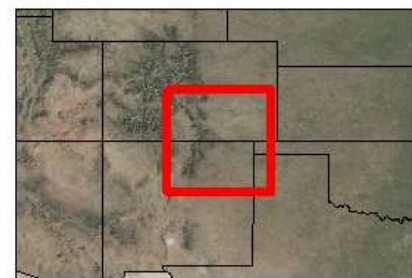
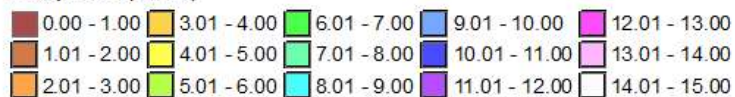
Total Precipitation (96-hours)
SPAS1251 - Lake Maloya, NM
5/17/1955 0800 GMT - 5/21/1955 0700 GMT

Gauges

- ◆ Daily
- Hourly
- Hourly Pseudo
- ◆ Supplemental



Precipitation (inches)



9/11/2012

Figure 125: Total storm isohyetal analysis for Lake Maloya, NM May 1955

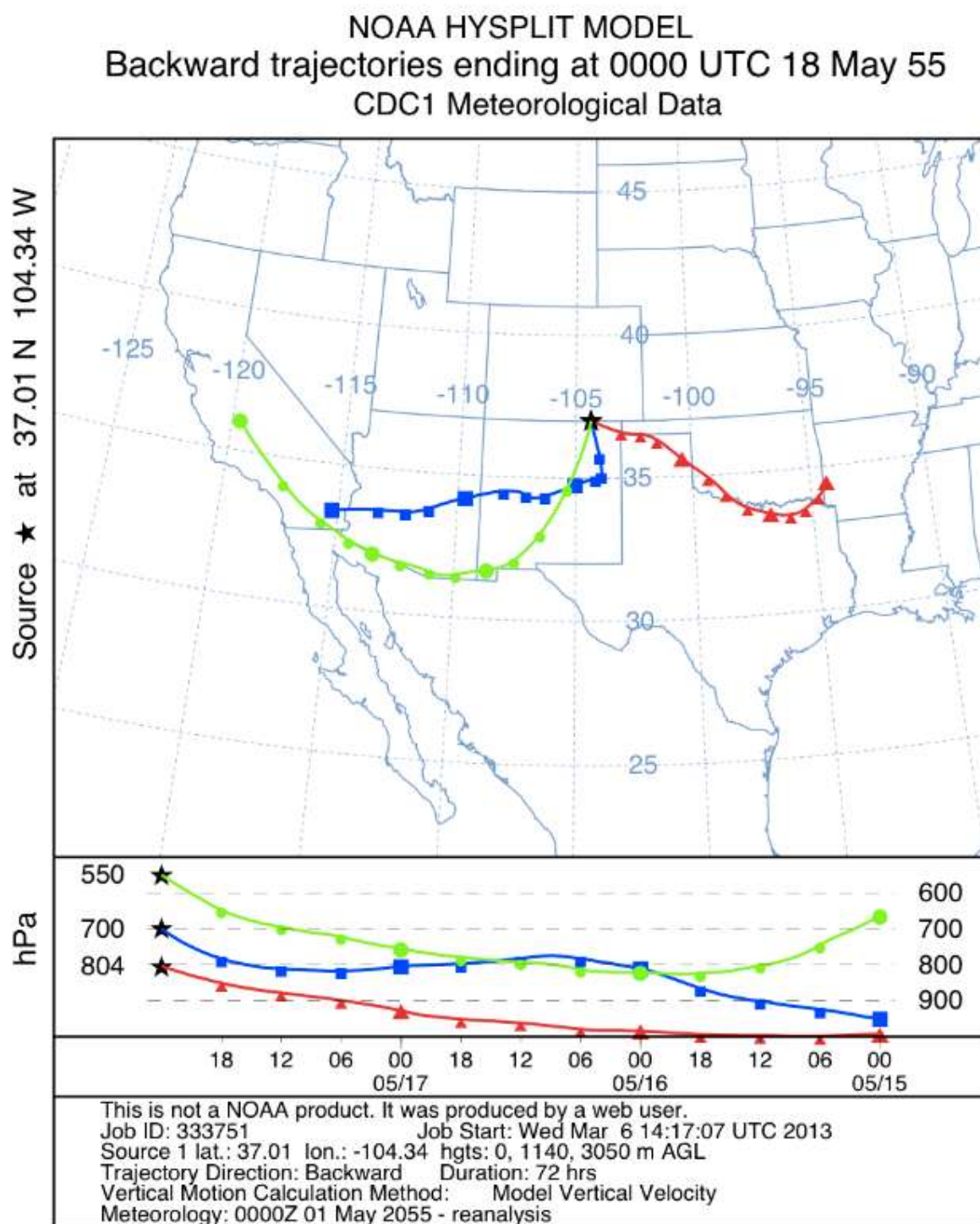


Figure 126: HYSPLIT trajectory analysis at Surface, 850mb and 700mb for Lake Maloya, NM May 1955

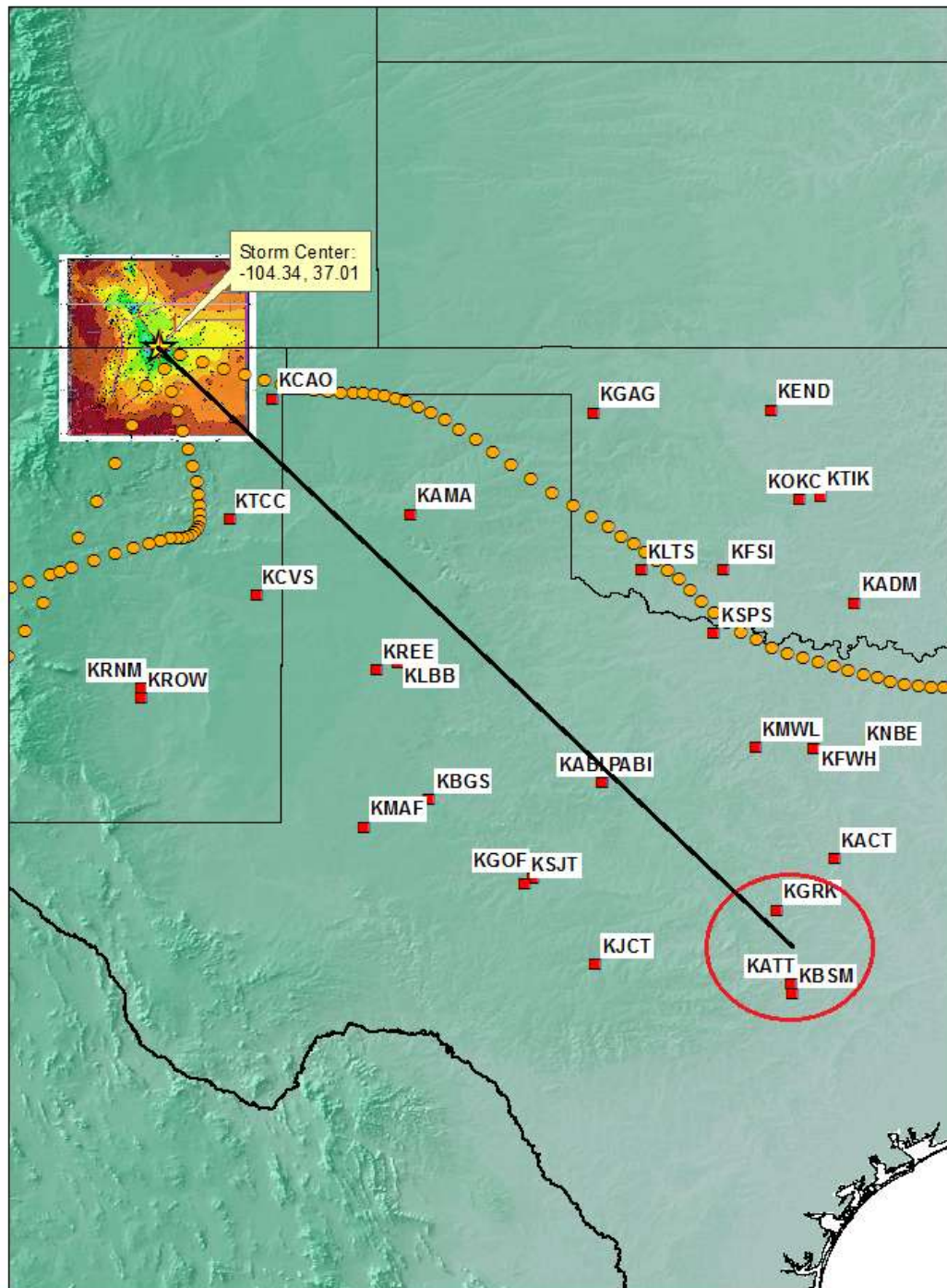


Figure 127: In-place storm representative dew point analysis for Lake Maloya, NM May 1955

Storm Precipitation Analysis System (SPAS) For Storm #1278

General Storm Location: Kentucky, Ohio River Valley

Storm Dates: March 7-11, 1964

Event: Synoptic

DAD Zone 1

Latitude: 37.35

Longitude: -87.50

Max. Grid Rainfall Amount: 11.67"

Max. Observed Rainfall Amount: 11.63"

Number of Stations: 1291 (819 Daily, 252 Hourly, 109 Hourly Pseudo, and 111 Supplemental)

SPAS Version: 9.5

Basemap: PRISM 30-yr Mean (1971-2000) March Precipitation

Spatial resolution: 00:00:30 (~ 0.30 mi²)

Radar Included: No

Depth-Area-Duration (DAD) analysis: Yes

Reliability of results: This analysis was based on hourly data, daily data, and supplemental station data. We have a high degree of confidence in the station based storm total results, the spatial pattern is dependent on basemap, and the timing is based on hourly and hourly pseudo stations. Results are similar to the analysis performed in the EPRI report for storm number 32.

SPAS Storm ID	NAME	LON	LAT	ELEV Round	Storm Representative				Climatological Maximum				IPMF
					T _g	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	T _g	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	
1278_1	MADISONVILLE	-87.496	37.346	400	70.00	2.25"	0.09"	2.160	73.0	2.60"	0.10"	2.500	1.16

Storm 1278 - March 7 (0700 UTC) - March 12 (0600 UTC), 1964 MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)															
Area (mi ²)	Duration (hours)														
	1	2	3	4	5	6	12	18	24	36	48	72	96	120	Total
0.4	1.99	2.77	2.88	3.23	3.37	3.90	5.64	7.74	8.69	9.36	11.25	11.59	11.67	11.67	11.67
1	1.98	2.76	2.86	3.23	3.36	3.89	5.64	7.73	8.67	9.33	11.22	11.58	11.62	11.62	11.62
10	1.96	2.72	2.82	3.21	3.32	3.85	5.60	7.66	8.59	9.25	11.12	11.47	11.53	11.53	11.53
25	1.95	2.71	2.81	3.19	3.31	3.84	5.58	7.63	8.57	9.22	11.08	11.42	11.49	11.49	11.49
50	1.94	2.70	2.79	3.18	3.27	3.82	5.57	7.61	8.55	9.20	11.05	11.39	11.47	11.47	11.47
100	1.90	2.63	2.74	3.17	3.26	3.72	5.54	7.59	8.52	9.18	11.02	11.36	11.44	11.44	11.44
150	1.86	2.58	2.73	3.11	3.25	3.68	5.46	7.45	8.43	9.10	10.97	11.34	11.42	11.42	11.42
200	1.82	2.54	2.70	3.05	3.25	3.66	5.42	7.27	8.28	8.97	10.83	11.19	11.27	11.27	11.27
300	1.77	2.44	2.65	2.97	3.20	3.61	5.31	7.00	7.95	8.68	10.49	10.93	11.00	11.00	11.00
400	1.72	2.34	2.59	2.90	3.16	3.56	5.18	6.81	7.71	8.51	10.27	10.73	10.78	10.79	10.79
500	1.66	2.26	2.55	2.85	3.12	3.52	5.09	6.70	7.57	8.39	10.10	10.57	10.62	10.63	10.63
1,000	1.53	2.04	2.38	2.67	2.99	3.37	4.76	6.44	7.17	8.01	9.60	10.16	10.20	10.21	10.21
2,000	1.40	1.86	2.17	2.50	2.80	3.15	4.52	6.25	6.82	7.70	9.22	9.77	9.80	9.81	9.81
3,500	1.27	1.71	2.02	2.34	2.61	2.93	4.29	6.00	6.58	7.48	8.94	9.48	9.51	9.52	9.52
5,000	1.18	1.62	1.92	2.24	2.48	2.77	4.13	5.80	6.42	7.32	8.73	9.30	9.33	9.34	9.34
7,500	1.08	1.52	1.83	2.12	2.35	2.59	3.93	5.52	6.25	7.13	8.50	9.02	9.05	9.06	9.06
10,000	1.00	1.44	1.76	2.03	2.26	2.47	3.79	5.29	6.10	6.98	8.32	8.83	8.84	8.86	8.86
15,000	0.90	1.33	1.64	1.90	2.12	2.31	3.54	4.91	5.86	6.71	8.05	8.47	8.48	8.51	8.51
20,000	0.83	1.23	1.54	1.80	2.01	2.19	3.37	4.65	5.66	6.53	7.81	8.22	8.24	8.26	8.26
35,000	0.68	1.05	1.32	1.58	1.77	1.94	2.96	4.09	5.20	6.07	7.21	7.64	7.64	7.67	7.67
50,000	0.57	0.92	1.17	1.41	1.59	1.77	2.71	3.79	4.84	5.74	6.70	7.18	7.19	7.21	7.21
75,000	0.46	0.76	1.00	1.20	1.37	1.52	2.38	3.41	4.33	5.22	6.02	6.51	6.51	6.54	6.54
100,000	0.37	0.65	0.85	1.04	1.19	1.34	2.15	3.08	3.90	4.74	5.47	5.93	5.94	5.96	5.96
227,344	0.20	0.34	0.45	0.56	0.64	0.73	1.20	1.76	2.24	2.85	3.34	3.72	3.72	3.77	3.77

Figure 128: Depth-area-duration values for Madisonville, KY March 1964

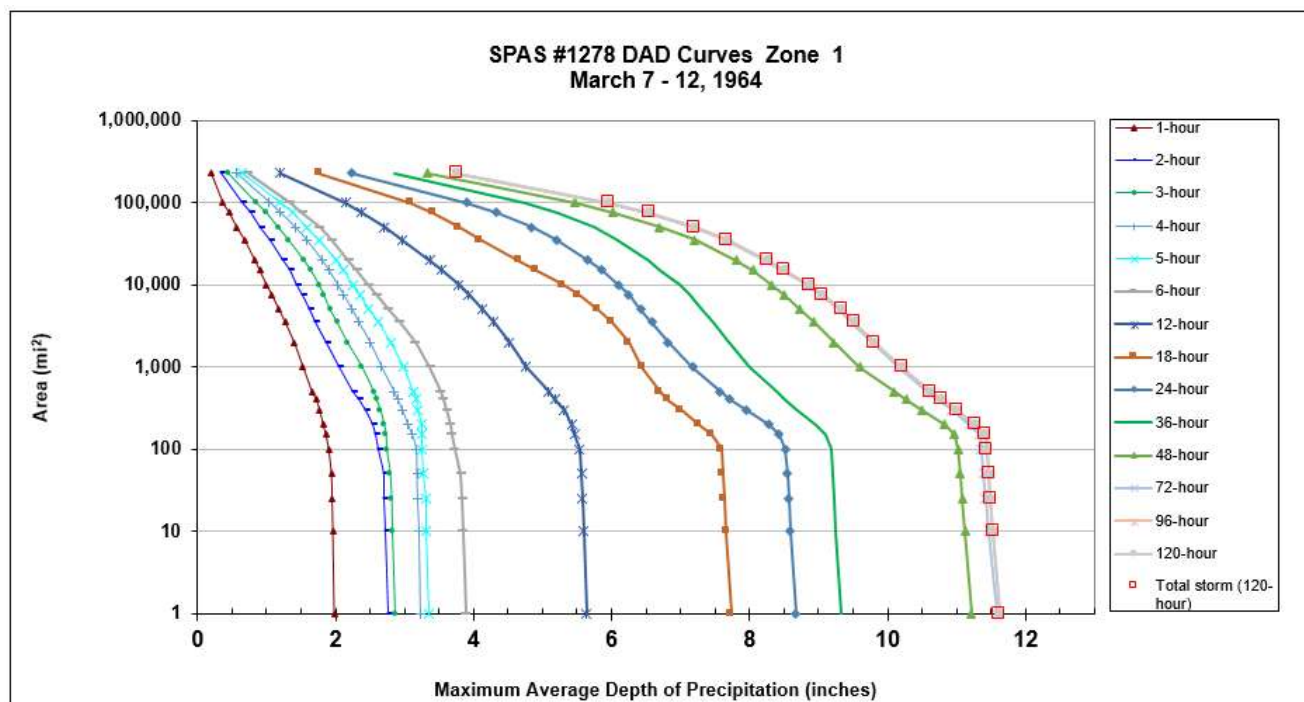


Figure 129: Depth-area-duration chart for Madisonville, KY March 1964

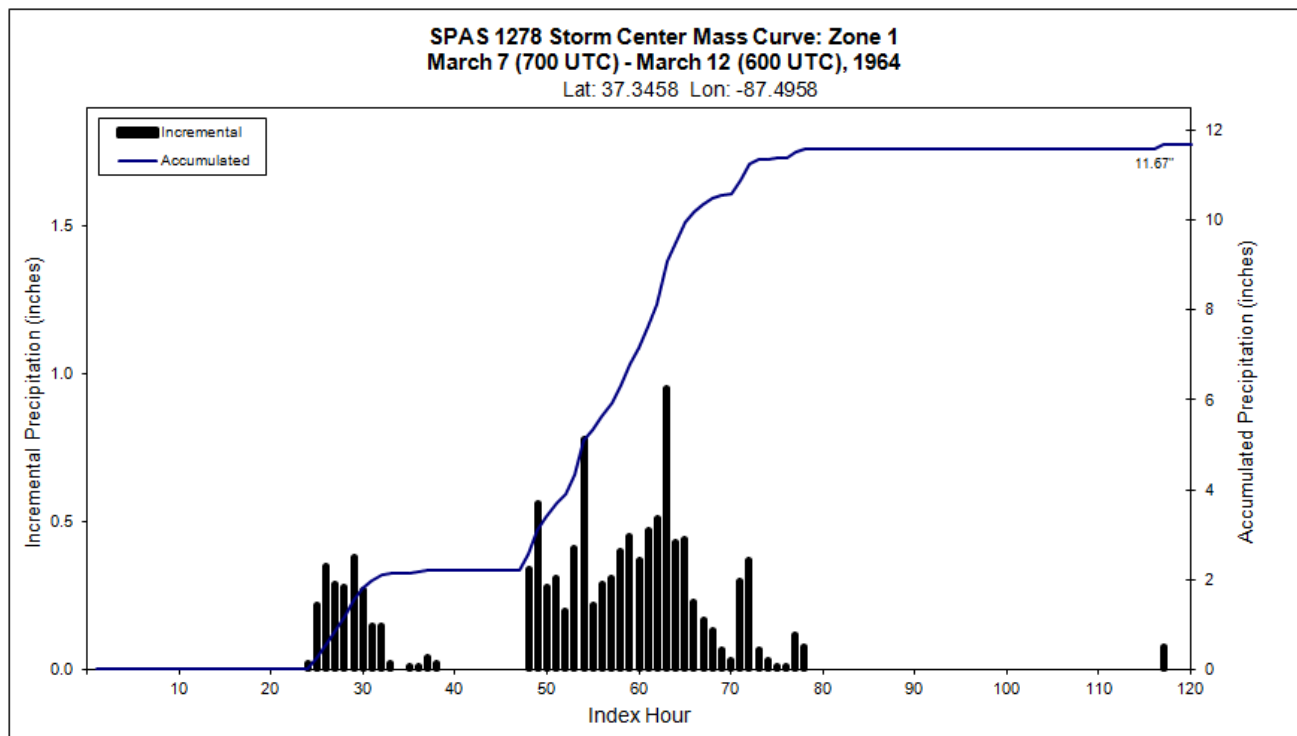


Figure 130: Mass curve chart for Madisonville, KY March 1964

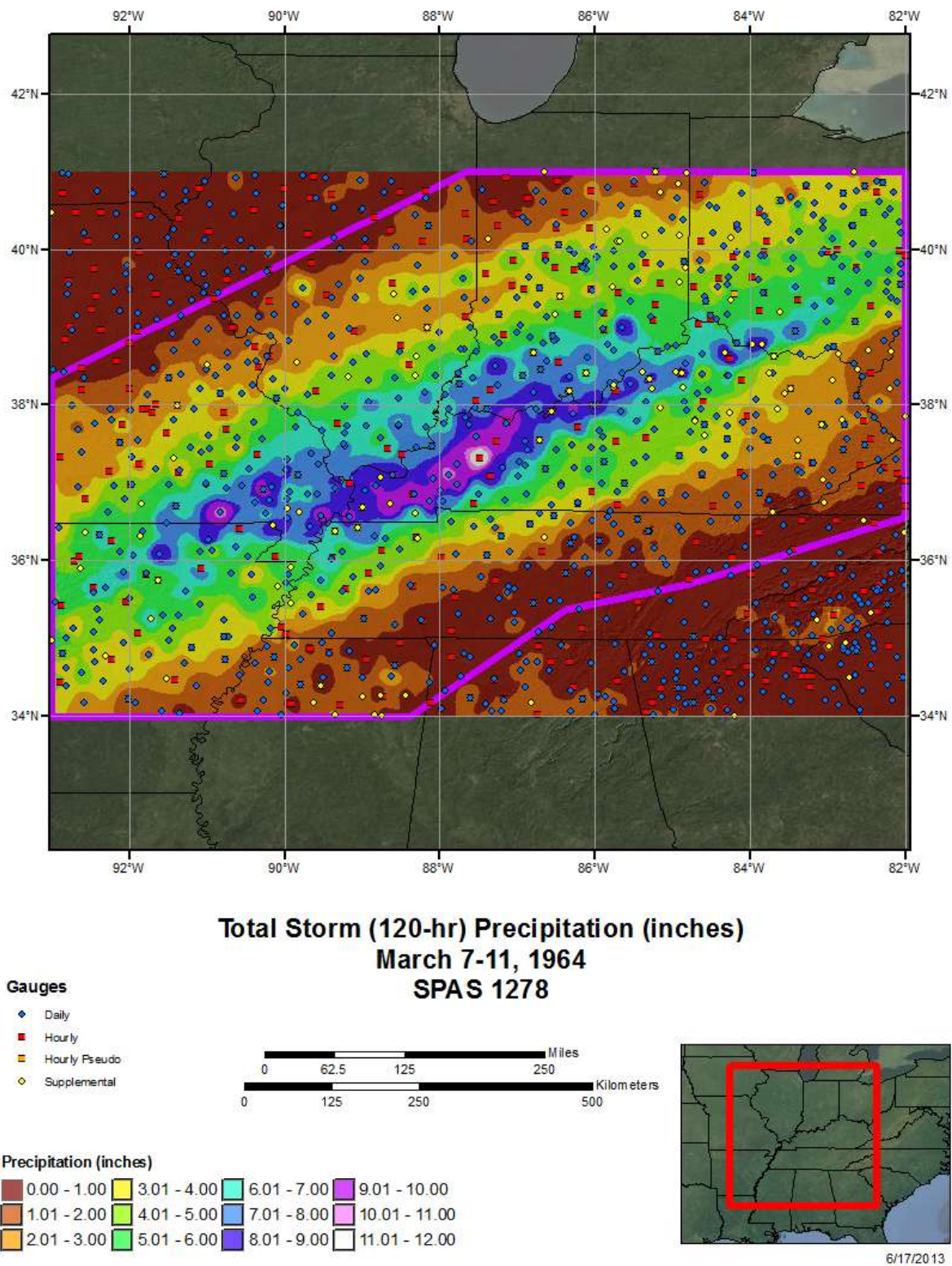


Figure 131: Total storm isohyetal analysis for Madisonville, KY March 1964

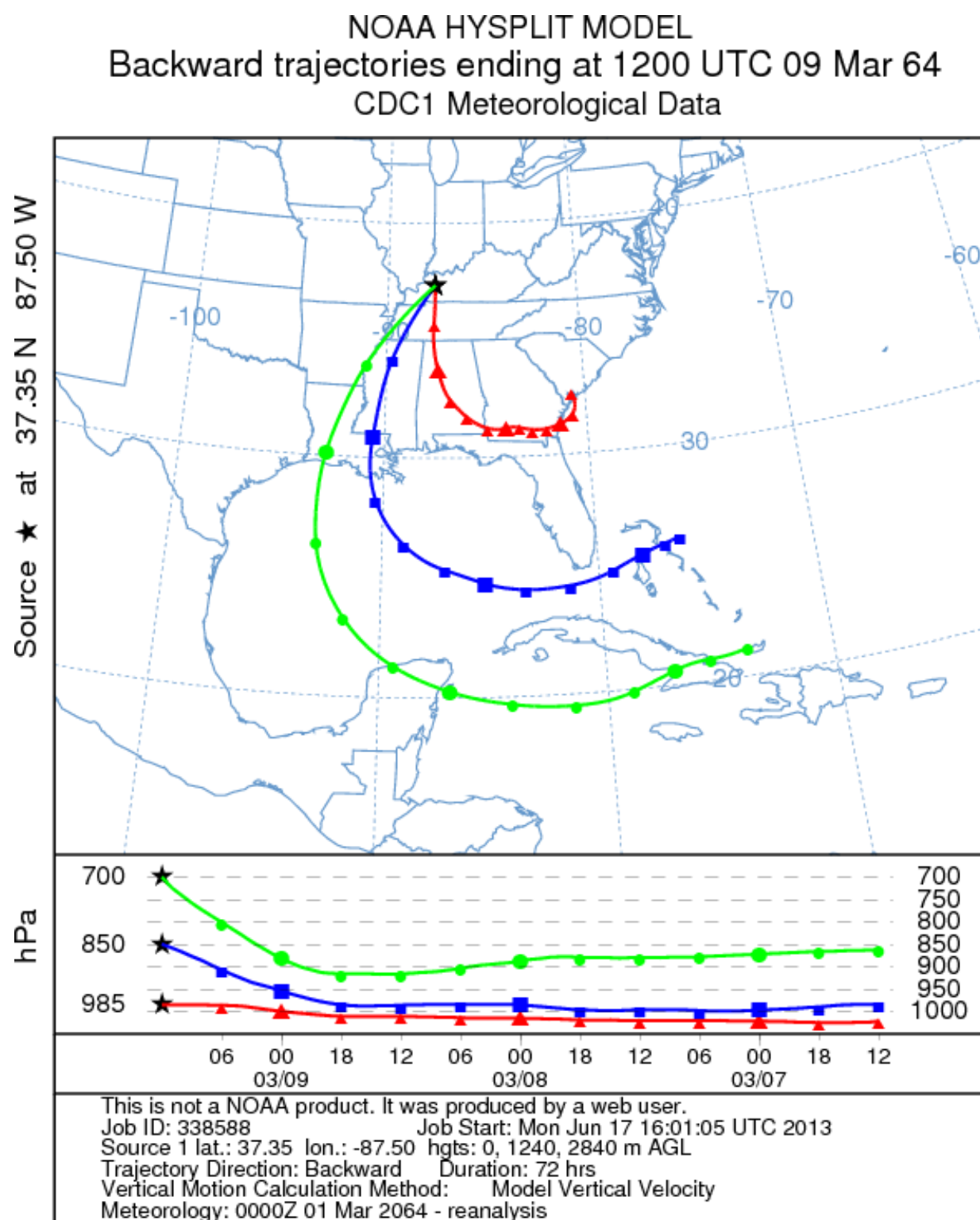


Figure 132: HYSPLIT trajectory analysis at Surface, 850mb and 700mb for Madisonville, KY March 1964

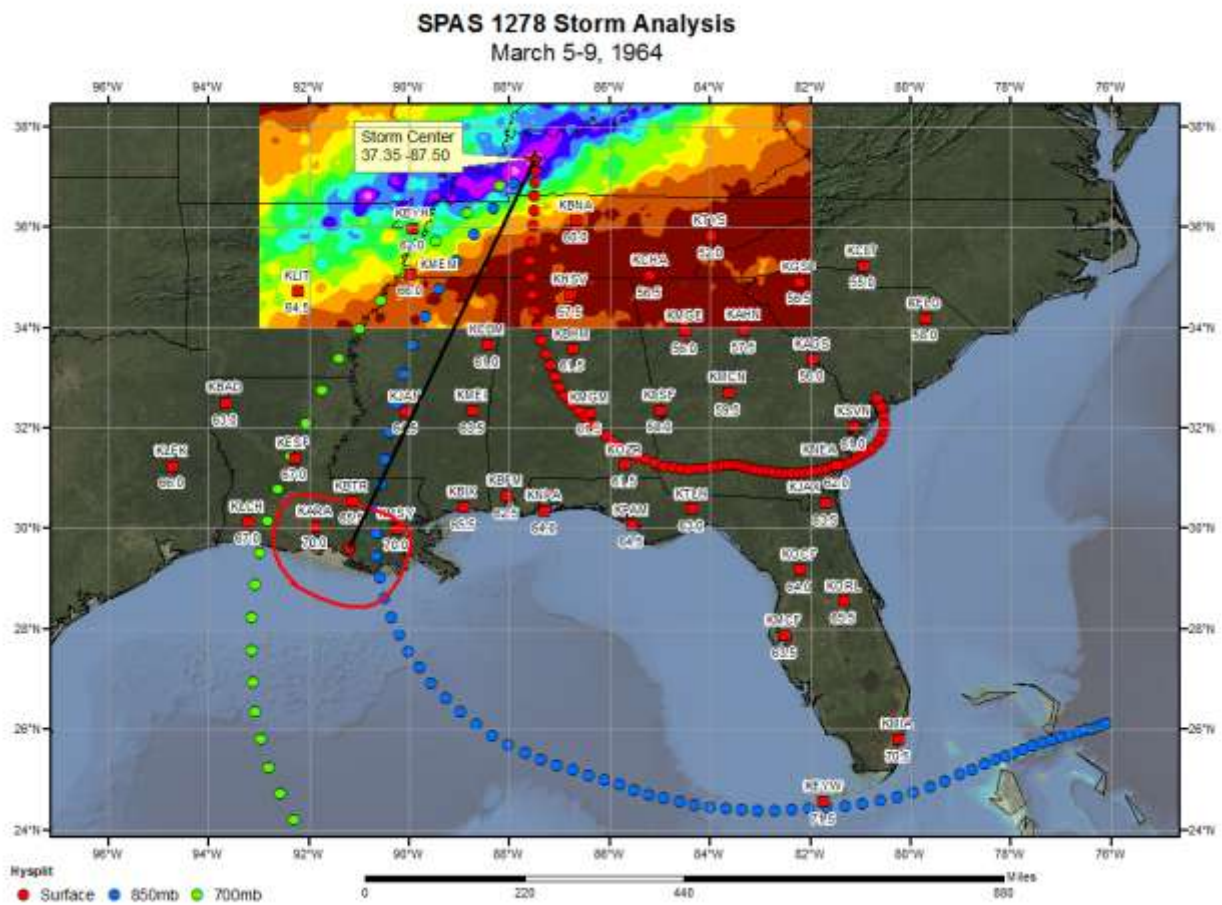


Figure 133: In-place storm representative dew point analysis for Madisonville, KY March 5-9, 1964

Storm Precipitation Analysis System (SPAS) For Storm #1181

General Storm Location: Gladewater, Texas

Storm Dates: April 22 (1400 UTC) to May 1 (0400 UTC), 1966

Event: Convective

DAD Zone 1

Latitude: 32.8029

Longitude: -94.7050

Max. Grid/Radar Rainfall Amount: 25.28"

Max. Observed Rainfall Amount: 25.35"

Max. Grid/Radar 1-hour Rainfall Amount: NA"

Max. Observed 1-hour Rainfall Amount: 2.98"

Number of Stations: 388 (115-hourly, 1-hourly estimated, 10-hourly pseudo, 233-daily, 29-supplemental)

SPAS Version: 8.5

Base Map Used: Yes, conus_prism_ppt_in_1971_2000_04

Spatial resolution: 00:00:30

Radar Included: No

Depth-Area-Duration (DAD) analysis: Yes, 1, 3, 6, 9, 12, 18, 24, 36, 48, 72, 96, 120, 144, 168, 192, and 206.

SPAS Storm ID	NAME	LON	LAT	ELEV Round	Storm Representative				Climatological Maximum				IPMF
					T _g	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	T _g	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	
1181_1	GLADEWATER	-94.705	32.803	300	71.50	2.42"	0.07"	2.345	77.0	3.14"	0.08"	3.060	1.30

Storm 1181 - April 22 (1400 UTC) - May 1 (0400 UTC), 1966																			
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)																			
Area (mi ²)	Duration (hours)																		
	1	2	3	4	5	6	9	12	18	24	36	48	72	96	120	144	168	192	206
0.4	2.97	4.39	5.86	8.26	8.48	9.14	10.50	10.86	11.09	14.49	18.16	18.52	20.99	21.12	21.13	21.55	23.22	25.16	25.28
1	2.96	4.36	5.82	8.20	8.41	9.07	10.40	10.79	11.01	14.38	18.04	18.40	20.85	21.00	21.01	21.42	23.08	25.03	25.11
10	2.92	4.15	5.63	7.90	8.26	8.75	10.02	10.60	10.81	14.12	17.69	18.05	20.52	20.69	20.71	21.12	22.75	24.71	24.80
25	2.83	3.97	5.55	7.67	8.17	8.49	9.73	10.33	10.51	13.67	17.02	17.37	19.97	20.14	20.15	20.61	22.62	24.58	24.67
50	2.71	3.88	5.43	7.39	7.99	8.23	9.36	9.97	10.13	13.16	16.19	16.52	19.26	19.43	19.45	20.00	22.52	24.49	24.58
100	2.54	3.72	5.22	7.04	7.69	7.91	8.87	9.49	9.62	12.44	15.17	15.46	18.39	18.70	18.82	19.37	22.21	24.35	24.40
150	2.43	3.61	5.06	6.83	7.45	7.68	8.56	9.19	9.31	11.99	14.54	14.80	17.91	18.31	18.47	19.08	22.02	24.13	24.18
200	2.36	3.52	4.95	6.66	7.28	7.50	8.30	8.98	9.10	11.63	14.10	14.36	17.61	18.04	18.22	18.88	21.88	23.97	24.02
300	2.24	3.39	4.77	6.41	7.02	7.23	7.91	8.64	8.76	11.12	13.49	13.77	17.20	17.68	17.88	18.60	21.63	23.74	23.80
400	2.16	3.29	4.61	6.18	6.80	6.99	7.63	8.33	8.45	10.70	13.07	13.37	16.91	17.44	17.64	18.37	21.38	23.45	23.49
500	2.08	3.18	4.46	5.99	6.58	6.76	7.37	8.07	8.20	10.39	12.76	13.07	16.69	17.26	17.45	18.15	21.19	23.19	23.24
1000	1.76	2.82	3.92	5.12	5.81	5.96	6.46	7.07	7.20	9.27	11.75	12.12	15.87	16.51	16.70	17.35	20.22	22.12	22.16
2000	1.47	2.34	3.26	4.25	4.82	4.96	5.44	5.98	6.15	8.08	10.64	10.97	14.51	15.23	15.41	16.01	18.68	20.51	20.55
3500	1.23	1.92	2.66	3.42	3.91	4.04	4.44	5.07	5.34	7.03	9.56	9.85	13.32	13.98	14.15	14.70	17.21	18.94	18.99
5000	1.05	1.71	2.24	2.86	3.32	3.43	3.79	4.39	4.65	6.39	8.72	9.02	12.51	13.17	13.32	13.87	16.18	17.89	17.96
7500	0.91	1.54	2.01	2.33	2.65	2.82	3.06	3.62	3.77	5.69	7.86	8.12	11.57	12.24	12.37	12.91	15.68	16.72	16.83
10000	0.84	1.43	1.86	2.16	2.38	2.67	2.85	3.42	3.50	5.25	7.27	7.52	10.95	11.62	11.74	12.28	14.35	15.94	16.07
15,000	0.73	1.26	1.67	1.93	2.17	2.44	2.59	3.19	3.25	4.68	6.49	6.76	10.03	10.72	10.86	11.41	13.36	14.82	14.98
20,000	0.66	1.15	1.51	1.76	2.01	2.27	2.51	2.87	2.93	4.33	6.00	6.27	9.37	10.11	10.25	10.79	12.66	14.05	14.22
35,000	0.50	0.89	1.20	1.43	1.66	1.88	2.09	2.38	2.40	3.78	5.10	5.41	8.08	8.85	9.01	9.65	11.04	12.27	12.46
50,000	0.38	0.72	1.00	1.20	1.40	1.55	2.08	2.59	2.59	3.44	4.45	4.84	7.20	8.01	8.15	8.73	9.93	11.08	11.28
75,000	0.27	0.53	0.72	0.88	1.05	1.16	1.65	2.12	2.05	2.97	3.83	4.22	6.09	6.86	7.00	7.53	8.59	9.60	9.83
100,000	0.22	0.41	0.57	0.69	0.82	0.89	1.20	1.64	1.59	2.52	3.17	3.64	5.28	6.02	6.15	6.64	7.51	8.38	8.62
110,791	0.20	0.37	0.52	0.63	0.74	0.81	1.10	1.50	1.23	1.77	2.92	3.28	4.96	5.68	5.80	6.18	7.06	7.87	8.14

Figure 134: Depth-area-duration values for Gladewater, TX April 1966

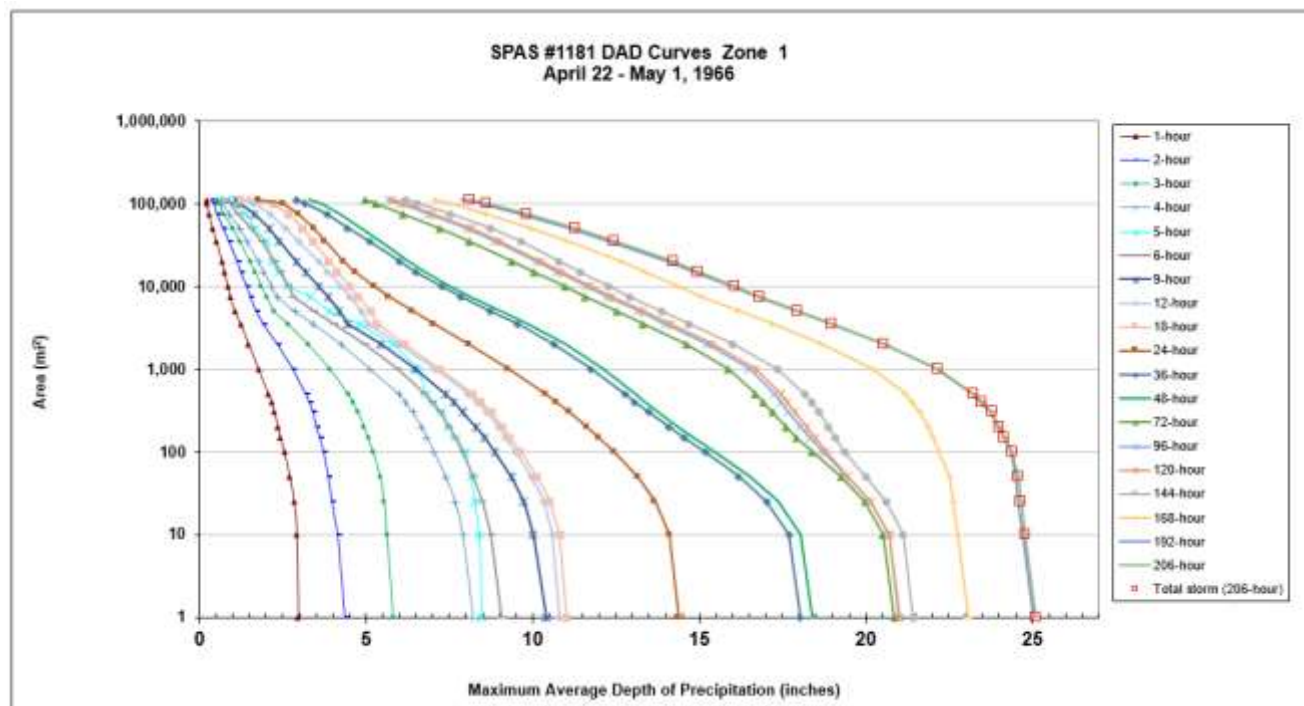


Figure 135: Depth-area-duration chart for Gladewater, TX April 1966

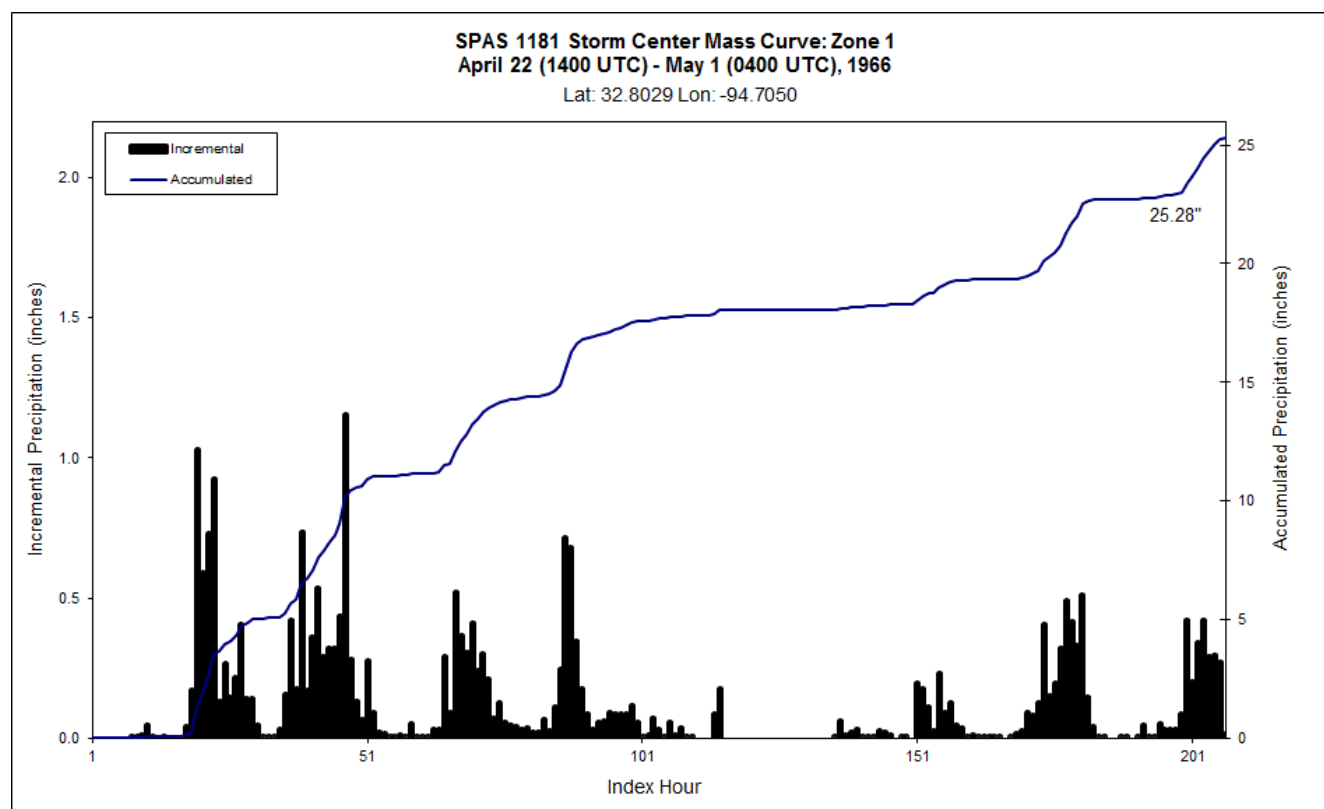
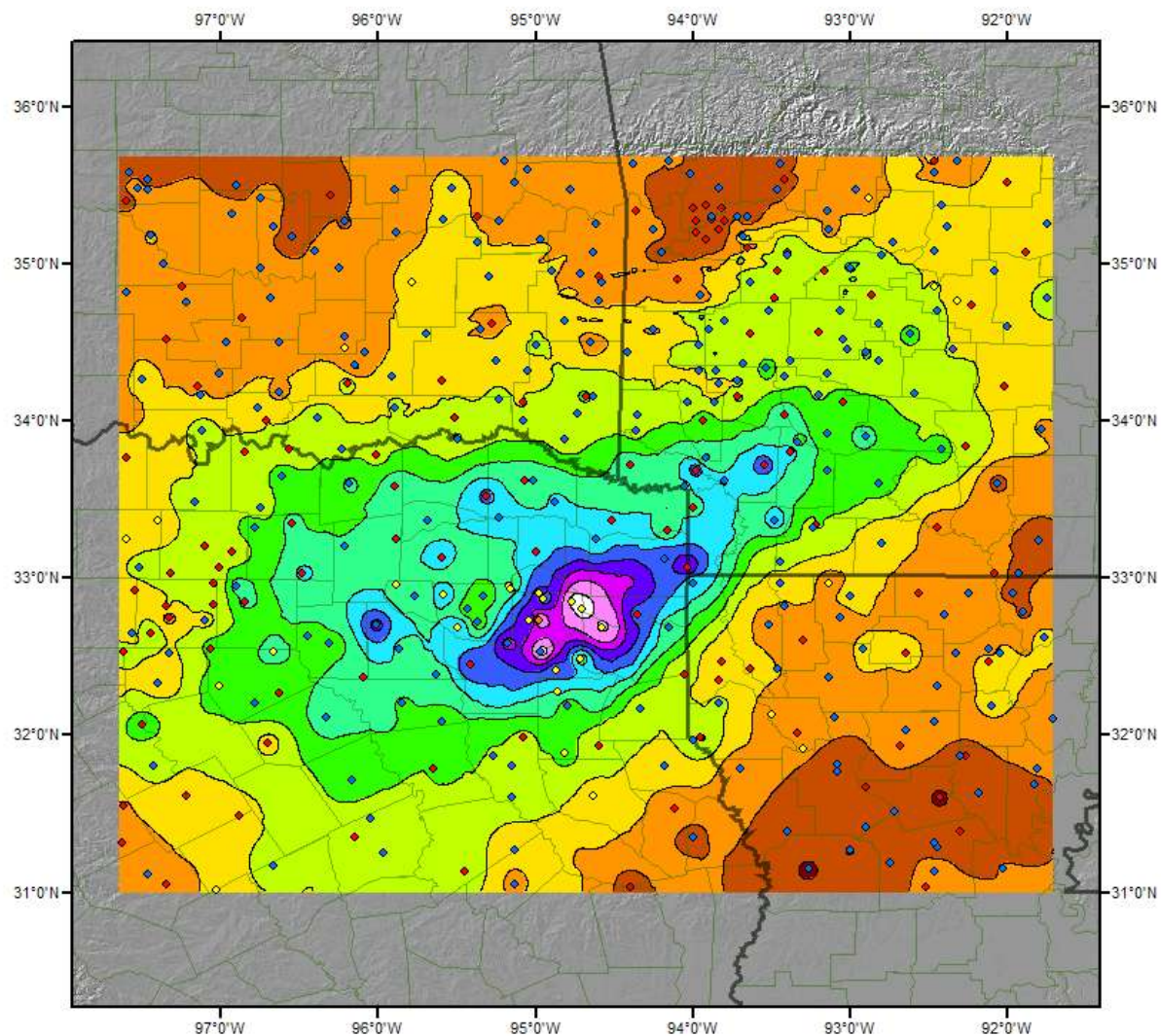


Figure 136: Mass curve chart for Gladewater, TX April 1966



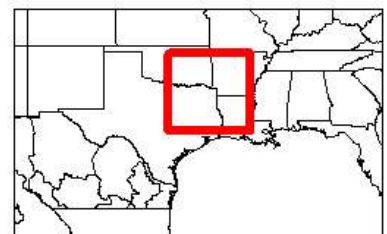
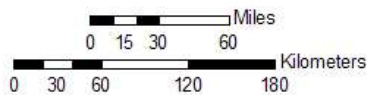
**Total Rainfall (206-hours)
Gladewater, TX 1966 Storm
SPAS #1181 April 22 (1400 UTC) to May 1 (0400 UTC), 1966**

Gauges

- ◆ Daily
- ◆ Hourly
- ◆ Hourly Estimated
- ◆ Hourly Pseudo
- ◆ Supplemental

Precipitation (inches)

- | | | | |
|-------------|---------------|---------------|---------------|
| 1.61 - 2.00 | 8.01 - 10.00 | 16.01 - 18.00 | 24.01 - 26.00 |
| 2.01 - 4.00 | 10.01 - 12.00 | 18.01 - 20.00 | |
| 4.01 - 6.00 | 12.01 - 14.00 | 20.01 - 22.00 | |
| 6.01 - 8.00 | 14.01 - 16.00 | 22.01 - 24.00 | |



MetStat AWR May 04, 2010

Figure 137: Total storm isohyetal analysis for Gladewater, TX April 1966

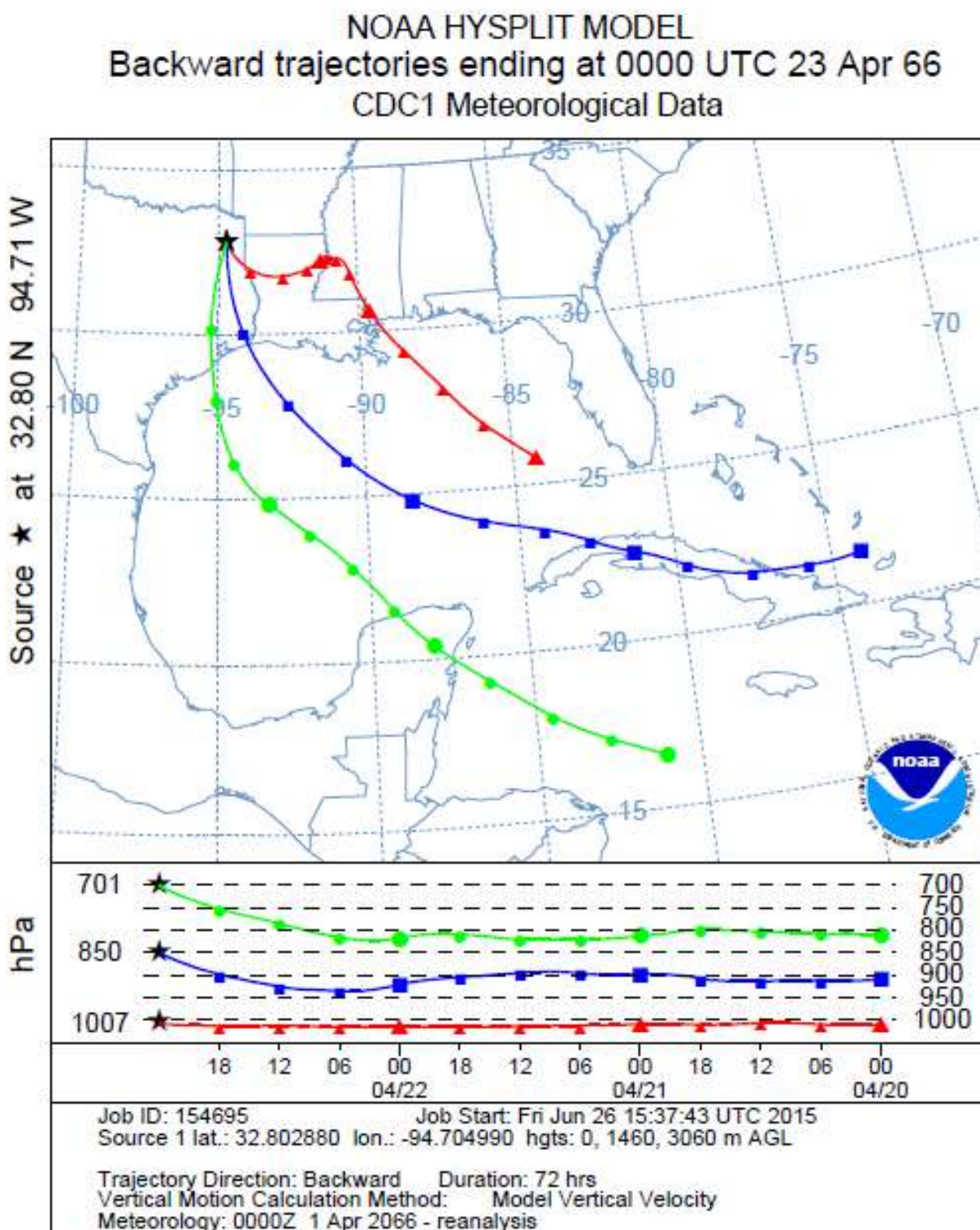


Figure 138: HYSPLIT trajectory analysis at Surface, 850mb and 700mb for Gladewater, TX April 1966

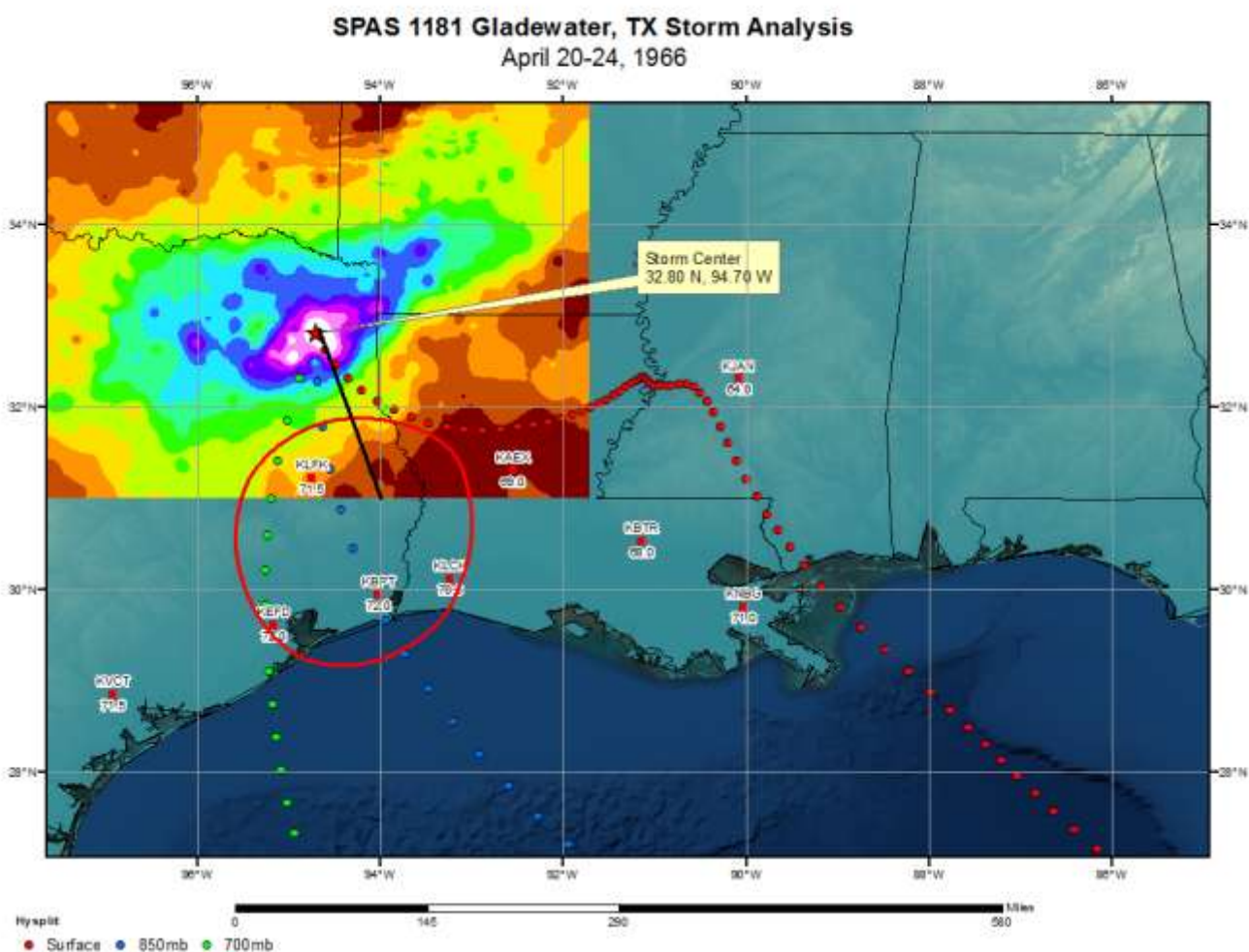


Figure 139: In-place storm representative dew point analysis for Gladewater, TX April 20-24, 1966

Storm Precipitation Analysis System (SPAS) For Storm #1357

General Storm Location: Tennessee Valley (-91.0, 37.3, 33.0, -81.1)

Storm Dates: March 14 – March 17, 1973

Event: Mid-latitude cyclone (MLC)

DAD Zone 1

Latitude: 34.8375

Longitude: -88.3958

Max. Grid/Radar Rainfall Amount: 12.15"

Max. Observed Rainfall Amount: 12.11" (Glen, MS)

Number of Stations: 664

SPAS Version: 9.5

Base Map Used: Mean annual maximum 48-hour precipitation associated with MLCs

Spatial resolution: 0.2707

Radar Included: No

Depth-Area-Duration (DAD) analysis: Yes

Reliability of results: In addition to the NCDC stations, there were three supplemental stations added to fill in where there was a lack of observations, in order to create a more realistic precipitation pattern. There were also four daily and seven hourly stations digitized and added from the TVA report. The added TVA data helped to enhance the accuracy of the timing of the storm center. Overall, this storm analysis is found to be reliable. Comparing the SPAS analysis to the TVA isohyetal map further validates the consistency of the magnitude and extent of the rainfall.

SPAS Storm ID	NAME	LON	LAT	ELEV Round	Storm Representative				Climatological Maximum				IPMF
					T _g	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	T _g	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	
1357_1	GLEN	-88.396	34.838	600	69.00	2.14"	0.13"	2.010	73.0	2.60"	0.14"	2.460	1.22

Storm 1357 Zone 1 - March 14 (0700 UTC) - March 18 (0600 UTC), 1973														
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)														
Area (mi ²)	Duration (hours)													
	1	2	3	4	5	6	12	18	24	36	48	72	96	Total
0.4	2.41	3.43	3.91	4.31	4.37	4.78	7.44	9.54	10.34	11.33	11.99	12.15	12.15	12.15
1	2.41	3.42	3.91	4.30	4.35	4.78	7.43	9.51	10.30	11.23	11.95	12.08	12.07	12.07
10	2.39	3.40	3.87	4.27	4.30	4.74	7.34	9.42	10.18	11.06	11.85	11.96	11.95	11.95
25	2.39	3.39	3.85	4.26	4.29	4.72	7.30	9.38	10.14	11.02	11.81	11.91	11.90	11.90
50	2.38	3.38	3.84	4.25	4.28	4.70	7.27	9.35	10.10	11.00	11.78	11.87	11.86	11.86
100	2.32	3.32	3.78	4.17	4.25	4.66	7.24	9.33	10.07	10.97	11.75	11.84	11.82	11.82
150	2.24	3.20	3.65	4.04	4.18	4.57	7.22	9.24	10.05	10.83	11.66	11.82	11.80	11.80
200	2.14	3.07	3.57	3.95	4.15	4.49	7.19	9.13	10.00	10.71	11.55	11.74	11.74	11.74
300	1.96	2.84	3.37	3.82	4.11	4.37	7.09	8.92	9.87	10.48	11.38	11.60	11.60	11.60
400	1.81	2.69	3.21	3.77	4.04	4.26	6.95	8.82	9.76	10.32	11.27	11.49	11.49	11.49
500	1.71	2.58	3.15	3.70	3.98	4.16	6.85	8.73	9.63	10.20	11.18	11.41	11.41	11.41
1000	1.57	2.25	2.91	3.39	3.75	3.98	6.52	8.43	9.24	9.81	10.89	11.11	11.11	11.11
2000	1.36	2.00	2.56	3.01	3.42	3.68	6.15	8.04	8.85	9.41	10.58	10.80	10.80	10.80
3500	1.17	1.81	2.19	2.66	3.12	3.36	5.84	7.63	8.49	9.10	10.28	10.48	10.48	10.48
5000	1.04	1.65	2.06	2.45	2.87	3.17	5.60	7.34	8.20	8.86	10.03	10.26	10.26	10.26
7500	0.88	1.46	1.89	2.22	2.59	2.94	5.28	6.97	7.81	8.56	9.74	9.96	9.96	9.96
10000	0.78	1.32	1.76	2.06	2.43	2.77	5.03	6.73	7.51	8.31	9.49	9.72	9.73	9.73
15,000	0.64	1.14	1.57	1.84	2.18	2.51	4.64	6.27	7.05	7.92	9.10	9.37	9.37	9.37
20,000	0.56	1.02	1.43	1.69	2.01	2.33	4.33	5.88	6.70	7.61	8.78	9.08	9.05	9.05
35,000	0.40	0.76	1.11	1.36	1.65	1.93	3.71	4.98	5.80	6.83	8.05	8.33	8.35	8.35
50,000	0.33	0.62	0.88	1.15	1.41	1.65	3.18	4.27	5.05	6.08	7.27	7.61	7.63	7.63
75,000	0.25	0.48	0.70	0.93	1.14	1.33	2.51	3.38	4.12	5.01	6.03	6.52	6.54	6.54
100,000	0.20	0.38	0.56	0.75	0.92	1.06	2.00	2.73	3.47	4.25	5.16	5.65	5.68	5.68
166,121	0.12	0.24	0.35	0.46	0.57	0.67	1.26	1.73	2.27	2.99	3.53	4.03	4.08	4.08

Figure 140: Depth-area-duration values for Glen, MS March 1973

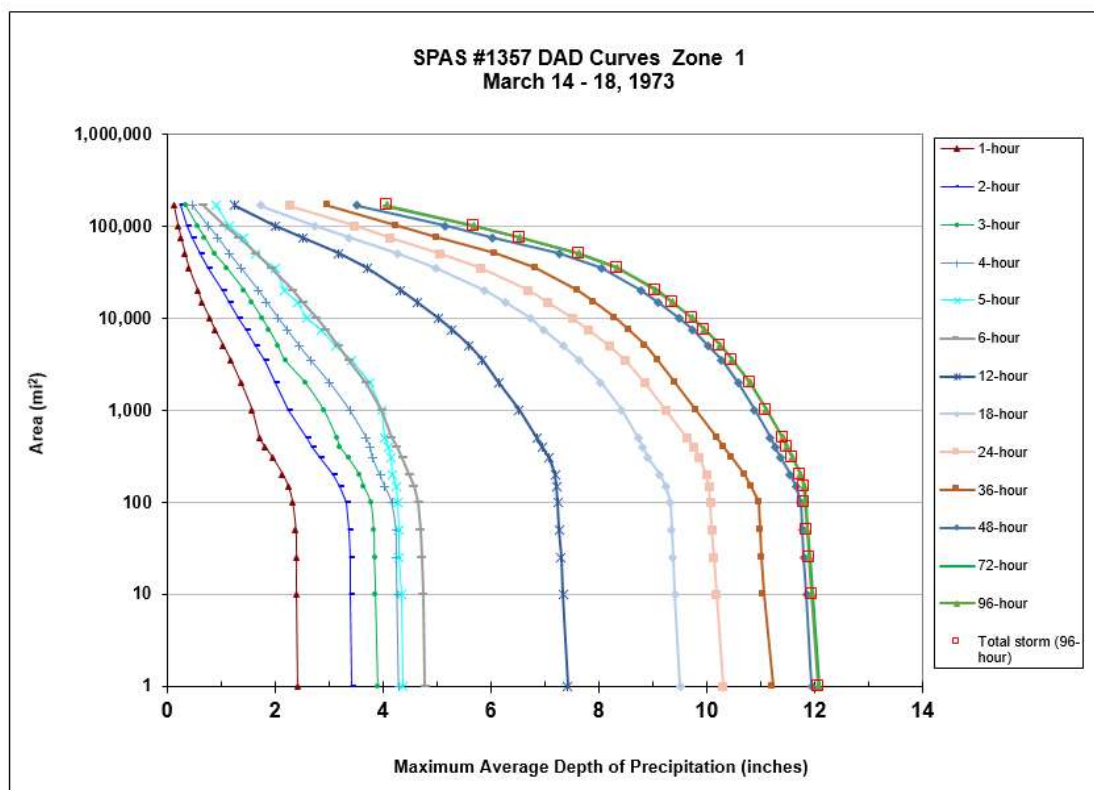


Figure 141: Depth-area-duration chart for Glen, MS March 1973

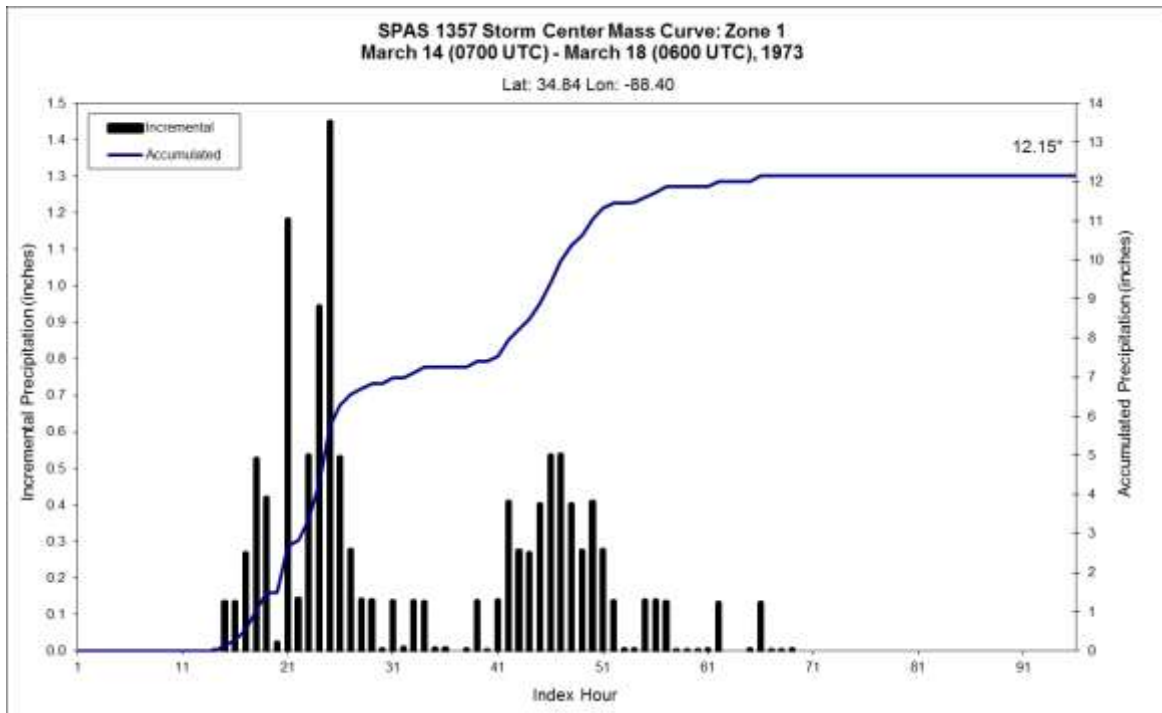


Figure 142: Mass curve chart for Glen, MS March 1973

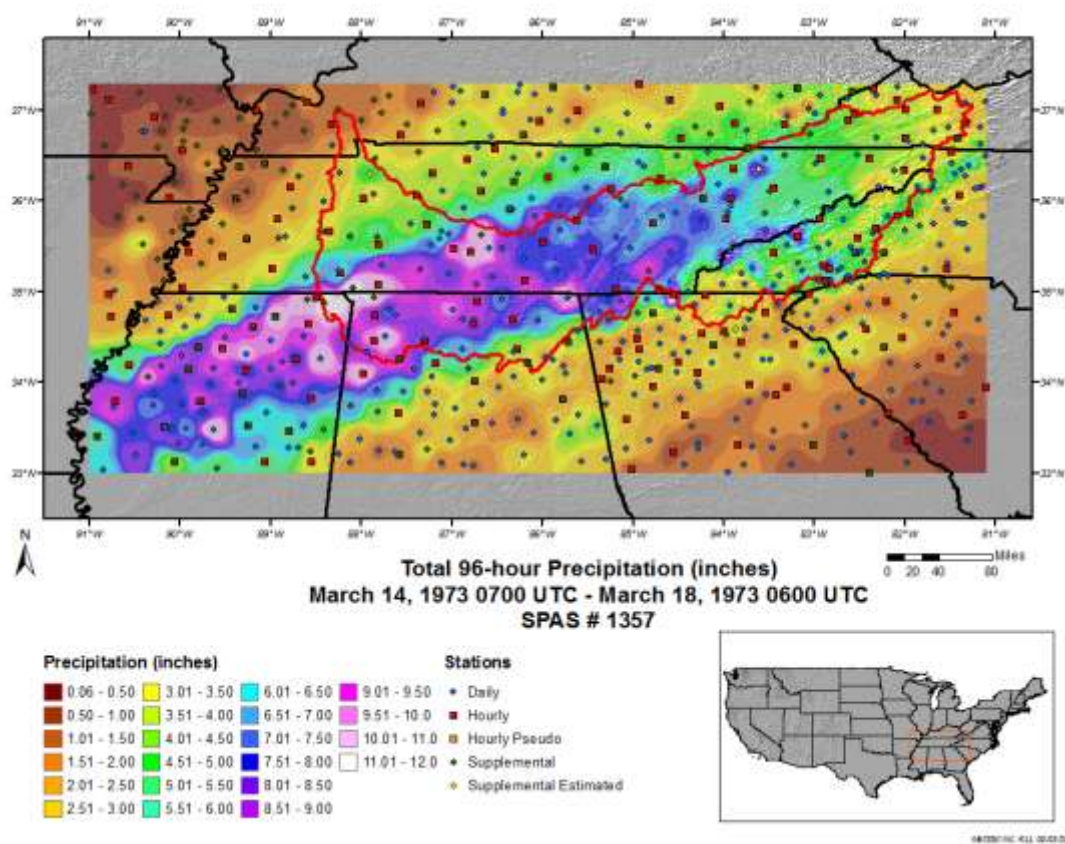


Figure 143: Total storm isohyetal analysis for Glen, MS March 1973

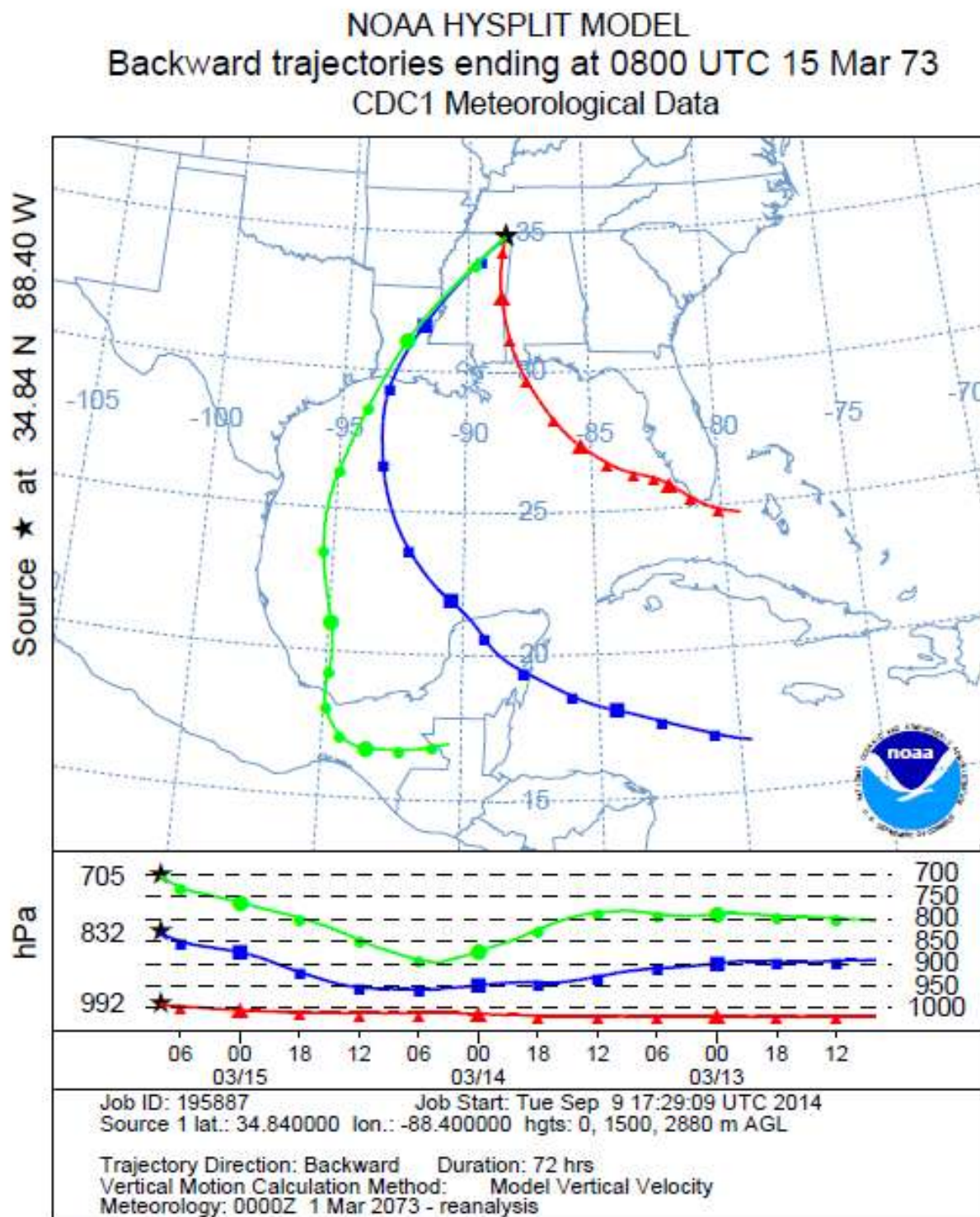


Figure 144: HYSPLIT trajectory analysis at Surface, 850mb and 700mb for Glen, MS March 1973

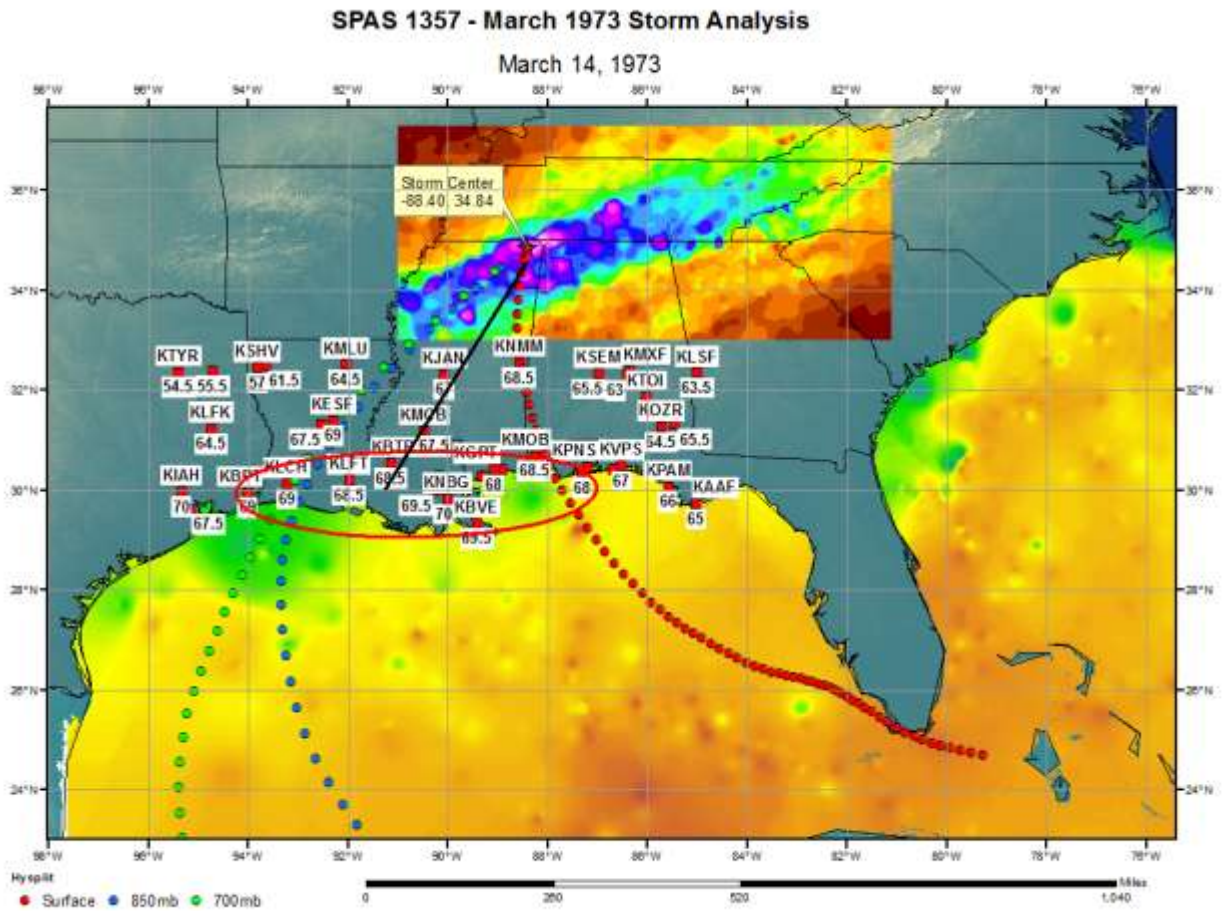


Figure 145: In-place storm representative dew point analysis for Glen, MS March 14, 1973

Storm Precipitation Analysis System (SPAS) For Storm #1227

General Storm Location: Louisville, MS

Storm Dates: April 11 (0700) - April 15 (0600), 1979

Event: Convective

DAD Zone 1

Latitude: 33.1042

Longitude: -88.8875

Max. Grid/Radar Rainfall Amount: 22.07"

Max. Observed Rainfall Amount: 22.00"

Number of Stations: 407 (204 Daily, 50 Hourly, 22 Hourly Pseudo, 131 Supplemental)

SPAS Version: 9.0

Base Map Used: A basemap/grid was created based on USGS isohyetal.

Spatial resolution: 30 seconds

Radar Included: No

Depth-Area-Duration (DAD) analysis: Yes

SPAS Storm ID	NAME	LON	LAT	ELEV Round	Storm Representative				Climatological Maximum				IPMF
					T _d	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	T _d	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	
1227_1	LOUISVILLE	-88.888	33.104	500	72.00	2.47"	0.12"	2.350	75.0	2.85"	0.13"	2.720	1.16

Storm 1227 - April 11 (0700 UTC) - April 15 (0600 UTC), 1979														
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)														
Area (mi ²)	Duration (hours)													
	1	2	3	4	5	6	12	18	24	36	48	72	96	Total
0.4	4.41	5.99	7.49	8.84	9.16	9.30	13.33	17.42	20.00	21.98	22.00	22.00	22.07	22.07
1	4.39	5.95	7.45	8.78	9.10	9.24	13.26	17.32	19.84	21.81	21.85	21.85	21.84	21.84
10	4.32	5.85	7.33	8.64	8.95	9.08	13.06	17.07	19.34	21.24	21.25	21.25	21.25	21.25
25	4.17	5.73	7.17	8.51	8.82	9.01	12.99	16.97	18.90	20.60	20.63	20.63	20.63	20.63
50	3.96	5.58	6.99	8.35	8.67	8.83	12.74	16.79	18.58	20.13	20.16	20.16	20.16	20.16
100	3.64	5.34	6.70	8.02	8.36	8.55	12.36	16.43	18.15	19.68	19.71	19.71	19.71	19.71
150	3.43	5.16	6.45	7.77	8.11	8.32	12.05	16.07	17.83	19.34	19.35	19.35	19.35	19.35
200	3.27	5.01	6.25	7.56	7.90	8.13	11.78	15.74	17.49	19.03	19.06	19.06	19.06	19.06
300	3.08	4.75	5.95	7.18	7.53	7.77	11.27	15.16	16.90	18.51	18.53	18.53	18.53	18.53
400	2.95	4.53	5.70	6.84	7.17	7.46	10.82	14.68	16.42	18.10	18.13	18.14	18.14	18.14
500	2.85	4.35	5.51	6.58	6.91	7.18	10.42	14.26	16.02	17.74	17.77	17.78	17.78	17.78
1,000	2.57	3.77	4.86	5.68	5.98	6.26	9.23	12.78	14.52	16.48	16.63	16.65	16.65	16.65
2,000	2.28	3.22	4.11	4.78	5.08	5.35	8.06	11.34	13.05	15.25	15.38	15.41	15.41	15.41
3,500	1.98	2.78	3.53	4.09	4.39	4.65	6.96	10.03	11.80	13.99	14.13	14.21	14.21	14.21
5,000	1.75	2.48	3.16	3.66	3.95	4.21	6.22	9.10	10.89	13.10	13.26	13.42	13.42	13.42
7,500	1.48	2.12	2.68	3.14	3.39	3.59	5.29	7.95	9.73	11.97	12.12	12.28	12.29	12.29
10,000	1.28	1.82	2.28	2.69	2.92	3.13	4.80	7.03	8.83	11.02	11.22	11.44	11.46	11.46
15,000	0.98	1.40	1.82	2.14	2.35	2.57	4.22	5.85	7.55	9.79	10.02	10.26	10.29	10.29
20,000	0.79	1.12	1.44	1.70	2.00	2.31	3.80	5.23	6.75	8.87	9.13	9.47	9.52	9.52
35,000	0.51	0.72	1.06	1.33	1.60	1.83	2.96	4.09	5.10	6.99	7.37	7.69	7.77	7.77
50,000	0.36	0.56	0.86	1.07	1.29	1.46	2.40	3.26	4.10	5.80	6.20	6.46	6.55	6.55
75,000	0.24	0.40	0.60	0.75	0.89	1.03	1.72	2.28	2.88	4.14	4.78	5.03	5.14	5.14
87,823	0.21	0.34	0.52	0.65	0.77	0.88	1.48	1.98	2.52	3.62	4.18	4.45	4.53	4.53

Figure 146: Depth-area-duration values for Louisville, MS April 1979

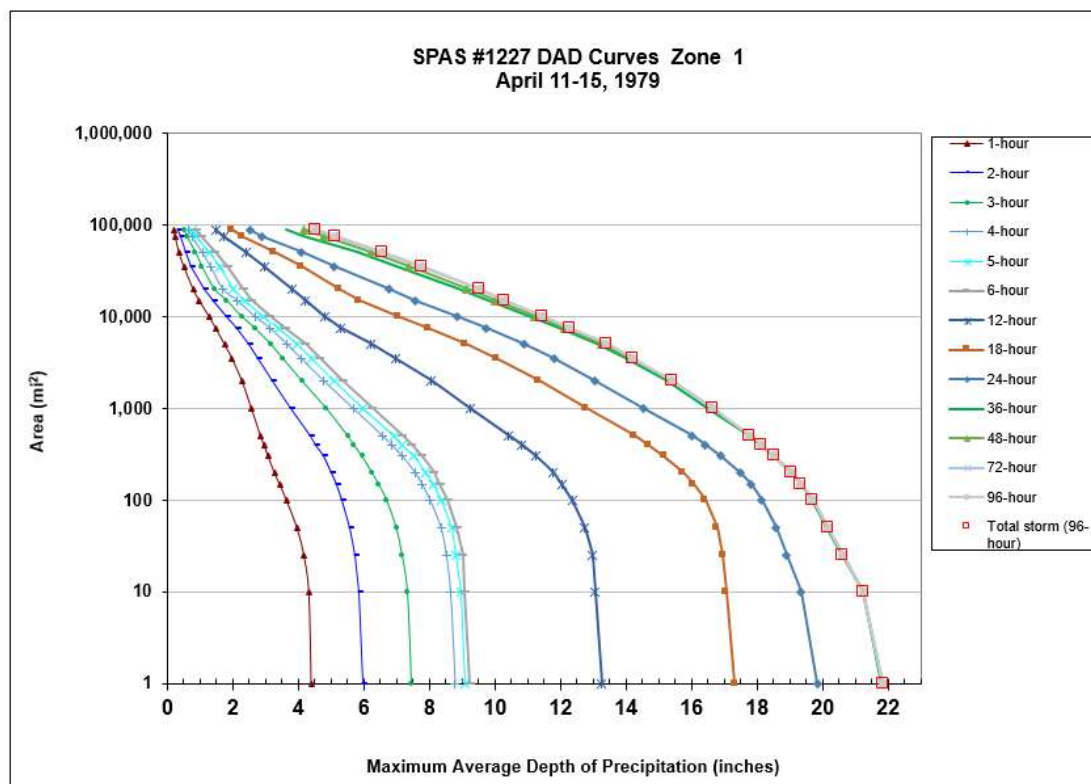
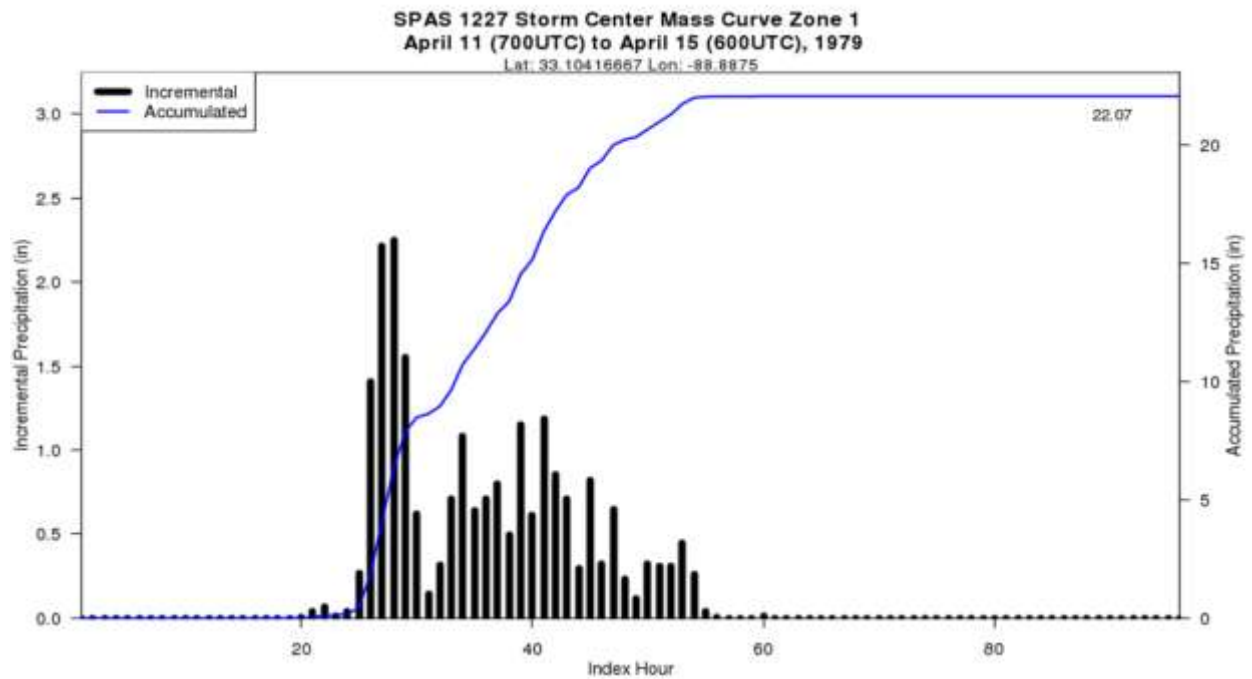


Figure 147: Depth-area-duration chart for Louisville, MS April 1979**Figure 148: Mass curve chart for Louisville, MS April 1979**

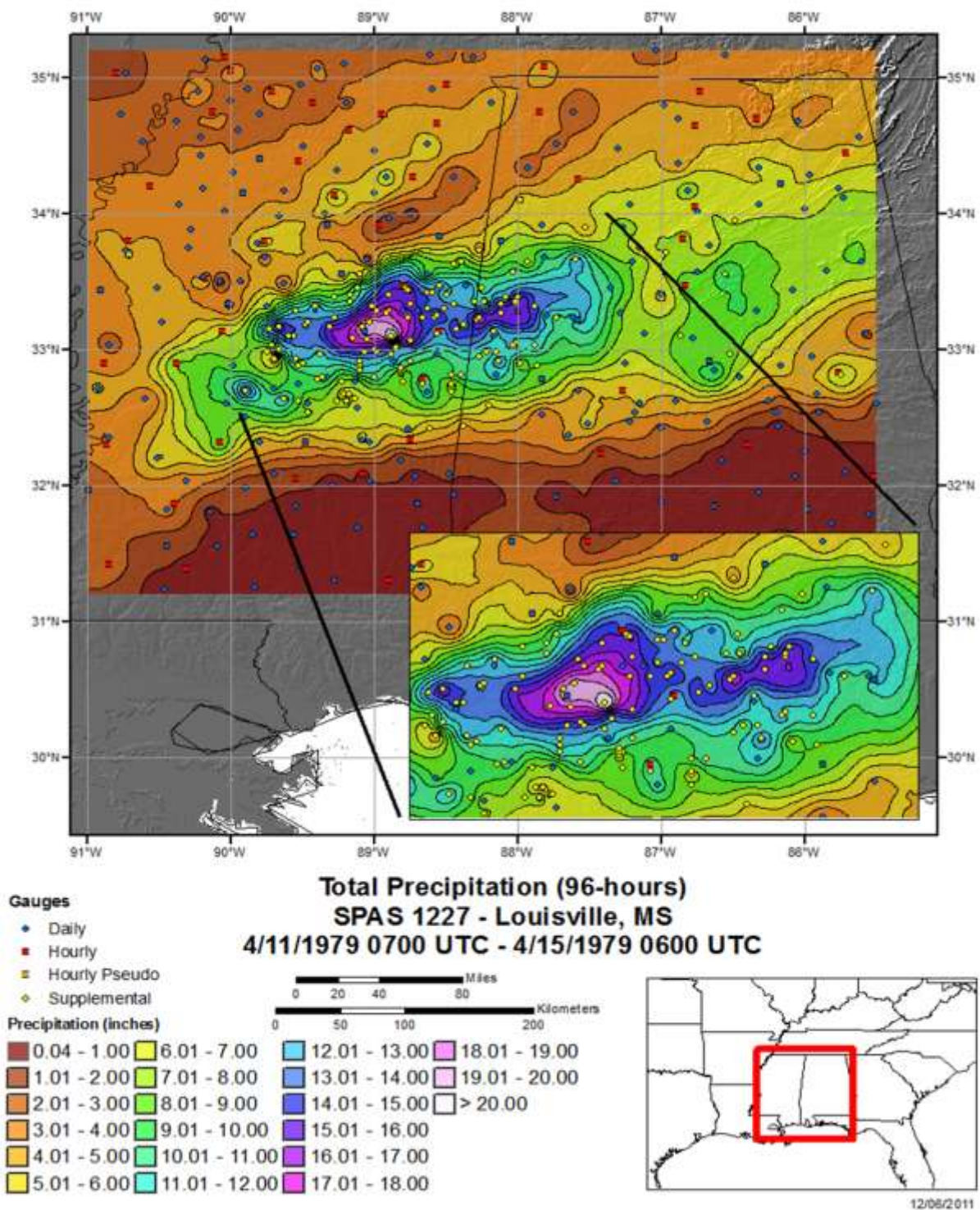


Figure 149: Total storm isohyetal analysis for Louisville, MS April 1979

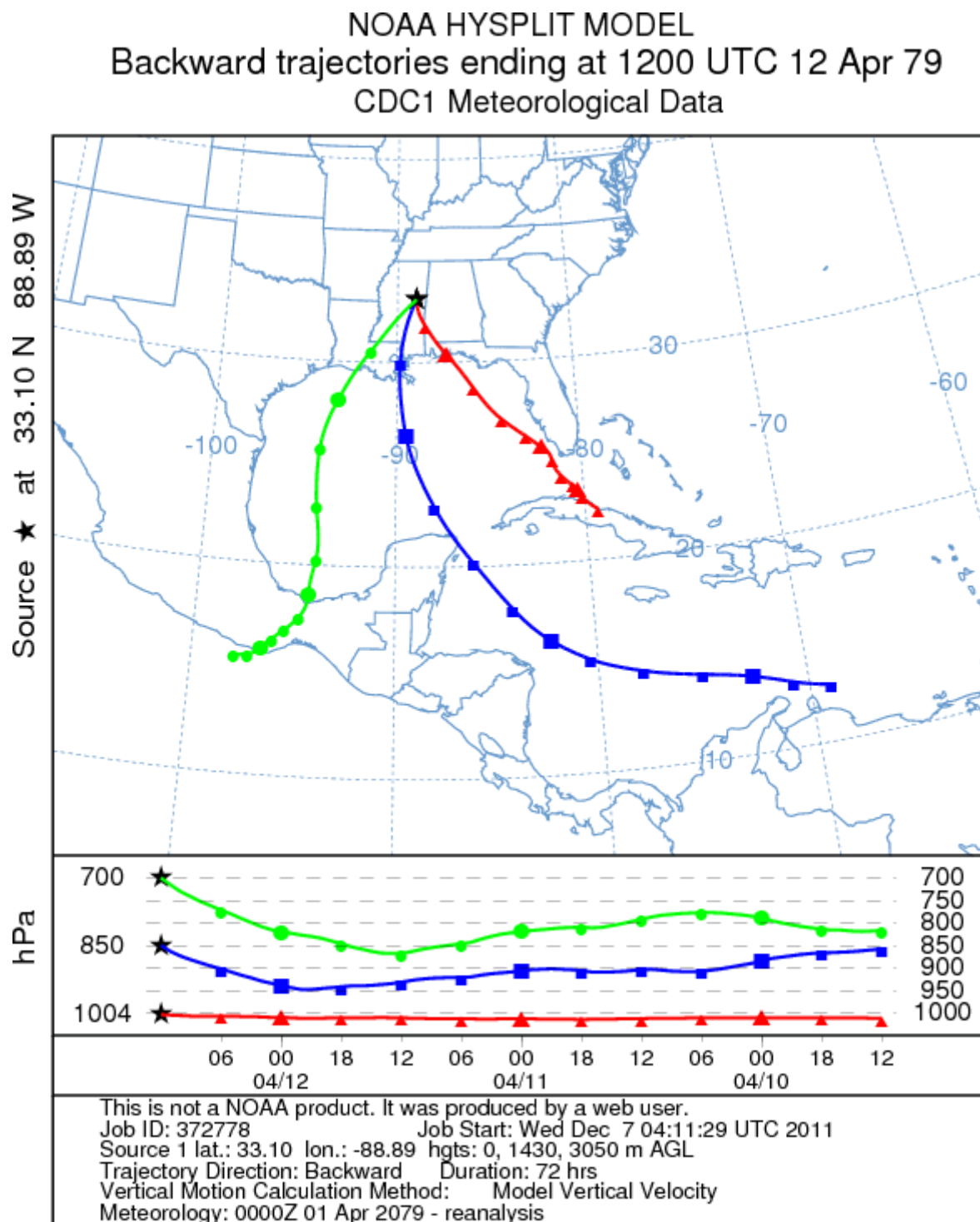


Figure 150: HYSPLIT trajectory analysis at Surface, 850mb and 700mb for Louisville, MS April 1979

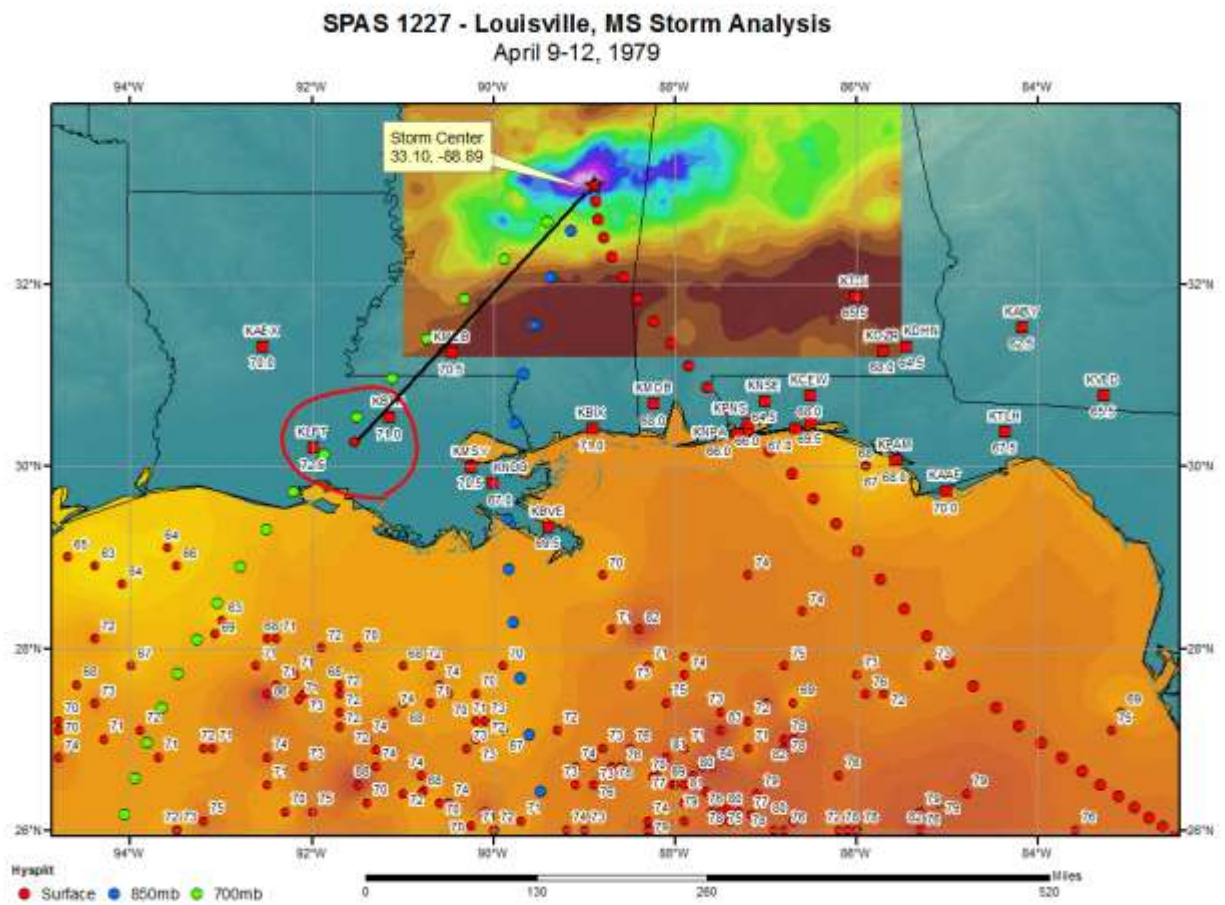


Figure 151: In-place storm representative dew point analysis for Louisville, MS April 9-12, 1979

Storm Precipitation Analysis System (SPAS) For Storm #1219

General Storm Location: Mountain View-Big Fork, AR

Storm Dates: December 1 (0600) - December 5 (0500), 1982

Event: Convective

DAD Zone 1

Latitude: 35.8708

Longitude: -92.1208

Max. Grid/Radar Rainfall Amount: 15.92"

Max. Observed Rainfall Amount: 15.59"

Number of Stations: 733 (524 Daily, 148 Hourly, 40 Hourly Pseudo, 21 Supplemental)

SPAS Version: 9.0

Base Map Used: Mean (1971-2000) PRISM July Precipitation

Spatial resolution: 0.30 sq-mi

Radar Included: No

Depth-Area-Duration (DAD) analysis: Yes

					Storm Representative				Climatological Maximum				
SPAS Storm ID	NAME	LON	LAT	ELEV Round	T _s	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	T _s	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	IPMF
1219_1	BIG FORK	-92.121	35.871	800	72.00	2.47"	0.18"	2.290	73.0	2.60"	0.19"	2.410	1.05

Storm 1219 - December 1 (0600 UTC) - December 5 (0500 UTC), 1982													
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)													
Area (mi ²)	Duration (hours)												
	1	3	4	5	6	12	18	24	36	48	72	96	Total
0.4	2.41	4.47	5.34	5.93	6.19	6.73	9.97	13.40	14.55	15.13	15.47	15.92	15.92
1	2.39	4.43	5.29	5.89	6.14	6.70	9.91	13.32	14.47	15.05	15.40	15.80	15.80
10	2.33	4.32	5.17	5.74	6.00	6.62	9.76	13.11	14.27	14.87	15.21	15.59	15.59
25	2.29	4.24	5.06	5.63	5.87	6.48	9.58	12.94	14.20	14.79	15.14	15.51	15.51
50	2.23	4.14	4.96	5.52	5.77	6.27	9.37	12.70	14.09	14.74	15.02	15.43	15.43
100	2.13	3.95	4.74	5.31	5.58	5.98	9.09	12.39	13.77	14.45	14.70	15.08	15.08
150	2.03	3.77	4.55	5.12	5.41	5.87	8.91	12.18	13.55	14.26	14.50	14.87	14.87
200	1.95	3.60	4.38	4.96	5.31	5.78	8.76	12.03	13.38	14.13	14.34	14.70	14.70
300	1.84	3.34	4.12	4.71	5.21	5.65	8.56	11.76	13.14	13.89	14.11	14.45	14.45
400	1.77	3.17	3.94	4.53	5.12	5.55	8.39	11.57	12.96	13.73	13.95	14.29	14.29
500	1.71	3.04	3.81	4.39	5.04	5.48	8.26	11.43	12.80	13.60	13.82	14.16	14.16
1,000	1.53	2.66	3.45	4.02	4.75	5.20	7.83	10.94	12.30	13.12	13.34	13.65	13.65
2,000	1.36	2.31	3.12	3.66	4.33	4.79	7.36	10.43	11.78	12.58	12.81	13.08	13.08
3,500	1.24	2.01	2.78	3.33	3.98	4.45	6.96	9.91	11.28	12.06	12.30	12.56	12.56
5,000	1.15	1.83	2.53	3.12	3.74	4.19	6.62	9.44	10.86	11.69	11.93	12.21	12.21
7,500	1.04	1.62	2.27	2.84	3.43	3.87	6.19	8.84	10.32	11.17	11.42	11.68	11.68
10,000	0.95	1.53	2.12	2.66	3.20	3.61	5.84	8.39	9.81	10.74	11.01	11.28	11.28
15,000	0.83	1.34	1.88	2.39	2.85	3.26	5.30	7.61	9.01	9.98	10.25	10.54	10.54
20,000	0.73	1.20	1.73	2.21	2.62	3.00	4.85	6.99	8.37	9.38	9.70	10.01	10.01
35,000	0.55	0.96	1.43	1.83	2.16	2.52	4.12	5.85	7.13	8.14	8.47	8.81	8.81
50,000	0.45	0.82	1.23	1.59	1.88	2.22	3.64	5.13	6.37	7.31	7.60	7.92	7.92
75,000	0.32	0.62	0.94	1.22	1.47	1.80	2.99	4.22	5.36	6.27	6.54	6.85	6.85
100,000	0.26	0.50	0.73	0.95	1.16	1.40	2.40	3.51	4.52	5.43	5.75	6.05	6.05
138,276	0.20	0.37	0.55	0.71	0.86	1.05	1.82	2.66	3.49	4.34	4.72	4.95	4.95

Figure 152: Depth-area-duration values for Big Fork, AR December 1982

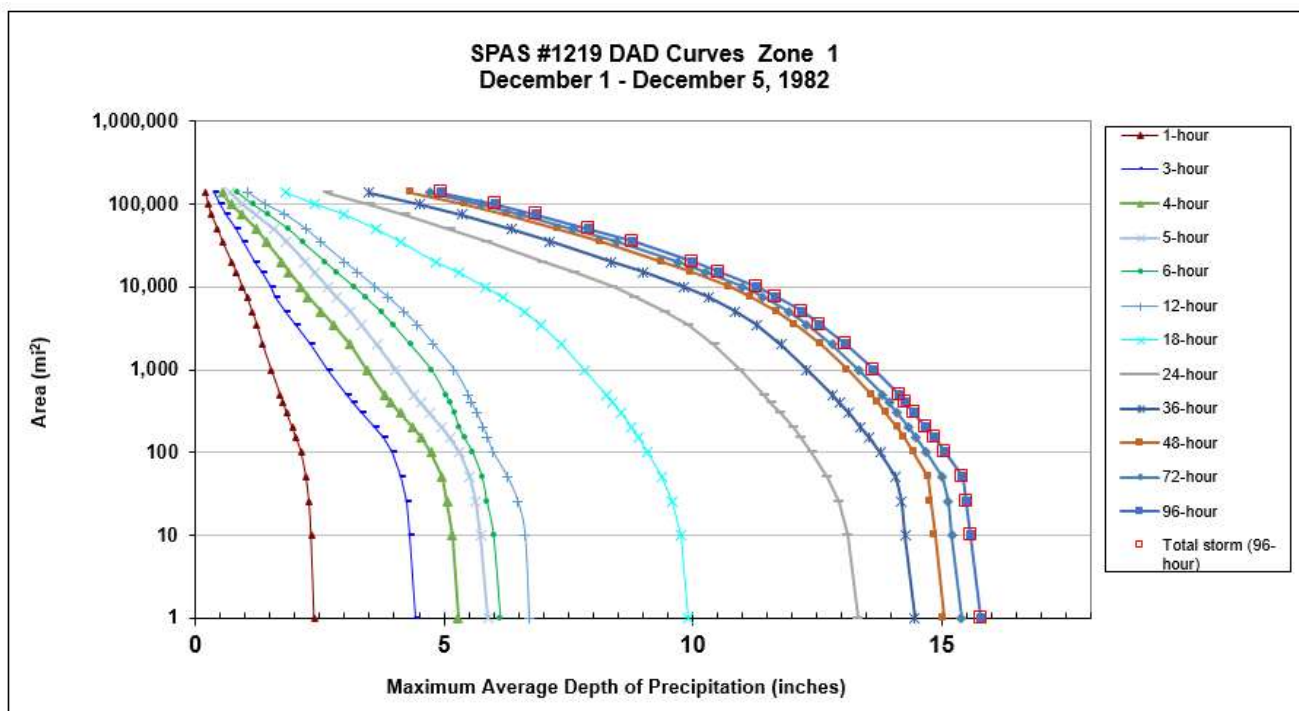


Figure 153: Depth-area-duration chart for Big Fork, AR December 1982

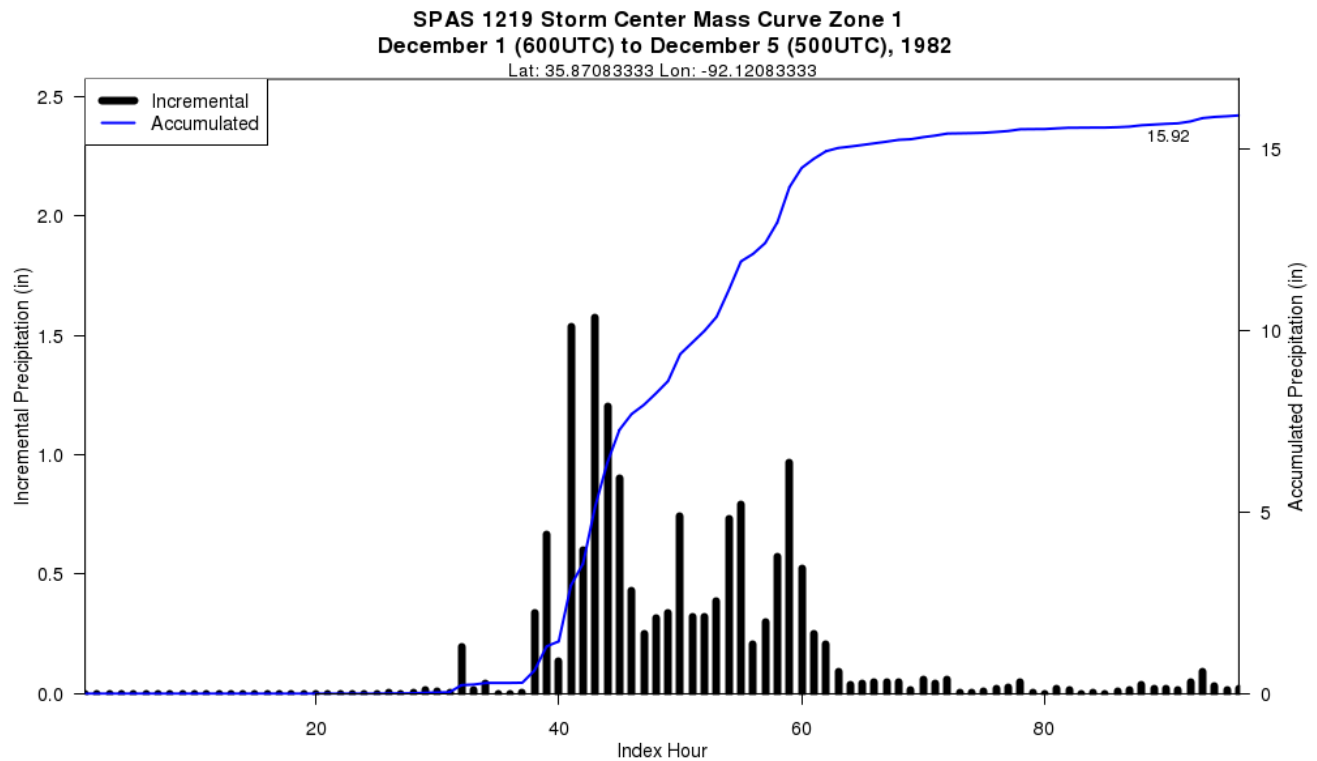
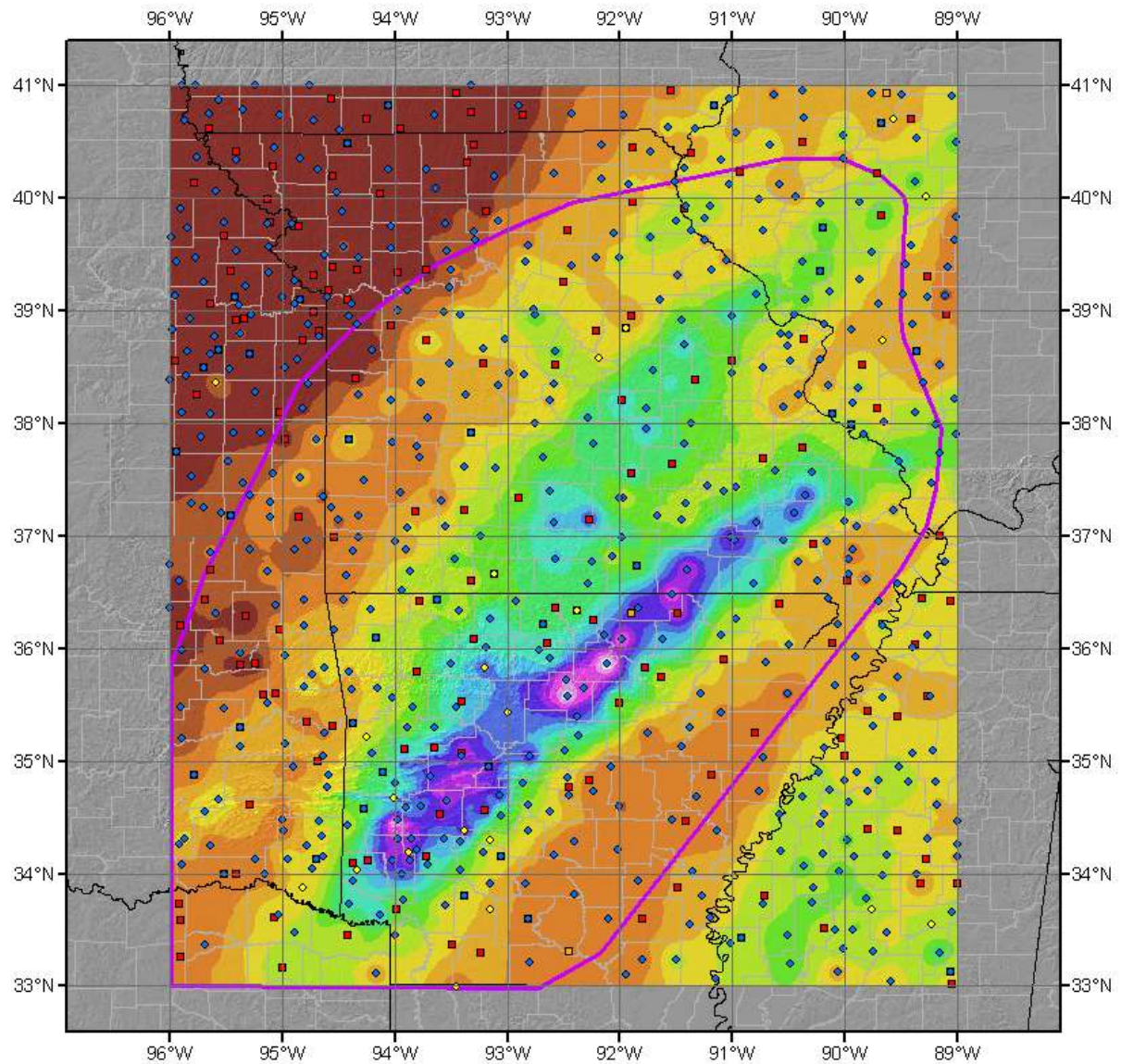


Figure 154: Mass curve chart for Big Fork, AR December 1982



Total Precipitation (96 hours)
SPAS #1219
12/01/1982 0100 UTC - 12/05/1982 0500 UTC

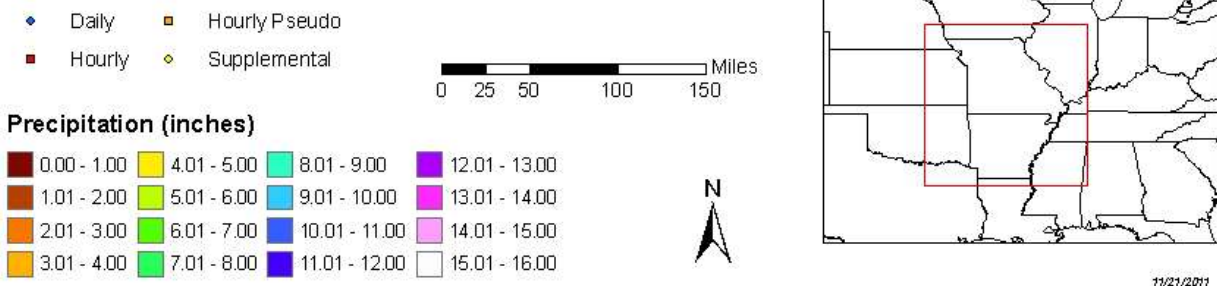


Figure 155: Total storm isohyetal analysis for Big Fork, AR December 1982

NOAA HYSPLIT MODEL
 Backward trajectories ending at 0000 UTC 03 Dec 82
 CDC1 Meteorological Data

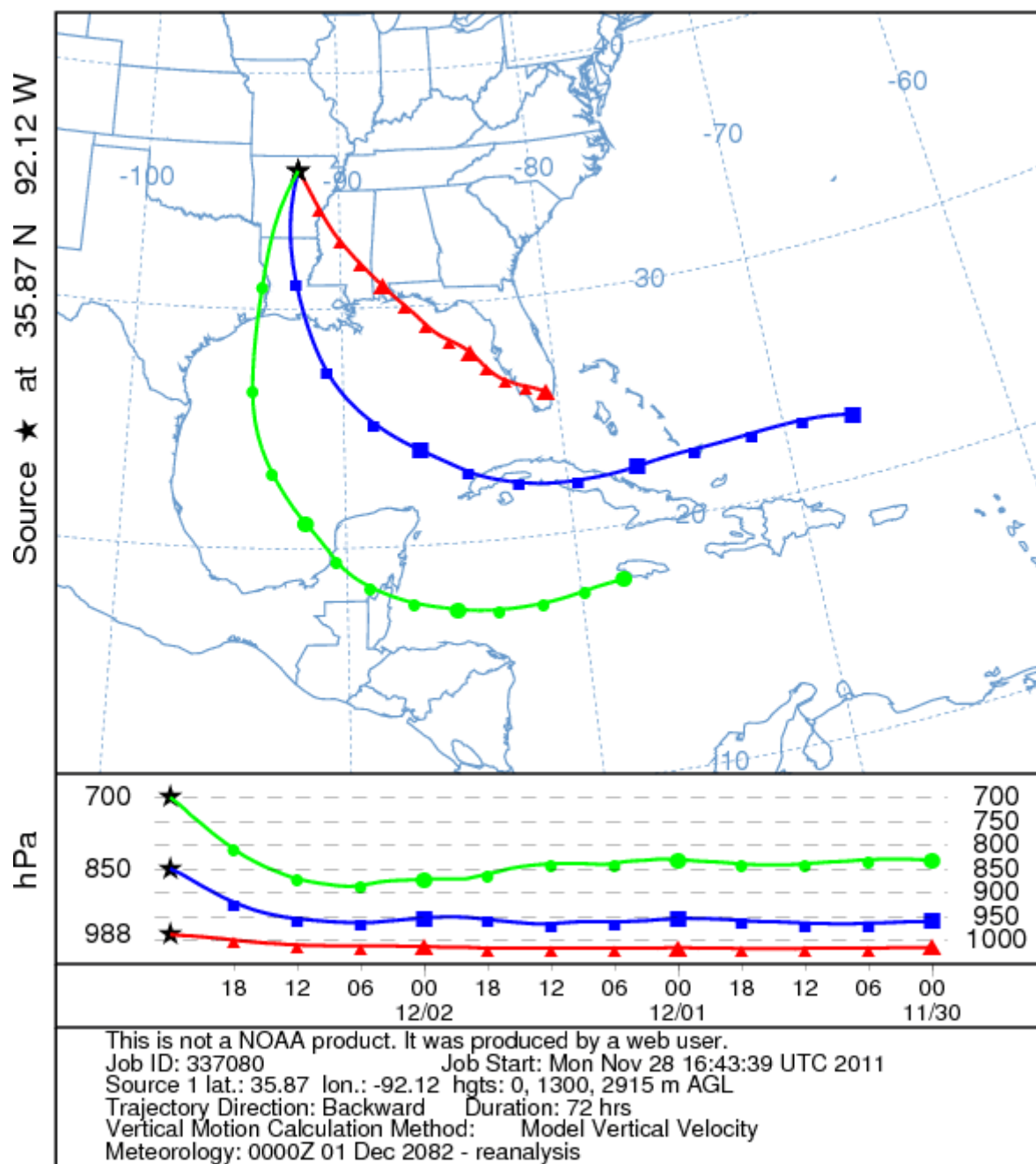


Figure 156: HYSPLIT trajectory analysis at Surface, 850mb and 700mb for Big Fork, AR December 1982

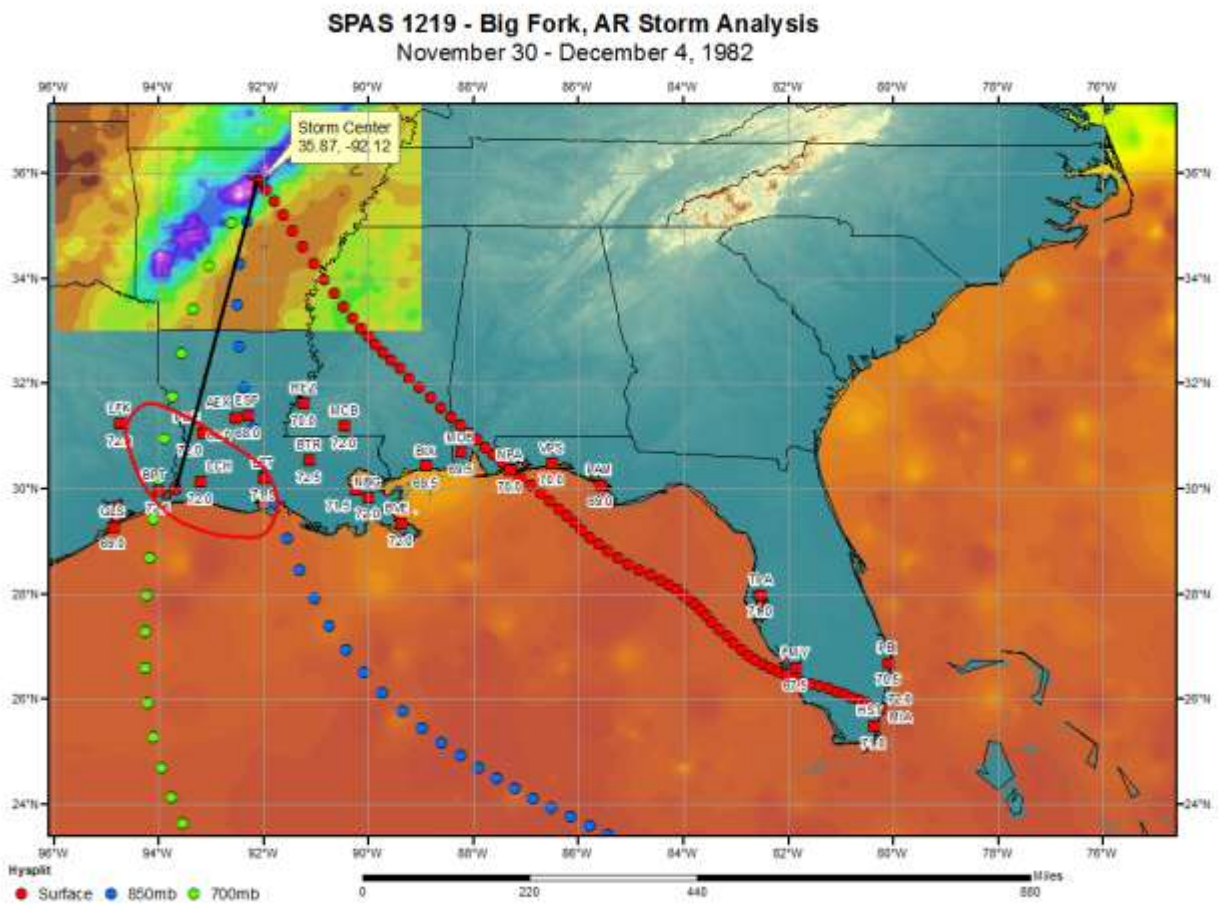


Figure 157: In-place storm representative dew point analysis for Big Fork, AR Nov 30 – Dec 4, 1982

Storm Precipitation Analysis System (SPAS) For Storm #1277

General Storm Location: Kentucky, Ohio River Valley

Storm Dates: February 12-16, 1989

Event: Synoptic

DAD Zone 1

Latitude: 36.9958

Longitude: -88.2625

Max. Grid Rainfall Amount: 13.20"

Max. Observed Rainfall Amount: 13.16"

Number of Stations: 1177 (795 Daily, 256 Hourly, 78 Hourly Pseudo, and 48 Supplemental)

SPAS Version: 9.5

Basemap: PRISM 30-yr Mean (1981-2000) February Precipitation

Spatial resolution: 00:00:30 (~ 0.30 mi²)

Radar Included: No

Depth-Area-Duration (DAD) analysis: Yes

Reliability of results: This analysis was based on hourly data, daily data, and supplemental station data. We have a high degree of confidence in the station based storm total results, the spatial pattern is dependent on basemap, and the timing is based on hourly and hourly pseudo stations.

SPAS Storm ID	NAME	LON	LAT	ELEV Round	Storm Representative				Climatological Maximum				IPMF
					T _g	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	T _g	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	
1277_1	GILBERTSVILLE	-88.263	36.996	400	64.00	1.68"	0.07"	1.610	70.5	2.31"	0.09"	2.215	1.38

Storm 1277 - February 12 (0700 UTC) - February 17 (0600 UTC), 1989															
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)															
Area (mi ²)	Duration (hours)														
	1	2	3	4	5	6	12	18	24	36	48	72	96	120	Total
0.4	1.54	2.45	3.33	4.26	4.87	5.13	7.39	8.37	9.40	9.82	11.12	13.05	13.20	13.20	13.20
1	1.53	2.45	3.33	4.25	4.85	5.12	7.37	8.34	9.37	9.79	11.08	13.01	13.14	13.14	13.14
10	1.52	2.43	3.30	4.21	4.82	5.07	7.32	8.27	9.29	9.72	10.99	12.91	13.04	13.04	13.04
25	1.52	2.42	3.28	4.19	4.80	5.05	7.29	8.24	9.27	9.69	10.95	12.87	13.00	13.00	13.00
50	1.52	2.41	3.27	4.17	4.79	5.04	7.28	8.22	9.24	9.67	10.92	12.84	12.97	12.97	12.97
100	1.50	2.33	3.21	4.05	4.63	4.89	7.16	8.11	9.10	9.51	10.81	12.70	12.83	12.83	12.83
150	1.46	2.29	3.21	3.86	4.42	4.66	6.95	7.89	8.86	9.26	10.56	12.44	12.58	12.58	12.58
200	1.41	2.29	3.21	3.64	4.16	4.40	6.71	7.62	8.58	9.00	10.33	12.21	12.36	12.36	12.36
300	1.32	2.26	3.18	3.49	3.70	4.02	6.29	7.23	8.16	8.65	10.03	11.89	12.04	12.04	12.04
400	1.25	2.22	3.11	3.42	3.65	3.96	6.02	6.99	7.91	8.41	9.85	11.68	11.82	11.82	11.82
500	1.23	2.19	3.05	3.35	3.60	3.90	5.83	6.82	7.72	8.23	9.71	11.51	11.66	11.66	11.66
1,000	1.15	2.02	2.73	3.03	3.38	3.68	5.33	6.35	7.18	7.74	9.29	11.02	11.17	11.17	11.17
2,000	1.08	1.83	2.37	2.74	3.02	3.32	4.95	5.90	6.73	7.24	8.88	10.61	10.77	10.77	10.77
3,500	0.99	1.62	2.10	2.51	2.78	3.10	4.59	5.54	6.37	6.84	8.50	10.27	10.44	10.44	10.44
5,000	0.90	1.50	1.98	2.36	2.64	2.94	4.34	5.28	6.09	6.58	8.21	10.01	10.20	10.20	10.20
7,500	0.79	1.35	1.81	2.17	2.44	2.74	4.01	5.00	5.77	6.25	7.86	9.65	9.88	9.88	9.88
10,000	0.71	1.25	1.69	2.04	2.30	2.59	3.75	4.74	5.51	6.02	7.57	9.35	9.62	9.62	9.62
15,000	0.62	1.11	1.52	1.84	2.12	2.40	3.38	4.36	5.06	5.57	7.07	8.85	9.10	9.11	9.11
20,000	0.55	1.00	1.38	1.69	1.99	2.26	3.17	4.06	4.67	5.26	6.68	8.40	8.66	8.66	8.66
35,000	0.42	0.78	1.11	1.40	1.66	1.91	2.81	3.52	3.99	4.61	5.90	7.44	7.76	7.76	7.76
50,000	0.34	0.65	0.92	1.18	1.41	1.63	2.49	3.14	3.56	4.21	5.37	6.81	7.16	7.17	7.17
75,000	0.26	0.49	0.70	0.91	1.11	1.29	2.09	2.69	3.08	3.67	4.72	6.06	6.38	6.39	6.39
100,000	0.20	0.39	0.56	0.71	0.88	1.03	1.78	2.35	2.72	3.31	4.21	5.44	5.78	5.80	5.80
233,469	0.09	0.17	0.25	0.33	0.40	0.48	0.88	1.24	1.49	1.86	2.36	3.08	3.39	3.45	3.45

Figure 158: Depth-area-duration values for Gilbertsville, KY February 1989

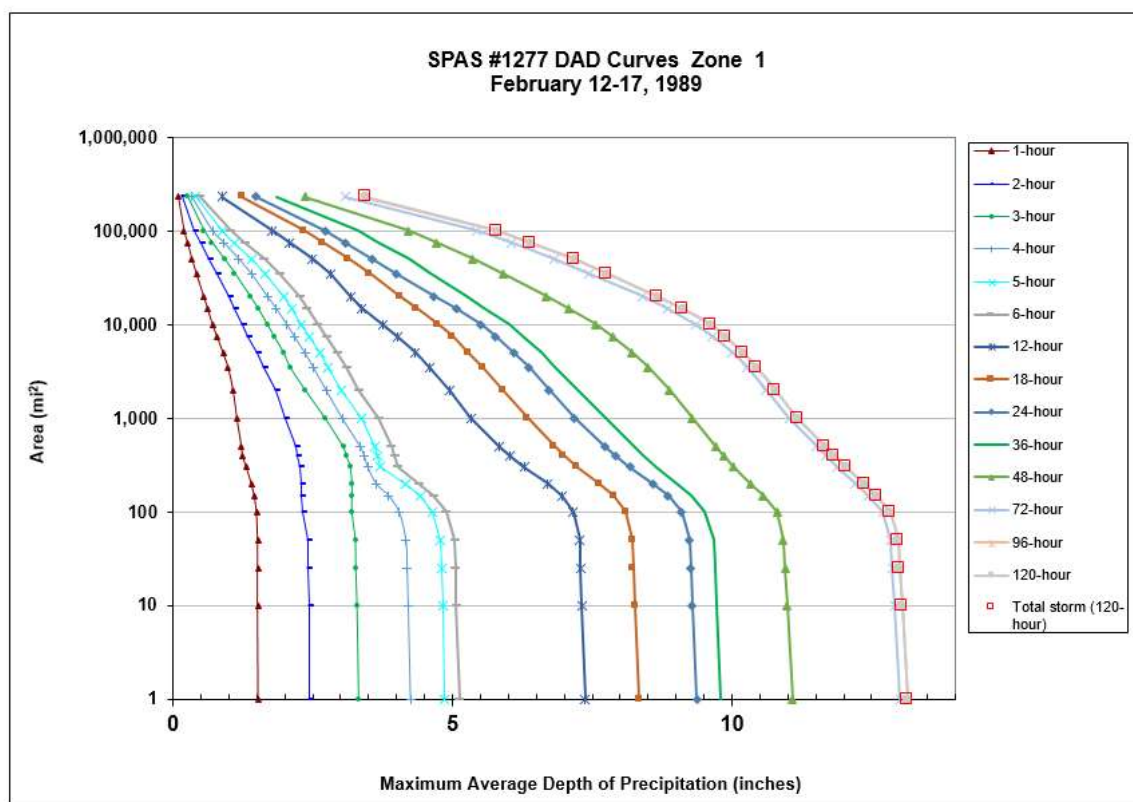


Figure 159: Depth-area-duration chart for Gilbertsville, KY February 1989

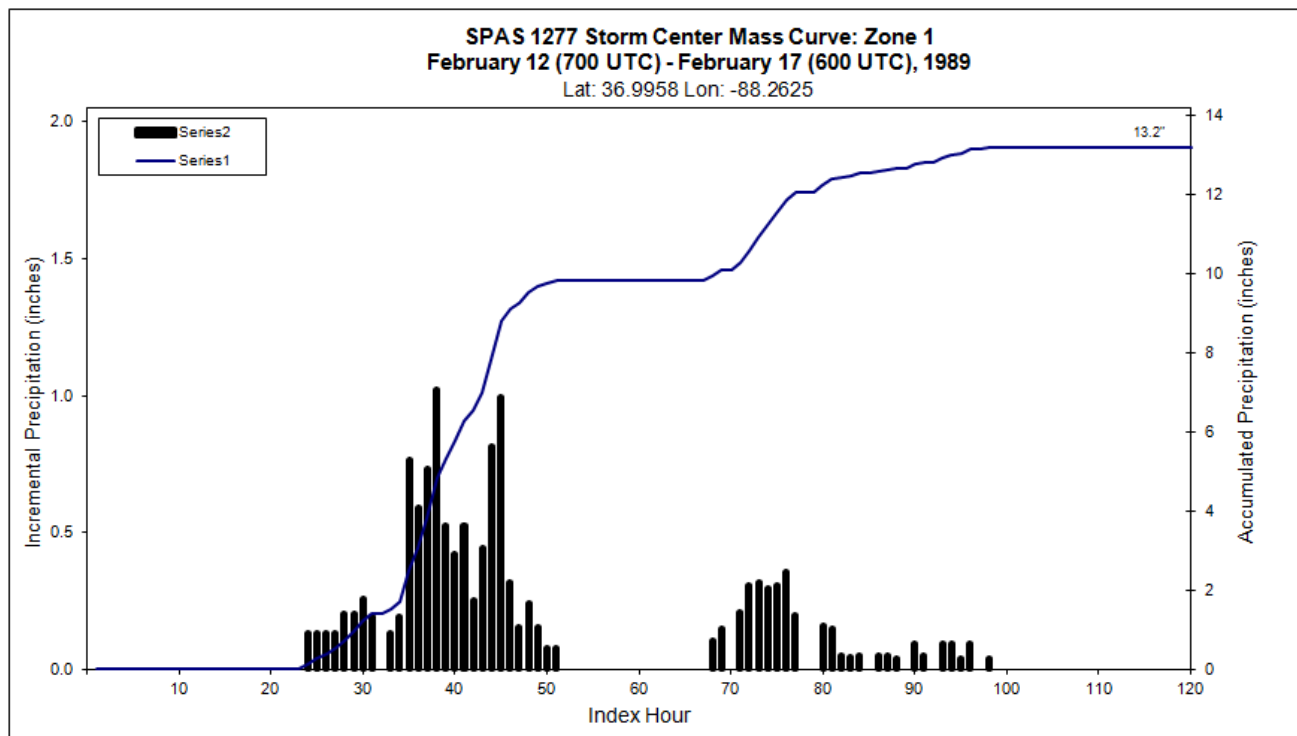


Figure 160: Mass curve chart for Gilbertsville, KY February 1989

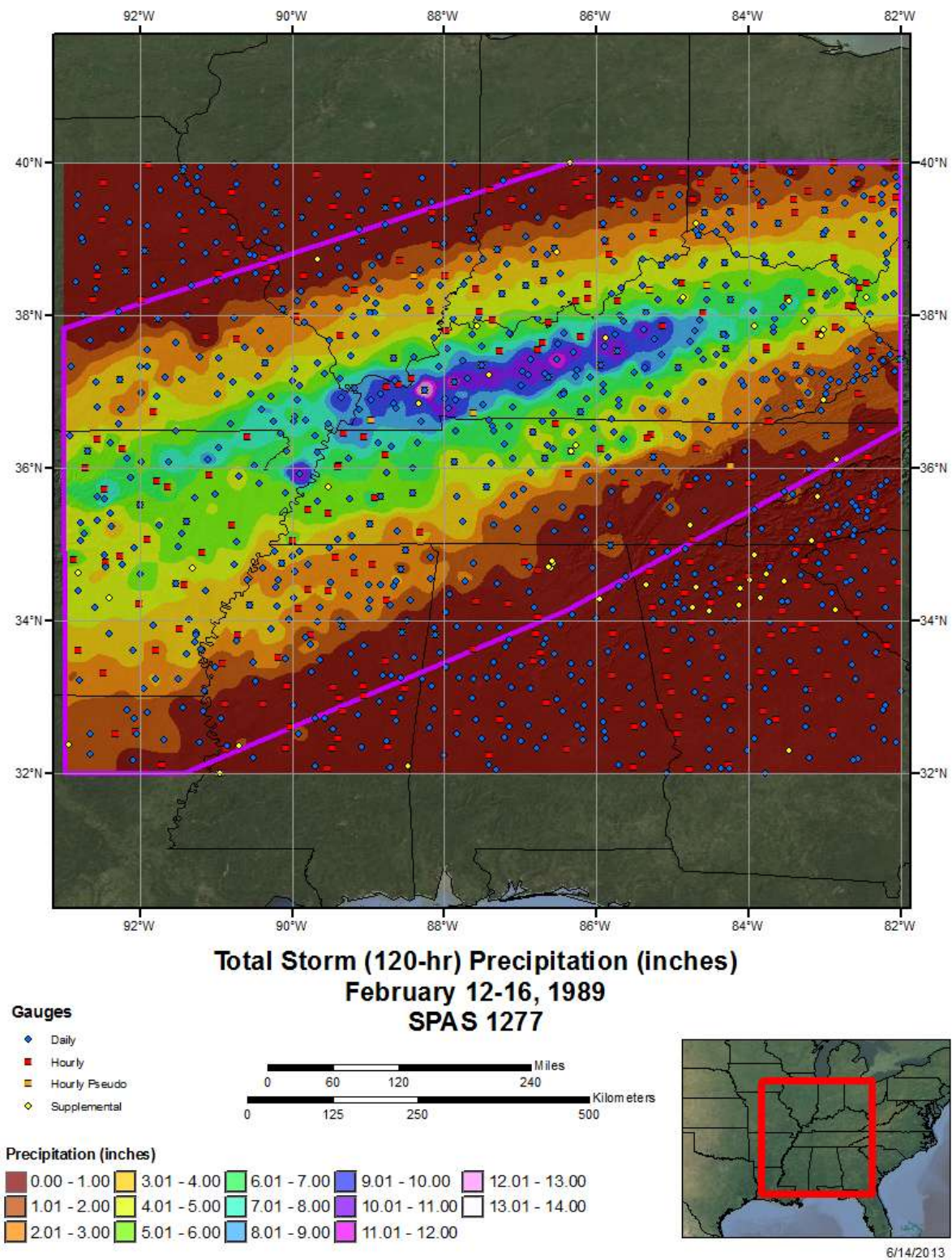


Figure 161: Total storm isohyetal analysis for Gilbertsville, KY February 1989

NOAA HYSPLIT MODEL
Backward trajectories ending at 0000 UTC 14 Feb 89
CDC1 Meteorological Data

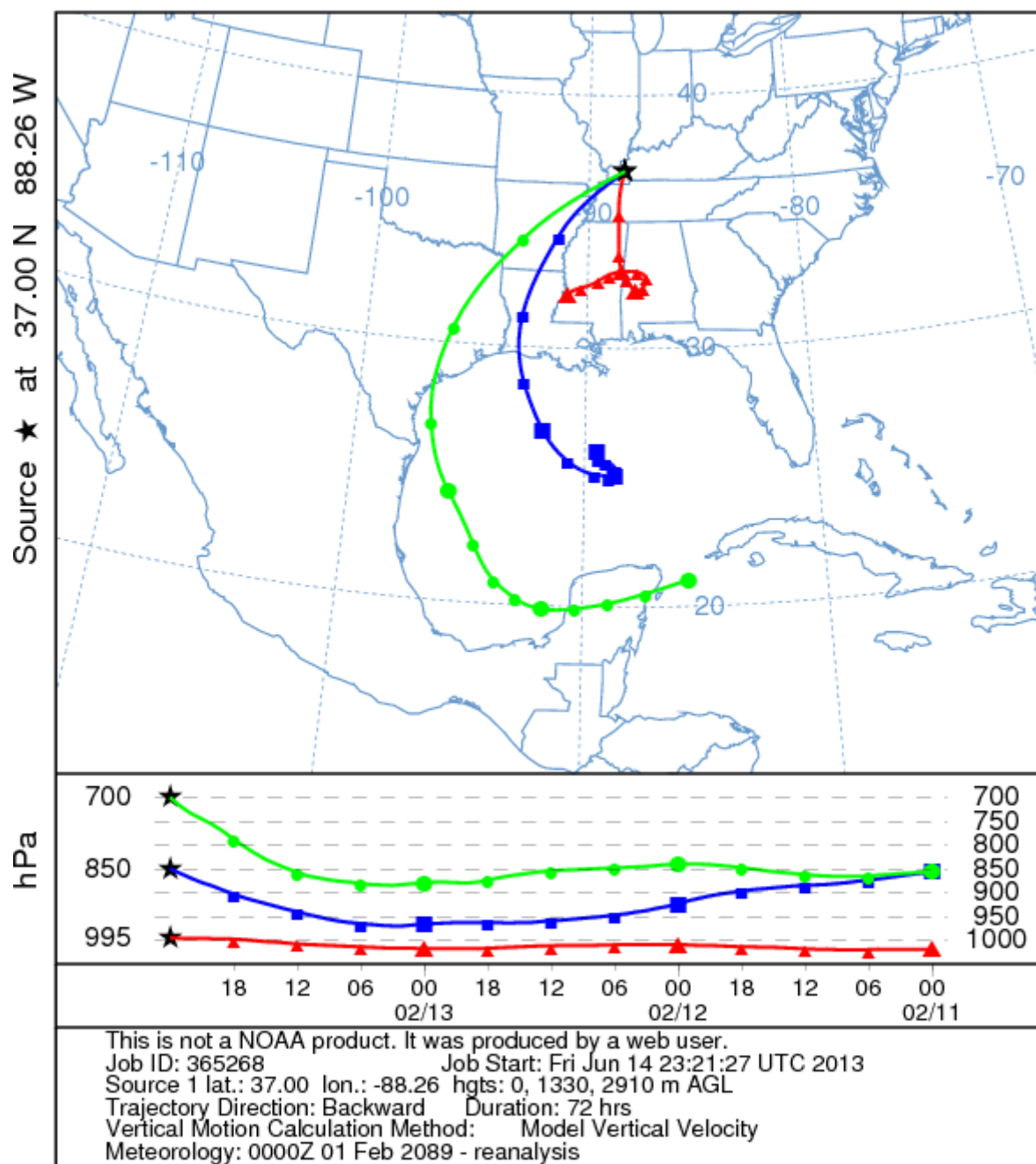


Figure 162: HYSPLIT trajectory analysis at Surface, 850mb and 700mb for Gilbertsville, KY
February 1989

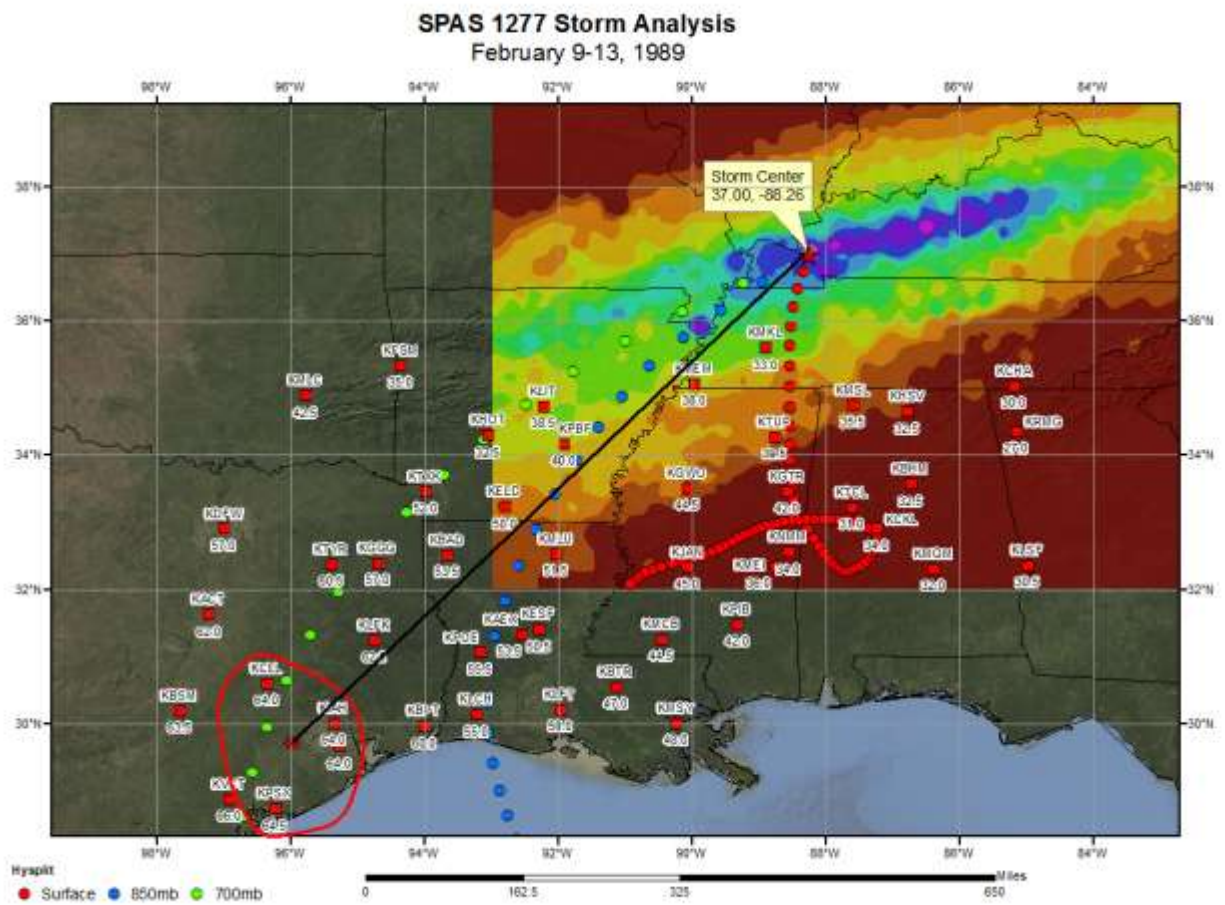


Figure 163: In-place storm representative dew point analysis for Gilbertsville, KY February 9-13, 1989

Storm Precipitation Analysis System (SPAS) For Storm #1244

General Storm Location: Mainly Kentucky and Tennessee.

Storm Dates: February 28 - March 4, 1997

Event: General storm

DAD Zone 1

Latitude: 38.1000

Longitude: -85.6700

Max. Grid Rainfall Amount: 13.51

Max. Observed Rainfall Amount: 13.04

Number of Stations: 872 (435 Daily, 118 Hourly, 0 Hourly Estimated, 48 Hourly Pseudo, 252 Supplemental, and 19 Supplemental Estimated)

SPAS Version: 9.5

Basemap: PRISM Mean (1971-2000) March precipitation and SPAS ippt precipitation

Spatial resolution: 36 seconds (~ 0.40 mi²)

Radar Included: Yes

Depth-Area-Duration (DAD) analysis: Yes

Reliability of results: This analysis was based on WDT NEXRAD data (unblocked) and extensive gauge data, we have a very high degree of confidence in the results. There were a few areas of radar beam blockage in the domain, these areas were adjusted using a beam blockage mask. The radar blocked areas did not affect the SPAS analysis. The Southeastern region was not included in the DAD, these region did not have radar coverage and the results are not completely accurate so they were not included in the analysis.

SPAS Storm ID	NAME	LON	LAT	ELEV Round	Storm Representative				Climatological Maximum				IPMF
					T _s	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	T _s	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	
1244_1	LOUISVILLE	-85.670	38.100	600	68.50	2.10"	0.13"	1.970	70.0	2.25"	0.13"	2.120	1.08

Storm 1244 - February 28 (0700 UTC) - March 4 (0500 UTC), 1997														
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)														
Area (mi ²)	Duration (hours)													
	1	2	3	4	5	6	12	18	24	36	48	72	95	Total
0.4	3.06	3.95	4.27	4.88	5.11	5.42	7.25	9.96	10.94	12.60	12.61	13.51	13.51	13.51
1	3.04	3.92	4.22	4.83	5.06	5.38	7.20	9.88	10.87	12.52	12.53	13.40	13.40	13.40
10	2.97	3.80	4.11	4.64	4.94	5.29	7.06	9.66	10.72	12.32	12.35	13.15	13.15	13.15
25	2.82	3.67	4.01	4.52	4.90	5.25	6.96	9.33	10.65	12.24	12.28	13.04	13.04	13.04
50	2.68	3.58	3.90	4.45	4.88	5.16	6.82	8.95	10.61	12.10	12.10	12.85	12.85	12.85
100	2.56	3.46	3.79	4.34	4.77	5.03	6.64	8.56	10.52	11.89	11.89	12.67	12.67	12.67
150	2.49	3.37	3.71	4.25	4.66	4.92	6.52	8.32	10.39	11.76	11.78	12.57	12.57	12.57
200	2.43	3.30	3.64	4.17	4.58	4.82	6.40	8.16	10.30	11.68	11.68	12.45	12.45	12.45
300	2.30	3.18	3.53	4.04	4.44	4.68	6.22	7.92	10.17	11.49	11.49	12.28	12.28	12.28
400	2.19	3.07	3.44	3.92	4.32	4.56	6.07	7.75	10.04	11.36	11.37	12.16	12.16	12.16
500	2.10	2.96	3.36	3.81	4.21	4.46	5.96	7.62	9.94	11.26	11.27	12.06	12.06	12.06
1,000	1.81	2.61	3.08	3.41	3.79	4.11	5.59	7.20	9.55	10.88	10.88	11.72	11.72	11.72
2,000	1.50	2.21	2.77	3.08	3.44	3.75	5.21	6.81	9.03	10.43	10.45	11.35	11.35	11.35
3,500	1.25	1.89	2.53	2.82	3.15	3.46	4.88	6.52	8.51	10.01	10.03	10.98	10.98	10.98
5,000	1.09	1.72	2.34	2.65	2.98	3.27	4.63	6.30	8.14	9.70	9.74	10.68	10.68	10.68
7,500	0.94	1.55	2.14	2.44	2.75	3.05	4.37	6.00	7.74	9.29	9.37	10.33	10.33	10.33
10,000	0.83	1.41	1.97	2.29	2.60	2.87	4.18	5.73	7.40	9.00	9.10	10.05	10.05	10.05
15,000	0.69	1.23	1.73	2.05	2.37	2.63	3.89	5.30	6.87	8.57	8.66	9.62	9.62	9.62
20,000	0.62	1.12	1.55	1.87	2.20	2.46	3.70	4.96	6.50	8.17	8.26	9.24	9.24	9.24
35,000	0.48	0.87	1.23	1.53	1.81	2.05	3.23	4.22	5.66	7.21	7.34	8.30	8.30	8.30
50,000	0.38	0.72	1.05	1.30	1.54	1.75	2.83	3.64	4.96	6.38	6.54	7.53	7.53	7.53
75,000	0.28	0.50	0.77	0.98	1.18	1.38	2.21	2.85	3.96	5.14	5.32	6.45	6.45	6.45
100,000	0.21	0.40	0.61	0.77	0.91	1.09	1.71	2.27	3.15	4.21	4.37	5.55	5.71	5.71
146,019	0.15	0.28	0.42	0.53	0.65	0.76	1.24	1.62	2.25	3.04	3.18	4.15	4.26	4.26

Figure 164: Depth-area-duration values for Louisville, KY February 1997

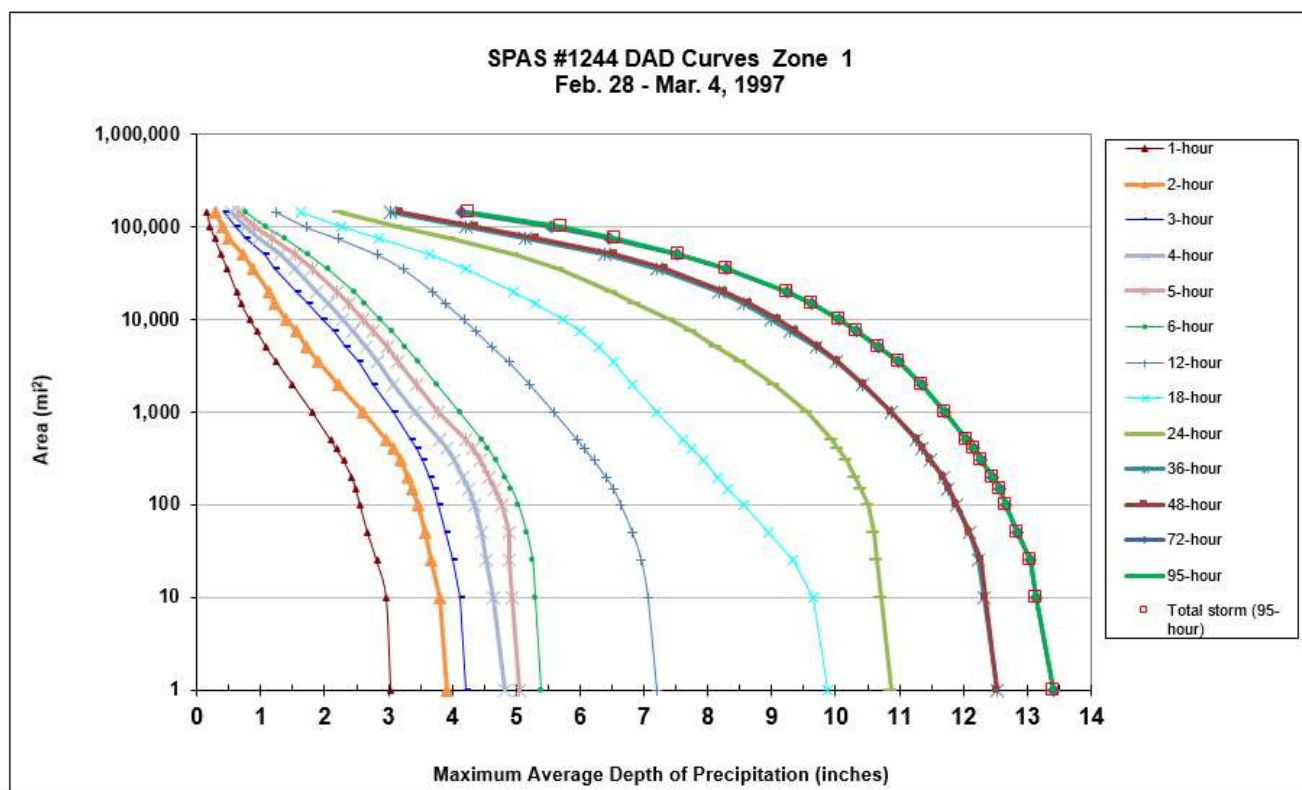


Figure 165: Depth-area-duration chart for Louisville, KY February 1997

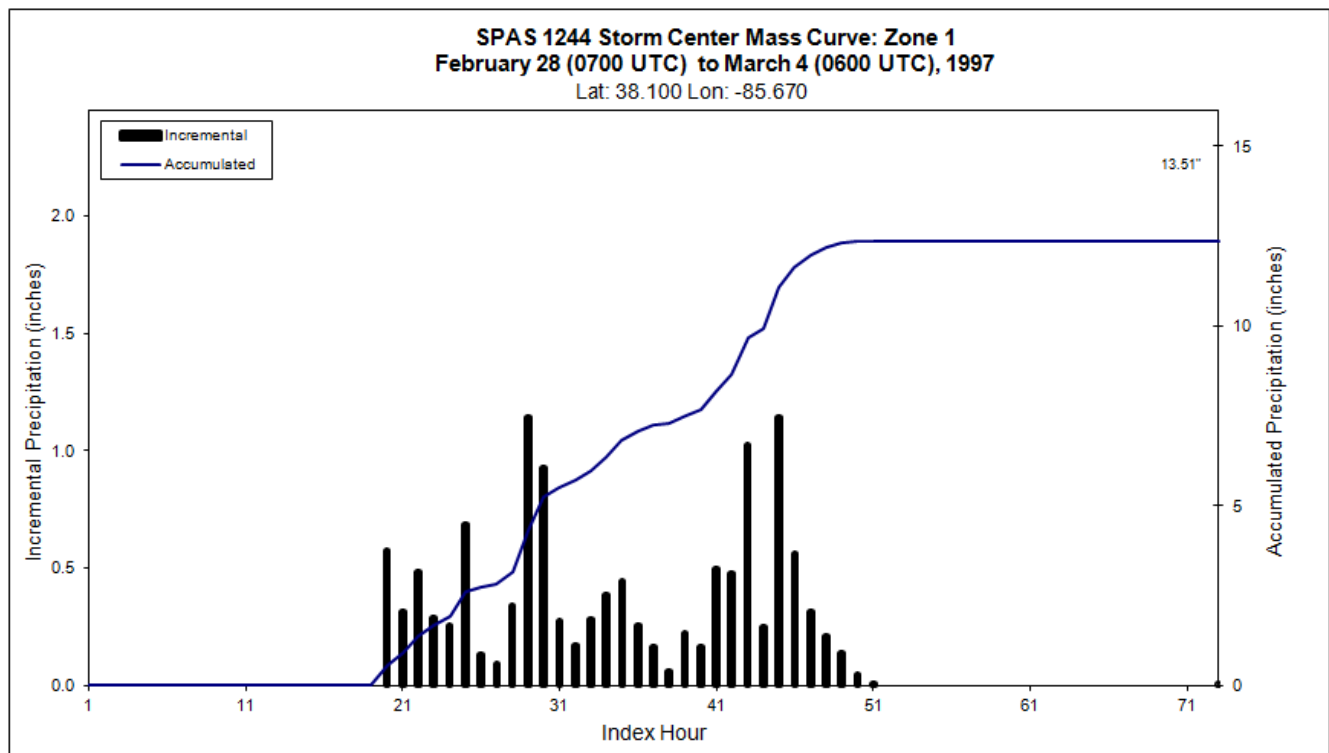


Figure 166: Mass curve chart for Louisville, KY February 1997

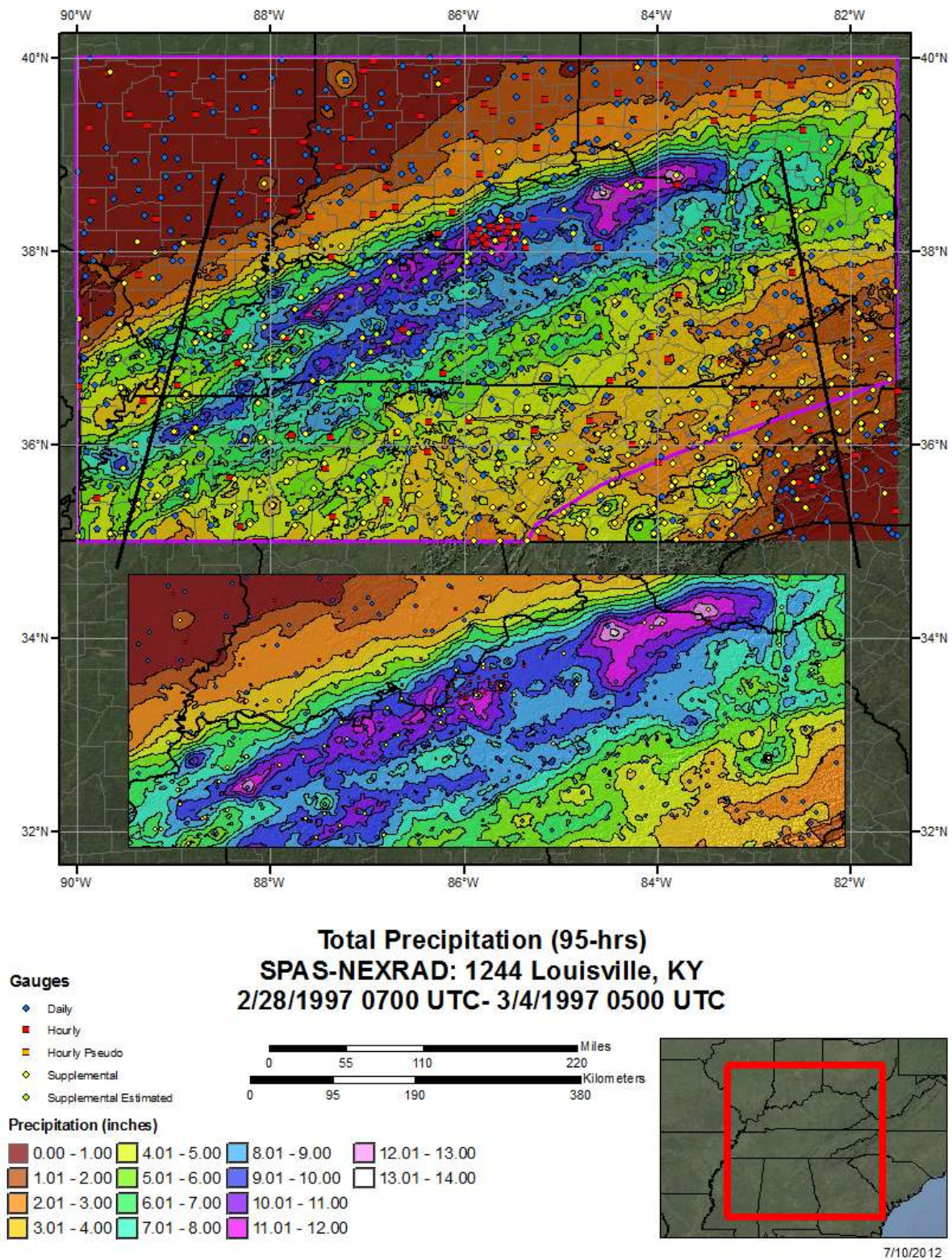


Figure 167: Total storm isohyetal analysis for Louisville, KY February 1997

NOAA HYSPLIT MODEL
 Backward trajectories ending at 1200 UTC 01 Mar 97
 CDC1 Meteorological Data

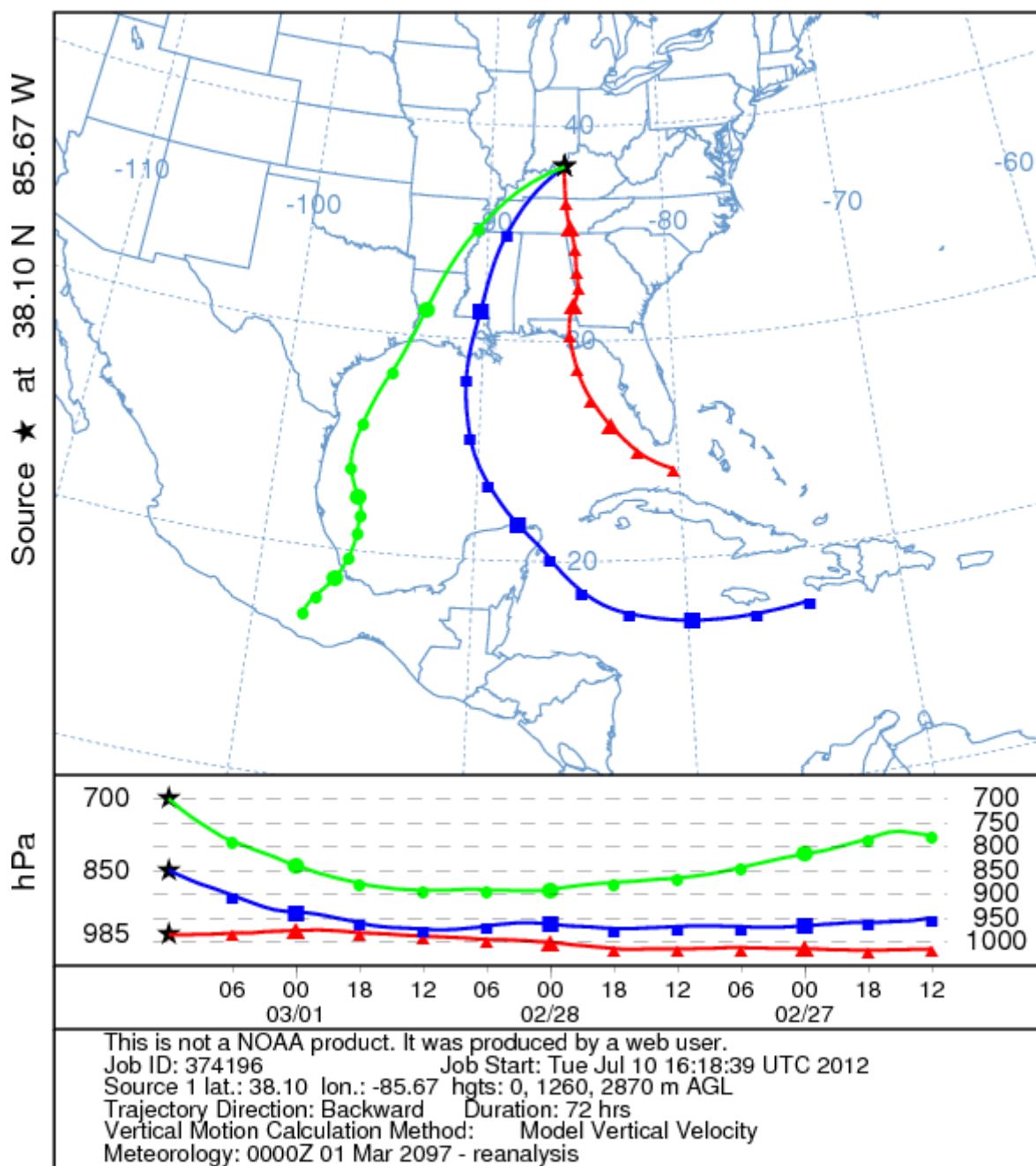


Figure 168: HYSPLIT trajectory analysis at Surface, 850mb and 700mb for Louisville, KY February 1997

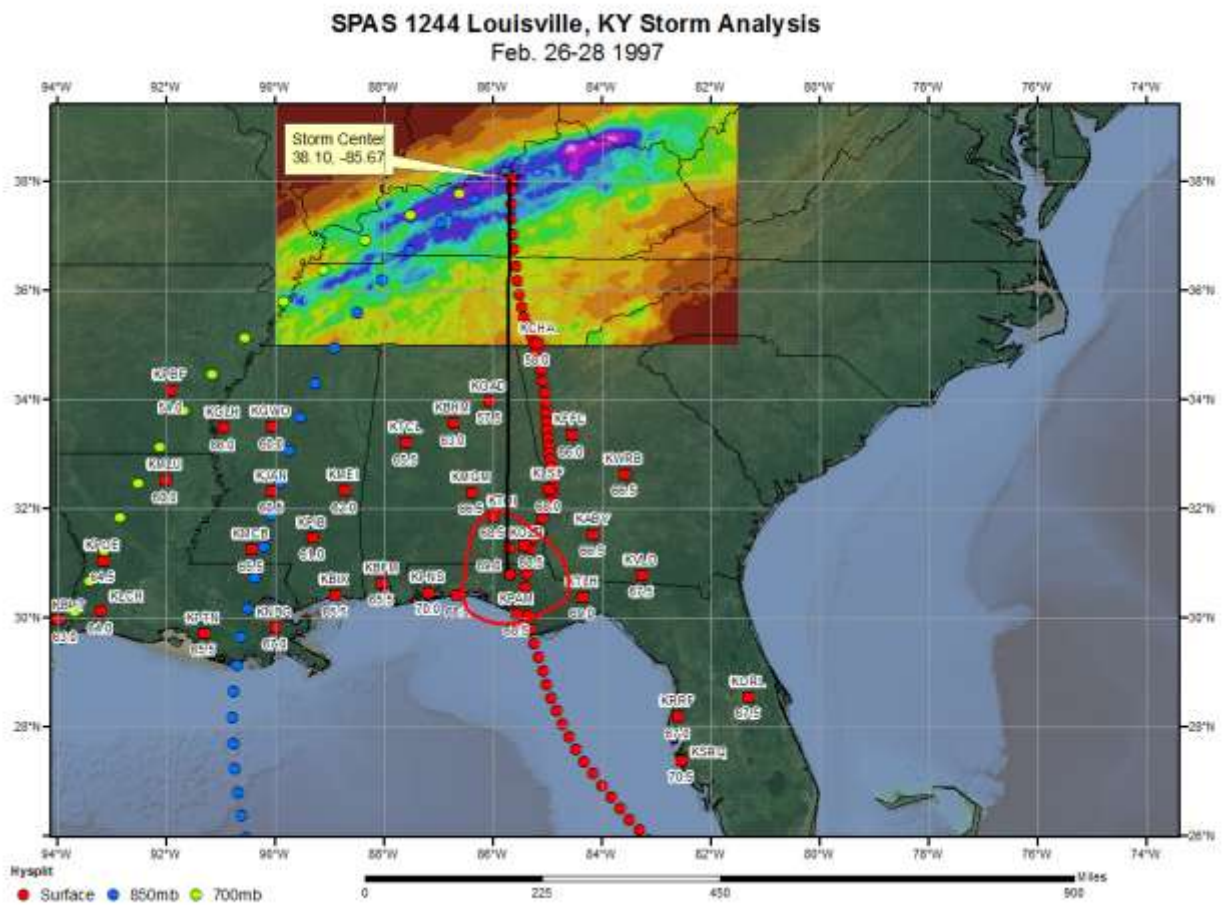


Figure 169: In-place storm representative dew point analysis for Louisville, KY February 26-28, 1997

Storm Precipitation Analysis System (SPAS) For Storm #1228

General Storm Location: Eastern Kansas, Northeastern Oklahoma and western Missouri

Storm Dates: June 26 – July 1, 2007

Event: Mesoscale Convective System (MCS)

DAD Zone 1 (entire domain)

Latitude: 37.63

Longitude: -96.05

Max. Grid Rainfall Amount: 25.50"

Max. Observed Rainfall Amount: 21.40" (FALL RIVER, KS)

Number of Stations: 509 (175 Daily, 68 Hourly, 0 Hourly Estimated, 1 Hourly Estimated Pseudo, 60 Hourly Pseudo, 205 Supplemental, and 0 Supplemental Estimated)

SPAS Version: 9.0

Basemap: PRISM Mean (1971-2000) June precipitation

Spatial resolution: 36 seconds (~0.38 mi²)

Radar Included: Yes (no outages)

Depth-Area-Duration (DAD) analysis: Yes

Reliability of results: Given the unblocked, clean and QC'ed radar data coupled with relatively extensive gauge data, we have a very high degree of confidence in the results. No supplemental estimated stations were warranted in this analysis.

SPAS Storm ID	NAME	LON	LAT	ELEV Round	Storm Representative				Climatological Maximum				IPMF
					T _s	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	T _s	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	
1228_1	FALL RIVER	-96.050	37.630	900	76.50	3.07"	0.24"	2.830	80.0	3.60"	0.27"	3.330	1.18

Storm 1228 - June 28 (0200 UTC) - July 2 (0000 UTC), 2007														
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)														
Area (mi ²)	Duration (hours)													
	1	2	3	6	12	18	24	36	48	72	77	84	96	Total
0.4	4.68	5.84	6.60	9.12	11.37	14.71	14.90	17.71	22.65	25.42	23.42	25.45	25.50	25.50
1	4.60	5.78	6.53	9.04	11.25	14.57	14.75	17.54	22.47	25.26	23.25	25.29	25.32	25.32
10	4.15	5.50	6.28	8.78	10.95	14.04	14.27	17.11	21.82	24.85	22.83	24.87	24.91	24.91
25	3.77	4.99	6.01	8.49	10.71	13.68	13.93	16.69	20.93	23.99	22.50	24.02	24.08	24.08
50	3.44	4.66	5.69	8.16	10.54	13.31	13.59	16.33	19.77	22.91	22.03	23.05	23.17	23.17
100	3.10	4.24	5.15	7.64	10.23	12.75	13.06	15.74	18.37	21.76	21.37	21.95	22.10	22.10
150	2.89	3.99	4.91	7.27	9.94	12.26	12.59	15.21	17.59	21.11	20.94	21.33	21.49	21.49
200	2.72	3.80	4.70	6.99	9.65	11.82	12.15	14.78	17.12	20.66	20.57	20.91	21.07	21.07
300	2.49	3.52	4.38	6.50	9.14	11.19	11.58	14.17	16.48	20.05	20.02	20.33	20.48	20.48
400	2.29	3.30	4.12	6.13	8.68	10.77	11.19	13.75	16.04	19.63	19.57	19.92	20.07	20.07
500	2.14	3.13	3.92	5.87	8.32	10.44	10.91	13.38	15.64	19.29	19.23	19.60	19.75	19.75
1,000	1.65	2.60	3.29	4.90	7.21	9.25	10.04	12.26	14.27	18.06	17.99	18.47	18.64	18.64
2,000	1.21	2.08	2.67	4.02	6.20	7.85	8.94	10.95	12.76	16.53	16.46	17.08	17.30	17.30
3,500	0.93	1.70	2.20	3.37	5.44	6.97	7.91	9.75	11.43	15.07	14.98	15.76	15.97	15.97
5,000	0.80	1.46	1.92	3.00	4.94	6.38	7.26	9.04	10.64	14.00	14.03	14.81	15.06	15.06
7,500	0.67	1.23	1.61	2.53	4.35	5.69	6.50	8.14	9.69	12.78	12.85	13.64	13.87	13.87
10,000	0.55	1.03	1.41	2.24	3.89	5.16	5.93	7.53	8.97	11.85	11.99	12.68	12.94	12.94
15,000	0.41	0.77	1.05	1.80	3.23	4.37	5.13	6.53	7.83	10.52	10.72	11.36	11.59	11.59
20,000	0.34	0.63	0.84	1.47	2.77	3.80	4.46	5.83	7.04	9.49	9.72	10.24	10.50	10.50
35,000	0.22	0.42	0.56	0.94	1.77	2.52	3.12	4.27	5.33	7.33	7.54	7.94	8.19	8.19
50,000	0.15	0.29	0.41	0.70	1.32	1.90	2.33	3.18	3.98	5.59	5.80	6.17	6.40	6.40
65,762	0.12	0.23	0.31	0.55	1.03	1.48	1.87	2.51	3.15	4.44	4.59	4.91	5.10	5.10

Figure 170: Depth-area-duration values for Fall River, KS June 2007

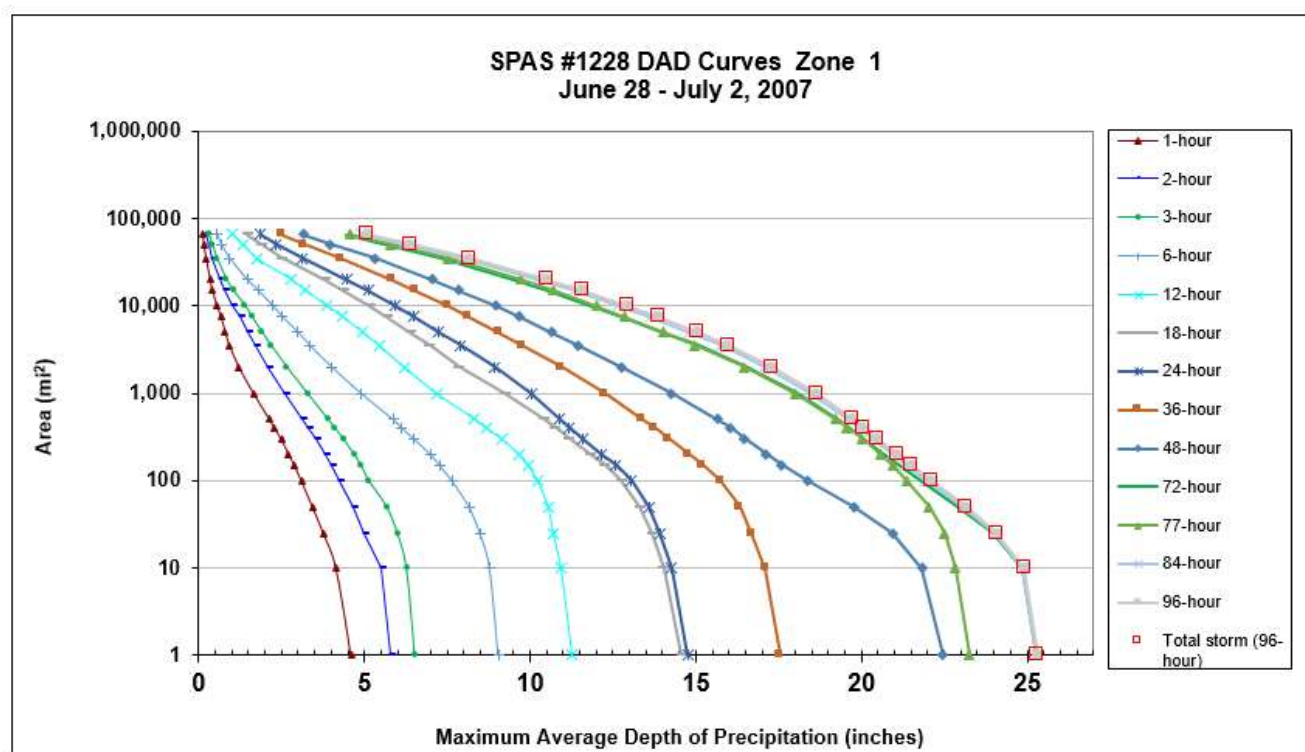


Figure 171: Depth-area-duration chart for Fall River, KS June 2007

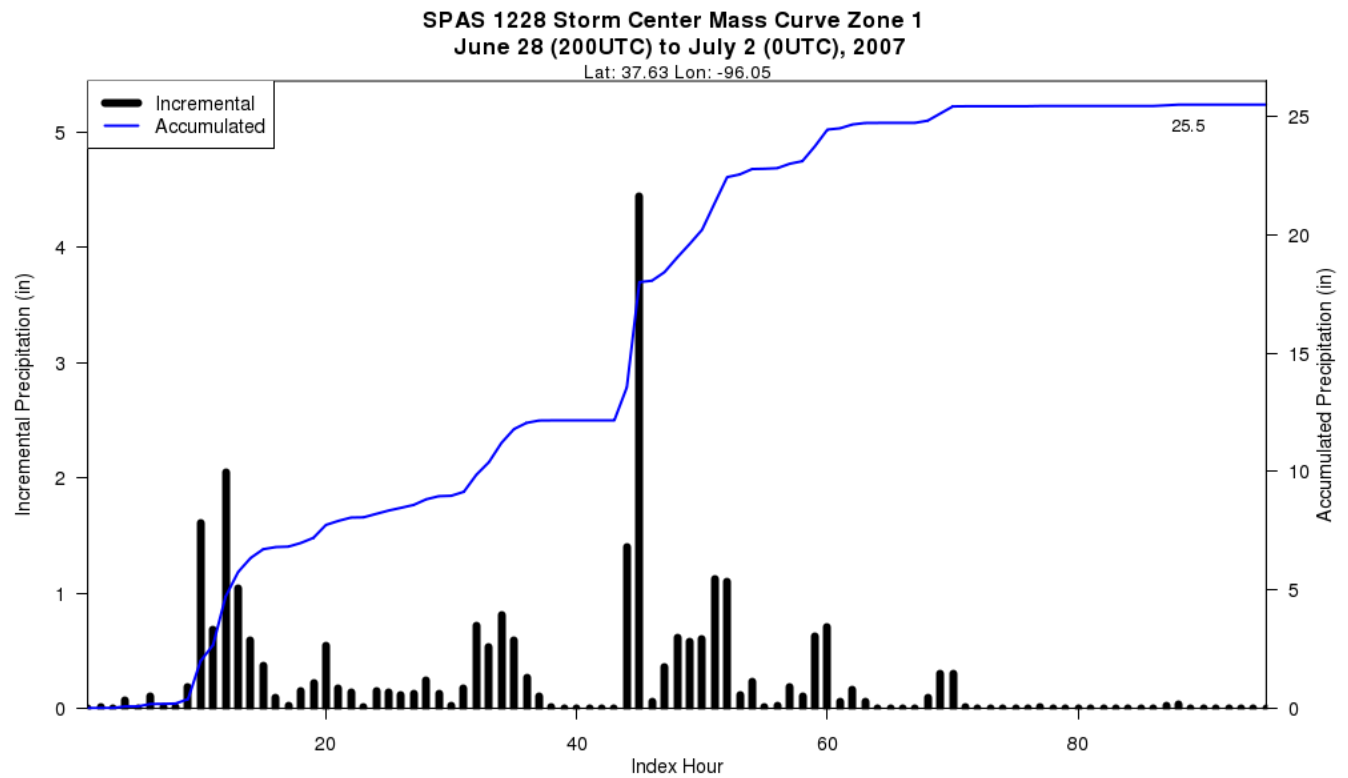


Figure 172: Mass curve chart for Fall River, KS June 2007

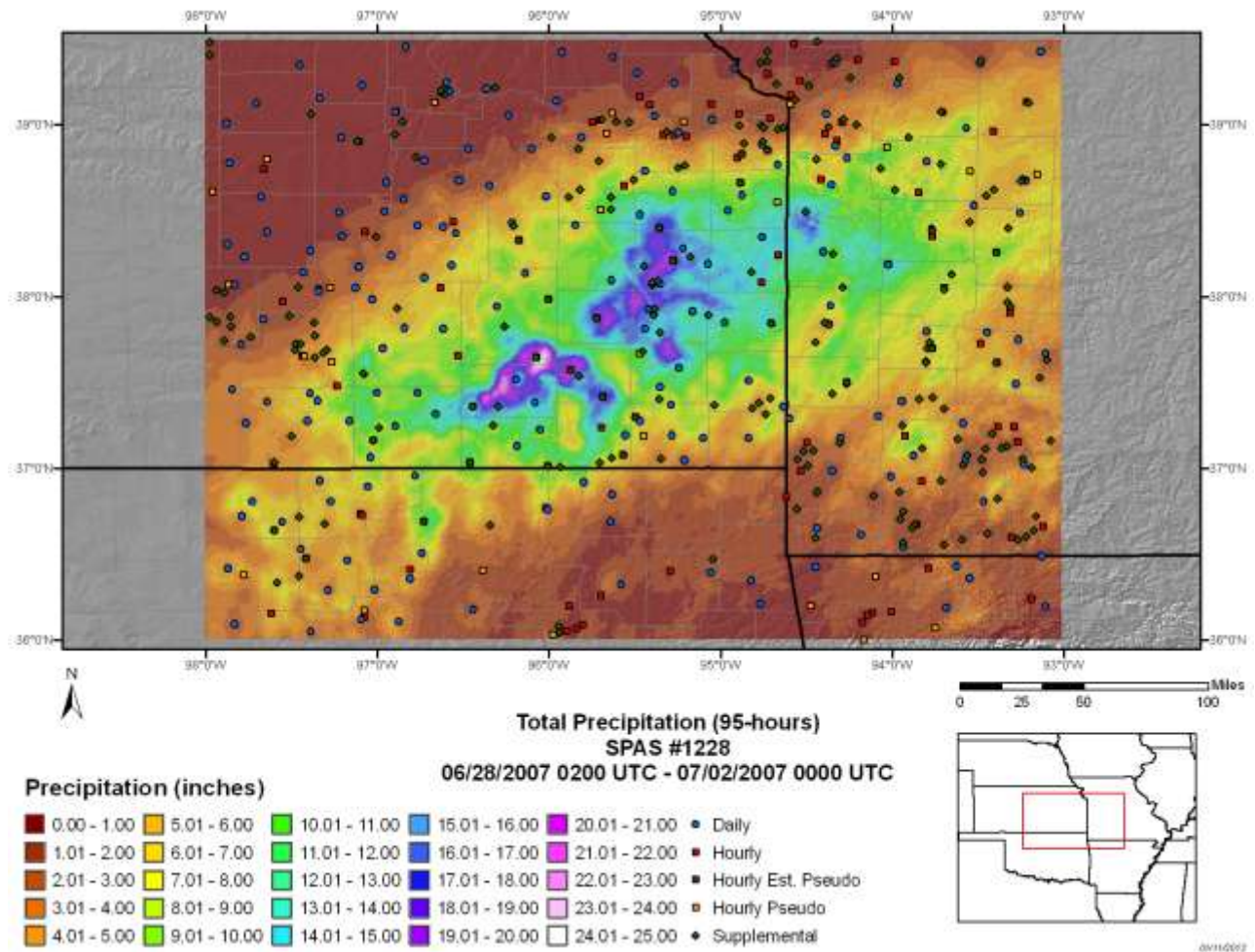


Figure 173: Total storm isohyetal analysis for Fall River, KS June 2007

NOAA HYSPLIT MODEL
 Backward trajectories ending at 1200 UTC 28 Jun 07
 CDC1 Meteorological Data

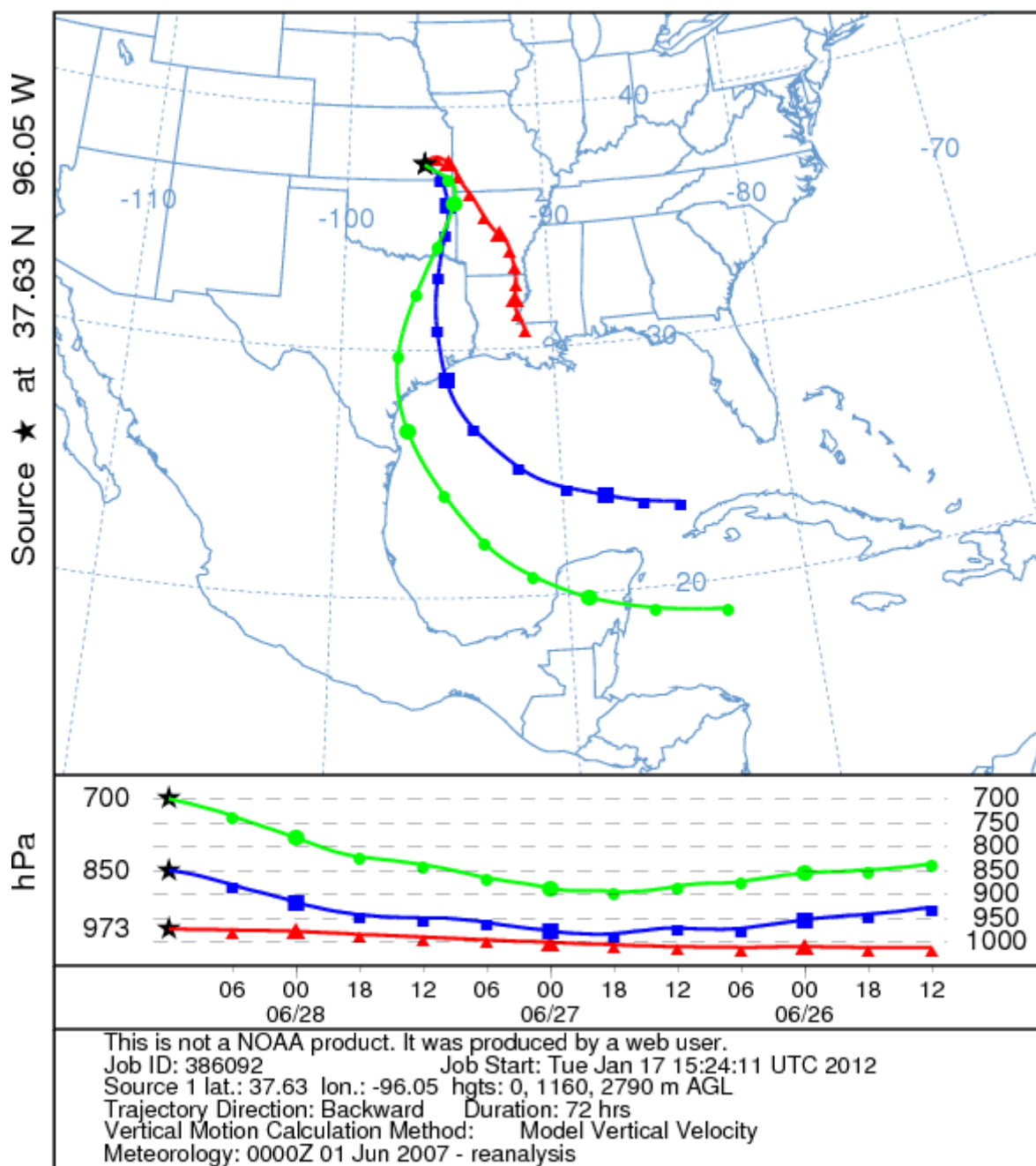


Figure 174: HYSPLIT trajectory analysis at Surface, 850mb and 700mb for Fall River, KS June 2007

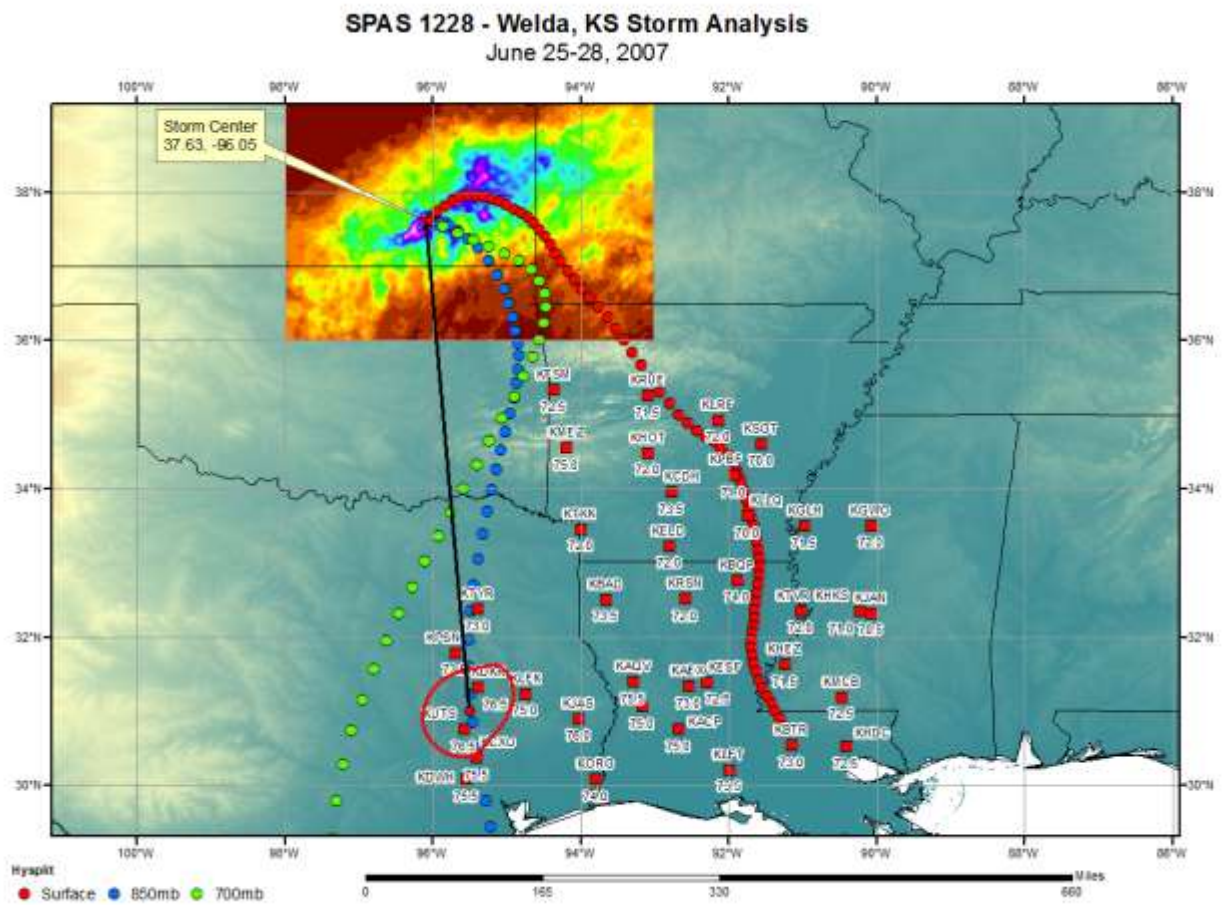


Figure 175: In-place storm representative dew point analysis for Fall River, KS June 25-28, 2007

Storm Precipitation Analysis System (SPAS) For Storm #1242

General Storm Location: Mainly Missouri, Illinois, and northern Arkansas.

Storm Dates: March 17-20, 2008

Event: General storm

DAD Zone 1

Latitude: 37.155

Longitude: -91.445

Max. Grid Rainfall Amount: 15.09

Max. Observed Rainfall Amount: 15.10

Number of Stations: 1142 (474 Daily, 242 Hourly, 0 Hourly Estimated, 32 Hourly Pseudo, 390 Supplemental, and 4 Supplemental Estimated)

SPAS Version: 9.5

Basemap: PRISM Mean (1971-2000) March precipitation plus Stage IV 48-hr total rainfall

Spatial resolution: 36 seconds (~ 0.40 mi²)

Radar Included: Yes

Depth-Area-Duration (DAD) analysis: Yes

Reliability of results: This analysis was based on WDT NEXRAD data (unblocked) and extensive gauge data, we have a very high degree of confidence in the results. There were a few areas of radar beam blockage in the domain, these areas were adjusted using a beam blockage mask. The radar blocked areas did not affect the SPAS analysis.

NAME	LON	LAT	ELEV Round	Storm Representative				Climatological Maximum				IPMF
				T _d	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	T _d	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	
ALLEY SPRING	-91.445	37.115	900	66.00	1.86"	0.17"	1.690	71.0	2.36"	0.20"	2.160	1.28

Storm 1242 - March 17 (0700 UTC) - March 20 (0600 UTC), 2008													
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)													
Area (mi ²)	Duration (hours)												
	1	2	3	4	5	6	12	18	24	36	48	72	Total
0.4	2.23	3.29	4.43	5.37	5.56	6.18	9.07	11.32	13.32	14.66	15.08	15.09	15.09
1	2.19	3.24	4.39	5.31	5.51	6.13	9.00	11.26	13.24	14.55	14.98	14.97	14.97
10	1.98	3.11	4.23	5.10	5.29	5.89	8.68	11.10	13.03	14.29	14.73	14.70	14.70
25	1.86	2.96	4.05	4.81	5.02	5.57	8.42	11.04	12.96	14.03	14.47	14.47	14.47
50	1.70	2.83	3.91	4.51	4.87	5.28	8.24	10.99	12.90	13.82	14.27	14.27	14.27
100	1.60	2.69	3.74	4.22	4.53	4.95	8.02	10.81	12.71	13.67	14.06	14.07	14.07
150	1.53	2.58	3.60	4.03	4.28	4.76	7.86	10.64	12.56	13.50	13.88	13.89	13.89
200	1.49	2.50	3.48	3.89	4.11	4.61	7.71	10.47	12.39	13.38	13.72	13.73	13.73
300	1.42	2.38	3.30	3.69	3.91	4.38	7.48	10.20	12.13	13.11	13.48	13.49	13.49
400	1.38	2.30	3.17	3.55	3.77	4.22	7.29	9.98	11.92	12.94	13.26	13.27	13.27
500	1.34	2.24	3.07	3.44	3.67	4.10	7.13	9.78	11.75	12.77	13.10	13.10	13.10
1,000	1.24	2.05	2.77	3.12	3.35	3.76	6.52	9.05	11.16	12.24	12.54	12.55	12.55
2,000	1.13	1.87	2.47	2.80	3.03	3.41	5.93	8.20	10.49	11.63	11.92	11.94	11.94
3,500	1.01	1.72	2.24	2.55	2.77	3.11	5.48	7.66	9.81	11.03	11.34	11.36	11.36
5,000	0.92	1.61	2.07	2.36	2.59	2.91	5.21	7.35	9.39	10.59	10.94	10.96	10.96
7,500	0.82	1.46	1.89	2.17	2.39	2.69	4.88	6.93	8.76	10.06	10.40	10.42	10.42
10,000	0.75	1.35	1.74	2.03	2.26	2.56	4.65	6.60	8.32	9.59	9.94	9.95	9.95
15,000	0.65	1.18	1.54	1.82	2.07	2.39	4.34	6.14	7.61	8.97	9.31	9.33	9.33
20,000	0.58	1.07	1.40	1.68	1.95	2.25	4.09	5.77	7.15	8.48	8.81	8.84	8.84
35,000	0.45	0.84	1.15	1.43	1.69	1.98	3.64	5.10	6.26	7.56	7.88	7.90	7.90
50,000	0.37	0.70	0.99	1.26	1.54	1.80	3.31	4.64	5.74	6.94	7.22	7.26	7.26
75,000	0.29	0.56	0.82	1.08	1.32	1.57	2.91	4.05	5.02	6.16	6.41	6.46	6.46
100,000	0.23	0.46	0.68	0.90	1.11	1.32	2.53	3.49	4.31	5.34	5.57	5.66	5.66
173,009	0.15	0.28	0.42	0.54	0.67	0.80	1.55	2.18	2.72	3.52	3.79	3.94	3.94

Figure 176: Depth-area-duration values for Alley Spring, MO March 2008

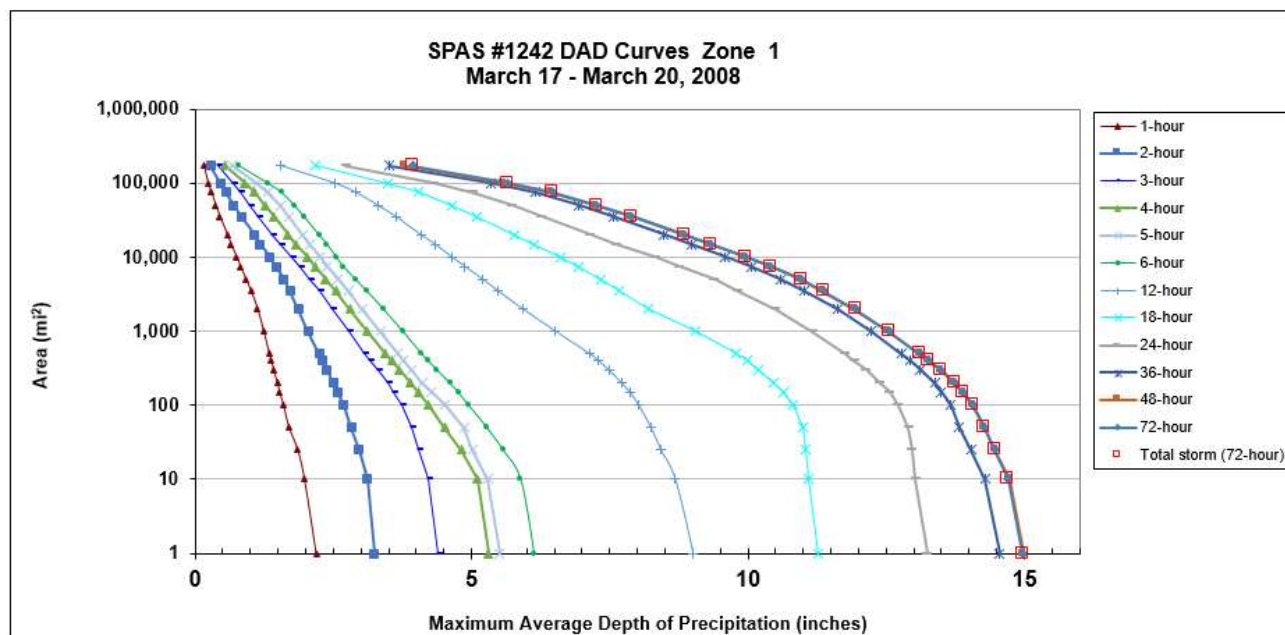


Figure 177: Depth-area-duration chart for Alley Spring, MO March 2008

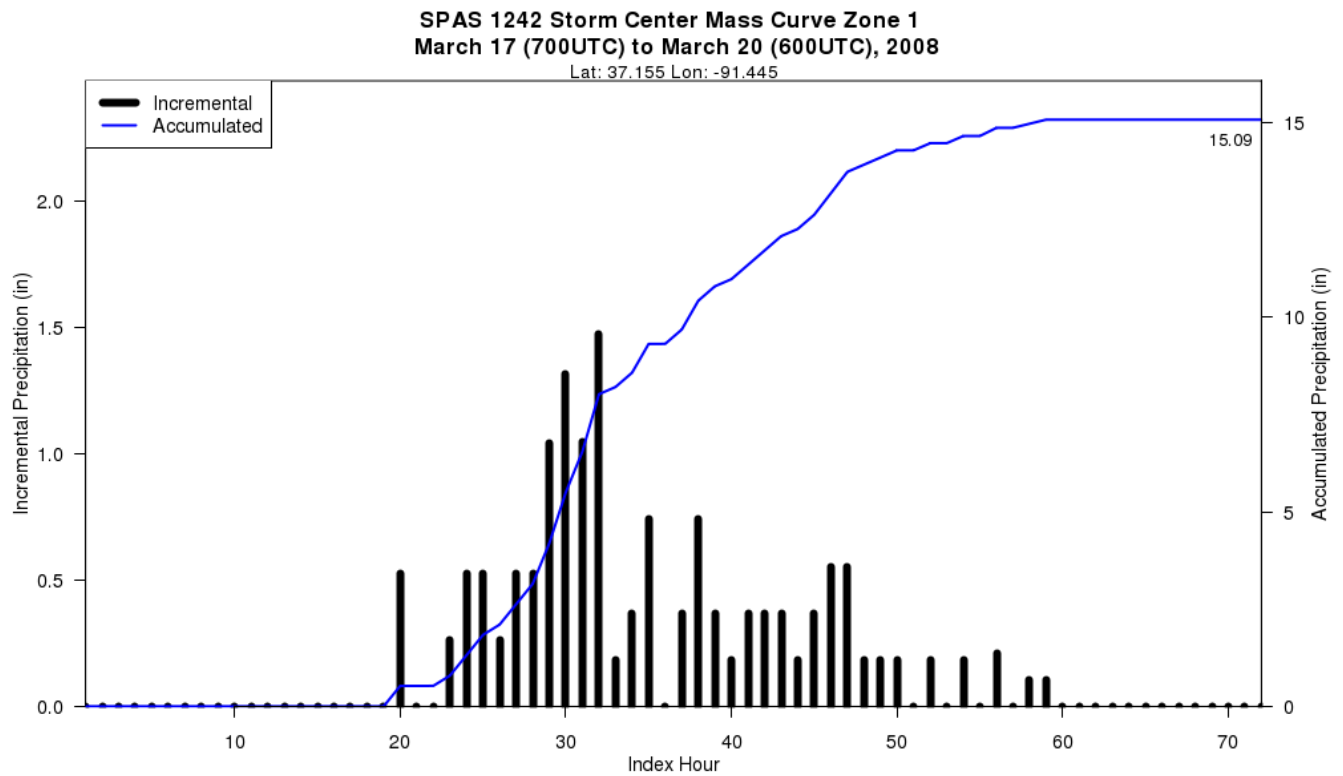


Figure 178: Mass curve chart for Alley Spring, MO March 2008

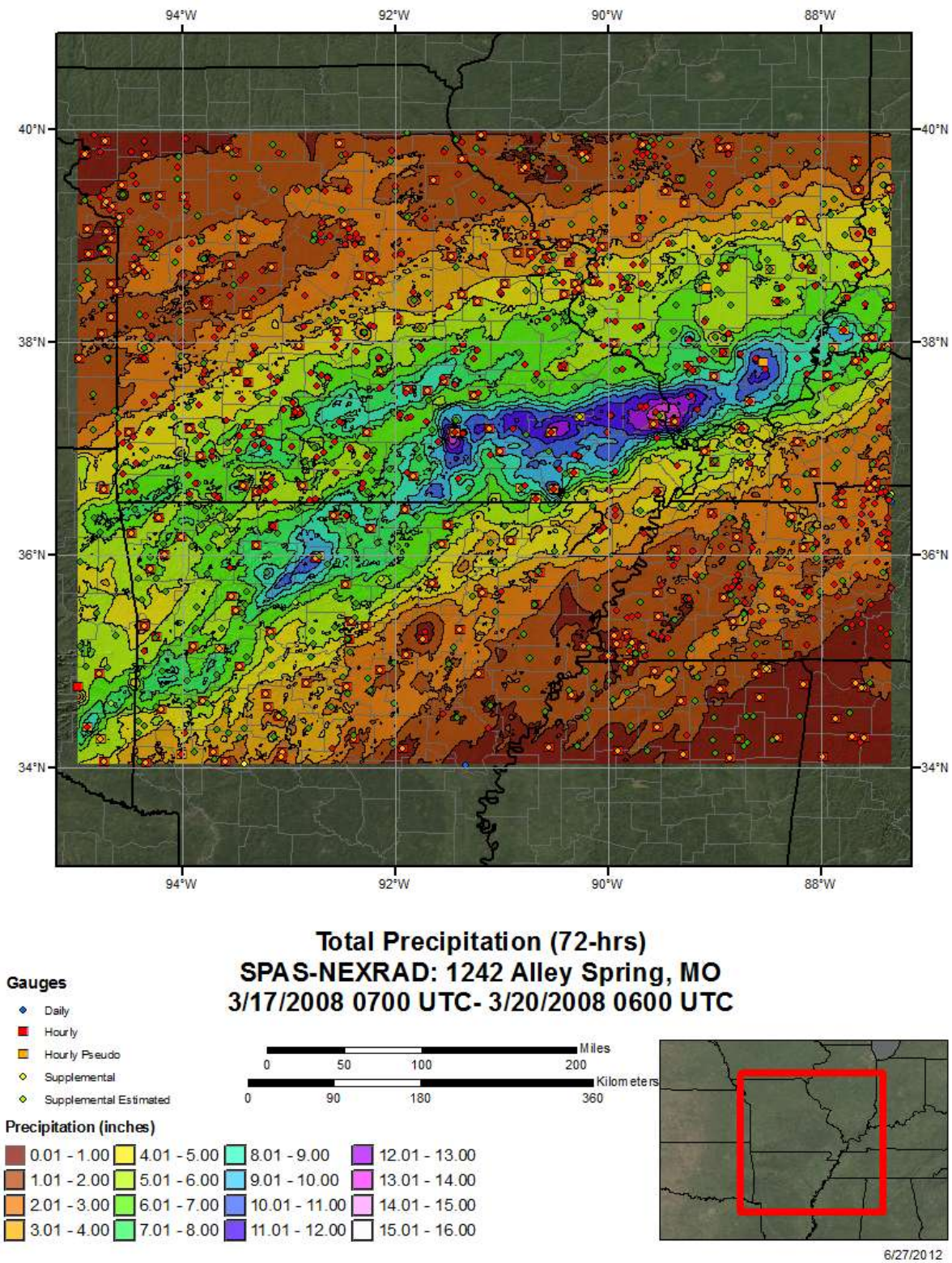


Figure 179: Total storm isohyetal analysis for Alley Spring, MO March 2008

NOAA HYSPLIT MODEL
 Backward trajectories ending at 1200 UTC 18 Mar 08
 CDC1 Meteorological Data

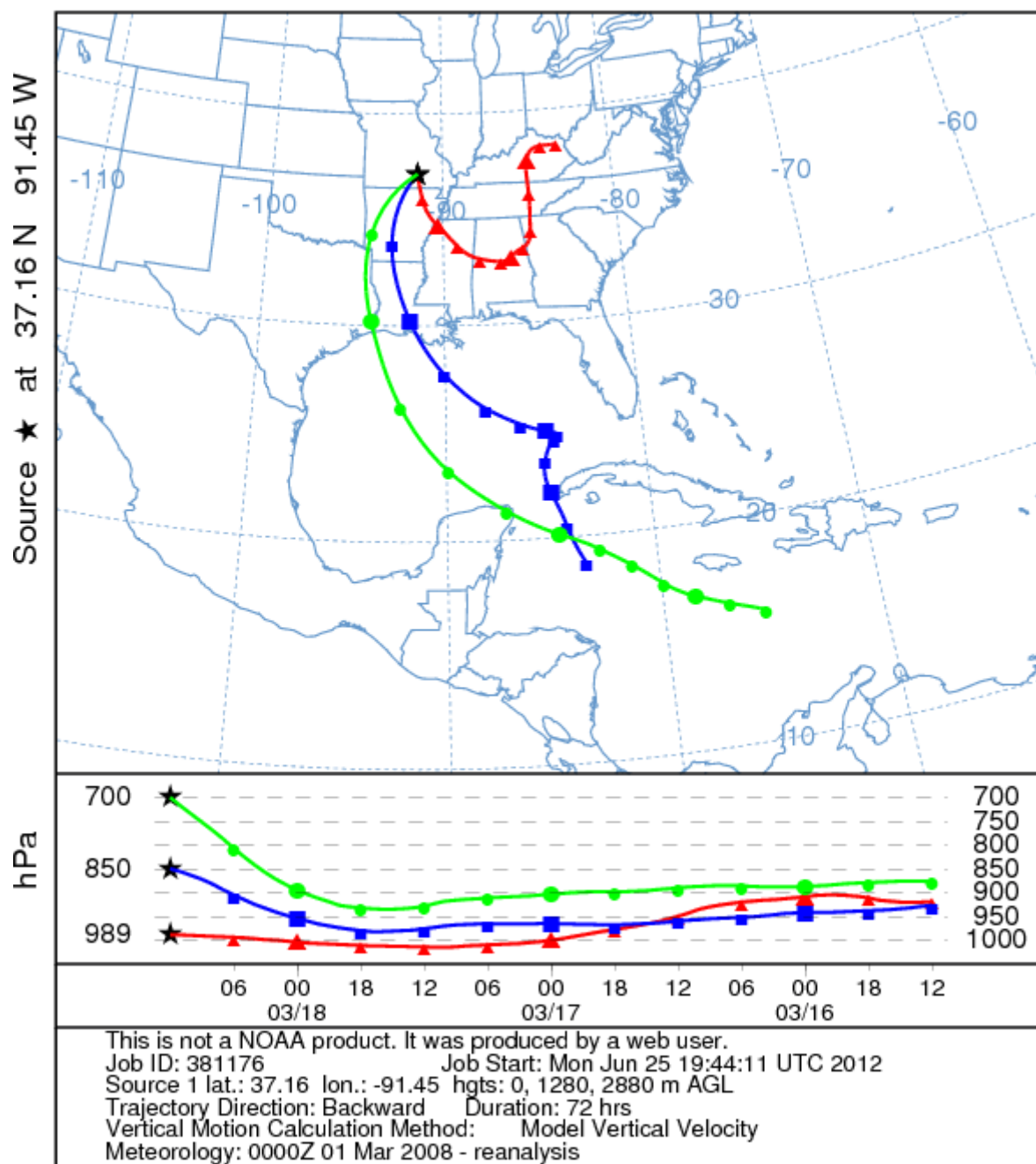


Figure 180: HYSPLIT trajectory analysis at Surface, 850mb and 700mb for Alley Spring, MO March 2008

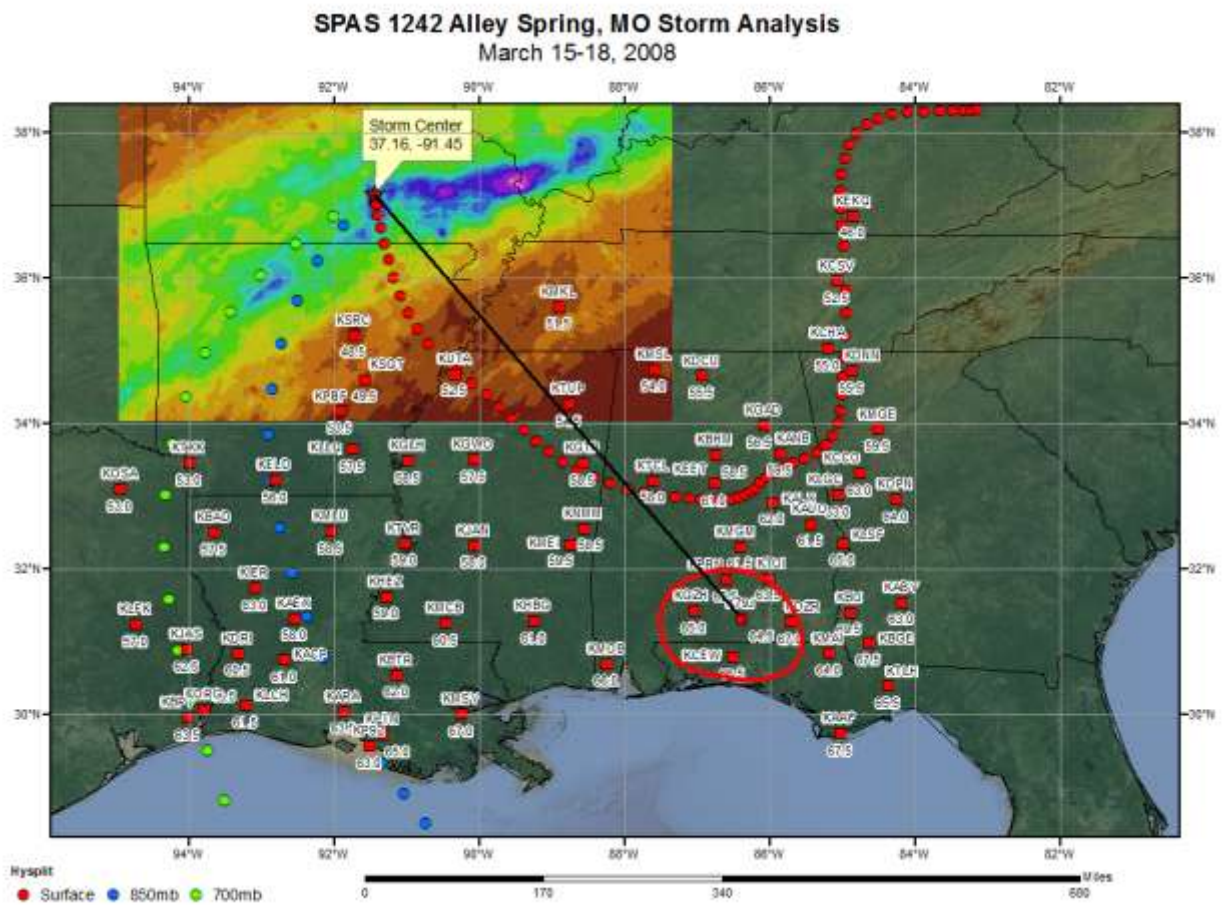


Figure 181: In-place storm representative dew point analysis for Alley Spring, MO March 15-18, 2008

Storm Precipitation Analysis System (SPAS) For Storm #1218

General Storm Location: Northwestern Georgia and portions of adjacent states

Storm Dates: September 19-22, 2009

Event: Thunderstorm

DAD Zone 1 (southern center)

Latitude: 33.87

Longitude: -84.76

Max. Grid Rainfall Amount: 25.37" (full storm period)

Max. Observed Rainfall Amount: 21.03" (24-hr total)

Number of Stations: 447 (59 Daily, 48 Hourly, 0 Hourly Estimated, 0 Hourly Estimated Pseudo, 62 Hourly Pseudo, 272 Supplemental, and 6 Supplemental Estimated)

SPAS Version: 8.5

Base Map Used: PRISM Mean (1971-2000) September precipitation

Spatial resolution: 36 seconds (~ 0.39 mi²)

Radar Included: Yes

Depth-Area-Duration (DAD) analysis: Yes

Reliability of results: Given the unblocked, clean and QC'ed radar data coupled with extensive gauge data, we have a very high degree of confidence in the results, particularly in DAD zone 1. We have slightly less confidence in the DAD results for Zone 2 given fewer stations sampled the peak rainfall center.

SPAS Storm ID	NAME	LON	LAT	ELEV Round	Storm Representative				Climatological Maximum				IPMF
					T _g	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	T _g	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	
1218_1	DOUGLASVILLE	-84.760	33.870	900	76.00	2.99"	0.23"	2.760	77.5	3.22"	0.25"	2.970	1.08

Storm 1218 - September 19 (1300 UTC) - September 22 (1200 UTC), 2009											
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)											
Area (mi ²)	Duration (hours)										
	1	2	3	6	12	18	24	36	48	72	Total
0.4	5.94	8.82	12.98	17.36	20.31	21.07	22.82	23.83	24.95	25.37	25.37
1	5.87	8.49	12.53	17.14	20.06	20.69	22.24	23.55	24.69	25.10	25.10
10	4.89	7.22	10.34	14.92	18.82	19.25	20.85	22.80	23.91	24.34	24.34
25	4.10	6.42	9.02	13.03	17.75	18.29	20.24	22.25	23.21	23.67	23.67
50	3.41	5.70	7.90	11.87	16.82	17.60	19.63	21.53	22.39	22.89	22.89
100	2.75	5.01	6.72	10.55	15.59	16.53	18.80	20.50	21.19	21.74	21.74
150	2.46	4.51	6.03	9.74	14.75	15.77	18.02	19.69	20.35	20.91	20.91
200	2.32	4.11	5.58	9.19	14.02	15.17	17.29	18.94	19.58	20.15	20.15
300	2.15	3.57	5.01	8.26	12.83	14.07	16.17	17.73	18.30	18.90	18.90
400	2.00	3.38	4.65	7.70	11.87	13.10	15.24	16.64	17.20	17.89	17.89
500	1.87	3.24	4.31	7.17	10.99	12.29	14.38	15.82	16.37	17.07	17.07
1,000	1.46	2.66	3.33	5.45	8.26	9.77	11.70	12.93	13.52	14.36	14.36
2,000	1.06	2.01	2.61	3.78	5.68	7.67	9.13	10.29	10.96	11.79	11.79
3,500	0.74	1.46	1.99	2.85	4.02	6.05	7.18	8.35	9.03	9.87	9.87
5,000	0.57	1.10	1.61	2.42	3.16	5.13	6.04	7.06	7.71	8.74	8.74
7,500	0.42	0.80	1.17	1.86	2.48	3.98	4.78	5.67	6.17	7.18	7.18
10,000	0.33	0.64	0.94	1.48	2.01	3.26	3.91	4.61	5.02	6.09	6.09
10,922	0.31	0.59	0.87	1.37	1.89	3.06	3.68	4.33	4.71	5.72	5.72

Figure 182: Depth-area-duration values for Douglasville, GA September 2009

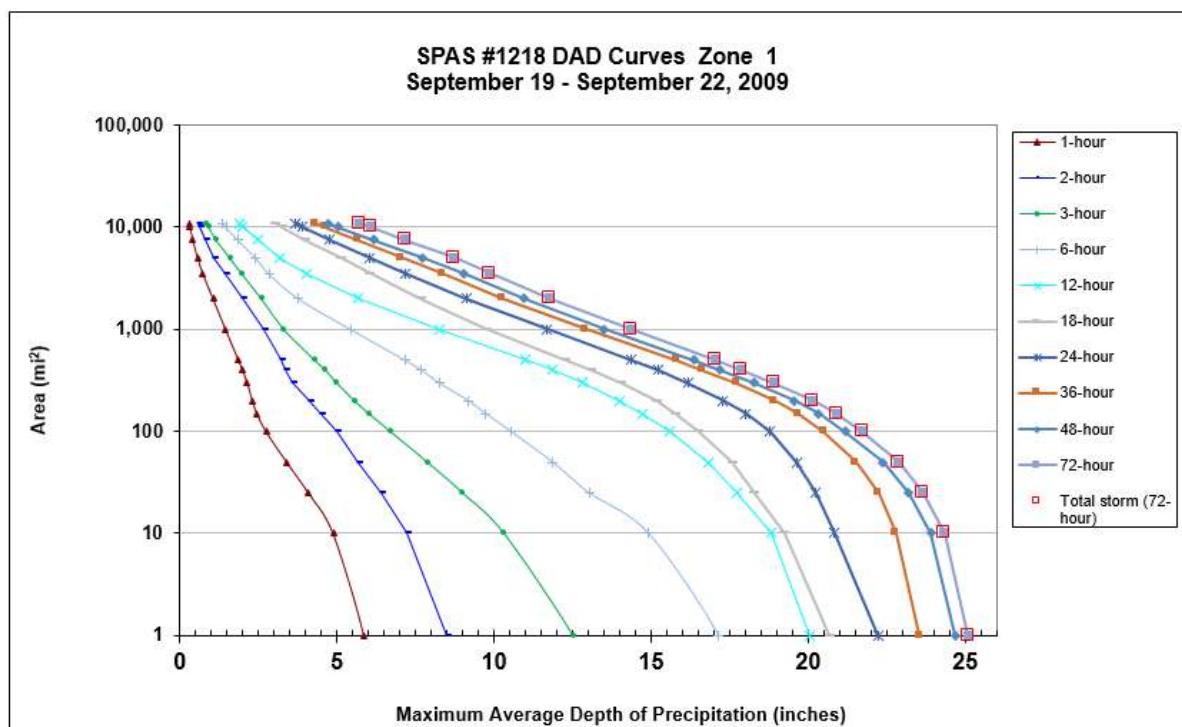


Figure 183: Depth-area-duration chart for Douglasville, GA September 2009

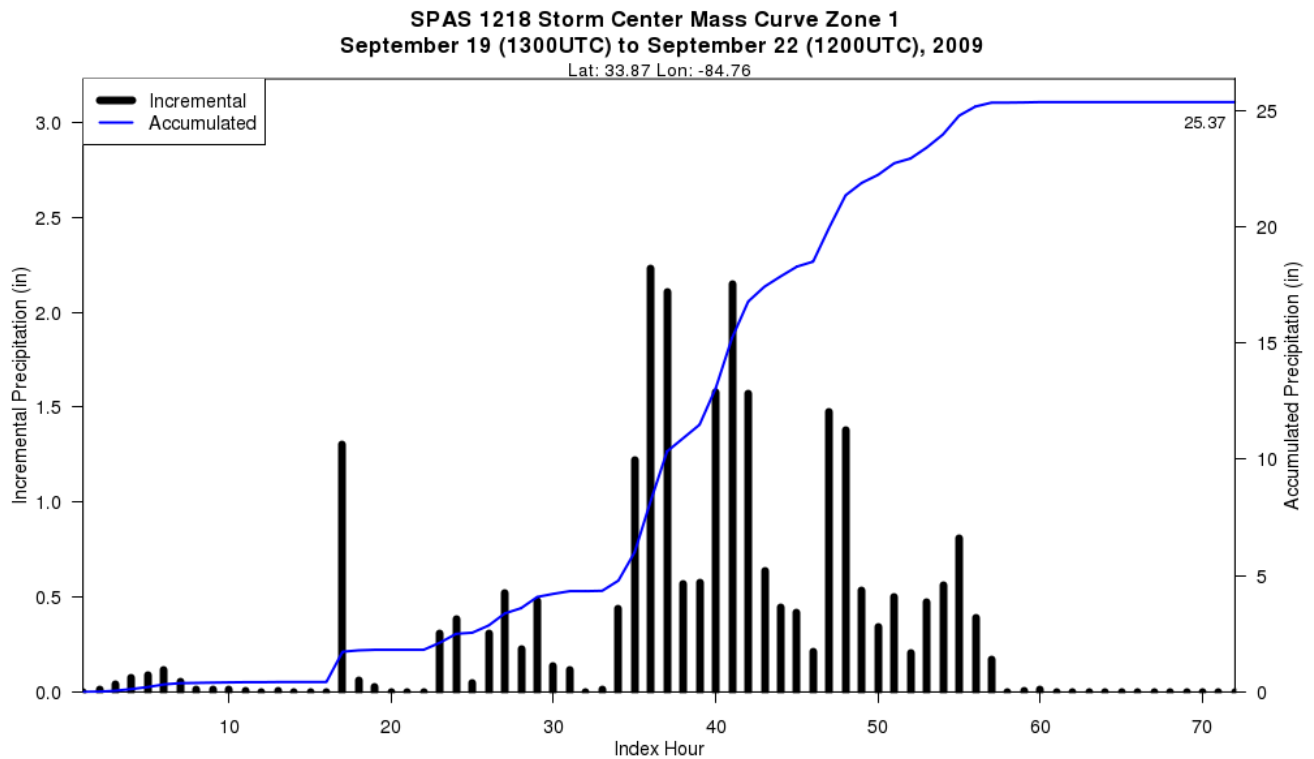
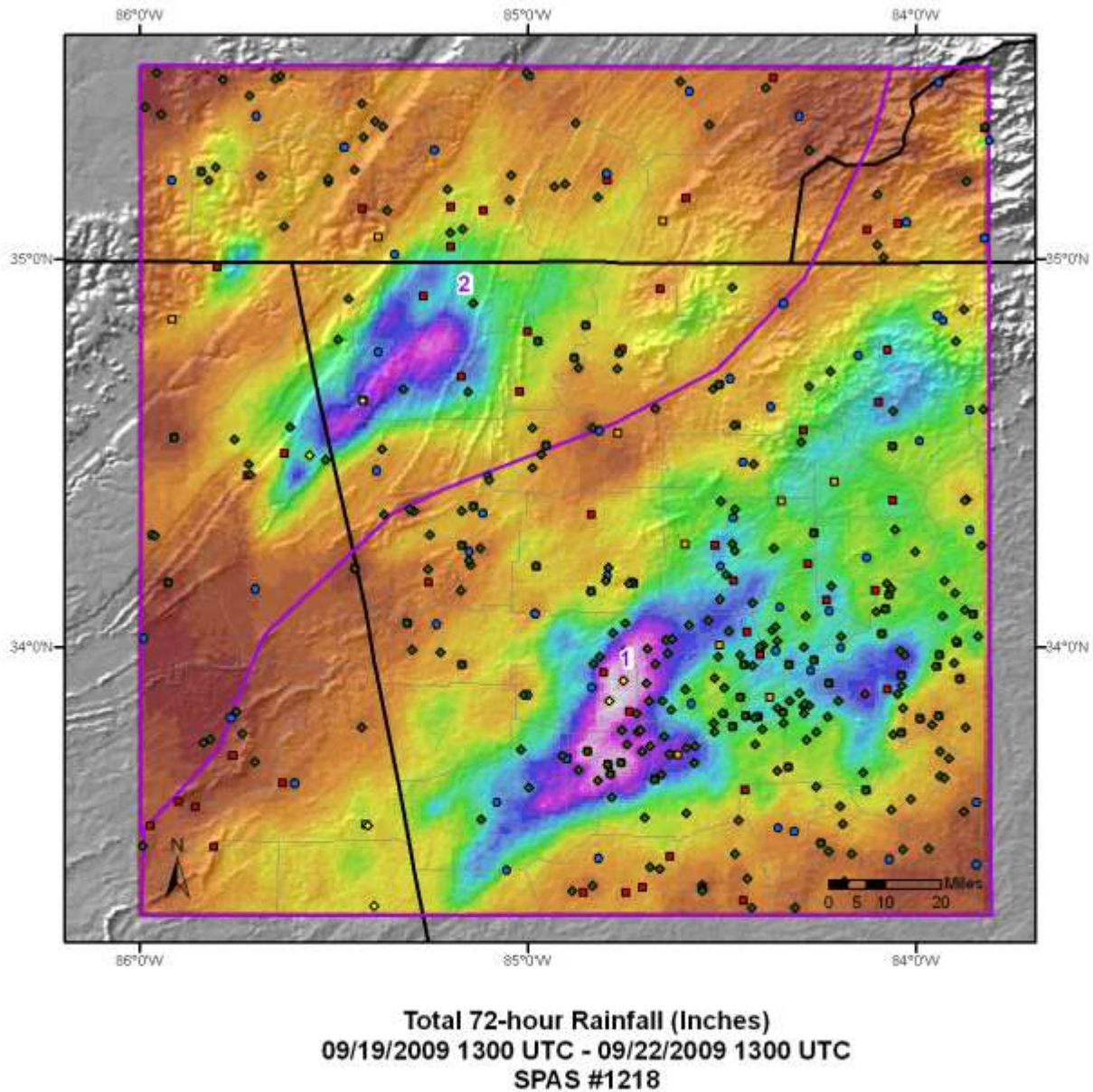


Figure 184: Mass curve chart for Douglasville, GA September 2009



Rainfall in Inches



MEPSTAT
09/09/2011

Figure 185: Total storm isohyetal analysis for Douglasville, GA September 2009

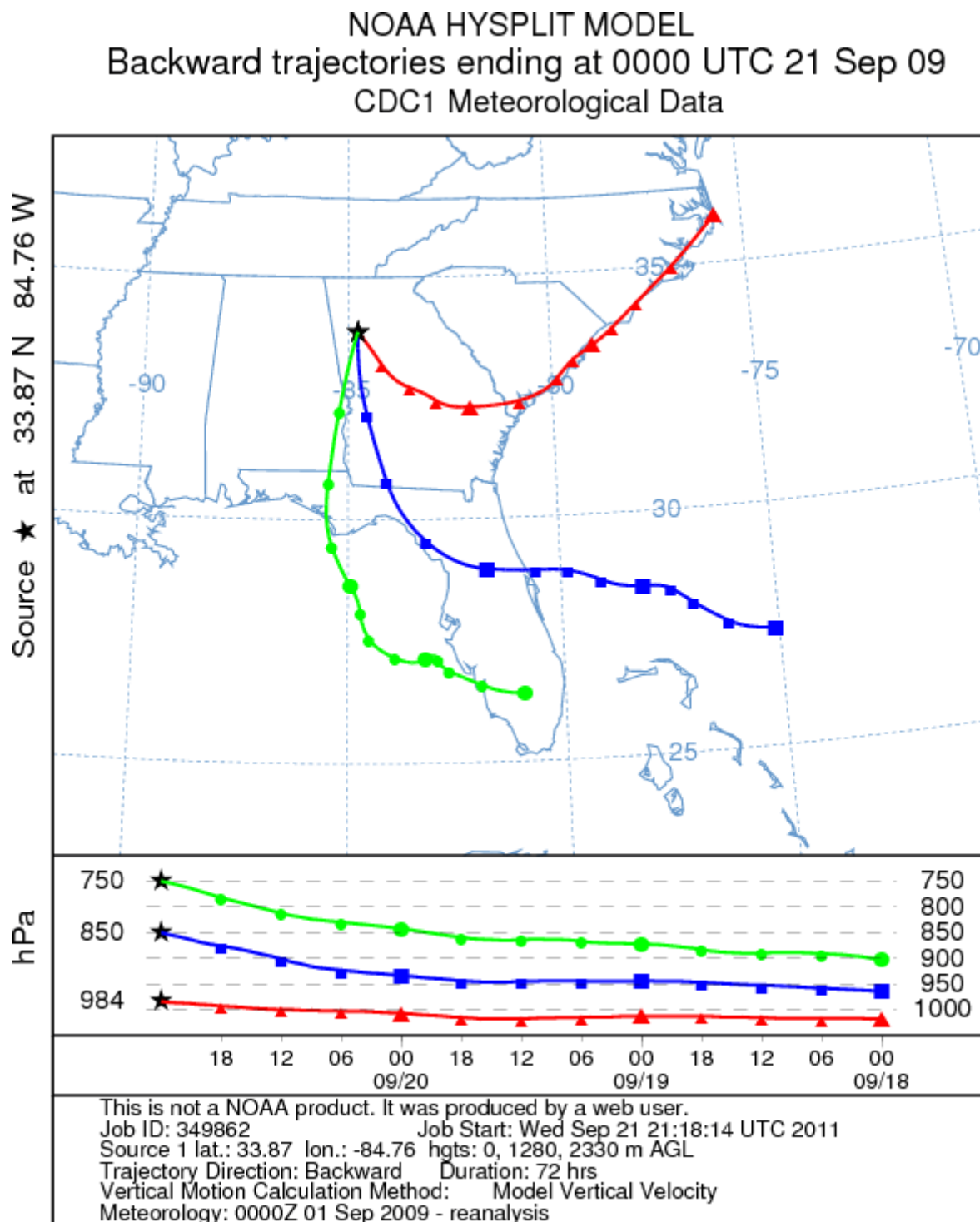
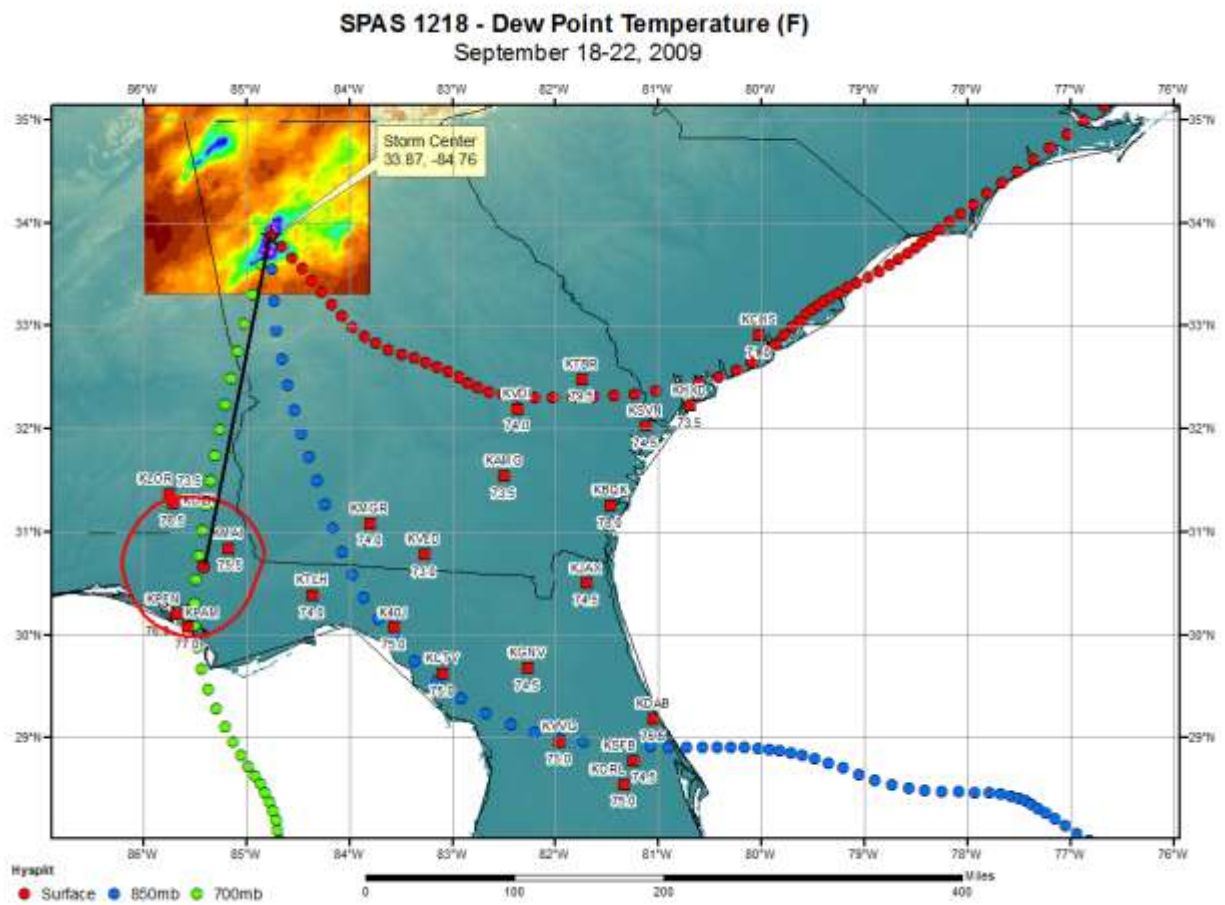


Figure 186: HYSPLIT trajectory analysis at Surface, 850mb and 700mb for Douglasville, GA
September 2009



**Figure 187: In-place storm representative dew point analysis for Douglasville, GA
September 18-22, 2009**

Storm Precipitation Analysis System (SPAS) For Storm #1208

General Storm Location: Western and Central Tennessee, Southwestern Kentucky and adjacent portions of nearby states

Storm Dates: April 30 – May 3, 2010

Event: Synoptic

DAD Zone 1

Latitude: 36.06

Longitude: -86.91

Max. Grid Rainfall Amount: 19.71"

Max. Observed Rainfall Amount: 19.70" at WARNER PARK, TN, followed by 19.51" at USGS SR840 Rain gauge No. 4 near Bending Chestnut, TN followed by 19.41" at CoCoRaHS Camden 4.5 NW, TN.

Number of Stations: 753 (120 Daily, 52 Hourly, 46 Hourly Pseudo, 1 Hourly Estimated Pseudo, 5 Hourly Estimated, 521 Supplemental, and 8 Supplemental Estimated)

SPAS Version: 8.5

Base Map Used: Mean (1971-2000) PRISM May Precipitation

Spatial resolution: 36 seconds (0.39 sq-mi)

Radar Included: Yes

Depth-Area-Duration (DAD) analysis: Yes

Degree of confidence in results: This was a difficult storm to analyze due to the extreme intensities, strong spatial rainfall gradients, large amount of data, relatively low radar reflectivity values across western Tennessee where among the heaviest rains fell. However, given this analysis was based on WDT NEXRAD data and a plethora of gauge data, our confidence in the results is high.

SPAS Storm ID	NAME	LON	LAT	ELEV Round	Storm Representative				Climatological Maximum				IPMF
					T _g	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	T _g	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	
1208_1	WARNER PARK	-86.906	36.061	600	75.00	2.85"	0.15"	2.700	76.5	3.07"	0.16"	2.905	1.08

Storm 1208 - May 1 (0100 UTC) - May 3 (1200 UTC), 2010													
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)													
Area (mi ²)	Duration (hours)												
	1	2	3	4	5	6	12	18	24	36	48	60	Total
0.4	4.63	6.50	8.92	11.04	12.01	15.31	17.77	18.33	18.39	19.35	19.66	19.71	19.71
1	4.59	6.48	8.89	10.99	11.95	15.22	17.69	18.24	18.30	19.24	19.57	19.63	19.63
10	4.44	6.36	8.81	10.73	11.77	14.96	17.44	18.01	18.06	19.03	19.28	19.41	19.41
25	4.29	6.20	8.60	10.42	11.56	14.66	17.18	17.74	17.81	18.87	19.08	19.19	19.19
50	4.04	5.93	8.25	10.09	11.21	14.11	16.69	17.27	17.34	18.67	18.89	18.98	18.98
100	3.72	5.50	7.72	9.51	10.73	13.20	15.89	16.55	16.64	18.30	18.60	18.69	18.69
150	3.58	5.18	7.37	9.17	10.42	12.61	15.35	16.03	16.14	18.00	18.37	18.47	18.47
200	3.43	4.96	7.10	8.89	10.19	12.18	14.98	15.64	15.78	17.77	18.19	18.30	18.30
300	3.16	4.65	6.72	8.45	9.80	11.55	14.45	15.09	15.27	17.43	17.93	18.04	18.04
400	2.96	4.42	6.44	8.08	9.42	11.06	14.07	14.71	14.91	17.18	17.72	17.83	17.83
500	2.80	4.25	6.18	7.74	9.07	10.62	13.73	14.40	14.63	16.99	17.54	17.66	17.66
1,000	2.26	3.65	5.24	6.69	7.80	9.04	12.57	13.29	13.64	16.38	16.92	17.03	17.03
2,000	1.79	3.06	4.19	5.43	6.44	7.50	11.19	12.07	12.63	15.72	16.25	16.35	16.35
3,500	1.55	2.71	3.48	4.50	5.45	6.34	9.96	11.03	11.65	14.98	15.56	15.66	15.66
5,000	1.37	2.44	3.06	3.95	4.85	5.60	9.25	10.29	10.91	14.28	14.89	14.98	14.98
7,500	1.15	2.09	2.71	3.34	4.13	4.72	8.24	9.28	9.90	13.24	13.85	13.95	13.95
10,000	0.99	1.84	2.43	2.94	3.62	4.14	7.41	8.46	9.08	12.39	13.02	13.12	13.12
15,000	0.78	1.49	2.03	2.44	2.99	3.38	6.24	7.29	7.92	11.16	11.87	11.95	11.95
20,000	0.66	1.27	1.77	2.16	2.60	2.94	5.56	6.53	7.16	10.28	11.05	11.14	11.14
35,000	0.44	0.86	1.25	1.60	1.91	2.24	4.19	5.15	5.70	8.39	9.26	9.35	9.35
50,000	0.32	0.62	0.91	1.17	1.41	1.68	3.17	4.08	4.63	6.64	7.63	7.75	7.75
53,737	0.30	0.58	0.85	1.09	1.32	1.57	2.97	3.83	4.34	6.22	7.25	7.38	7.38

Figure 188: Depth-area-duration values for Warner Park, TN May 2010

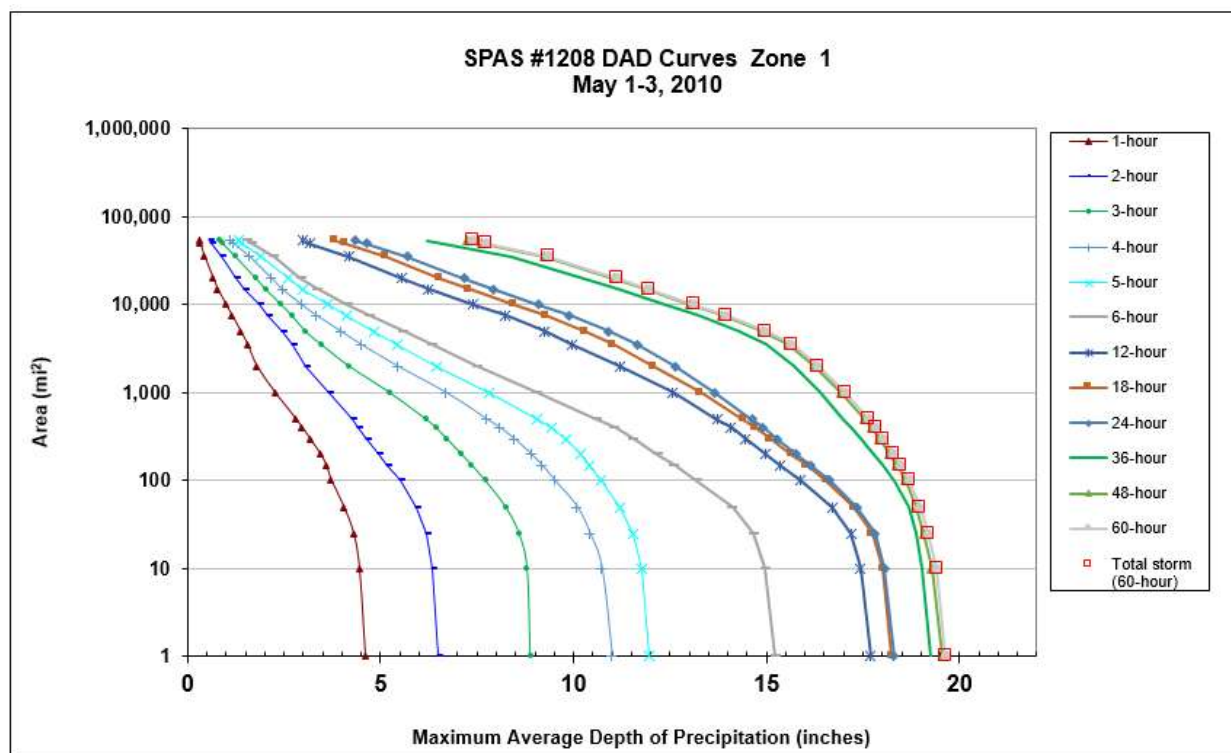


Figure 189: Depth-area-duration chart for Warner Park, TN May 2010

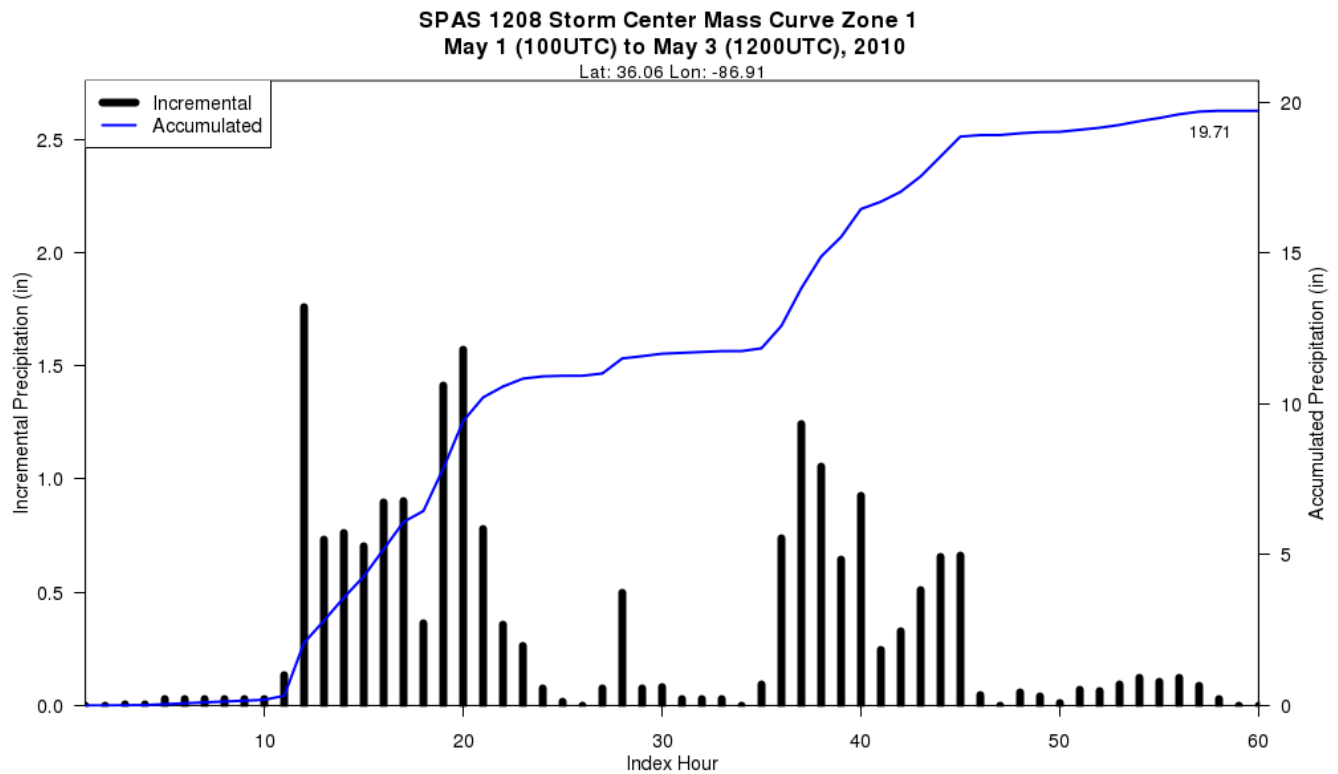


Figure 190: Mass curve chart for Warner Park, TN May 2010

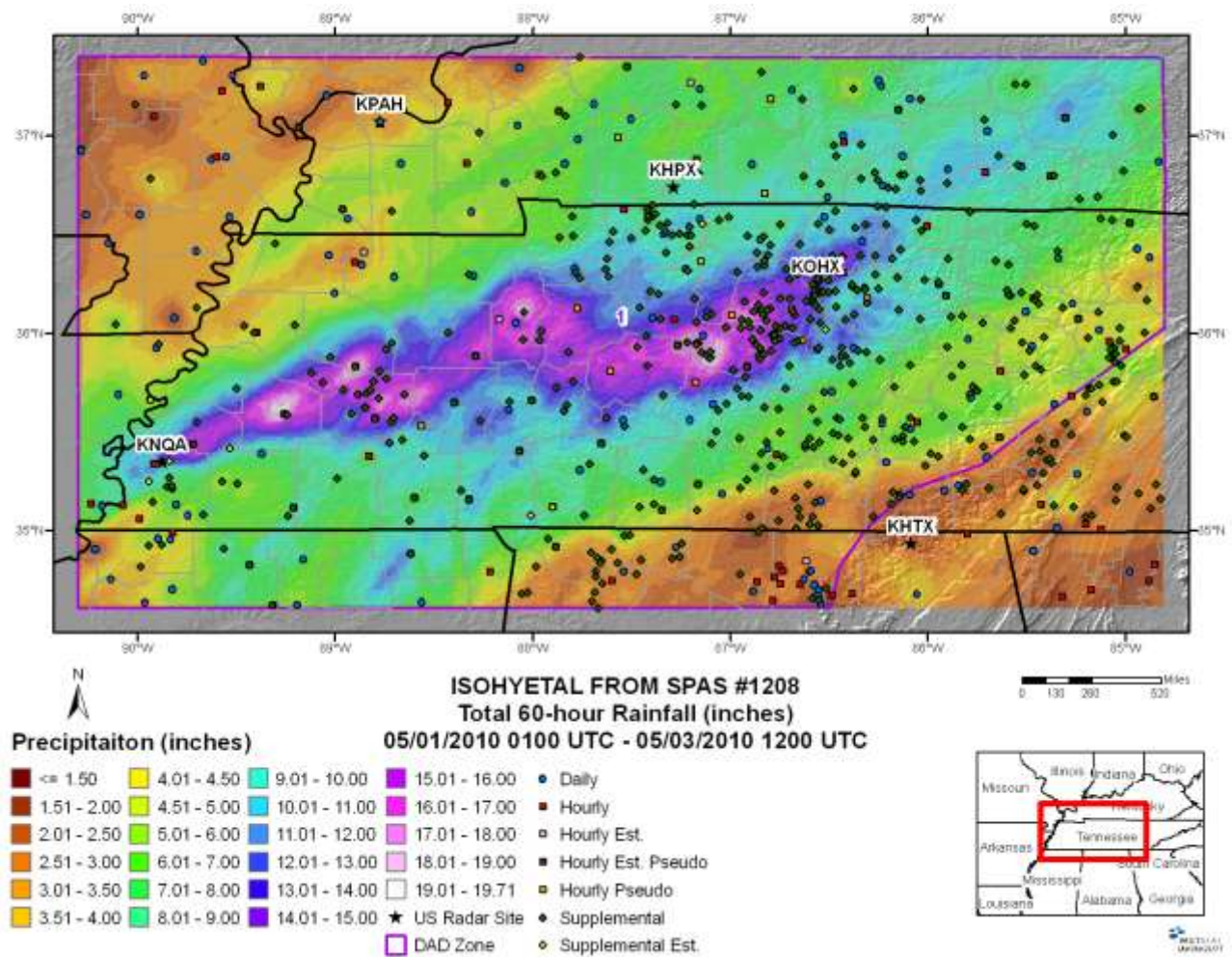


Figure 191: Total storm isohyetal analysis for Warner Park, TN May 2010

NOAA HYSPLIT MODEL
 Backward trajectories ending at 2300 UTC 01 May 10
 CDC1 Meteorological Data

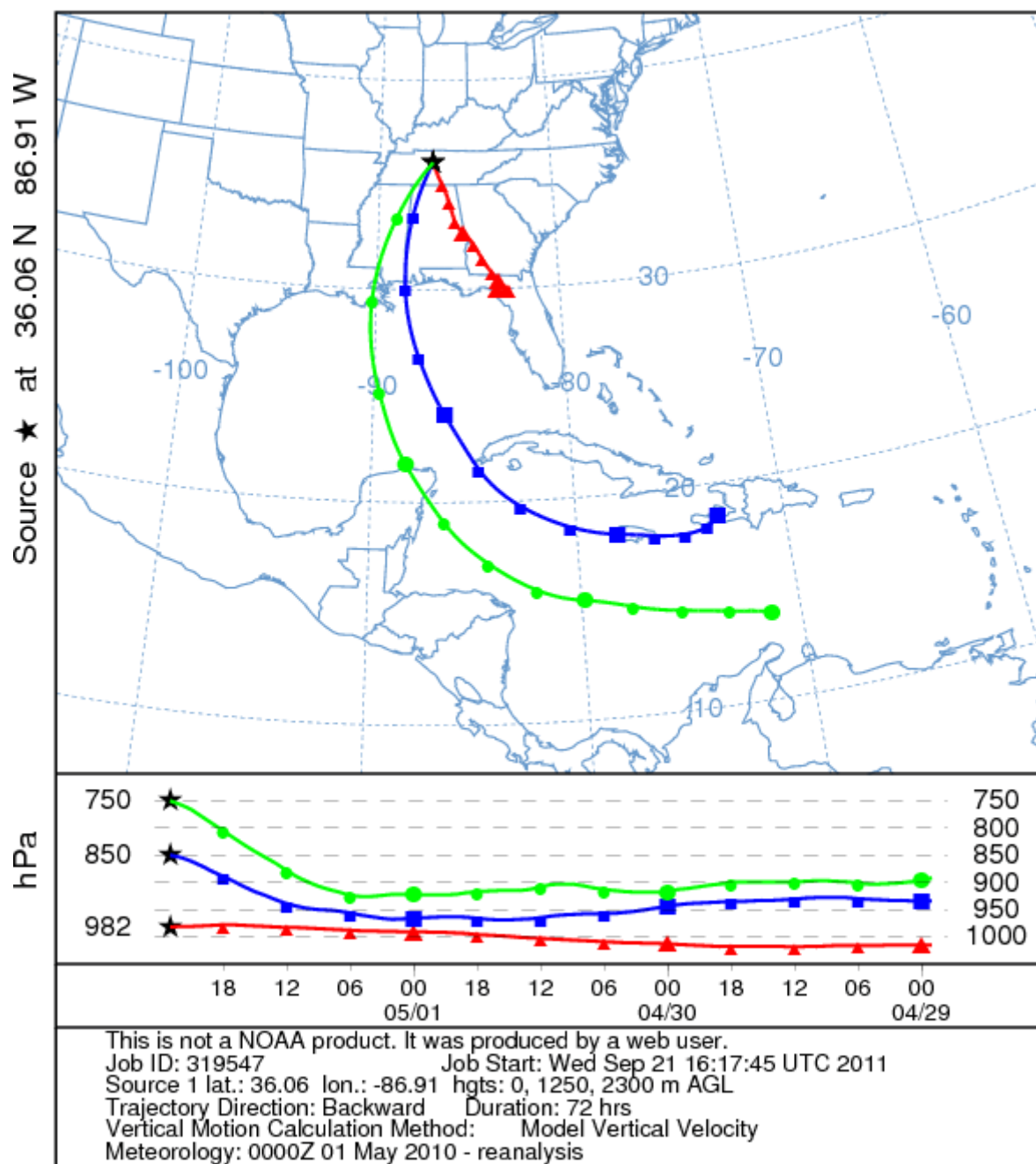


Figure 192: HYSPLIT trajectory analysis at Surface, 850mb and 700mb for Warner Park, TN May 2010

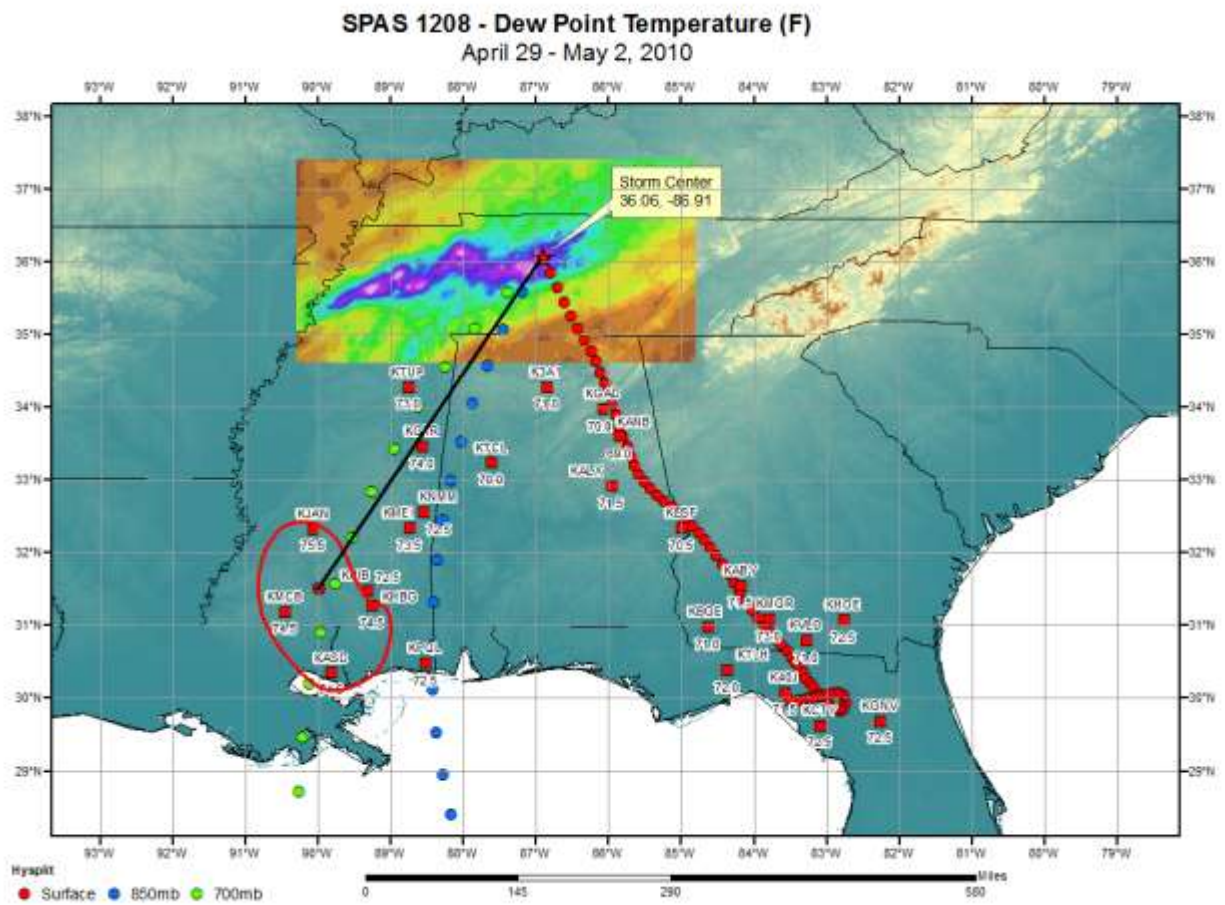


Figure 193: In-place storm representative dew point analysis for Warner Park, TN April 29 – May 2, 2010

Storm Precipitation Analysis System (SPAS) For Storm #1530

General Storm Location: Guadalupe Pass, TX (37.0, -108.0, 30.0, -102.0)

Storm Dates: September 10-14, 2013 (84-hours)

Event: Synoptic

DAD Zone 1

Latitude: 32.035

Longitude: -104.555

Max. Grid Rainfall Amount: 18.34"

Max. Observed Rainfall Amount: 15.76" Guadalupe Pass, TX

DAD Zone 2

Latitude: 34.595

Longitude: -104.475

Max. Grid Rainfall Amount: 9.63"

Max. Observed Rainfall Amount: 8.29" Sumner Lake, NM

DAD Zone 3

Latitude: 35.685

Longitude: -105.435

Max. Grid Rainfall Amount: 9.95"

Max. Observed Rainfall Amount: 8.70" Wesner Springs, NM

DAD Zone 4

Latitude: 32.145

Longitude: -105.995

Max. Grid Rainfall Amount: 11.94"

Max. Observed Rainfall Amount: 7.83" Chaparral, NM

Number of Stations: 910

SPAS Version: 10

Base Map Used: us_ppt_in_map_1961_1990_usda_northamerica

Spatial resolution: 00:00:36

Radar Included: Yes

Depth-Area-Duration (DAD) analysis: Yes

Degree of confidence in results: This analysis was based on an abundance of hourly data, daily data, supplemental station data and one hourly estimated station at the storm center. We have a good degree of confidence for the station based storm total results. The spatial pattern is dependent on the basemap (us_ppt_in_map_1961_1990_usda_northamerica). There is a high degree of confidence with the timing based on the several hourly and hourly pseudo stations. Some daily stations were moved to supplemental due to timing issues or removed due to erroneous storm precipitation observations. Additional details can be found in the "Read_Me_1530.docx" file. The Guadalupe Pass hourly station had missing data at the beginning and end of the ippt 144 hour period, but captured the main precipitation event. After consideration and several runs, an hourly estimated pseudo (HEP) station was not used instead of the Guadalupe Pass station.

Due to beam blockage issues, some of the hourly precipitation intensities, at the storm center, were likely high. An hourly estimated (HE) station was created at the SPAS storm center from its mass curve with radar index hours 34, 42, 49 and 52 estimated from nearby stations (see below). Also, a supplemental station was created near the original SPAS created storm center in order to control the overall magnitude of the storm (highest observation near storm center was 15.76 inches; SPAS without supplemental at storm center was about 20 inches due to beam blockage issues). This SPAS storm center supplemental station was set to 17.50 inches (over the radar period), which was the approximate difference between the 20 inch storm center and 15.76 inch highest observation.

SPAS Storm ID	NAME	LON	LAT	ELEV Round	Storm Representative				Climatological Maximum				IPMF
					T _g	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	T _g	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	
1530_1	GUADALUPE PASS	-104.555	32.035	4,000	74.00	2.73"	0.87"	1.860	79.0	3.44"	1.03"	2.410	1.30

Storm 1530 Zone 1 - Sep. 10 (1300 UTC) - Sep. 14 (0000 UTC), 2013														
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)														
areasqmi	Duration (hours)													
	1	2	3	4	5	6	12	18	24	36	48	72	84	Total
0.4	2.27	3.93	5.06	5.89	6.43	7.46	12.05	14.15	15.59	16.76	17.71	18.34	18.34	18.34
1	2.24	3.88	5.00	5.83	6.38	7.41	11.91	14.00	15.42	16.59	17.54	18.15	18.15	18.15
10	2.16	3.63	4.74	5.64	6.28	7.29	11.61	13.65	14.81	15.93	16.83	17.44	17.44	17.44
25	2.13	3.43	4.56	5.56	6.21	7.20	11.52	13.41	14.37	15.52	16.35	16.98	16.98	16.98
50	2.08	3.31	4.40	5.39	6.07	7.00	11.25	13.15	14.07	15.18	15.99	16.62	16.62	16.62
100	1.96	3.12	4.19	5.09	5.84	6.70	11.04	12.74	13.73	14.85	15.63	16.24	16.24	16.24
150	1.85	2.95	4.01	4.89	5.67	6.51	10.88	12.51	13.44	14.54	15.32	15.90	15.90	15.90
200	1.74	2.80	3.86	4.73	5.53	6.33	10.76	12.32	13.22	14.31	15.10	15.65	15.65	15.65
300	1.57	2.60	3.63	4.49	5.29	6.05	10.52	12.08	12.88	13.90	14.73	15.21	15.21	15.21
400	1.45	2.45	3.45	4.30	5.07	5.80	10.30	11.82	12.59	13.56	14.38	14.83	14.83	14.83
500	1.35	2.32	3.29	4.10	4.85	5.59	10.08	11.56	12.27	13.17	13.94	14.40	14.36	14.36
1,000	1.02	1.86	2.62	3.28	3.94	4.60	8.38	9.62	10.27	11.07	11.79	12.21	12.21	12.21
2,000	0.77	1.35	1.90	2.41	2.90	3.44	6.48	7.48	8.09	8.77	9.39	9.75	9.75	9.75
3,500	0.64	1.03	1.48	1.90	2.29	2.66	5.06	5.98	6.57	7.18	7.71	8.01	8.04	8.04
5,000	0.53	0.88	1.25	1.62	1.94	2.23	4.22	5.14	5.71	6.26	6.74	7.01	7.05	7.05
7,500	0.43	0.69	0.99	1.30	1.55	1.79	3.38	4.18	4.65	5.12	5.59	5.84	5.94	5.94
10,000	0.35	0.55	0.80	1.08	1.31	1.52	2.81	3.53	3.98	4.43	4.85	5.07	5.15	5.15
15,000	0.25	0.41	0.60	0.81	0.98	1.14	2.10	2.65	2.99	3.37	3.81	4.02	4.09	4.09
19,842	0.20	0.34	0.49	0.66	0.80	0.93	1.72	2.17	2.45	2.78	3.17	3.33	3.39	3.39

Figure 194: Depth-area-duration values for Guadalupe Pass, TX September 2013

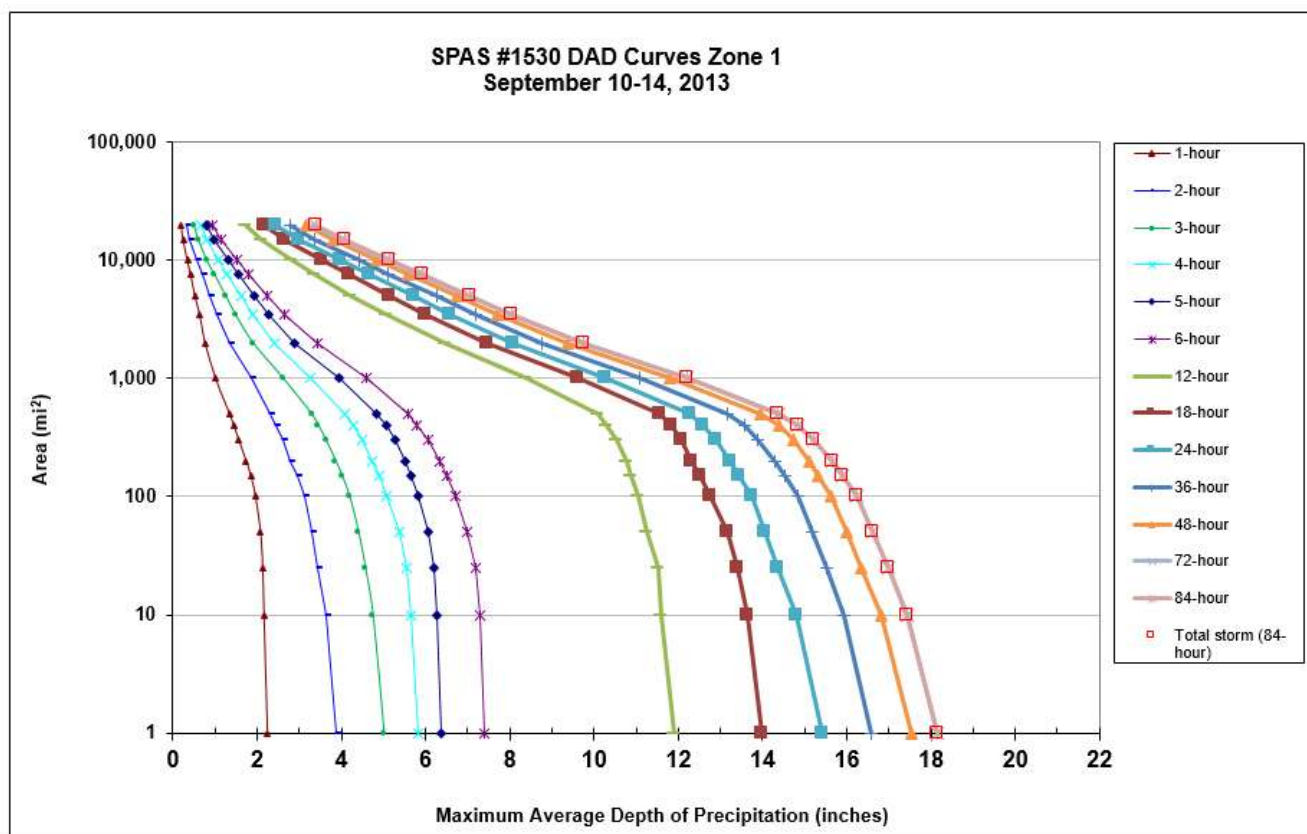


Figure 195: Depth-area-duration chart for Guadalupe Pass, TX September 2013

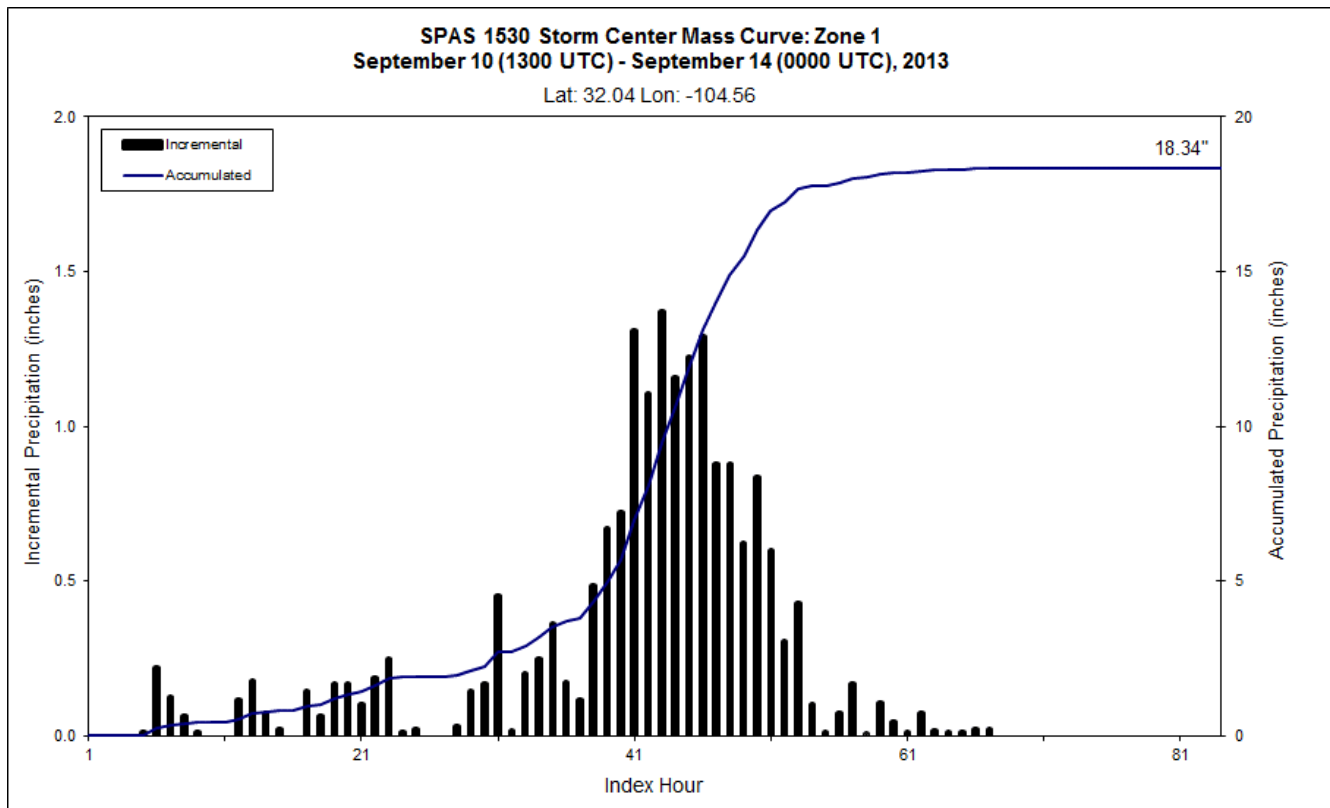


Figure 196: Mass curve chart for Guadalupe Pass, TX September 2013

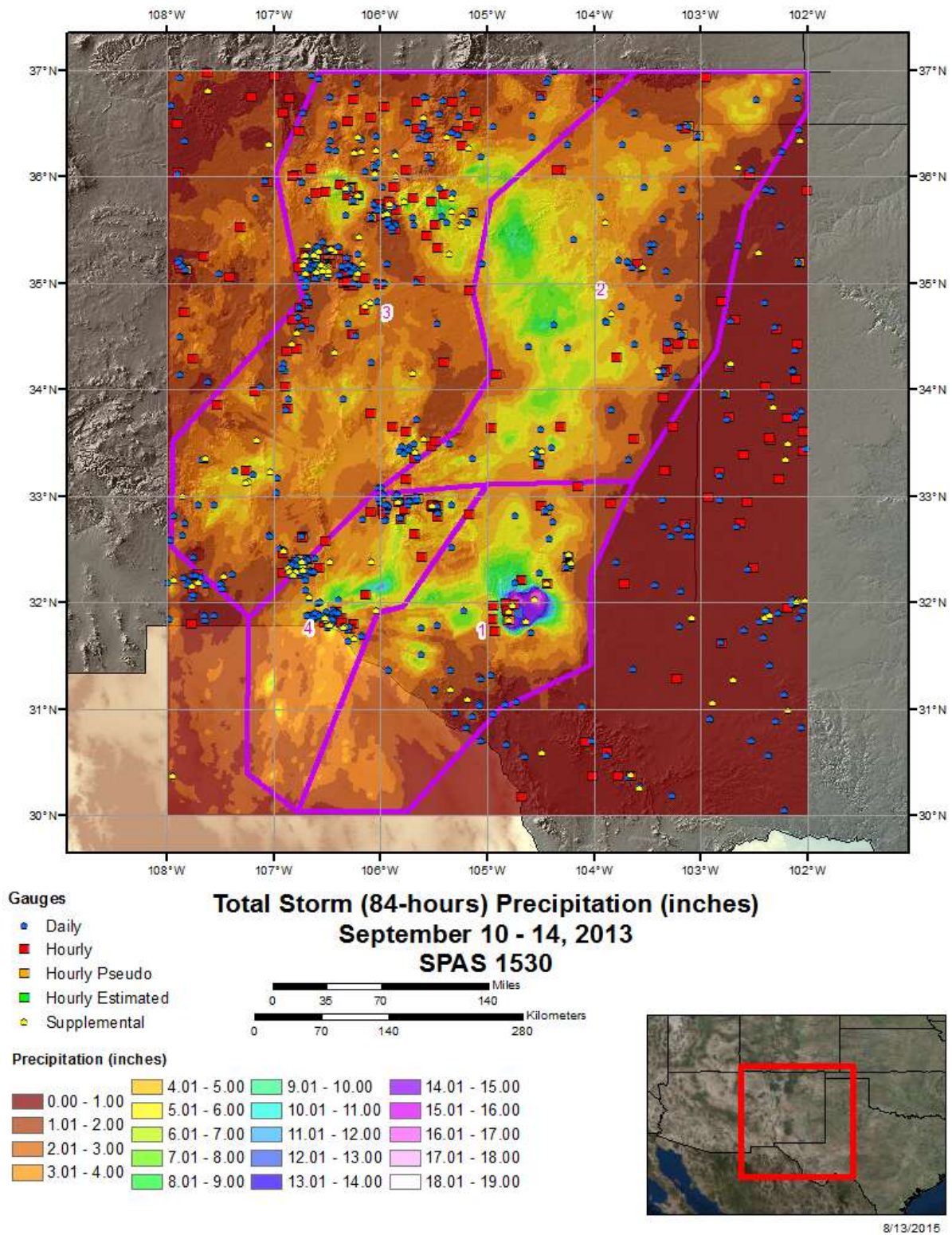


Figure 197: Total storm isohyetal analysis for Guadalupe Pass, TX September 2013

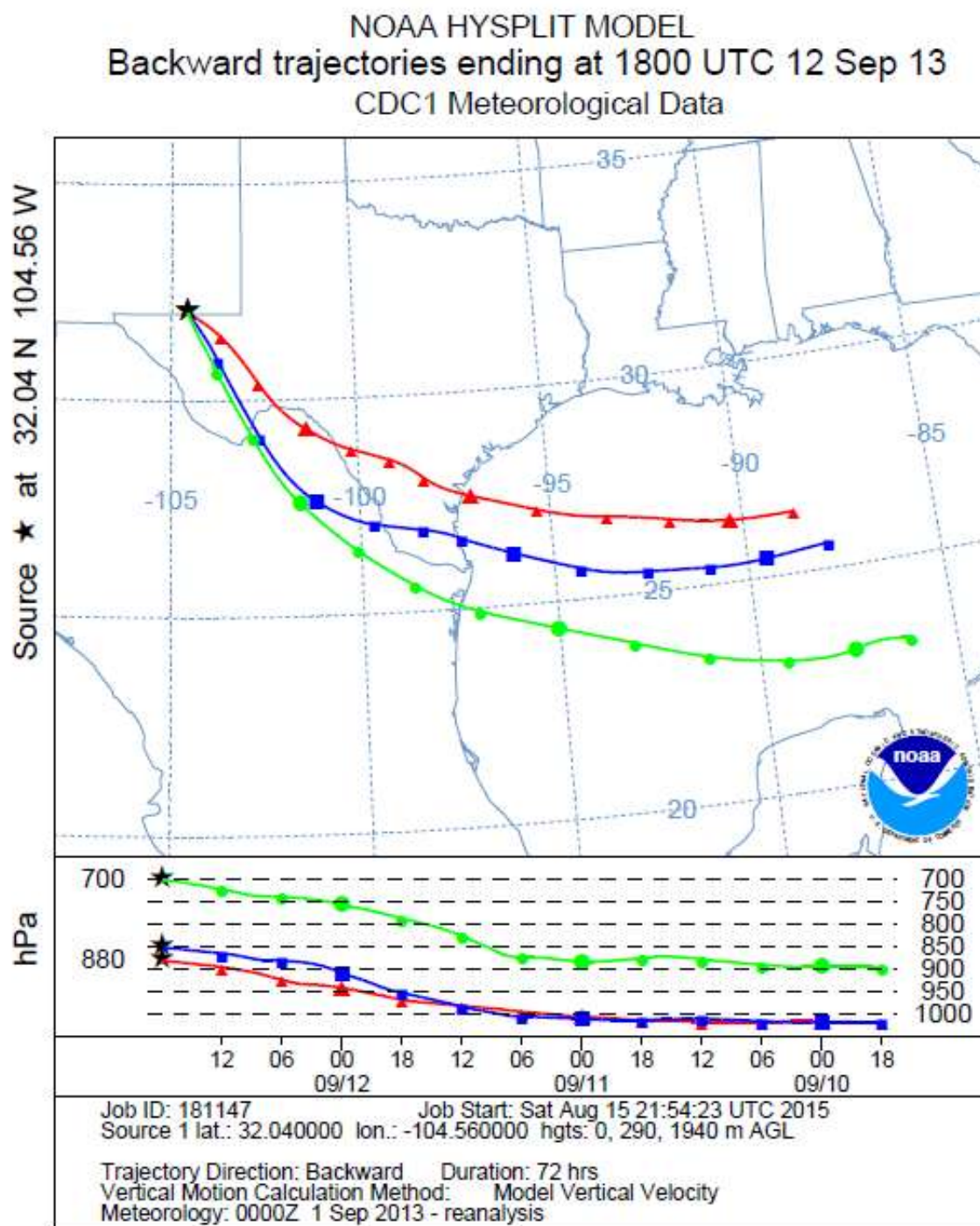
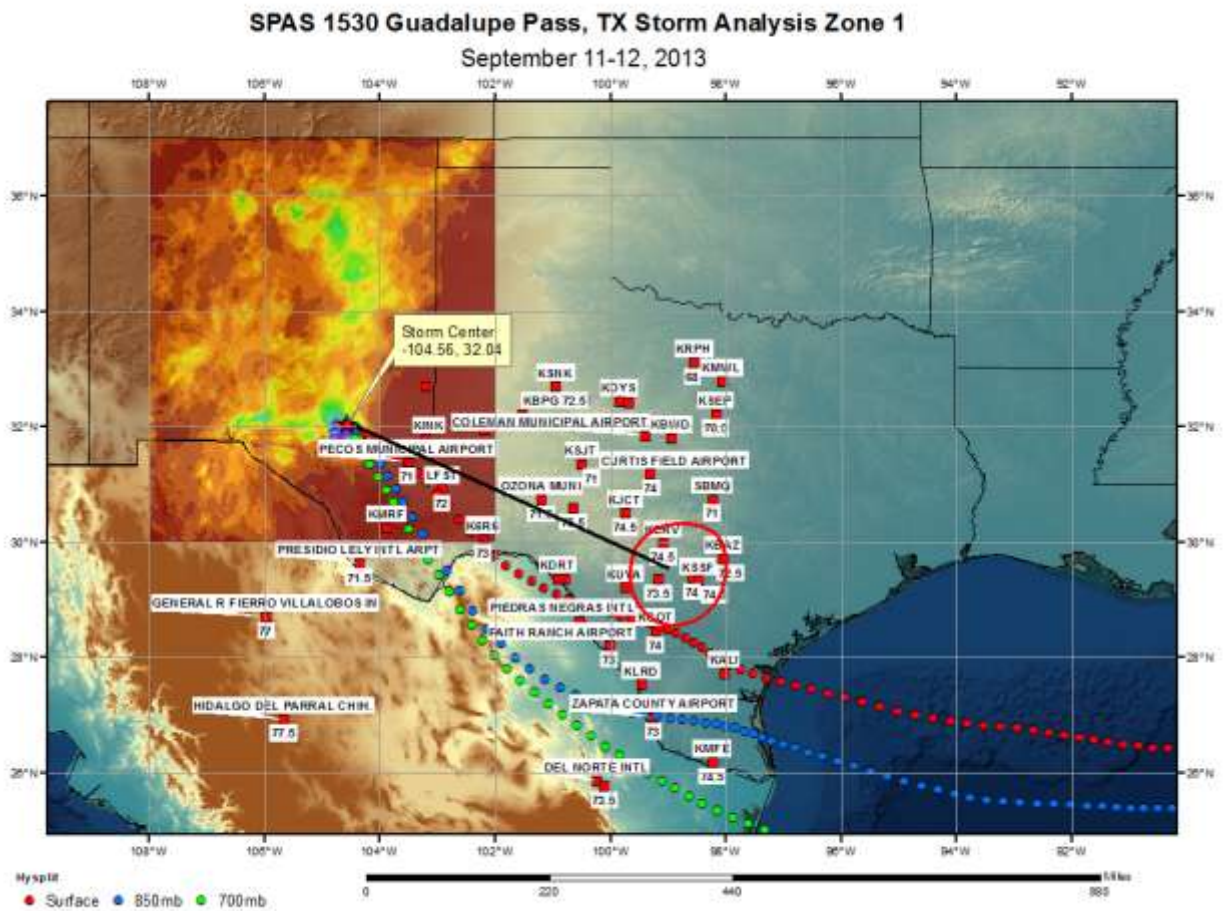


Figure 198: HYSPLIT trajectory analysis at Surface, 850mb and 700mb for Guadalupe Pass, TX
September 2013



**Figure 199: In-place storm representative dew point analysis for Guadalupe Pass, TX
September 11-12, 2013**

Storm Precipitation Analysis System (SPAS) For Storm #1530

General Storm Location: Guadalupe Pass, TX (37.0, -108.0, 30.0, -102.0)

Storm Dates: September 10-14, 2013 (84-hours)

Event: Synoptic

DAD Zone 1

Latitude: 32.035

Longitude: -104.555

Max. Grid Rainfall Amount: 18.34"

Max. Observed Rainfall Amount: 15.76" Guadalupe Pass, TX

DAD Zone 2

Latitude: 34.595

Longitude: -104.475

Max. Grid Rainfall Amount: 9.63"

Max. Observed Rainfall Amount: 8.29" Sumner Lake, NM

DAD Zone 3

Latitude: 35.685

Longitude: -105.435

Max. Grid Rainfall Amount: 9.95"

Max. Observed Rainfall Amount: 8.70" Wesner Springs, NM

DAD Zone 4

Latitude: 32.145

Longitude: -105.995

Max. Grid Rainfall Amount: 11.94"

Max. Observed Rainfall Amount: 7.83" Chaparral, NM

Number of Stations: 910

SPAS Version: 10

Base Map Used: us_ppt_in_map_1961_1990_usda_northamerica

Spatial resolution: 00:00:36

Radar Included: Yes

Depth-Area-Duration (DAD) analysis: Yes

Degree of confidence in results: This analysis was based on an abundance of hourly data, daily data, supplemental station data and one hourly estimated station at the storm center. We have a good degree of confidence for the station based storm total results. The spatial pattern is dependent on the basemap (us_ppt_in_map_1961_1990_usda_northamerica). There is a high degree of confidence with the timing based on the several hourly and hourly pseudo stations. Some daily stations were moved to supplemental due to timing issues or removed due to erroneous storm precipitation observations. Additional details can be found in the "Read_Me_1530.docx" file. The Guadalupe Pass hourly station had missing data at the beginning and end of the ippt 144 hour period, but captured the main precipitation event. After consideration and several runs, an hourly estimated pseudo (HEP) station was not used instead of the Guadalupe Pass station.

Due to beam blockage issues, some of the hourly precipitation intensities, at the storm center, were likely high. An hourly estimated (HE) station was created at the SPAS storm center from its mass curve with radar index hours 34, 42, 49 and 52 estimated from nearby stations (see below). Also, a supplemental station was created near the original SPAS created storm center in order to control the overall magnitude of the storm (highest observation near storm center was 15.76 inches; SPAS without supplemental at storm center was about 20 inches due to beam blockage issues). This SPAS storm center supplemental station was set to 17.50 inches (over the radar period), which was the approximate difference between the 20 inch storm center and 15.76 inch highest observation.

SPAS Storm ID	NAME	LON	LAT	ELEV Round	Storm Representative				Climatological Maximum				IPMF
					T _g	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	T _g	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	
1530_2	SUMNER LAKE	-104.475	34.595	4,300	74.00	2.73"	0.93"	1.800	79.0	3.44"	1.10"	2.340	1.30

Storm 1530 Zone 2 - Sep. 10 (1300 UTC) - Sep. 14 (0000 UTC), 2013														
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)														
areasqmi	Duration (hours)													
	1	2	3	4	5	6	12	18	24	36	48	72	84	Total
0.4	1.78	2.89	3.10	3.20	3.30	3.38	5.02	5.91	6.31	8.53	9.27	9.40	9.63	9.63
1	1.77	2.86	3.07	3.17	3.27	3.35	4.98	5.86	6.25	8.46	9.19	9.33	9.56	9.56
10	1.71	2.73	2.93	3.03	3.13	3.21	4.82	5.68	6.11	8.25	8.97	9.12	9.39	9.39
25	1.65	2.56	2.76	2.86	2.97	3.04	4.55	5.39	6.02	8.01	8.69	8.99	9.33	9.33
50	1.58	2.39	2.60	2.71	2.83	2.92	4.24	5.11	5.94	7.78	8.44	8.94	9.22	9.22
100	1.47	2.20	2.44	2.57	2.70	2.80	3.97	5.03	5.79	7.56	8.19	8.78	9.09	9.09
150	1.37	2.09	2.36	2.48	2.62	2.72	3.87	4.95	5.70	7.41	8.01	8.68	9.01	9.01
200	1.32	2.02	2.30	2.41	2.56	2.66	3.83	4.90	5.61	7.30	7.89	8.62	8.93	8.93
300	1.23	1.90	2.21	2.31	2.47	2.56	3.75	4.79	5.48	7.15	7.70	8.45	8.78	8.78
400	1.17	1.82	2.13	2.24	2.39	2.48	3.67	4.71	5.39	7.03	7.57	8.29	8.66	8.66
500	1.12	1.76	2.06	2.16	2.33	2.42	3.61	4.63	5.31	6.95	7.47	8.15	8.53	8.53
1,000	0.96	1.55	1.84	1.96	2.10	2.25	3.36	4.34	5.06	6.64	7.14	7.71	8.08	8.08
2,000	0.79	1.35	1.61	1.74	1.88	2.05	3.05	3.99	4.74	6.25	6.73	7.25	7.56	7.56
3,500	0.65	1.18	1.41	1.54	1.68	1.86	2.83	3.69	4.44	5.85	6.29	6.76	7.03	7.03
5,000	0.56	1.05	1.26	1.40	1.53	1.72	2.66	3.51	4.21	5.53	5.94	6.40	6.62	6.62
7,500	0.47	0.90	1.08	1.21	1.34	1.53	2.49	3.31	3.93	5.12	5.53	5.95	6.16	6.16
10,000	0.40	0.78	0.94	1.08	1.21	1.37	2.32	3.11	3.67	4.79	5.17	5.58	5.77	5.77
15,000	0.33	0.62	0.77	0.88	1.00	1.13	2.05	2.76	3.25	4.22	4.60	5.03	5.20	5.20
20,000	0.26	0.50	0.64	0.75	0.86	0.95	1.80	2.46	2.91	3.76	4.17	4.57	4.73	4.73
33,053	0.17	0.34	0.43	0.51	0.59	0.66	1.27	1.8	2.13	2.79	3.13	3.43	3.55	3.55

Figure 200: Depth-area-duration chart for Sumner Lake, NM September 2013

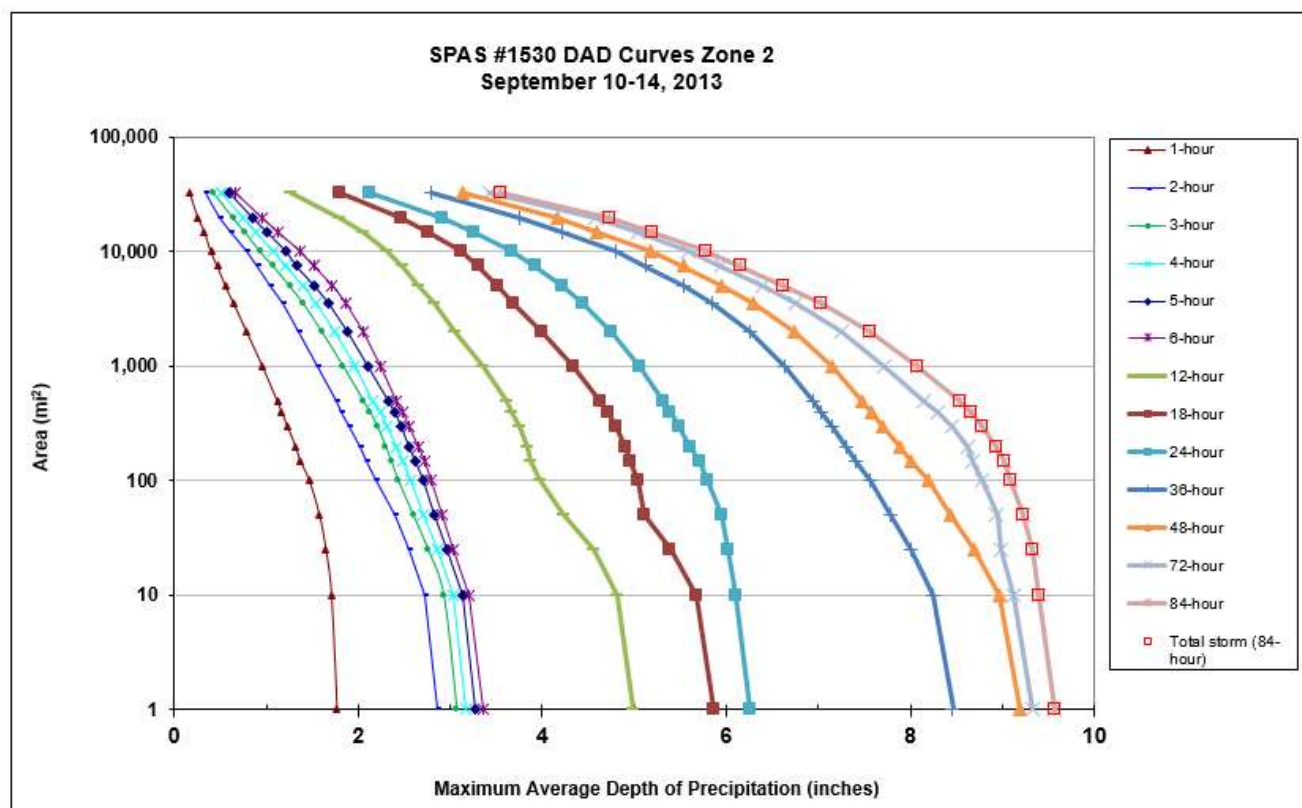


Figure 201: Depth-area-duration chart for Sumner Lake, NM September 2013

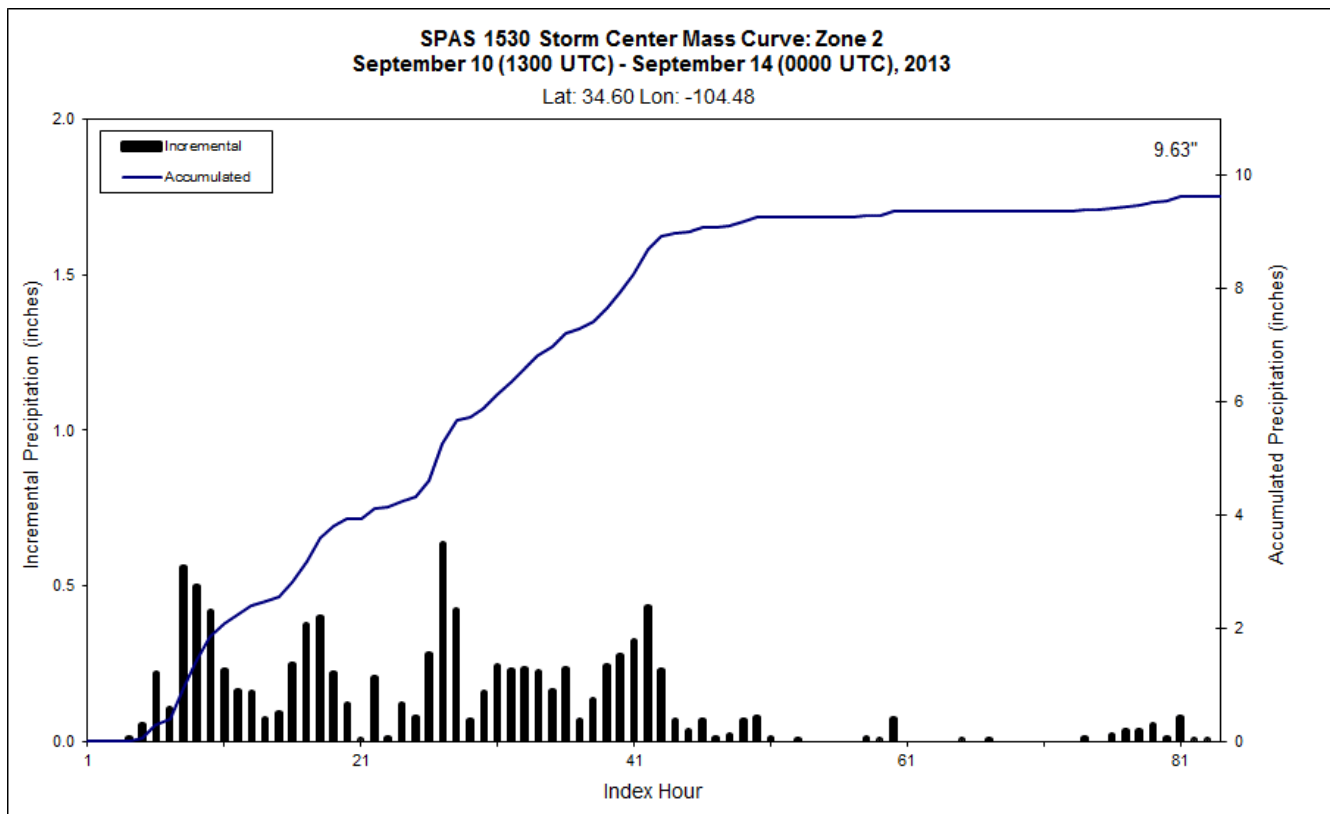


Figure 202: Mass curve chart for Sumner Lake, NM September 2013

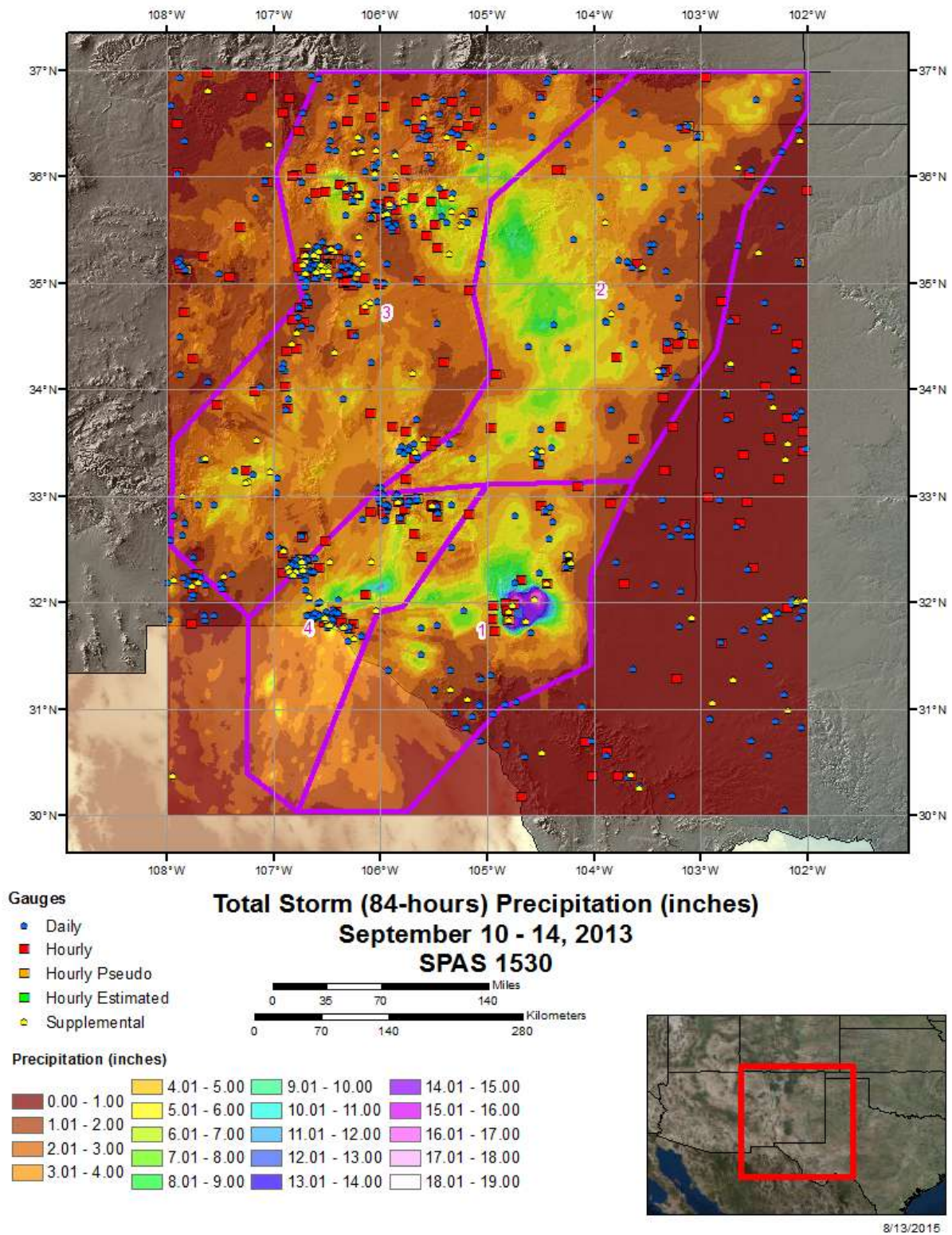
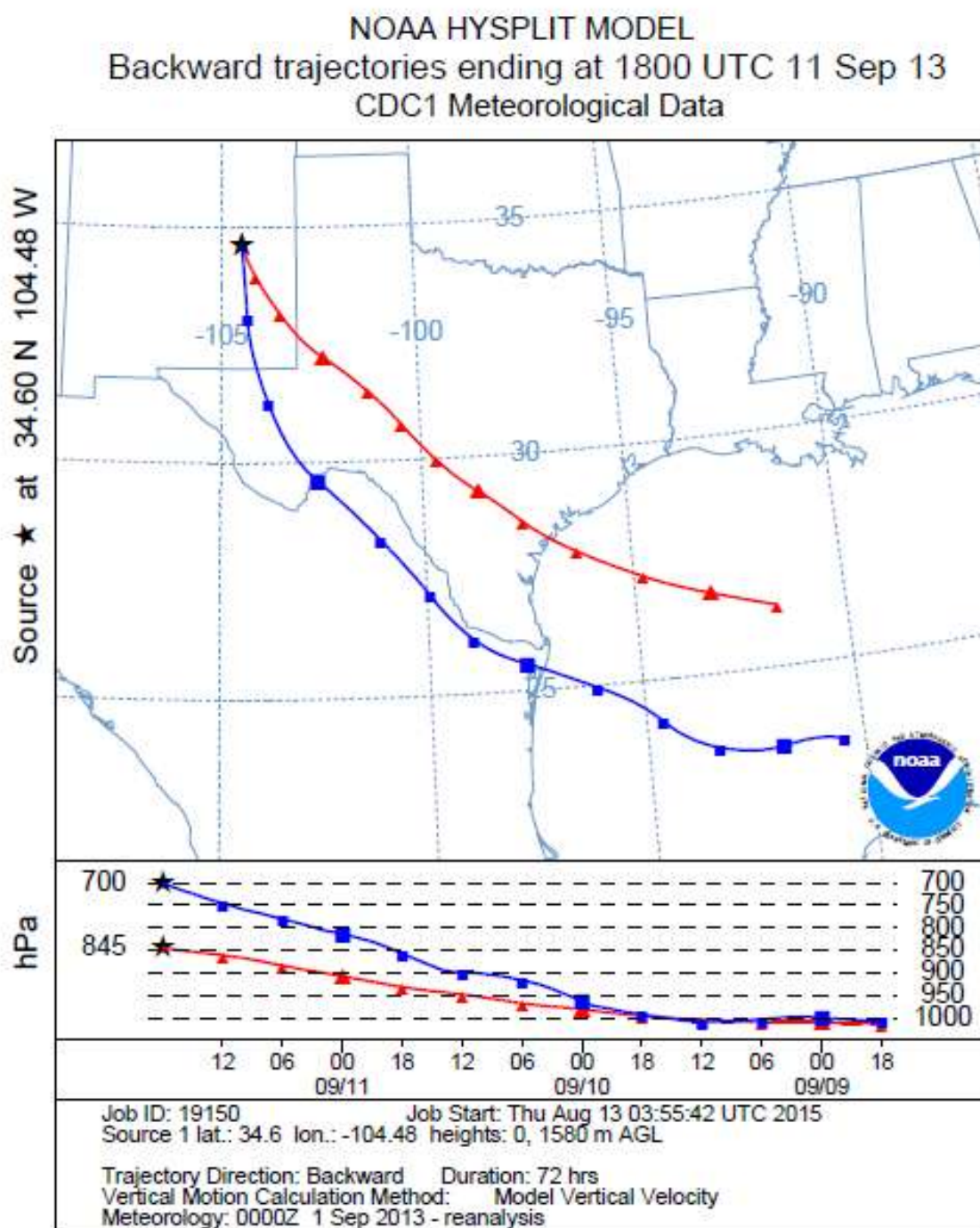
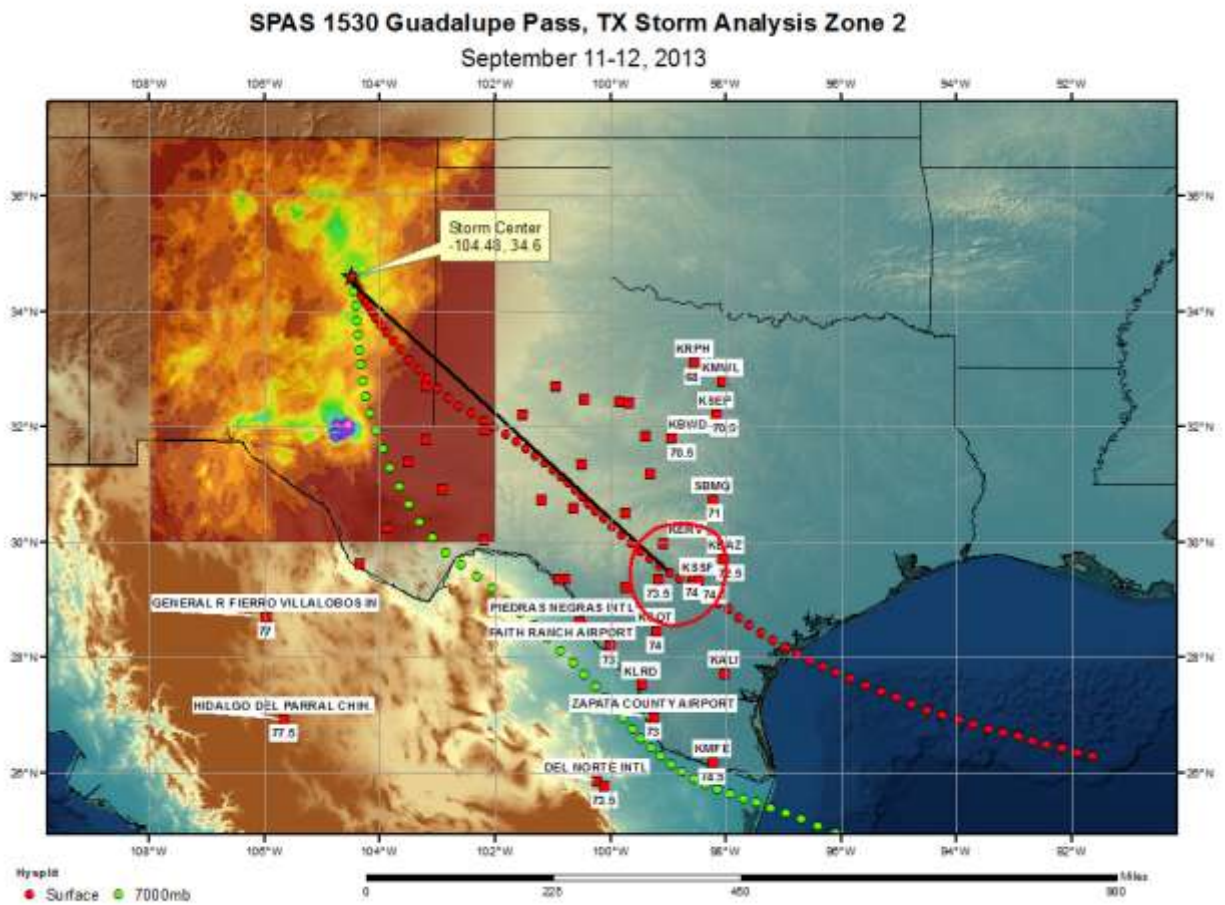


Figure 203: Total storm isohyetal analysis for Sumner Lake, NM September 2013



**Figure 204: HYSPLIT trajectory analysis at Surface, 850mb and 700mb for Sumner Lake, NM
 September 2013**



**Figure 205: In-place storm representative dew point analysis for Sumner Lake, NM
September 11-12, 2013**

Storm Precipitation Analysis System (SPAS) For Storm #1530

General Storm Location: Guadalupe Pass, TX (37.0, -108.0, 30.0, -102.0)

Storm Dates: September 10-14, 2013 (84-hours)

Event: Synoptic

DAD Zone 1

Latitude: 32.035

Longitude: -104.555

Max. Grid Rainfall Amount: 18.34"

Max. Observed Rainfall Amount: 15.76" Guadalupe Pass, TX

DAD Zone 2

Latitude: 34.595

Longitude: -104.475

Max. Grid Rainfall Amount: 9.63"

Max. Observed Rainfall Amount: 8.29" Sumner Lake, NM

DAD Zone 3

Latitude: 35.685

Longitude: -105.435

Max. Grid Rainfall Amount: 9.95"

Max. Observed Rainfall Amount: 8.70" Wesner Springs, NM

DAD Zone 4

Latitude: 32.145

Longitude: -105.995

Max. Grid Rainfall Amount: 11.94"

Max. Observed Rainfall Amount: 7.83" Chaparral, NM

Number of Stations: 910

SPAS Version: 10

Base Map Used: us_ppt_in_map_1961_1990_usda_northamerica

Spatial resolution: 00:00:36

Radar Included: Yes

Depth-Area-Duration (DAD) analysis: Yes

Degree of confidence in results: This analysis was based on an abundance of hourly data, daily data, supplemental station data and one hourly estimated station at the storm center. We have a good degree of confidence for the station based storm total results. The spatial pattern is dependent on the basemap (us_ppt_in_map_1961_1990_usda_northamerica). There is a high degree of confidence with the timing based on the several hourly and hourly pseudo stations. Some daily stations were moved to supplemental due to timing issues or removed due to erroneous storm precipitation observations. Additional details can be found in the "Read_Me_1530.docx" file. The Guadalupe Pass hourly station had missing data at the beginning and end of the ippt 144 hour period, but captured the main precipitation event. After consideration and several runs, an hourly estimated pseudo (HEP) station was not used instead of the Guadalupe Pass station.

Due to beam blockage issues, some of the hourly precipitation intensities, at the storm center, were likely high. An hourly estimated (HE) station was created at the SPAS storm center from its mass curve with radar index hours 34, 42, 49 and 52 estimated from nearby stations (see below). Also, a supplemental station was created near the original SPAS created storm center in order to control the overall magnitude of the storm (highest observation near storm center was 15.76 inches; SPAS without supplemental at storm center was about 20 inches due to beam blockage issues). This SPAS storm center supplemental station was set to 17.50 inches (over the radar period), which was the approximate difference between the 20 inch storm center and 15.76 inch highest observation.

SPAS Storm ID	NAME	LON	LAT	ELEV Round	Storm Representative				Climatological Maximum				IPMF
					T _g	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	T _g	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	
1530_4	CHAPARRAL	-105.995	32.145	4,700	74.00	2.73"	1.00"	1.730	79.0	3.44"	1.19"	2.250	1.30

Storm 1530 Zone 4 - Sep. 10 (1300 UTC) - Sep. 14 (0000 UTC), 2013													
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)													
areasqmi	Duration (hours)												
	1	2	3	4	5	6	12	18	24	36	48	72	84
0.4	1.67	2.36	2.79	3.44	3.46	3.67	4.97	5.73	6.55	8.61	9.23	11.71	11.94
1	1.66	2.33	2.75	3.38	3.41	3.61	4.92	5.68	6.50	8.53	9.14	11.64	11.86
10	1.54	2.12	2.52	3.08	3.20	3.36	4.60	5.31	6.09	8.15	8.75	11.28	11.50
25	1.35	2.02	2.43	2.87	3.02	3.21	4.41	5.04	5.81	7.75	8.32	10.82	11.05
50	1.15	1.90	2.28	2.63	2.84	3.05	4.28	4.85	5.52	7.35	7.94	10.27	10.49
100	1.02	1.74	2.10	2.38	2.62	2.83	4.11	4.64	5.18	6.87	7.48	9.61	9.84
150	0.94	1.65	1.99	2.27	2.51	2.70	3.97	4.50	5.00	6.54	7.17	9.17	9.41
200	0.89	1.58	1.91	2.19	2.42	2.60	3.85	4.38	4.85	6.30	6.94	8.85	9.08
300	0.81	1.47	1.77	2.07	2.30	2.46	3.68	4.20	4.63	5.93	6.55	8.35	8.56
400	0.75	1.37	1.67	1.97	2.19	2.34	3.54	4.05	4.47	5.65	6.25	7.95	8.17
500	0.70	1.30	1.58	1.89	2.11	2.25	3.42	3.90	4.31	5.45	6.02	7.66	7.87
1,000	0.57	1.02	1.26	1.58	1.76	1.89	2.94	3.39	3.76	4.70	5.24	6.72	6.93
2,000	0.42	0.73	0.95	1.22	1.36	1.49	2.38	2.80	3.07	3.89	4.43	5.76	5.99
3,500	0.31	0.53	0.72	0.91	1.04	1.15	1.90	2.30	2.51	3.24	3.77	4.99	5.24
5,000	0.25	0.42	0.58	0.75	0.85	0.95	1.61	2.01	2.20	2.87	3.39	4.49	4.75
7,500	0.19	0.31	0.44	0.55	0.64	0.74	1.31	1.65	1.83	2.44	2.90	3.92	4.17
10,000	0.15	0.25	0.36	0.45	0.52	0.60	1.08	1.40	1.60	2.15	2.55	3.47	3.69
11,534	0.13	0.22	0.31	0.40	0.46	0.54	0.97	1.27	1.44	1.97	2.34	3.18	3.40

Figure 206: Depth-area-duration values for Chaparral, NM September 2013

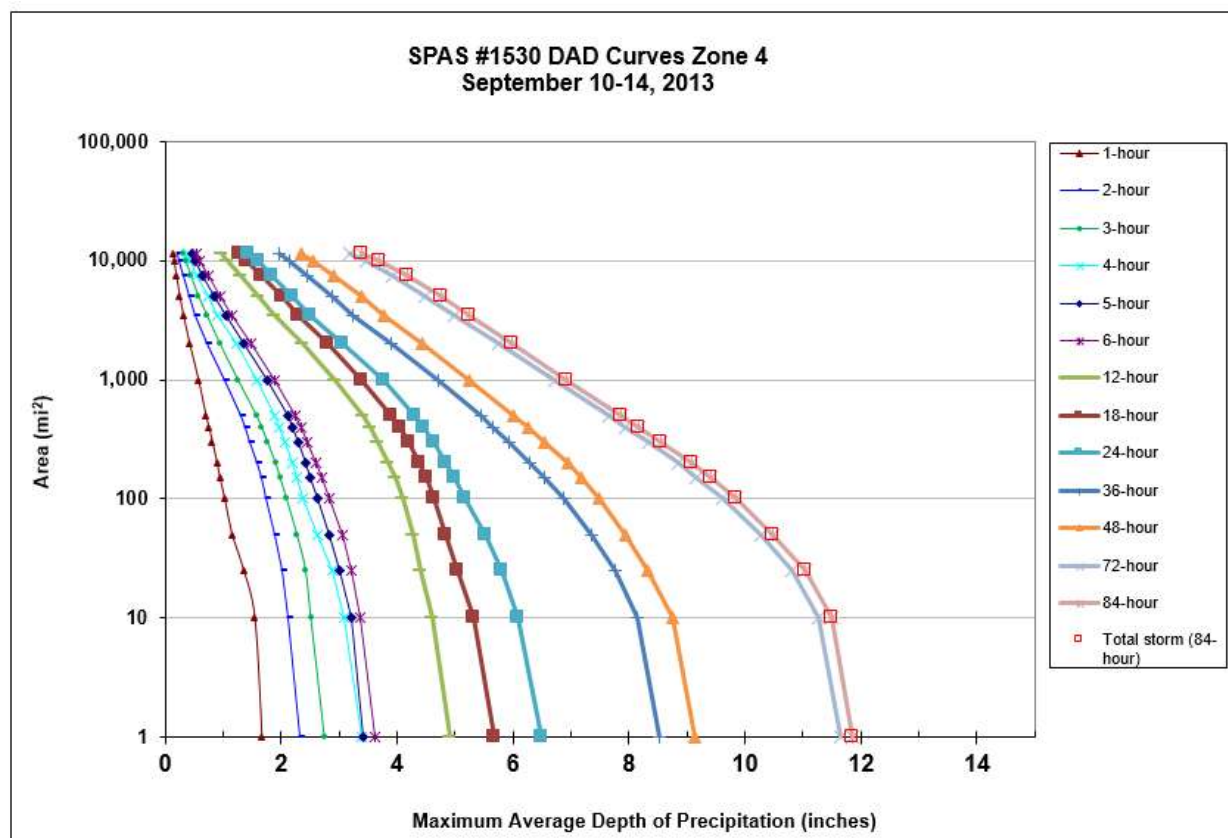


Figure 207: Depth-area-duration chart for Chaparral, NM September 2013

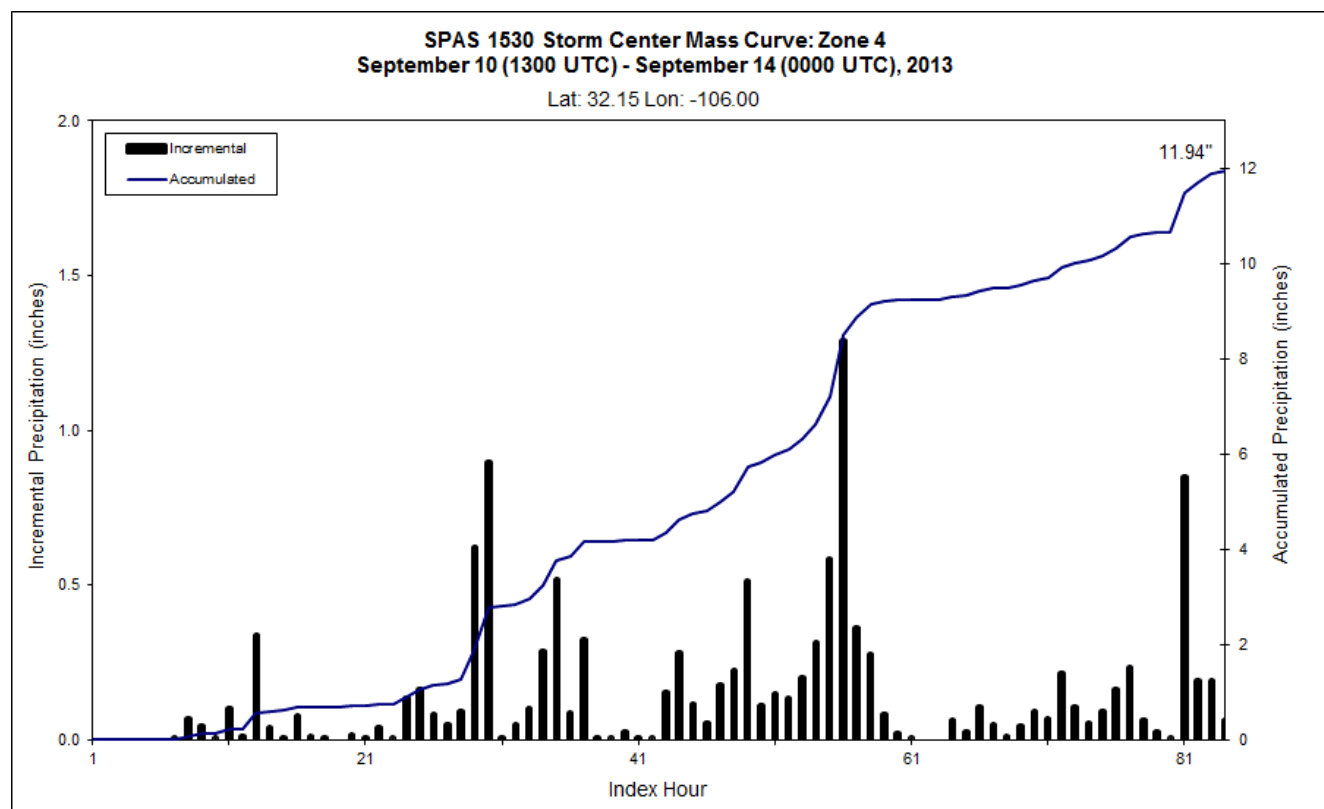


Figure 208: Mass curve chart for Chaparral, NM September 2013

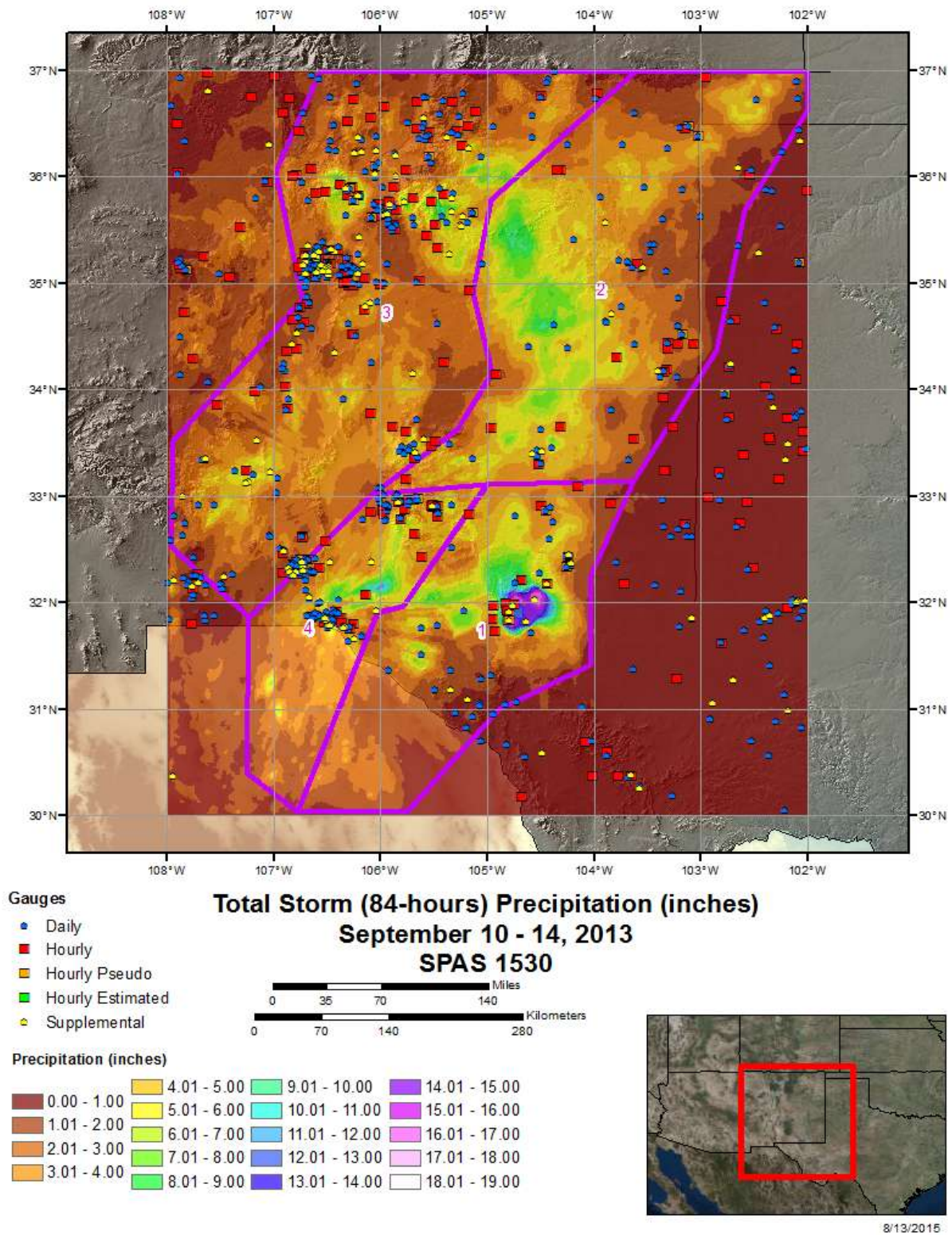


Figure 209: Total storm isohyetal analysis for Chaparral, NM September 2013

NOAA HYSPLIT MODEL
Backward trajectories ending at 1800 UTC 12 Sep 13
CDC1 Meteorological Data

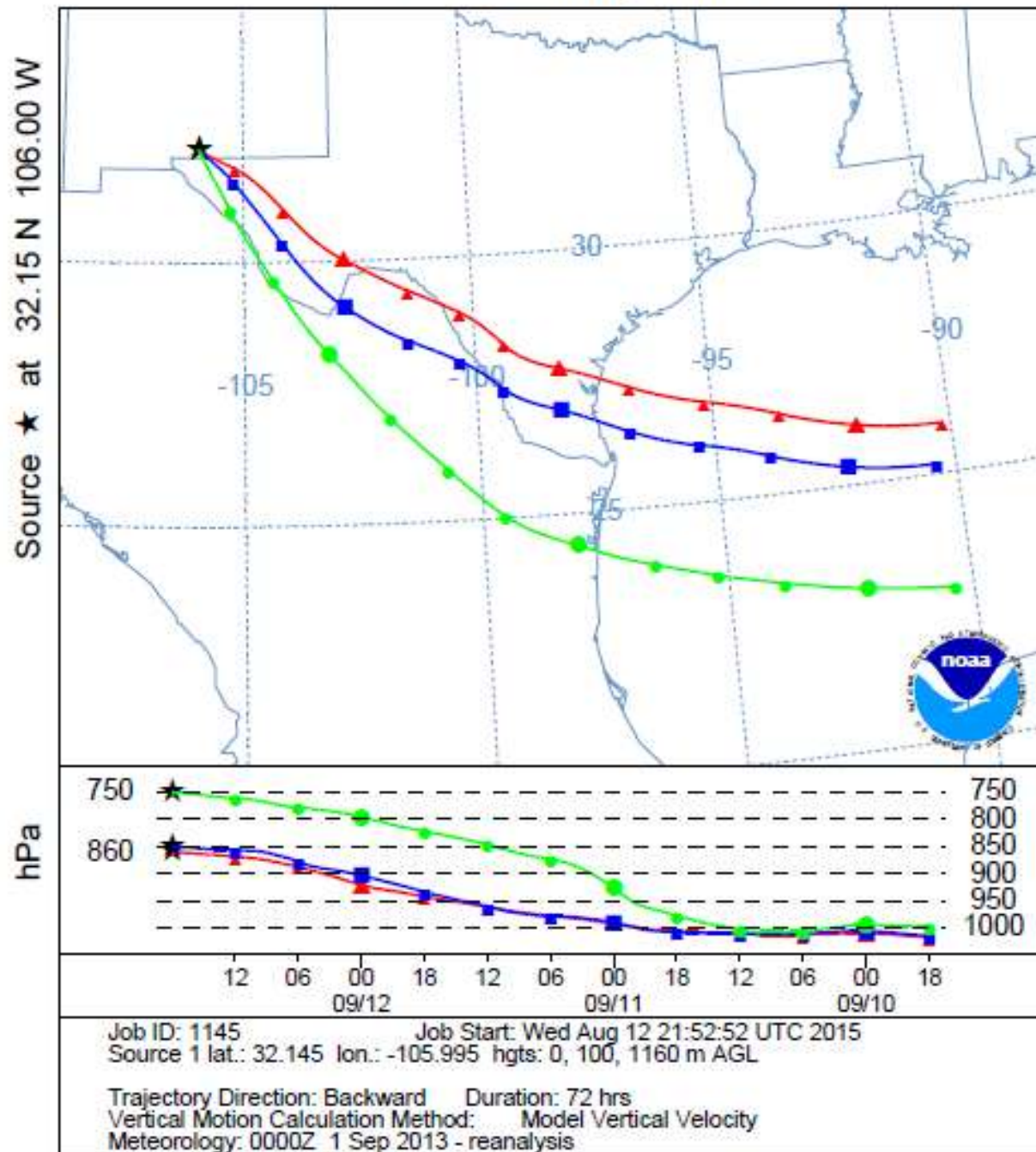


Figure 210: HYSPLIT trajectory analysis at Surface, 850mb and 700mb for Chaparral, NM
September 2013

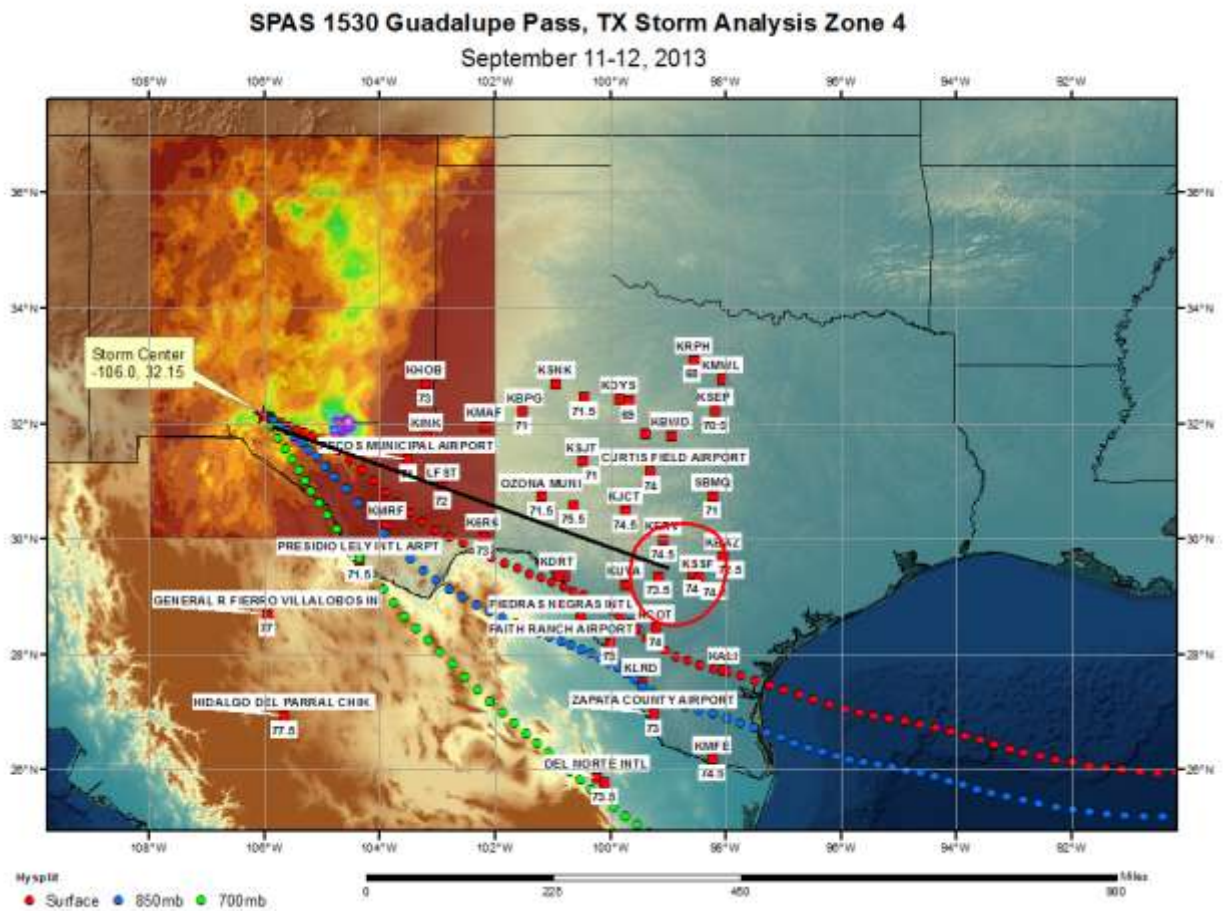


Figure 211: In-place storm representative dew point analysis for Chaparral, NM September 11-12, 2013

Storm Precipitation Analysis System (SPAS) For Storm #1597

General Storm Location: Pensacola, FL 33.0, -89.5, 29.0, -84.5

Storm Dates: April 29-30, 2014 (36-hours)

Event: Synoptic

DAD Zone 1

Latitude: 30.3750

Longitude: -87.5850

Max. Grid Rainfall Amount: 25.42"

Max. Observed Rainfall Amount: 24.30" Pensacola, FL

Number of Stations: 422

SPAS Version: 10

Base Map Used: Blended basemap based on default ZR precipitation and conus_prism_ppt_in_1981_2010_04

Spatial resolution: 0.01 decimal degree (0.41-sqmi)

Radar Included: Yes

Depth-Area-Duration (DAD) analysis: Yes

Degree of confidence in results: This analysis was based on 422 hourly stations, daily data, supplemental station data, and radar data. We have a good degree of confidence for the station based storm total results. The spatial pattern is dependent on the radar data, gauge data, and basemap. There is a good degree of confidence with the timing based on the hourly stations near the storm center. Some daily stations were moved to supplemental due to timing issues.

SPAS Storm ID	NAME	LON	LAT	ELEV Round	Storm Representative				Climatological Maximum				IPMF
					T _g	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	T _g	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	
1597_1	SILVERHILL	-87.585	30.375	0	77.00	3.14"	0.00"	3.140	80.5	3.68"	0.00"	3.680	1.17

Storm 1597 Zone 1 - Apr. 29 (0700 UTC) - Apr. 30 (1800 UTC), 2014											
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)											
areasqmi	Duration (hours)										
	1	2	3	4	5	6	12	18	24	36	Total
0.4	5.66	8.48	10.73	11.94	14.10	15.52	22.54	23.24	24.34	25.42	25.42
1	5.63	8.43	10.67	11.87	14.02	15.44	22.42	23.10	24.18	25.26	25.26
10	5.53	8.30	10.53	11.68	13.79	15.24	22.10	22.75	23.80	24.86	24.86
25	5.49	8.25	10.44	11.54	13.34	14.90	21.75	22.54	23.45	24.59	24.59
50	5.37	8.18	10.20	11.33	12.72	14.29	21.24	22.02	22.83	24.07	24.07
100	5.12	7.95	9.84	11.05	12.08	13.60	20.48	21.28	22.00	23.31	23.31
150	4.84	7.72	9.53	10.83	11.76	13.20	19.85	20.66	21.35	22.65	22.65
200	4.58	7.51	9.22	10.63	11.53	12.96	19.35	20.17	20.82	22.14	22.14
300	4.23	7.11	8.71	10.29	11.17	12.60	18.58	19.44	20.05	21.35	21.35
400	3.97	6.73	8.34	9.98	10.87	12.32	17.95	18.90	19.45	20.80	20.80
500	3.77	6.42	8.04	9.66	10.60	12.03	17.43	18.48	18.93	20.37	20.37
1,000	3.10	5.28	6.86	8.30	9.30	10.65	15.93	17.16	17.33	19.00	19.00
2,000	2.39	4.20	5.53	6.71	7.71	8.84	13.83	15.29	15.41	17.31	17.31
3,500	1.94	3.28	4.43	5.46	6.39	7.33	11.74	13.37	13.60	15.79	15.79
5,000	1.69	2.72	3.81	4.70	5.54	6.31	10.25	11.76	12.36	14.51	14.51
7,500	1.38	2.29	3.14	3.87	4.60	5.25	8.54	9.93	10.81	13.02	13.02
10,000	1.20	1.96	2.68	3.30	3.95	4.51	7.50	8.78	9.65	11.96	11.96
15,000	0.89	1.52	2.11	2.64	3.19	3.63	6.03	7.10	8.16	10.31	10.31
20,000	0.72	1.18	1.68	2.13	2.62	3.02	5.16	6.11	7.07	9.22	9.22
35,000	0.44	0.72	1.08	1.33	1.71	1.92	3.46	4.28	5.29	7.12	7.12
50,000	0.31	0.53	0.81	0.98	1.29	1.45	2.62	3.29	3.99	5.70	5.70
72,488	0.21	0.38	0.56	0.72	0.90	1.06	1.91	2.47	2.97	4.27	4.27

Figure 212: Depth-area-duration values for Silverhill, AL April 2014

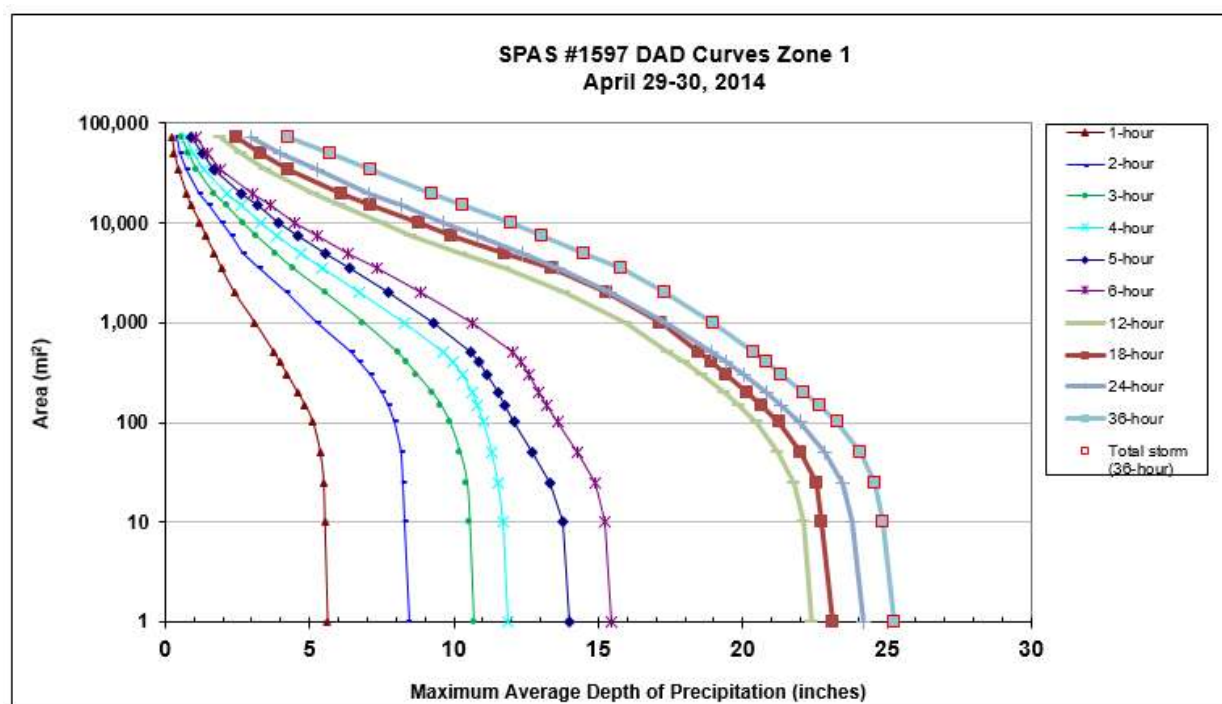


Figure 213: Depth-area-duration chart for Silverhill, AL April 2014

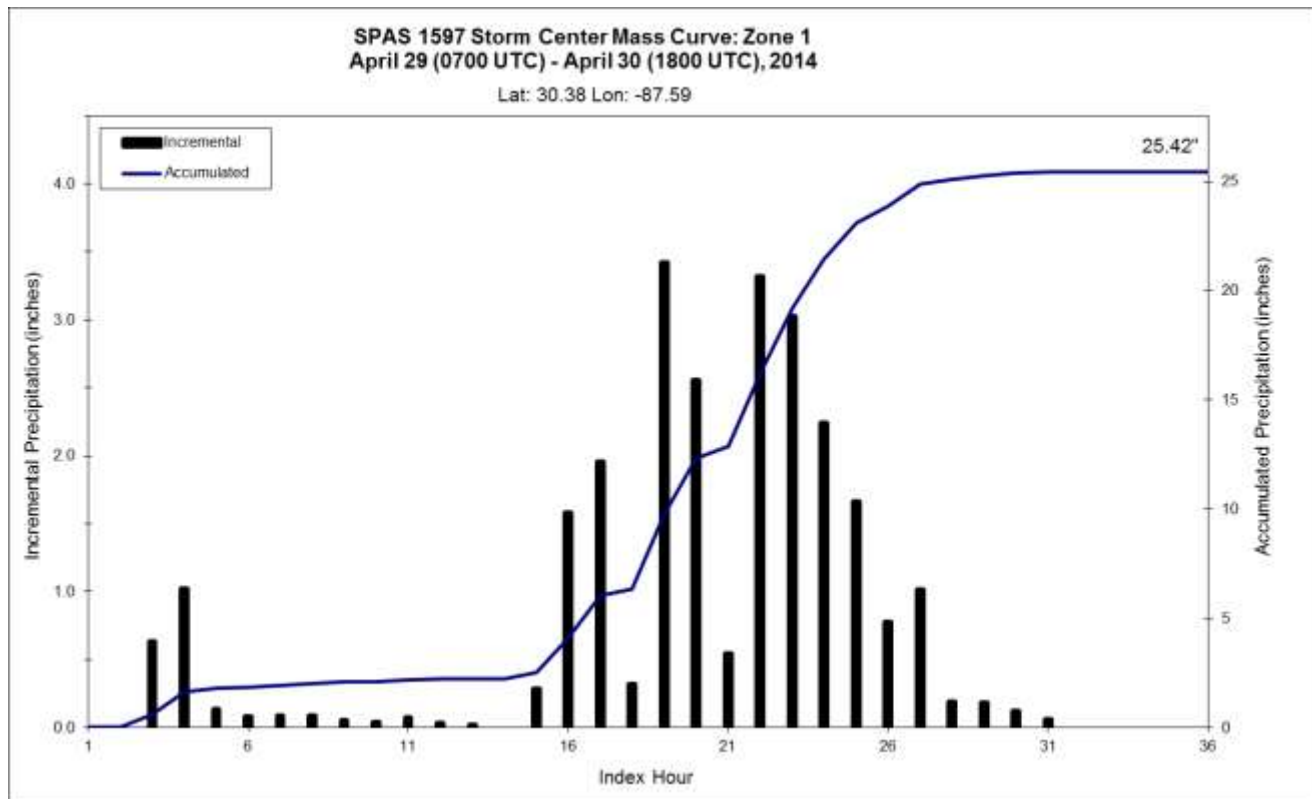


Figure 214: Mass curve chart for Silverhill, AL April 2014

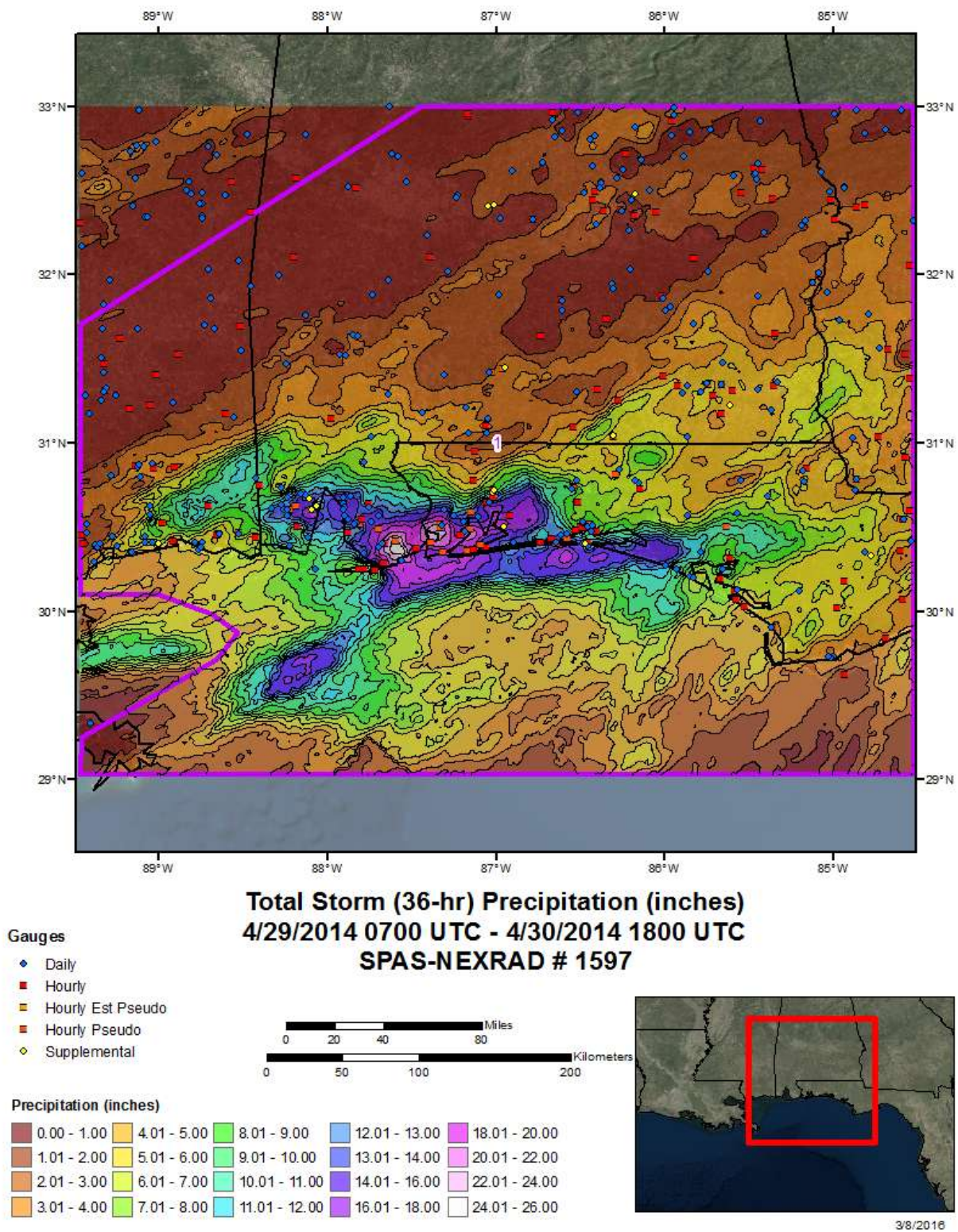


Figure 215: Total storm isohyetal analysis for Silverhill, AL April 2014

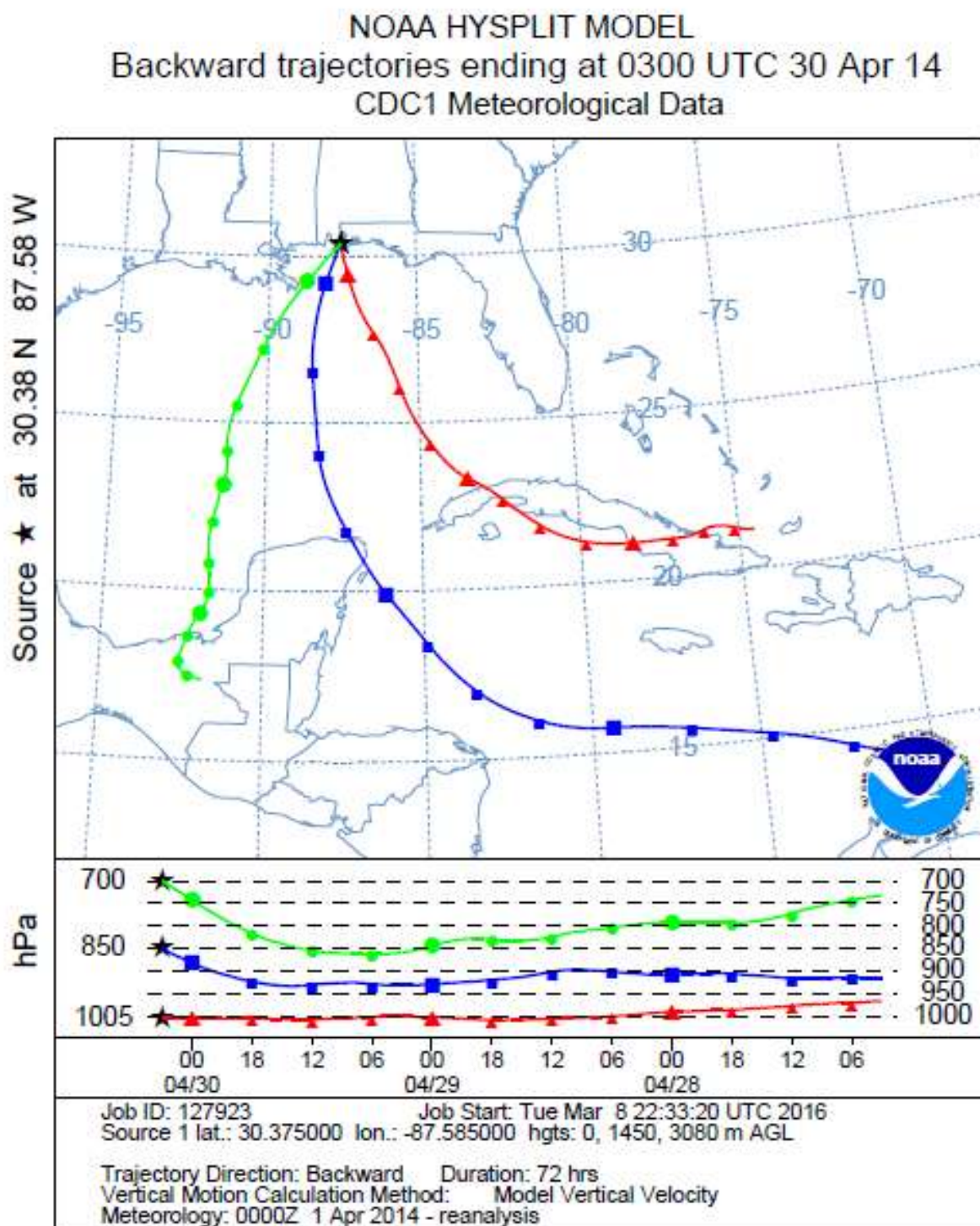


Figure 216: HYSPLIT trajectory analysis at Surface, 850mb and 700mb for Silverhill, AL April 2014

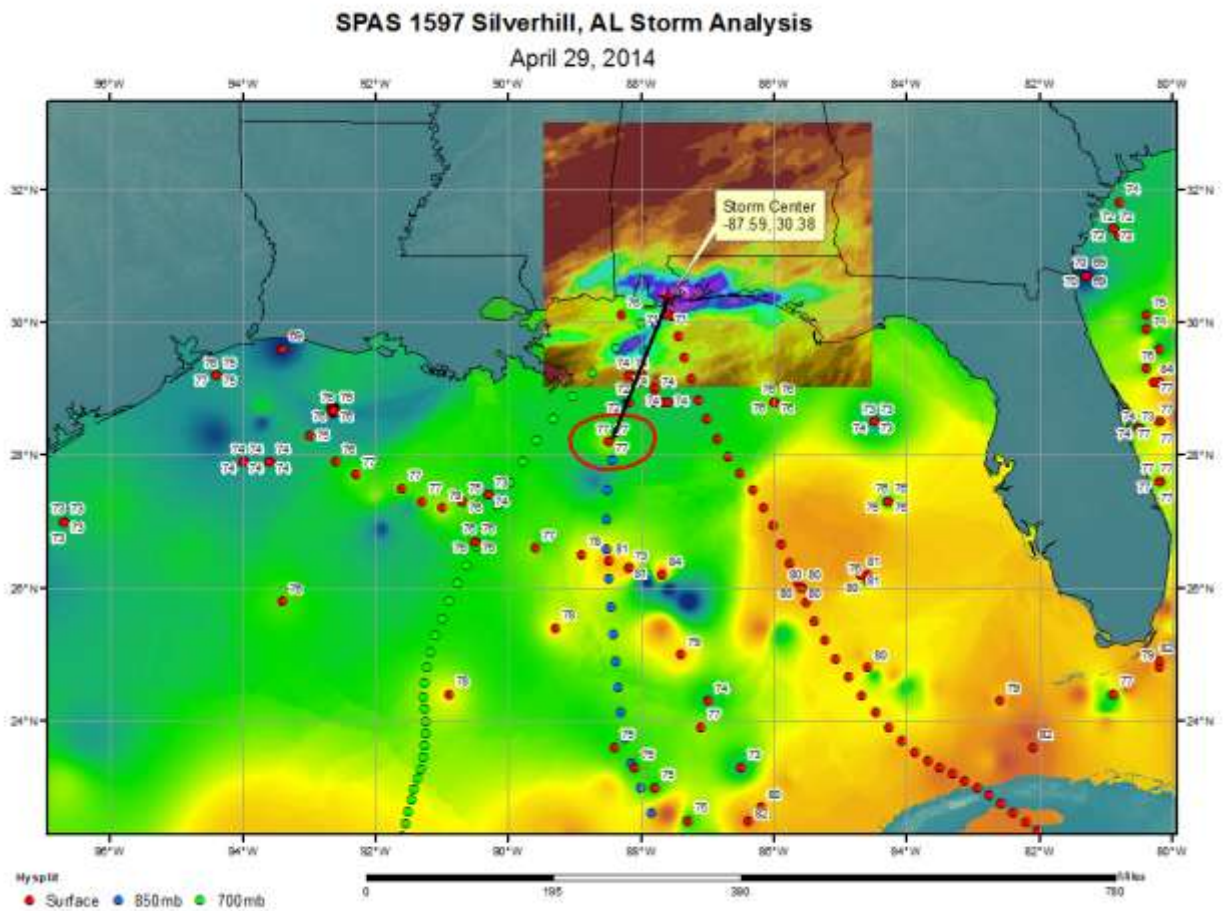


Figure 217: In-place storm representative SST analysis for Silverhill, AL April 29, 2014

Local Storms

Storm Precipitation Analysis System (SPAS) For Storm #1494

General Storm Location: South Central Texas -101.2, 32.6, 27.6, -97.5

Storm Dates: June 30 – July 2, 1932

Event: CORPS of Engineers, US Army Assignment GM 5 – 1

DAD Zone 1

Latitude: 30.1708

Longitude: -99.3792

Max. Grid Rainfall Amount: 35.56"

Max. Observed Rainfall Amount: 35.56" Mountain Home

Number of Stations: 68

SPAS Version: 10

Base Map Used: Manually digitized contours

Spatial resolution: 0.2861

Radar Included: No

Depth-Area-Duration (DAD) analysis: Yes

Degree of confidence in results: All of the hourly stations used in this analysis were manually digitized from the Army CORPS of Engineers' pertinent data report. This provided very high accuracy of the hourly data based on previous well-known reports. These hourly stations were essential in the timing of the daily and supplemental stations. Five of the 11 supplemental stations were added based on reports found in an online book (Flash Floods in Texas), and the remaining six supplemental stations were converted from daily stations as their timing was questionable. With all of the data being thoroughly inspected, the DAD and precipitation pattern following reasonably close to the Army CORPS of Engineers report, and the precipitation totals for various periods throughout the storm being consistent with previous reports, this analysis is considered to be reliable.

SPAS Storm ID	NAME	LON	LAT	ELEV Round	Storm Representative				Climatological Maximum				IPMF
					T _a	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	T _a	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	
1494_1	MOUNTAIN HOME	-99.379	30.171	1,900	77.00	3.14"	0.49"	2.650	80.0	3.60"	0.54"	3.060	1.15

Storm 1494 - July 1 (0100 UTC) - July 2 (1900 UTC), 1932														
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)														
Area (mi ²)	Duration (hours)													
	1	2	3	4	5	6	12	18	24	36	48	72	96	120
0.3	8.73	13.19	15.98	18.27	19.47	19.82	21.42	32.61	33.64	35.43	35.43	35.43	35.56	35.56
1	8.64	13.07	15.83	18.10	19.28	19.63	21.22	32.30	33.31	35.09	35.09	35.09	35.09	35.09
10	8.10	12.24	14.83	16.96	18.07	18.39	19.88	30.27	31.44	33.22	33.22	33.22	33.22	33.22
25	7.72	11.67	14.13	16.16	17.22	17.53	18.95	28.87	30.18	31.87	31.87	31.87	31.87	31.87
50	7.25	10.97	13.29	15.19	16.19	16.48	17.83	27.17	28.99	30.61	30.61	30.61	30.61	30.61
100	6.04	9.13	11.06	12.66	13.49	13.73	14.87	23.20	26.18	27.70	27.71	27.71	27.71	27.71
150	5.44	8.22	9.96	11.40	12.14	12.36	13.54	21.03	23.80	25.46	25.51	25.51	25.51	25.51
200	5.04	7.63	9.25	10.58	11.27	11.48	12.90	19.69	22.19	23.95	24.02	24.02	24.02	24.02
300	4.54	6.86	8.33	9.53	10.14	10.34	12.08	18.01	20.66	22.02	22.07	22.07	22.07	22.07
400	4.24	6.41	7.78	8.90	9.49	9.66	11.59	17.00	19.67	20.89	20.94	20.94	20.94	20.94
500	4.03	6.10	7.41	8.48	9.04	9.21	11.23	16.31	18.93	20.26	20.34	20.34	20.34	20.34
1000	3.39	5.15	6.28	7.20	7.69	7.89	9.91	14.35	16.81	18.45	18.58	18.58	18.58	18.58
2000	2.60	3.97	4.93	5.71	6.16	6.43	8.46	12.71	14.75	16.84	16.97	16.97	16.97	16.97
5000	1.60	2.59	3.32	3.98	4.48	4.82	7.03	8.72	11.36	13.68	13.81	13.81	13.81	13.81
10,000	0.96	1.59	2.18	2.80	3.36	3.76	5.51	6.03	8.15	9.93	10.09	10.09	10.09	10.09
20,000	0.57	0.97	1.30	1.71	2.04	2.22	3.51	3.81	4.95	6.16	6.30	6.30	6.30	6.30
50,000	0.29	0.51	0.67	0.89	1.05	1.11	1.76	1.93	2.45	3.04	3.12	3.12	3.12	3.12
76,299	0.21	0.36	0.49	0.62	0.73	0.81	1.26	1.35	1.75	2.19	2.26	2.26	2.26	2.26

Figure 218: Depth-area-duration values for Mountain Home, TX July 1932

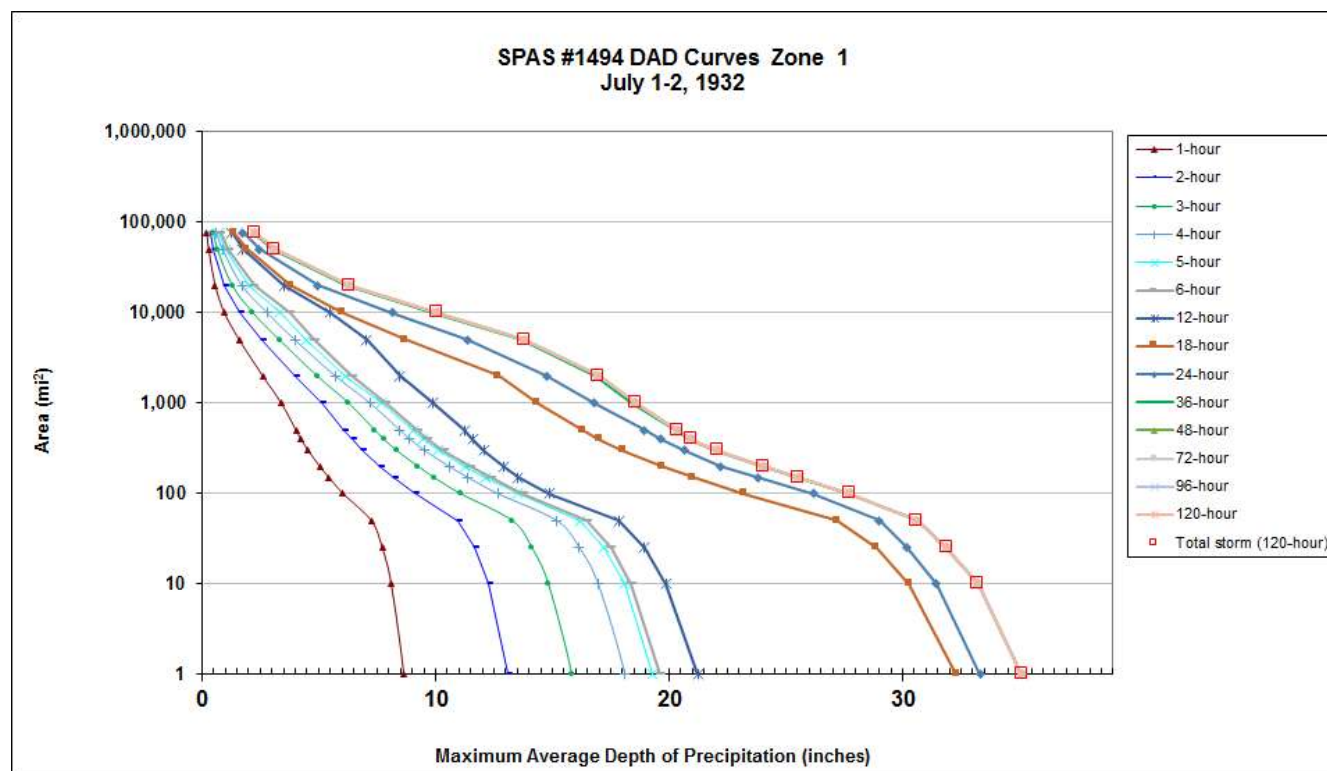


Figure 219: Depth-area-duration chart for Mountain Home, TX July 1932

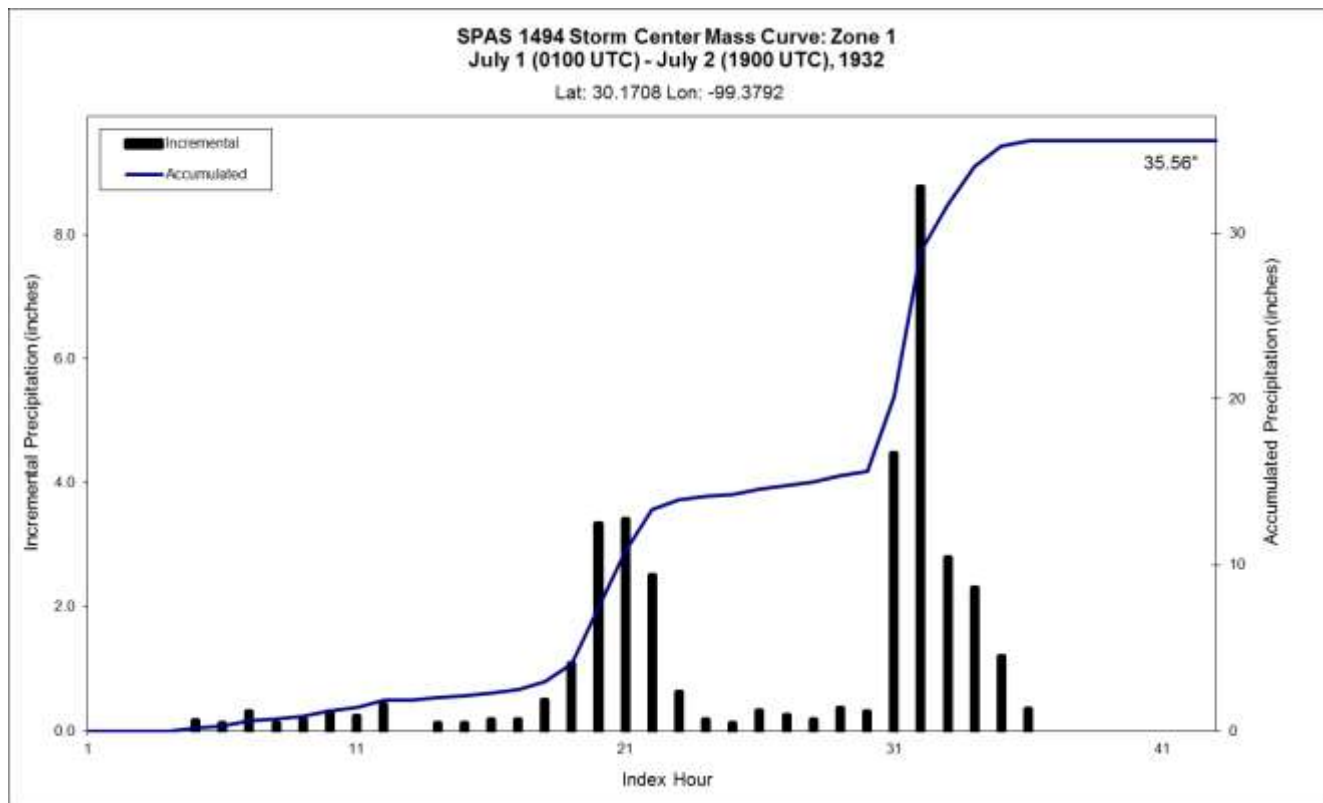
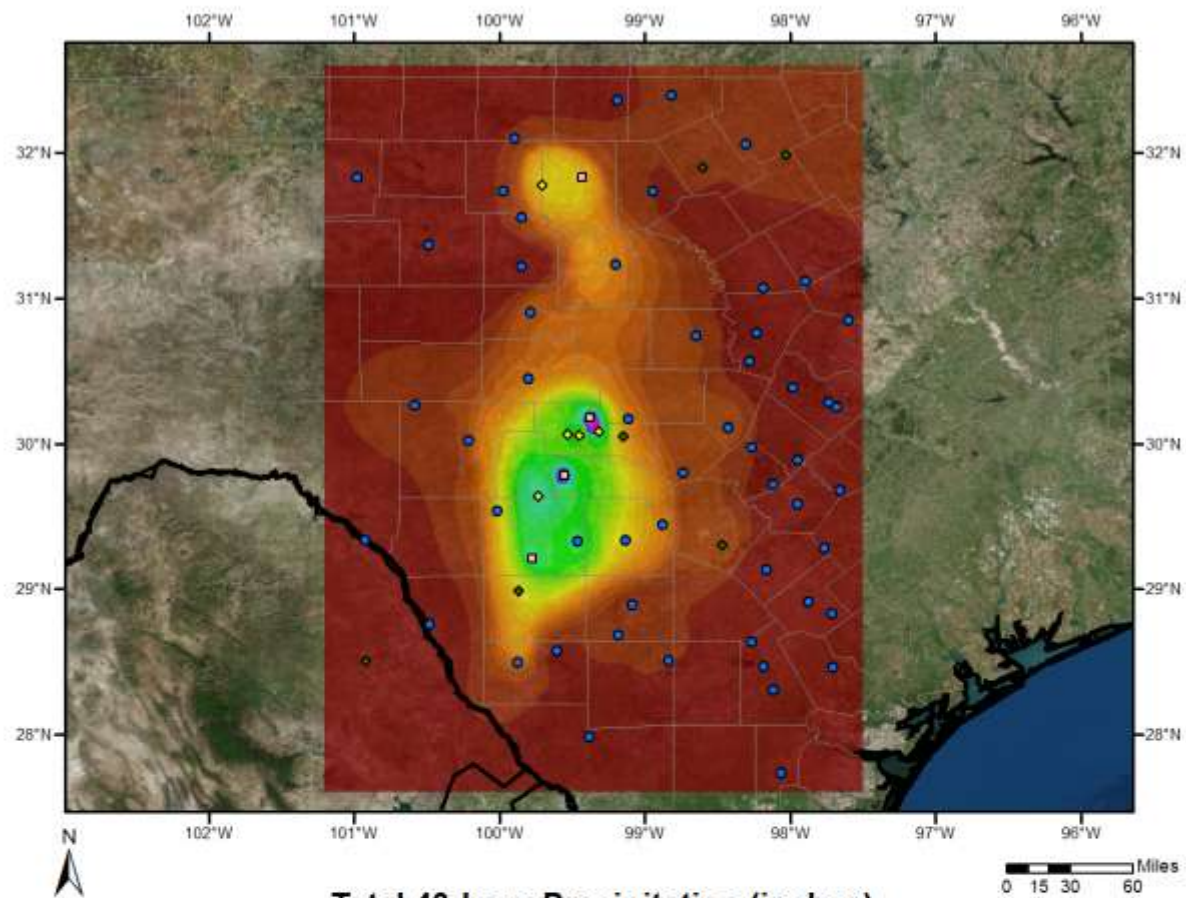


Figure 220: Mass curve chart for Mountain Home, TX July 1932

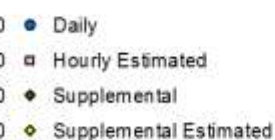


Total 43-hour Precipitation (inches)
July 1, 1932 0100 UTC - July 2, 1932 1900 UTC
SPAS #1494

Precipitation (inches)



Stations



KLL 8/11/2018

Figure 221: Total storm isohyetal analysis for Mountain Home, TX July 1932

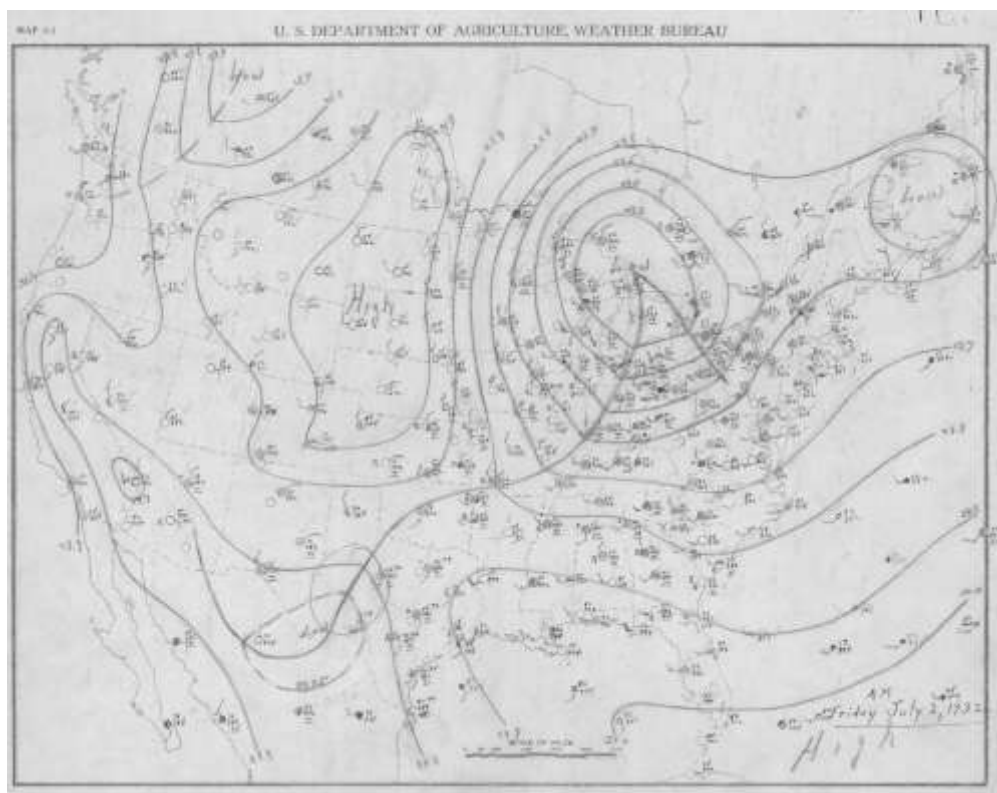


Figure 222: Daily Weather Map for Mountain Home, TX July 1, 1932 AM

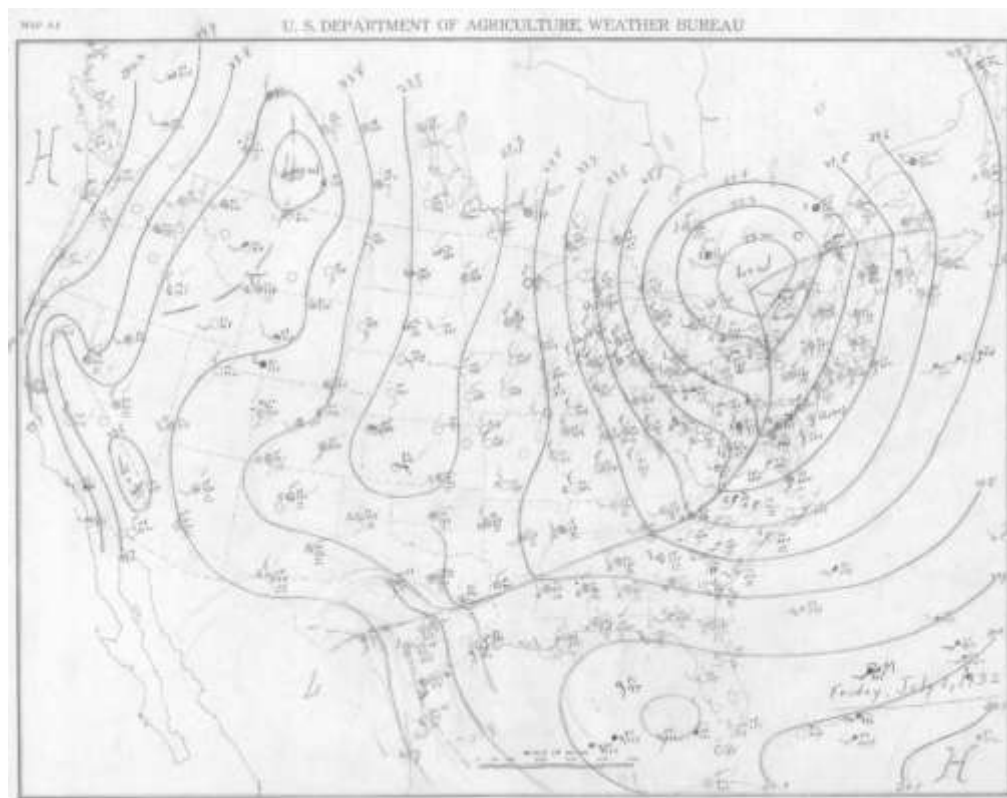


Figure 223: Daily Weather Map for Mountain Home, TX July 1, 1932 PM

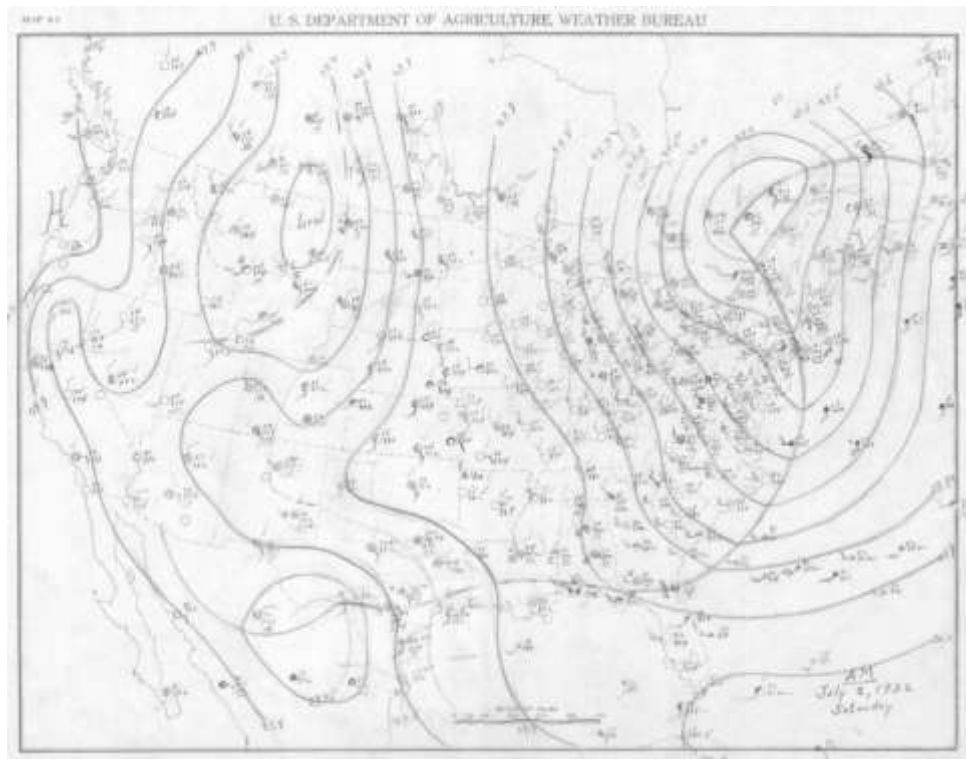


Figure 224: Daily Weather Map for Mountain Home, TX July 2, 1932 AM

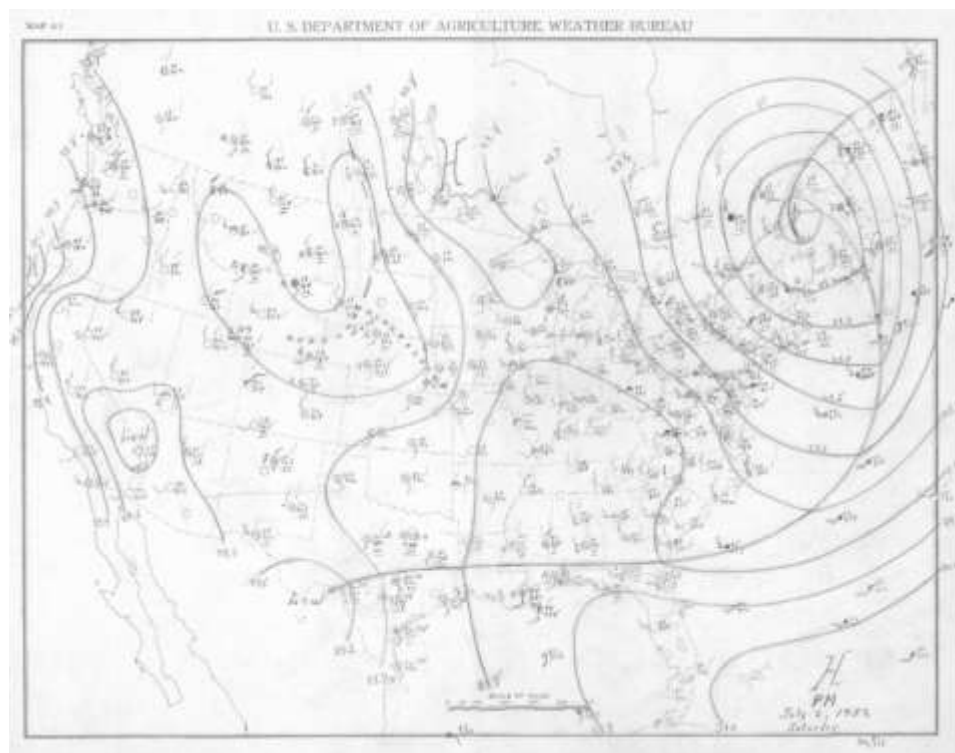


Figure 225: Daily Weather Map for Mountain Home, TX July 2, 1932 PM

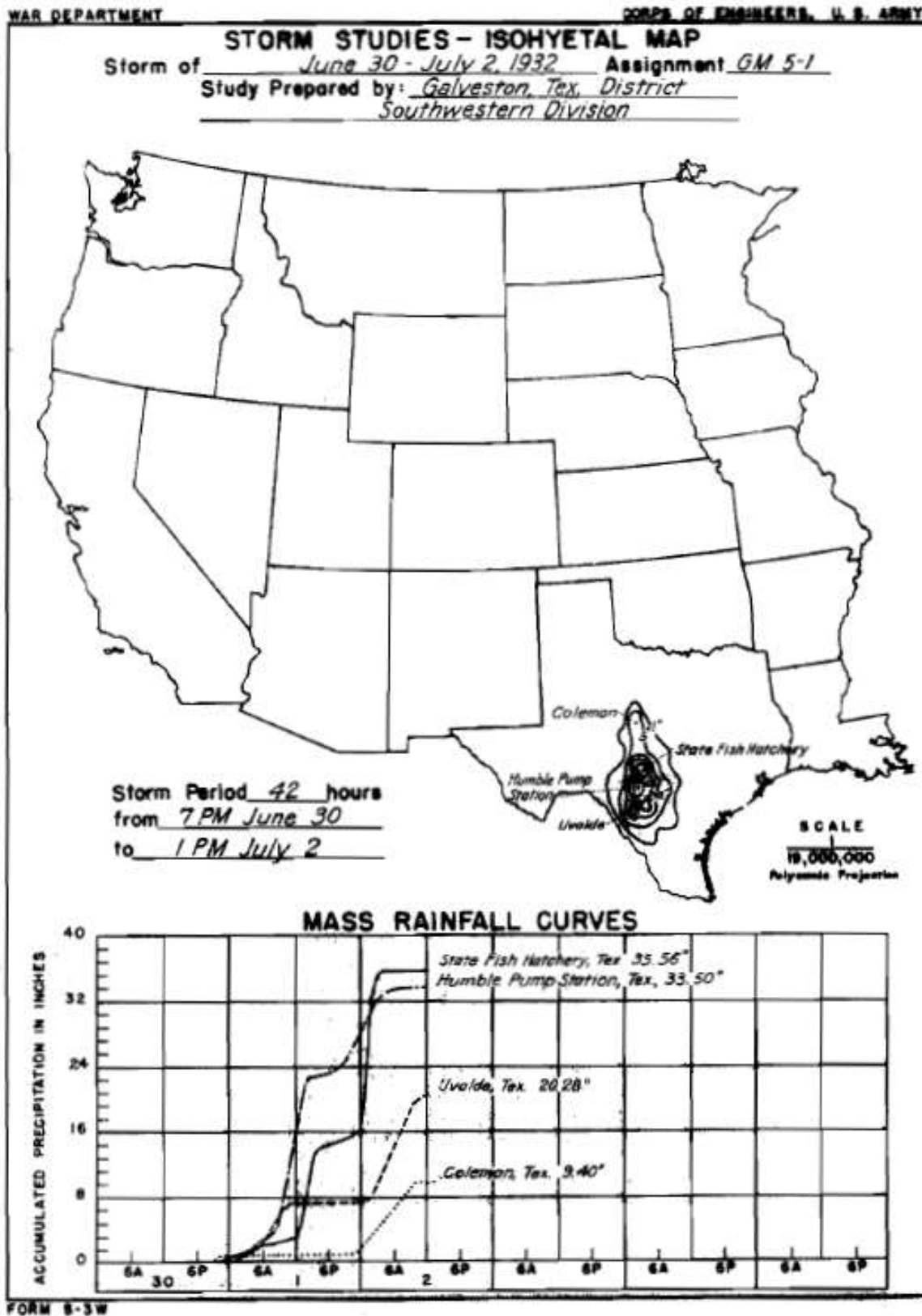


Figure 227: USACE Total storm isohyetal and mass curve chart for Mountain Home, TX July 1932

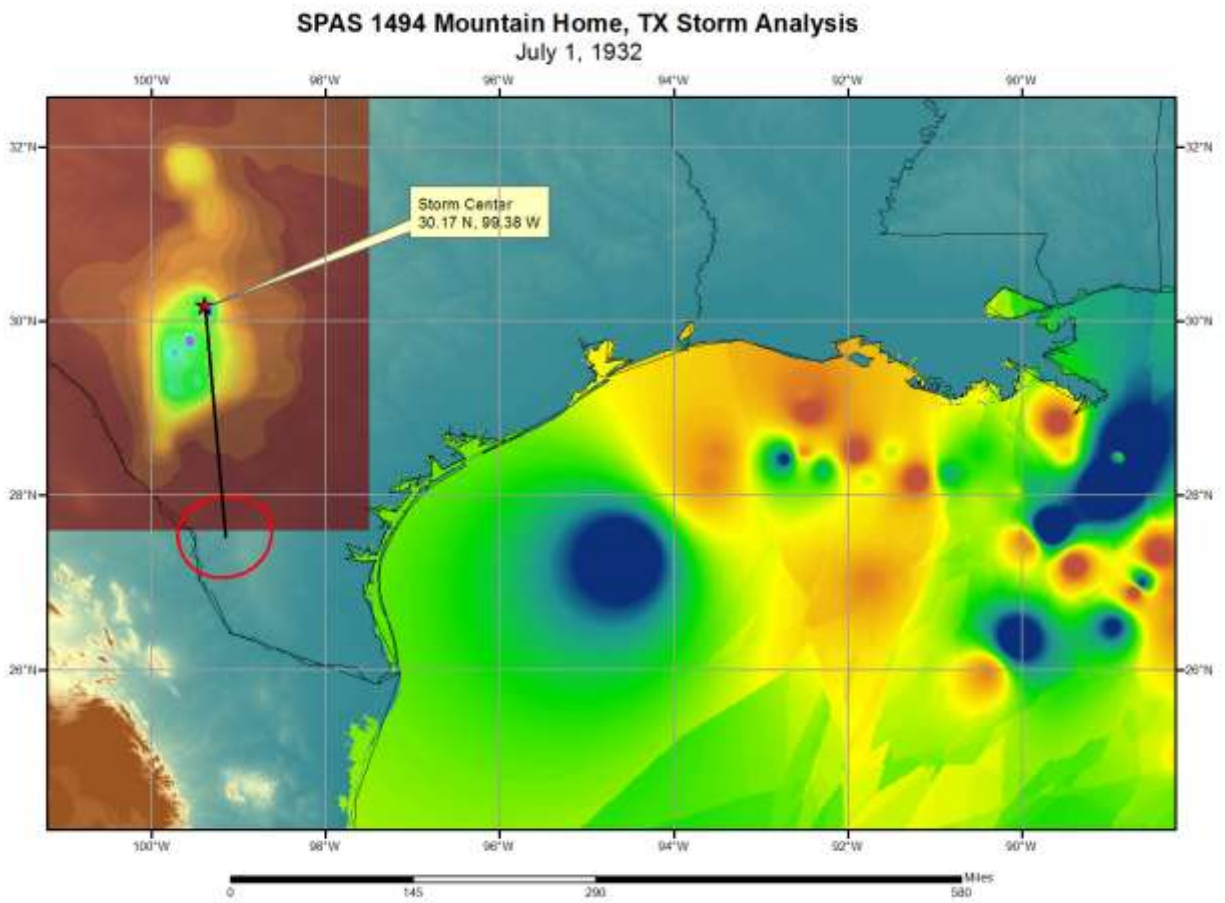


Figure 228: In-place storm representative dew point analysis for Mountain Home, TX July 1, 1932

16.

Storm Date	Assignment Number	Representative Storm Dewpoint	Reference Point
<u>1929</u>			
Mar 11-16	LMV 2-20	67	75 S of Elba, Ala.
Mar 21-23	OR 7-15	68	270 SSE of Rock Island, Tenn.
Apr 18-21	MR 3-22	66	200 SSE of Holton, Kans.
May 10-14	MR 3-23	68	200 SE of Lumberton, Ga.
May 25-30	GM 4-26	76	190 SSE of Hardy, Tex.
May 25-30	MR 4-27	68	500 SE of Sentinel Butte, Mont.
May 29-Jun 3	MR 3-25	69	250 S of Bethany, Mo.
Jun 6-7	MR 4-28	62	400 SE of Beach, N. Dak.
Jul 15-18	LMV 1-17	74	80 WSW of Woodville, Miss.
Aug 1-2	UMV 2-17	73	190 S of Toledo, Iowa.
Sep 5-9	LMV 4-13	75	90 E of Algiers, La.
Sep 23-28	SA 3-20	74	50 E of Glenville, Ga.
Sep 29-Oct 3	SA 3-23	74	200 E of Vernon, Fla.
Nov 11-15	GM 2-4	71	250 SSE of Helena, Ala.
<u>1930</u>			
Jan 6-11	LMV 2-22	60	190 SE of Arkadelphia, Ark.
May 6-11	LMV 2-23	71	220 SW of Swan Lake, Miss.
May 15-19	LMV 2-24	75	290 SE of Camden, Ark.
Jun 7-11	MA 1-19	62	160 SW of Springfield, Mass.
Jun 12-15	UMV 2-14	67	120 SW of Washington, Iowa.
Sep 13-15	MR 3-26	70	175 SSE of Holton, Kans.
Oct 9-12	SW 2-6	70	540 SE of Porter, N. Mex.
<u>1931</u>			
Jul 20-25	GL 1-27	72	250 SW of Conklingville, N. Y.
<u>1932</u>			
Jan 11-13	LMV 4-16	62	120 SE of Urania, La.
Jun 2-6	SW 2-7	70	250 S of Meeker, Okla.
Jun 2-6	SW 2-7A	70	500 SSE of Tribune, Kans.
Jun 30-Jul 2	GM 5-1	75	175 S of Kerrville, Tex.
Jul 3-8	OR 3-20	73	250 SW of Clay, W. Va.
Aug 1-3	OR 2-8	76	510 SW of Lexington, Ky.
Aug 15-17	SW 2-8	72	160 SSE of Enid, Okla.
Aug 30-Sep 5	GM 5-16A	76	340 S of Fairfield, Tex.
Sep 5-7	GM 5-16B	75	400 SE of Abilene, Tex.
Sep 16-17	KA 1-20	63	75 E of Westerly, R. I.

Figure 229: USACE storm representative dew point for Mountain Home, TX July 1932

Storm Precipitation Analysis System (SPAS) For Storm #1495

General Storm Location: Oklahoma and Texas (36.3, -101.0, 34.8, -98.9)

Storm Dates: April 3 – April 5, 1934

Event: Localized Extreme Precipitation Event

DAD Zone 1

Latitude: 35.6208

Longitude: -99.6792

Max. Grid Rainfall Amount: 23.11"

Max. Observed Rainfall Amount: 23.00"

Number of Stations: 143

SPAS Version: 10

Base Map Used: EDADS USACE Total Storm Isohyetal

Spatial resolution: 00:00:30 (0.30-sqmi)

Radar Included: No

Depth-Area-Duration (DAD) analysis: Yes

Degree of confidence in results: While no NCDC hourly stations were available for this storm, two recorder stations and three estimated stations were digitized from the U.S. Army Corp of Engineers (USACE) Storm Study and EDADS pertinent data; these three estimated stations contained the storm center and provided timing. The storm center timing (no79) was based on the EDADS mass curve combined with bucket survey timing and the USACE max point data. The timing insured the maximum point data matched observed values at 2hrs (15.00"), 6hrs (20.00"), and 12hrs (23.00"). A period on intense rainfall was noted between 10pm and midnight, this period was selected to represent the maximum 2hr observation of 15.00" (note the 15.00" fell in 2hrs 20mins, for the analysis we placed in 2hrs). The USGS did a post-storm bucket survey collecting ~200 observations, the EDADS document contained 150 bucket survey data. The 150 observations included amount, location, timing, and remarks.

SPAS Storm ID	NAME	LON	LAT	ELEV Round	Storm Representative				Climatological Maximum				IPMF
					T _d	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	T _d	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	
1495_1	CHEYENNE	-99.679	35.621	1,900	68.00	2.05"	0.37"	1.680	74.0	2.73"	0.45"	2.285	1.36

Storm 1495 Zone 1 - April 3 (0700 UTC) - April 6 (0600 UTC), 1934															
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)															
areasqmi	Duration (hours)														
	1	2	3	4	5	6	12	18	24	36	48	72	96	120	TOTAL
0.3	7.5	14.9	16.2	17.4	18.7	20.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.1	23.1
1	7.3	14.7	15.9	17.2	18.4	19.7	22.6	22.6	22.6	22.7	22.7	22.7	22.7	22.7	22.7
10	6.1	12.3	13.5	14.9	16.3	17.9	21.3	21.3	21.3	21.3	21.4	21.4	21.4	21.4	21.4
25	5.5	10.9	12.4	13.9	15.4	17.0	20.2	20.2	20.2	20.2	20.3	20.3	20.3	20.3	20.3
50	4.9	9.7	11.2	12.7	14.3	15.8	18.8	18.8	18.8	18.8	18.9	18.9	18.9	18.9	18.9
100	4.3	8.6	10.1	11.6	13.1	14.6	17.4	17.4	17.4	17.5	17.6	17.6	17.6	17.6	17.6
150	4.0	8.1	9.5	11.0	12.4	14.0	16.7	16.7	16.7	16.8	16.9	16.9	16.9	16.9	16.9
200	3.9	7.7	9.1	10.6	12.0	13.5	16.2	16.2	16.2	16.3	16.4	16.4	16.4	16.4	16.4
300	3.6	7.2	8.5	10.0	11.4	12.8	15.4	15.4	15.4	15.4	15.5	15.6	15.6	15.6	15.6
400	3.4	6.7	8.1	9.5	10.8	12.2	14.7	14.7	14.7	14.7	14.8	14.8	14.8	14.8	14.8
500	3.2	6.4	7.6	8.9	10.3	11.6	13.8	13.8	13.8	13.9	14.0	14.0	14.0	14.0	14.0
1,000	2.4	4.7	5.9	7.0	8.1	8.9	10.7	10.7	10.7	10.8	10.8	10.8	10.8	10.8	10.8
2,000	1.6	3.1	4.0	4.8	5.6	6.2	7.4	7.4	7.4	7.5	7.5	7.5	7.5	7.5	7.5
5,000	0.8	1.6	2.0	2.4	2.8	3.1	3.7	3.7	3.7	3.8	3.8	3.8	3.8	3.8	3.8
10,000	0.5	0.9	1.2	1.4	1.7	1.8	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
12,235	0.4	0.8	1.0	1.2	1.4	1.6	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9

Figure 230: Depth-area-duration values for Cheyenne, OK April 1934

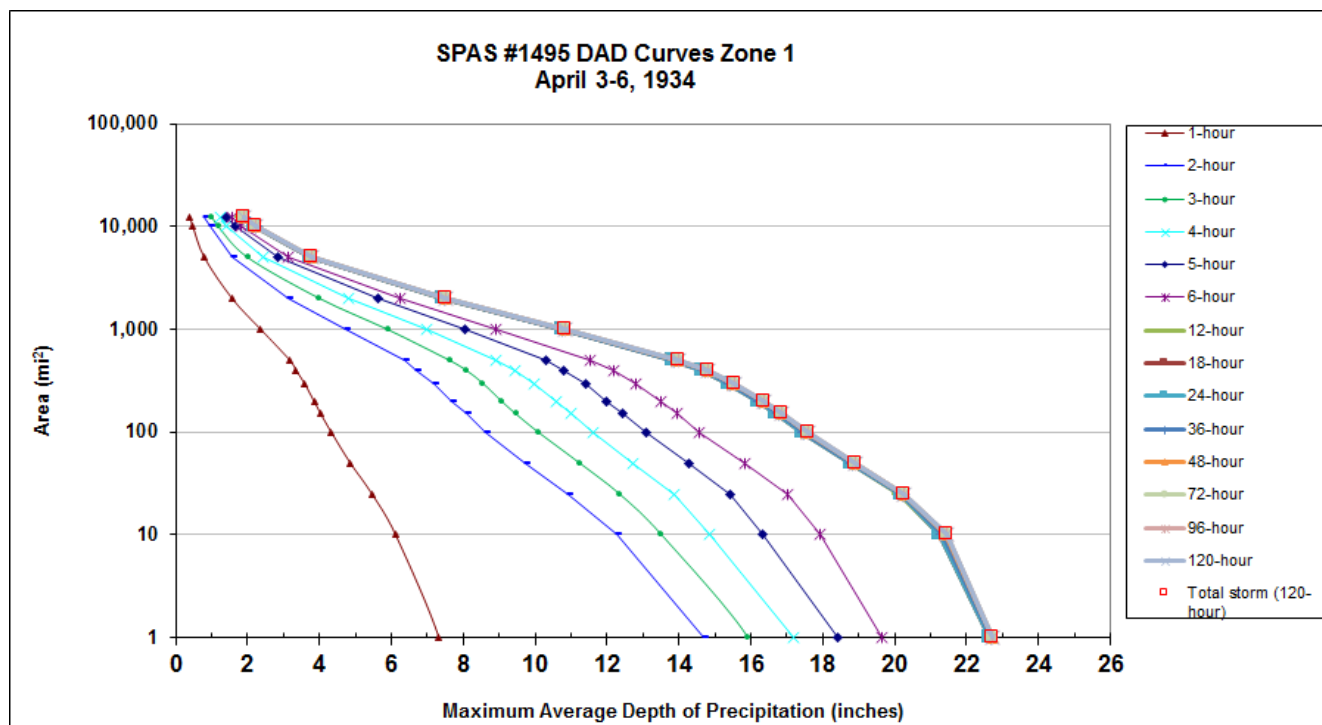


Figure 231: Depth-area-duration chart for Cheyenne, OK April 1934

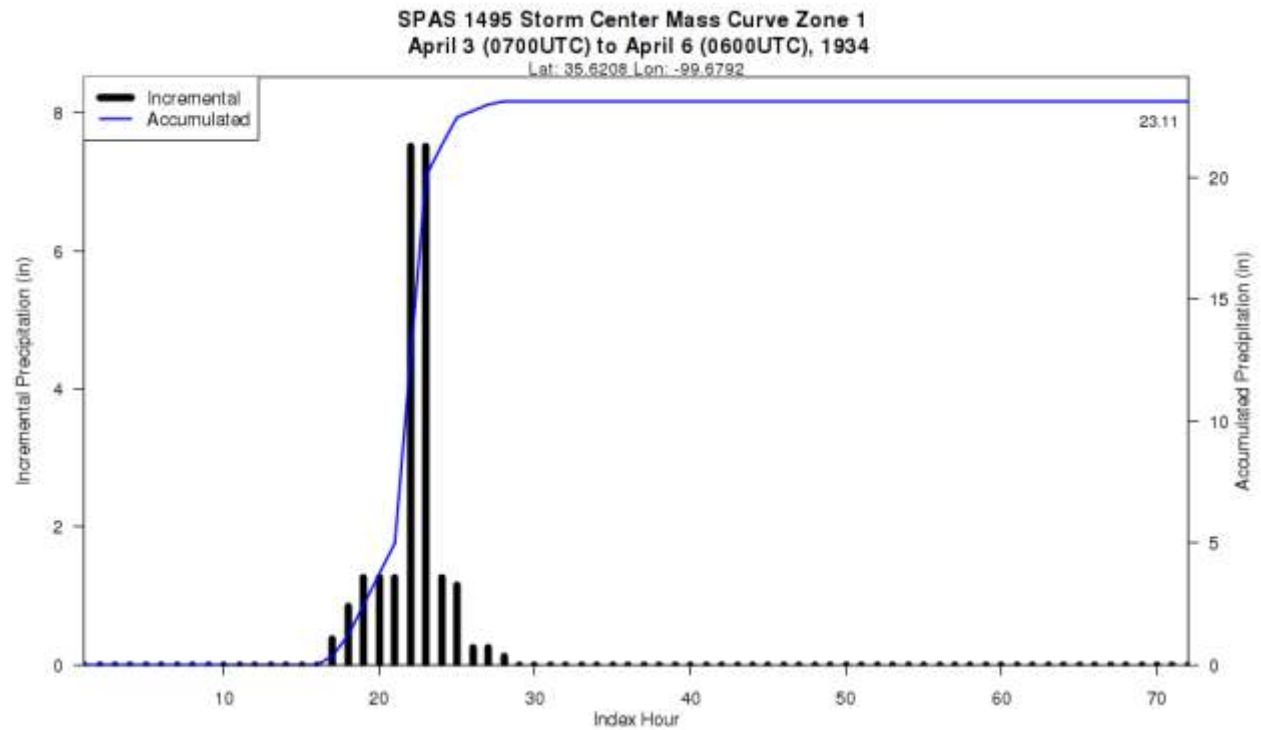
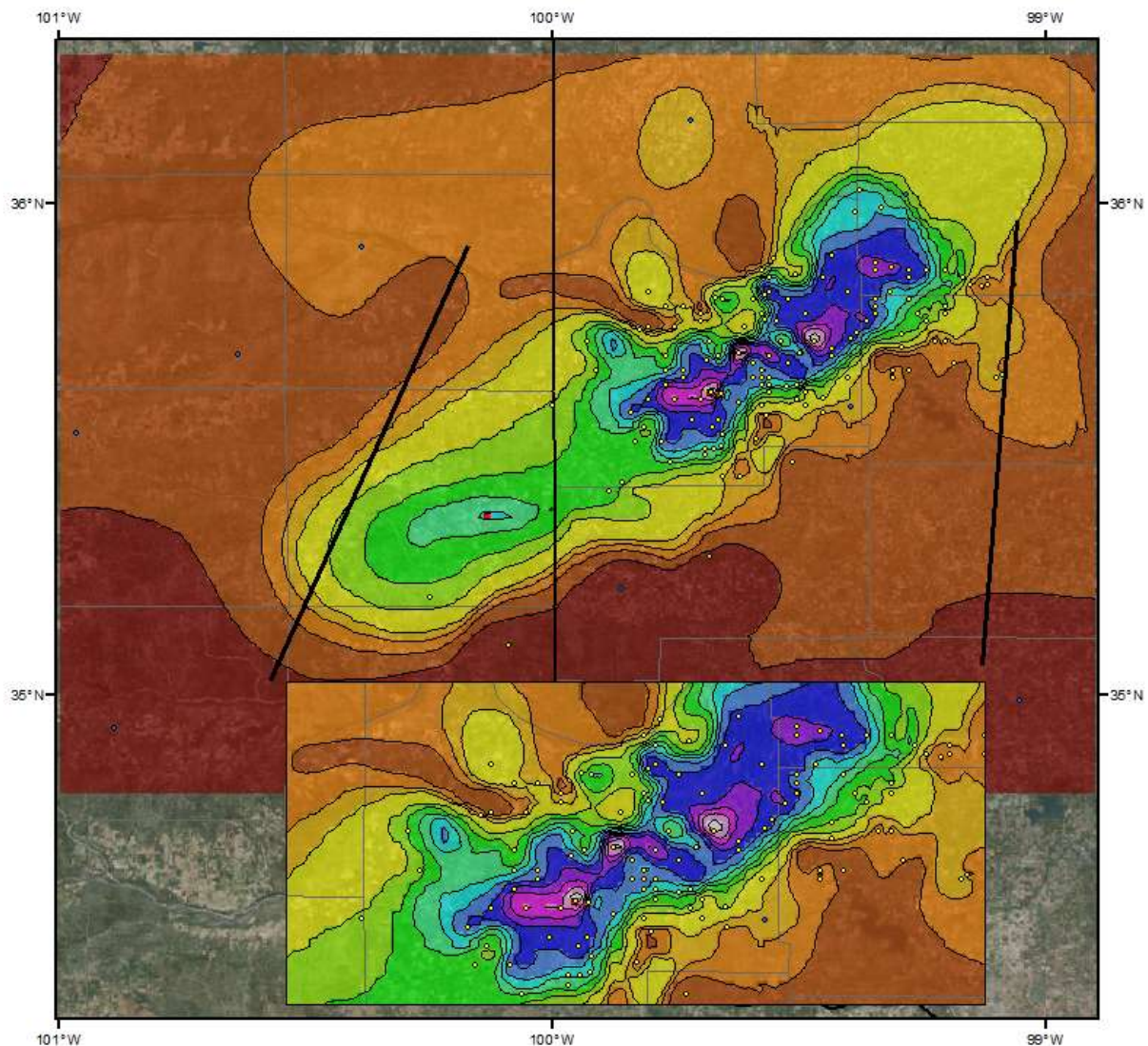


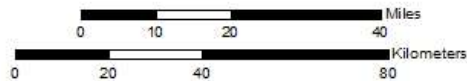
Figure 232: Mass curve chart for Cheyenne, OK April 1934



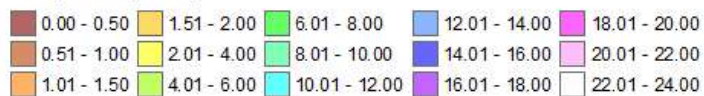
Total 72-hour Precipitation (inches)
April 3, 1934 (0700 UTC) - April 6, 1934 (0600 UTC)
SPAS #1495

Gauges

- Daily
- Hourly Estimated
- Hourly Est. Pseudo
- ◊ Supplemental
- ◊ Supplemental Est.



Precipitation (inches)



2/29/2016

Figure 233: Total storm isohyetal analysis for Cheyenne, OK April 1934

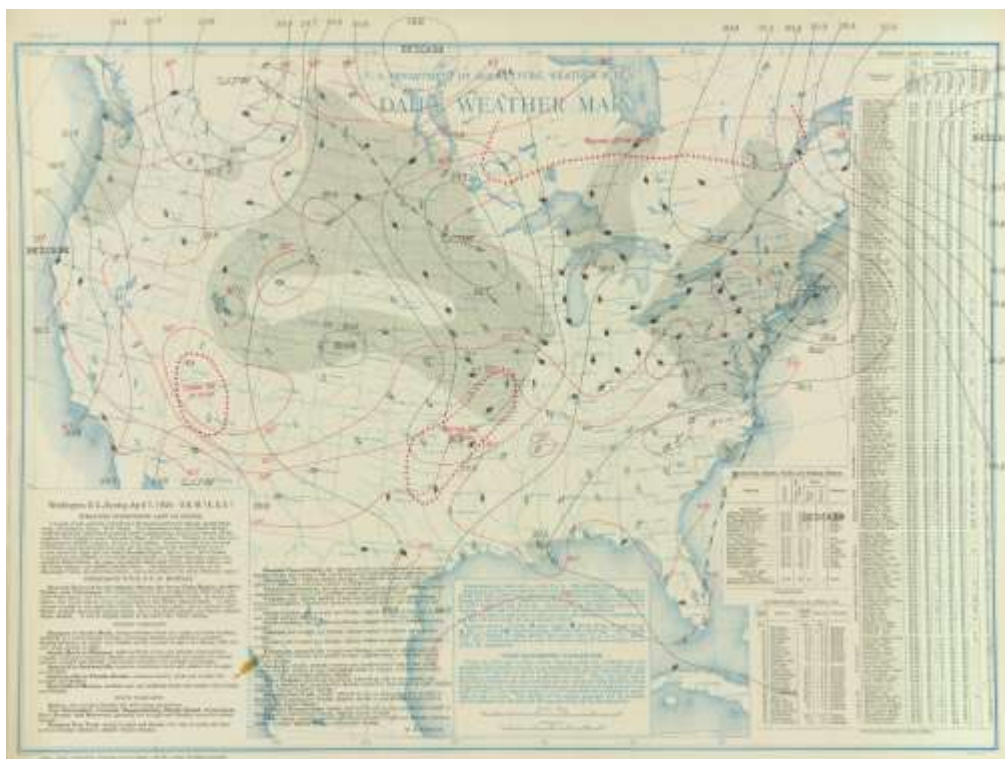


Figure 234: Daily Weather Map for Cheyenne, OK April 1, 1934

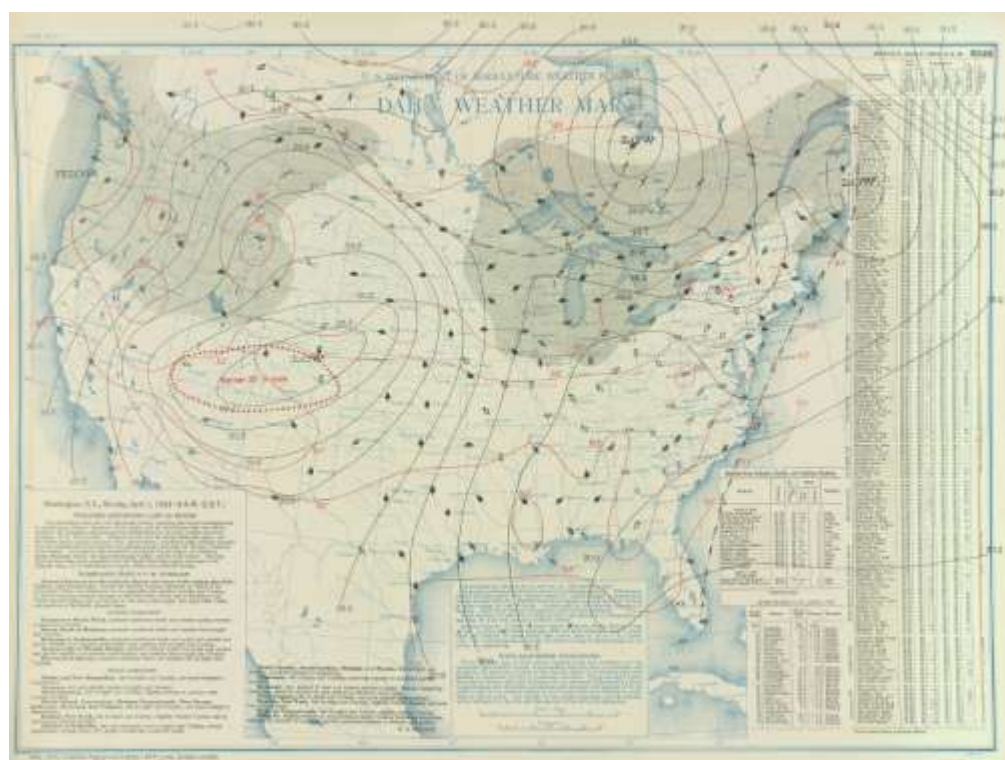



Figure 235: Daily Weather Map for Cheyenne, OK April 2, 1934



Figure 236: Daily Weather Map for Cheyenne, OK April 3, 1934

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS

STORM STUDIES - PERTINENT DATA SHEET



-LEGEND-
 Area covered by final isohyetal map.
 Area enclosed by 2-inch isohyetal.

LOCATION MAP

Storm of 3-4 April 1934
 Assignment SW 2-11
 Location Oklahoma and Texas
 Study Prepared by:
 Southwestern Division
 Tulsa District Office

Part I Reviewed by H. M. Sec. of
 Weather Bureau, 7/22/46
 Part II Approved by Office, Chief
 of Engineers for Distribution
 of Factual Data, 8/19/47

Remarks: Center near
 Cheyenne, Oklahoma
 Dewpt. 64° - Ref. Pt. 250 SE
 Grid G-17

DATA AND COMPUTATIONS COMPILED

PART I

Preliminary isohyetal map, in 1 sheet, scale 1:250,000
 Precipitation data and mass curves: (Number of Sheets)

Form 5001-C (Hourly precip. data)	2
Form 5001-B (24-hour " " " ")	-
Form 5001-D (" " " ")	7
Misc. precip. records, meteorological data, etc. (Supplemental Folder)	112
Form 5002 (Mass rainfall curves)	21

PART II

Final isohyetal maps, in 1 sheet, scale 1:250,000
 Data and computation sheets:

Form S-10 (Data from mass rainfall curves)	3
Form S-11 (Depth-area data from isohyetal map)	2
Form S-12 (Maximum depth-duration data)	4
Maximum duration-depth-area curves	1
Data relating to periods of maximum rainfall	1

MAXIMUM AVERAGE DEPTH OF RAINFALL IN INCHES

Area in Sq. Mi.	Duration of Rainfall in Hours									
	6	12	18							
Max. Station	20.0	23.0	23.0							
10	17.3	20.8	21.3							
100	14.4	17.1	17.7							
200	13.3	15.7	16.4							
500	11.5	13.5	14.0							
1,000	9.1	10.7	11.1							
2,000	6.2	7.3	7.5							
2,200	5.8	6.9	7.1							

Form S-2

Figure 237: USACE Depth-area-duration values for Cheyenne, OK April 1934

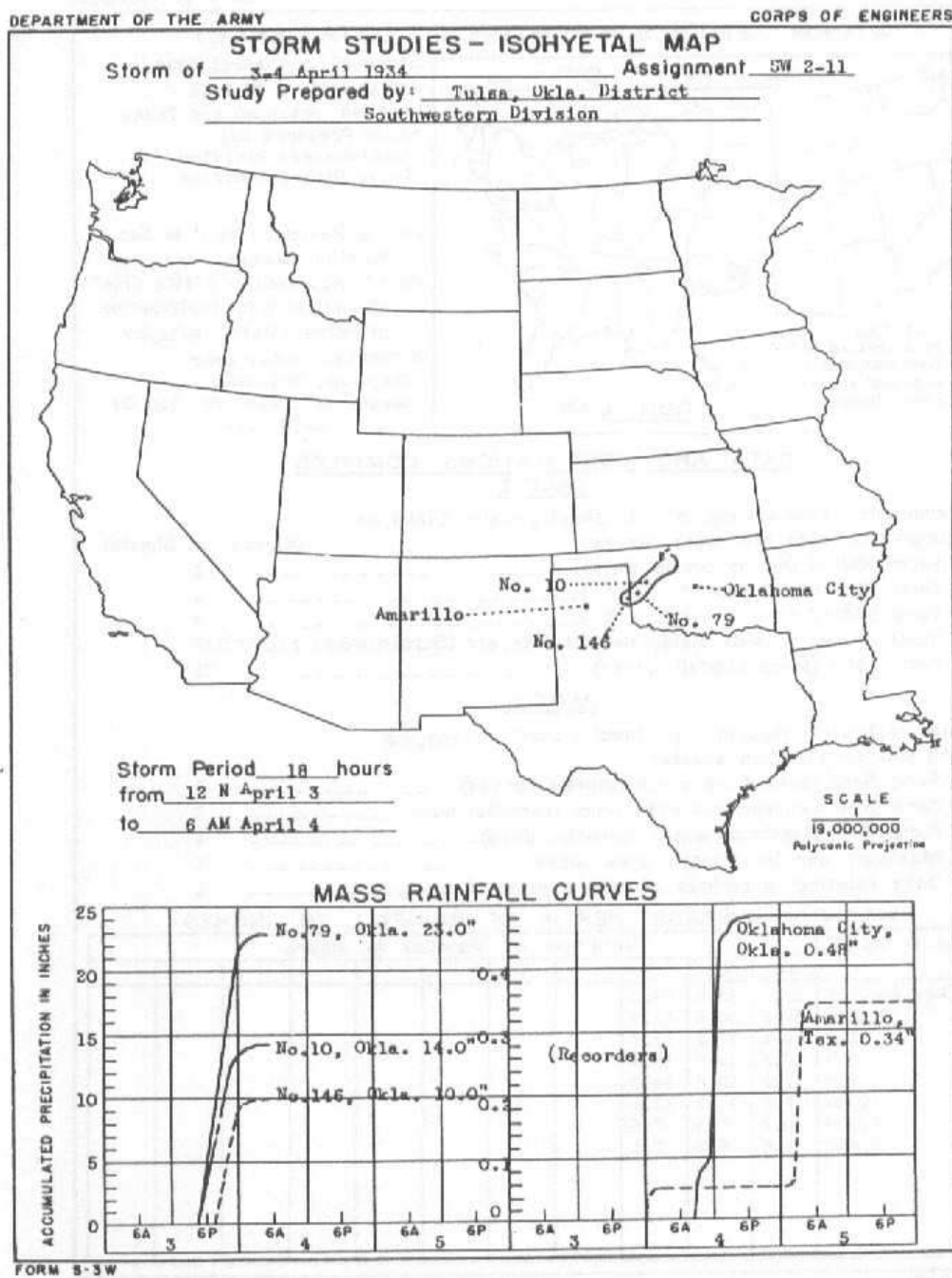


Figure 238: USACE Total storm isohyetal and mass curve chart for Cheyenne, OK April 1934

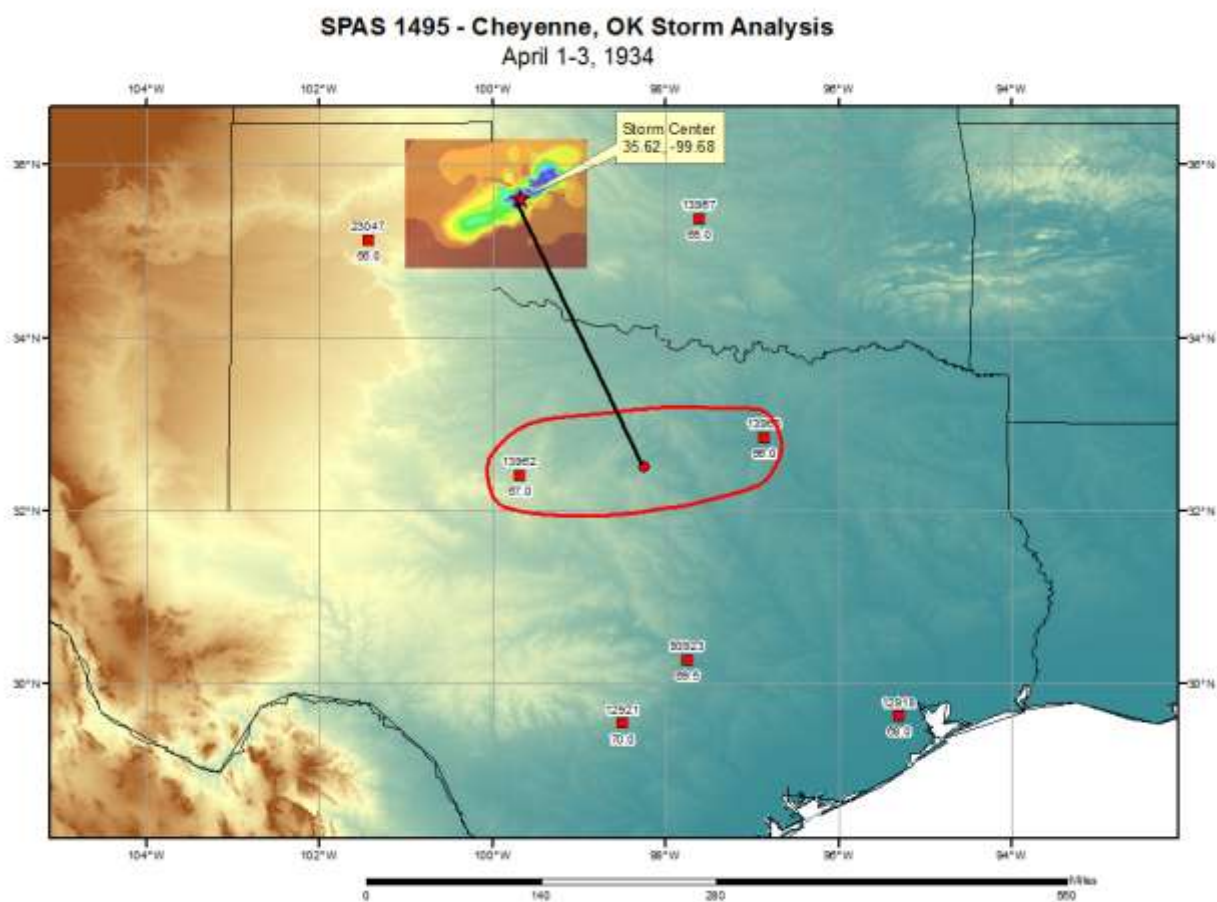


Figure 239: In-place storm representative dew point analysis for Cheyenne, OK April 1-3, 1934

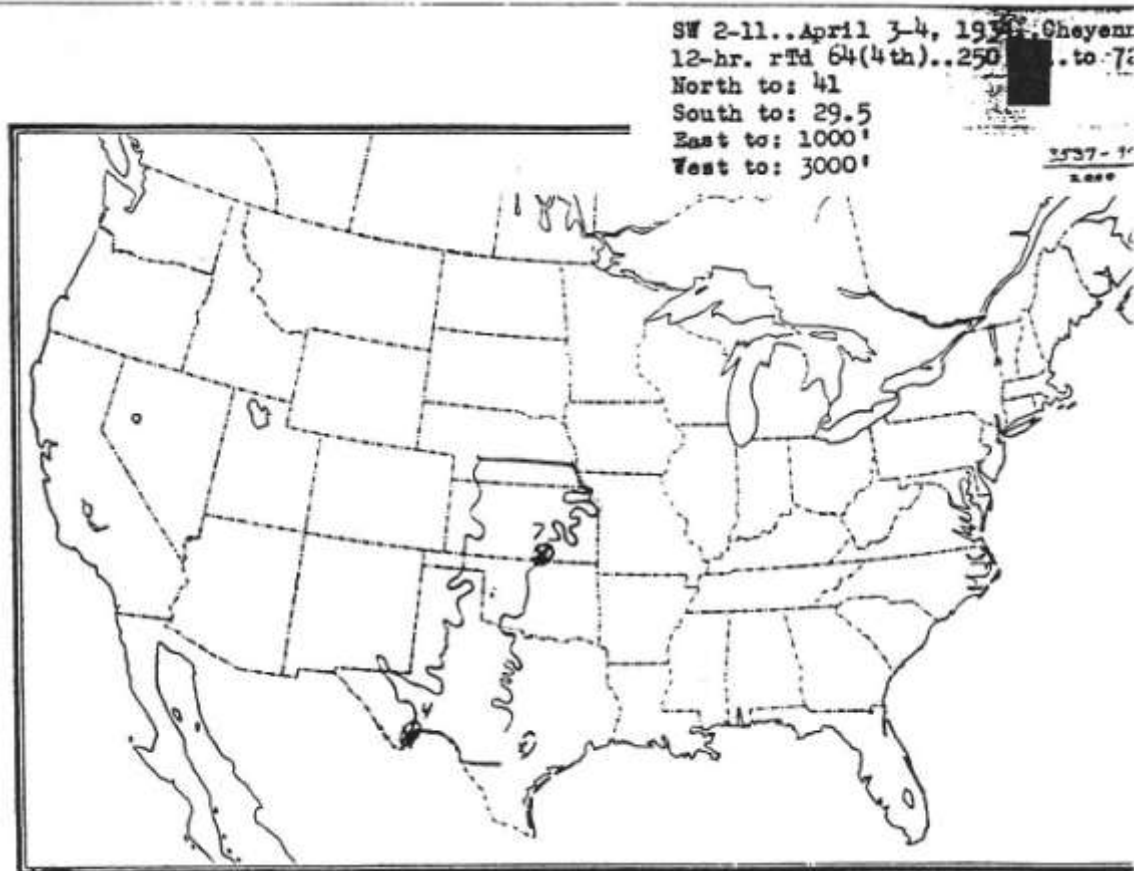


Figure 240: NWS Transposition Limit Map for Cheyenne, OK April 1934

Storm Precipitation Analysis System (SPAS) For Storm #1295 (re-run/expansion of Storm #1039)

General Storm Location: Eastern Colorado and southern Colorado Front Range

Storm Dates: May 29-31, 1935

Event: MCCs/Thunderstorms

DAD Zone 1

Latitude: 39.2375

Longitude: -104.4875

Max. Grid Rainfall Amount: 23.86"

Max. Observed Rainfall Amount: 24.00" ("estimated" via bucket survey in Elbert County, CO)

DAD Zone 2

Latitude: 39.32916

Longitude: -103.5375

Max. Grid Rainfall Amount: 12.65"

Max. Observed Rainfall Amount: 11.00" (Limon 19 NE)

DAD Zone 3

Latitude: 39.6125

Longitude: -102.2625

Max. Grid Rainfall Amount: 18.00"

Max. Observed Rainfall Amount: 18.00" (Idalia 5SE, CO near Holly; we excluded the highly unreliable reports of up to 24" in/around Holly)

Number of Stations: 102

SPAS Version: 9.5

Basemap: Final SPAS #1008 Precip Map, which used June 1965 Total Precipitation PRISM Grid

Spatial resolution: 30 seconds

Radar Included: No

Depth-Area-Duration (DAD) analysis: Yes

Reliability of results: This was a challenging storm to analyze given the lack of accurate measurements and hourly recording data. The storm analysis is consistent with the numerous other analyses of this storm by the USACE, USACE and NWS. Although we have a moderate degree of confidence in the magnitudes of precipitation; some areas reported heavy amounts of hail, which introduces error precipitation totals. We have low confidence in the precise precipitation patterns and temporal distributions given the lack of hourly data and radar data.

SPAS Storm ID	NAME	LON	LAT	ELEV Round	Storm Representative				Climatological Maximum				IPMF
					T _d	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	T _d	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	
1295_3	HALE	-102.263	39.613	3,700	76.50	3.07"	0.89"	2.175	78.0	3.29"	0.94"	2.350	1.08

Storm 1295 - May 29 (0800 UTC) - June 1 (0700 UTC), 1935															
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)															
Area (mi ²)	Duration (hours)														
	1	2	3	4	5	6	12	18	24	36	48	72	96	120	Total
0.3	9.31	14.64	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00
1	9.26	14.58	17.92	17.92	17.92	17.92	17.92	17.92	17.92	17.92	17.92	17.92	17.92	17.92	17.92
10	9.14	14.35	17.67	17.67	17.67	17.67	17.67	17.67	17.67	17.67	17.67	17.67	17.67	17.67	17.67
25	8.79	13.89	17.26	17.26	17.26	17.26	17.26	17.26	17.26	17.26	17.26	17.26	17.26	17.26	17.26
50	8.36	12.98	16.60	16.60	16.60	16.60	16.60	16.60	16.60	16.60	16.60	16.60	16.60	16.60	16.60
100	7.35	11.35	14.80	14.83	14.89	14.89	14.89	14.89	14.89	14.89	14.89	14.89	14.89	14.89	14.89
150	6.60	10.13	13.51	13.66	13.77	13.77	13.77	13.77	13.77	13.77	13.77	13.77	13.77	13.77	13.77
200	6.05	9.26	12.57	12.80	12.95	12.95	12.95	12.95	12.95	12.95	12.95	12.95	12.95	12.95	12.95
300	5.27	8.06	11.21	11.67	11.85	11.85	11.86	11.86	11.86	11.86	11.86	11.86	11.86	11.86	11.86
400	4.71	7.28	10.31	10.82	11.01	11.01	11.03	11.03	11.03	11.03	11.03	11.03	11.03	11.03	11.03
500	4.25	6.68	9.56	10.20	10.39	10.39	10.41	10.41	10.41	10.41	10.41	10.41	10.41	10.41	10.41
1,000	2.98	5.05	7.42	8.05	8.25	8.25	8.28	8.28	8.31	8.31	8.31	8.31	8.31	8.31	8.31
2,000	2.01	3.60	5.34	5.76	5.90	5.90	5.95	5.95	6.12	6.12	6.12	6.12	6.12	6.12	6.12
5,000	1.07	2.08	2.99	3.29	3.38	3.38	3.50	3.51	3.77	3.77	3.77	3.77	3.77	3.77	3.77
10,000	0.64	1.21	1.80	1.96	2.00	2.00	2.09	2.10	2.25	2.25	2.25	2.25	2.25	2.25	2.25
14,855	0.46	0.90	1.35	1.45	1.48	1.48	1.56	1.56	1.68	1.68	1.68	1.68	1.68	1.68	1.68

Figure 241: Depth-area-duration values for Hale, CO May 1935

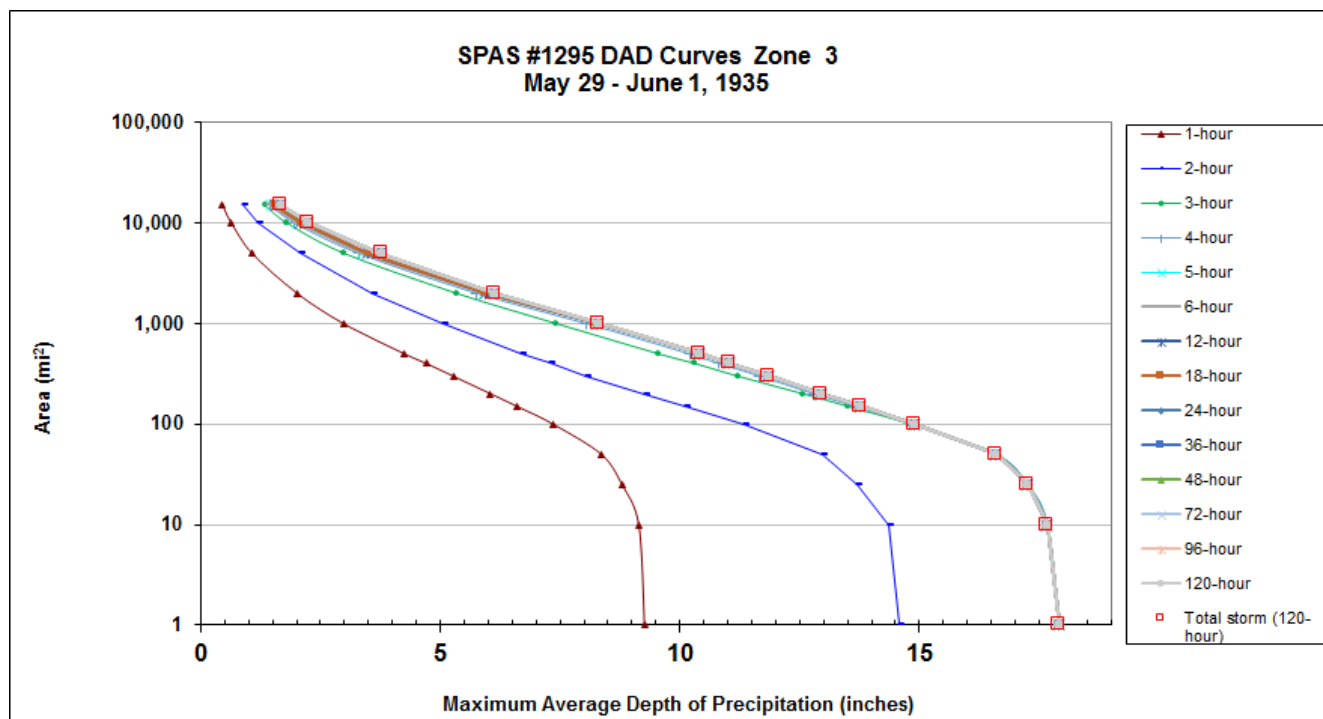


Figure 242: Depth-area-duration chart for Hale, CO May 1935

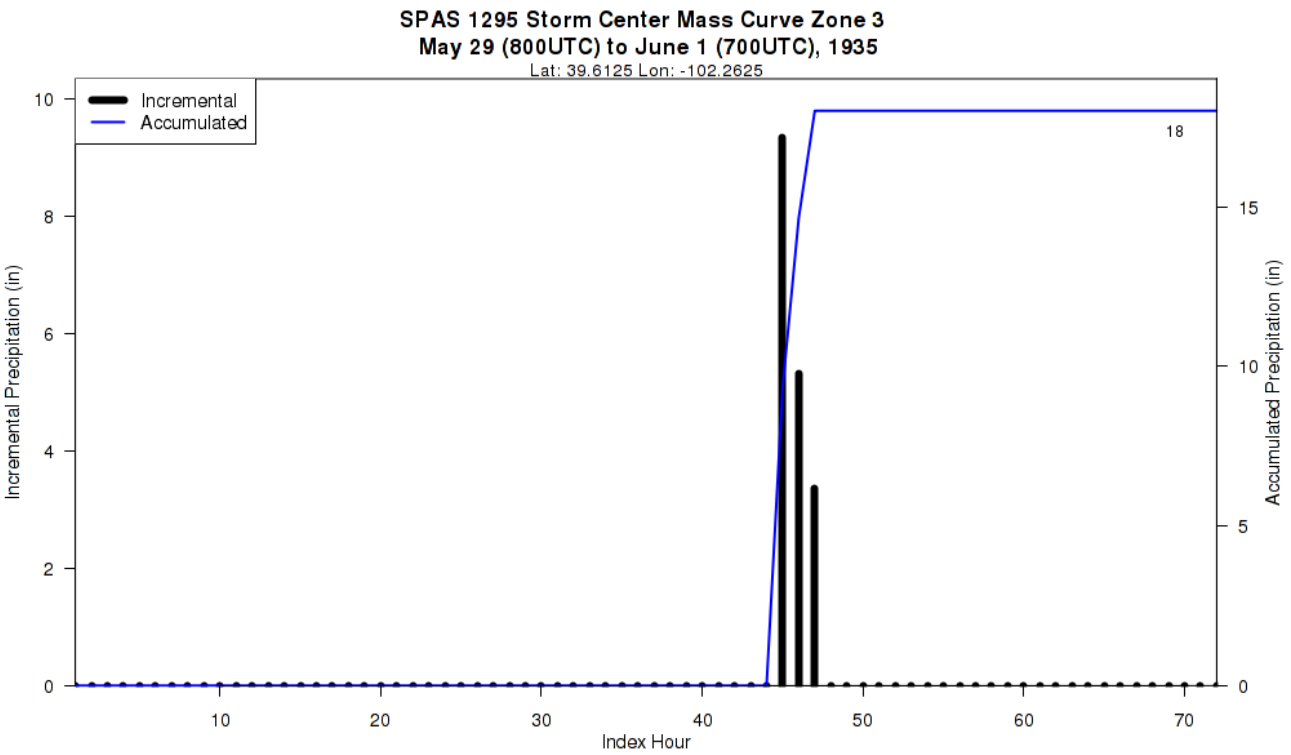


Figure 243: Mass curve chart for Hale, CO May 1935

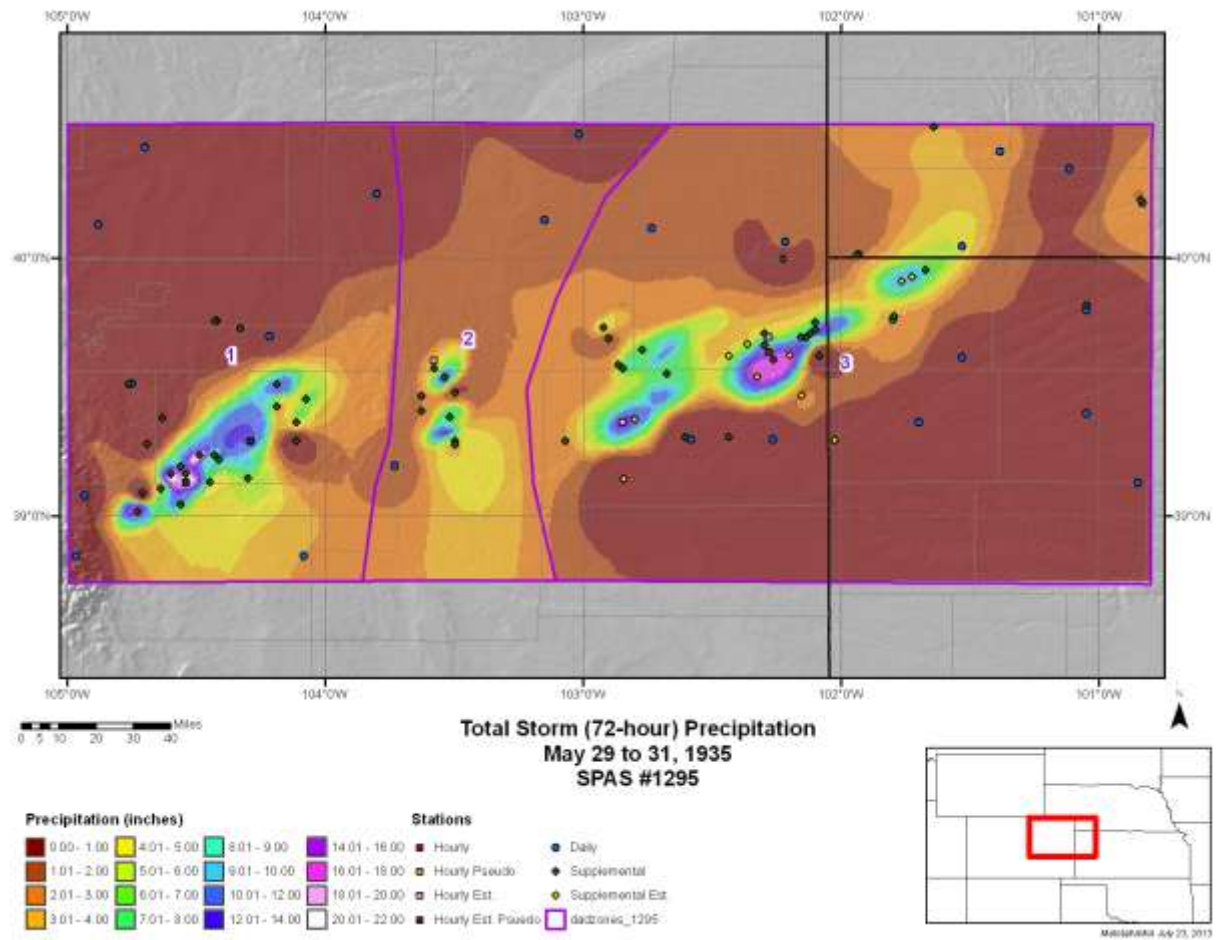


Figure 244: Total storm isohyetal analysis for Hale, CO May 1935

WAR DEPARTMENT
CORPS OF ENGINEERS, U.S. ARMY

STORM STUDIES - PERTINENT DATA SHEET

LOCATION MAP

Storm of May 30 - 31, 1935
Assignment M R 3 - 28 A
Location Eastern Colorado
Study Prepared by:
Missouri River Division
Kansas City District

Part I Reviewed by H. M. Sec. of
Weather Bureau, 11/16/42
Part II Approved by Office, Chief
of Engineers for Distribution
of Factual Data, 7/14/45

Remarks: Centers:
N.E. of Colorado Springs, Colo.
and N.E. of Burlington, Colo.

DATA AND COMPUTATIONS COMPILED

PART I

Preliminary isohyetal map, in 1 sheet, scale 1 : 1,000,000	
Precipitation data and mass curves:	(Number of Sheets)
Form 5001-C (Hourly precip. data)-----	29
Form 5001-B (24-hour " " " ")-----	64
Form 5001-D (" " " ")-----	3
Misc. precip. records, meteorological data, etc.-----	37
Form 5002 (Mass rainfall curves)-----	63

PART II

Final isohyetal maps, in 2 sheet, scale 1 : 1,000,000 & 1 : 500,000	
Data and computation sheets:	
Form S-10 (Data from mass rainfall curves)-----	3
Form S-11 (Depth-area data from isohyetal map)-----	2
Form S-12 (Maximum depth-duration data)-----	7
Maximum duration-depth-area curves-----	1
Data relating to periods of maximum rainfall-----	2

MAXIMUM AVERAGE DEPTH OF RAINFALL IN INCHES

Area in Sq. Mi.	Duration of Rainfall in Hours									
	6	12	18	24						
Max. Station	24.0	24.0	24.0	24.0						
5	22.1	23.3	23.3	23.3						
10	20.6	22.2	22.2	22.2						
20	18.8	20.7	20.7	20.7						
50	16.0	18.0	18.0	18.0						
100	13.7	15.4	15.4	15.4						
200	11.2	12.6	12.6	12.6						
500	7.8	9.3	9.3	9.3						
1,000	5.8	7.2	7.2	7.2						
2,000	4.1	5.3	5.5	5.5						
5,000	2.4	3.5	3.8	4.0						
6,300	2.1	3.1	3.6	3.8						

Form S-2

Figure 245: USACE Depth-area-duration values for Hale, CO May 1935

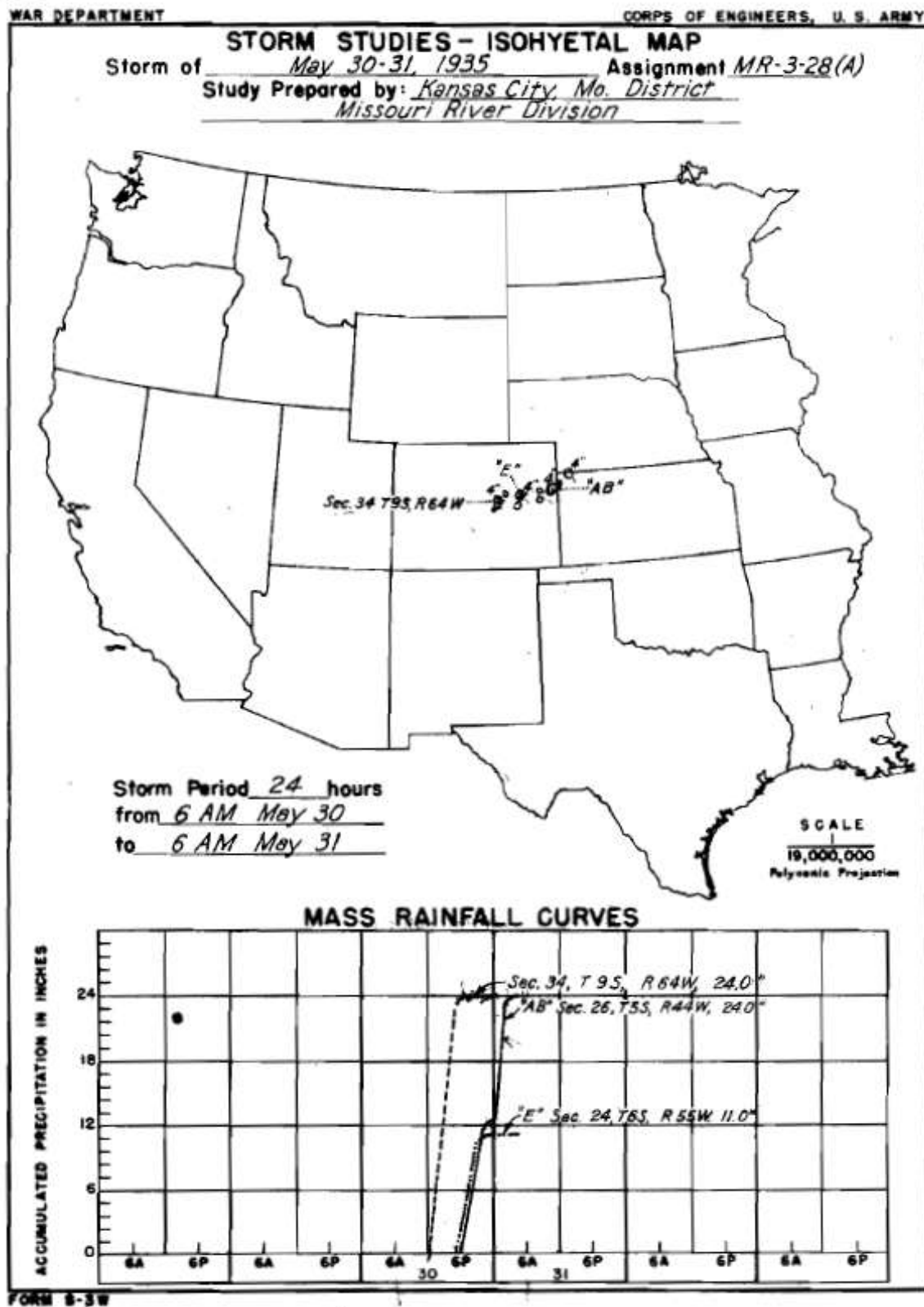


Figure 246: USACE Total storm isohyetal and mass curve chart for Hale, CO May 1935



Figure 247: Daily Weather Map for Hale, CO May 27, 1935



Figure 248: Daily Weather Map for Hale, CO May 28, 1935



Figure 249: Daily Weather Map for Hale, CO May 29, 1935



Figure 250: Daily Weather Map for Hale, CO May 30, 1935



Figure 251: Daily Weather Map for Hale, CO May 31, 1935



Figure 252: Daily Weather Map for Hale, CO June 1, 1935

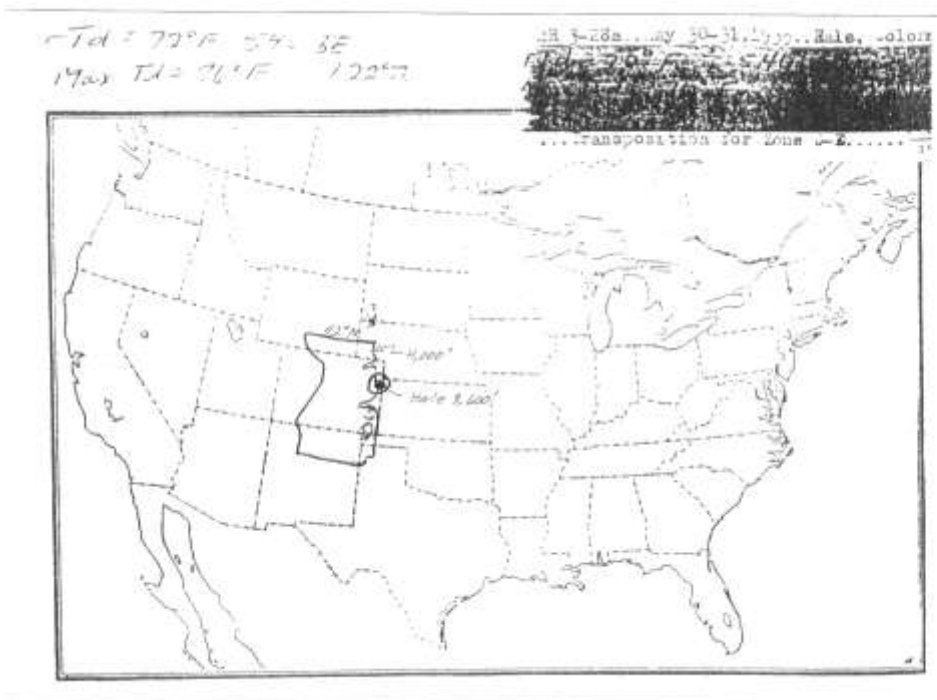


Figure 254: NWS Transposition Limit Map for Hale, CO May 1935

Storm Precipitation Analysis System (SPAS) For Storm #1496

General Storm Location: Woodward Ranch, TX (31.1, -101.0, 27.7, -97.2)

Storm Dates: May 30 – June 1, 1935

Event: Extreme Precipitation Event

DAD Zone 1

Latitude: 29.4792

Longitude: -99.3875

Max. Grid Rainfall Amount: 21.93"

Max. Observed Rainfall Amount: 21.84" Woodward Ranch, TX

Number of Stations: 58

SPAS Version: 10

Base Map Used: PRISM Monthly Basemap for September 1941(us_ppt_1941_09_30sec_in)

Spatial resolution: 0.2882

Radar Included: No

Depth-Area-Duration (DAD) analysis: Yes

Degree of confidence in results: In addition to the NCDC stations, twenty-five supplemental stations were added to ensure data consistency. Due to the amount and integrity of the U.S. Army Corps of Engineers (USACE), one hourly station was digitized based on the mass rainfall curves from the USACE report. With the density of stations available and the consistency of the resulting SPAS analysis to the U.S. Army Corps of Engineers report, this analysis is deemed quite reliable to the fact that this analysis only had one hourly station. Attempts were made to the USACE branches for the full storm reports to no avail.

SPAS Storm ID	NAME	LON	LAT	ELEV Round	Storm Representative				Climatological Maximum				IPMF
					T _d	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	T _d	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	
1496_1	WOODWARD RANCH	-99.388	29.479	1,200	77.00	3.14"	0.32"	2.820	80.5	3.68"	0.36"	3.320	1.18

Storm 1496 - May 30 (0700 UTC) - May 30 (1900 UTC), 1935															
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)															
Area (mi ²)	Duration (hours)														
	1	2	3	4	5	6	12	18	24	36	48	72	96	120	Total
0.3	10.40	15.01	21.86	21.86	21.86	21.86	21.86	21.86	21.86	21.86	21.86	21.86	21.86	21.93	21.93
1	10.33	14.89	21.68	21.68	21.68	21.68	21.68	21.68	21.68	21.68	21.68	21.68	21.68	21.68	21.68
10	9.95	14.15	20.61	20.61	20.61	20.61	20.61	20.61	20.61	20.61	20.61	20.61	20.61	20.61	20.61
25	9.18	13.17	19.21	19.21	19.21	19.21	19.22	19.22	19.22	19.22	19.22	19.22	19.22	19.22	19.22
50	8.42	12.16	17.80	17.80	17.80	17.80	17.82	17.82	17.82	17.82	17.82	17.82	17.82	17.82	17.82
100	7.69	10.76	15.90	15.90	15.90	15.90	15.93	15.93	15.93	15.93	15.93	15.93	15.93	15.93	15.93
150	7.18	9.88	14.71	14.71	14.71	14.71	14.73	14.73	14.73	14.73	14.73	14.73	14.73	14.73	14.73
200	6.82	9.26	13.87	13.87	13.87	13.87	13.90	13.90	13.90	13.90	13.90	13.90	13.90	13.90	13.90
300	6.19	8.38	12.69	12.69	12.69	12.69	12.72	12.72	12.72	12.72	12.72	12.72	12.72	12.72	12.72
400	5.70	7.68	11.79	11.79	11.79	11.79	11.83	11.83	11.83	11.83	11.83	11.83	11.83	11.83	11.83
500	5.31	7.23	11.06	11.06	11.06	11.06	11.10	11.10	11.10	11.10	11.10	11.10	11.10	11.10	11.10
1,000	4.08	5.82	8.87	8.87	8.87	8.87	8.90	8.90	8.90	8.90	8.90	8.90	8.90	8.90	8.90
2,000	2.88	4.35	6.82	6.82	6.82	6.82	6.84	6.84	6.84	6.84	6.84	6.84	6.84	6.84	6.84
2,355	2.61	4.00	6.33	6.33	6.33	6.33	6.34	6.34	6.34	6.34	6.34	6.34	6.34	6.34	6.34

Figure 255: Depth-area-duration values for Woodward Ranch, TX May 1935

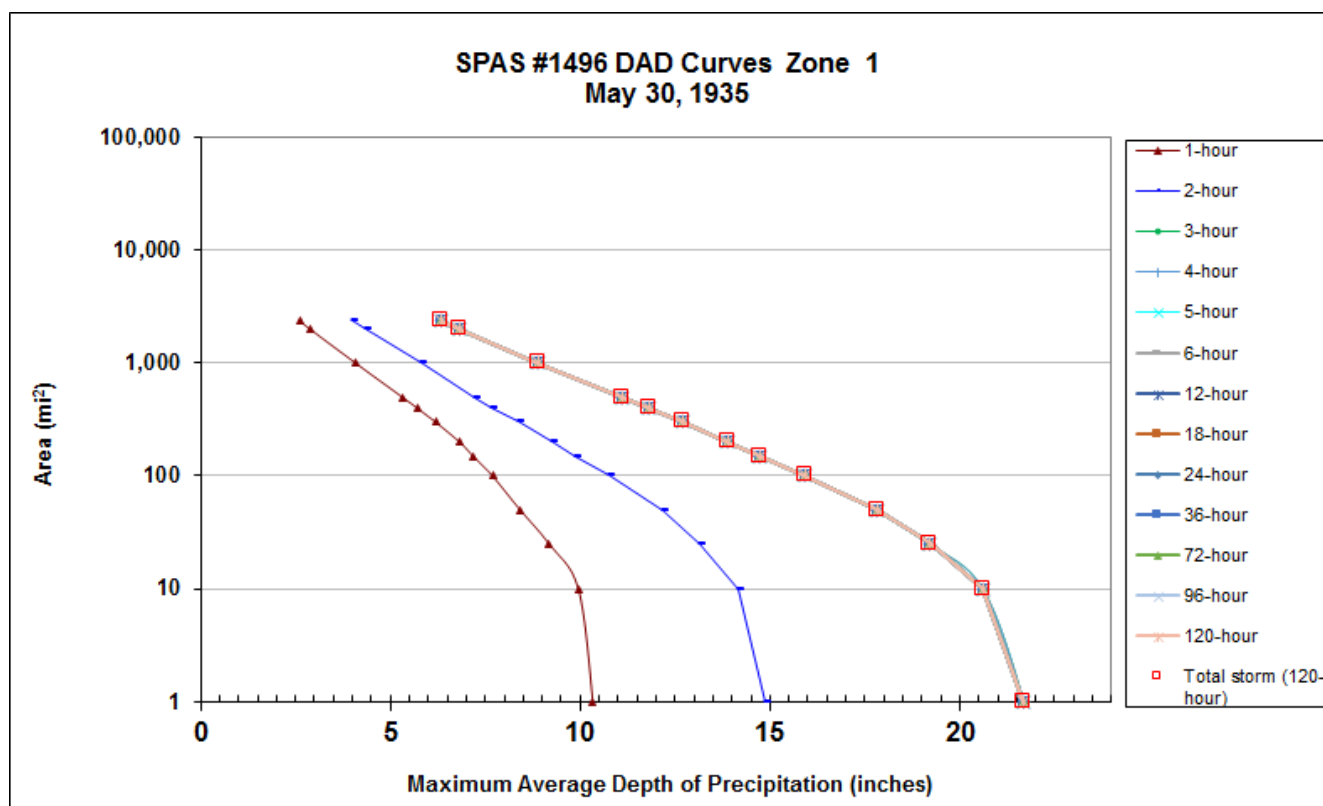


Figure 256: Depth-area-duration chart for Woodward Ranch, TX May 1935

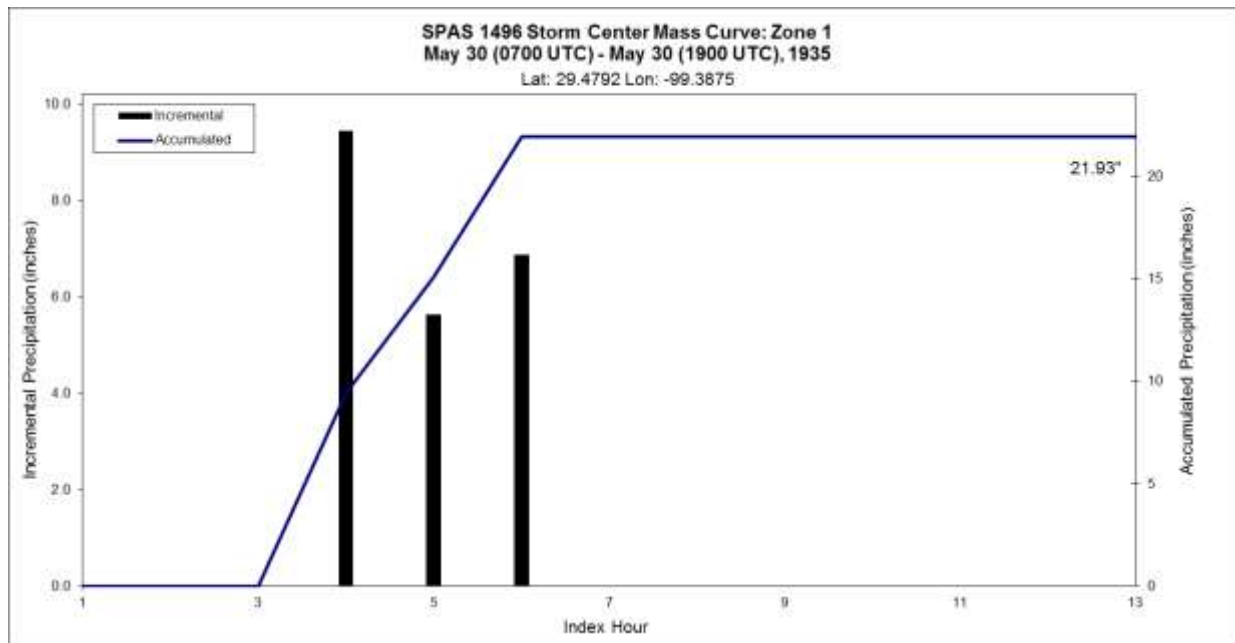


Figure 257: Mass curve chart for Woodward Ranch, TX May 1935

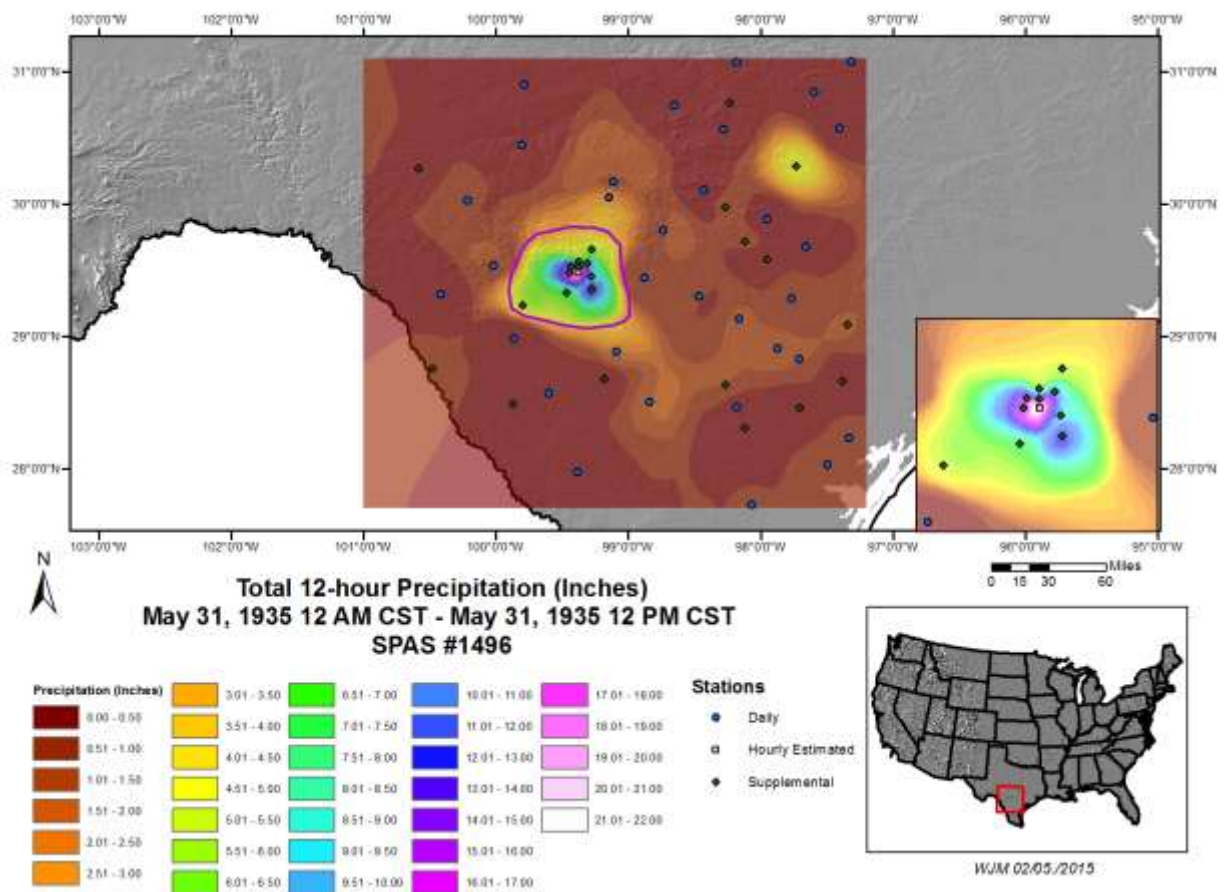
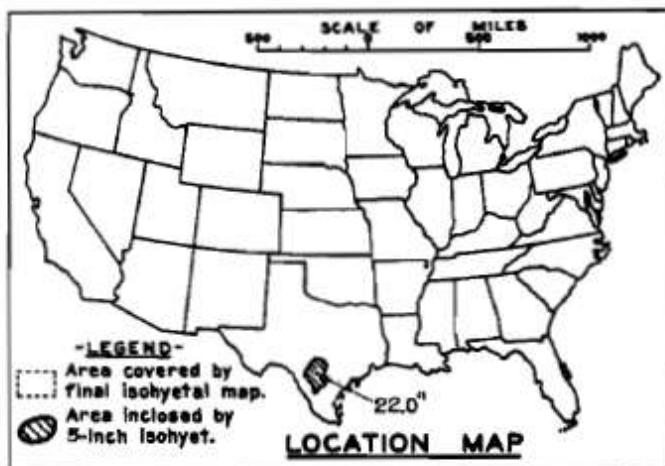


Figure 258: Total storm isohyetal analysis for Woodward Ranch, TX May 1935

WAR DEPARTMENT

CORPS OF ENGINEERS, U. S. ARMY

STORM STUDIES - PERTINENT DATA SHEET

Storm of May 31, 1935

Assignment G M 5 - 20

Location Southwestern Texas

Study Prepared by:

Southwestern Division

Galveston District Office

Part I Reviewed by H. M. Sec. of
Weather Bureau, 5/8/44Part II Approved by Office, Chief
of Engineers for Distribution
of Factual Data, 2/27/45

Remarks: Center at :

Woodward Ranch, New Mexico

DATA AND COMPUTATIONS COMPILED**PART I**

Preliminary isohyetal map, in 1 sheet, scale 1 : 1,000,000

Precipitation data and mass curves: (Number of Sheets)

Form 5001-C (Hourly precip. data)----- 4

Form 5001-B (24-hour " ")----- -

Form 5001-D (" " ")----- 4

Misc. precip. records, meteorological data, etc.----- 1

Form 5002 (Mass rainfall curves)----- 10

PART II

Final isohyetal maps, in 1 sheet, scale 1 : 1,000,000

Data and computation sheets:

Form S-10 (Data from mass rainfall curves)----- 1

Form S-11 (Depth-area data from isohyetal map)----- 1

Form S-12 (Maximum depth-duration data)----- 2

Maximum duration-depth-area curves----- 1

Data relating to periods of maximum rainfall----- -

MAXIMUM AVERAGE DEPTH OF RAINFALL IN INCHES

Area in Sq. Mi.	Duration of Rainfall in Hours									
	2	4	6	8	10					
Max. Station	15.0	22.0	22.0	22.0	22.0					
5	13.0	20.6	21.0	21.0	21.0					
10	12.9	20.1	20.5	20.5	20.5					
50	12.1	17.9	18.2	18.2	18.2					
100	11.1	16.0	16.4	16.4	16.4					
200	9.7	13.5	14.0	14.0	14.0					
500	7.6	10.1	10.9	11.0	11.0					
1,000	5.8	7.8	8.6	8.8	8.9					
2,000	4.3	5.7	6.5	6.8	6.9					
4,000	3.0	4.0	4.6	4.8	4.9					
5,000	2.6	3.5	4.0	4.2	4.3					
7,000	2.1	2.8	3.2	3.3	3.4					

Form S-2

Figure 259: USACE Depth-area-duration values for Woodward Ranch, TX May 1935

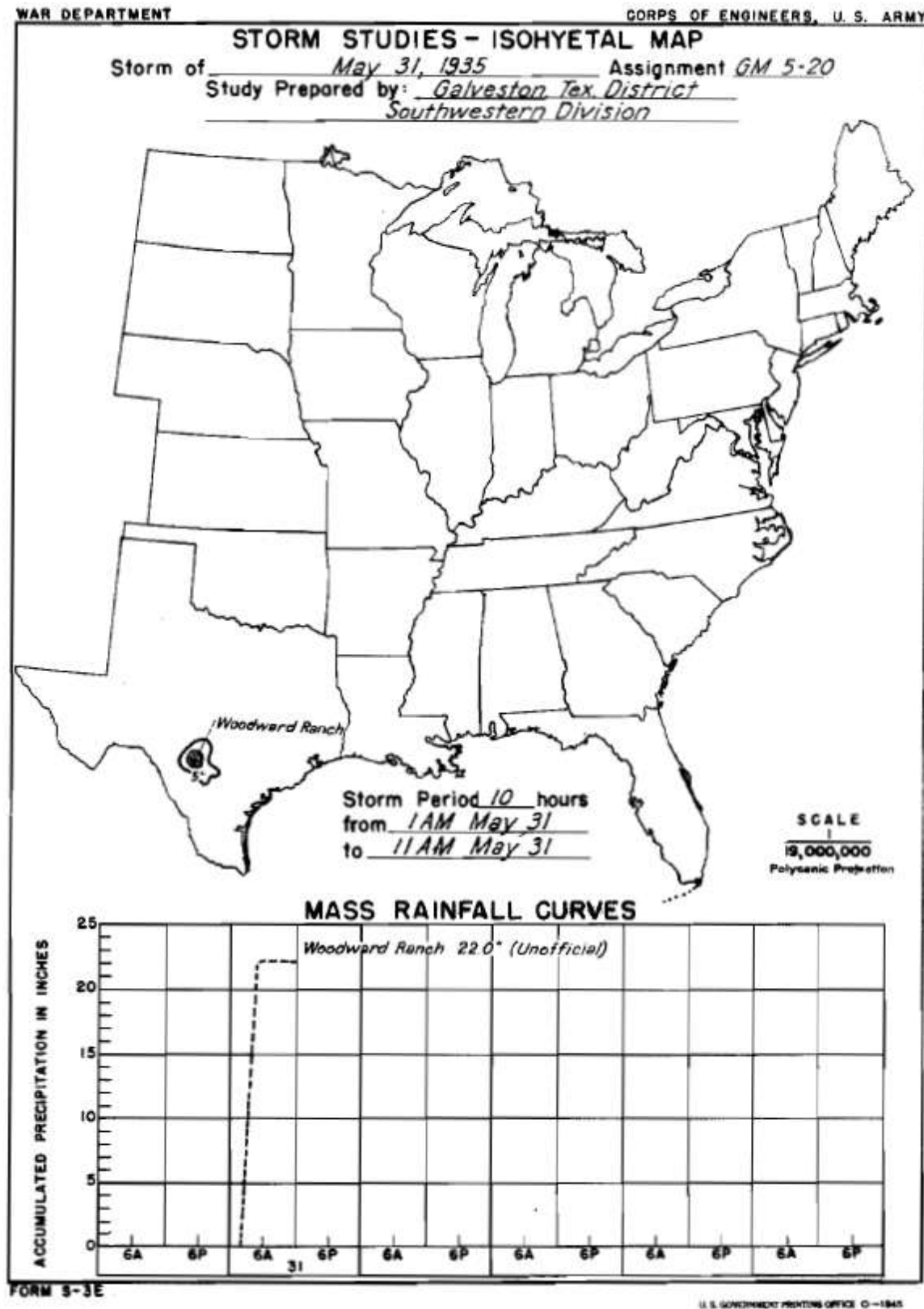


Figure 260: USACE Total storm isohyetal and mass curve chart for Woodward Ranch, TX May 1935



Figure 261: Daily Weather Map for Woodward Ranch, TX May 29, 1935



Figure 262: Daily Weather Map for Woodward Ranch, TX May 30, 1935



Figure 263: Daily Weather Map for Woodward Ranch, TX May 31, 1935



Figure 264: Daily Weather Map for Woodward Ranch, TX June 1, 1935

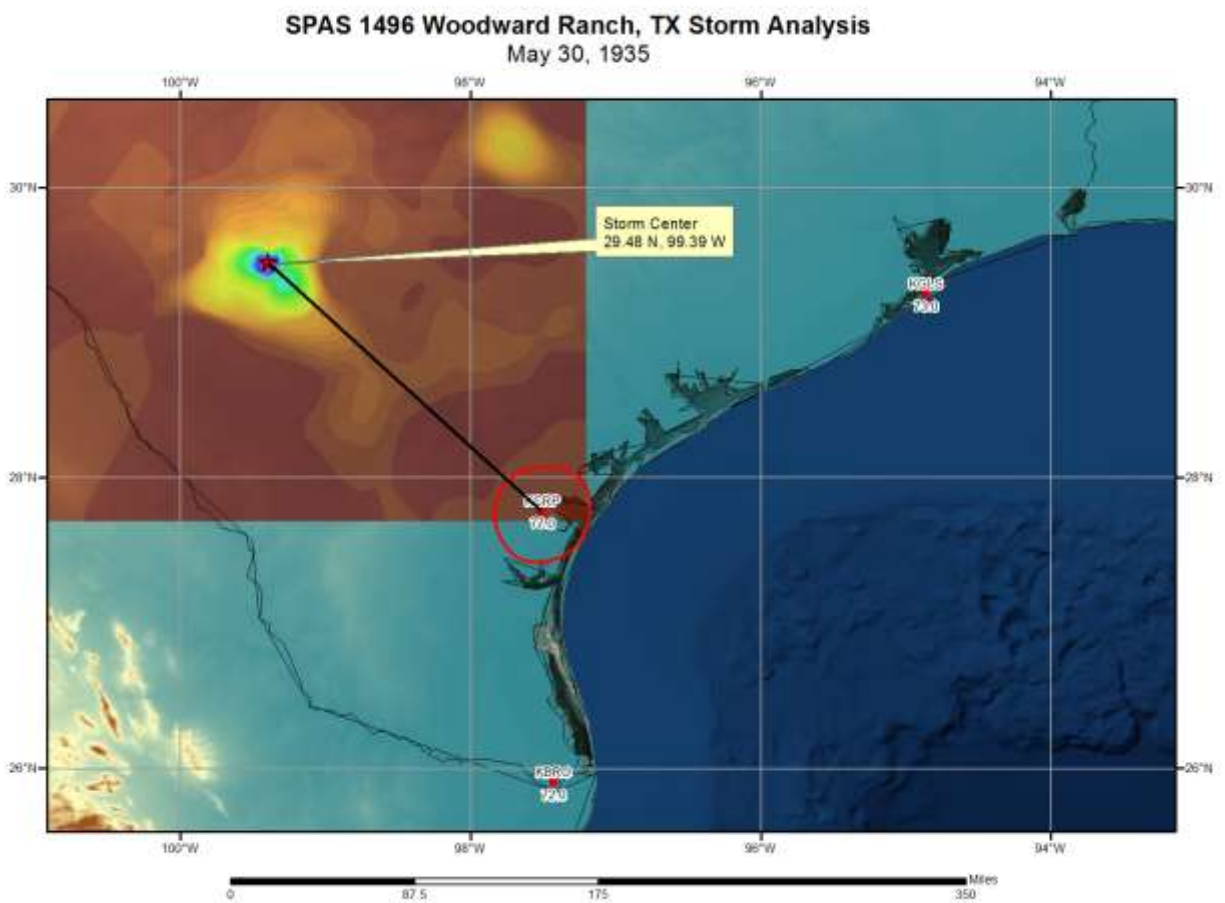


Figure 265: In-place storm representative dew point analysis for Woodward Ranch, TX May 30, 1935

11.

Storm Date	Assignment Number	Representative Storm Dewpoint	Reference Point
<u>1932 (cont.)</u>			
Oct 4-6	NA 1-21	69	180 S of Elks Park, N. Y.
Oct 14-18	SA 5-11B	70	260 SE of Tuscaloosa, Ala.
Oct 15-18	SA 5-11A	71	210 SE of Rocky Mount, Va.
Nov 4-9	SA 4-28	75	50 SE of Canal Point, Fla.
Dec 8-14	GM 2-11	64	175 SE of Tallahassee, Miss.
Dec 21-24	SW 2-9	64	250 SE of Sulphur, Okla.
<u>1933</u>			
Apr 11-14	NA 1-23	61	650 SW of Durham, N. C.
Jun 28-29	UMV 2-15	70	175 S of Corin, Mo.
Jul 22-27	LMV 2-26	76	190 SE of Logansport, La.
Jul 24	SA 1-11	70	100 S of Lakeville, Pa.
Aug 20-24	NA 1-24A	70	80 SE of Peekamoose, N. Y.
Aug 20-24	NA 1-24B	70	80 E of York, Pa.
Sep 3-8	SA 4-30	73	140 SE of Clermont, Fla.
Sep 14-18	NA 1-25	76	490 SW of Provincetown, Mass.
Dec 15-20	SW 2-10	66	210 S of Stuttgart, Ark.
<u>1934</u>			
Feb 27-Mar 4	LMV 4-19	65	250 E of De Ridder, La.
Apr 3-4	SW 2-11	64	250 SE of Cheyenne, Okla.
Jun 12-16	SA 5-1	77	50 SW of St. Leo, Fla.
Sep 5-9	SA 5-12	73	110 SW of Beaufort, N. C.
Sep 16-19	NA 1-26	70	70 E of Emmitsburg, Md.
Oct 16-18	MR 3-27	67	150 SSE of Sedan, Kans.
Nov 19-21	LMV 1-18	69	140 SW of Millry, Ala.
<u>1935</u>			
Jan 18-21	LMV 1-19	63	180 SSW of Hernando, Miss.
May 2-7	LMV 4-20	73	100 ESE of Melville, La.
May 16-20	LMV 4-21	73	85 S of Simmesport, La.
May 27-Jun 2	MR 3-28B	70	175 S of Chanute, Kans.
May 30-31	MR 3-28A	68	325 SSE of Hale, Colo.
May 31	GM 5-20	74	200 SE of D'Hanis, Tex.
Jun 10-15	GM 5-2	75	230 SE of Sogovia, Tex.
Jun 12-18	SW 2-13	74	160 SSE of Waldron, Ark.
Jun 21-22	OR 5-5	70	180 SW of Greenville, Ky.
Jun 25-26	UMV 3-14	69	160 S of Clinton, Mo.
Jul 6-10	NA 1-27	71	220 SSW of Hector, N. Y.
Aug 6-7	OR 9-11	73	250 SW of Keene, Ohio.
Sep 2-6	SA 1-26	76	210 S of Easton, Md.
Sep 2-7	GM 5-3	75	300 SE of Ballinger, Tex.
Dec 5-8	GM 5-4	64	60 SE of Batsuma, Tex.

Figure 266: USACE storm representative dew point for Woodward Ranch, TX May 1935

Storm Precipitation Analysis System (SPAS) For Storm #1485

General Storm Location: Southwest New Mexico 33.8,-109.0,31.7,-105.9

Storm Dates: August 30, 1935

Event: Mesoscale convective event

DAD Zone 1

Latitude: 32.3042

Longitude: -106.7958

Max. Grid Rainfall Amount: 10.03"

Max. Observed Rainfall Amount: 10.00"

Number of Stations: 30

SPAS Version: 10

Base Map Used: Combination of manually digitized contours using isohyetal map from a report by Leopold on the storm and a two-year six-hour prism climatological basemap.

Spatial resolution: 0.2785

Radar Included: No

Depth-Area-Duration (DAD) analysis: Yes

Degree of confidence in results: One of the two hourly stations used in this analysis was manually digitized from the L.B. Leopold report of the storm. The other hourly station was estimated based on timing provided by nearby daily cooperative reports. While not many hourly stations were used, the area and duration of the storm were both fairly small, so they are sufficient in providing a high degree of accuracy of the timing of this storm. Ten of the eleven supplemental stations were converted from daily station type due to uncertainty in observation time. The eleventh supplemental station was estimated based on a report from the PMP analysis of the storm. With all of the data being thoroughly inspected and the precipitation totals for various periods throughout the storm being consistent with previous reports, this analysis is considered to be reliable.

SPAS Storm ID	NAME	LON	LAT	ELEV Round	Storm Representative				Climatological Maximum				IPMF
					T _s	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	T _s	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	
1485_1	LAS CRUCES	-106.796	32.304	3,900	78.00	3.29"	0.98"	2,310	80.0	3.60"	1.05"	2,550	1.10

Storm 1485 - August 30 (0600 UTC) - August 30 (1400 UTC), 1935														
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)														
Area (mi ²)	Duration (hours)													
	1	2	3	4	5	6	12	18	24	36	48	72	96	120
0.3	4.33	6.55	7.93	9.43	9.85	9.84	9.99	9.99	9.99	9.99	9.99	9.99	9.99	10.03
1	4.29	6.50	7.89	9.36	9.58	9.77	9.91	9.91	9.91	9.91	9.91	9.91	9.91	9.91
10	4.08	6.19	7.49	8.90	9.11	9.29	9.44	9.44	9.44	9.44	9.44	9.44	9.44	9.44
25	3.74	5.66	6.85	8.14	8.34	8.50	8.64	8.64	8.64	8.64	8.64	8.64	8.64	8.64
50	3.42	5.17	6.25	7.44	7.62	7.76	7.89	7.89	7.89	7.89	7.89	7.89	7.89	7.89
100	3.05	4.62	5.59	6.65	6.81	6.94	7.05	7.05	7.05	7.05	7.05	7.05	7.05	7.05
150	2.76	4.18	5.06	6.02	6.16	6.28	6.38	6.38	6.38	6.38	6.38	6.38	6.38	6.38
200	2.54	3.84	4.65	5.53	5.66	5.77	5.86	5.86	5.86	5.86	5.86	5.86	5.86	5.86
300	2.21	3.34	4.04	4.81	4.92	5.02	5.10	5.10	5.10	5.10	5.10	5.10	5.10	5.10
400	1.99	3.01	3.64	4.34	4.44	4.52	4.61	4.61	4.61	4.61	4.61	4.61	4.61	4.61
500	1.82	2.75	3.33	3.96	4.06	4.14	4.22	4.22	4.22	4.22	4.22	4.22	4.22	4.22
1,000	1.36	2.06	2.49	2.97	3.04	3.10	3.17	3.17	3.17	3.17	3.17	3.17	3.17	3.17
2,000	0.99	1.50	1.82	2.17	2.22	2.27	2.33	2.33	2.33	2.33	2.33	2.33	2.33	2.33
5,000	0.59	0.89	1.07	1.31	1.38	1.42	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48
10,000	0.39	0.56	0.69	0.85	0.93	0.96	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
20,000	0.25	0.36	0.44	0.55	0.62	0.65	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69
25,836	0.20	0.30	0.38	0.47	0.54	0.56	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60

Figure 267: Depth-area-duration values for Las Cruces, NM August 1935

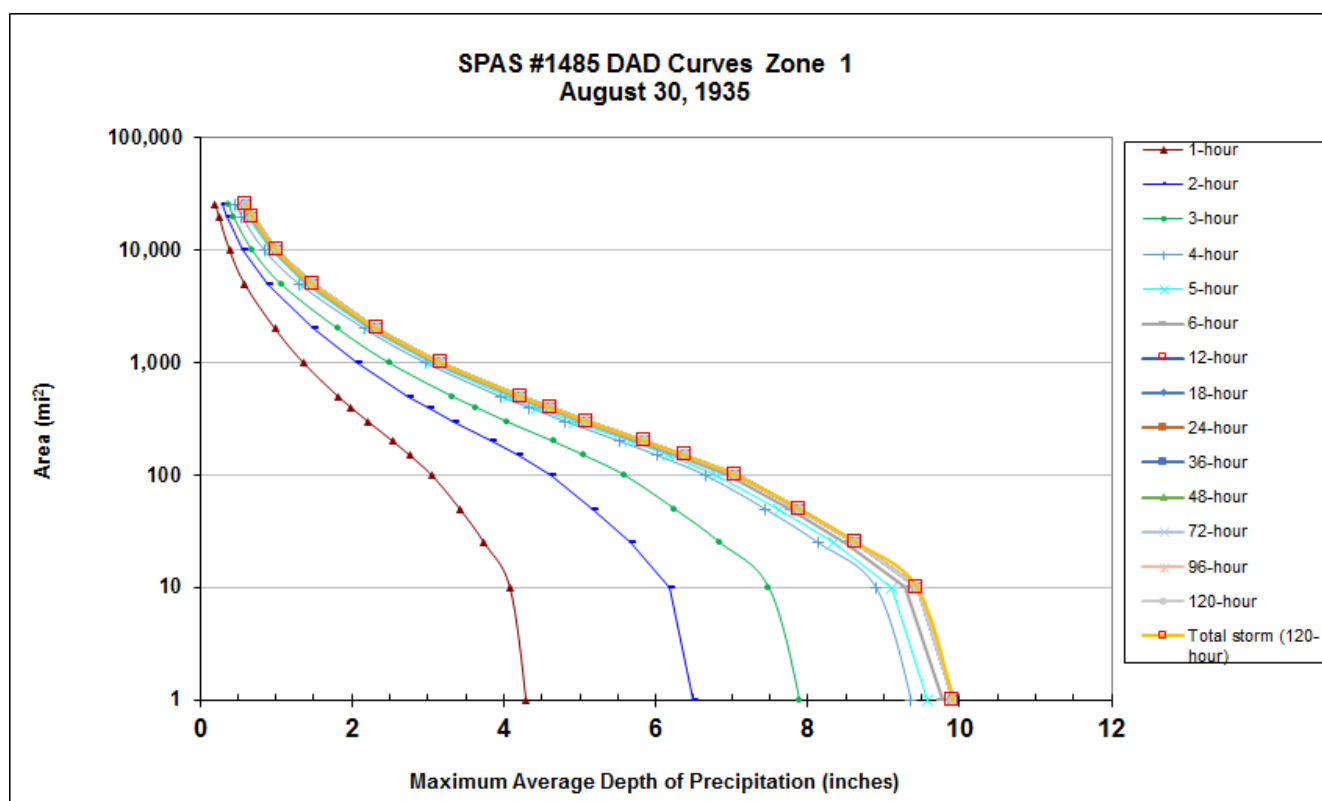


Figure 268: Depth-area-duration chart for Las Cruces, NM August 1935

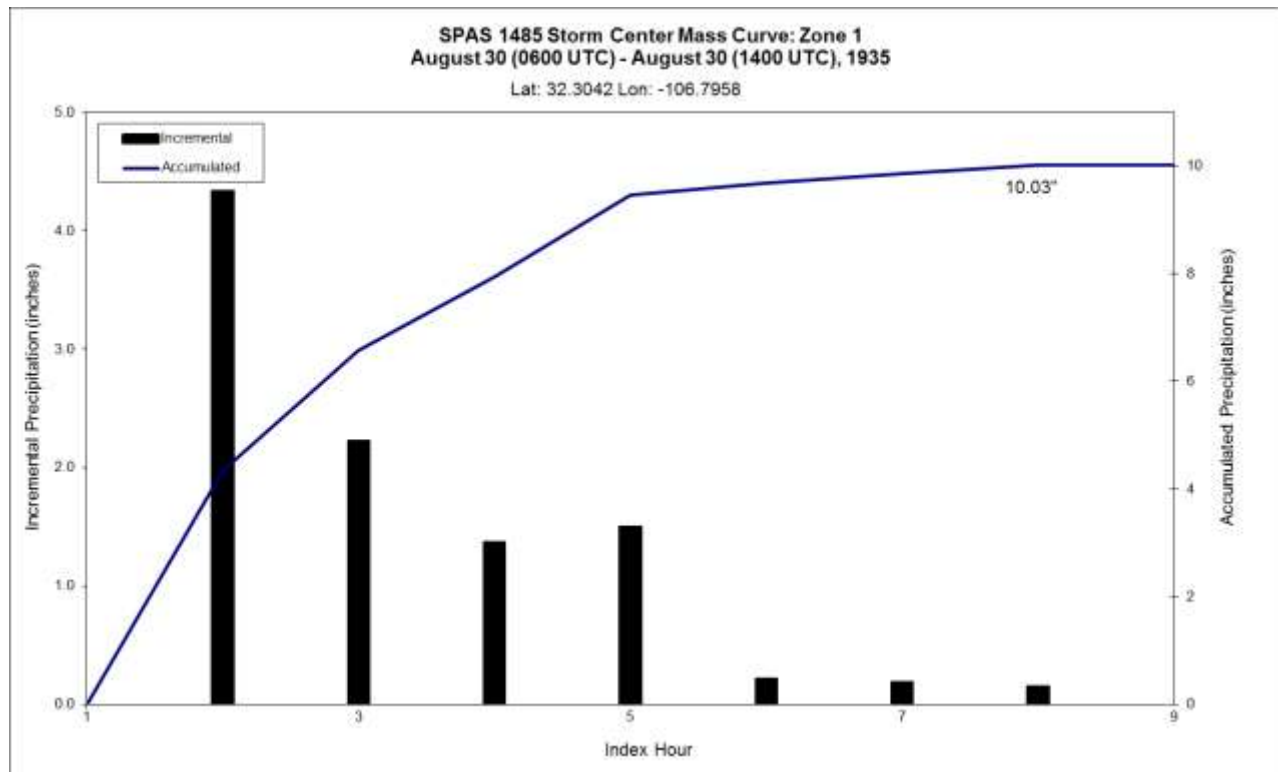


Figure 269: Mass curve chart for Las Cruces, NM August 1935

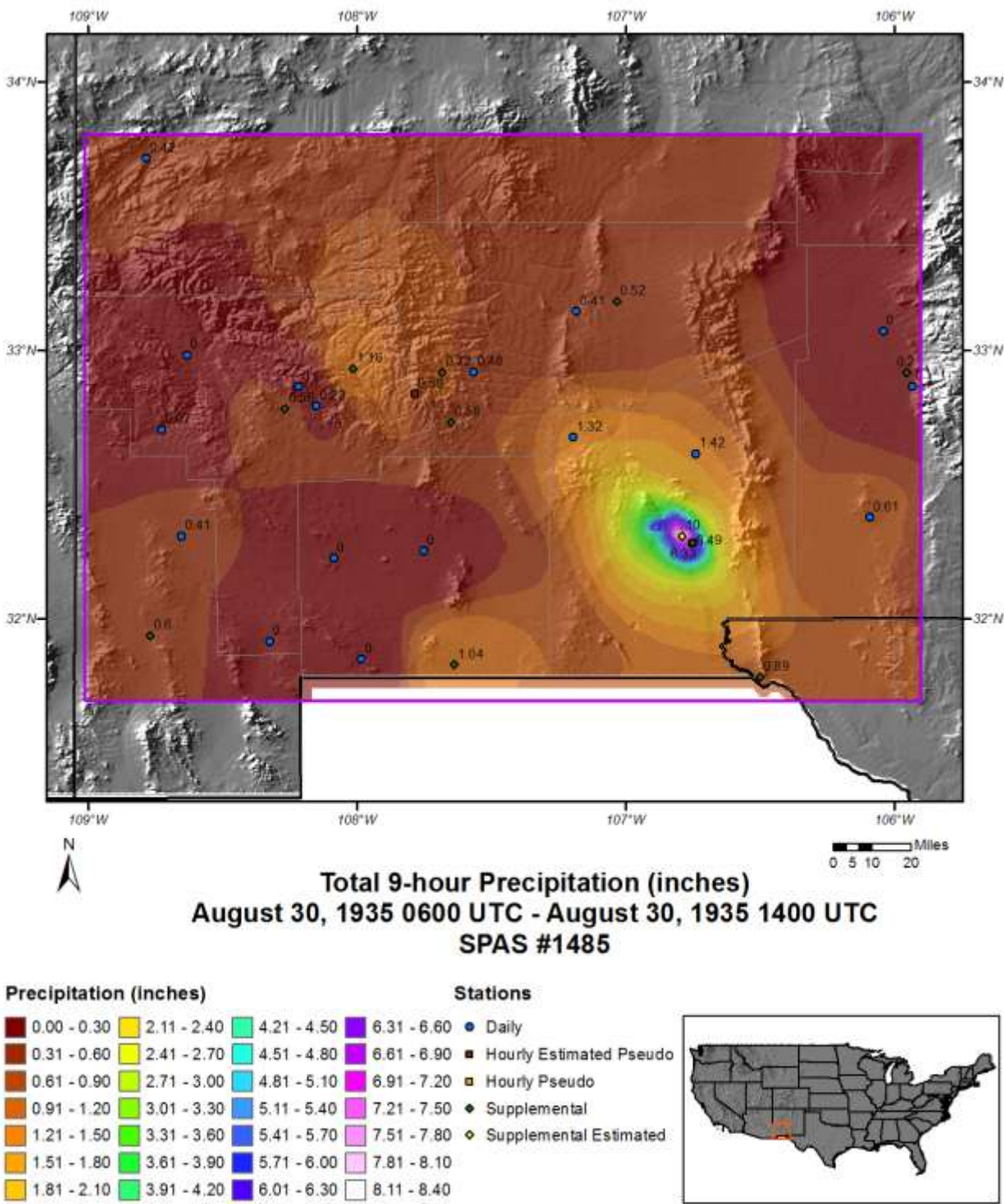


Figure 270: Total storm isohyetal analysis for Las Cruces, NM August 1935

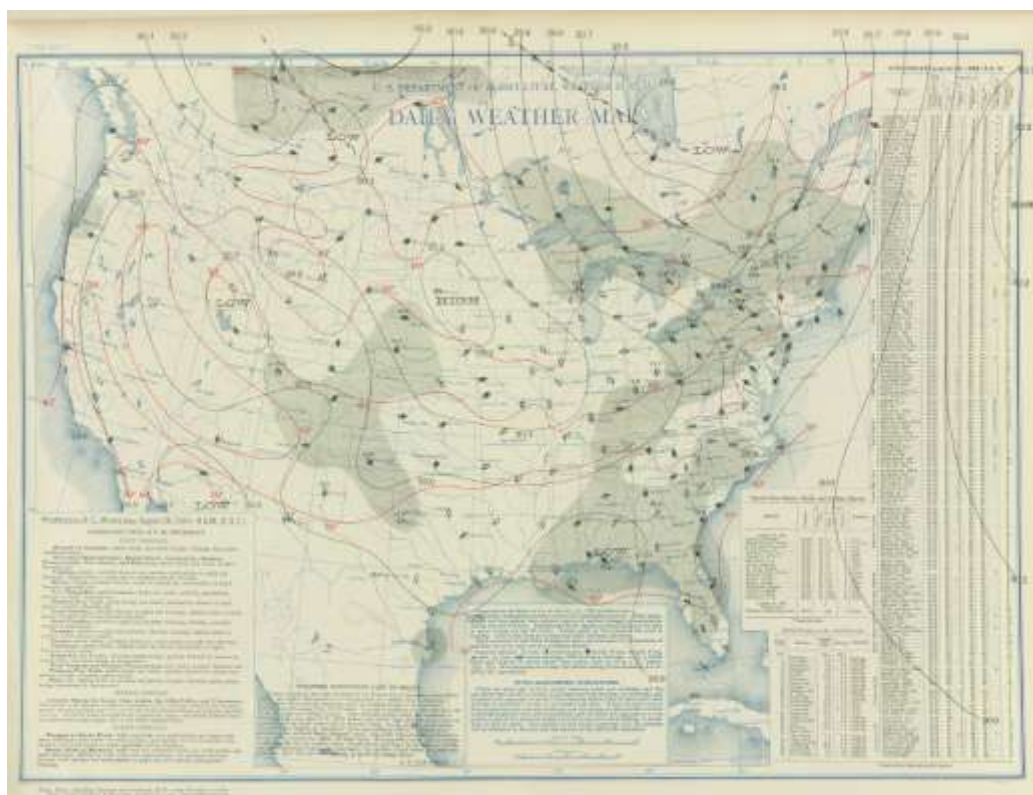


Figure 271: Daily Weather Map for Las Cruces, NM August 28, 1935



Figure 272: Daily Weather Map for Las Cruces, NM August 29, 1935



Figure 273: Daily Weather Map for Las Cruces, NM August 30, 1935

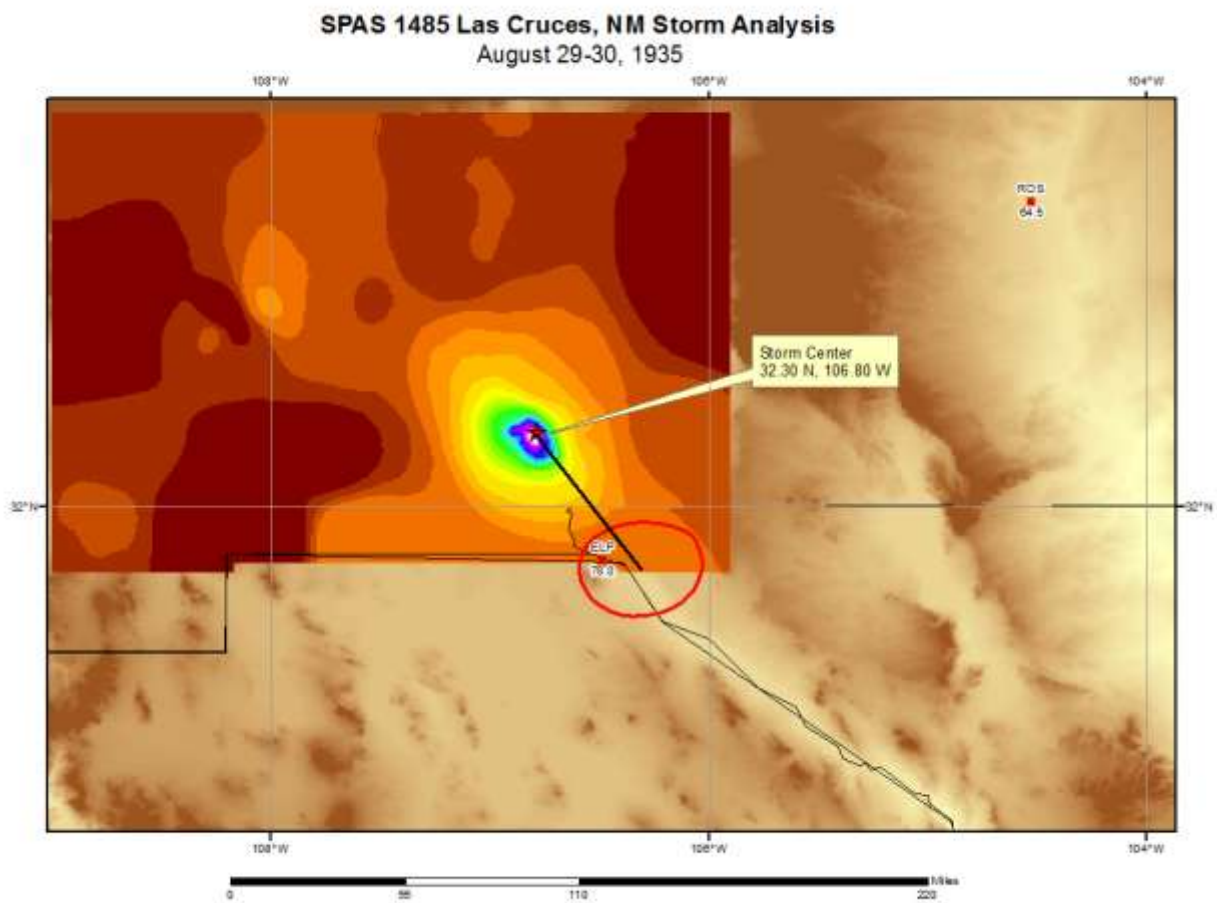


Figure 274: In-place storm representative dew point analysis for Las Cruces, NM August 29-30, 1935

Storm Precipitation Analysis System (SPAS) For Storm #1429

General Storm Location: Hallett, OK

Storm Dates: September 2 – September 5 1940

Event: CORPS of Engineers, US Army Assignment S W 2 – 18

DAD Zone 1

Latitude: 38.4292

Longitude: -95.8125

Max. Grid Rainfall Amount: 7.27"

Max. Observed Rainfall Amount: 7.25"

DAD Zone 2

Latitude: 36.2458

Longitude: -96.6125

Max. Grid Rainfall Amount: 24.00"

Max. Observed Rainfall Amount: 24.00"

Number of Stations: 186

SPAS Version: 10.0

Basemap: Manually digitized contours

Spatial resolution: 0.2642

Radar Included: No

Depth-Area-Duration (DAD) analysis: Yes

Reliability of results: All seven of the hourly stations were digitized from either the Army CORPS of Engineers' pertinent data report or from a NCDC local climatology report of the storm. This provided very high accuracy of the hourly data, which is essential in the timing of the daily and supplemental stations. Of the 43 supplemental stations, 30 were formatted as daily stations. These stations were in the supplemental file due to there being more data on either end of the storm duration as defined for this analysis. For example, if the daily station took measurements in the morning, then there may have been more precipitation reported for the remainder of the storm that was actually part of the following day's observation. Alternatively, if a station had an observation time in the evening then there could have been data not used from the day before that was valid for the period of the storm and could be added to the analysis. With all of the data being thoroughly inspected, the DAD and

precipitation pattern following closely to the Army CORPS of Engineers report, and the precipitation totals for various periods throughout the storm being consistent with previous reports, this analysis is considered to be reliable.

SPAS Storm ID	NAME	LON	LAT	ELEV Round	Storm Representative				Climatological Maximum				IPMF
					T _a	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	T _a	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	
1429_2	HALLETT	-96.613	36.246	900	77.50	3.22"	0.25"	2.970	80.0	3.60"	0.27"	3.330	1.12

Storm 1429 - September 2 (0700 UTC) - September 6 (0600 UTC), 1940															
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)															
Area (mi ²)	Duration (hours)														
	1	2	3	4	5	6	12	18	24	36	48	72	96	120	Total
0.3	4.05	7.90	11.75	14.17	15.56	18.42	23.82	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00
1	4.05	7.90	11.75	14.17	15.56	18.42	23.82	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00
10	4.00	7.81	11.63	14.02	15.39	18.22	23.54	23.73	23.73	23.73	23.73	23.73	23.73	23.73	23.73
25	3.94	7.68	11.43	13.79	15.14	17.92	23.17	23.35	23.35	23.35	23.35	23.35	23.35	23.35	23.35
50	3.76	7.33	10.91	13.15	14.45	17.10	22.13	22.29	22.29	22.30	22.30	22.30	22.30	22.30	22.30
100	3.50	6.83	10.16	12.25	13.45	15.93	20.62	20.78	20.78	20.80	20.80	20.80	20.80	20.80	20.80
150	3.29	6.41	9.53	11.52	12.63	15.00	19.40	19.54	19.58	19.66	19.66	19.67	19.67	19.67	19.67
200	3.10	6.04	8.98	10.83	11.90	14.13	18.36	18.50	18.61	18.83	18.83	18.83	18.84	18.84	18.84
300	2.75	5.36	7.97	9.62	10.57	12.59	16.91	17.18	17.33	17.71	17.71	17.72	17.72	17.72	17.72
400	2.49	4.82	7.16	8.65	9.57	11.41	15.94	16.24	16.39	16.86	16.87	16.88	16.89	16.89	16.89
500	2.30	4.40	6.53	7.92	8.83	10.55	15.20	15.55	15.69	16.14	16.14	16.15	16.16	16.16	16.16
1,000	1.80	3.35	4.98	6.09	6.89	8.23	12.49	12.86	12.97	13.46	13.47	13.63	13.67	13.67	13.67
2,000	1.39	2.57	3.83	4.75	5.41	6.30	9.80	10.12	10.19	10.64	10.69	11.07	11.14	11.14	11.14
5,000	0.93	1.72	2.58	3.23	3.69	4.15	6.77	7.04	7.09	7.51	7.59	8.00	8.18	8.18	8.18
10,000	0.64	1.15	1.73	2.20	2.57	2.86	4.97	5.16	5.21	5.58	5.69	6.02	6.26	6.26	6.26
20,000	0.39	0.72	1.08	1.39	1.60	1.82	3.18	3.35	3.42	4.00	4.16	4.51	4.72	4.72	4.72
50,000	0.20	0.39	0.58	0.76	0.86	1.00	1.70	1.79	1.88	2.27	2.39	2.61	2.80	2.80	2.80
55,417	0.19	0.36	0.54	0.70	0.80	0.90	1.59	1.67	1.76	2.14	2.25	2.46	2.64	2.64	2.64

Figure 275: Depth-area-duration values for Hallett, OK September 1940

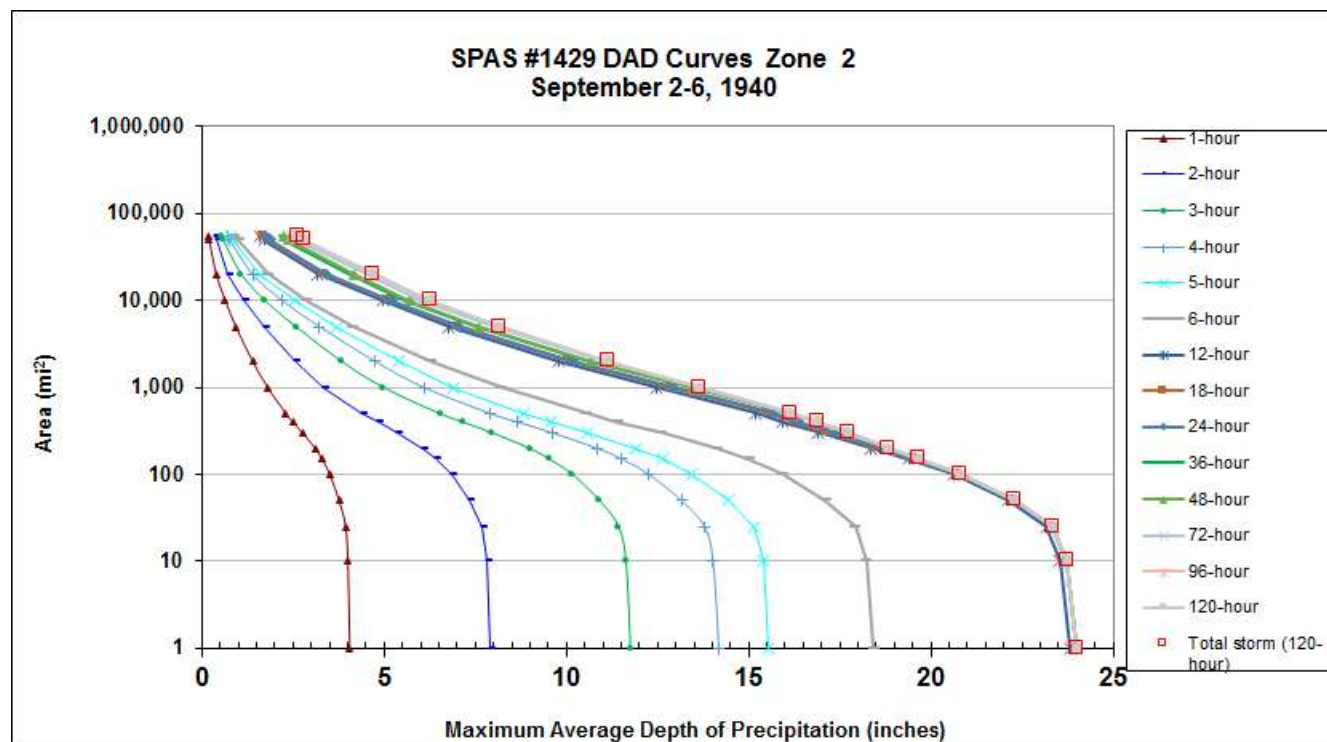


Figure 276: Depth-area-duration chart for Hallett, OK September 1940

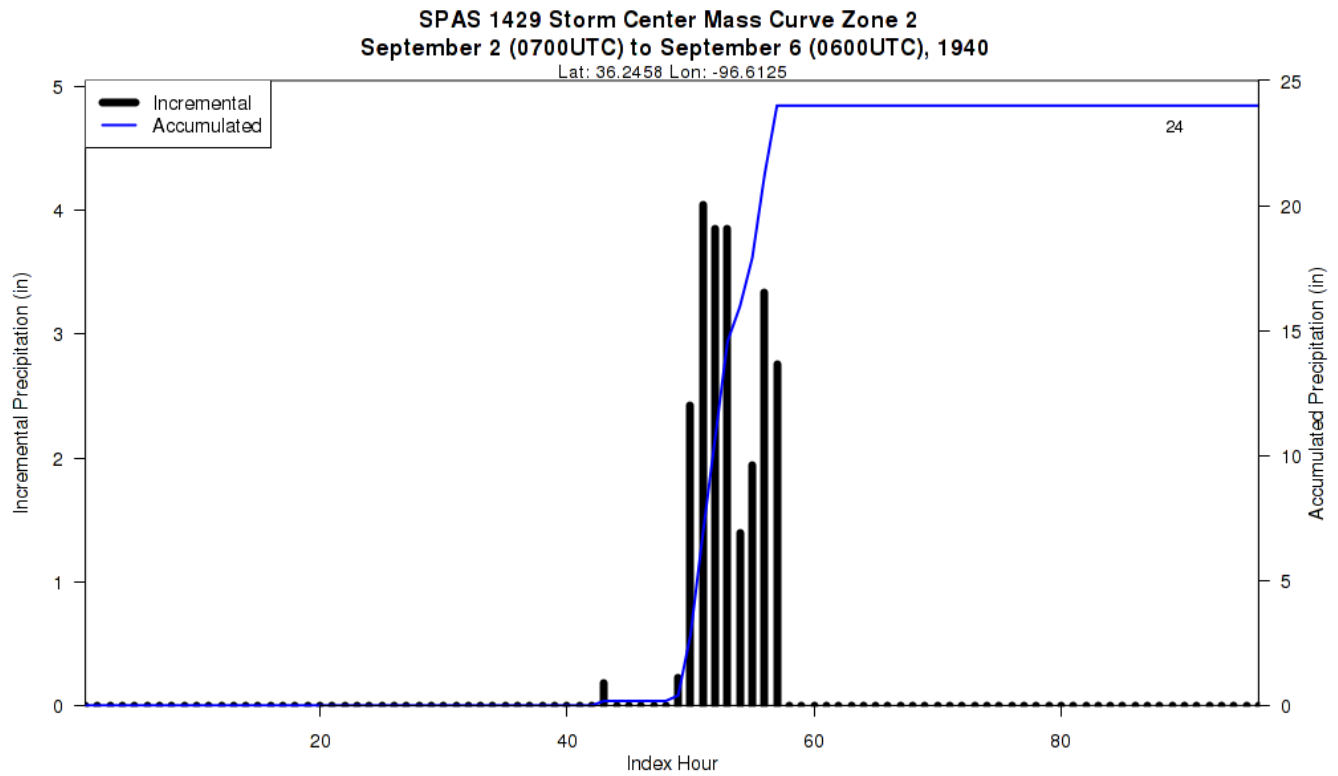


Figure 277: Mass curve chart for Hallett, OK September 1940

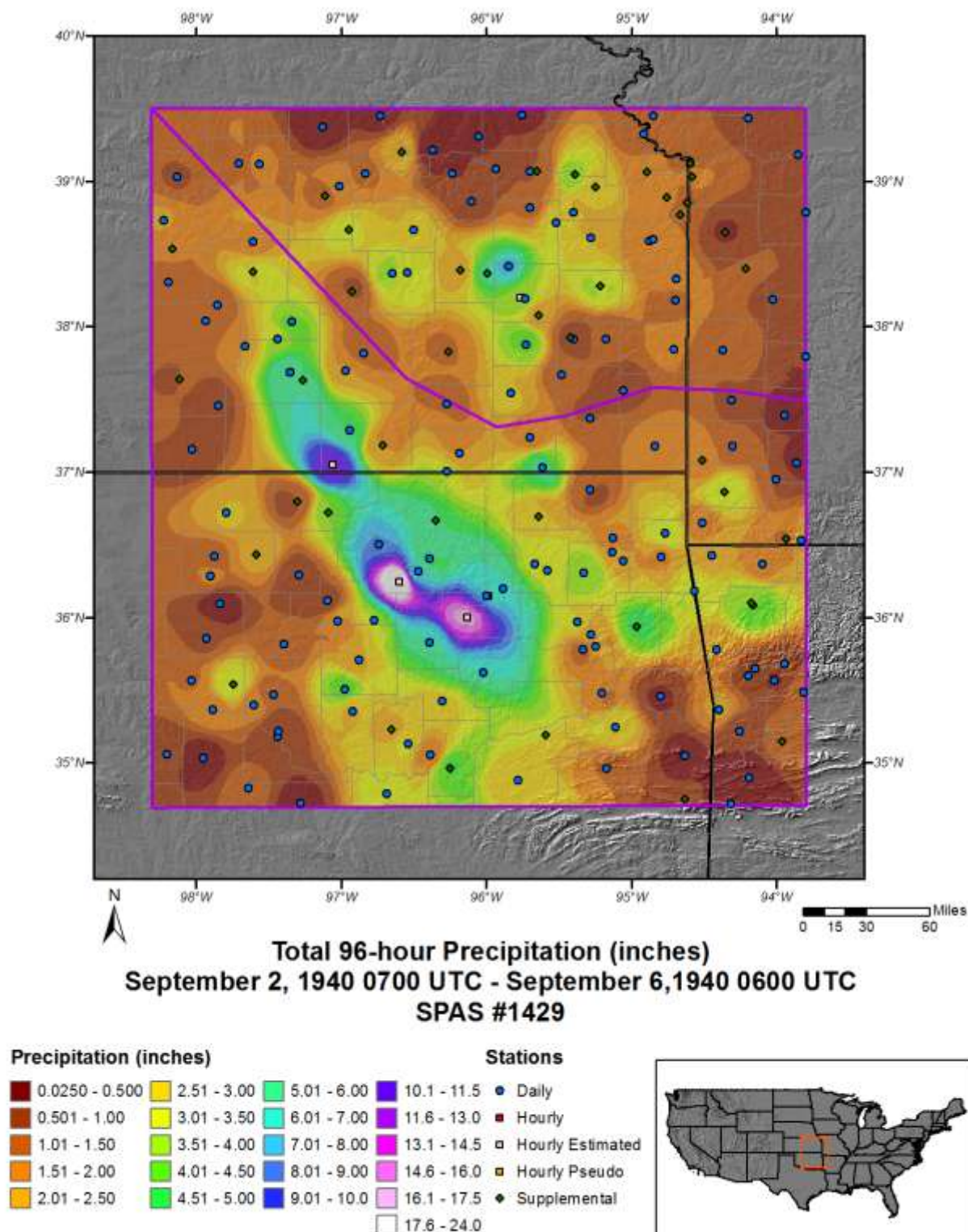


Figure 278: Total storm isohyetal analysis for Hallett, OK September 1940

WAR DEPARTMENT

CORPS OF ENGINEERS, U.S. ARMY

STORM STUDIES - PERTINENT DATA SHEET

Storm of September 2 - 6, 1940
 Assignment S W 2 - 18
 Location Okla. Kans. Mo. & Ark.
 Study Prepared by:
 Southwestern Division
 Tulsa District Office

Part I Reviewed by H. M. Sec. of
 Weather Bureau, 8/18/41
 Part II Approved by Office, Chief
 of Engineers for Distribution
 of Factual Data, 3/25/43
 Remarks: Centers at;
 Hallett, Okla. and Lebo, Kans.

DATA AND COMPUTATIONS COMPILED**PART I**

Preliminary isohyetal map, in 2 sheet, scale 1 : 1,000,000
 Precipitation data and mass curves: (Number of Sheets)
 Form 5001-C (Hourly precip. data)----- 38
 Form 5001-B (24-hour " ")----- -
 Form 5001-D (" " " ")----- 23
 Misc. precip. records, meteorological data, etc.----- 1
 Form 5002 (Mass rainfall curves)----- 49

PART II

Final isohyetal maps, in 1 sheet, scale 1 : 1,000,000
 Data and computation sheets:
 Form S-10 (Data from mass rainfall curves)----- 9
 Form S-11 (Depth-area data from isohyetal map)----- 3
 Form S-12 (Maximum depth-duration data)----- 11
 Maximum duration-depth-area curves----- 1
 Data relating to periods of maximum rainfall----- 2

MAXIMUM AVERAGE DEPTH OF RAINFALL IN INCHES.

Area in Sq. Mi.	Duration of Rainfall in Hours									
	6	12	18	24	30	36	48	54	90	
Max. Station	18.9	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	
10	18.4	23.4	23.6	23.6	23.6	23.6	23.6	23.6	23.6	
100	14.7	19.2	19.4	19.6	19.7	19.8	19.8	19.8	19.8	
200	12.5	17.6	17.8	18.0	18.1	18.2	18.3	18.3	18.3	
500	9.7	15.4	15.6	15.7	15.8	16.1	16.2	16.2	16.2	
1,000	7.9	13.3	13.4	13.6	13.7	14.0	14.1	14.1	14.1	
2,000	6.2	10.3	10.5	10.7	10.9	11.1	11.3	11.3	11.3	
5,000	4.3	7.3	7.4	7.5	7.7	7.8	7.9	8.0	8.0	
10,000	3.0	5.3	5.4	5.5	5.6	5.7	5.8	5.9	5.9	
15,000	2.4	4.4	4.5	4.7	4.7	4.8	4.9	5.1	5.1	
20,000	2.0	3.9	4.1	4.2	4.3	4.4	4.5	4.6	4.6	

Form S-2

Figure 279: USACE Depth-area-duration values for Hallett, OK September 1940

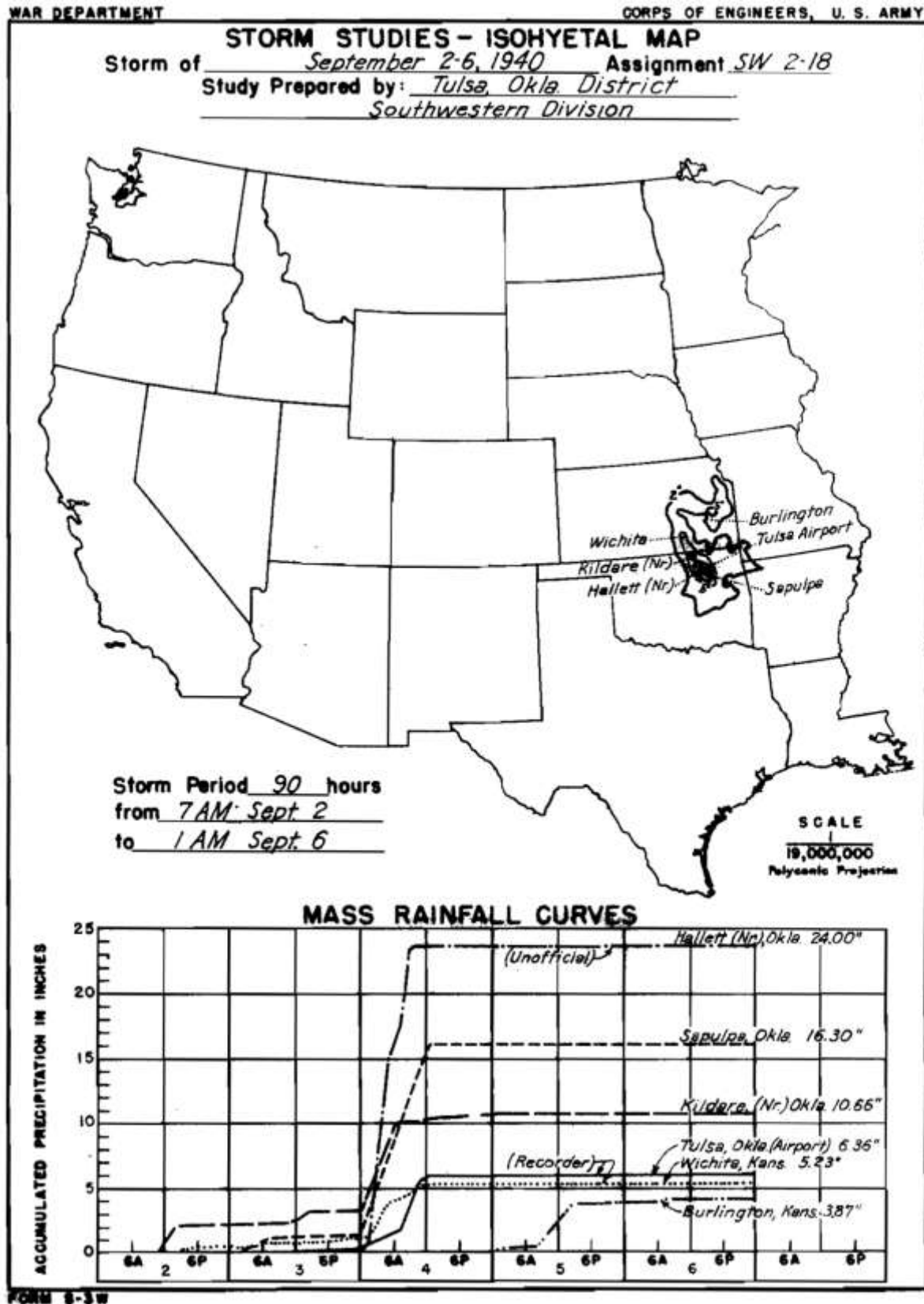


Figure 280: USACE Total storm isohyetal and mass curve chart for Hallett, OK September 1940

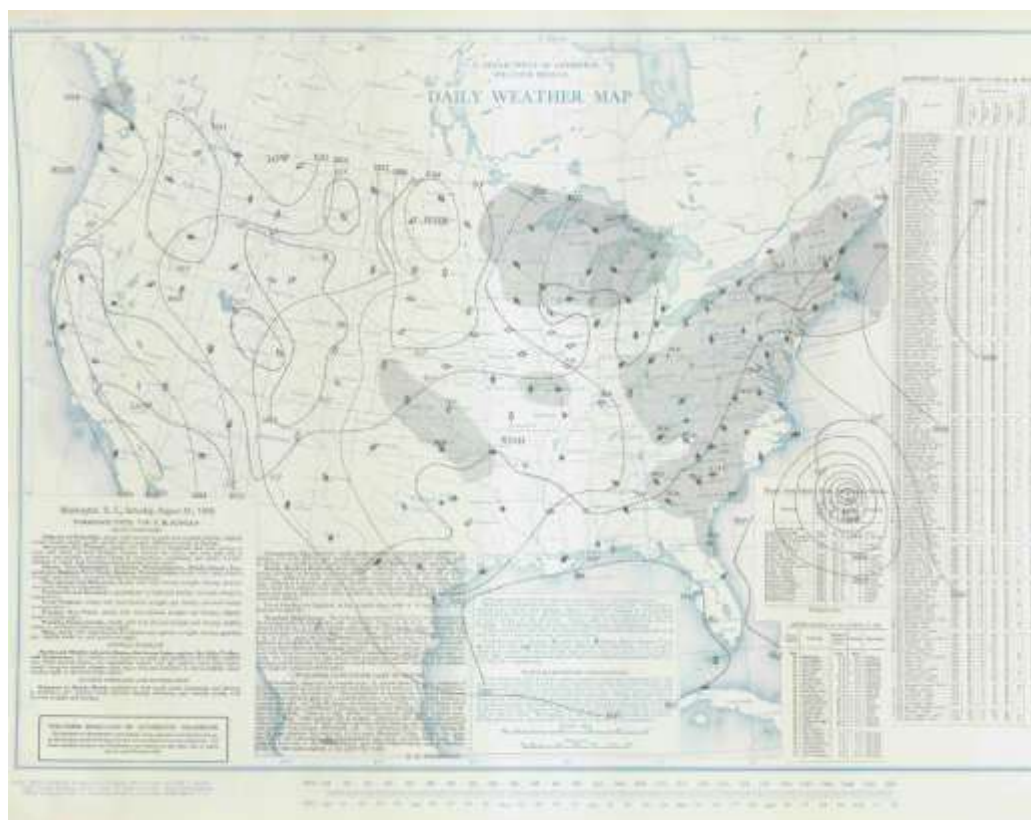


Figure 281: Daily Weather Map for Hallett, OK August 31, 1940

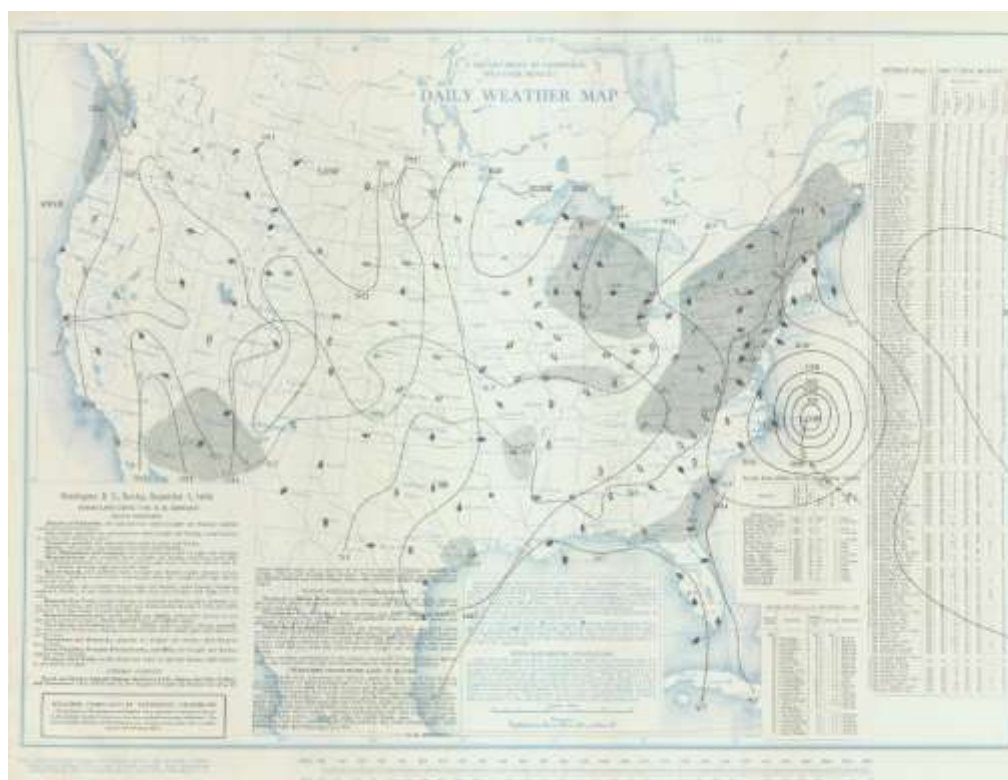


Figure 282: Daily Weather Map for Hallett, OK September 1, 1940



Figure 283: Daily Weather Map for Hallett, OK September 2, 1940



Figure 284: Daily Weather Map for Hallett, OK September 3, 1940



Figure 285: Daily Weather Map for Hallett, OK September 4, 1940



Figure 286: Daily Weather Map for Hallett, OK September 5, 1940

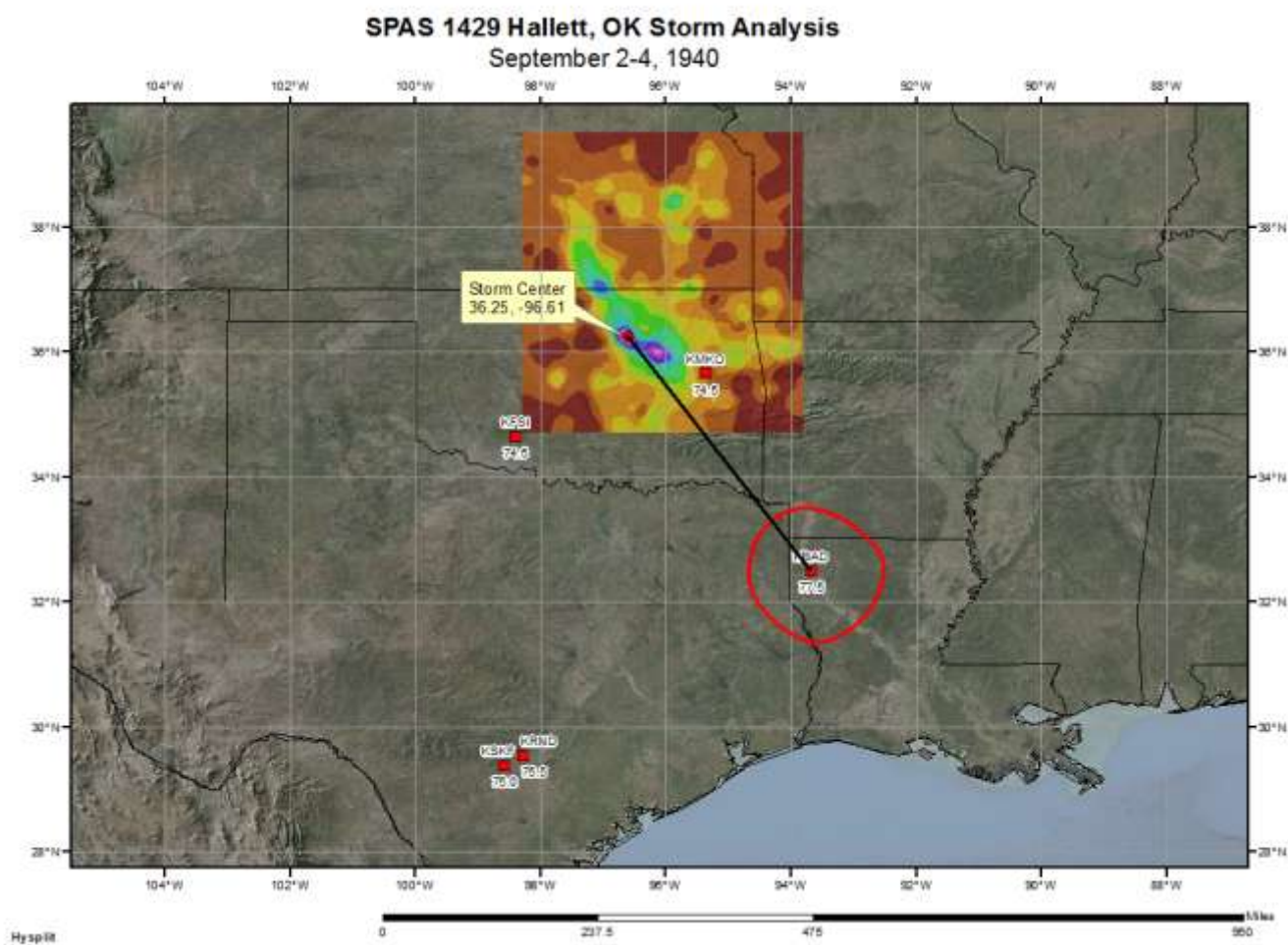


Figure 287: In-place storm representative dew point analysis for Hallett, OK September 2-4, 1940

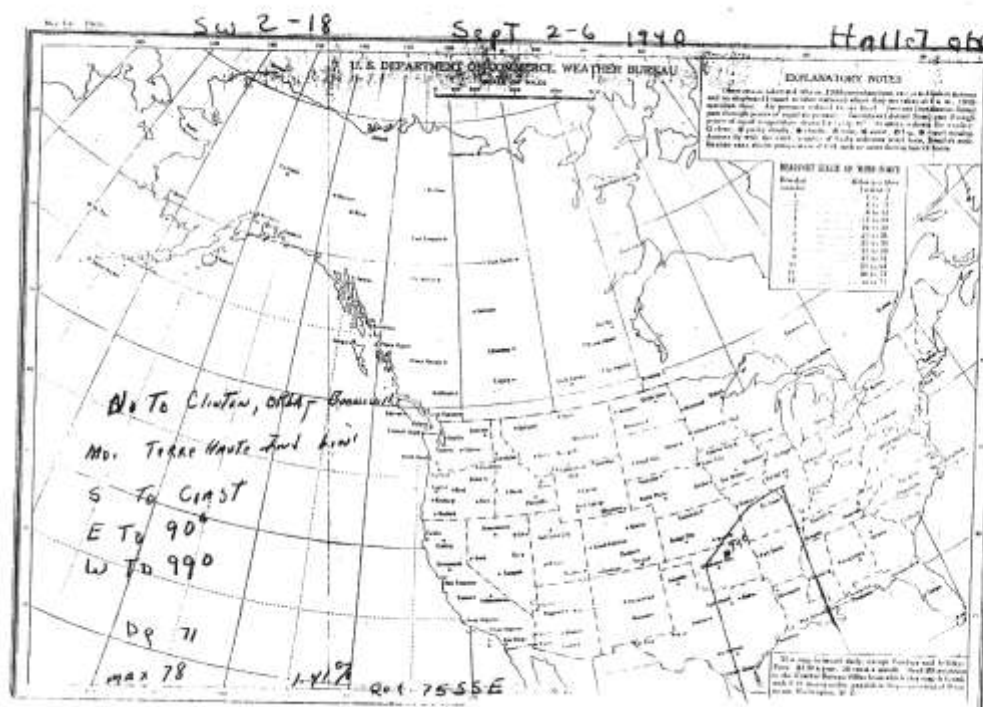


Figure 288: NWS Transposition Map for Hallett, OK September 1940

Storm Precipitation Analysis System (SPAS) For Storm #1432

General Storm Location: Mounds, Oklahoma

Storm Dates: May 15 – May 20, 1943

Event: Extreme Precipitation Event

DAD Zone 1

Latitude: 35.8458

Longitude: -96.0708

Max. Grid Rainfall Amount: 19.27"

Max. Observed Rainfall Amount: 19.23"

Number of Stations: 415

SPAS Version: 10.0

Basemap: Continental United States 2 year 6 hour (conus_0002yr06h)

Spatial resolution: 0.2624

Radar Included: No

Depth-Area-Duration (DAD) analysis: Yes

Reliability of results: In addition to the NCDC stations, seventeen supplemental stations were added to ensure data consistency. Due to the amount and integrity of the U.S. Army Corps of Engineers (USACE), five hourly stations were digitized based on the mass rainfall curves. With the density of stations available and the consistency of the resulting SPAS analysis to the U.S. Army Corps of Engineers report, this analysis is deemed quite reliable.

SPAS Storm ID	NAME	LON	LAT	ELEV Round	Storm Representative				Climatological Maximum				IPMF
					T _g	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	T _g	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	
1432_1	MOUNDS	-96.071	35.846	800	73.00	2.60"	0.19"	2.410	79.0	3.44"	0.23"	3.210	1.33

Storm 1432 - May 15 (0700 UTC) - May 21 (0600 UTC), 1943																	
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)																	
Area (mi ²)	Duration (hours)																
	1	2	3	4	5	6	12	18	24	30	36	48	60	72	96	120	Total
0.3	8.21	12.02	14.02	15.82	16.02	16.23	17.15	17.24	17.34	17.35	17.39	17.43	18.79	18.94	19.27	19.27	19.27
1	8.21	12.02	14.02	15.82	16.02	16.23	17.15	17.19	17.20	17.20	17.39	17.39	18.66	18.66	19.26	19.26	19.26
10	8.19	11.98	13.98	15.78	15.98	16.18	17.10	17.14	17.16	17.16	17.35	17.35	18.63	18.65	19.22	19.22	19.22
25	8.16	11.92	13.91	15.70	15.90	16.11	17.03	17.08	17.12	17.12	17.27	17.27	18.58	18.64	19.13	19.14	19.14
50	8.10	11.83	13.80	15.57	15.77	15.99	16.90	16.96	17.06	17.06	17.15	17.15	18.50	18.61	19.00	19.00	19.00
100	7.85	11.45	13.36	15.07	15.26	15.47	16.39	16.43	16.43	16.48	16.51	16.59	17.82	18.15	18.42	18.52	18.53
150	7.48	10.90	12.71	14.35	14.53	14.70	15.62	15.68	15.71	15.71	15.78	15.85	17.19	17.41	17.73	17.92	17.96
200	7.06	10.28	12.00	13.54	13.71	13.95	14.35	14.83	14.89	14.89	14.96	15.00	16.48	16.76	17.38	17.56	17.57
300	6.26	9.10	10.61	11.98	12.13	12.32	13.08	13.08	13.08	13.08	13.22	13.89	15.90	16.35	16.75	17.15	17.18
400	5.58	8.10	9.46	10.67	10.81	11.00	11.65	11.65	11.83	11.83	12.04	13.20	15.41	16.04	16.65	16.74	16.78
500	5.03	7.26	8.46	9.56	9.67	9.95	10.40	10.40	11.02	11.02	11.99	12.63	15.18	15.84	16.27	16.45	16.45
1,000	3.90	5.64	6.27	7.89	7.89	7.89	7.89	8.06	8.20	9.05	10.31	11.57	13.11	13.11	14.75	15.37	15.37
2,000	2.86	3.48	3.77	5.10	5.34	5.48	6.20	6.20	7.05	8.15	9.39	10.27	12.63	12.99	13.42	13.99	13.99
5,000	1.74	2.69	2.69	2.77	2.88	4.00	4.45	4.86	5.35	6.51	7.19	8.77	11.09	11.40	11.99	12.27	12.27
10,000	0.72	1.59	2.36	2.61	2.64	3.02	3.02	3.91	4.56	4.99	6.78	7.49	9.64	9.89	10.26	10.62	10.98
20,000	0.57	0.88	1.35	2.01	2.40	2.61	2.80	2.98	4.11	4.67	5.33	6.26	7.84	8.30	8.49	9.35	9.38
50,000	0.37	0.70	0.97	1.19	1.19	1.26	1.94	2.40	2.94	3.66	3.82	4.95	6.17	6.33	6.68	7.35	7.38
100,000	0.24	0.41	0.52	0.85	0.92	1.02	1.31	1.45	1.60	2.18	2.42	2.65	3.56	3.70	4.68	5.32	5.36
151,933	0.16	0.31	0.46	0.58	0.70	0.79	0.95	1.13	1.41	1.77	1.99	2.39	3.06	3.26	3.53	3.83	3.88

Figure 289: Depth-area-duration values for Mounds, OK May 1943

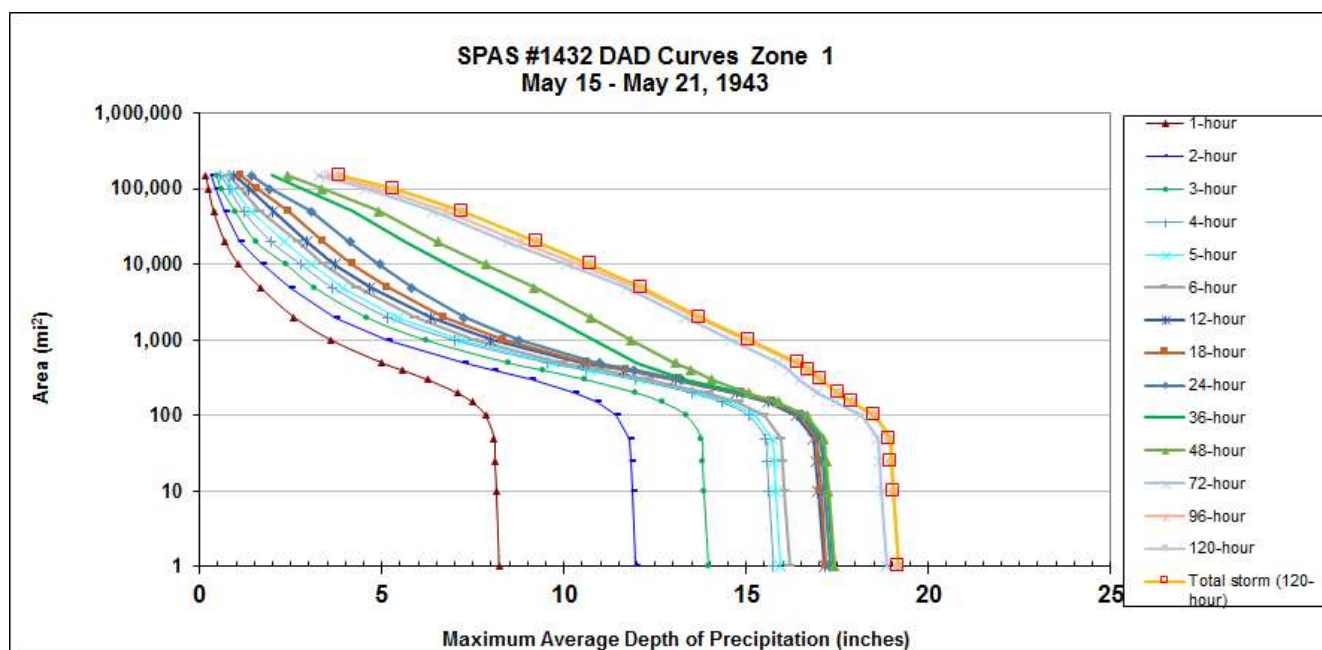


Figure 290: Depth-area-duration values for Mounds, OK May 1943

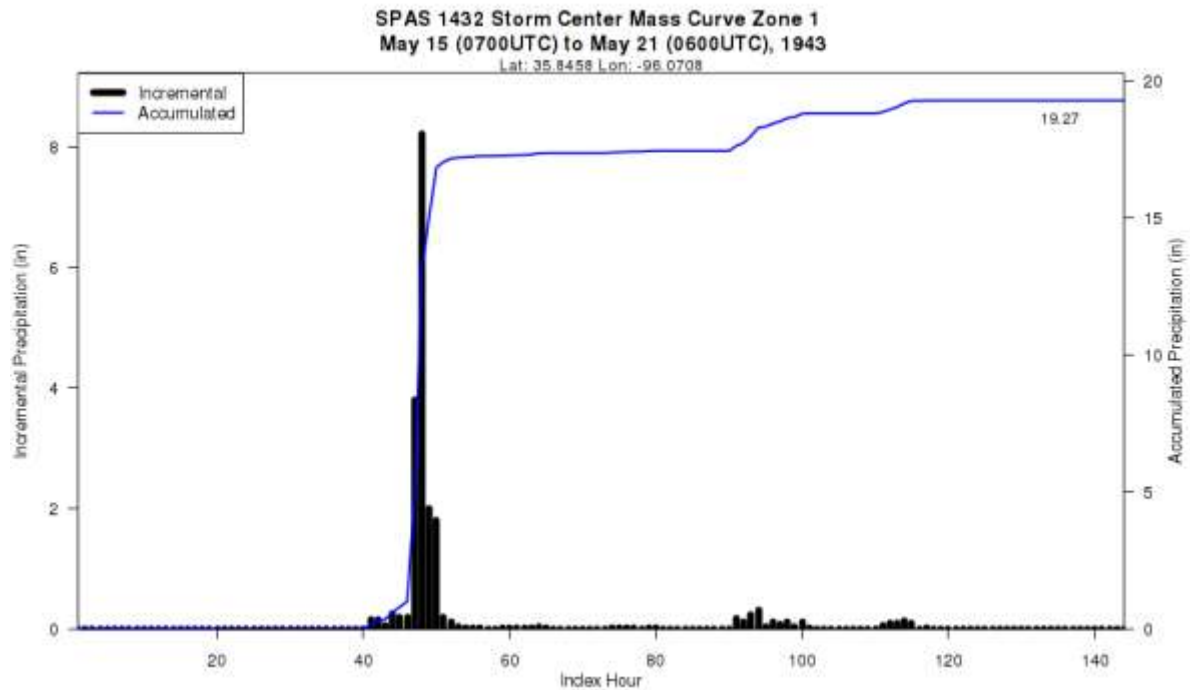


Figure 291: Mass curve chart for Mounds, OK May 1943

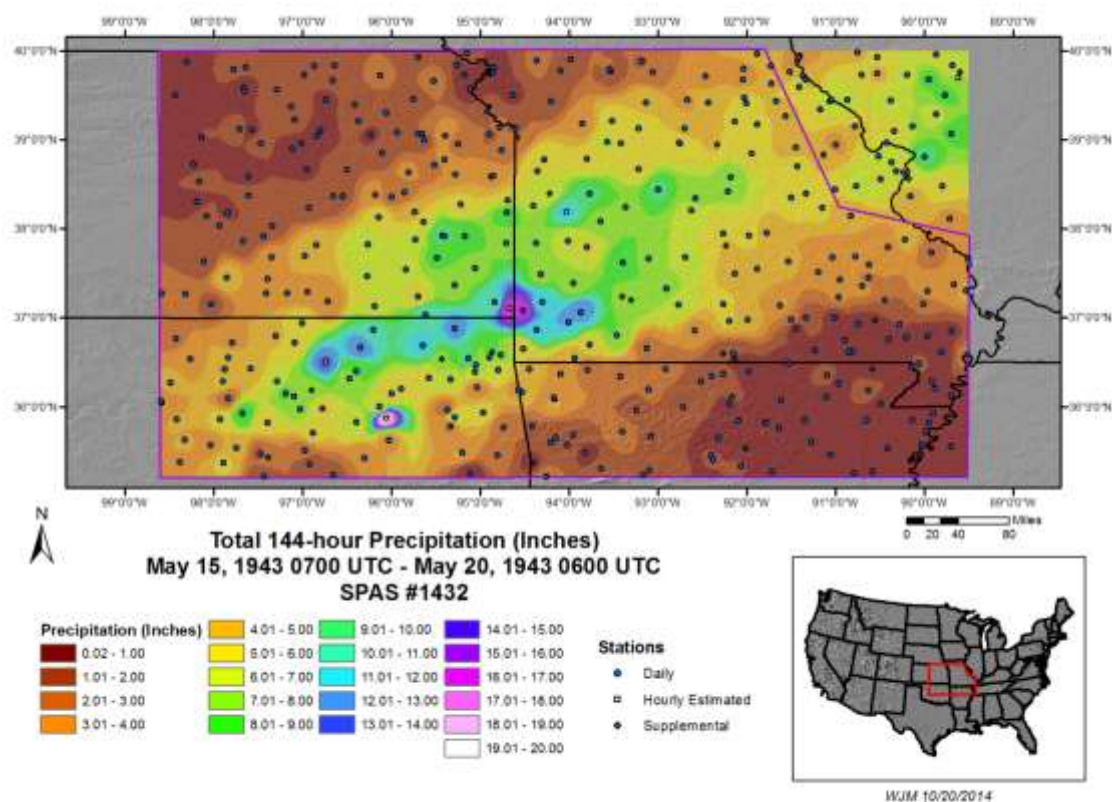


Figure 292: Total storm isohyetal analysis for Mounds, OK May 1943

STORM STUDIES - PERTINENT DATA SHEET

Storm of 12-20 May 1943
Assignment SW 2-21
Location Oklahoma to Great Lakes
Study Prepared by:
Southwestern Division
Tulsa District Office

Part I Reviewed by H. M. Sec. of
Weather Bureau, 10/9/46
Part II Approved by Office, Chief
of Engineers for Distribution
of Factual Data, 8/15/49
Remarks: Center near
Mounds, Okla.
Dewpt. 71° - Ref. Pt. 60 ESE
Grid G-15

DATA AND COMPUTATIONS COMPILED

PART I

Preliminary isohyetal map, in 1 sheet, scale 1: 1,000,000

Precipitation data and mass curves:

(Number of Sheets)

Form 5001-C (Hourly precip. data)----- 531

Form 5001-B (24-hour " ")-----

Form 5001-D (" " " ") _____ 147

Miscel. precip. records, meteorological data, etc.----- 10

Form 5002 (Mass rainfall curves)..... 251

PART II

Final isohyetal maps, in 1 sheet, scale 1:1,000,000

Data and computation sheets:

Form S-10 (Data from mass rainfall curves)----- 42

Form S-II (Depth-area data from isohyetal map)----- 8

Form S-12 (Maximum depth-duration data)----- 12

Maximum duration-depth-area curves_____ 1

Data relating to periods of maximum rainfall_____]

MAXIMUM AVERAGE DEPTH OF RAINFALL IN INCHES

Area in Sq. Mi.	Duration of Rainfall in Hours										144
	6	12	18	24	36	48	60	72	96	120	192
Max. Station	16.2	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0
10	15.9	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.8	16.9	16.9
100	14.2	14.8	14.9	14.9	14.9	14.9	15.0	15.4	15.6	15.9	15.9
200	13.0	13.5	13.9	13.9	13.9	13.9	13.9	14.4	15.0	15.5	15.5
500	9.2	10.6	11.1	11.1	11.5	12.0	13.7	14.4	14.6	14.9	14.9
1,000	6.2	7.9	8.4	8.5	10.0	10.8	13.2	13.8	14.1	14.9	14.9
2,000	4.0	5.3	6.3	6.6	9.2	10.0	12.6	13.2	13.5	13.7	13.7
5,000	3.0	3.6	4.9	5.4	8.3	8.9	11.5	12.1	12.4	12.5	12.6
10,000	2.6	3.1	4.2	4.8	7.3	8.0	10.2	10.7	11.0	11.3	11.4
20,000	2.1	2.6	3.5	4.2	6.2	6.9	8.6	9.1	9.4	9.8	10.1
50,000	1.6	2.0	2.6	3.4	4.6	5.3	6.6	7.0	7.4	7.8	8.2
100,000	1.1	1.5	2.0	2.6	3.5	4.1	5.0	5.4	5.8	6.4	6.8
200,000	0.7	1.0	1.3	1.7	2.3	2.7	3.5	3.8	4.3	4.9	5.2

Form S-2

Figure 293: USACE Depth-area-duration values for Mounds, OK May 1943

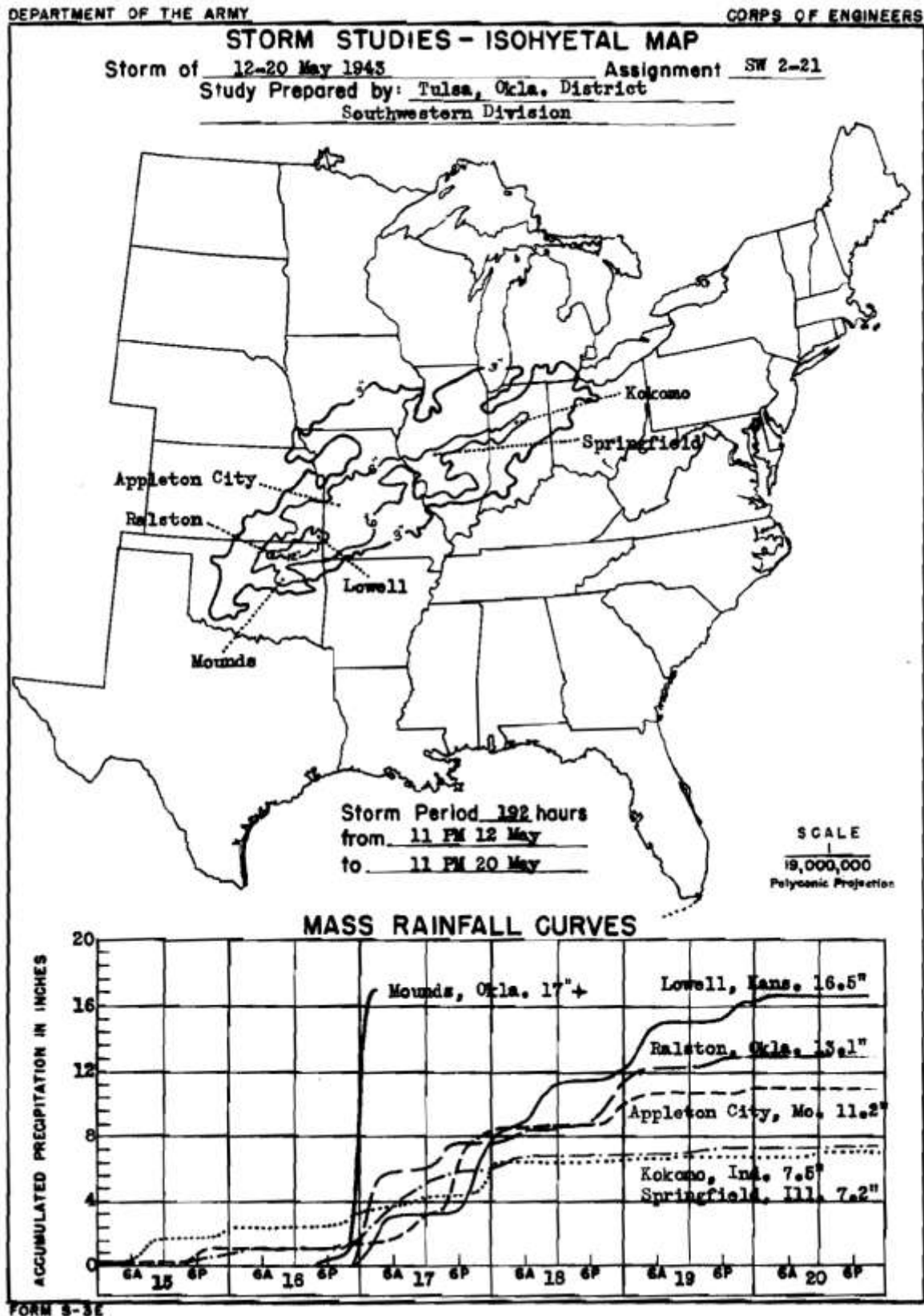


Figure 294: USACE Total storm isohyetal and mass curve chart for Mounds, OK May 1943



Figure 295: Daily Weather Map for Mounds, OK May 13, 1943

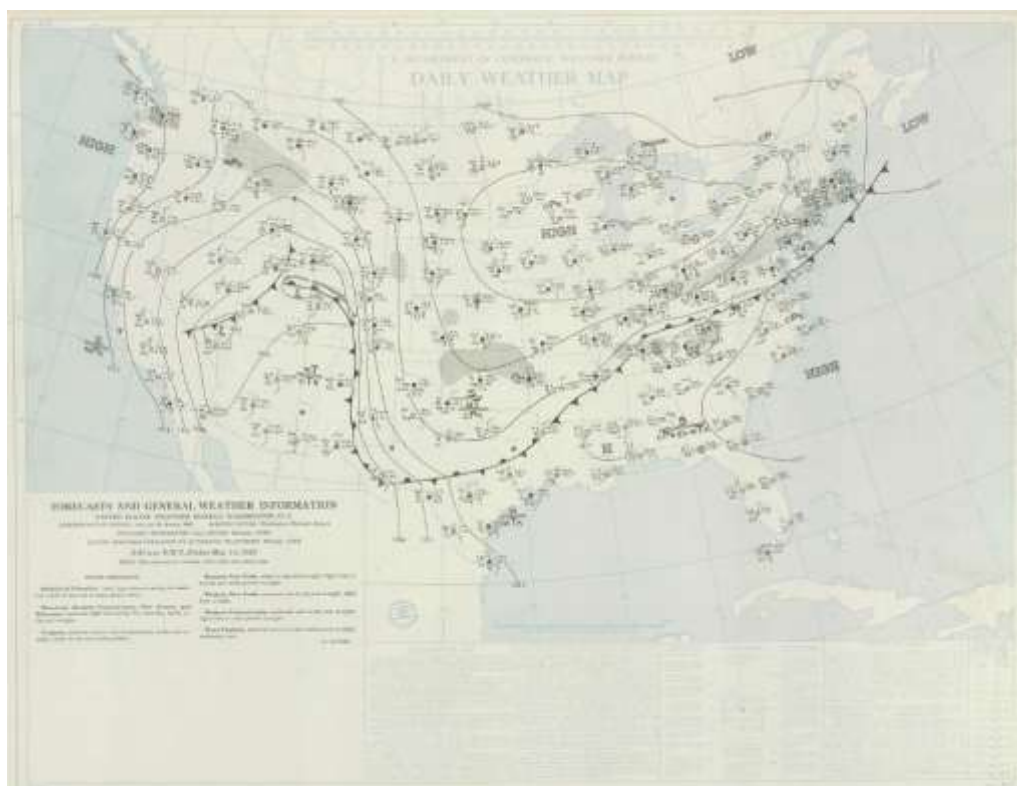


Figure 296: Daily Weather Map for Mounds, OK May 14, 1943

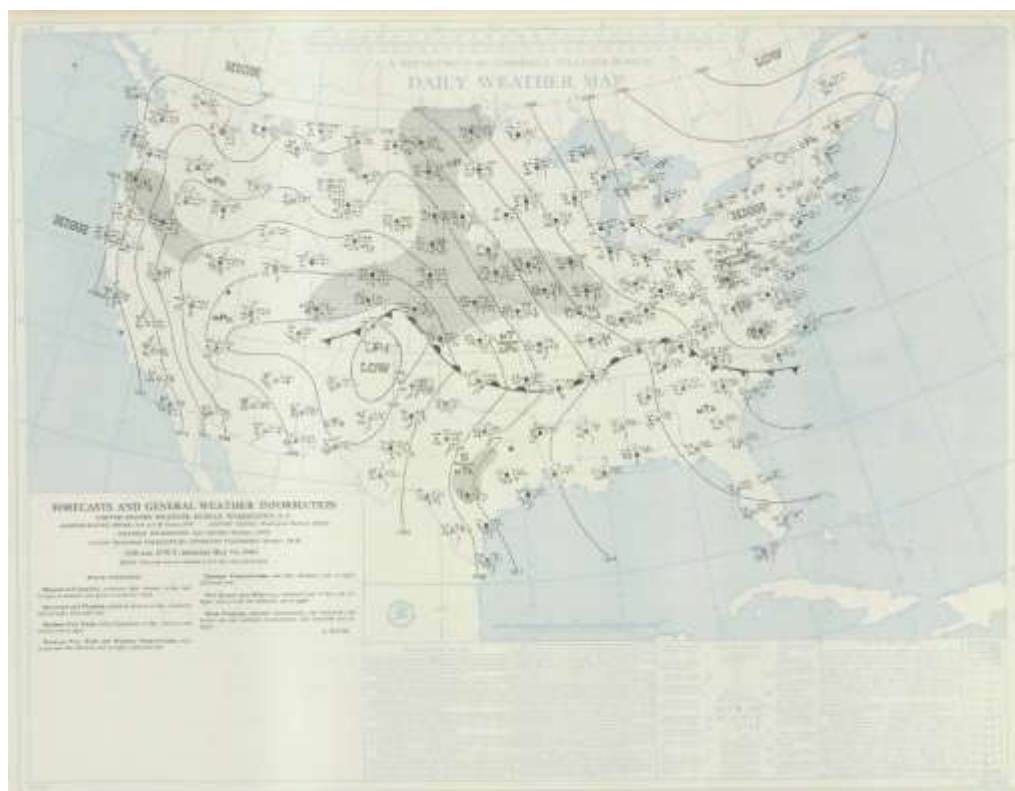


Figure 297: Daily Weather Map for Mounds, OK May 15, 1943

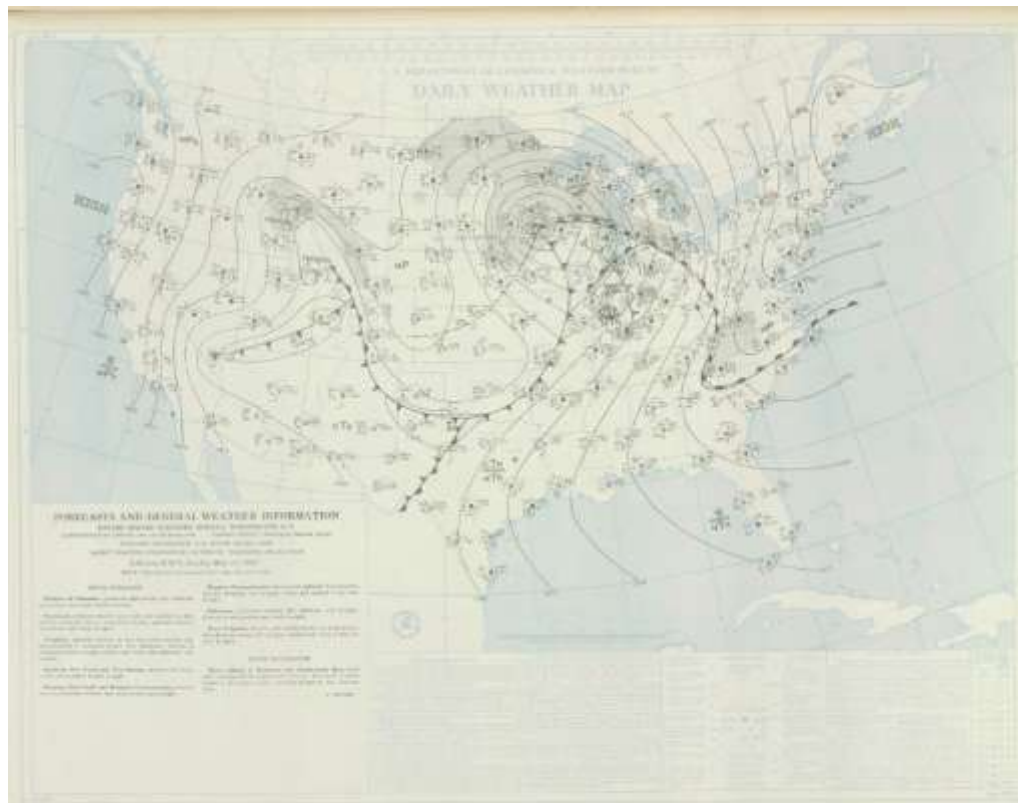


Figure 298: Daily Weather Map for Mounds, OK May 16, 1943

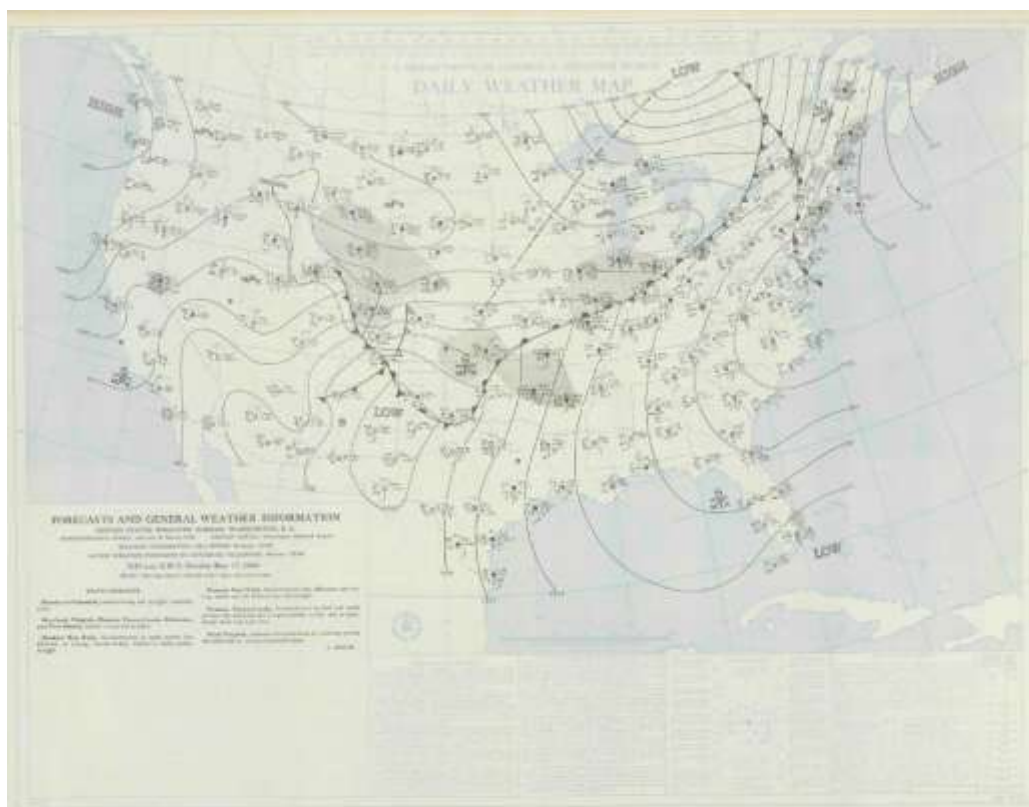


Figure 299: Daily Weather Map for Mounds, OK May 17, 1943

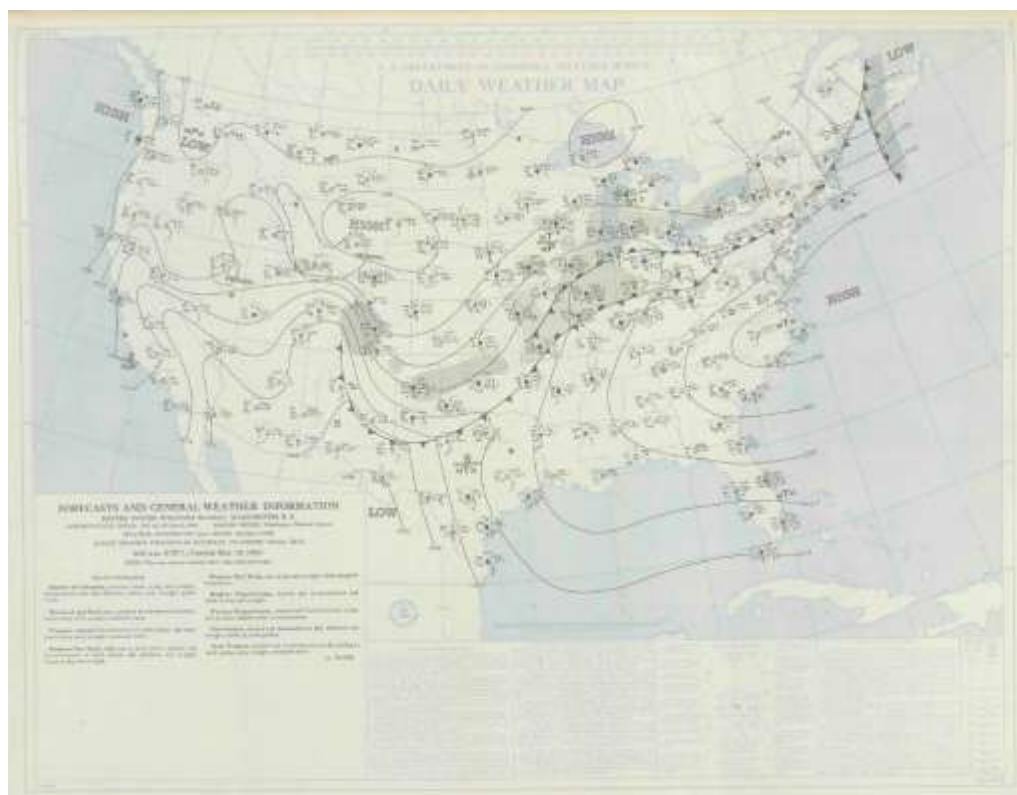


Figure 300: Daily Weather Map for Mounds, OK May 18, 1943



Figure 301: Daily Weather Map for Mounds, OK May 19, 1943

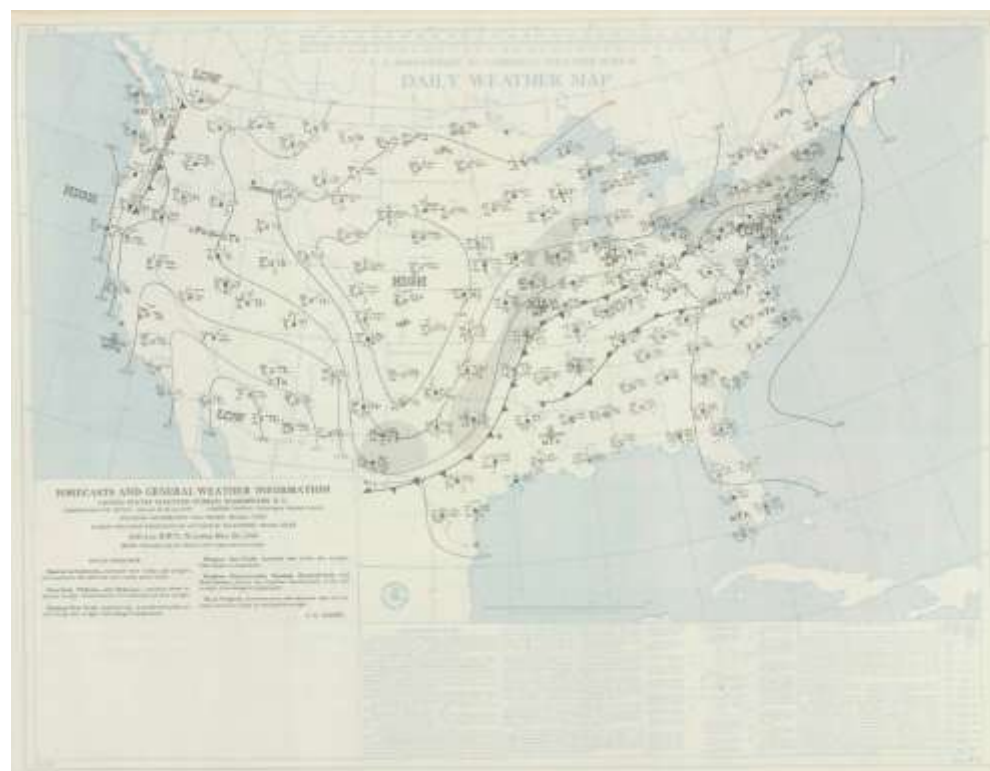


Figure 302: Daily Weather Map for Mounds, OK May 20, 1943

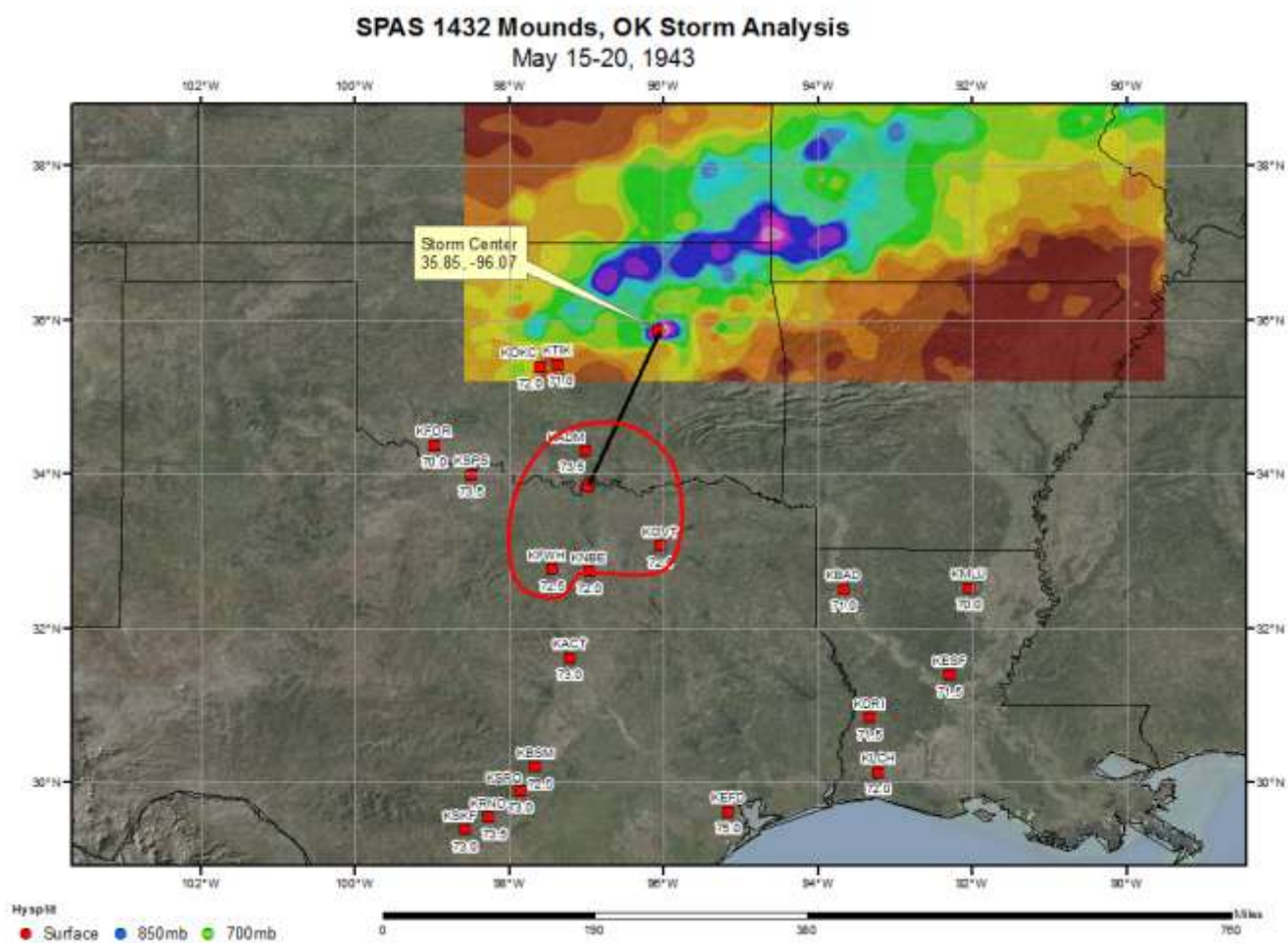


Figure 303: In-place storm representative dew point analysis for Mounds, OK May 15-20, 1943

SW 2-21..May 13-20, 1943..Mounds, Okl
12-hr. rTd 71(16tn)..to 76, 28p..80

SAME AS SW2-20 X

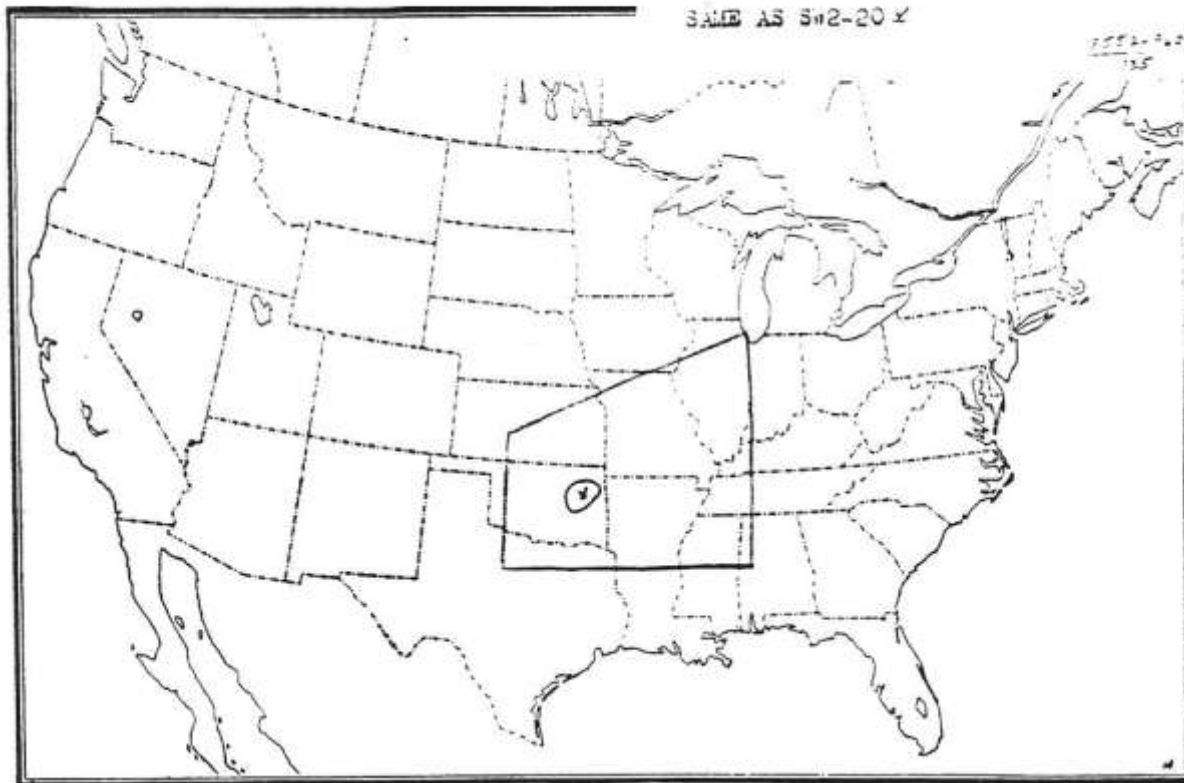


Figure 304: NWS Transposition Map for Mounds, OK May 1943

Storm Precipitation Analysis System (SPAS) For Storm #1558

General Storm Location: Rock Springs/Barksdale, TX (-102.0, 31.0, 28.0, -99.0)

Storm Dates: September 22-25, 1955

Event: Local

DAD Zone 1

Latitude: 29.9125

Longitude: -99.9958

Max. Grid Rainfall Amount: 24.09" Barksdale, TX

Max. Observed Rainfall Amount: 24.00"

Number of Stations: 66

SPAS Version: 10.0

Basemap: Blended Basemap of PRISM Mean September 1971-2000 Climatology and the USGS Isohyetal Pattern

Spatial resolution: 0.2880

Radar Included: No

Depth-Area-Duration (DAD) analysis: Yes

Reliability of results: This analysis was based on hourly data, daily data, and supplemental station data. We have a high degree of confidence in the station based storm total results. The spatial pattern is dependent on the blended basemap, and the timing is based on hourly and hourly pseudo stations. An additional twenty-five supplemental stations were created to ensure data consistency.

SPAS Storm ID	NAME	LON	LAT	ELEV Round	Storm Representative				Climatological Maximum				IPMF
					T _g	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	T _g	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	
1558_1	ROCK SPRINGS	-99.996	29.912	2,000	77.50	3.22"	0.53"	2.690	79.5	3.52"	0.56"	2.960	1.10

Storm 1558 - September 22 (0700 UTC) - September 26 (0600 UTC), 1955														
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)														
Area (mi ²)	Duration (hours)													
	1	2	3	4	5	6	12	18	24	36	48	72	96	120
0.3	4.00	6.55	8.70	10.67	12.82	14.61	20.85	23.47	23.99	24.02	24.02	24.03	24.03	24.09
1	3.97	6.51	8.64	10.59	12.73	14.51	20.70	23.32	23.81	23.86	23.86	23.87	23.87	23.87
10	3.90	6.38	8.46	10.39	12.47	14.21	20.30	22.83	23.36	23.37	23.37	23.37	23.37	23.37
25	3.75	6.14	8.15	10.00	12.00	13.69	19.53	21.99	22.47	22.50	22.50	22.51	22.51	22.51
50	3.57	5.84	7.75	9.50	11.41	13.01	18.57	20.90	21.35	21.39	21.39	21.40	21.40	21.40
100	3.29	5.38	7.12	8.75	10.48	11.96	17.05	19.19	19.61	19.64	19.64	19.64	19.64	19.64
150	3.11	5.05	6.66	8.17	9.79	11.17	15.89	17.91	18.27	18.32	18.32	18.32	18.32	18.32
200	2.97	4.82	6.29	7.76	9.24	10.53	15.00	16.88	17.29	17.32	17.32	17.33	17.33	17.33
300	2.75	4.44	5.78	7.17	8.48	9.66	13.73	15.47	15.92	15.95	15.96	15.97	15.97	15.97
400	2.57	4.15	5.37	6.77	7.91	8.98	12.75	14.55	14.97	15.00	15.01	15.02	15.02	15.02
500	2.42	3.91	5.07	6.42	7.49	8.49	12.03	13.79	14.19	14.22	14.23	14.24	14.24	14.24
1,000	1.97	3.21	4.17	5.41	6.27	7.05	9.96	11.57	11.90	11.93	11.95	11.96	11.96	11.96
2,000	1.48	2.49	3.25	4.41	5.05	5.68	7.97	9.39	9.67	9.70	9.72	9.75	9.75	9.75
5,000	0.85	1.53	2.13	2.87	3.30	3.71	5.25	6.24	6.64	6.69	6.71	6.85	6.85	6.85
10,000	0.52	0.91	1.34	1.75	2.08	2.34	3.37	4.34	4.81	4.88	4.90	5.06	5.06	5.06
20,000	0.30	0.50	0.76	0.99	1.27	1.41	2.03	2.52	2.81	2.96	2.99	3.22	3.22	3.22
37,345	0.16	0.30	0.45	0.59	0.69	0.78	1.14	1.49	1.65	1.70	1.74	1.85	1.85	1.85

Figure 305: Depth-area-duration values for Rock Springs, TX September 1955

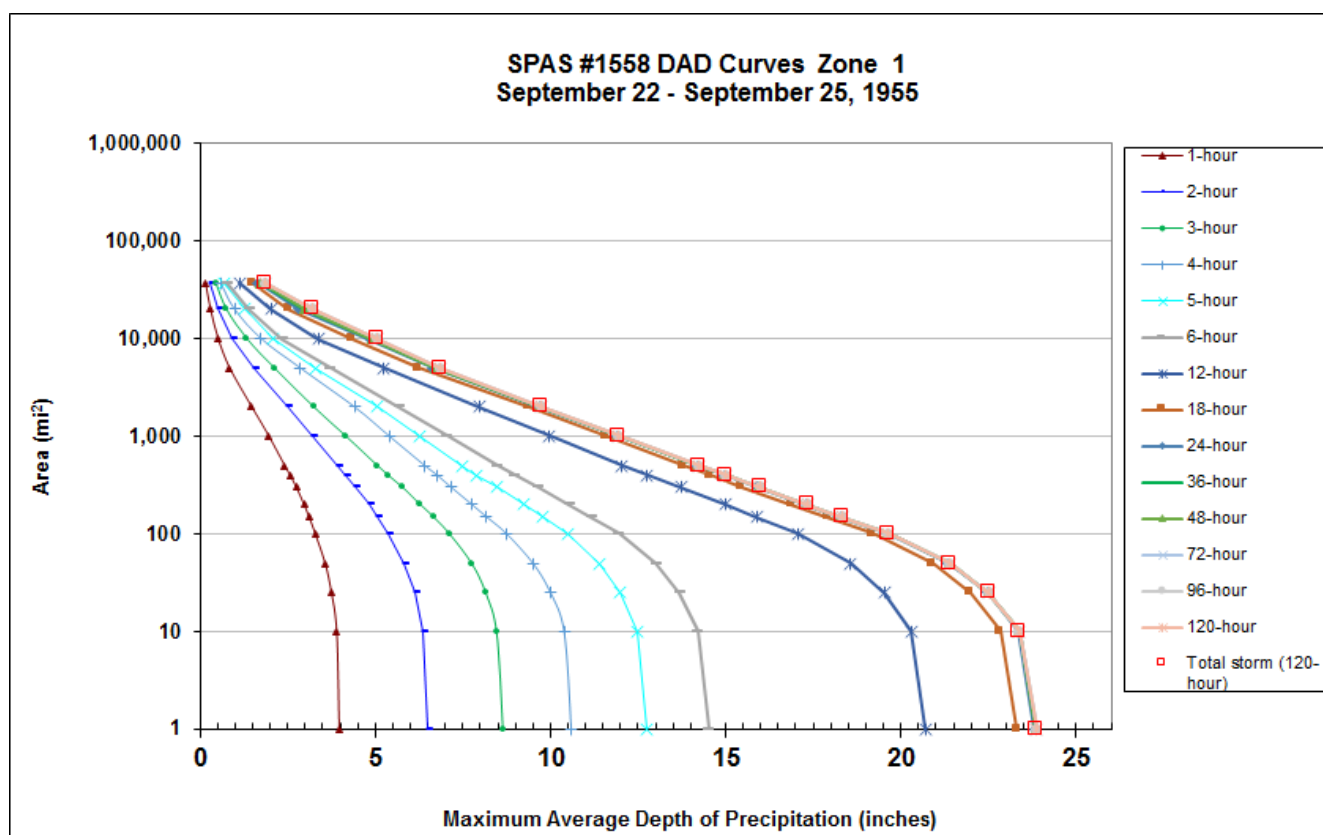
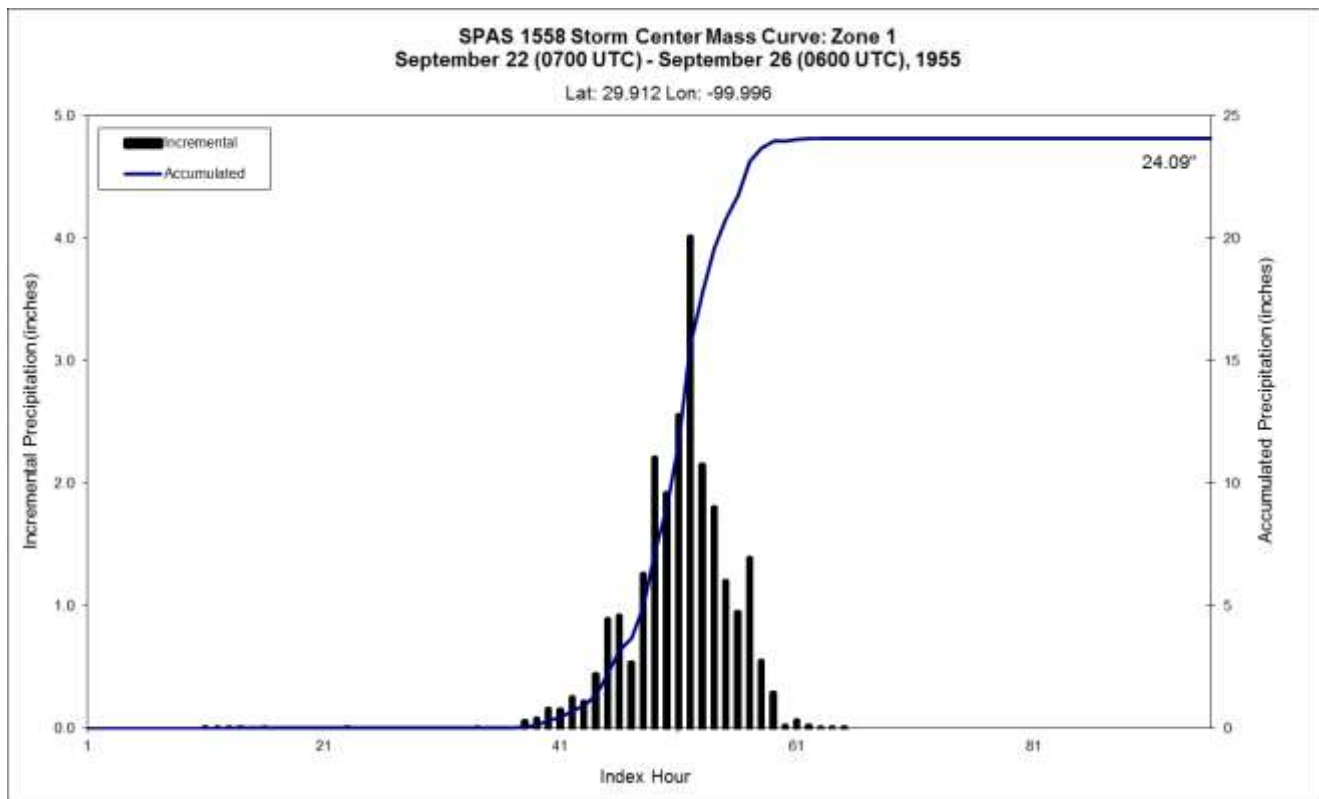


Figure 306: Depth-area-duration chart for Rock Springs, TX September 1955



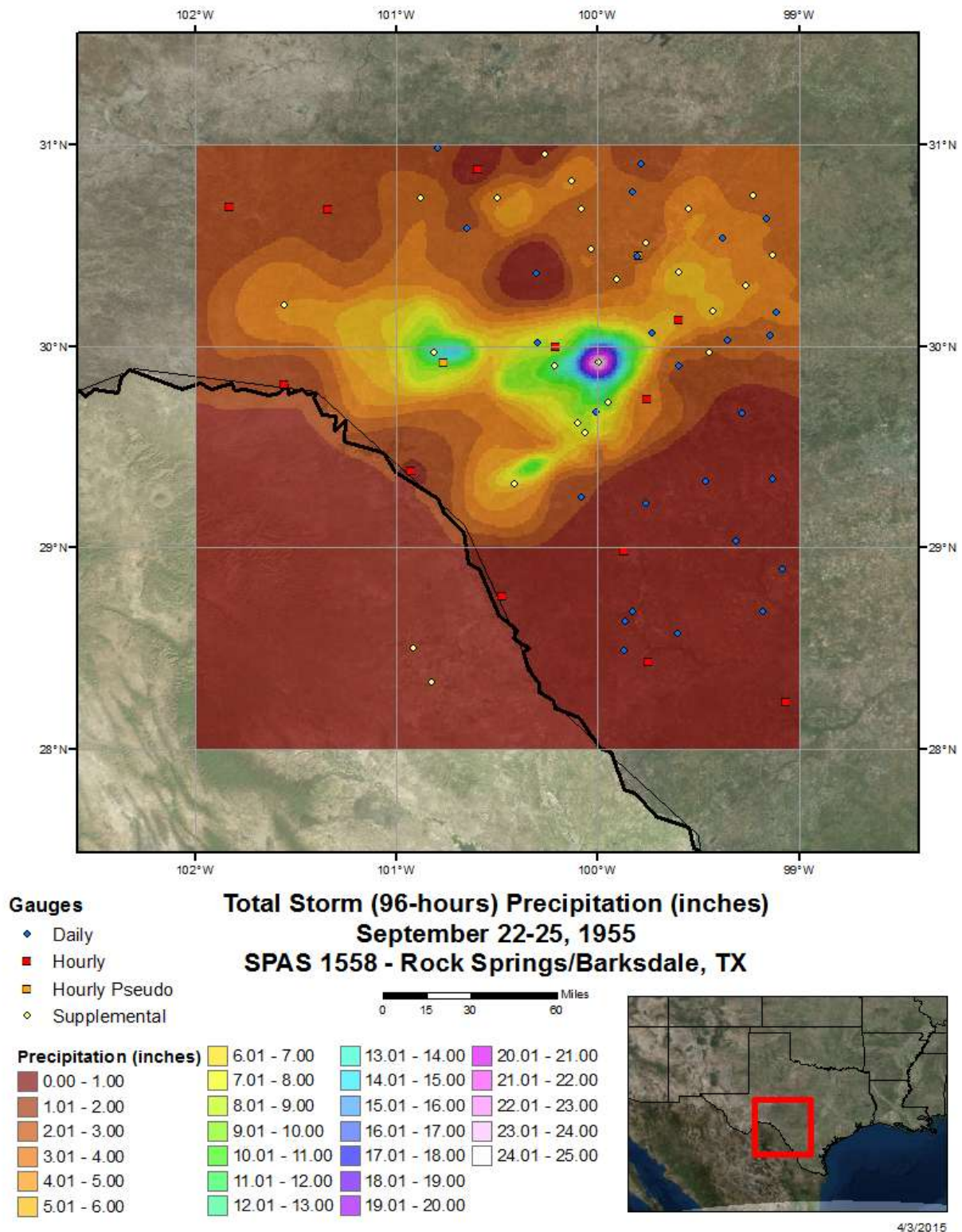


Figure 308: Total storm isohyetal analysis for Rock Springs, TX September 1955

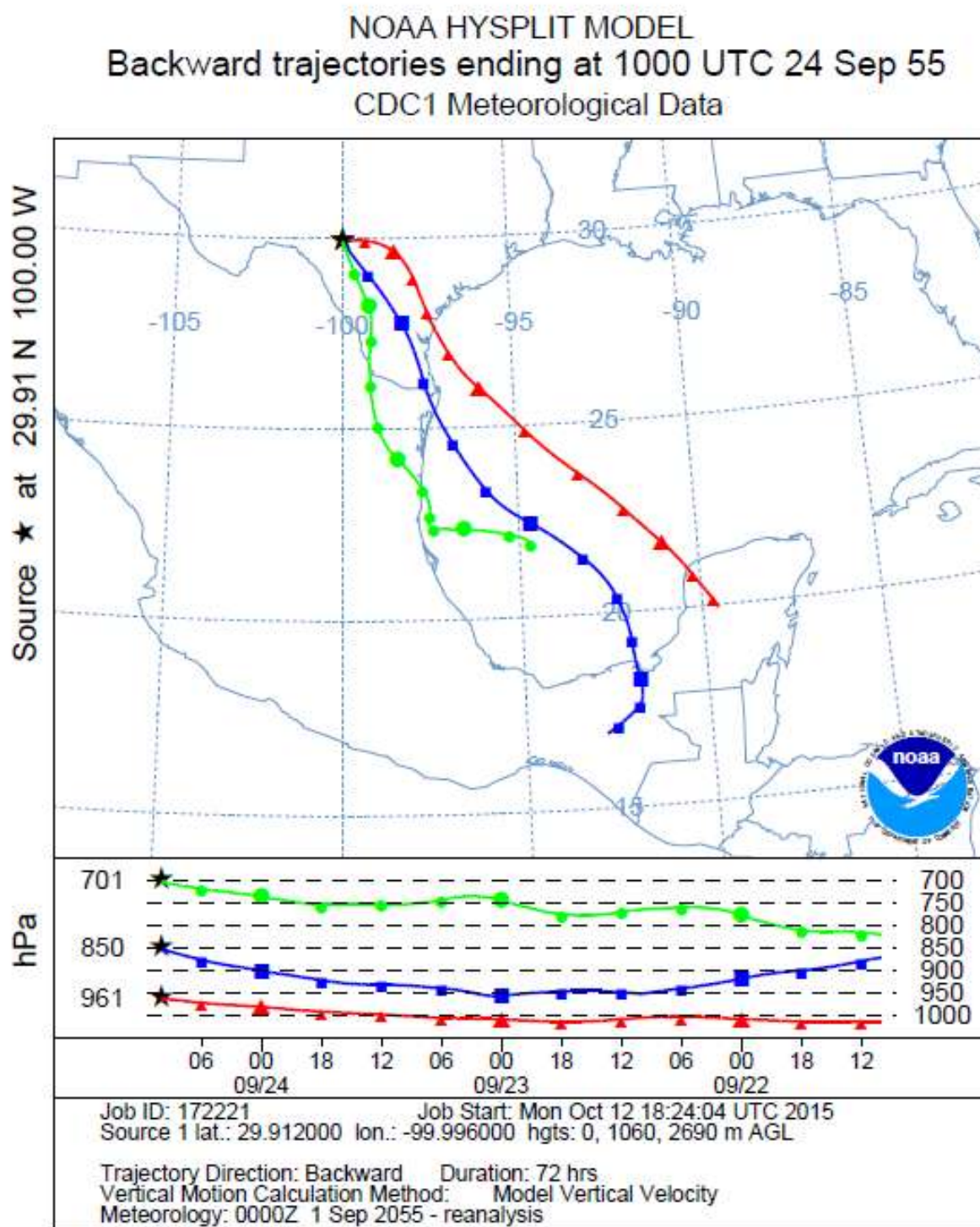
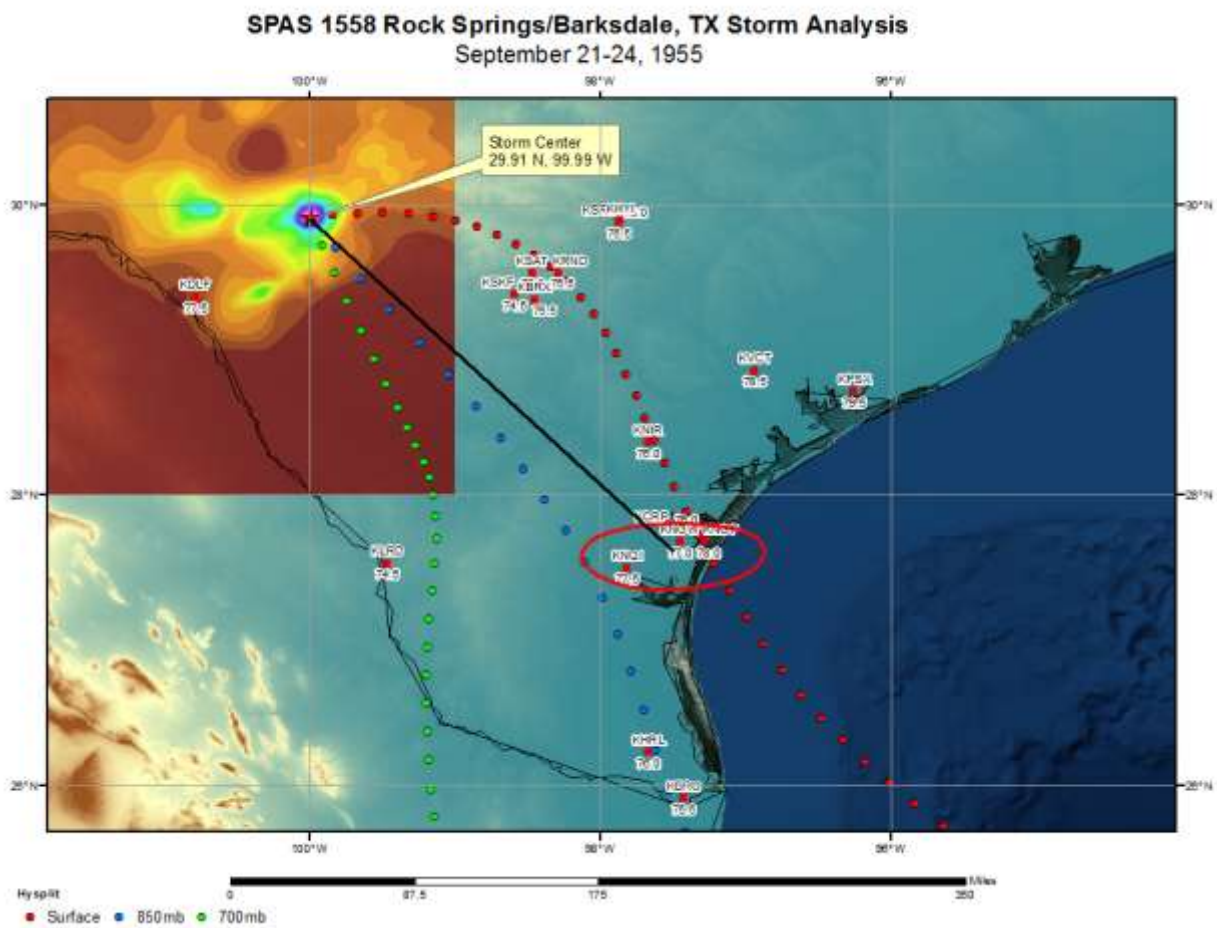


Figure 309: HYSPLIT trajectory analysis at Surface, 850mb and 700mb for Rock Springs, TX
September 1955



**Figure 310: In-place storm representative dew point analysis for Rock Springs, TX
September 21-24, 1955**

Storm Precipitation Analysis System (SPAS) For Storm # 1293 (Re-Run of SPAS #1009)

General Storm Location: Southeastern Colorado, NE New Mexico and E Kansas.

Storm Dates: June 14 – 19, 1965

Event: Thunderstorms and possible Mesoscale Convective Complex (MCC)

DAD Zone 1 (Holly/Two Buttes, CO)

Latitude: 37.7125

Longitude: -102.40416

Max. Grid Rainfall Amount: 19.18"

Max. Observed Rainfall Amount: 18.00"

Number of Stations: 414

SPAS Version: 9.5

Base Map Used: Modified USGS total precipitation map for the period June 13-20, 1965

Radar Included: No

Depth-Area-Duration (DAD) analysis: 1, 2, 3, 4, 5, 6, 12, 18, 24, 36, 48, 72, 96, 120, & 144 hr

Confidence in results: For reasons described below, the results of this analysis are markedly different than SPAS 1009, but are believed to be more accurate. A comprehensive bucket survey provides us with a moderate degree of confidence in the magnitudes; however exact storm patterns have a high degree of uncertainty. The temporal distributions are anchored on good, but sparse hourly data, therefore confidence is lower than normal with the timing.

Comments: This analysis was a re-analysis of SPAS #1009. Since then, several software enhancements have taken place. Plus, a large amount of additional data (Bucket Survey) was added, mainly to address the western storm centers (southeast of Denver). Also, a USGS isohyetal map was used as the basemap, which injected a great deal of information into the analysis versus the #1009 analysis. For these reasons, the results of this analysis are different than 1009, but are believed to be more accurate. 251 Bucket Survey amounts were added from the Colorado Climatological Data. After QC, a total of 224 remained in the data set. Unlike SPAS #1009 where the storm center was near Holly, SPAS #1293 has the storm center about 30 miles southwest of Holly (or 28 miles south –southeast of Lamar, CO). The USGS report stated intense rains began on June 16th in this area and dropped 15.5" of rain. Coupled with other rain showers during the June 14-19th period, the total storm center rainfall rose to 18" for the 144-hour period. Two Buttes, the closest hourly "station," was based on a mass curve published in the USGS report (shown below). The USGS mass curve for Two Buttes looked to be estimated, so the final timing was also influenced by surrounding true hourly stations.

SPAS Storm ID	NAME	LON	LAT	ELEV Round	Storm Representative				Climatological Maximum				IPMF
					T _g	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	T _g	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	
1293_1	HOLLY	-102.404	37.713	4,100	77.00	3.14"	0.99"	2.150	80.5	3.68"	1.10"	2.580	1.20

Storm 1293 - June 14 (0800 UTC) - June 20 (0700 UTC), 1965														
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)														
Area (mi ²)	Duration (hours)													
	1	2	3	4	5	6	12	18	24	36	48	72	96	120
0.3	3.94	5.62	7.69	9.10	11.95	13.63	14.52	14.55	16.45	17.55	18.80	18.90	19.09	19.18
1	3.92	5.60	7.62	9.06	11.89	13.56	14.46	14.49	16.38	17.47	18.71	18.82	19.00	19.09
10	3.85	5.52	7.28	8.92	11.74	13.38	14.24	14.27	16.12	17.21	18.41	18.52	18.71	18.80
25	3.82	5.49	7.23	8.86	11.68	13.31	14.15	14.18	16.02	17.10	18.30	18.40	18.60	18.69
50	3.75	5.36	7.08	8.68	11.43	13.04	13.86	13.89	15.80	16.87	18.07	18.18	18.35	18.44
100	3.52	5.02	6.62	8.12	10.70	12.20	12.97	13.00	15.06	16.14	17.44	17.59	17.74	17.90
150	3.29	4.70	6.20	7.61	10.01	11.42	12.16	12.18	14.34	15.44	16.84	17.04	17.16	17.40
200	3.10	4.44	5.85	7.18	9.45	10.77	11.48	11.50	13.74	14.83	16.28	16.60	16.64	16.97
300	2.80	4.01	5.28	6.48	8.53	9.73	10.37	10.40	12.71	13.79	15.34	15.78	15.82	16.15
400	2.53	3.61	4.77	5.85	7.70	8.79	9.37	9.41	11.88	12.93	14.55	15.04	15.06	15.44
500	2.28	3.24	4.28	5.25	6.92	7.89	8.42	8.46	11.15	12.22	13.92	14.46	14.49	14.86
1,000	1.54	2.23	2.80	3.63	4.40	5.03	5.42	5.76	8.61	9.64	11.83	12.56	12.62	13.00
2,000	1.32	1.72	2.20	2.86	3.15	3.41	3.92	4.82	6.30	7.24	9.62	10.40	10.48	10.89
5,000	0.83	1.18	1.52	1.87	2.09	2.32	2.79	3.52	4.69	5.41	6.68	7.34	7.47	7.71
10,000	0.50	0.75	0.98	1.12	1.31	1.48	1.90	2.35	3.32	3.94	4.64	5.13	5.36	5.45
20,000	0.28	0.47	0.62	0.71	0.80	0.94	1.22	1.46	2.08	2.72	2.98	3.47	3.73	3.82
40,556	0.15	0.25	0.35	0.40	0.49	0.54	0.74	0.92	1.25	1.66	1.86	2.20	2.37	2.47

Figure 311: Depth-area-duration values for Holly, CO June 1965

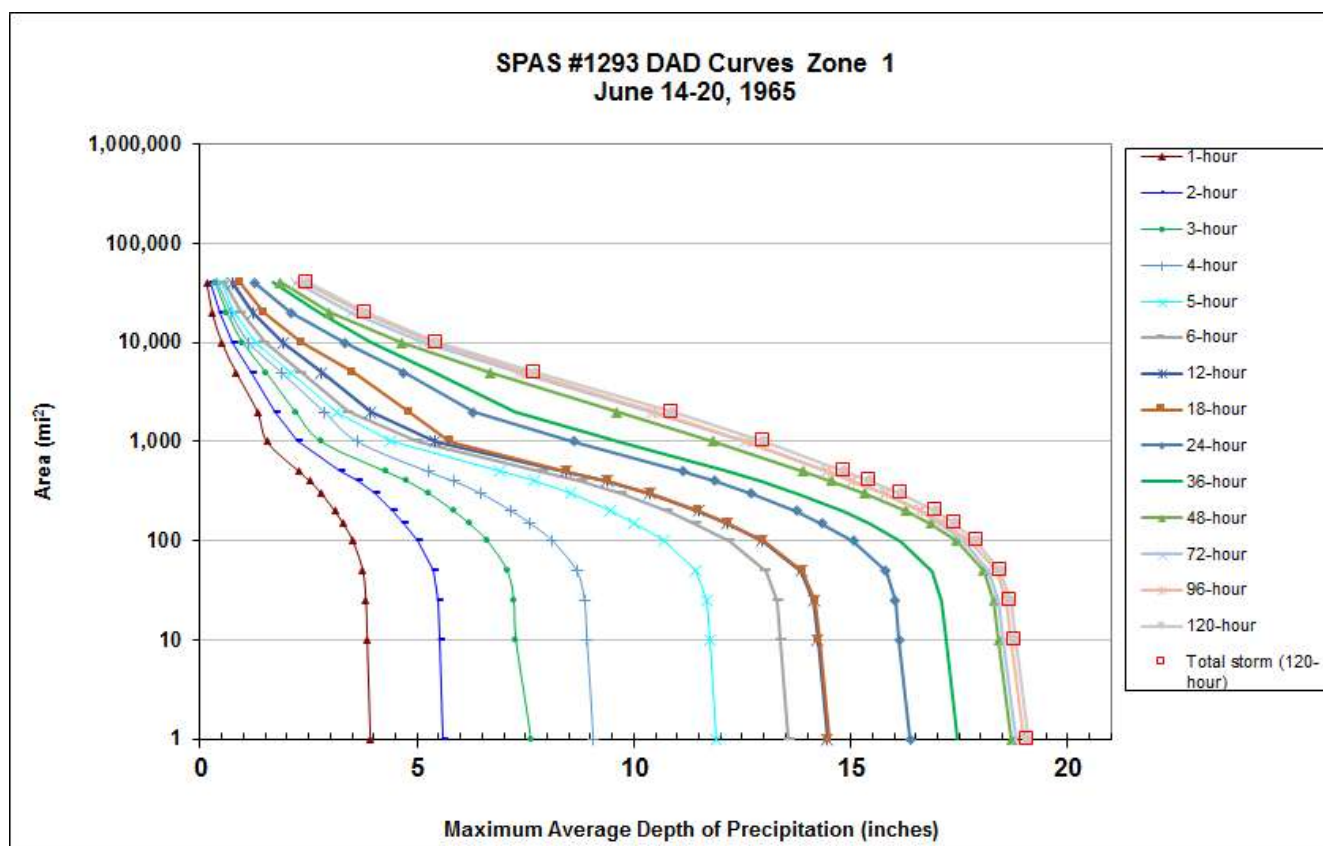


Figure 312: Depth-area-duration chart for Holly, CO June 1965

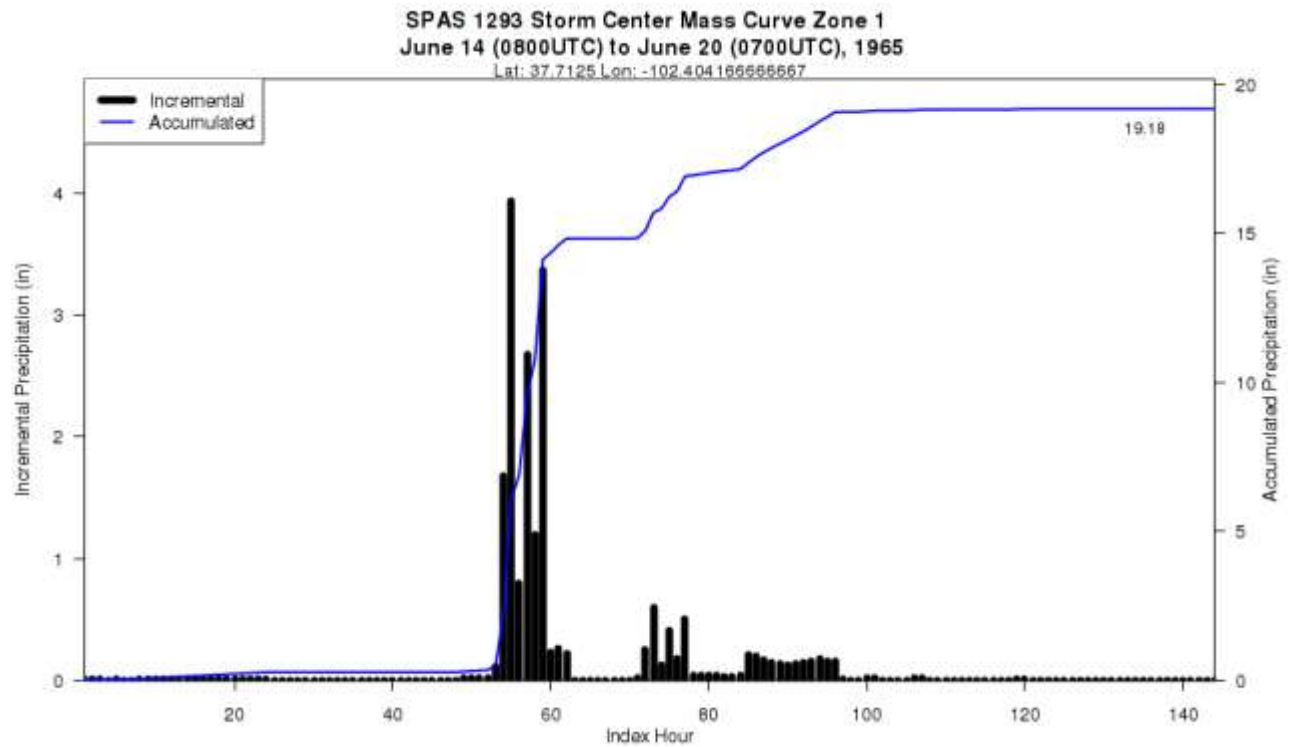
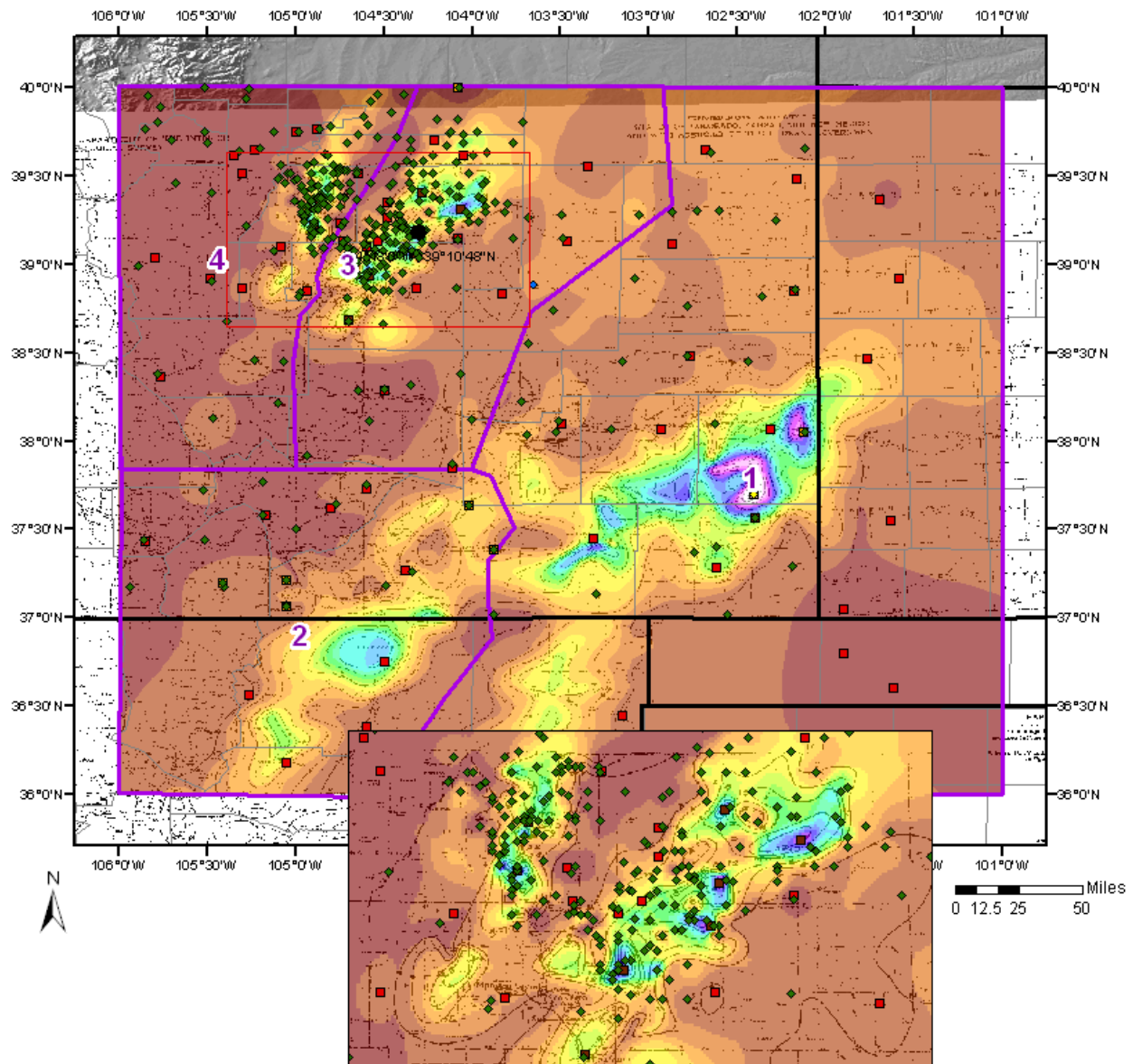
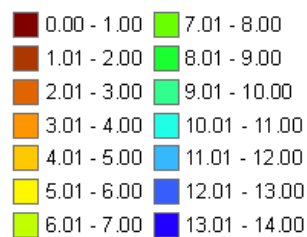


Figure 313: Mass curve chart for Holly, CO June 1965



Total 144-hour Precipitation (inches)
06/14/1965 08 UTC - 06/20/1965 07 UTC
SPAS #1293

Precipitation (inches)



Stations

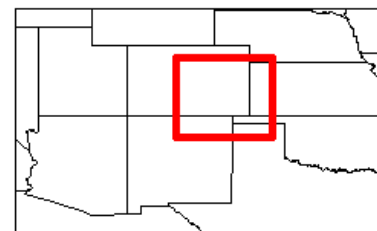
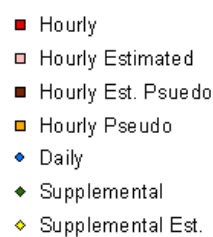


Figure 314: Total storm isohyetal analysis for Holly, CO June 1965

NOAA HYSPLIT MODEL
 Backward trajectories ending at 1200 UTC 16 Jun 65
 CDC1 Meteorological Data

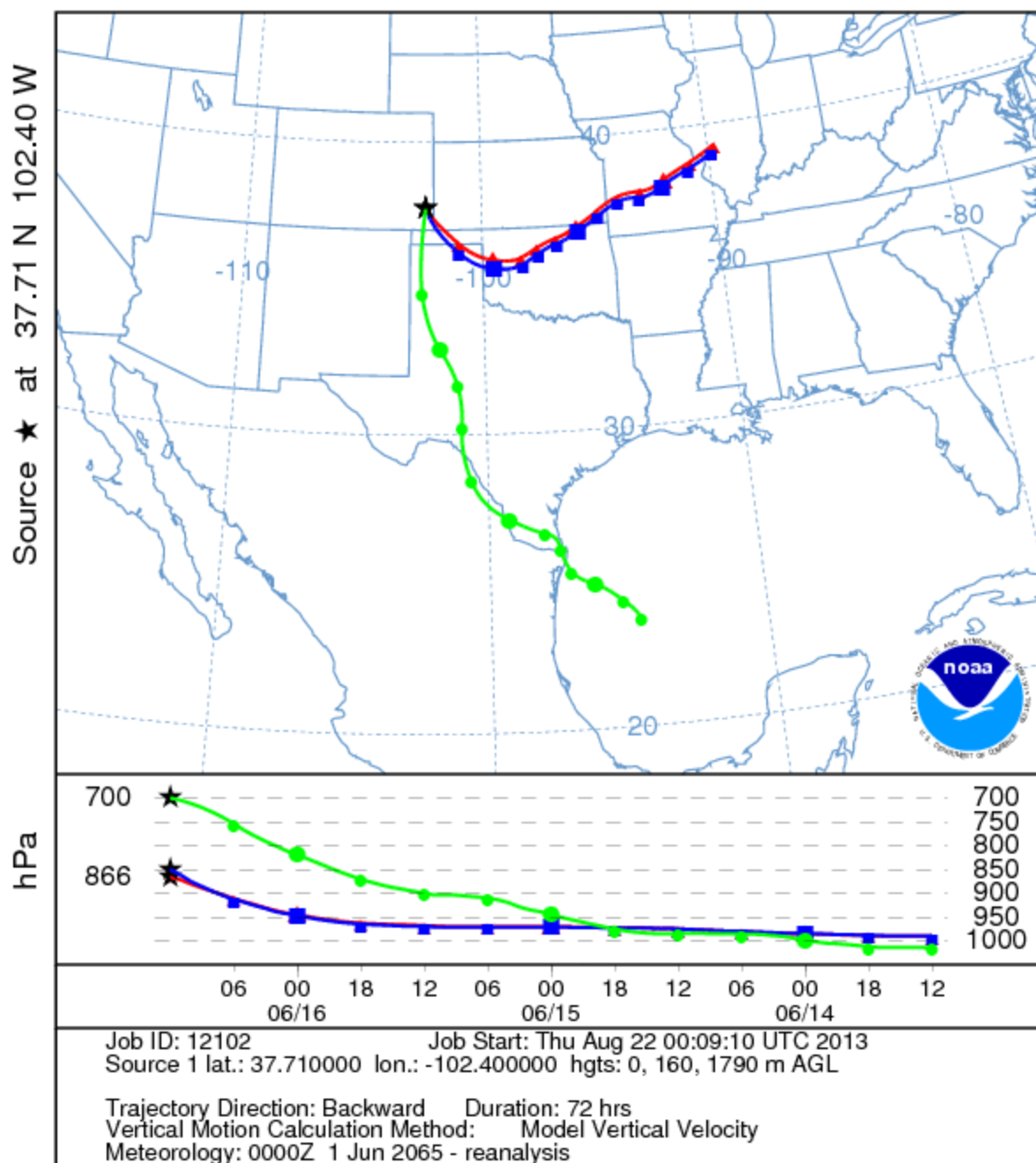


Figure 315: HYSPLIT trajectory analysis at Surface, 850mb and 700mb for Holly, CO June 1965

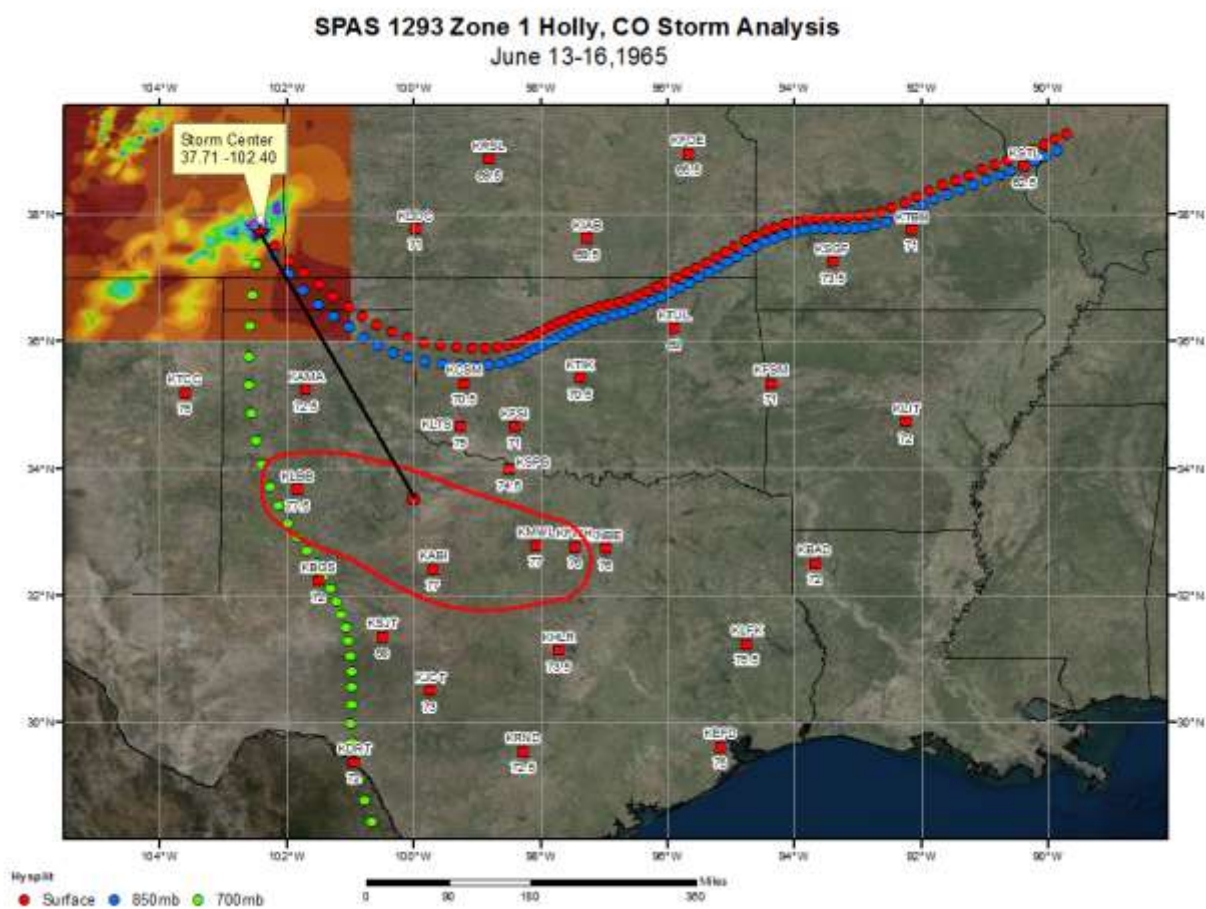


Figure 316: In-place storm representative dew point analysis for Holly, CO June 13-16, 1965

Storm Precipitation Analysis System (SPAS) For Storm #1034

General Storm Location: Enid, OK (center: Boggy Creek, OK)

Storm Dates: October 10 – 12, 1973

Event: Thunderstorm, possibly associated with a mesoscale convective complex (MCC)

Latitude: 36.4000 (36.3805)

Longitude: -97.8833 (-97.8683)

Rainfall Amount: 15.68" (20.00") (Grid/Pixel = 19.45")

Number of Stations: 52 (d=38, h=4, hp=4, s=6)

SPAS Version: 2.0

Base Map Used: No

Radar Included: No

Depth-Area-Duration (DAD) analysis: Yes, 1, 2, 3, 4, 5, 6, 12, 18, 24, 36, 48, 72, and 96 hours

					Storm Representative				Climatological Maximum				
SPAS Storm ID	NAME	LON	LAT	ELEV Round	T _d	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	T _d	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	IPMF
1034_1	ENID	-97.868	36.381	1,200	75.00	2.85"	0.30"	2.550	77.0	3.14"	0.32"	2.820	1.11

Storm 1034 - Enid OK, October 9 - 12, 1973															
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)															
Area (mi ²)	Duration (hours)														
	1	2	3	4	5	6	12	18	24	36	48	72	96	120	total
1	2.77	4.26	5.74	7.06	9.22	11.22	17.09	18.98	19.02	19.02	19.20	19.38	19.45	19.45	19.45
10	2.63	4.06	5.49	7.60	8.80	10.73	16.33	18.13	18.16	18.16	18.33	18.51	18.57	18.57	18.57
25	2.54	3.91	5.31	7.33	8.49	10.35	15.74	17.48	17.51	17.51	17.68	17.84	17.91	17.91	17.91
50	2.45	3.77	5.14	7.09	8.20	10.00	15.20	16.88	16.91	16.91	17.07	17.23	17.29	17.29	17.29
100	2.36	3.62	4.97	6.83	7.90	9.64	14.63	16.25	16.27	16.27	16.42	16.57	16.64	16.64	16.64
150	2.27	3.51	4.87	6.62	7.64	9.36	14.16	15.72	15.74	15.74	15.89	16.03	16.09	16.09	16.09
200	2.20	3.39	4.79	6.43	7.40	9.09	13.69	15.21	15.23	15.23	15.37	15.51	15.57	15.57	15.57
300	2.09	3.18	4.65	6.06	6.95	8.59	12.84	14.27	14.29	14.29	14.41	14.54	14.60	14.60	14.60
400	2.06	2.99	4.54	5.75	6.61	8.20	12.10	13.45	13.47	13.47	13.58	13.70	13.75	13.75	13.75
500	2.04	2.92	4.43	5.50	6.36	7.91	11.47	12.78	12.80	12.80	12.90	13.00	13.06	13.06	13.06
1,000	1.85	2.65	3.89	4.61	5.40	6.71	9.47	10.55	10.57	10.57	10.63	10.70	10.89	10.89	10.89
2,000	1.46	2.16	3.21	3.73	4.30	5.35	7.40	8.11	8.13	8.13	8.17	8.20	8.67	8.67	8.67
5,000	0.96	1.51	2.38	2.75	3.18	3.91	5.24	5.64	5.65	5.65	5.67	5.68	6.32	6.32	6.32
9,524	0.33	0.56	1.63	1.90	2.19	2.67	3.83	4.15	4.16	4.16	4.19	4.20	4.98	4.98	4.98

Figure 317: Depth-area-duration values for Enid, OK October 1973

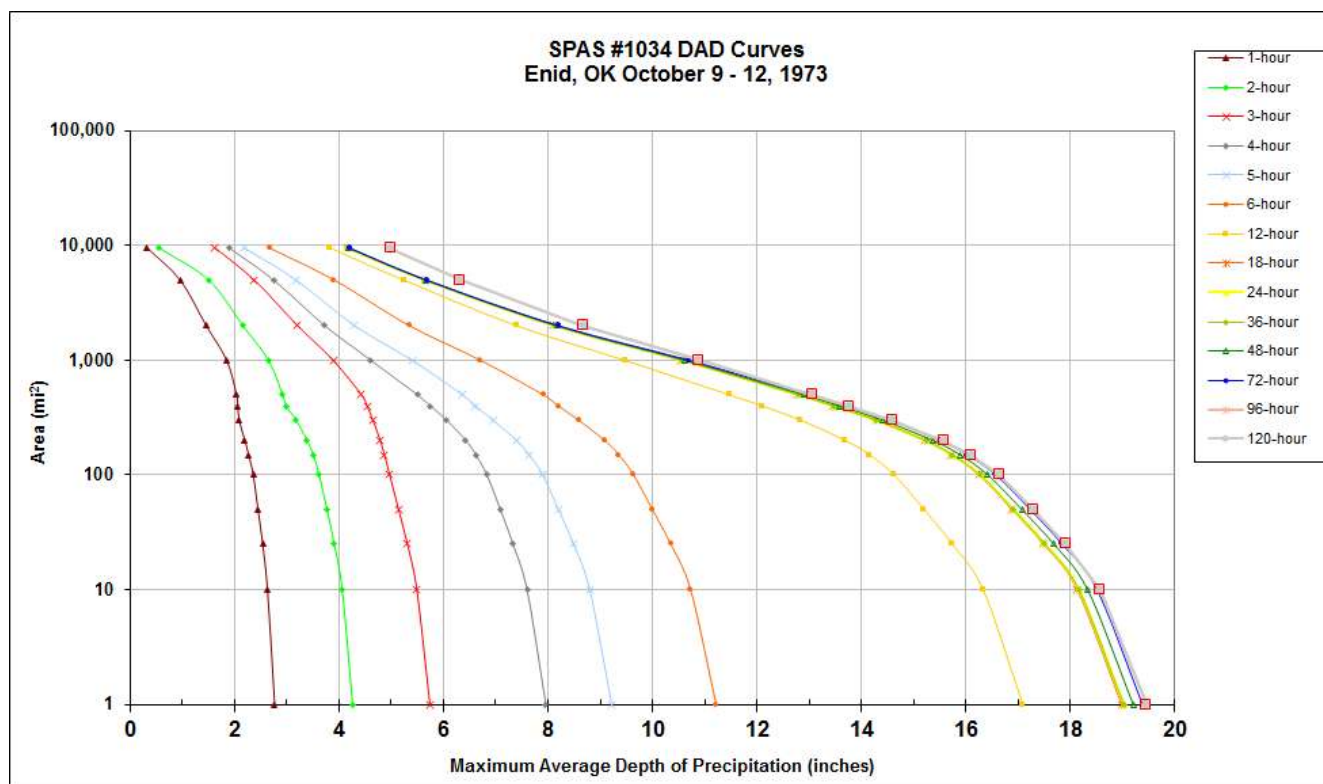


Figure 318: Depth-area-duration chart for Enid, OK October 1973

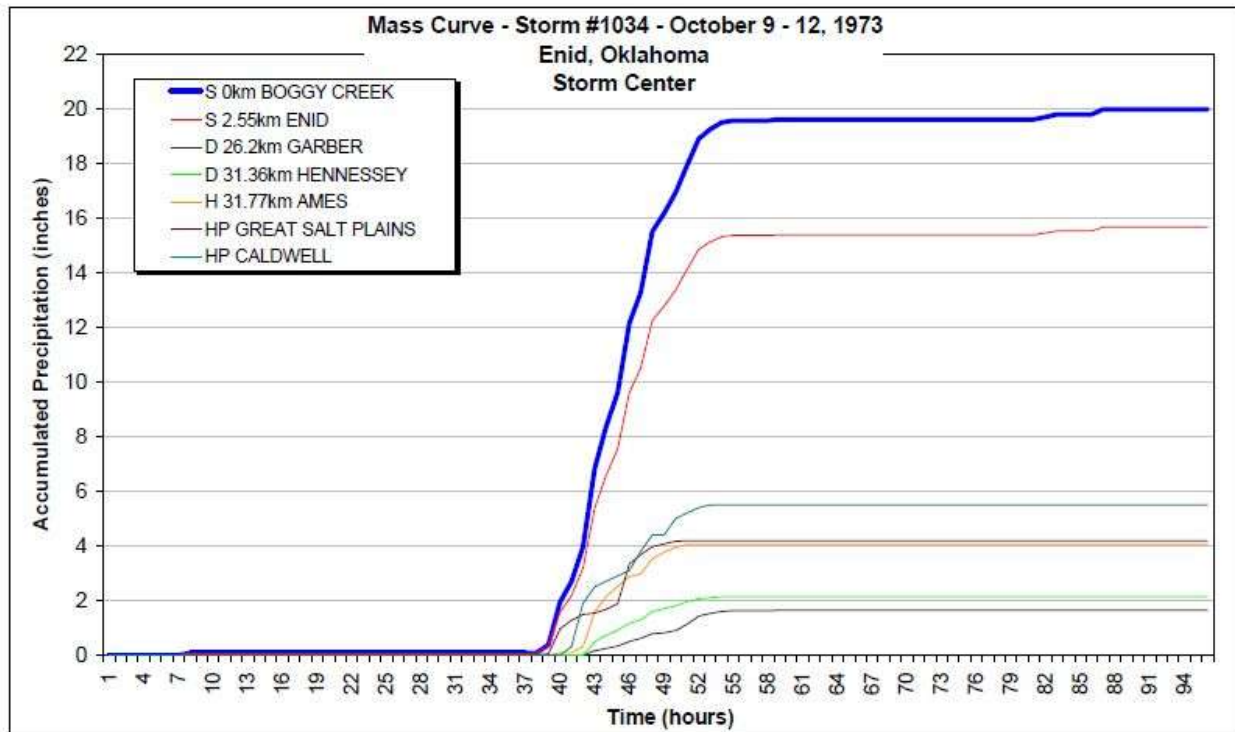
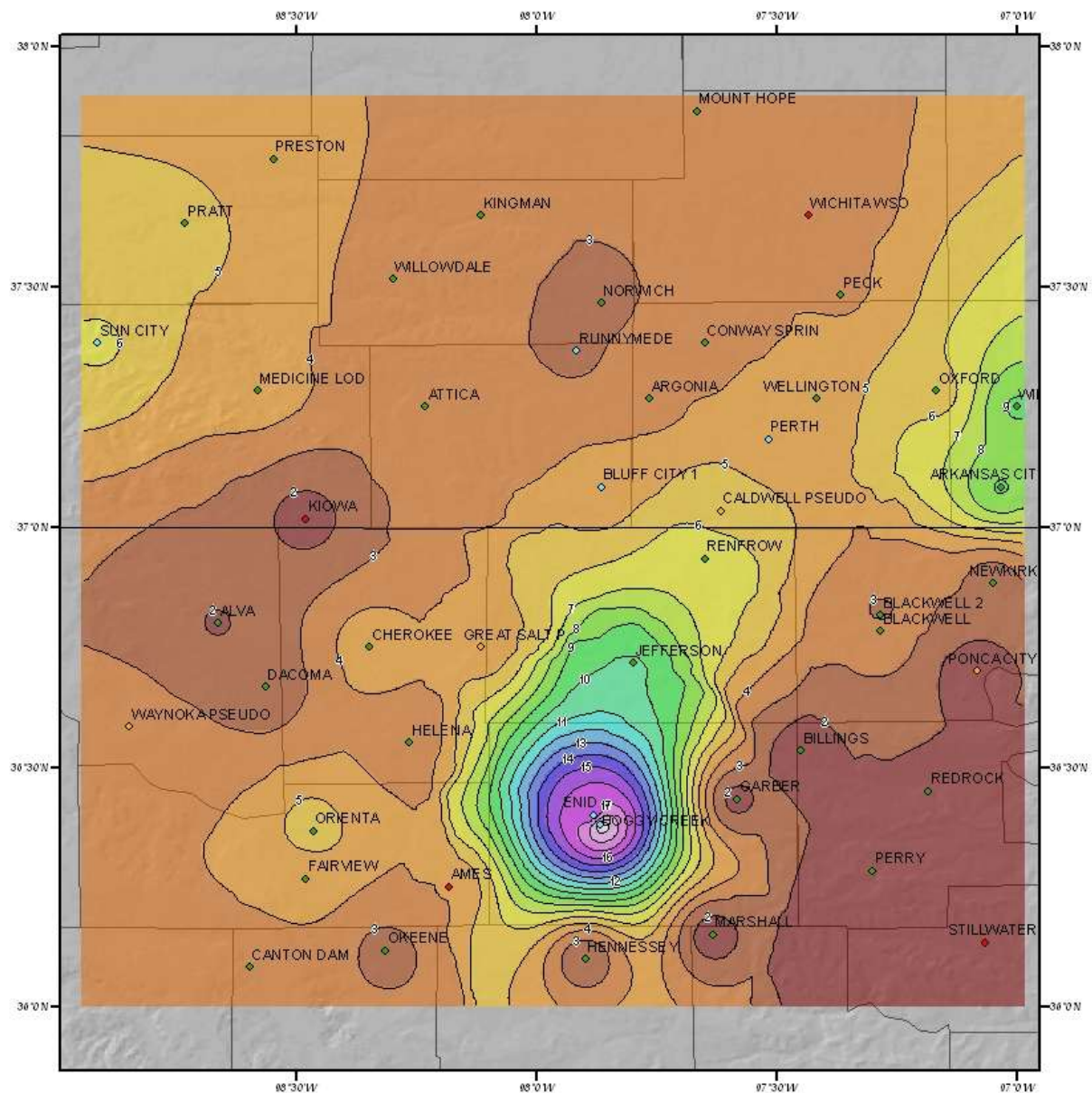
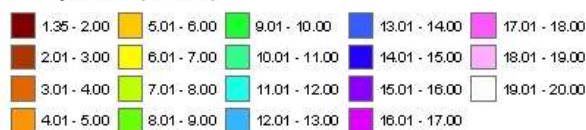


Figure 319: Mass curve chart for Enid, OK October 1973

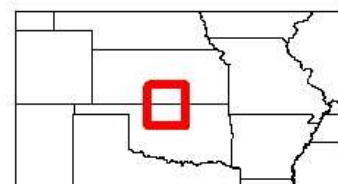


SPAS Storm #1034 - October 9 to 12, 1973
Total Rainfall (96-hours) - Enid, Oklahoma

Precipitation (inches)



Gauging Stations



Coordinate system: GCS North American 1983
 Scale: 1:1,210,722
 NCEP/FAO April 8, 2007

Figure 320: Total storm isohyetal analysis for Enid, OK October 1973

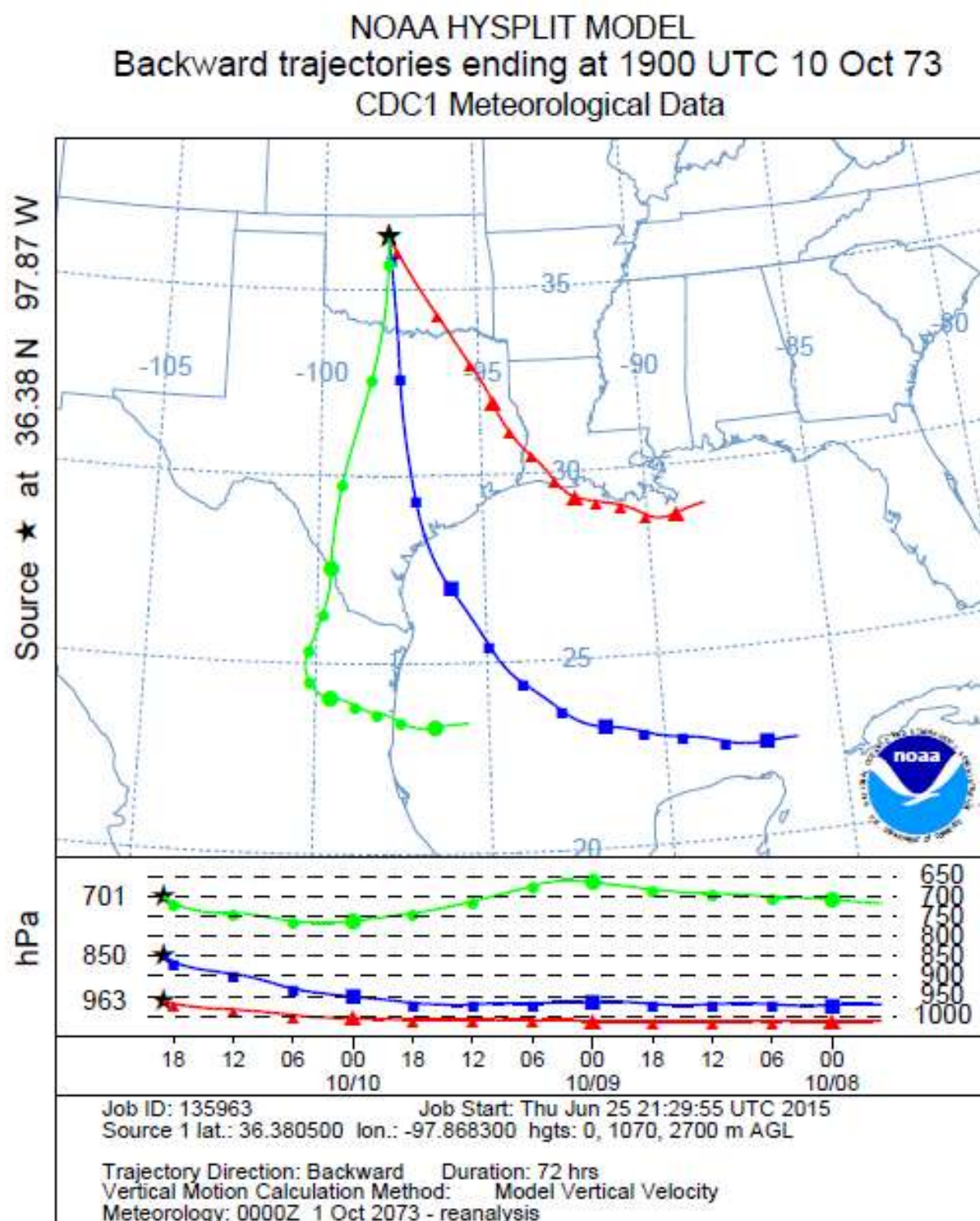


Figure 321: HYSPLIT trajectory analysis at Surface, 850mb and 700mb for Enid, OK October 1973

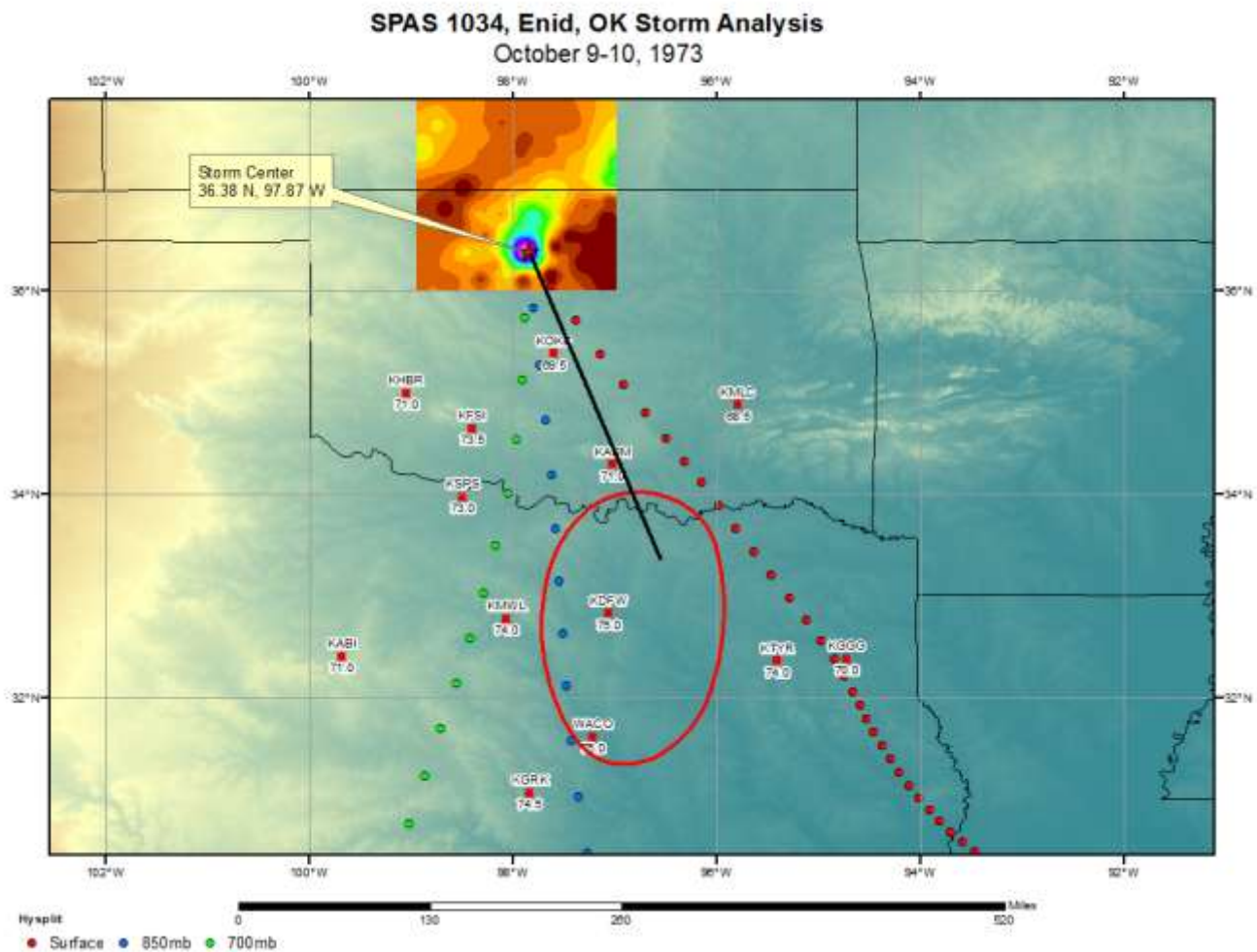


Figure 322: In-place storm representative dew point analysis for Enid, OK October 9-10, 1973

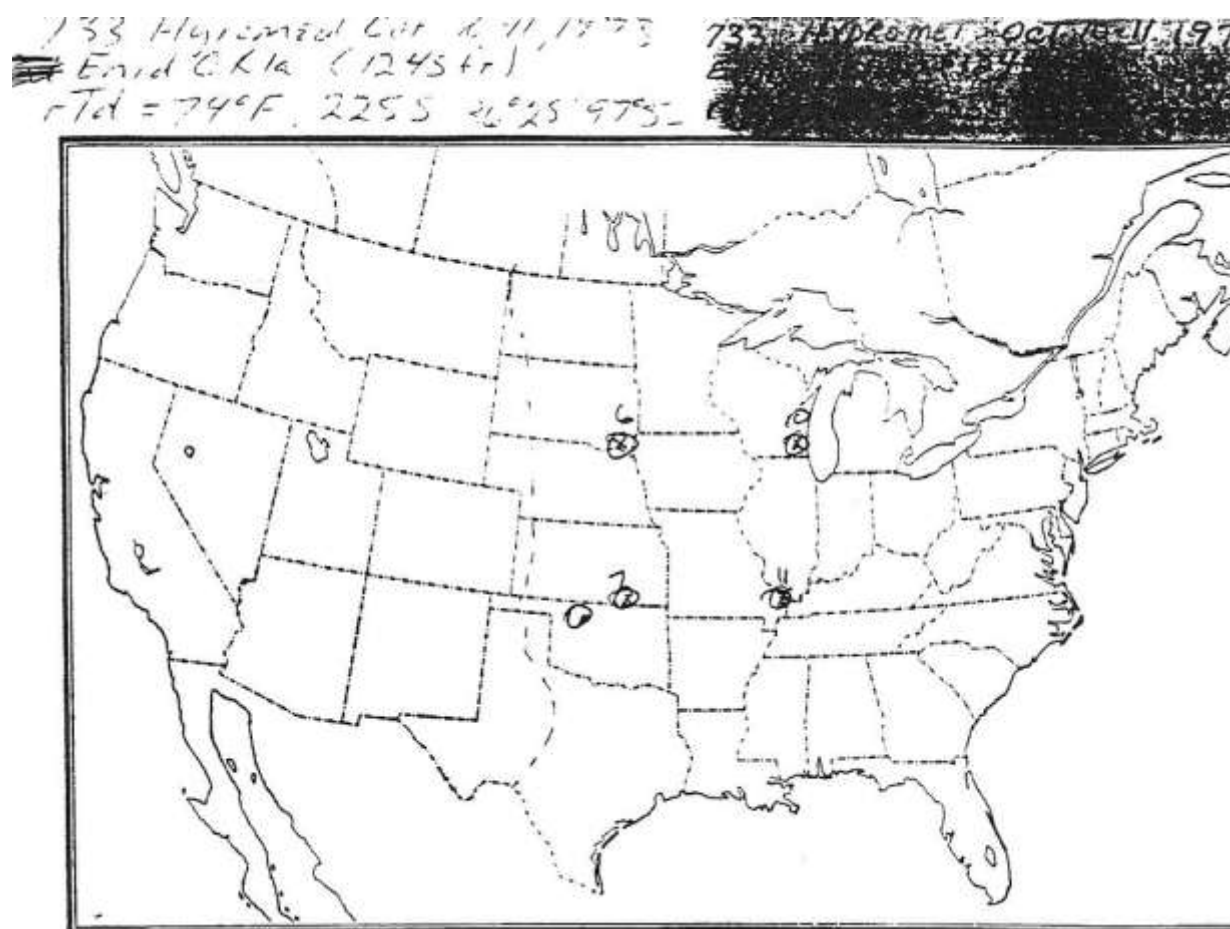


Figure 323: NWS Transposition Map for Enid, OK October 1973

Storm Precipitation Analysis System (SPAS) For Storm #1487

General Storm Location: Southern New Mexico and Western Texas (-108.8, 34.5, 31.1, -104.7)

Storm Dates: August 18 – August 20, 1978

Event: Localized Extreme Precipitation Event

DAD Zone 1

Latitude: 32.3875

Longitude: -106.5292

Max. Grid Rainfall Amount: 10.43" Cox Ranch, NM

Max. Observed Rainfall Amount: 10.00"

Number of Stations: 105

SPAS Version: 10.0

Basemap: Monthly PRISM Map – August 1978

Spatial resolution: 0.2783

Radar Included: No

Depth-Area-Duration (DAD) analysis: Yes

Reliability of results: In addition to the NCDC hourly stations, an isohyetal map from the U.S. Army Corp of Engineers (USACE) was digitized and used to locate supplemental stations and provide insight on the overall spatial pattern at White Sands Missile Range (WSMR); 12 total supplemental stations were added from the USACE Report. In order to contain the storm center, 11 estimated stations were also added in a north-south transect and surrounding the added WSMR Stations. A majority of the precipitation at WSMR fell in a four-hour time period from 1700-2100 MST on August 19. Due to the density of observations and well reported timing, the storm center reliability is quite high. While precipitation did fall outside of this time period as well as outside of the small storm center location, there is less information to determine rainfall pattern and timing as accurately.

SPAS Storm ID	NAME	LON	LAT	ELEV Round	Storm Representative				Climatological Maximum				IPMF
					T _g	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	T _g	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	
1487_1	WHITE SANDS	-106.529	32.387	4,600	74.00	2.73"	0.98"	1.750	80.0	3.60"	1.21"	2.390	1.37

Storm 1487 - August 18 (0800 UTC) - August 21 (0700 UTC), 1978															
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)															
Area (mi ²)	Duration (hours)														
	1	2	3	4	5	6	12	18	24	36	48	72	96	120	Total
0.3	2.20	4.40	6.60	7.70	8.25	8.80	10.32	10.40	10.40	10.40	10.40	10.40	10.40	10.43	10.43
1	2.18	4.36	6.55	7.64	8.18	8.73	10.22	10.31	10.31	10.31	10.31	10.31	10.31	10.31	10.31
10	1.90	3.80	5.70	6.65	7.12	7.60	8.93	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00
25	1.64	3.28	4.92	5.74	6.15	6.56	7.72	7.79	7.79	7.79	7.79	7.79	7.79	7.79	7.79
50	1.42	2.83	4.24	4.94	5.30	5.65	6.70	6.77	6.77	6.77	6.77	6.77	6.77	6.77	6.77
100	1.20	2.41	3.44	4.01	4.30	4.60	5.55	5.64	5.64	5.64	5.64	5.64	5.64	5.64	5.64
150	1.10	2.22	3.03	3.53	3.78	4.04	4.97	5.07	5.07	5.07	5.07	5.07	5.07	5.07	5.07
200	1.05	2.10	2.83	3.28	3.50	3.75	4.59	4.69	4.69	4.69	4.69	4.69	4.69	4.69	4.69
300	0.99	1.94	2.56	2.96	3.15	3.38	4.11	4.22	4.22	4.22	4.22	4.22	4.22	4.22	4.22
400	0.95	1.84	2.39	2.75	2.92	3.15	3.83	3.91	3.91	3.91	3.91	3.91	3.91	3.91	3.91
500	0.92	1.76	2.26	2.59	2.75	2.97	3.68	3.77	3.77	3.77	3.77	3.77	3.77	3.77	3.77
1,000	0.83	1.53	1.91	2.17	2.29	2.49	3.27	3.38	3.38	3.38	3.38	3.38	3.38	3.38	3.38
2,000	0.70	1.33	1.59	1.79	1.89	2.11	2.94	3.02	3.03	3.03	3.03	3.03	3.03	3.03	3.03
5,000	0.50	0.94	1.14	1.30	1.46	1.71	2.37	2.48	2.49	2.49	2.50	2.50	2.50	2.50	2.50
10,000	0.34	0.61	0.76	0.93	1.08	1.34	1.87	1.98	1.99	2.01	2.02	2.02	2.02	2.02	2.02
20,000	0.23	0.39	0.50	0.60	0.71	0.85	1.31	1.45	1.46	1.50	1.53	1.53	1.53	1.53	1.53
50,000	0.10	0.19	0.24	0.32	0.37	0.45	0.72	0.86	0.88	0.90	0.92	0.92	0.92	0.92	0.92
50,654	0.10	0.19	0.24	0.32	0.37	0.45	0.72	0.85	0.86	0.89	0.91	0.91	0.91	0.91	0.91

Figure 324: Depth-area-duration values for White Sands, NM August 1978

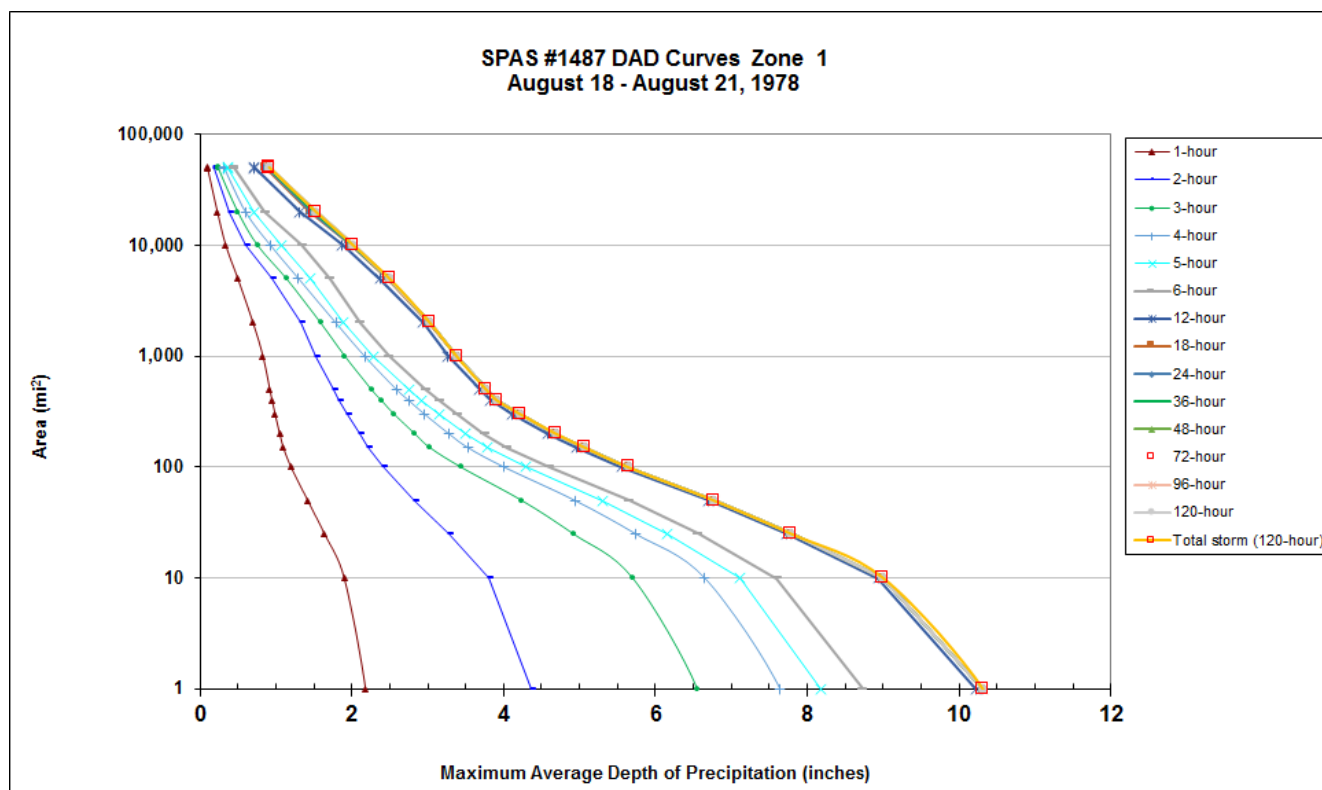


Figure 325: Depth-area-duration chart for White Sands, NM August 1978

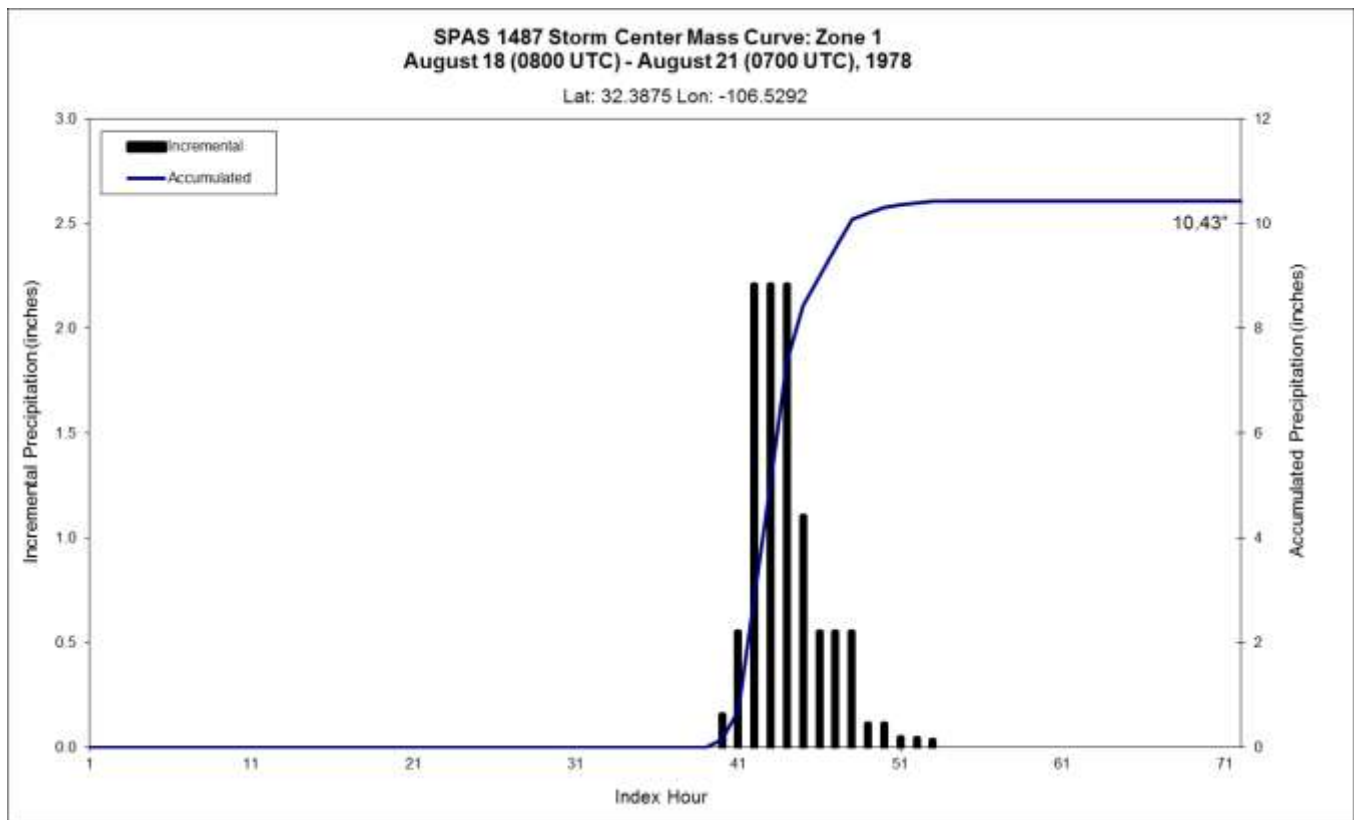


Figure 326: Mass curve chart for White Sands, NM August 1978

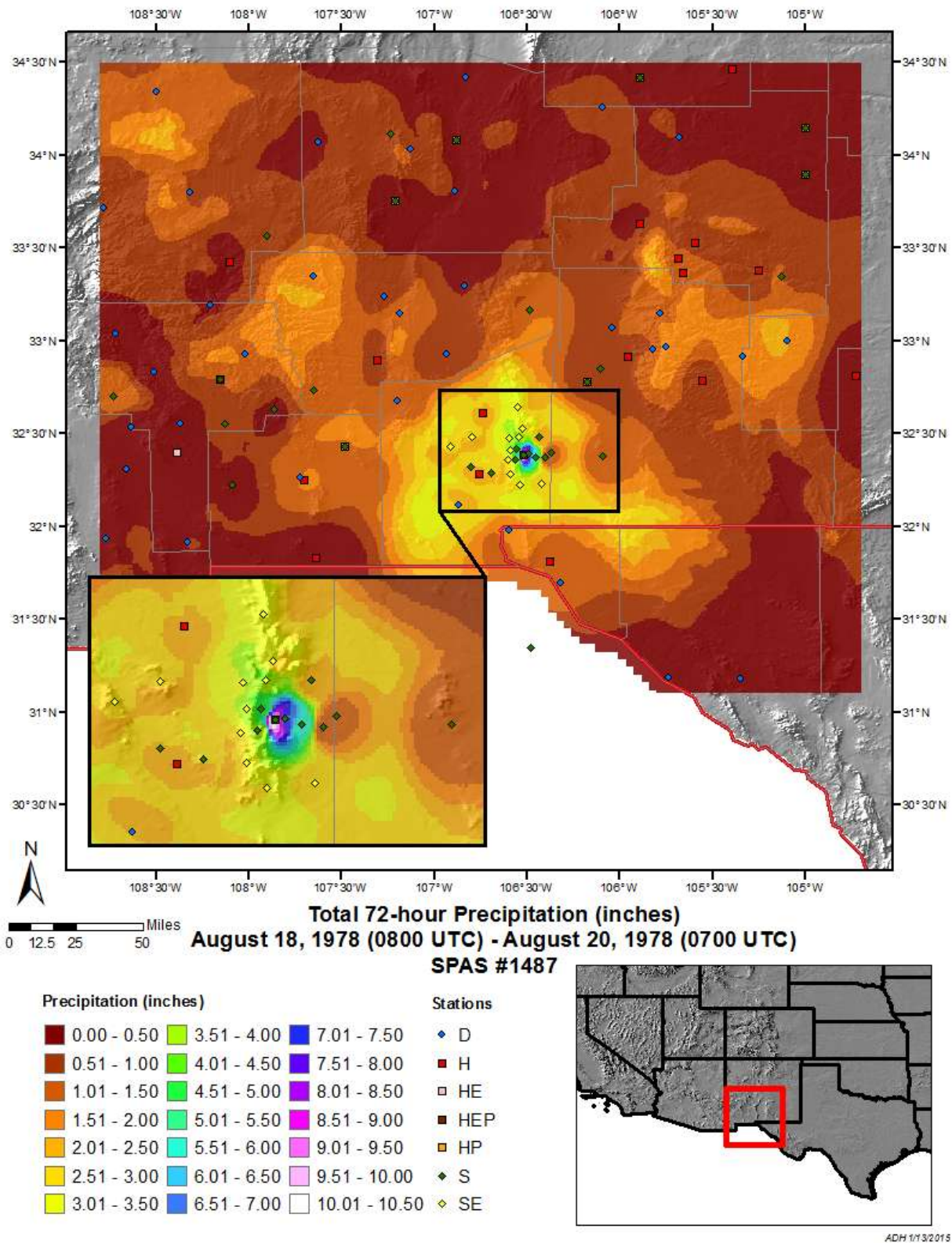


Figure 327: Total storm isohyetal analysis for White Sands, NM August 1978

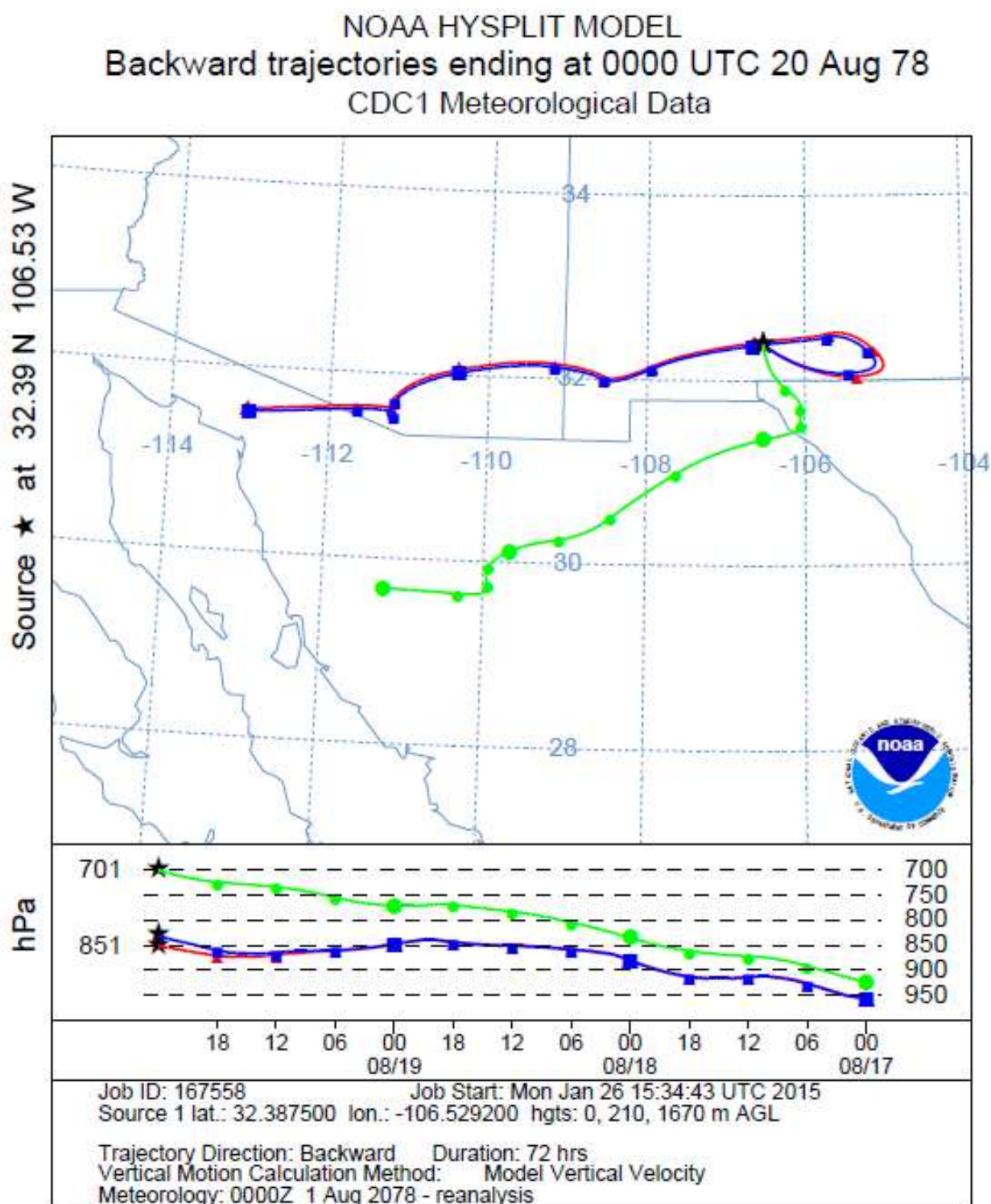


Figure 328: HYSPLIT trajectory analysis at Surface, 850mb and 700mb for White Sands, NM
August 1978

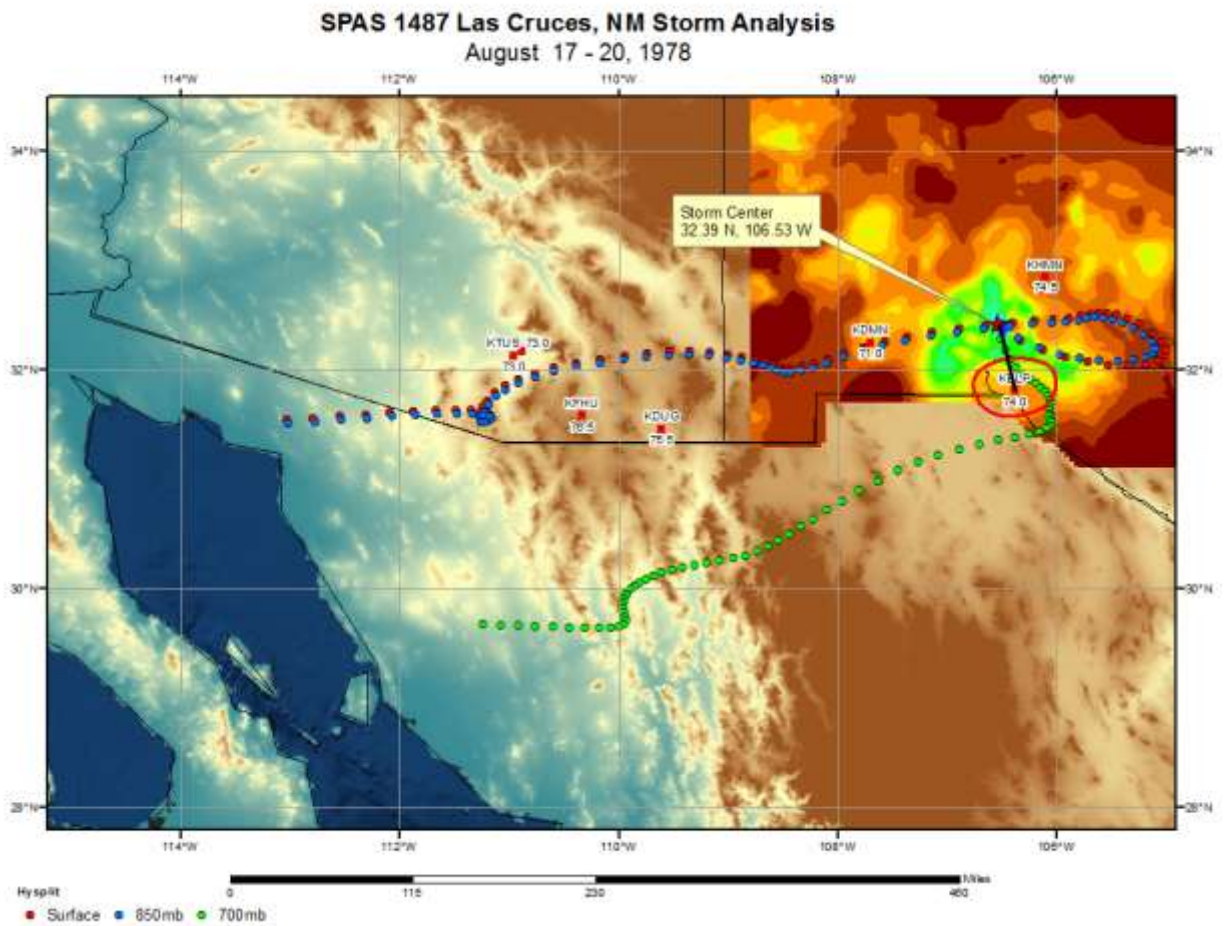


Figure 329: In-place storm representative dew point analysis for White Sands, NM August 17-20, 1978

Storm Precipitation Analysis System (SPAS) For Storm #1247

General Storm Location: Colorado

Storm Dates: July 2-5, 1981

Event: Thunderstorm

DAD Zone 1

Latitude: 37.096

Longitude: -104.379

Max. Grid Rainfall Amount: 16.33"

Max. Observed Rainfall Amount: 16.00"

Number of Stations: 54 (23 Daily, 8 Hourly, 2 Hourly Pseudo, and 21 Supplemental)

SPAS Version: 9.5

Basemap: Blend of isohyetal from Bishop report and PRISM July 1981 precipitation

Spatial resolution: 00:00:30 (~ 0.30 mi²)

Radar Included: No

Depth-Area-Duration (DAD) analysis: Yes

SPAS Storm ID	NAME	LON	LAT	ELEV Round	Storm Representative				Climatological Maximum				IPMF
					T _d	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	T _d	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	
1247_1	FRIJOLE CREEK	-104.379	37.096	6,500	77.00	3.14"	1.45"	1.690	78.5	3.37"	1.53"	1.840	1.09

Storm 1247 - July 2 (8 UTC) - July 5 (7 UTC), 1981															
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)															
Area (mi ²)	Duration (hours)														
	1	2	3	4	5	6	12	18	24	36	48	72	96	120	Total
0.3	6.14	12.26	14.56	16.21	16.22	16.23	16.23	16.25	16.25	16.28	16.28	16.28	16.28	16.33	16.33
1	6.09	12.19	14.47	16.11	16.12	16.12	16.13	16.14	16.14	16.17	16.18	16.18	16.18	16.18	16.18
10	5.62	11.16	13.29	14.83	14.85	14.85	14.86	14.87	14.87	14.91	14.91	14.91	14.91	14.91	14.91
25	4.96	9.82	11.73	13.13	13.16	13.17	13.18	13.22	13.22	13.28	13.29	13.29	13.29	13.29	13.29
50	4.24	8.34	10.03	11.26	11.30	11.30	11.32	11.34	11.34	11.43	11.44	11.44	11.44	11.44	11.44
100	3.51	6.84	8.31	9.37	9.41	9.42	9.44	9.48	9.48	9.57	9.59	9.59	9.59	9.59	9.59
150	3.10	6.00	7.31	8.27	8.33	8.35	8.37	8.41	8.41	8.55	8.57	8.57	8.57	8.57	8.57
200	2.82	5.45	6.66	7.55	7.62	7.63	7.66	7.71	7.71	7.86	7.88	7.88	7.88	7.88	7.88
300	2.44	4.70	5.75	6.55	6.64	6.66	6.70	6.76	6.76	6.96	6.99	6.99	6.99	6.99	6.99
400	2.19	4.23	5.17	5.89	5.98	6.01	6.05	6.11	6.11	6.32	6.35	6.35	6.35	6.35	6.35
500	2.01	3.83	4.75	5.43	5.52	5.54	5.59	5.66	5.66	5.87	5.90	5.90	5.90	5.90	5.90
1,000	1.46	2.79	3.45	3.96	4.06	4.08	4.13	4.21	4.21	4.47	4.51	4.51	4.51	4.51	4.51
2,000	0.92	1.69	2.14	2.52	2.66	2.70	2.74	2.88	2.88	3.19	3.23	3.25	3.25	3.25	3.25
5,000	0.44	0.87	1.07	1.25	1.32	1.34	1.36	1.50	1.50	1.77	1.82	1.82	1.82	1.82	1.82
10,000	0.25	0.52	0.63	0.73	0.78	0.79	0.81	0.92	0.93	1.14	1.17	1.18	1.18	1.18	1.18
15,206	0.18	0.35	0.46	0.53	0.56	0.57	0.59	0.67	0.67	0.87	0.90	0.90	0.90	0.90	0.90

Figure 330: Depth-area-duration values for Frijole Creek, CO July 1981

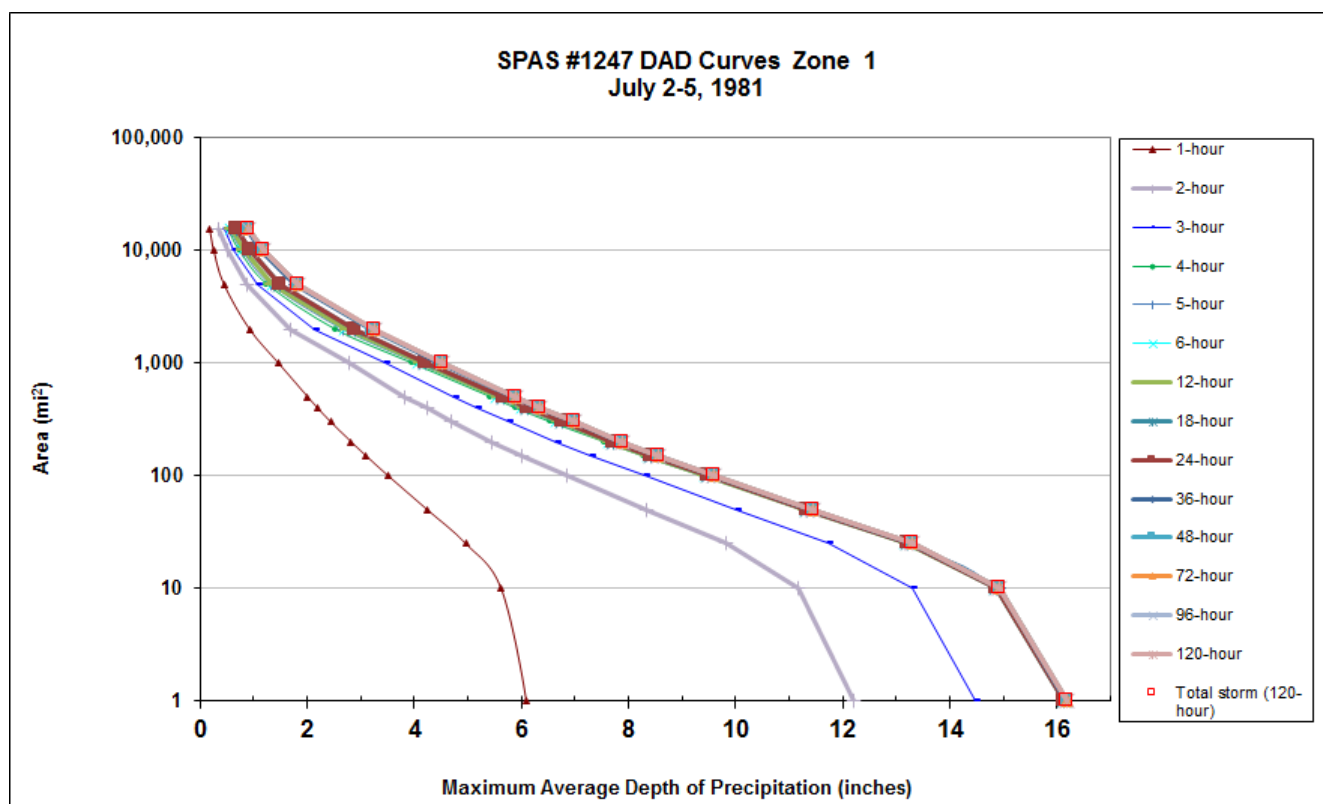


Figure 331: Depth-area-duration chart for Frijole Creek, CO July 1981

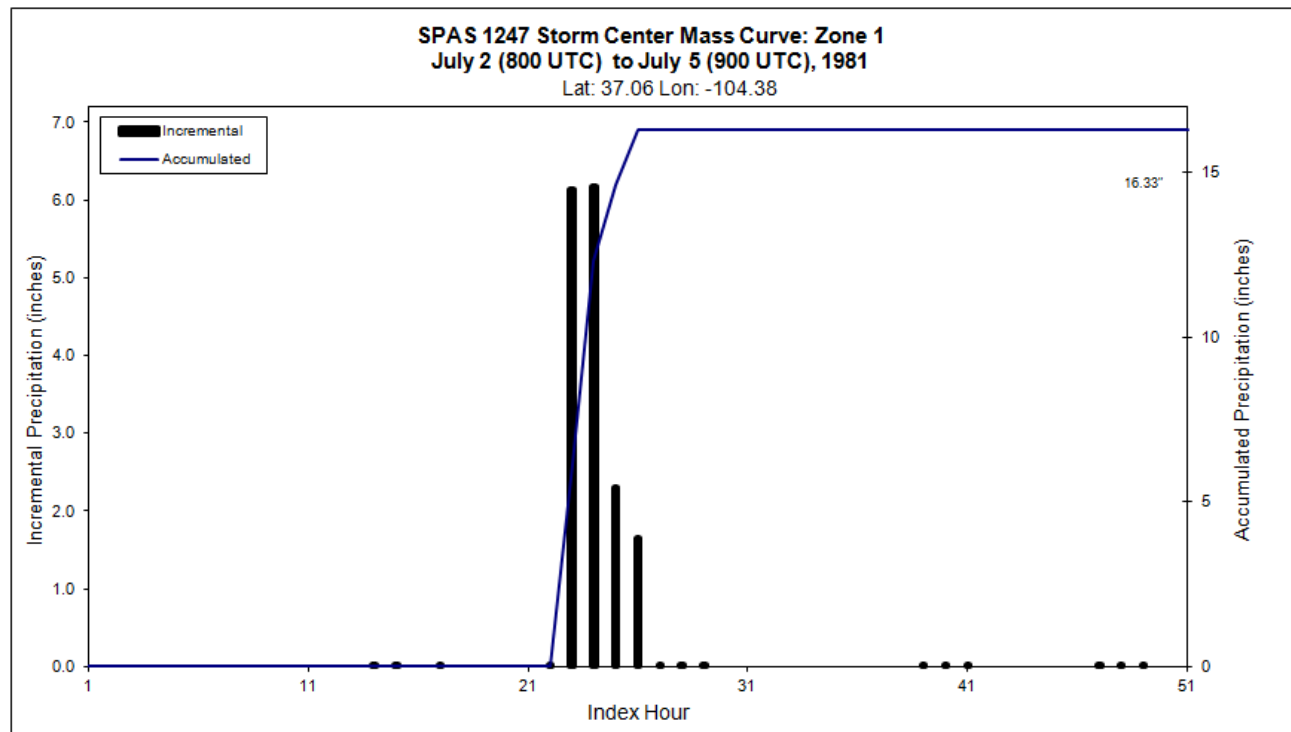
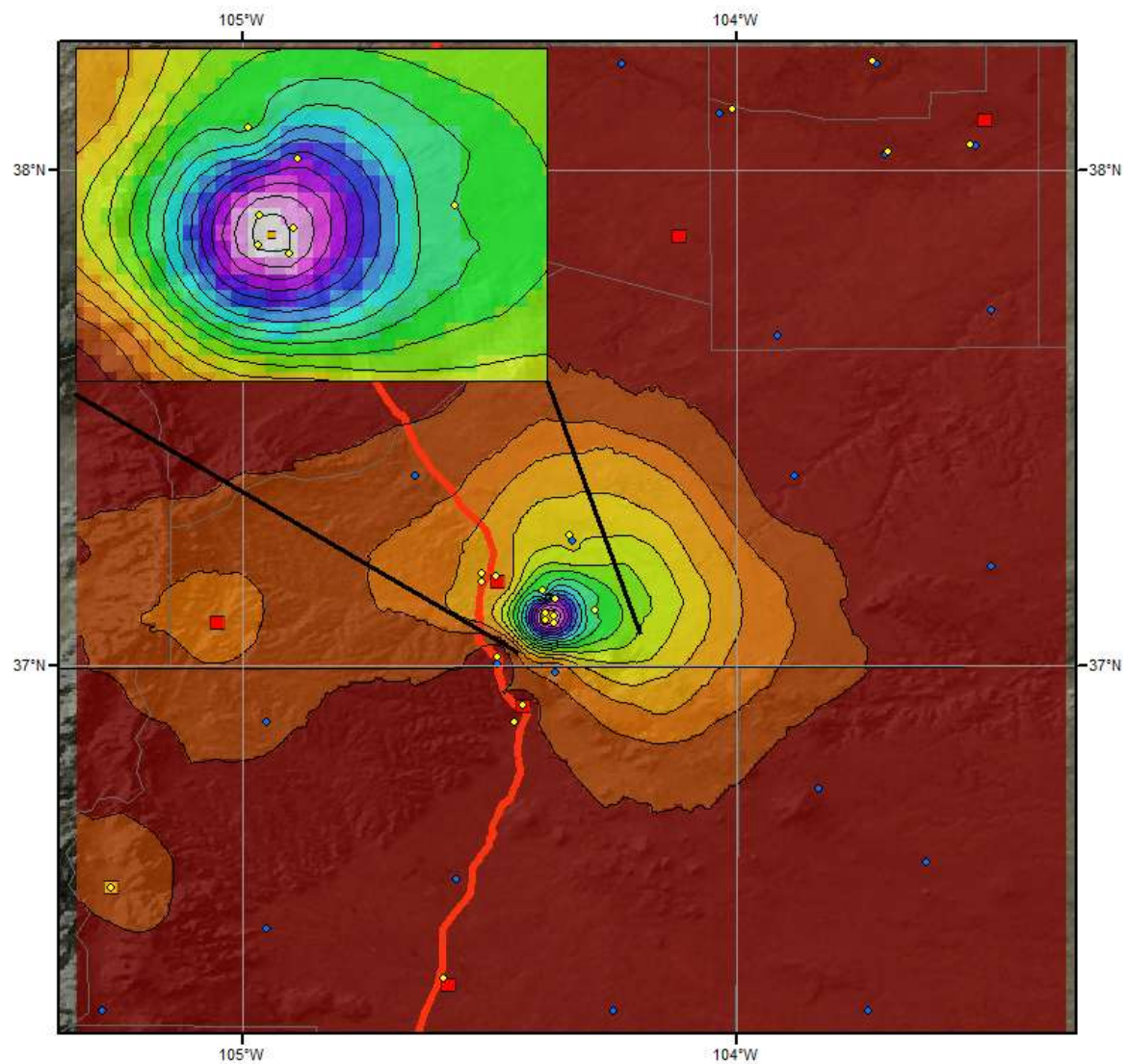


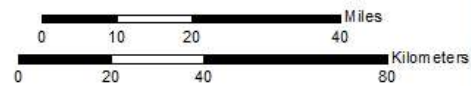
Figure 332: Mass curve chart for Frijole Creek, CO July 1981



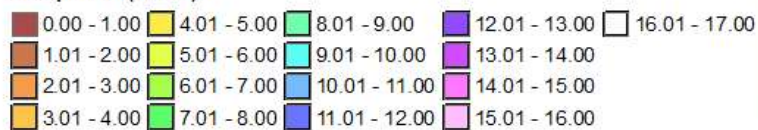
Total Precipitation (72-hours)
SPAS-Lite 1247 - Frijole Creek, CO
7/02/1981 0800 GMT - 7/05/1981 0700 GMT

Gauges

- ◆ Daily
- Hourly
- Hourly Pseudo
- ◇ Supplemental



Precipitation (inches)



8/20/2012

Figure 333: Total storm isohyetal analysis for Frijole Creek, CO July 1981

NOAA HYSPLIT MODEL
 Backward trajectories ending at 0000 UTC 03 Jul 81
 CDC1 Meteorological Data

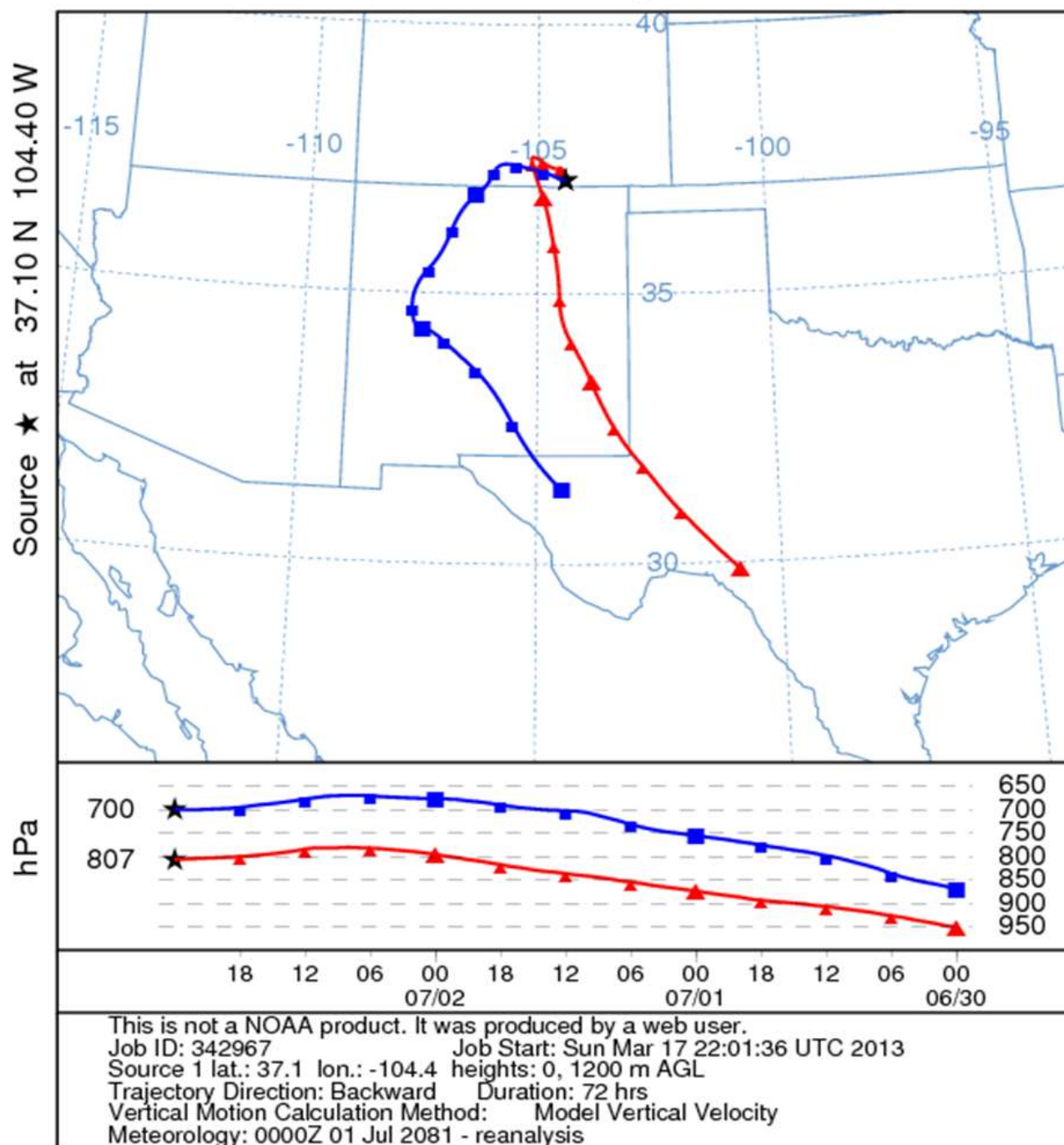


Figure 334: HYSPLIT trajectory analysis at Surface, 850mb and 700mb for Frijole Creek, CO July 1981

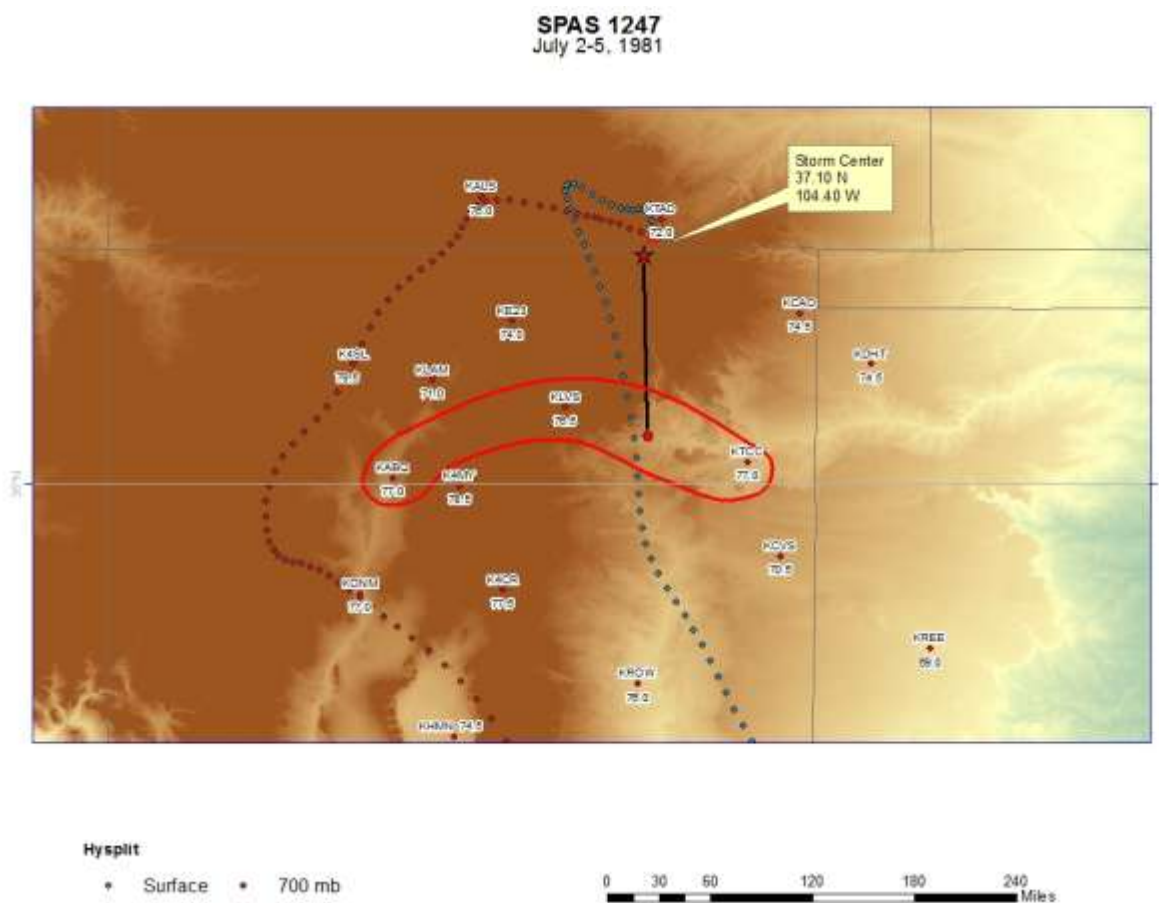


Figure 335: In-place storm representative dew point analysis for Frijole Creek, CO July 2-5, 1981

Storm Precipitation Analysis System (SPAS) For Storm #1185

General Storm Location: Corrigan, TX

Storm Dates: October 15-18, 1994

Event: Tropical moisture & stationary front

Zone 1

Latitude: 30.26

Longitude: -94.89

Max. Grid Rainfall Amount: 30.90"

Max. Observed Rainfall Amount: Liberty, TX (28.66")

Number of Stations: 233 (159 Daily, 15 Hourly, 10 Hourly Pseudo, 32 Supplemental, 3 Hourly Estimated and 14 Hourly Estimated Pseudo)

SPAS Version: 8.5

Base Map Used: Yes, conus_prism_ppt_in_1971_2000_10

Spatial resolution: 00:00:36 (0.4 sq. miles)

Radar Included: Yes

Depth-Area-Duration (DAD) analysis: Yes

SPAS Storm ID	NAME	LON	LAT	ELEV Round	Storm Representative				Climatological Maximum				IPMF
					T _s	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	T _s	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	
1185_1	CORRIGAN	-94.890	30.260	100	82.00	3.95"	0.03"	3.920	84.0	4.30"	0.04"	4.260	1.09

Storm 1185- October 15 (0100 UTC) - October 18 (2300 UTC), 1994															
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)															
Area (mi ²)	Duration (hours)														
	1	2	3	4	5	6	12	18	24	36	48	72	96	120	Total
0.4	7.32	11.37	12.75	13.58	15.94	16.93	19.71	22.16	22.91	25.68	27.56	29.82	30.90	30.90	30.90
1	7.21	11.25	12.59	13.47	15.82	16.80	19.56	22.01	22.75	25.44	27.30	29.57	30.62	30.62	30.62
10	6.32	10.24	11.49	13.20	15.50	16.46	19.19	21.60	22.32	24.61	26.38	28.42	29.51	29.51	29.51
25	5.77	9.50	10.74	12.82	15.00	15.97	18.90	20.98	21.71	24.18	25.86	27.67	28.74	28.74	28.74
50	5.17	8.81	10.34	12.34	14.36	15.31	18.45	20.35	21.07	23.86	25.48	27.14	28.19	28.19	28.19
100	4.87	8.03	9.77	11.62	13.42	14.28	17.72	19.46	20.13	23.44	25.01	26.63	27.66	27.66	27.66
150	4.67	7.55	9.31	11.09	12.69	13.51	17.21	18.87	19.51	23.13	24.71	26.34	27.36	27.36	27.36
200	4.50	7.21	8.91	10.66	12.14	12.93	16.79	18.43	19.07	22.91	24.51	26.16	27.14	27.14	27.14
300	4.26	6.76	8.39	10.02	11.38	12.13	16.14	17.76	18.40	22.48	24.09	25.76	26.72	26.72	26.72
400	4.09	6.40	7.97	9.57	10.80	11.48	15.64	17.26	17.91	22.13	23.73	25.45	26.40	26.40	26.40
500	3.94	6.14	7.65	9.19	10.37	11.03	15.22	16.85	17.56	21.73	23.37	25.20	26.15	26.15	26.15
1,000	3.47	5.28	6.84	8.02	9.00	9.67	13.97	15.63	16.51	20.04	22.13	24.04	24.96	24.96	24.96
2,000	2.85	4.44	5.96	6.97	7.97	8.73	12.67	14.42	15.40	18.20	20.78	22.66	23.47	23.47	23.47
5,000	1.80	3.16	4.53	5.47	6.42	7.21	10.81	12.52	13.51	16.01	18.60	20.15	20.86	20.86	20.86
10,000	1.17	2.20	3.27	4.06	4.84	5.52	8.74	10.45	11.34	13.44	16.00	17.45	18.06	18.06	18.06
20,000	0.79	1.44	1.98	2.70	3.31	3.80	6.19	7.69	8.72	10.47	12.46	13.92	14.43	14.43	14.43
39,064	0.33	0.73	1.11	1.55	1.26	0.69	2.11	4.76	1.39	6.83	8.47	9.69	10.08	10.08	10.08

Figure 336: Depth-area-duration values for Corrigan, TX October 1994

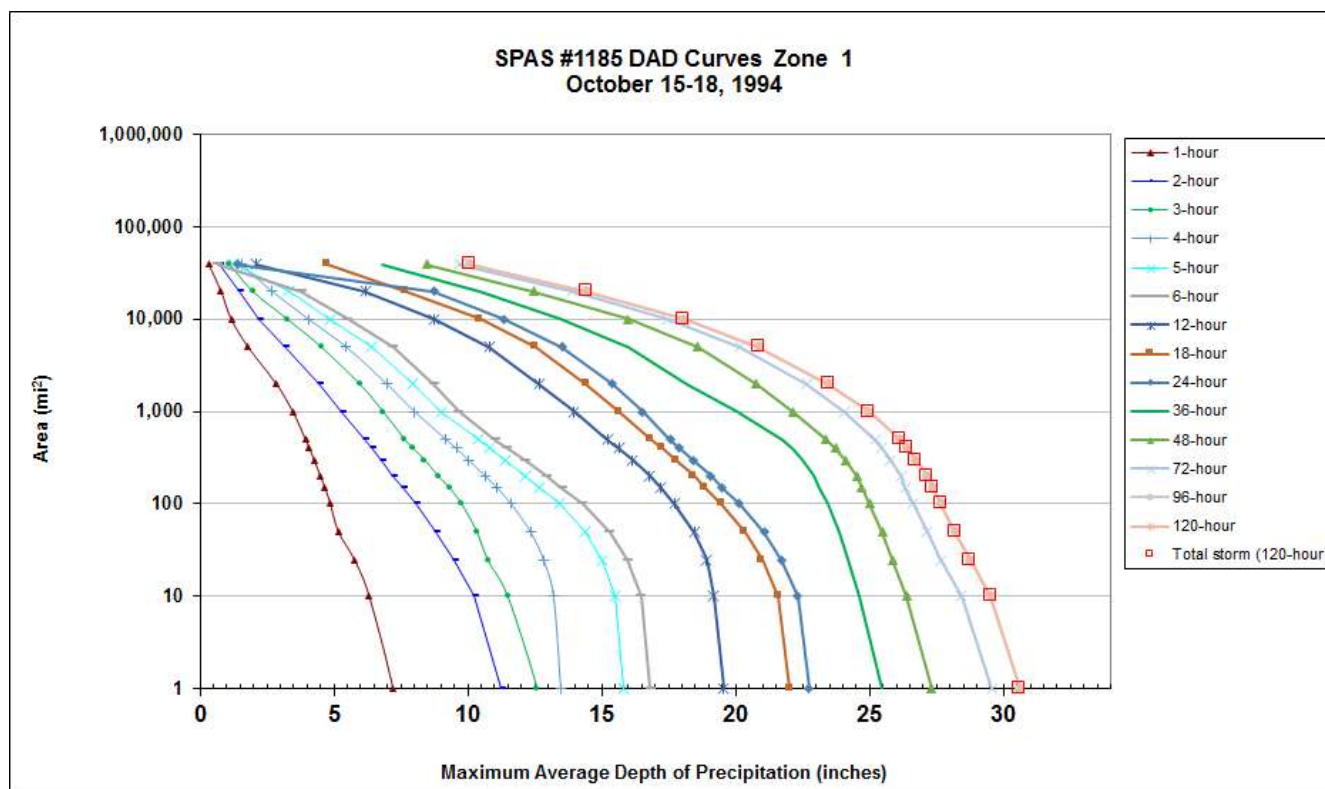


Figure 337: Depth-area-duration chart for Corrigan, TX October 1994

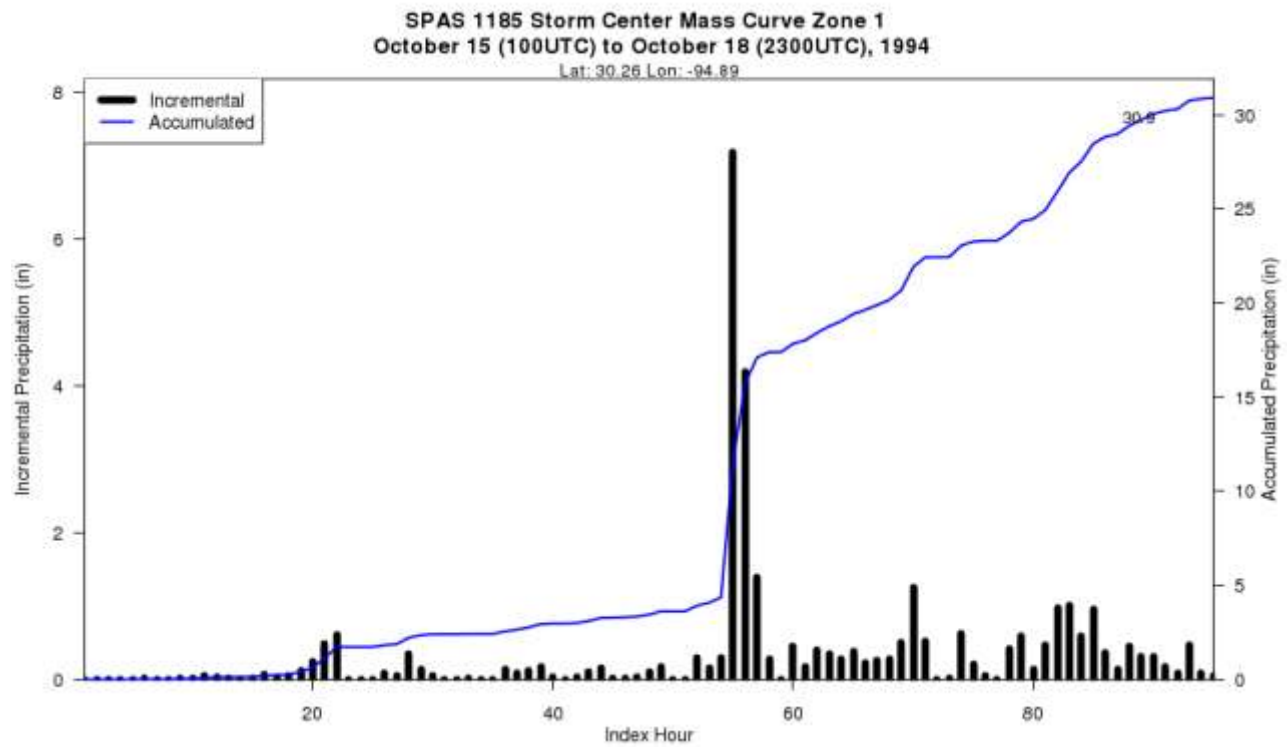


Figure 338: Mass curve chart for Corrigan, TX October 1994

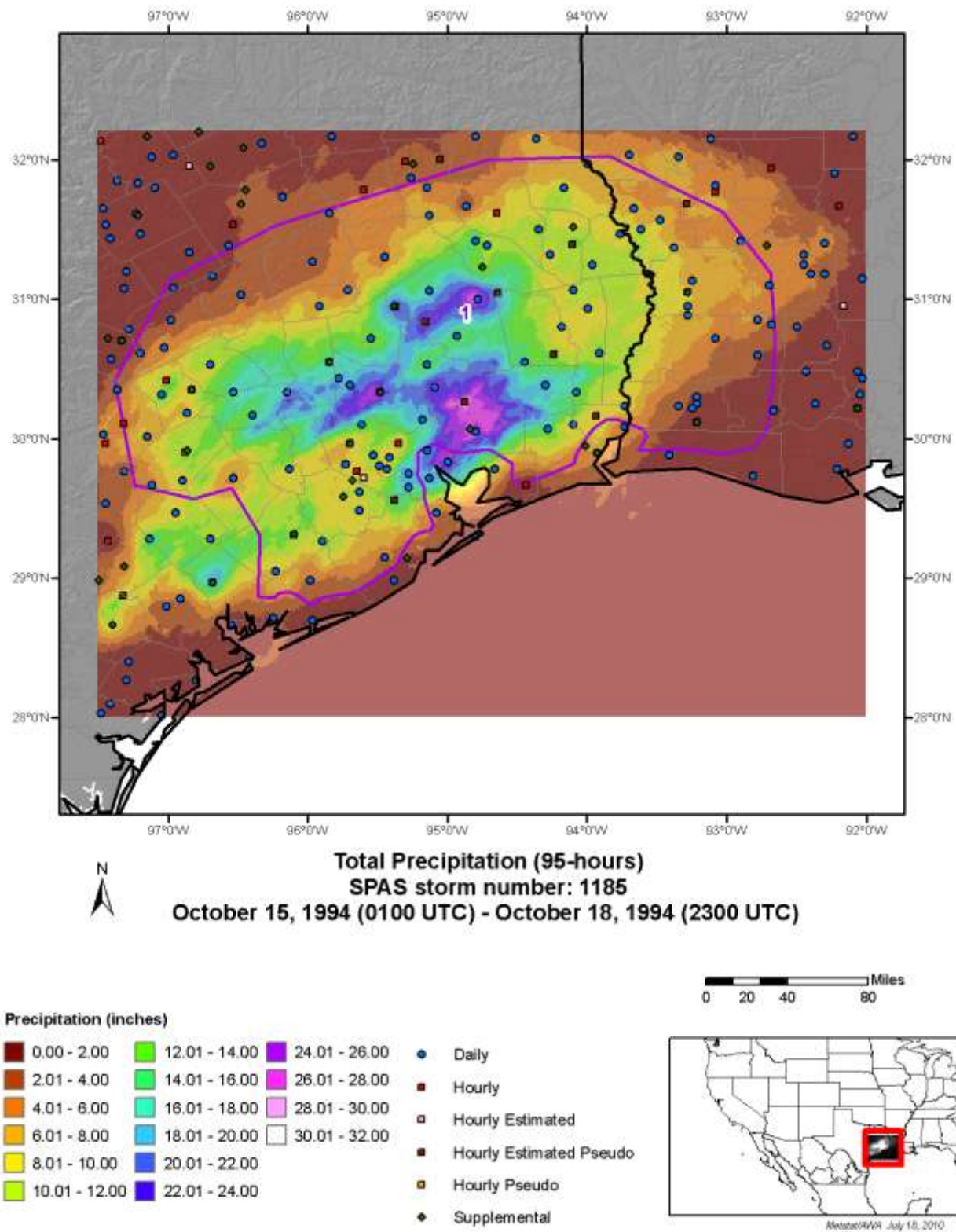


Figure 339: Total storm isohyetal analysis for Corrigan, TX October 1994

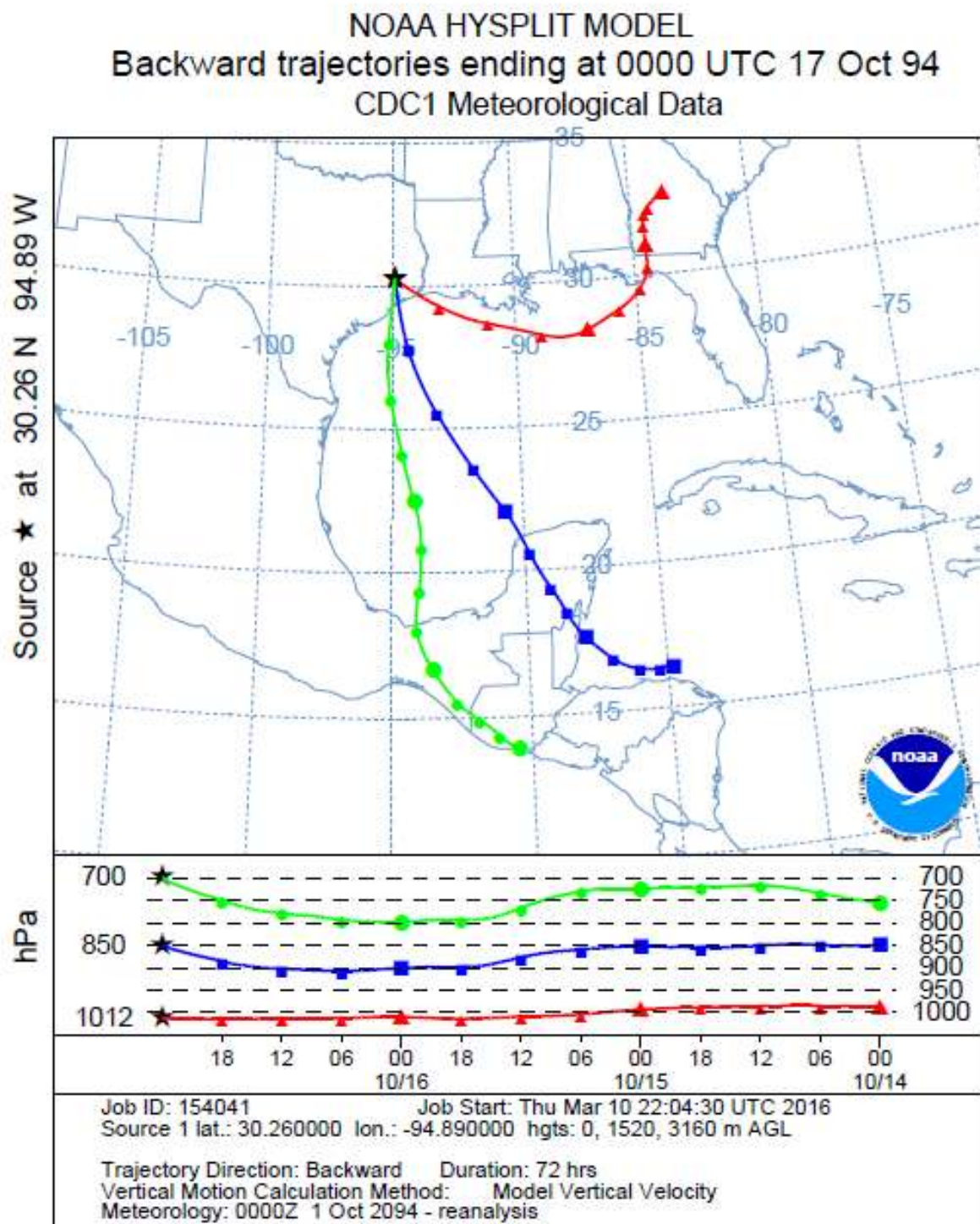


Figure 340: HYSPLIT trajectory analysis at Surface, 850mb and 700mb for Corrigan, TX October 1994

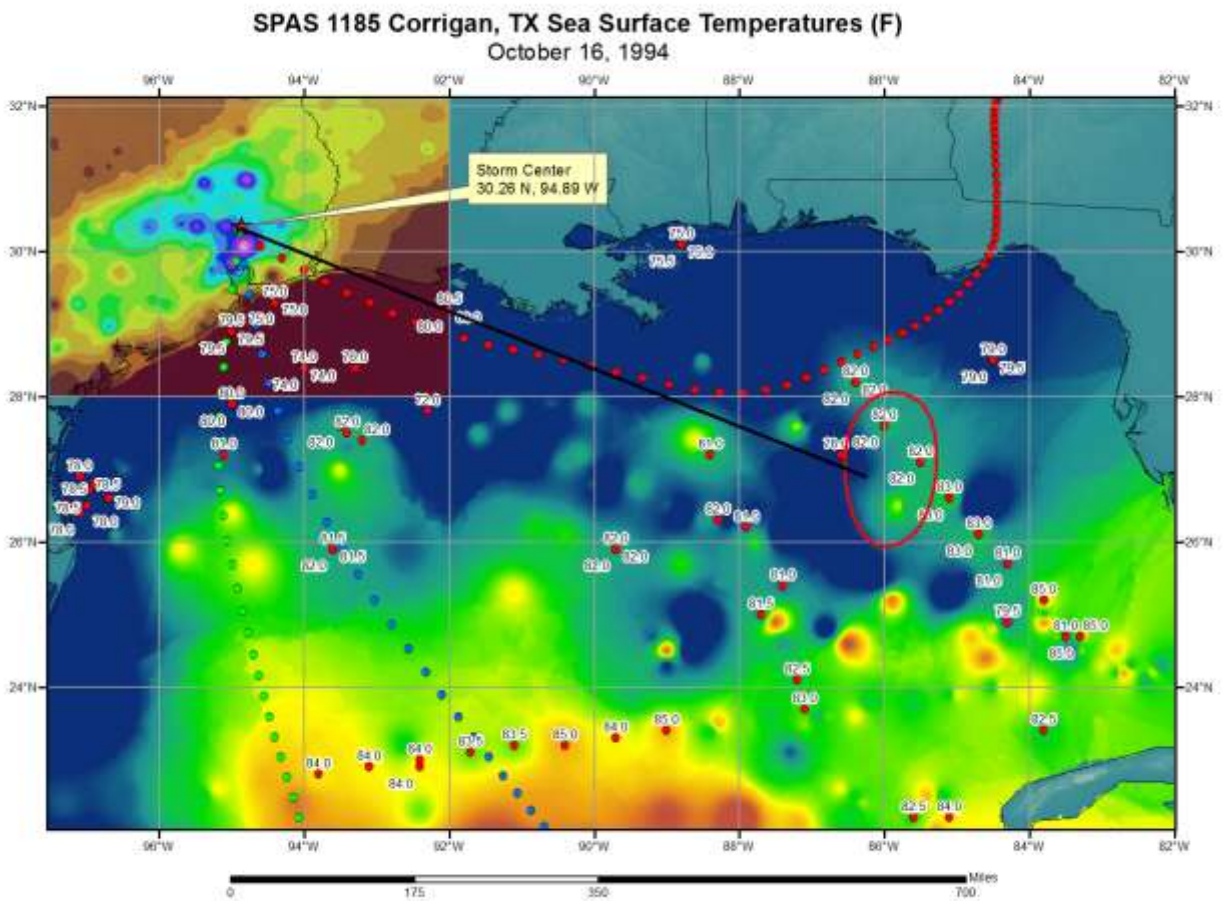


Figure 341: In-place storm representative SST analysis for Corrigan, TX October 16, 1994

Storm Precipitation Analysis System (SPAS) For Storm #1528

General Storm Location: El Paso, TX

Storm Dates: August 1, 2006

Event: Convective

DAD Zone 1

Latitude: 31.935

Longitude: -106.515

Max. Grid Rainfall Amount: 10.25"

Max. Observed Rainfall Amount: 10.00"

SPAS Version: 10.0

Basemap: Blended PRISM August (1981-2010) precipitation and Default ZR Estimated Rainfall

Spatial resolution: 0.01 (~ 0.40 mi²)

Radar Included: Yes

Depth-Area-Duration (DAD) analysis: Yes

Reliability of results: This analysis was based on hourly data, daily data, supplemental station data and NEXRAD Radar. We have a high degree of confidence in the radar/station based storm total results, the spatial pattern is dependent on the radar data and basemap, and the timing is based on hourly, hourly pseudo stations, and radar data.

SPAS Storm ID	NAME	LON	LAT	ELEV Round	Storm Representative				Climatological Maximum				IPMF
					T _s	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	T _g	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	
1528_1	EL PASO	-106.515	31.935	4,800	78.00	3.29"	1.17"	2,120	79.5	3.52"	1.23"	2,290	1.08

Storm 1528 - August 1 (0200 UTC) - August 2 (0700 UTC), 2006														
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)														
Area (mi ²)	Duration (hours)													
	1	2	3	4	5	6	12	18	24	36	48	72	96	120
0.4	2.16	3.95	4.77	4.98	5.18	6.83	9.83	10.25	10.25	10.25	10.25	10.25	10.25	10.25
1	2.12	3.91	4.72	4.92	5.13	6.75	9.73	10.15	10.14	10.14	10.14	10.14	10.14	10.14
10	1.89	3.56	4.33	4.51	4.68	6.20	8.99	9.44	9.46	9.46	9.46	9.46	9.46	9.46
25	1.75	3.02	3.79	4.09	4.28	5.40	7.94	8.73	8.82	8.82	8.82	8.82	8.82	8.82
50	1.55	2.62	3.23	3.72	3.92	4.48	6.86	8.04	8.16	8.16	8.16	8.16	8.16	8.16
100	1.24	2.17	2.68	3.17	3.38	3.74	5.78	6.98	7.09	7.09	7.09	7.09	7.09	7.09
150	1.03	1.89	2.37	2.85	3.05	3.39	5.19	6.23	6.32	6.33	6.33	6.33	6.33	6.33
200	0.90	1.70	2.15	2.59	2.81	3.13	4.80	5.71	5.80	5.80	5.80	5.80	5.80	5.80
300	0.75	1.42	1.82	2.22	2.43	2.69	4.25	4.98	5.05	5.05	5.05	5.05	5.05	5.05
400	0.65	1.21	1.60	1.96	2.15	2.35	3.84	4.43	4.50	4.51	4.51	4.51	4.51	4.51
500	0.58	1.07	1.43	1.75	1.93	2.11	3.55	4.06	4.12	4.13	4.13	4.13	4.13	4.13
1,000	0.37	0.69	1.01	1.23	1.35	1.47	2.59	2.91	2.96	2.97	2.97	2.97	2.97	2.97
1,697	0.24	0.46	0.70	0.86	0.95	1.04	1.86	2.08	2.12	2.13	2.13	2.13	2.13	2.13

Figure 342: Depth-area-duration values for El Paso, TX August 2006

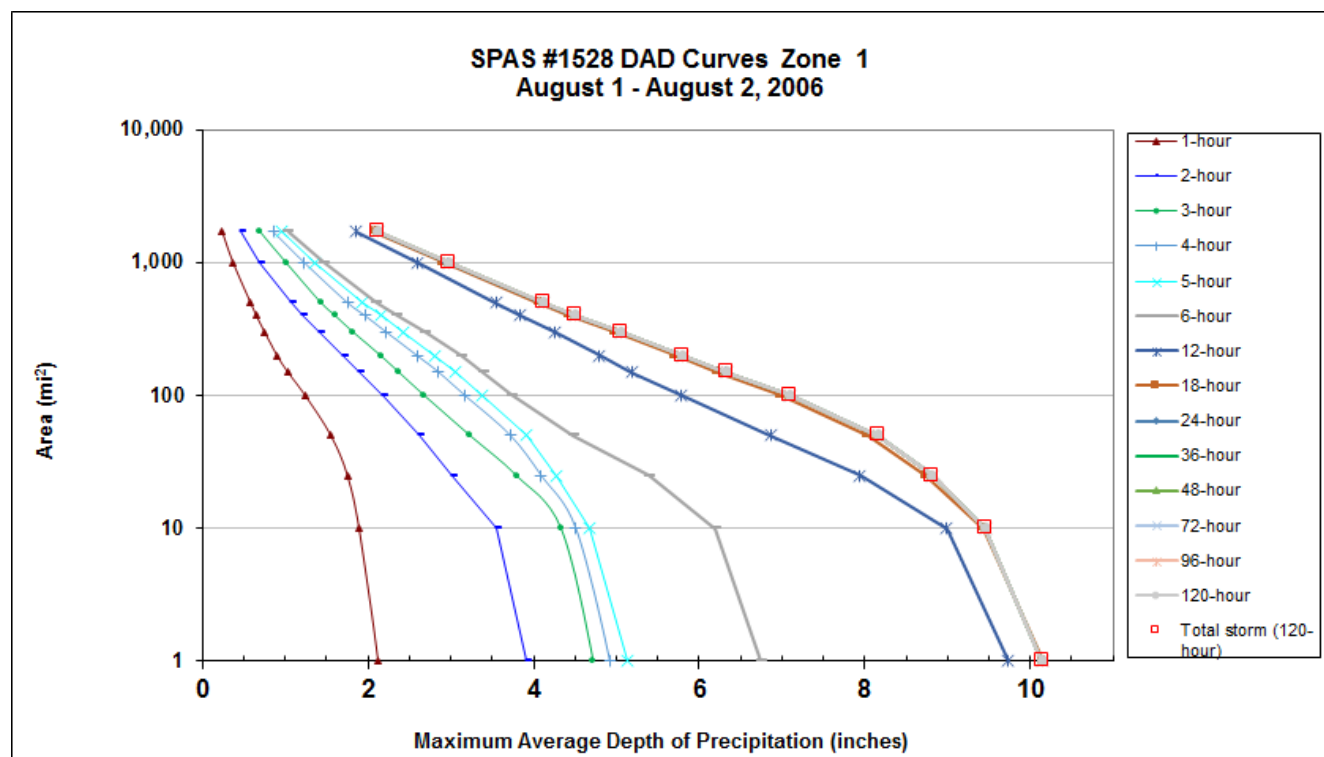


Figure 343: Depth-area-duration chart for El Paso, TX August 2006

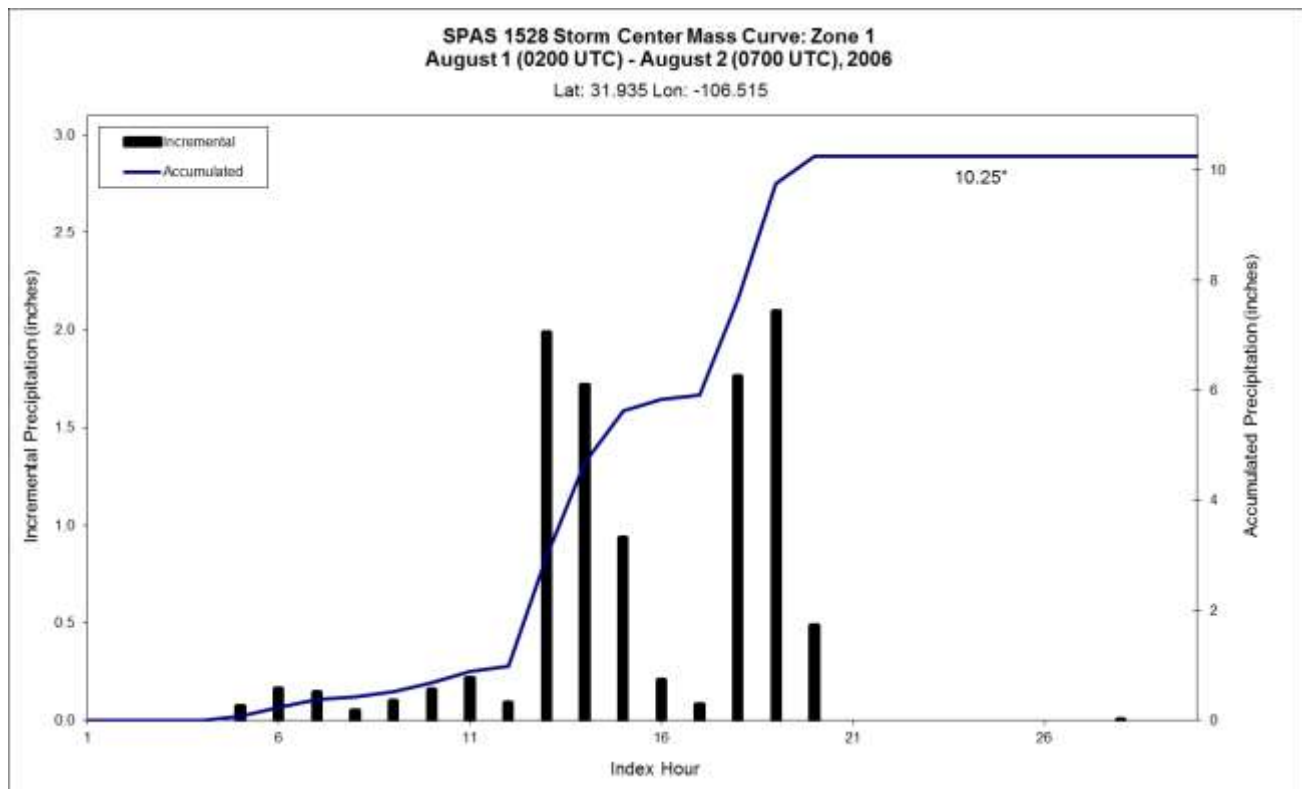


Figure 344: Mass curve chart for El Paso, TX August 2006

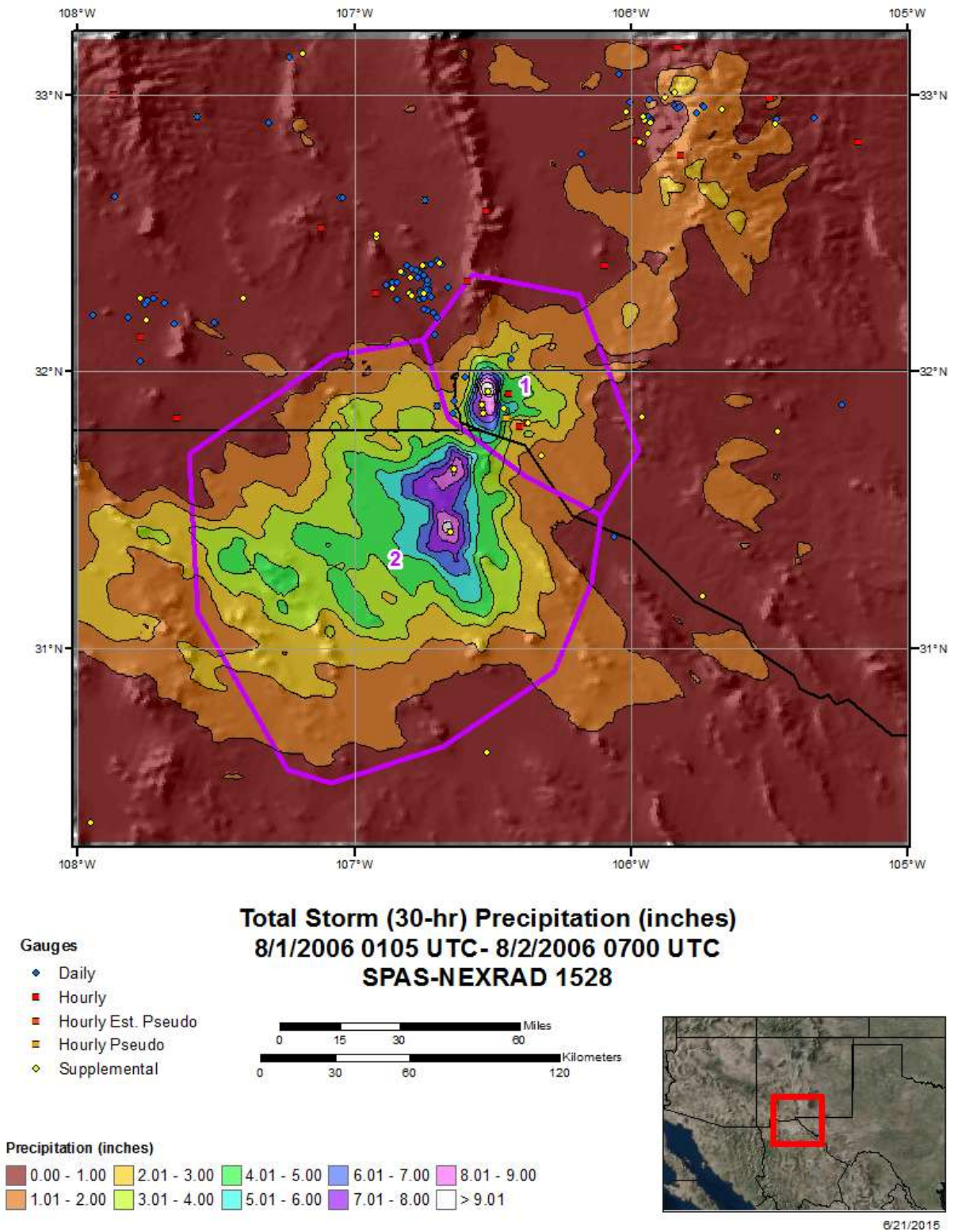


Figure 345: Total storm isohyetal analysis for El Paso, TX August 2006

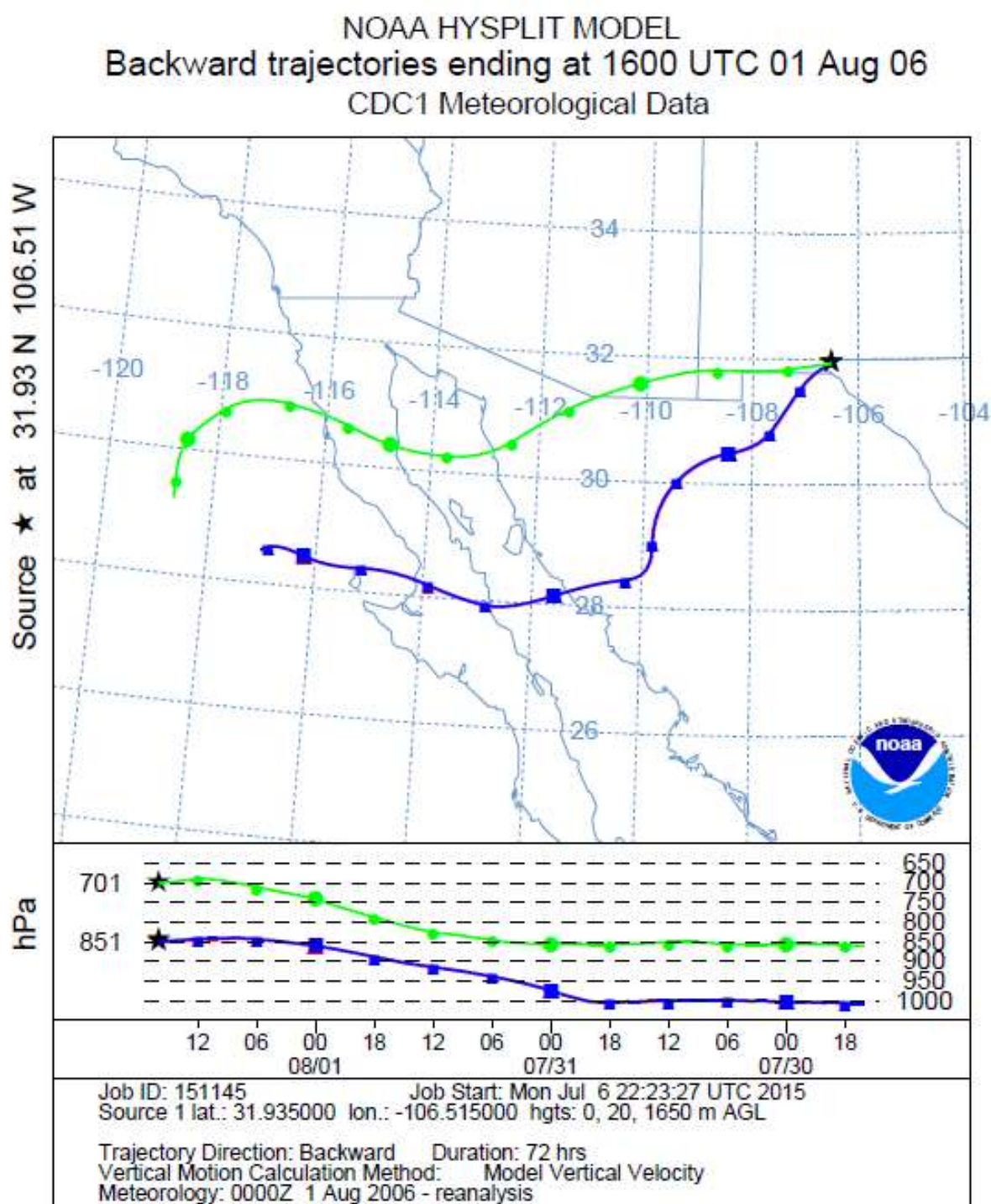


Figure 346: HYSPLIT trajectory analysis at Surface, 850mb and 700mb for El Paso, TX August 2006

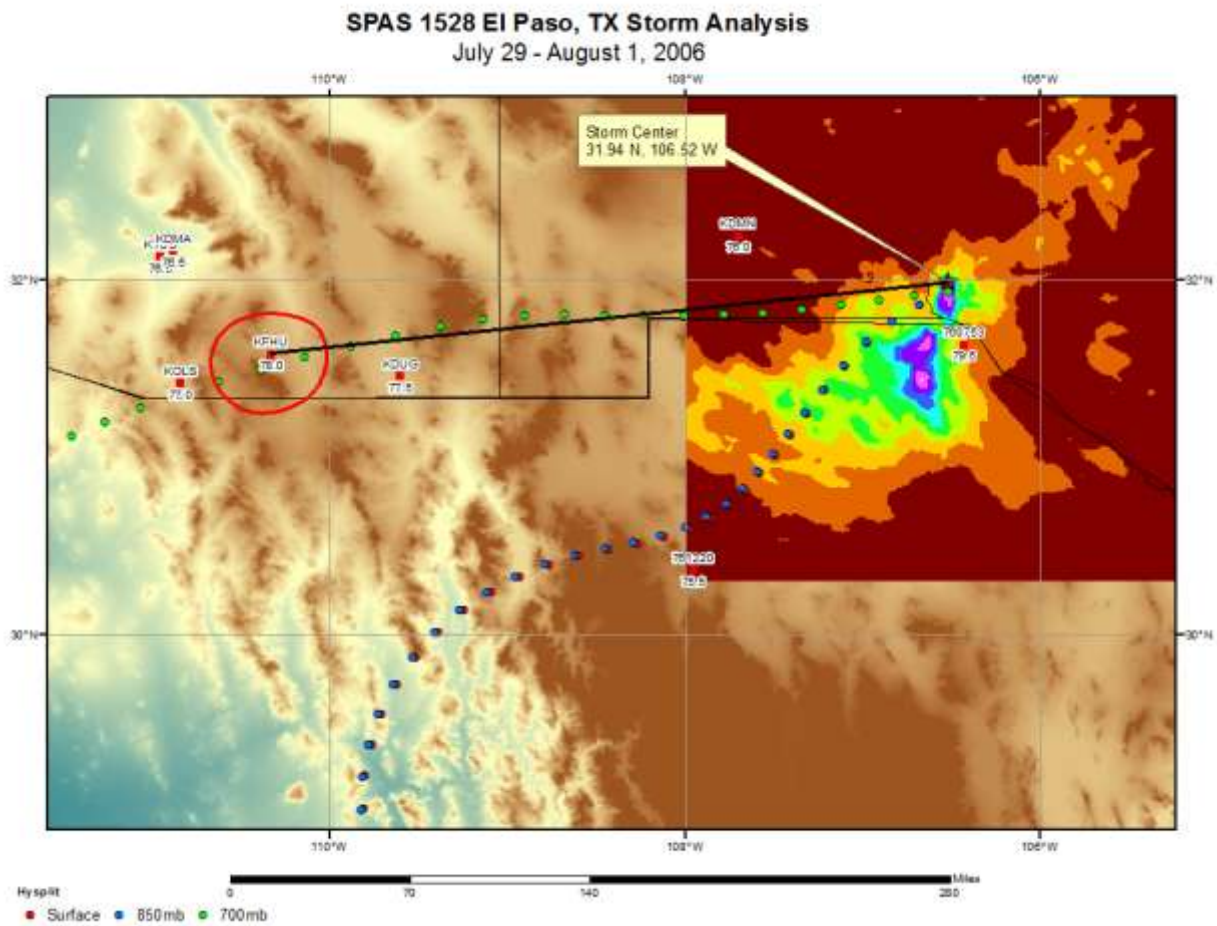


Figure 347: In-place storm representative dew point analysis for El Paso, TX July 29 - August 1, 2006

Storm Precipitation Analysis System (SPAS) For Storm #1595

General Storm Location: Spearman, Texas (38.2, -103.0, 35.0, -99.4)

Storm Dates: June 12-13, 2010 (48-hours)

Event: Convective

DAD Zone 1

Latitude: 36.1350

Longitude: -101.4950

Max. Grid Rainfall Amount: 13.89" Gruver, TX

Max. Observed Rainfall Amount: 9.72"

Number of Stations: 196

SPAS Version: 10.0

Basemap: conus_prism_ppt_in_1981_2010_06

Spatial resolution: 0.01 decimal degree (0.403-sqmi)

Radar Included: Yes

Depth-Area-Duration (DAD) analysis: Yes

Reliability of results: This analysis was based on 196 hourly stations, daily data, supplemental station data, and radar data. We have a good degree of confidence for the station based storm total results. The spatial pattern is dependent on the radar data, gauge data, and basemap. There is a good degree of confidence with the timing based on the hourly stations near the storm center. Some daily stations were moved to supplemental due to timing issues.

SPAS Storm ID	NAME	LON	LAT	ELEV Round	Storm Representative				Climatological Maximum				IPMF
					T _g	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	T _g	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	
1595_1	SPEARMAN	-101.495	36.135	3,300	76.50	3.07"	0.81"	2.260	79.5	3.52"	0.89"	2.635	1.17

Storm 1595 - June 12 (1300 UTC) - June 14 (1200 UTC), 2010															
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)															
Area (mi ²)	Duration (hours)														
	1	2	3	4	5	6	12	18	24	36	48	72	96	120	Total
0.4	3.55	5.06	6.84	7.56	7.80	8.13	13.43	13.87	13.89	13.89	13.89	13.89	13.89	13.89	13.89
1	3.44	5.02	6.78	7.50	7.73	8.06	13.31	13.75	13.77	13.77	13.77	13.77	13.77	13.77	13.77
10	2.88	4.83	6.56	7.26	7.48	7.79	12.87	13.30	13.32	13.32	13.32	13.32	13.32	13.32	13.32
25	2.71	4.59	6.25	6.94	7.16	7.44	12.37	12.77	12.79	12.79	12.79	12.79	12.79	12.79	12.79
50	2.57	4.28	5.84	6.51	6.75	6.98	11.78	12.15	12.16	12.16	12.16	12.16	12.16	12.16	12.16
100	2.48	3.81	5.21	5.84	6.06	6.28	10.85	11.20	11.23	11.23	11.23	11.23	11.23	11.23	11.23
150	2.42	3.57	4.69	5.30	5.52	5.69	10.08	10.46	10.48	10.48	10.48	10.48	10.48	10.48	10.48
200	2.36	3.41	4.30	4.86	5.07	5.22	9.44	9.83	9.91	9.96	9.97	9.97	9.97	9.97	9.97
300	2.27	3.12	3.88	4.20	4.41	4.58	8.56	9.00	9.12	9.27	9.29	9.29	9.29	9.29	9.29
400	2.16	2.92	3.69	3.91	4.08	4.33	7.97	8.47	8.60	8.80	8.84	8.84	8.84	8.84	8.84
500	2.05	2.76	3.54	3.76	3.94	4.15	7.54	8.08	8.22	8.46	8.50	8.50	8.50	8.50	8.50
1,000	1.67	2.25	2.99	3.24	3.48	3.71	6.21	6.95	7.16	7.46	7.52	7.52	7.52	7.52	7.52
2,000	1.22	1.73	2.29	2.61	2.88	3.18	4.92	5.76	5.93	6.40	6.46	6.46	6.46	6.46	6.46
5,000	0.67	1.09	1.40	1.67	1.96	2.23	3.31	4.07	4.17	4.74	4.79	4.79	4.79	4.79	4.79
10,000	0.36	0.66	0.87	1.11	1.39	1.60	2.51	2.95	3.04	3.47	3.50	3.50	3.50	3.50	3.50
20,000	0.21	0.37	0.49	0.62	0.80	0.93	1.51	1.79	1.82	2.05	2.07	2.07	2.07	2.07	2.07
21,710	0.20	0.34	0.45	0.58	0.74	0.86	1.41	1.65	1.69	1.92	1.94	1.94	1.94	1.94	1.94

Figure 348: Depth-area-duration values for Spearman, TX June 2010

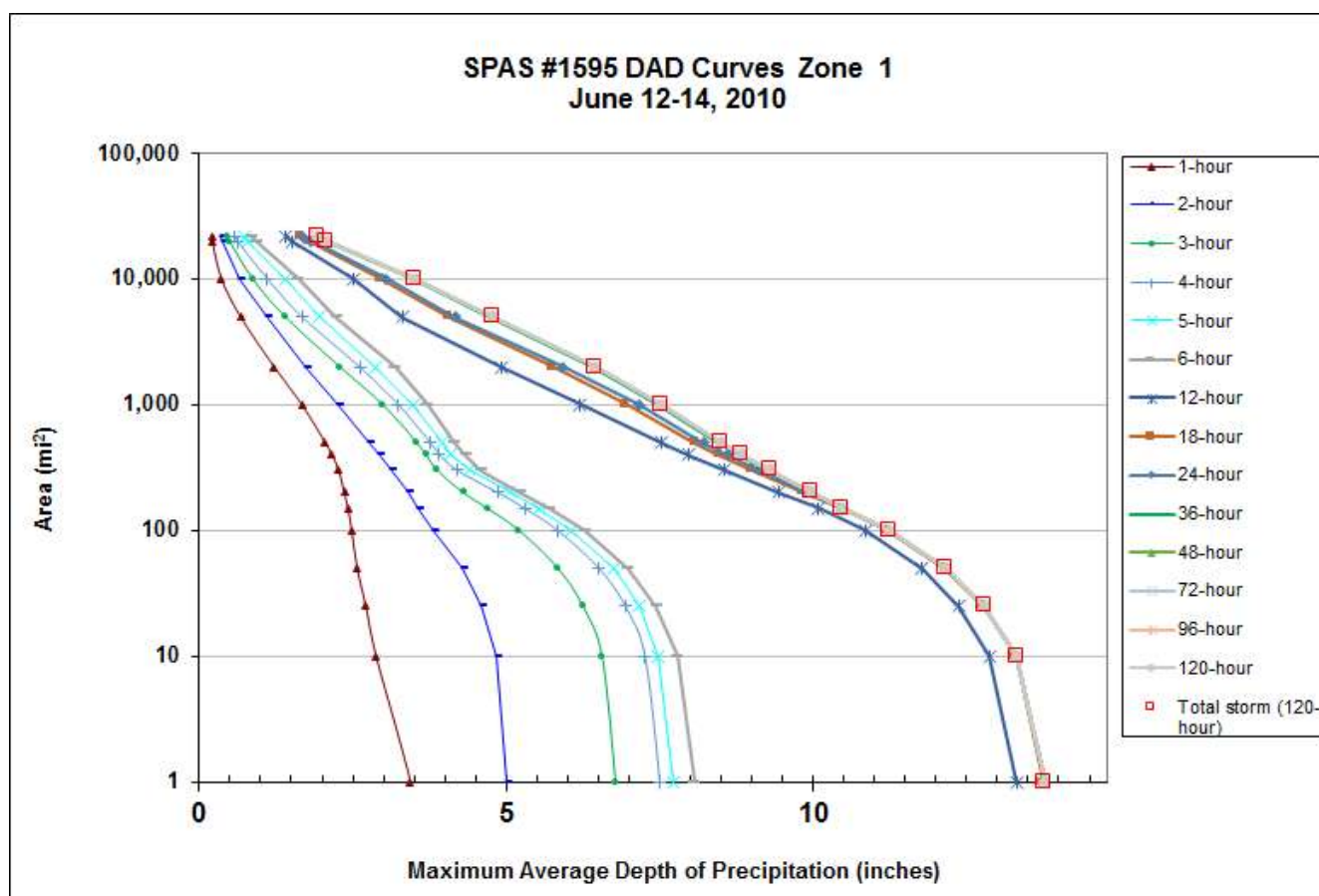


Figure 349: Depth-area-duration chart for Spearman, TX June 2010

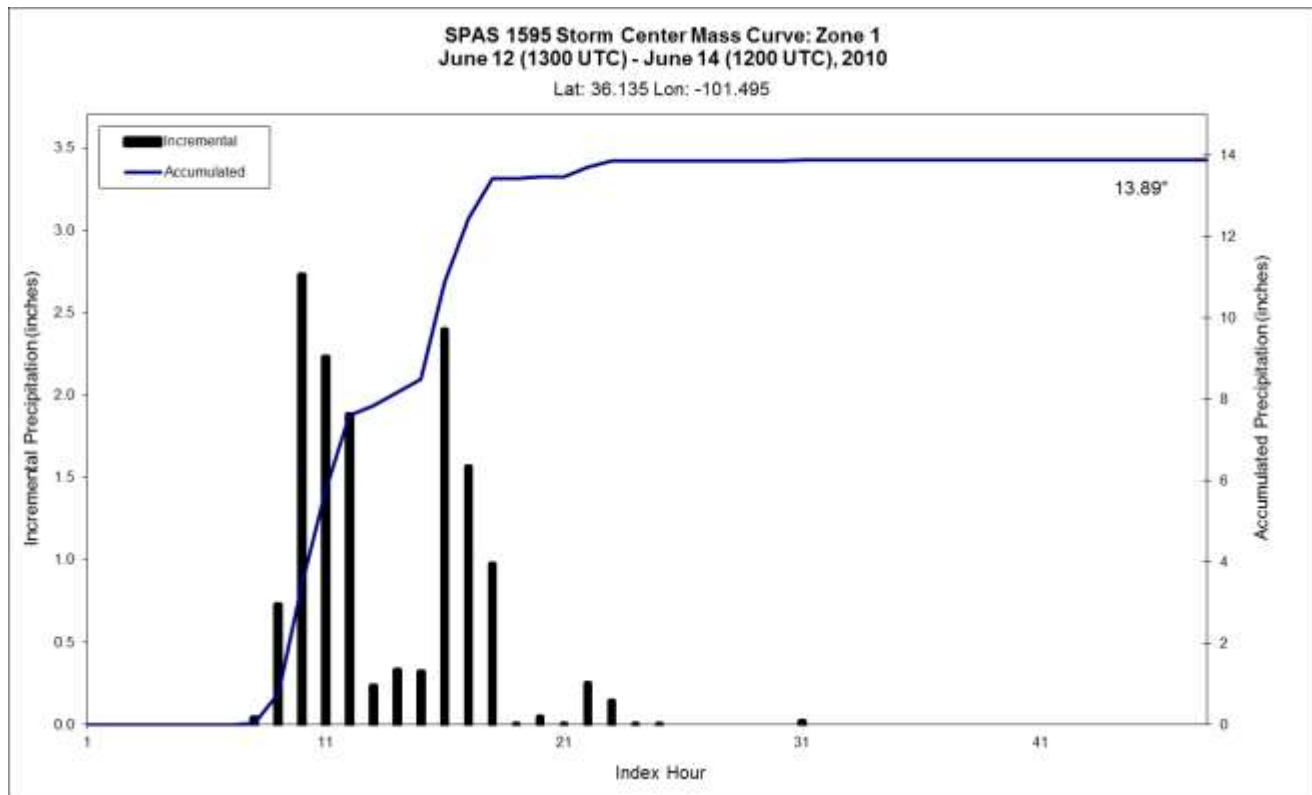


Figure 350: Mass curve chart for Spearman, TX June 2010

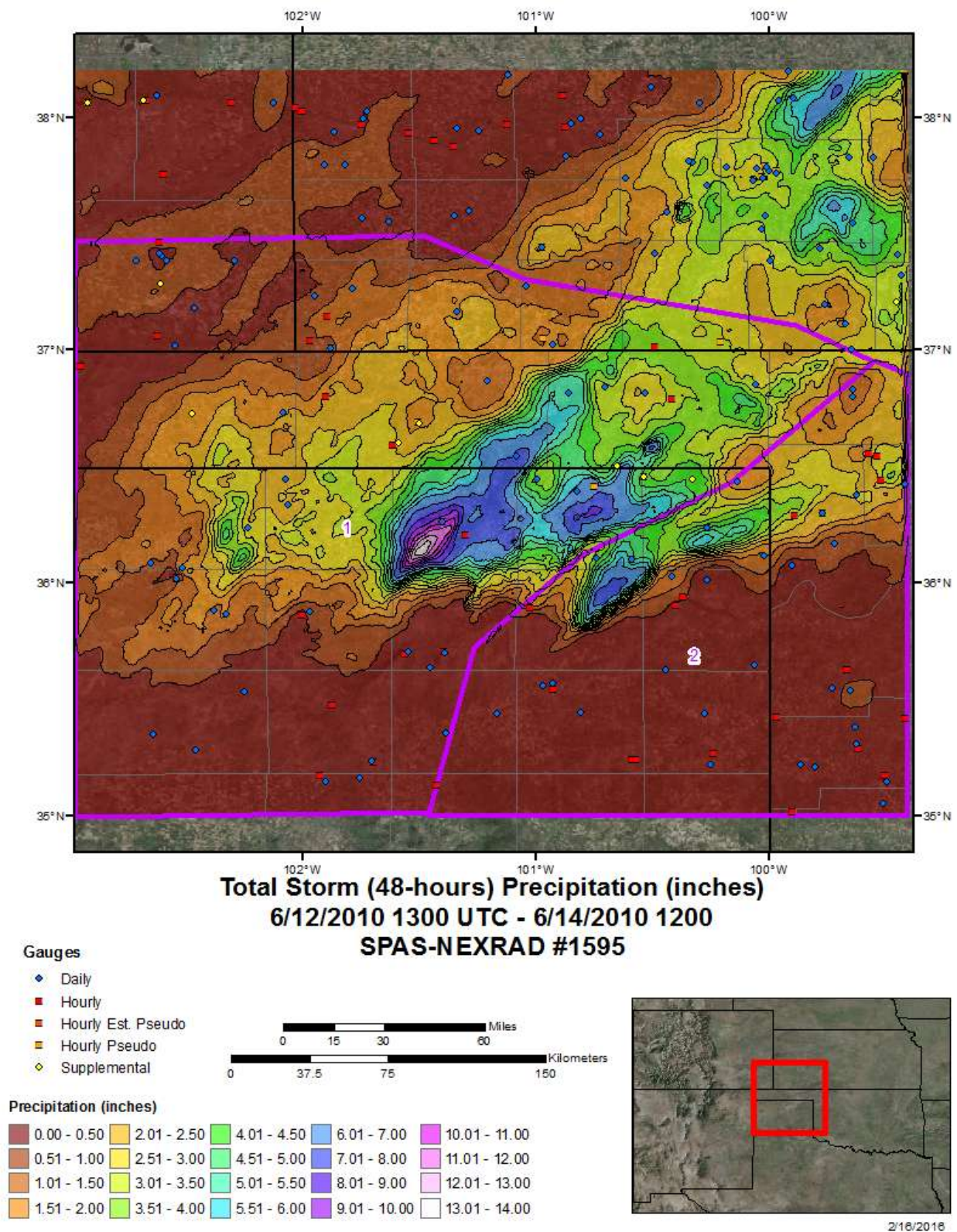


Figure 351: Total storm isohyetal analysis for Spearman, TX June 2010

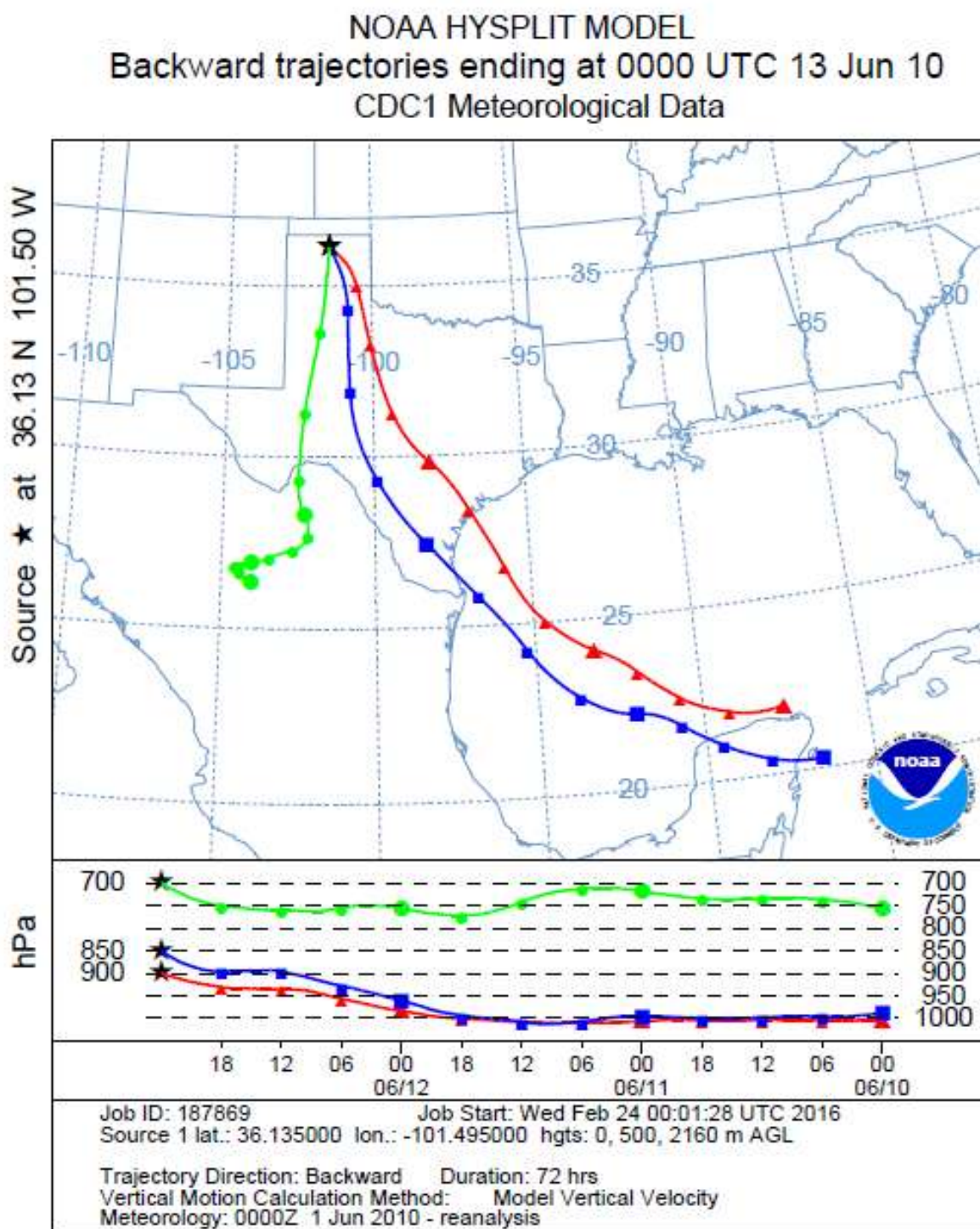


Figure 352: HYSPLIT trajectory analysis at Surface, 850mb and 700mb for Spearman, TX June 2010

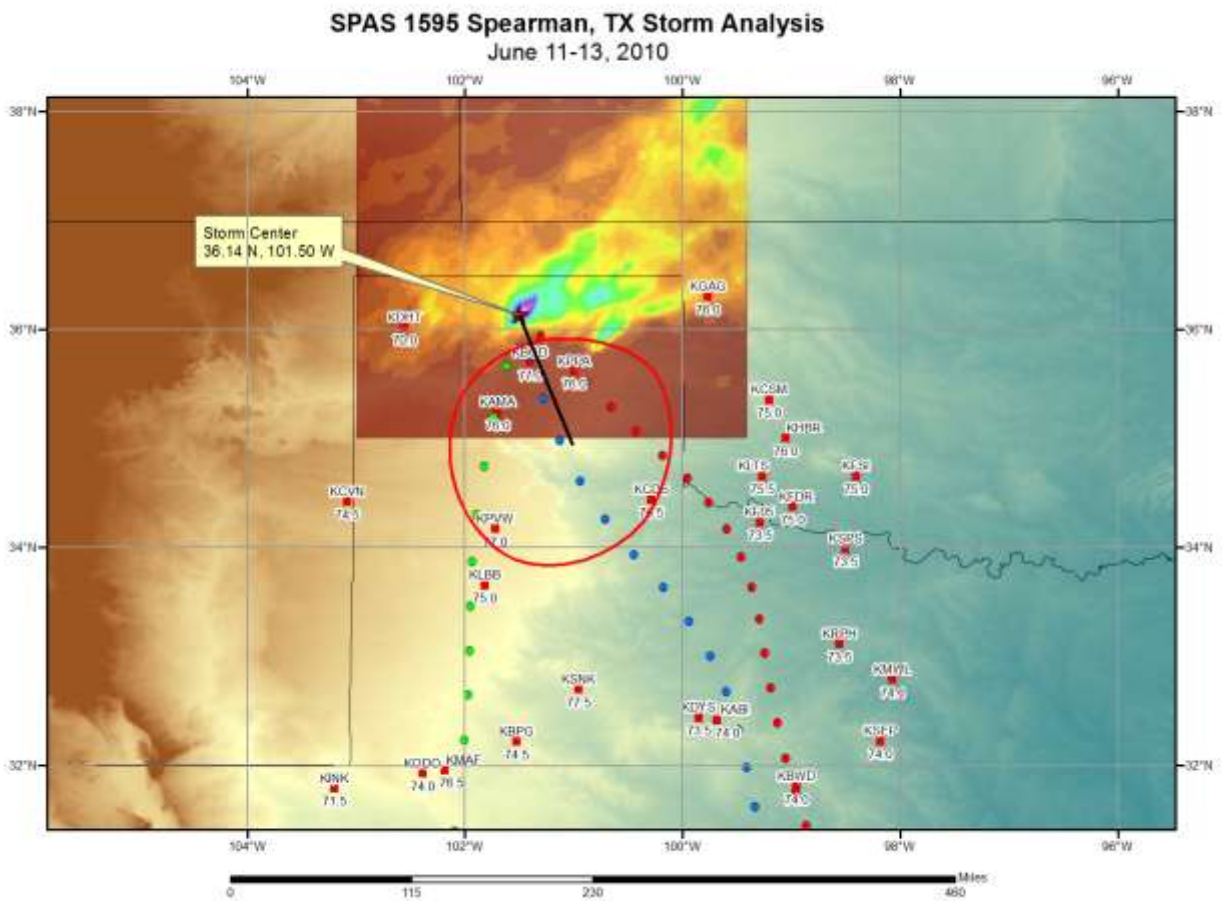


Figure 353: In-place storm representative dew point analysis for Spearman, TX June 11-13, 2010

Storm Precipitation Analysis System (SPAS) For Storm #1557

General Storm Location: Gail, Texas (34.2, -103.0, 31.4, -100.0)

Storm Dates: September 20-21, 2014 (24-hours)

Event: Convective

DAD Zone 1

Latitude: 32.7250

Longitude: -101.4050

Max. Grid Rainfall Amount: 13.96"

Max. Observed Rainfall Amount: 10.82" Gail, TX

Number of Stations: 176

SPAS Version: 10.0

Basemap: Blended basemap based on default ZR precipitation and conus_prism_ppt_in_1981_2010_09

Spatial resolution: 0.01 decimal degree (0.403-sqmi)

Radar Included: Yes

Depth-Area-Duration (DAD) analysis: Yes

Reliability of results: This analysis was based on 176 hourly stations, daily data, supplemental station data, and radar data. We have a good degree of confidence for the station based storm total results. The spatial pattern is dependent on the radar data, gauge data, and basemap. There is a good degree of confidence with the timing based on the hourly stations near the storm center. Some daily stations were moved to supplemental due to timing issues.

SPAS Storm ID	NAME	LON	LAT	ELEV Round	Storm Representative				Climatological Maximum				IPMF
					T _s	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	T _s	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	
1557_1	GAIL	-101.405	32.725	2,600	76.50	3.07"	0.65"	2.415	79.0	3.44"	0.70"	2.740	1.13

Storm 1557 - September 20 (0100 UTC) - September 21 (0000 UTC), 2014														
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)														
Area (mi ²)	Duration (hours)													
	1	2	3	4	5	6	12	18	24	36	48	72	96	120
0.4	5.21	8.60	11.44	12.60	12.96	13.07	13.84	13.92	13.96	13.96	13.96	13.96	13.96	13.96
1	5.15	8.51	11.32	12.50	12.87	12.98	13.72	13.78	13.83	13.83	13.83	13.83	13.83	13.83
10	4.81	8.04	10.83	12.03	12.42	12.52	13.18	13.26	13.30	13.30	13.30	13.30	13.30	13.30
25	4.36	7.52	10.06	11.20	11.66	11.76	12.30	12.40	12.47	12.47	12.47	12.47	12.47	12.47
50	3.71	6.66	8.81	9.90	10.45	10.55	11.03	11.26	11.41	11.41	11.41	11.41	11.41	11.41
100	3.08	5.45	7.07	8.08	8.65	8.81	9.29	9.77	9.95	9.95	9.95	9.95	9.95	9.95
150	2.73	4.82	6.17	7.13	7.60	7.69	8.42	8.90	9.07	9.07	9.07	9.07	9.07	9.07
200	2.50	4.41	5.61	6.52	6.93	7.28	7.86	8.34	8.52	8.52	8.52	8.52	8.52	8.52
300	2.18	3.86	4.88	5.75	6.08	6.36	7.13	7.63	7.80	7.80	7.80	7.80	7.80	7.80
400	1.96	3.44	4.38	5.12	5.44	5.72	6.60	7.14	7.32	7.32	7.32	7.32	7.32	7.32
500	1.81	3.15	4.01	4.68	4.98	5.25	6.21	6.73	6.92	6.92	6.92	6.92	6.92	6.92
1,000	1.35	2.26	2.91	3.37	3.71	4.08	5.11	5.58	5.77	5.77	5.77	5.77	5.77	5.77
2,000	0.89	1.46	1.99	2.41	2.77	3.13	4.17	4.52	4.65	4.65	4.65	4.65	4.65	4.65
5,000	0.46	0.81	1.08	1.33	1.66	1.94	2.87	3.13	3.26	3.26	3.26	3.26	3.26	3.26
10,000	0.28	0.52	0.68	0.77	1.02	1.20	1.76	1.97	2.14	2.14	2.14	2.14	2.14	2.14
20,000	0.15	0.28	0.40	0.47	0.62	0.73	1.10	1.17	1.29	1.29	1.29	1.29	1.29	1.29
33,686	0.09	0.17	0.24	0.31	0.37	0.44	0.71	0.80	0.88	0.88	0.88	0.88	0.88	0.88

Figure 354: Depth-area-duration values for Gail, TX September 2014

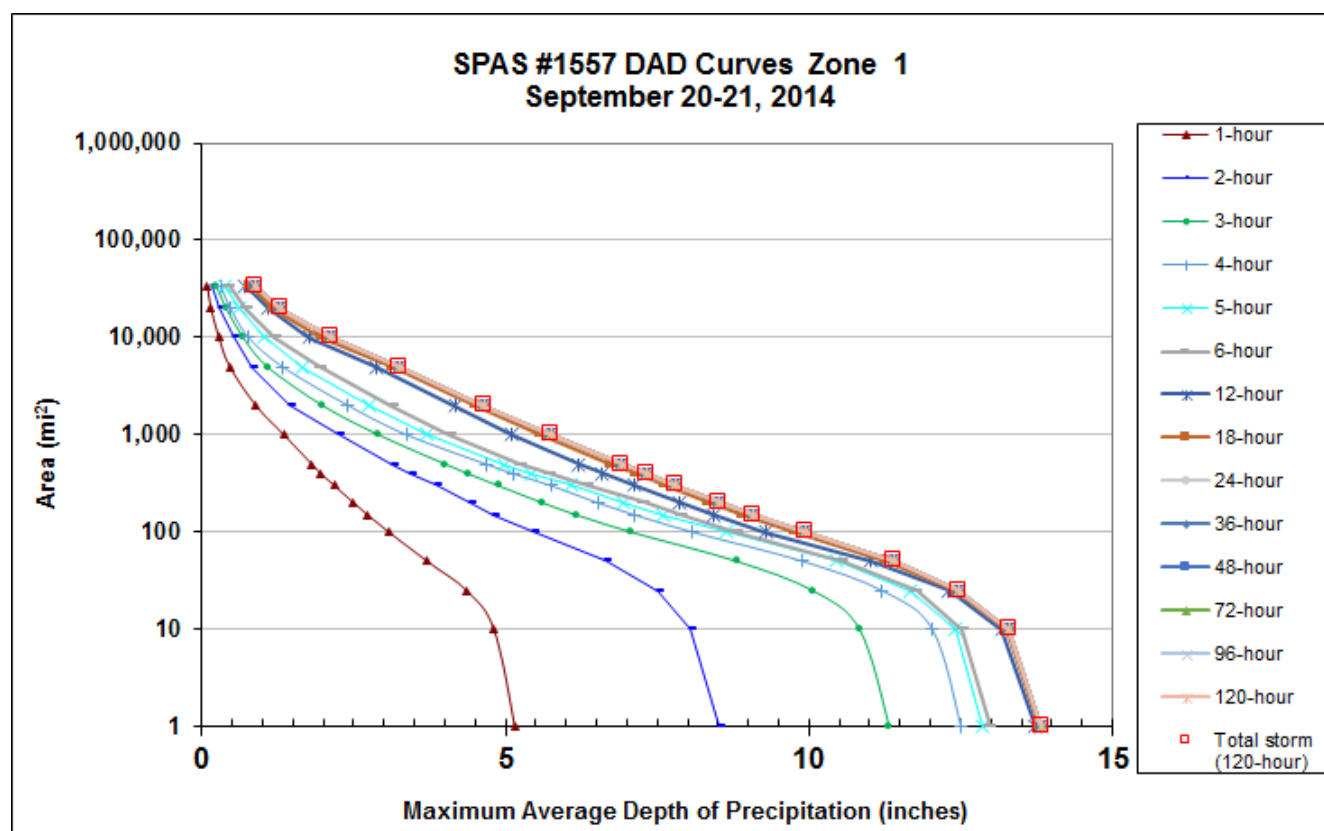


Figure 355: Depth-area-duration chart for Gail, TX September 2014

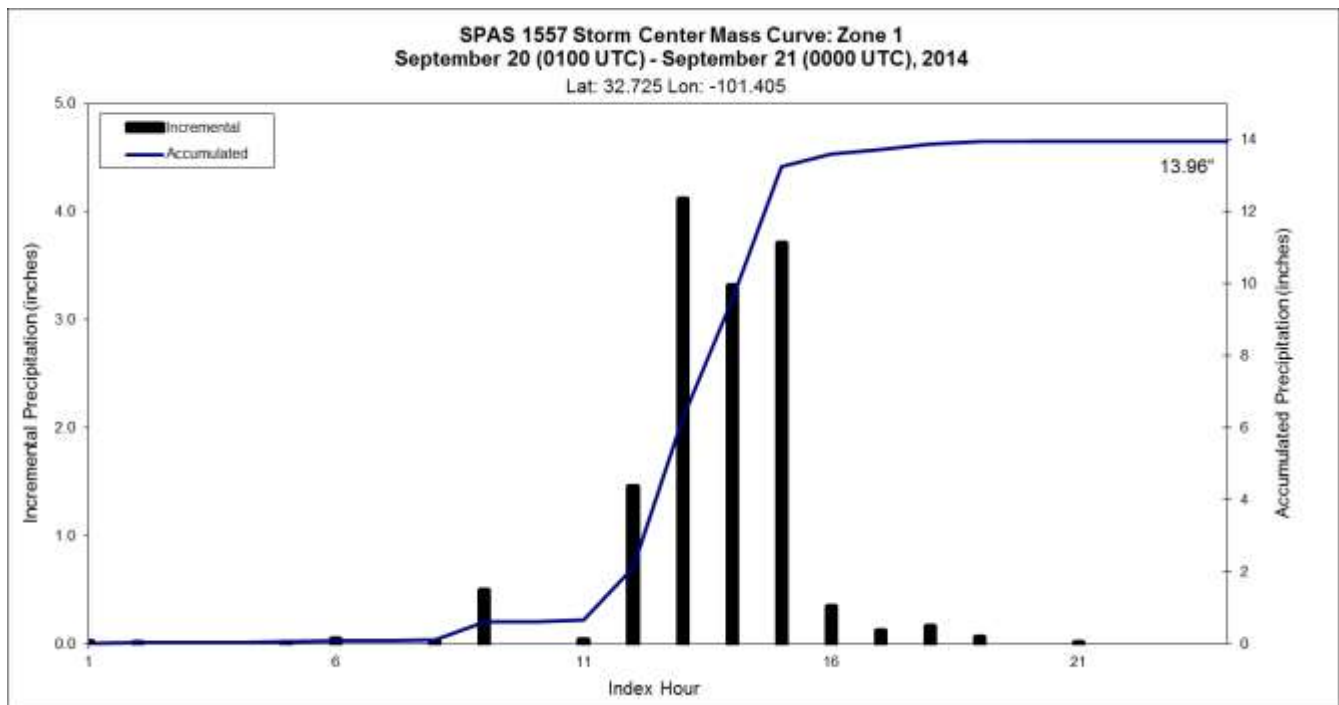


Figure 356: Mass curve chart for Gail, TX September 2014

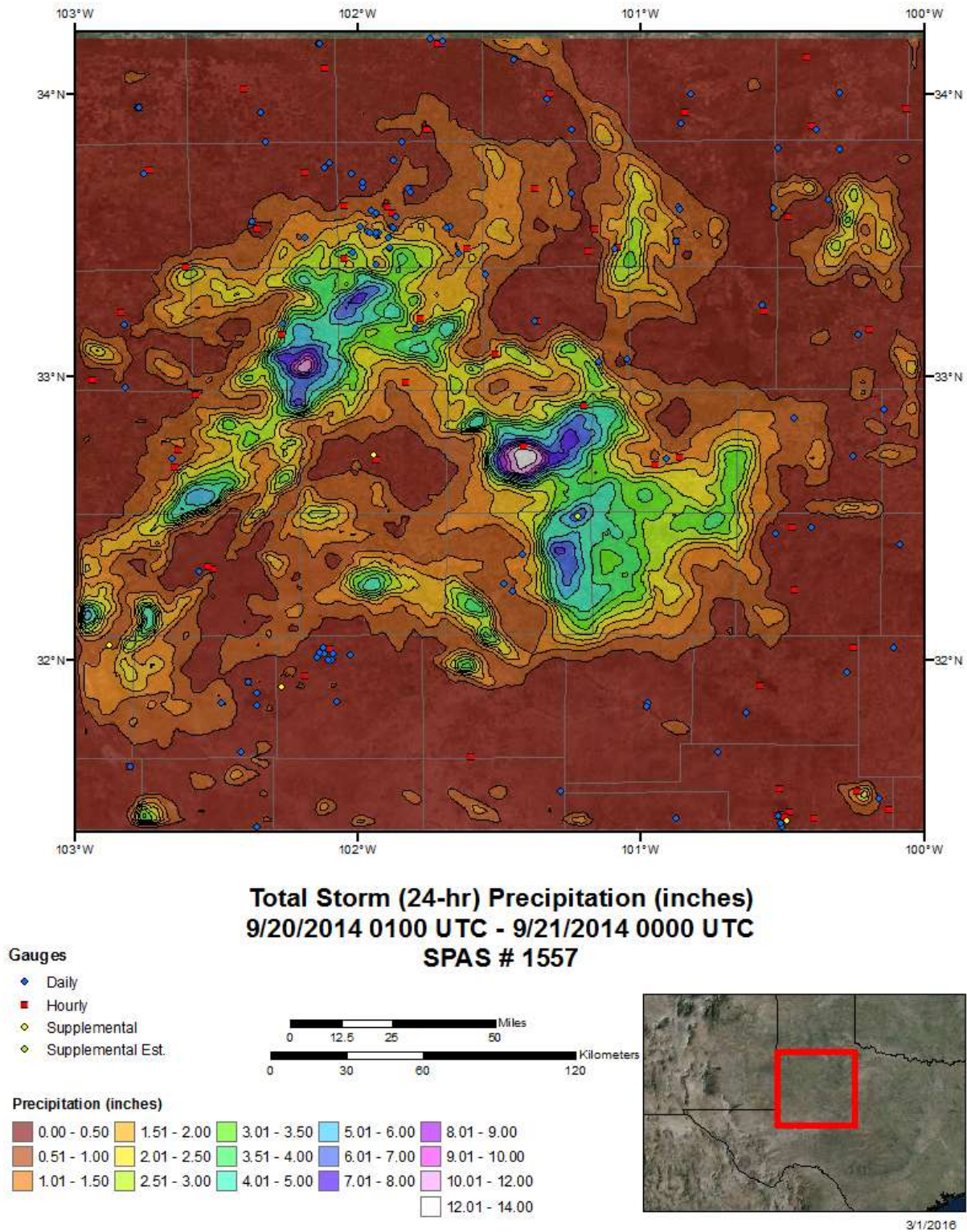


Figure 357: Total storm isohyetal analysis for Gail, TX September 2014

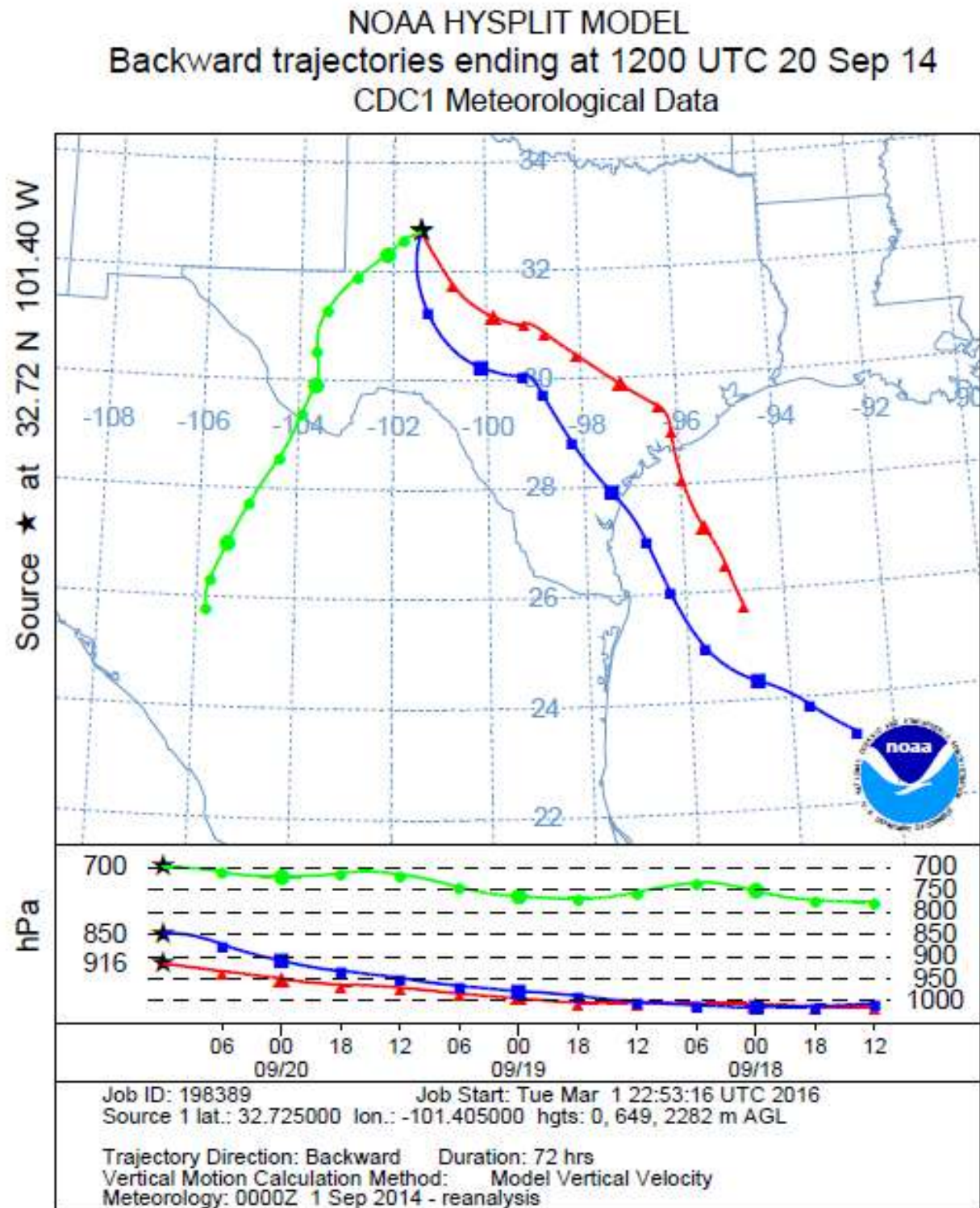


Figure 358: HYSPLIT trajectory analysis at Surface, 850mb and 700mb for Gail, TX September 2014

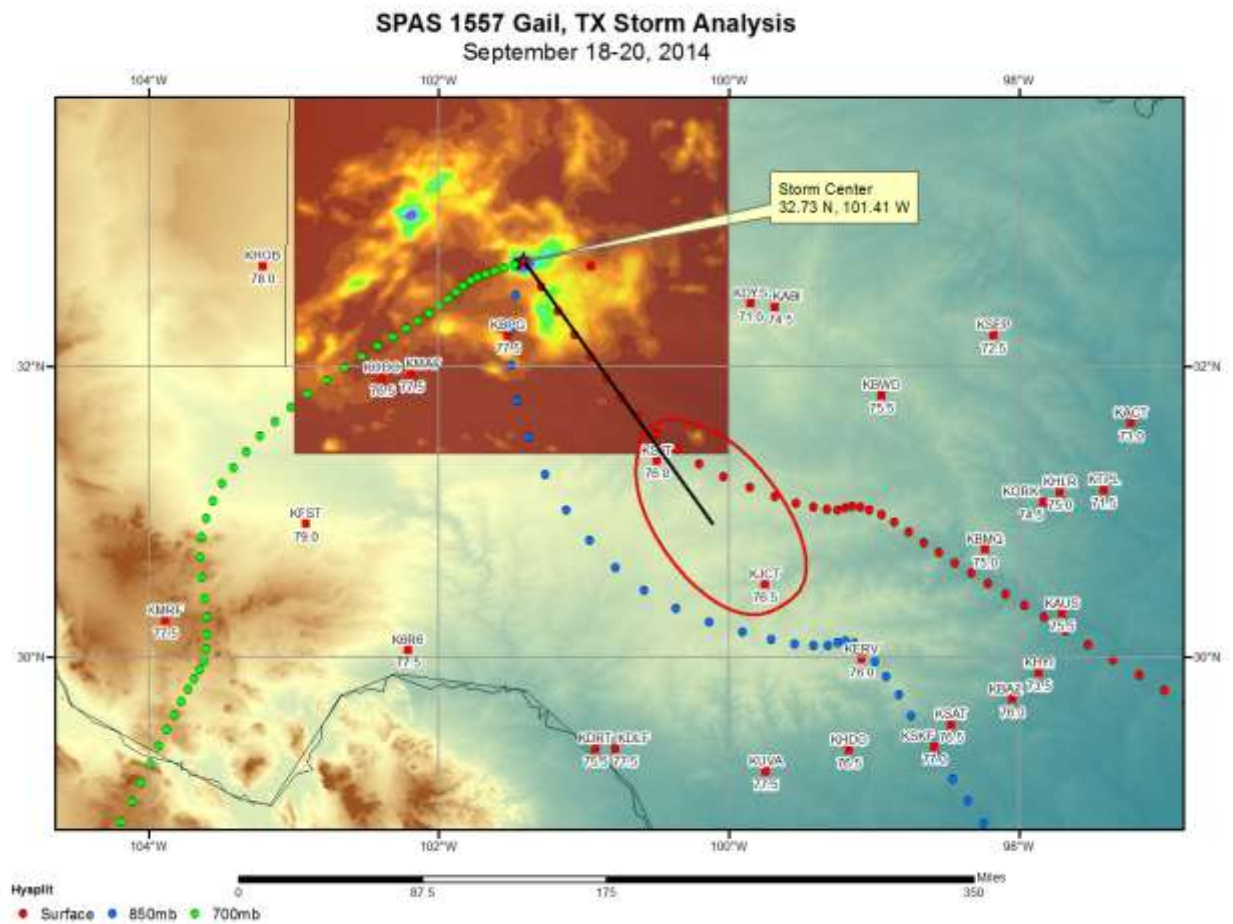


Figure 359: In-place storm representative dew point analysis for Gail, TX September 18-20, 2014

Storm Precipitation Analysis System (SPAS) For Storm #1588

General Storm Location: Tahoka, Texas (36.0, -104.0, 32.0, -99.5)

Storm Dates: May 4-6, 2015 (36-hours)

Event: Convective

DAD Zone 1

Latitude: 33.105

Longitude: -101.825

Max. Grid Rainfall Amount: 10.51" Tahoka, TX

Max. Observed Rainfall Amount: 9.23"

Number of Stations: 280

SPAS Version: 10.0

Basemap: Blended basemap based on default ZR precipitation and conus_prism_ppt_in_1981_2010_05

Spatial resolution: 0.01 decimal degree (0.395-sqmi)

Radar Included: Yes

Depth-Area-Duration (DAD) analysis: Yes

Reliability of results: This analysis was based on 280 hourly stations, daily data, supplemental station data, and radar data. We have a good degree of confidence for the station based storm total results. The spatial pattern is dependent on the radar data, gauge data, and basemap. There is a good degree of confidence with the timing based on the hourly stations near the storm center. Some daily stations were moved to supplemental due to timing issues.

SPAS Storm ID	NAME	LON	LAT	ELEV Round	Storm Representative				Climatological Maximum				IPMF
					T _s	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	T _s	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	
1588_1	TAHOKA	-101.825	33.105	3,000	71.00	2.36"	0.61"	1.750	77.5	3.22"	0.77"	2.450	1.40

Storm 1588 - May 4 (1900 UTC) - May 6 (0600 UTC), 2015														
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)														
Area (mi ²)	Duration (hours)													
	1	2	3	4	5	6	12	18	24	36	48	72	96	120
0.4	4.26	5.94	8.08	8.80	9.00	9.16	10.02	10.45	10.51	10.51	10.51	10.51	10.51	10.51
1	4.22	5.87	8.00	8.69	8.90	9.06	9.91	10.34	10.41	10.41	10.41	10.41	10.41	10.41
10	4.06	5.58	7.55	8.28	8.47	8.63	9.49	9.91	9.97	9.97	9.97	9.97	9.97	9.97
25	3.81	5.30	7.19	7.92	8.10	8.27	9.12	9.55	9.60	9.60	9.60	9.60	9.60	9.60
50	3.45	5.02	6.82	7.52	7.69	7.88	8.75	9.20	9.25	9.25	9.25	9.25	9.25	9.25
100	2.88	4.51	6.16	6.81	6.99	7.17	8.06	8.61	8.66	8.67	8.67	8.67	8.67	8.67
150	2.63	4.12	5.61	6.21	6.45	6.63	7.51	8.25	8.31	8.32	8.32	8.32	8.32	8.32
200	2.49	3.82	5.16	5.76	6.05	6.21	7.16	8.02	8.08	8.09	8.09	8.09	8.09	8.09
300	2.26	3.36	4.52	5.14	5.45	5.61	6.72	7.72	7.78	7.79	7.79	7.79	7.79	7.79
400	2.06	3.04	4.07	4.66	5.02	5.19	6.43	7.51	7.57	7.59	7.59	7.59	7.59	7.59
500	1.89	2.79	3.72	4.32	4.66	4.87	6.21	7.32	7.39	7.40	7.40	7.40	7.40	7.40
1,000	1.36	2.27	2.95	3.43	3.71	4.20	5.55	6.65	6.76	6.78	6.78	6.78	6.78	6.78
2,000	1.04	1.84	2.38	2.79	3.24	3.65	4.84	5.94	6.09	6.13	6.13	6.13	6.13	6.13
5,000	0.64	1.14	1.54	1.96	2.26	2.67	3.64	4.75	4.91	5.02	5.02	5.02	5.02	5.02
10,000	0.45	0.82	1.09	1.39	1.61	1.89	2.85	3.85	4.01	4.19	4.19	4.19	4.19	4.19
20,000	0.29	0.56	0.78	0.95	1.11	1.26	2.27	2.98	3.15	3.36	3.36	3.36	3.36	3.36
49,831	0.15	0.29	0.42	0.52	0.63	0.75	1.36	1.77	1.90	2.08	2.08	2.08	2.08	2.08

Figure 360: Depth-area-duration values for Tahoka, TX May 2015

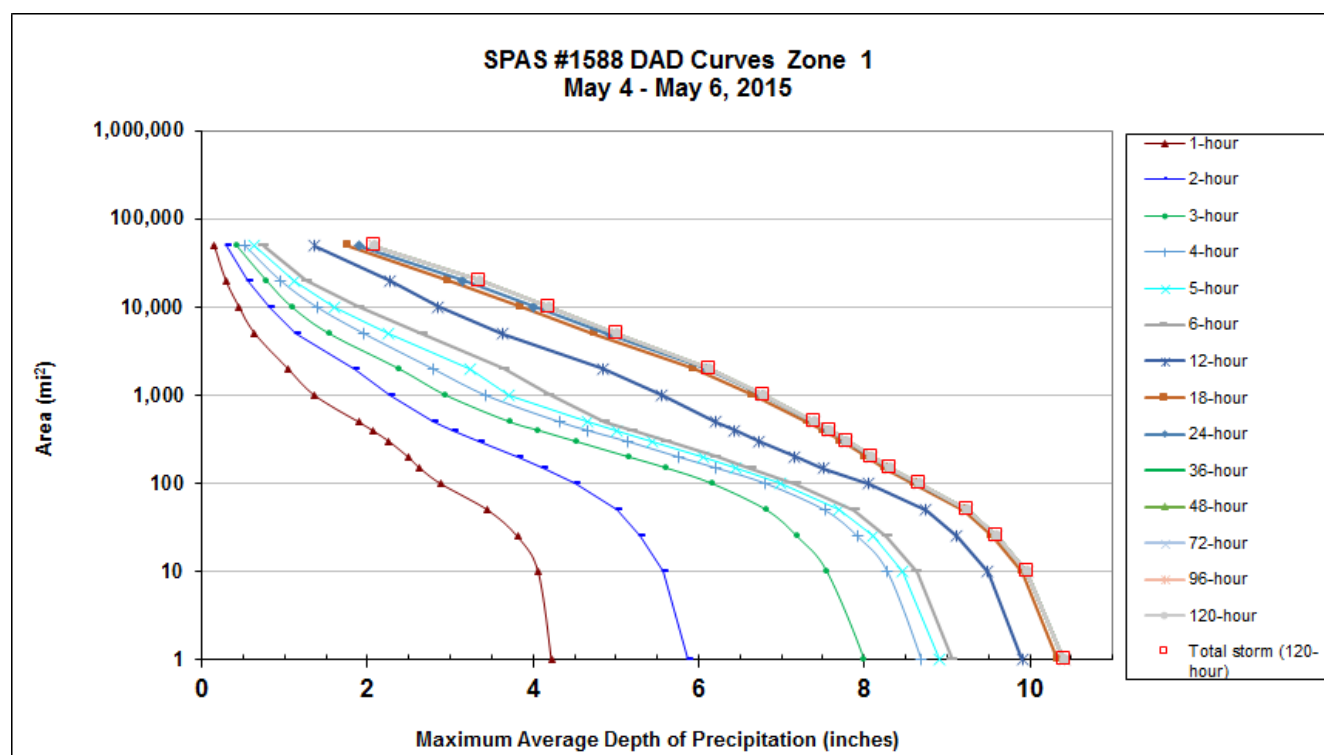


Figure 361: Depth-area-duration chart for Tahoka, TX May 2015

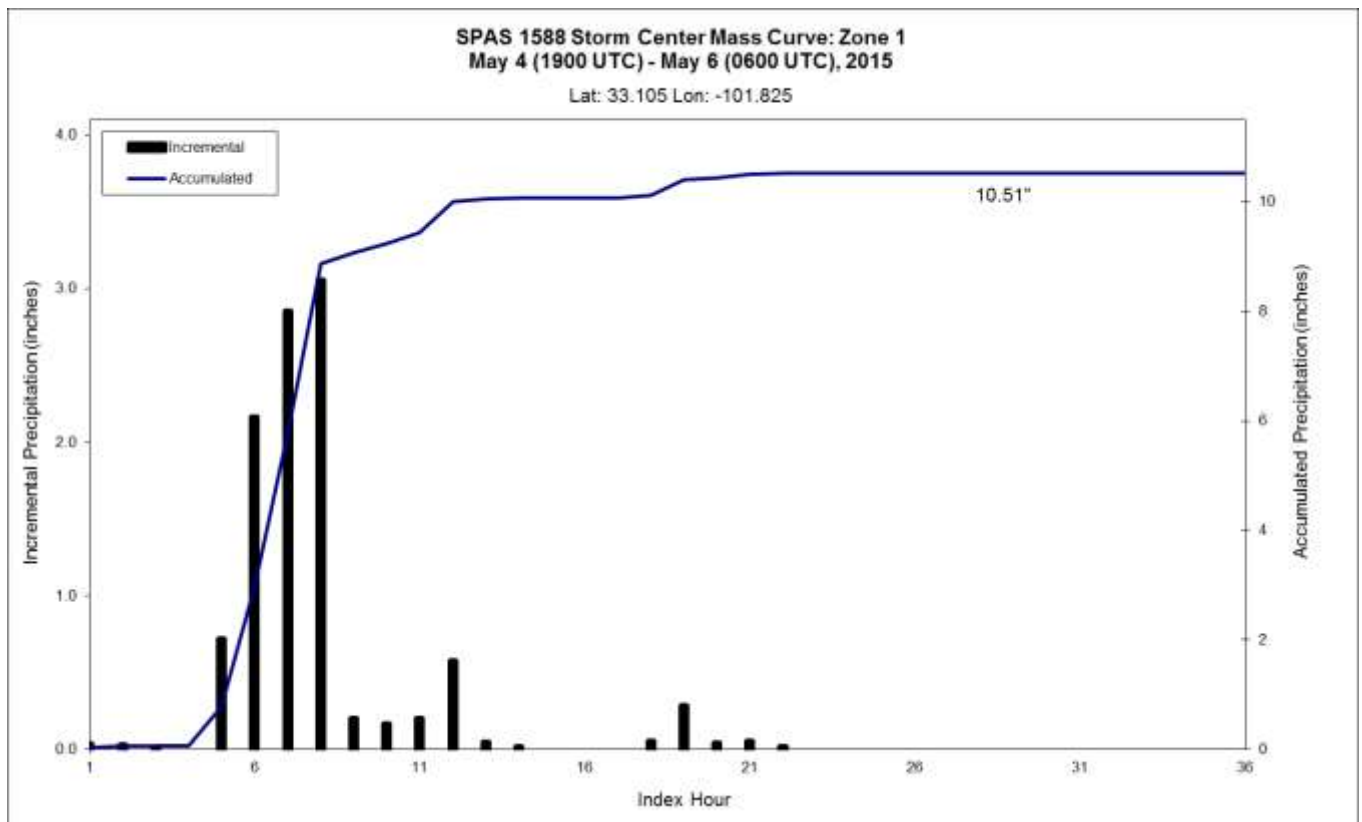


Figure 362: Mass curve chart for Tahoka, TX May 2015

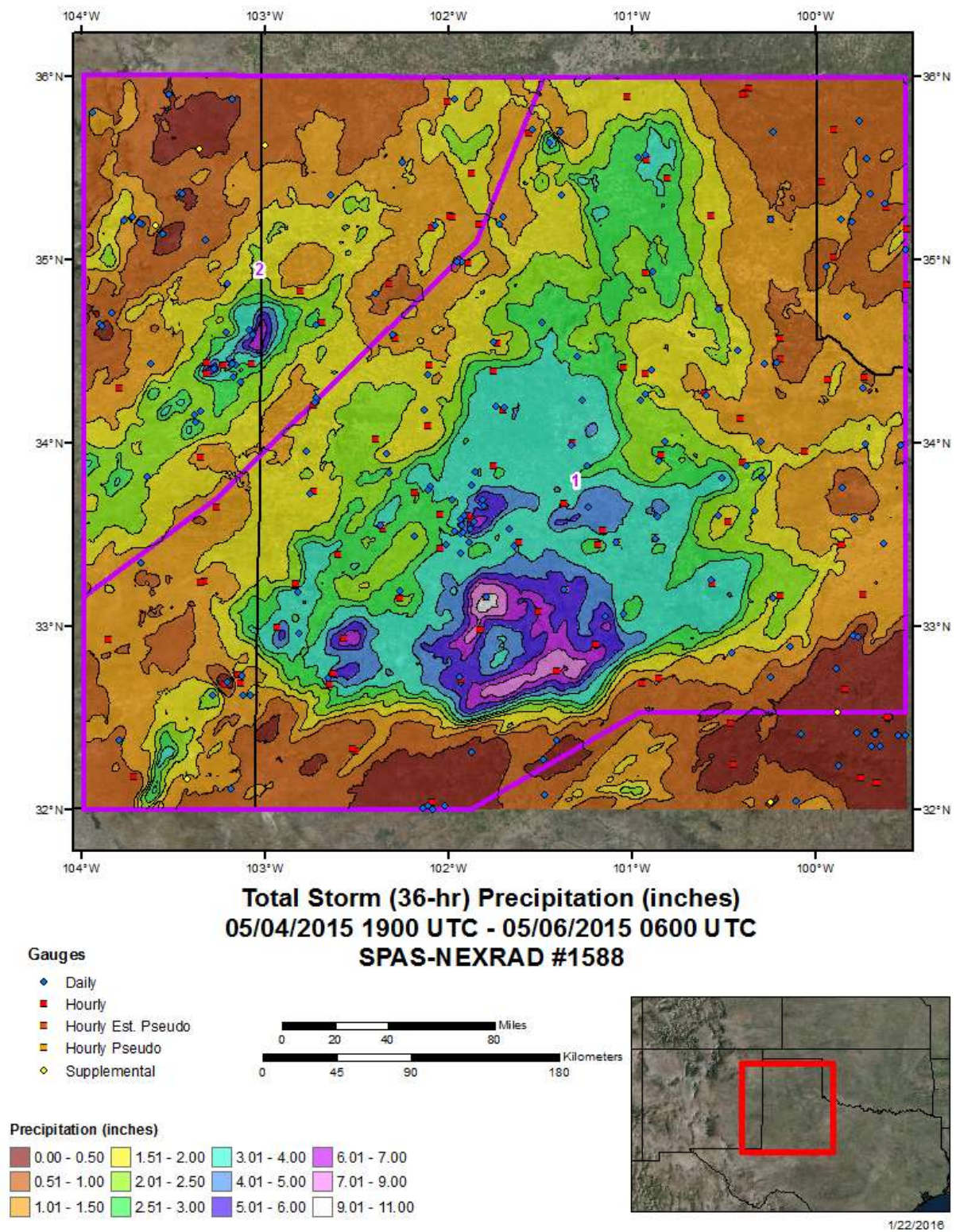


Figure 363: Total storm isohyetal analysis for Tahoka, TX May 2015

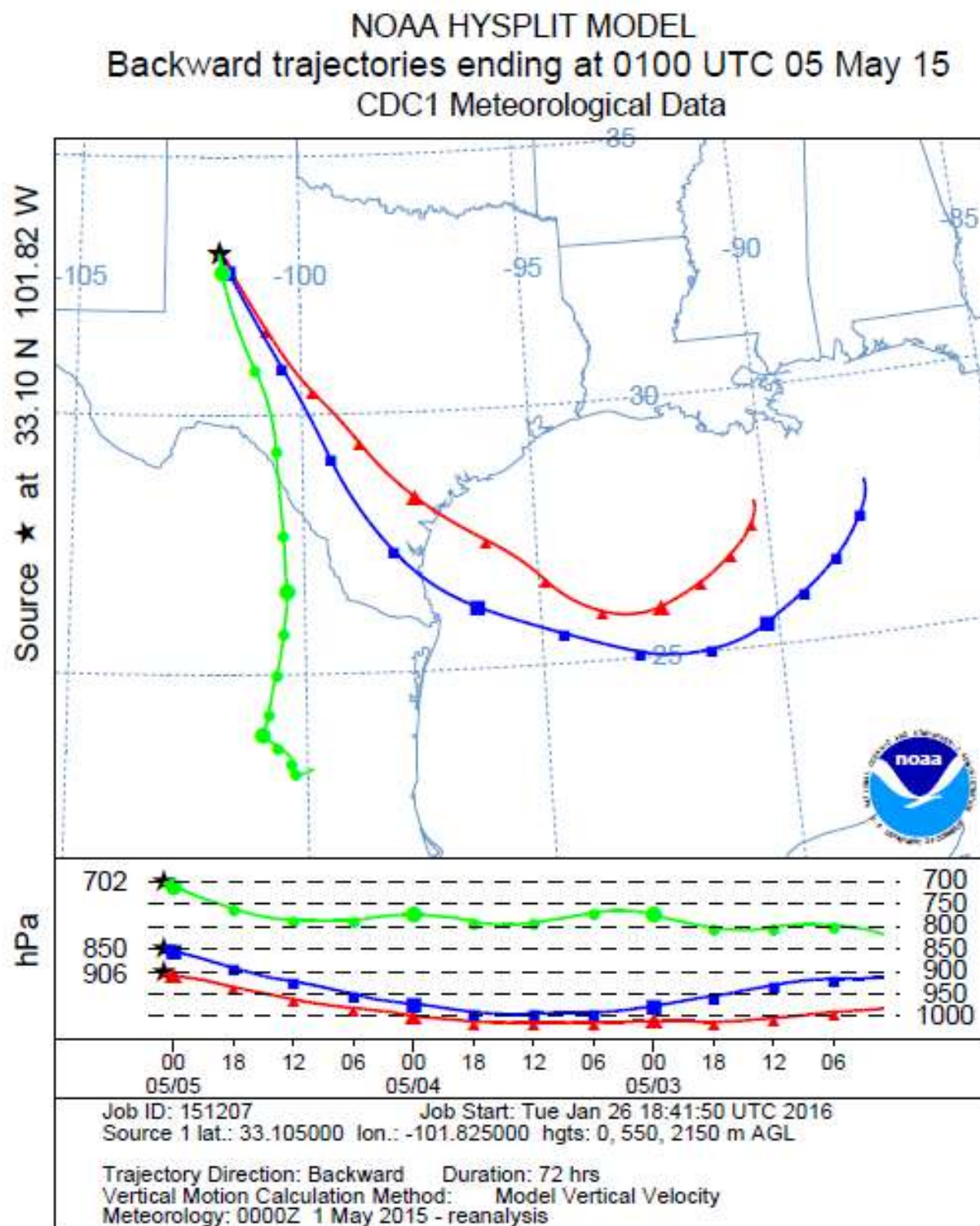


Figure 364: HYSPLIT trajectory analysis at Surface, 850mb and 700mb for Tahoka, TX May 2015

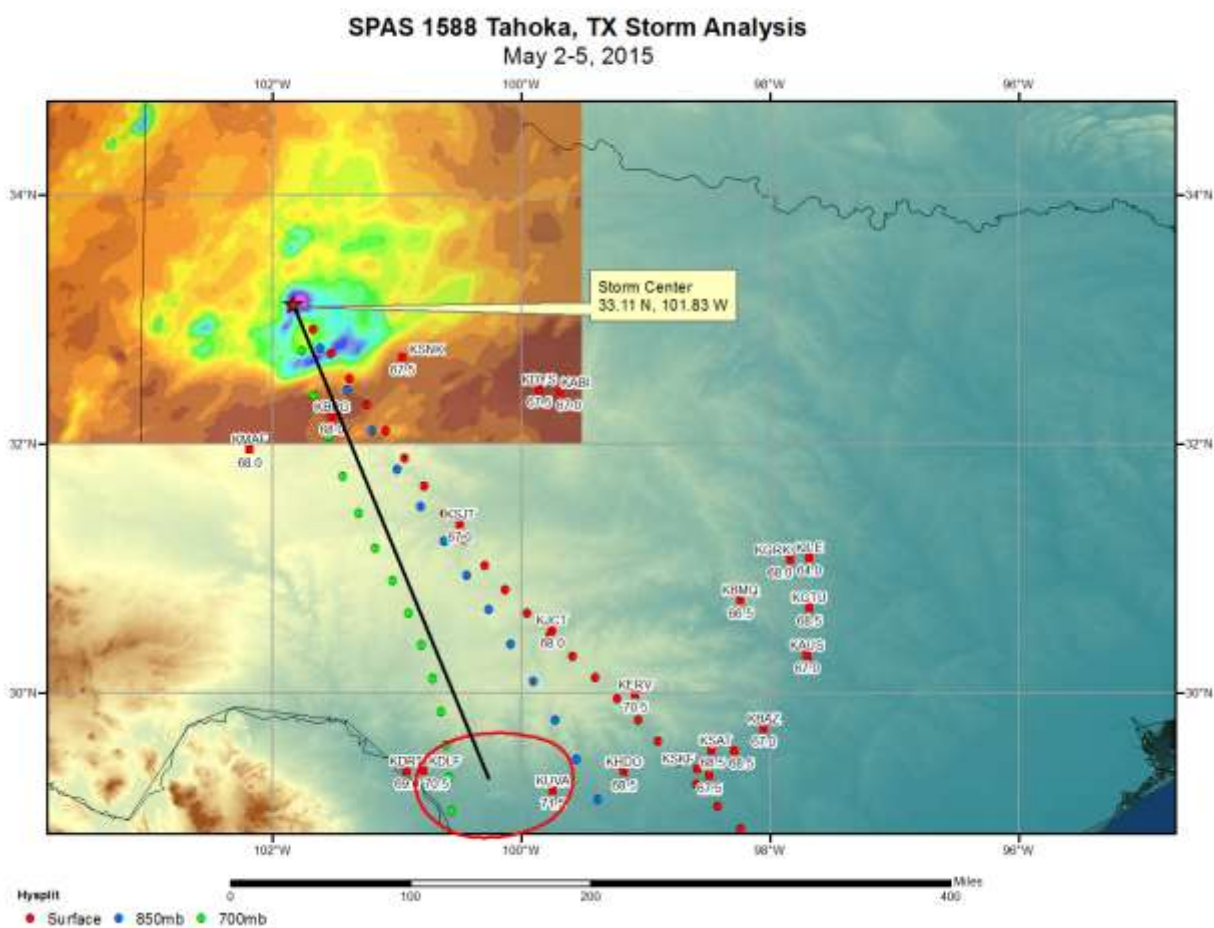


Figure 365: In-place storm representative analysis for Tahoka, TX May 2-5, 2015

Storm Precipitation Analysis System (SPAS) For Storm #1589

General Storm Location: Abilene, Texas (34.5, -102.0, 30.5, -97.0)

Storm Dates: July 7-9, 2015 (42-hours)

Event: Convective

DAD Zone 1

Latitude: 34.4350

Longitude: -99.1150

Max. Grid Rainfall Amount: 10.91"

Max. Observed Rainfall Amount: 9.53"

Number of Stations: 715

SPAS Version: 10.0

Basemap: Total storm precipitation based on default ZR relationship

Spatial resolution: 0.01 decimal degree (0.403-sqmi)

Radar Included: Yes

Depth-Area-Duration (DAD) analysis: Yes

Reliability of results: This analysis was based on 715 hourly stations, daily data, supplemental station data, and radar data. We have a good degree of confidence for the station based storm total results. The spatial pattern is dependent on the radar data, gauge data, and basemap. There is a good degree of confidence with the timing based on the hourly stations near the storm center. Some daily stations were moved to supplemental due to timing issues.

SPAS Storm ID	NAME	LON	LAT	ELEV Round	Storm Representative				Climatological Maximum				IPMF
					T _g	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	T _g	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	
1589_1	ABILENE	-99.115	31.435	1,300	77.00	3.14"	0.34"	2,800	82.0	3.95"	0.39"	3,560	1.27

Storm 1589 - July 7 (0700 UTC) - July 9 (0000 UTC), 2015														
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)														
Area (mi ²)	Duration (hours)													
	1	2	3	4	5	6	12	18	24	36	48	72	96	120
0.4	3.76	6.21	6.93	8.29	9.06	9.61	10.81	10.91	10.91	10.91	10.91	10.91	10.91	10.91
1	3.72	6.15	6.86	8.24	9.00	9.54	10.74	10.83	10.83	10.83	10.83	10.83	10.83	10.83
10	3.55	5.89	6.57	8.11	8.85	9.38	10.55	10.62	10.62	10.62	10.62	10.62	10.62	10.62
25	3.39	5.54	6.21	7.86	8.59	9.15	10.27	10.33	10.34	10.34	10.34	10.34	10.34	10.34
50	3.19	5.12	6.02	7.59	8.36	8.85	9.96	10.01	10.02	10.07	10.07	10.07	10.07	10.07
100	2.92	4.59	5.80	7.23	7.97	8.48	9.57	9.61	9.62	9.80	9.80	9.80	9.80	9.80
150	2.71	4.29	5.54	6.89	7.58	8.10	9.20	9.30	9.31	9.59	9.60	9.60	9.60	9.60
200	2.53	4.04	5.25	6.57	7.20	7.73	8.84	9.02	9.04	9.42	9.43	9.43	9.43	9.43
300	2.25	3.60	4.79	6.00	6.55	7.15	8.22	8.58	8.61	9.10	9.12	9.12	9.12	9.12
400	2.03	3.28	4.46	5.62	6.08	6.70	7.84	8.26	8.30	8.85	8.90	8.90	8.90	8.90
500	1.85	3.05	4.18	5.30	5.75	6.37	7.53	8.02	8.06	8.67	8.72	8.72	8.72	8.72
1,000	1.60	2.38	3.37	4.28	4.62	5.09	6.51	7.21	7.26	8.07	8.12	8.12	8.12	8.12
2,000	1.36	1.81	2.53	3.11	3.44	3.85	5.37	6.15	6.23	7.43	7.49	7.49	7.49	7.49
5,000	0.94	1.33	1.75	2.09	2.40	2.64	3.91	4.59	4.70	6.25	6.32	6.32	6.32	6.32
10,000	0.61	0.94	1.33	1.68	1.97	2.16	3.04	3.43	3.78	5.23	5.32	5.32	5.32	5.32
20,000	0.36	0.55	0.84	1.12	1.37	1.57	2.38	2.69	2.99	4.10	4.21	4.21	4.21	4.21
50,000	0.14	0.25	0.38	0.48	0.59	0.68	1.16	1.41	1.68	2.35	2.43	2.43	2.43	2.43
61,706	0.12	0.21	0.31	0.39	0.49	0.56	0.96	1.17	1.36	1.96	2.03	2.03	2.03	2.03

Figure 366: Depth-area-duration values for Abilene, TX July 2015

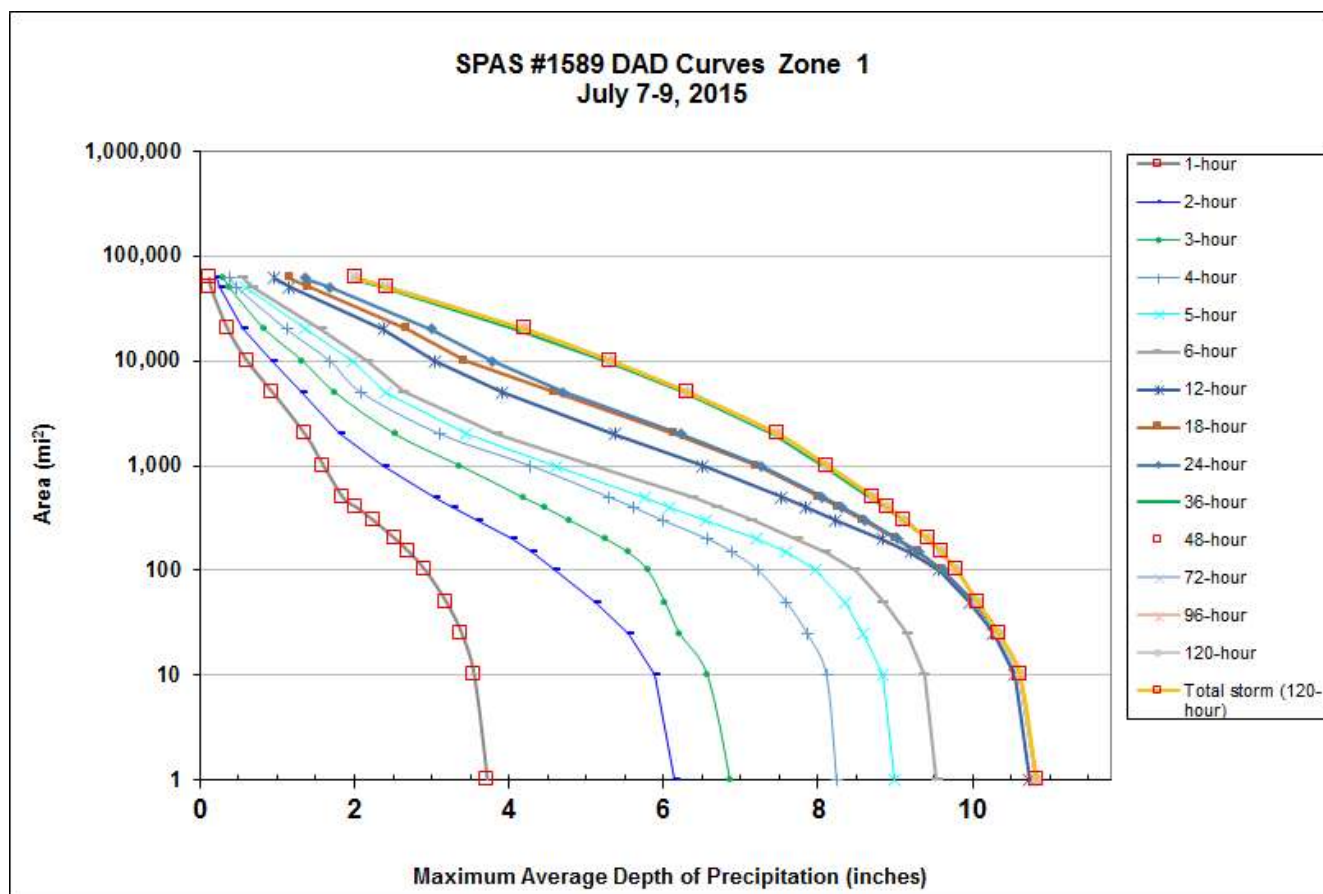


Figure 367: Depth-area-duration chart for Abilene, TX July 2015

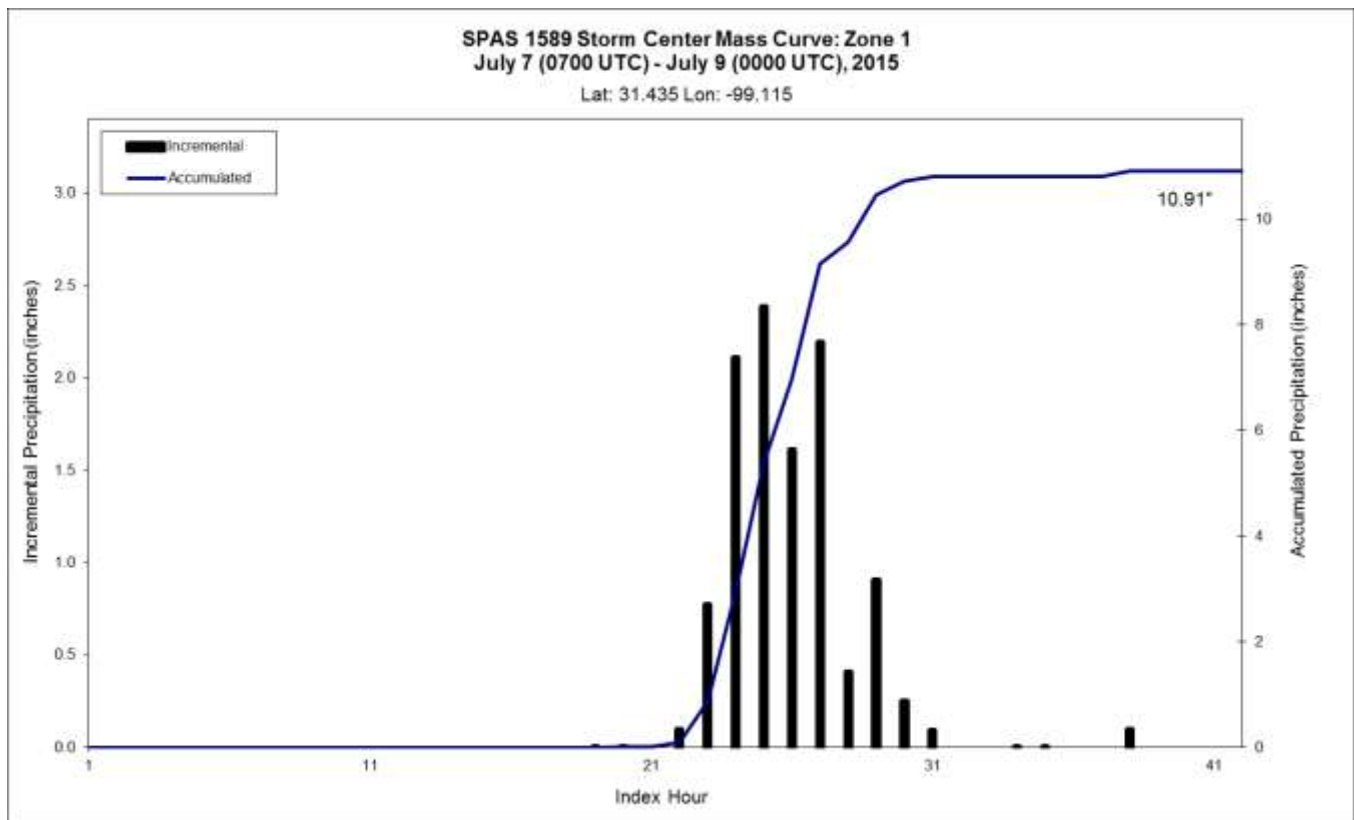


Figure 368: Mass curve chart for Abilene, TX July 2015

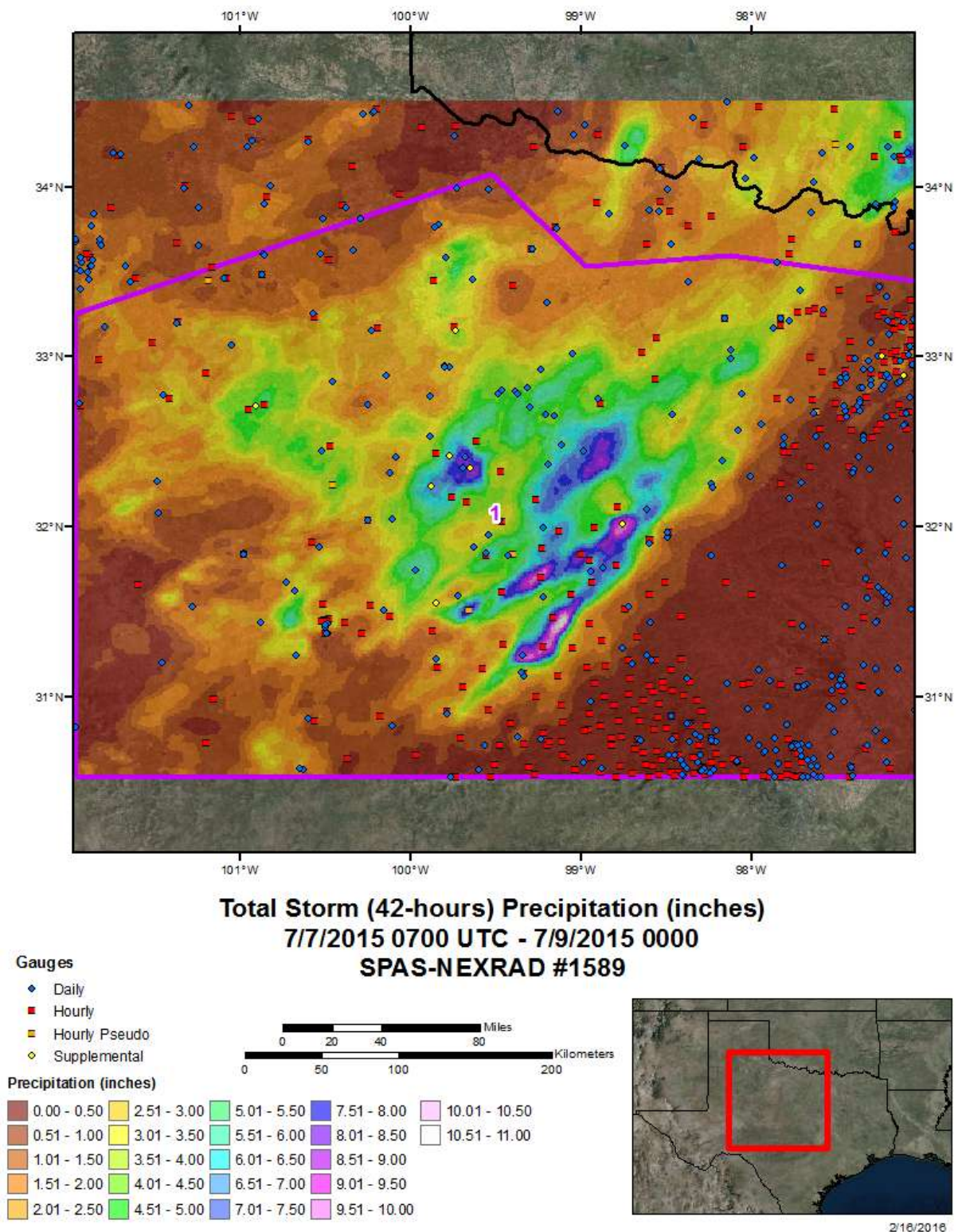


Figure 369: Total storm isohyetal analysis for Abilene, TX July 2015

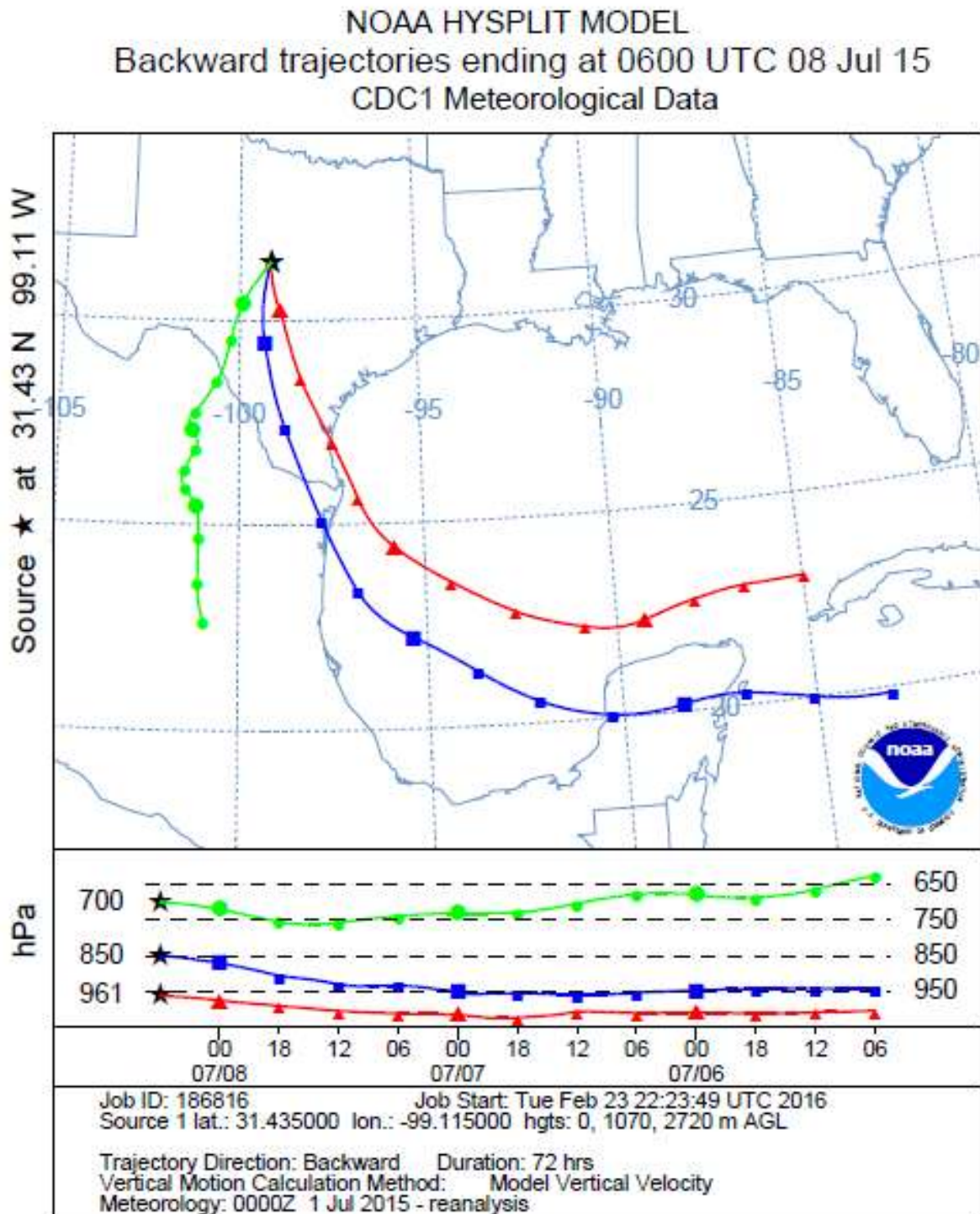


Figure 370: HYSPLIT trajectory analysis at Surface, 850mb and 700mb for Abilene, TX July 2015

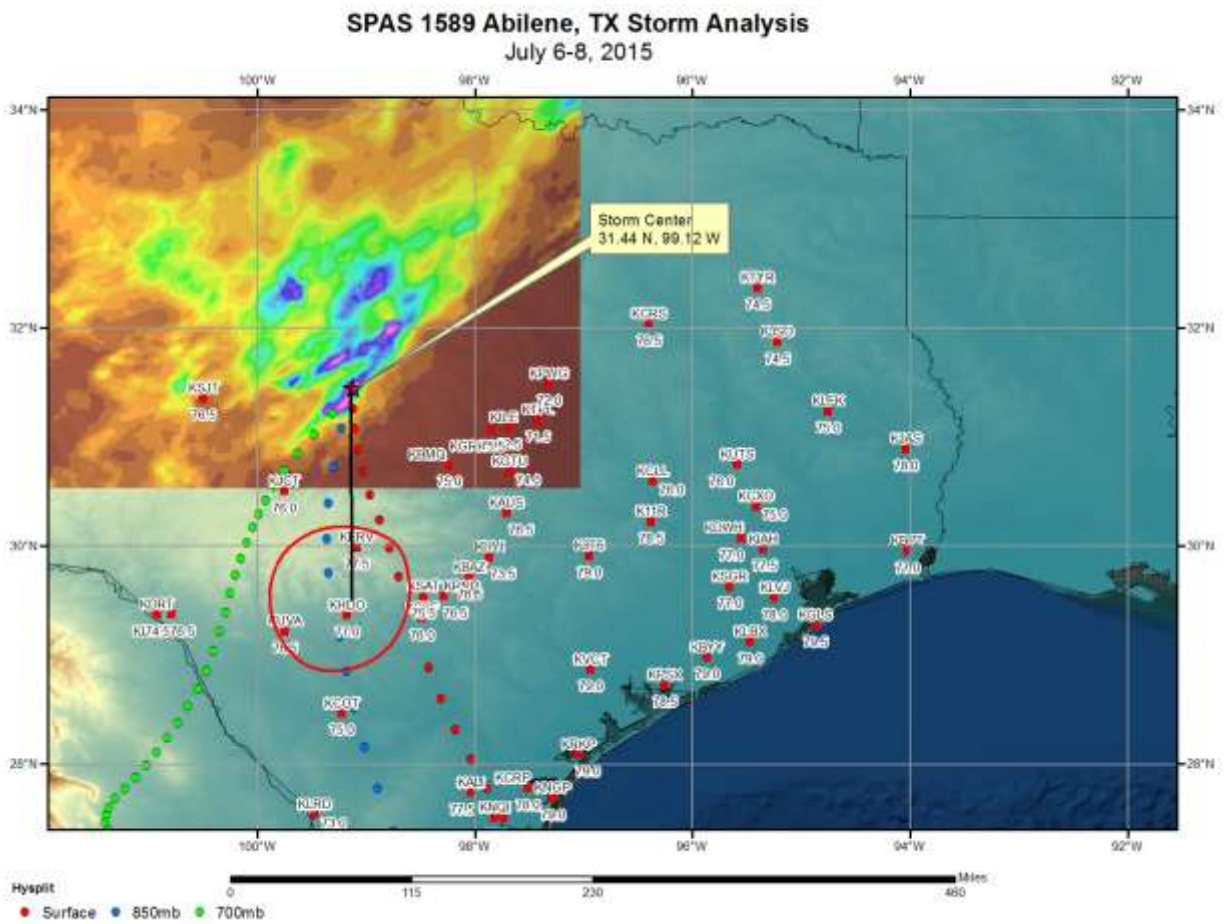


Figure 371: In-place storm representative dew point analysis for Abilene, TX July 6-8, 2015

Storm Precipitation Analysis System (SPAS) For Storm #1590

General Storm Location: Dawson, Texas (33.8, -98.5, 30.8, -94.5)

Storm Dates: October 23-26, 2015 (72-hours)

Event: Convective

DAD Zone 1

Latitude: 31.895

Longitude: -96.645

Max. Grid Rainfall Amount: 32.92"

Max. Observed Rainfall Amount: 30.50"

Number of Stations: 458

SPAS Version: 10.0

Basemap: Blended basemap based on default ZR precipitation and conus_prism_ppt_in_1981_2010_10

Spatial resolution: 0.01 decimal degree (0.403-sqmi)

Radar Included: Yes

Depth-Area-Duration (DAD) analysis: Yes

Reliability of results: This analysis was based on 458 hourly stations, daily data, supplemental station data (Dawson Treatment Plant), and radar data. We have a good degree of confidence for the station based storm total results. The spatial pattern is dependent on the radar data, gauge data, and basemap. There is a good degree of confidence with the timing based on the hourly stations near the storm center. Some daily stations were moved to supplemental due to timing issues.

SPAS Storm ID	NAME	LON	LAT	ELEV Round	Storm Representative				Climatological Maximum				IPMF
					T _g	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	T _g	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	
1590_1	DAWSON	-96.645	31.895	500	76.00	2.99"	0.13"	2,860	77.0	3.14"	0.14"	3,000	1.05

Storm 1590 - October 23 (0100 UTC) - October 26 (0000 UTC), 2015														
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)														
Area (mi ²)	Duration (hours)													
	1	2	3	4	5	6	12	18	24	36	48	72	96	120
0.4	5.31	9.19	12.28	14.60	17.28	18.67	20.71	26.22	28.05	30.22	32.12	32.92	32.92	32.92
1	5.26	9.13	12.21	14.46	17.16	18.55	20.55	26.04	27.86	30.02	31.91	32.70	32.70	32.70
10	5.07	8.99	12.02	14.11	16.86	18.23	20.16	25.57	27.39	29.51	31.38	32.17	32.17	32.17
25	4.90	8.85	11.95	13.76	16.48	18.02	19.91	25.29	27.10	29.20	31.13	31.88	31.88	31.88
50	4.69	8.59	11.68	13.35	15.98	17.57	19.47	24.77	26.56	28.62	30.49	31.24	31.24	31.24
100	4.35	8.08	11.19	12.76	15.15	16.79	18.76	23.92	25.67	27.69	29.50	30.23	30.23	30.23
150	4.09	7.64	10.71	12.27	14.48	16.15	18.23	23.26	24.99	27.00	28.73	29.43	29.43	29.43
200	3.88	7.22	10.22	11.84	13.89	15.56	17.72	22.65	24.37	26.37	28.04	28.74	28.74	28.74
300	3.57	6.59	9.43	10.98	12.76	14.45	16.68	21.49	23.19	25.18	26.75	27.46	27.46	27.46
400	3.34	6.17	8.80	10.28	11.89	13.45	15.87	20.50	22.17	24.25	25.65	26.43	26.43	26.43
500	3.16	5.82	8.30	9.77	11.24	12.70	15.25	19.76	21.39	23.50	24.81	25.60	25.60	25.60
1,000	2.50	4.51	6.59	8.02	9.35	10.28	13.24	17.27	18.77	20.76	21.83	22.61	22.61	22.61
2,000	2.01	3.36	4.88	6.01	7.10	7.92	10.61	14.21	15.69	17.65	18.48	19.24	19.24	19.24
5,000	1.34	2.21	3.06	3.81	4.51	5.16	7.80	10.45	11.82	13.51	14.16	14.99	14.99	14.99
10,000	0.91	1.55	2.08	2.67	3.15	3.66	6.02	8.29	9.55	11.02	11.82	12.58	12.58	12.58
20,000	0.55	0.97	1.42	1.77	2.13	2.40	4.29	6.27	7.49	9.10	9.88	10.42	10.42	10.42
32,245	0.39	0.69	0.99	1.25	1.52	1.74	3.17	4.78	5.81	7.23	7.96	8.55	8.55	8.55

Figure 372: Depth-area-duration values for Dawson, TX October 2015

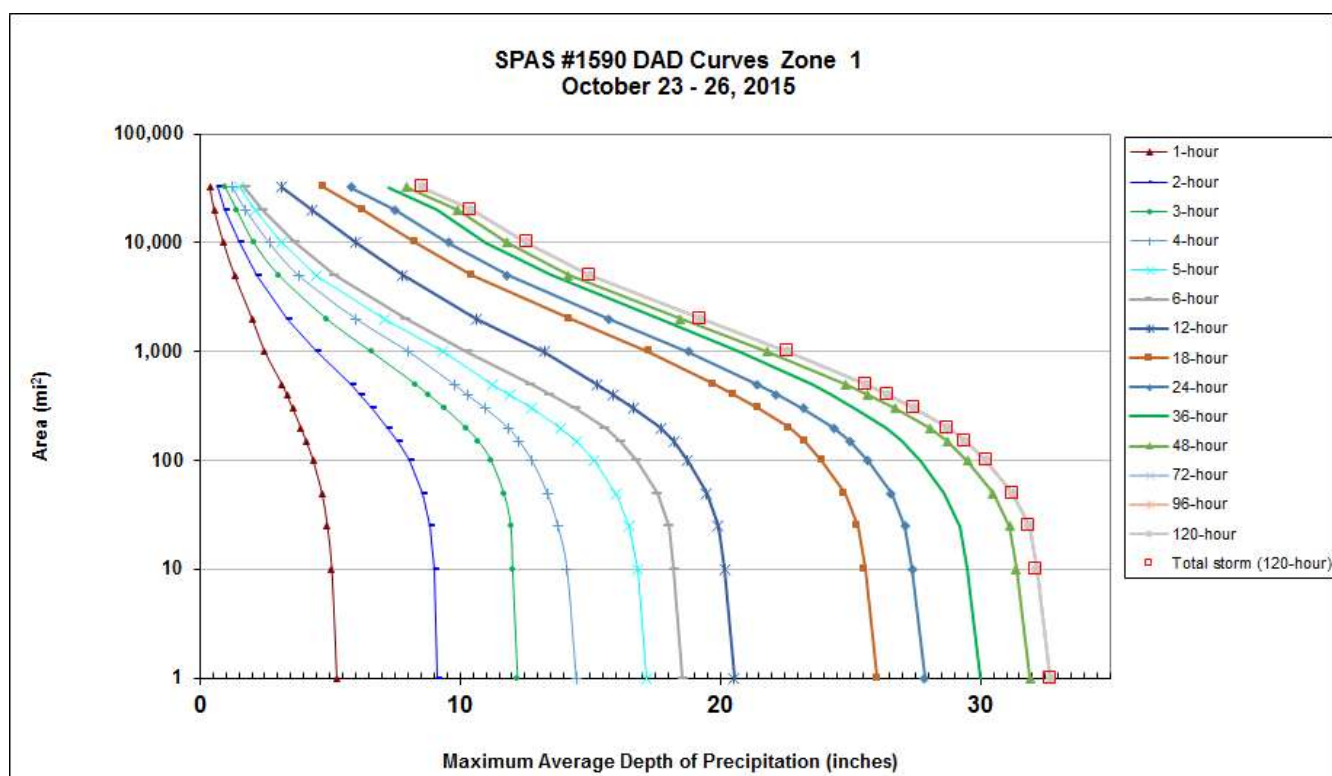


Figure 373: Depth-area-duration chart for Dawson, TX October 2015

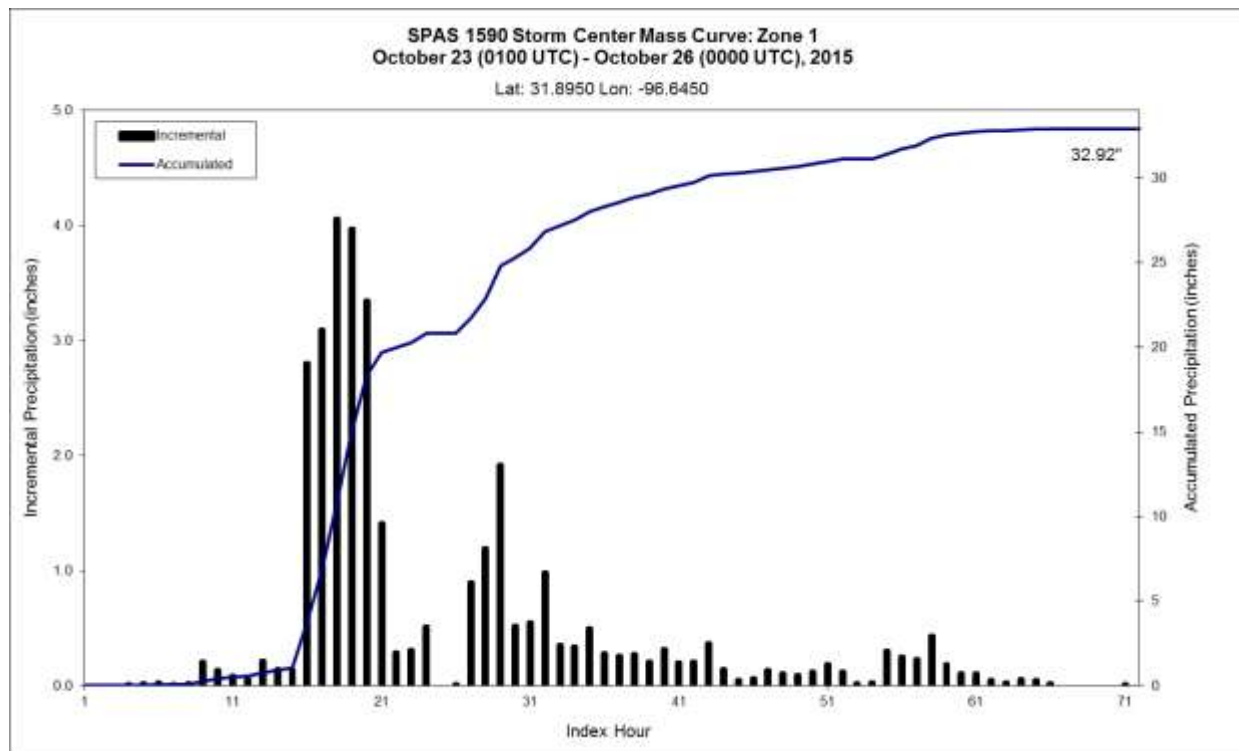


Figure 374: Mass curve chart for Dawson, TX October 2015

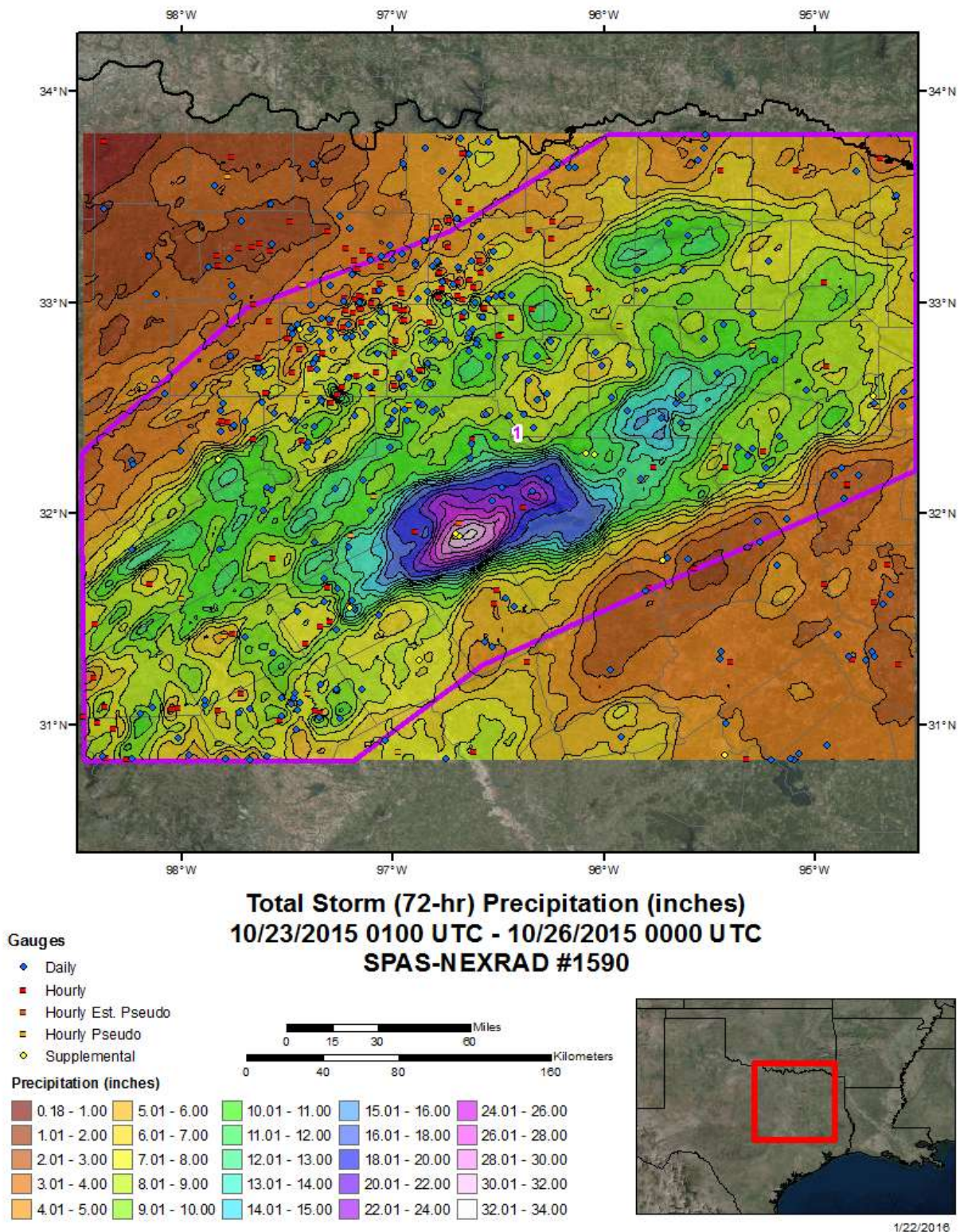


Figure 375: Total storm isohyetal analysis for Dawson, TX October 2015

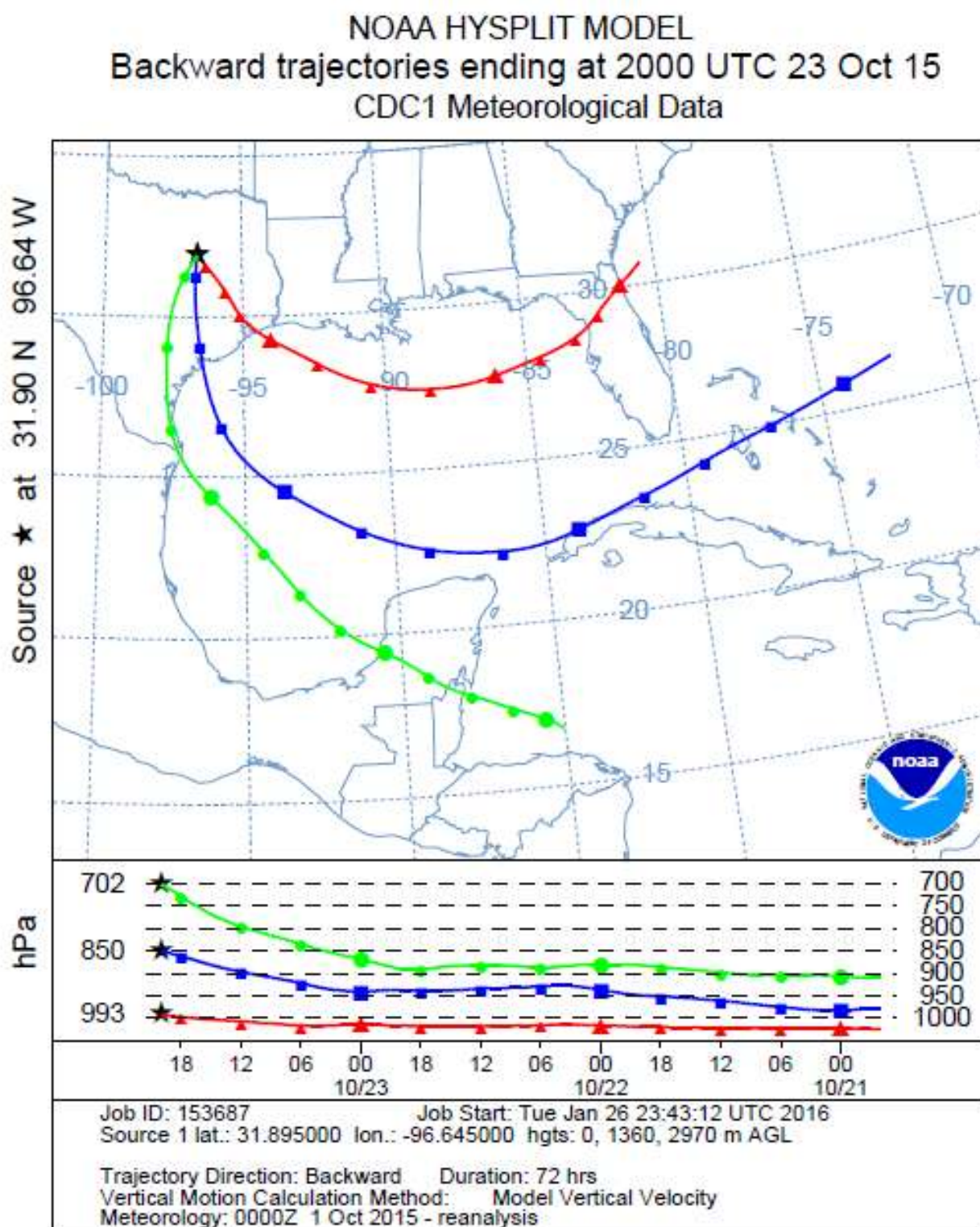


Figure 376: HYSPLIT trajectory analysis at Surface, 850mb and 700mb for Dawson, TX October 2015

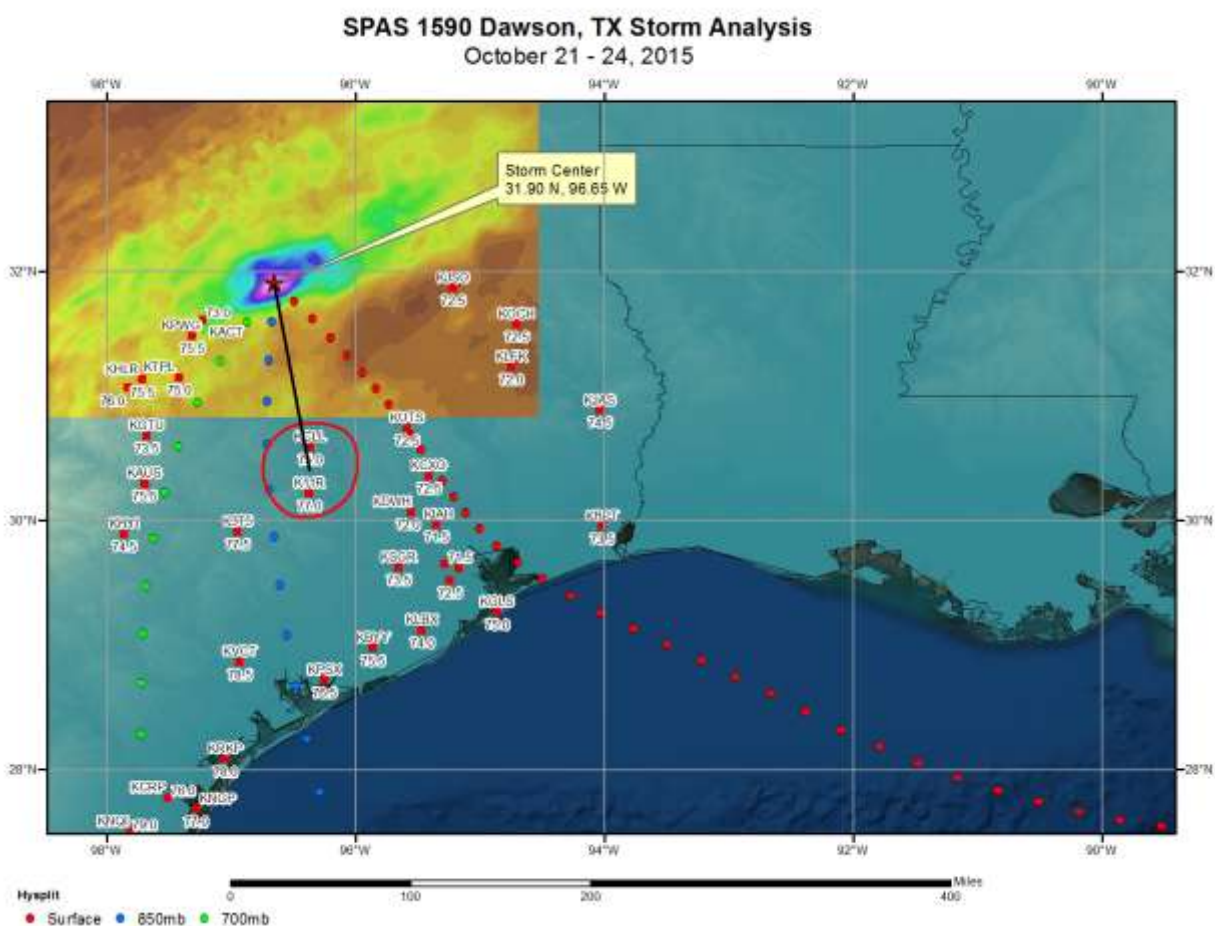


Figure 377: In-place storm representative dew point analysis for Dawson, TX October 21-24, 2015

Tropical Storms

Storm Precipitation Analysis System (SPAS) For Storm #1582

General Storm Location: Texas, Oklahoma (35.2 -102.5 29.0 -96.0)

Storm Dates: September 14-17, 1936 (96-hours)

Event: Broome, TX (GM 5-7)

DAD Zone 1

Latitude: 31.788

Longitude: -100.854

Max. Grid Rainfall Amount: 30.34" Broome, TX

Max. Observed Rainfall Amount: 30.00"

DAD Zone 2

Latitude: 30.454

Longitude: -100.038

Max. Grid Rainfall Amount: 30.13" Roosevelt, TX

Max. Observed Rainfall Amount: 30.00"

Number of Stations: 213

SPAS Version: 10.0

Basemap: conus_prism_ppt_in_1971_2000_09

Radar Included: No

Depth-Area-Duration (DAD) analysis: Yes

Reliability of results: This analysis was based on hourly data (H), daily data (D) and supplemental data (S). We have a good degree of confidence in the station based storm total results. The spatial pattern is dependent on basemap and the timing is based on five hourly stations.

SPAS Storm ID	NAME	LON	LAT	ELEV Round	Storm Representative				Climatological Maximum				IPMF
					T _d	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	T _d	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	
1582_1	BROOME	-100.854	31.788	2,300	84.00	4.30"	0.72"	3.580	86.0	4.67"	0.76"	3.910	1.09

Storm 1582 Zone 1 - Sep. 14 (0700 UTC) - Sep. 17 (0600 UTC), 1936															
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)															
areasqmi	Duration (hours)														
	1	2	3	4	5	6	12	18	24	36	48	72	96	120	Total
0.3	2.76	4.93	7.11	9.39	11.34	13.77	22.53	24.96	27.14	27.14	27.14	30.29	30.29	30.35	30.35
1	2.75	4.90	7.08	9.35	11.29	13.71	22.43	24.86	27.02	27.03	27.03	30.16	30.16	30.16	30.16
10	2.72	4.85	7.01	9.26	11.17	13.57	22.19	24.60	26.74	26.74	26.74	29.84	29.84	29.84	29.84
25	2.71	4.82	6.98	9.22	11.12	13.51	22.10	24.49	26.63	26.63	26.63	29.72	29.71	29.71	29.71
50	2.69	4.80	6.95	9.18	11.08	13.47	22.03	24.42	26.54	26.54	26.54	29.62	29.62	29.62	29.62
100	2.59	4.65	6.73	8.88	10.74	13.03	21.27	23.60	25.63	25.63	25.64	28.75	28.76	28.76	28.76
150	2.46	4.45	6.48	8.55	10.34	12.54	20.39	22.66	24.57	24.59	24.60	27.75	27.76	27.76	27.76
200	2.34	4.26	6.23	8.22	9.97	12.06	19.55	21.75	23.56	23.58	23.60	26.89	26.92	26.92	26.92
300	2.14	3.94	5.83	7.70	9.37	11.29	18.16	20.27	21.93	21.96	21.99	25.68	25.75	25.75	25.75
400	1.99	3.72	5.55	7.34	8.97	10.76	17.19	19.22	20.74	20.79	20.83	24.86	24.93	24.93	24.93
500	1.92	3.64	5.35	7.07	8.68	10.36	16.40	18.43	19.80	19.87	19.92	24.23	24.31	24.31	24.31
1,000	1.79	3.34	4.86	6.32	7.73	9.19	14.04	15.98	16.99	17.12	17.25	21.98	22.08	22.08	22.08
2,000	1.64	3.03	4.35	5.68	6.86	8.12	11.91	13.72	14.45	14.62	14.84	19.72	19.82	19.82	19.82
5,000	1.26	2.32	3.32	4.34	5.20	6.14	8.85	10.28	10.80	11.02	11.65	15.86	15.95	15.95	15.95
10,000	0.87	1.61	2.32	3.01	3.64	4.33	6.31	7.30	7.72	7.98	8.94	11.78	11.93	11.93	11.93
20,000	0.52	0.99	1.41	1.83	2.22	2.63	3.87	4.48	4.78	5.32	6.52	8.35	8.54	8.54	8.54
50,000	0.25	0.47	0.70	0.88	1.07	1.29	1.92	2.21	2.41	2.87	3.56	4.48	4.60	4.60	4.60
71,713	0.18	0.35	0.50	0.66	0.81	0.95	1.45	1.68	1.83	2.19	2.73	3.39	3.48	3.48	3.48

Figure 378: Depth-area-duration values for Broome, TX September 1936

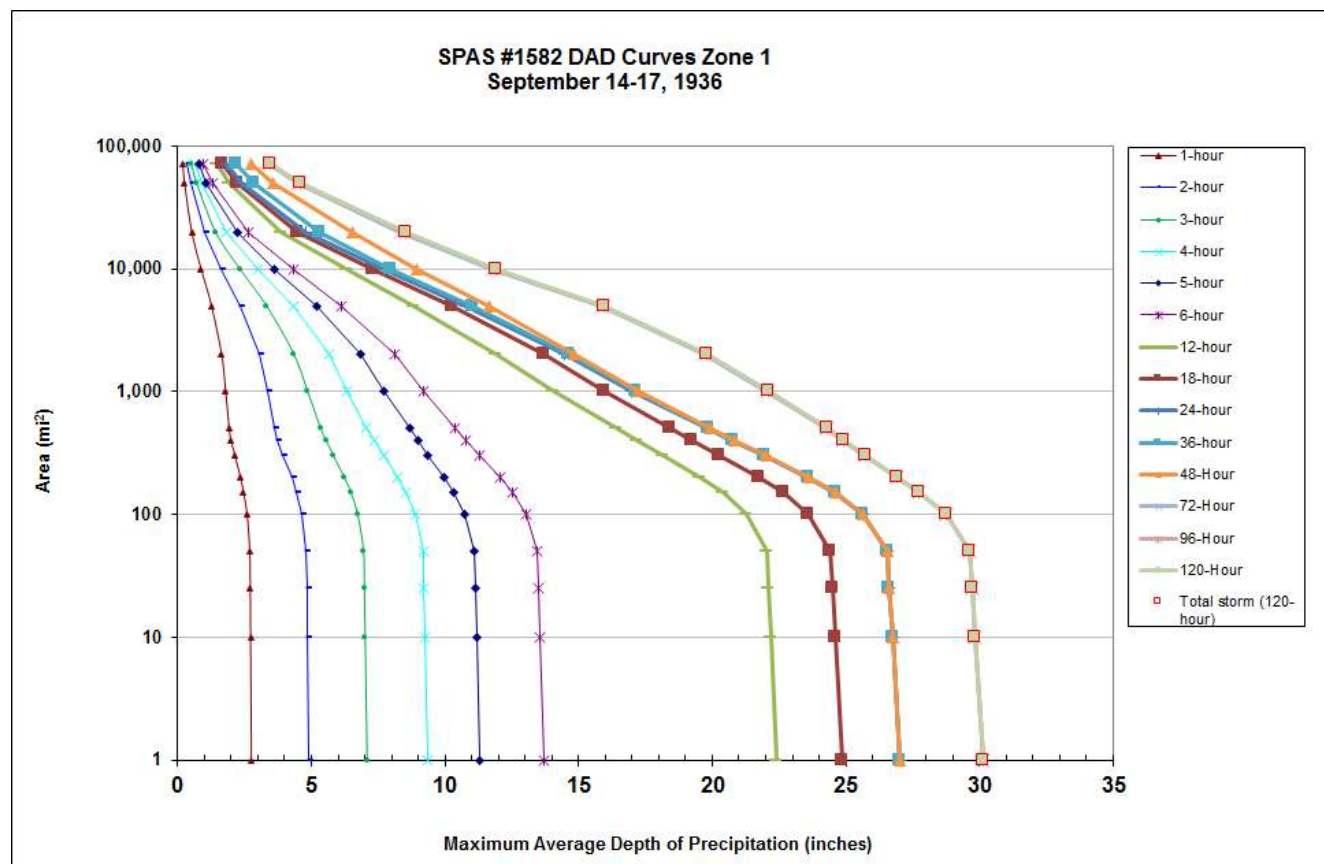


Figure 379: Depth-area-duration chart for Broome, TX September 1936

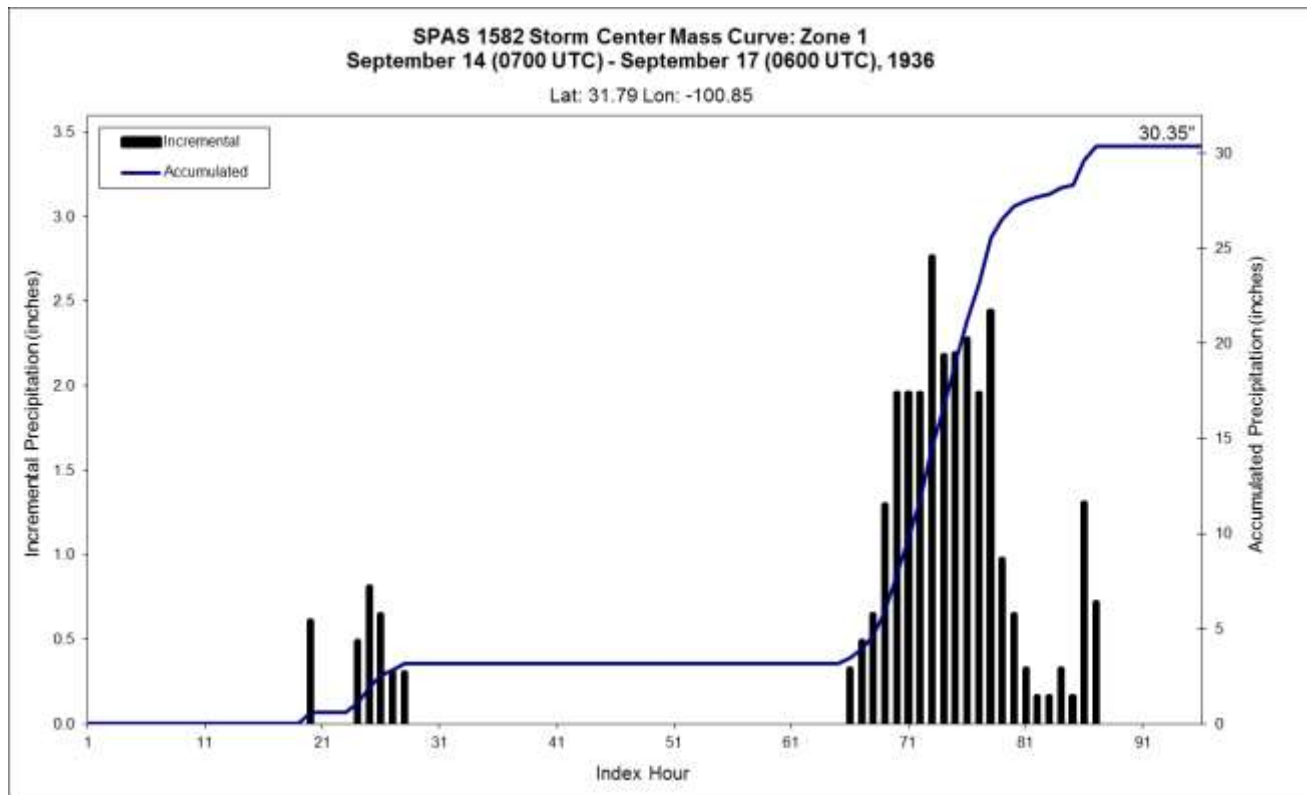
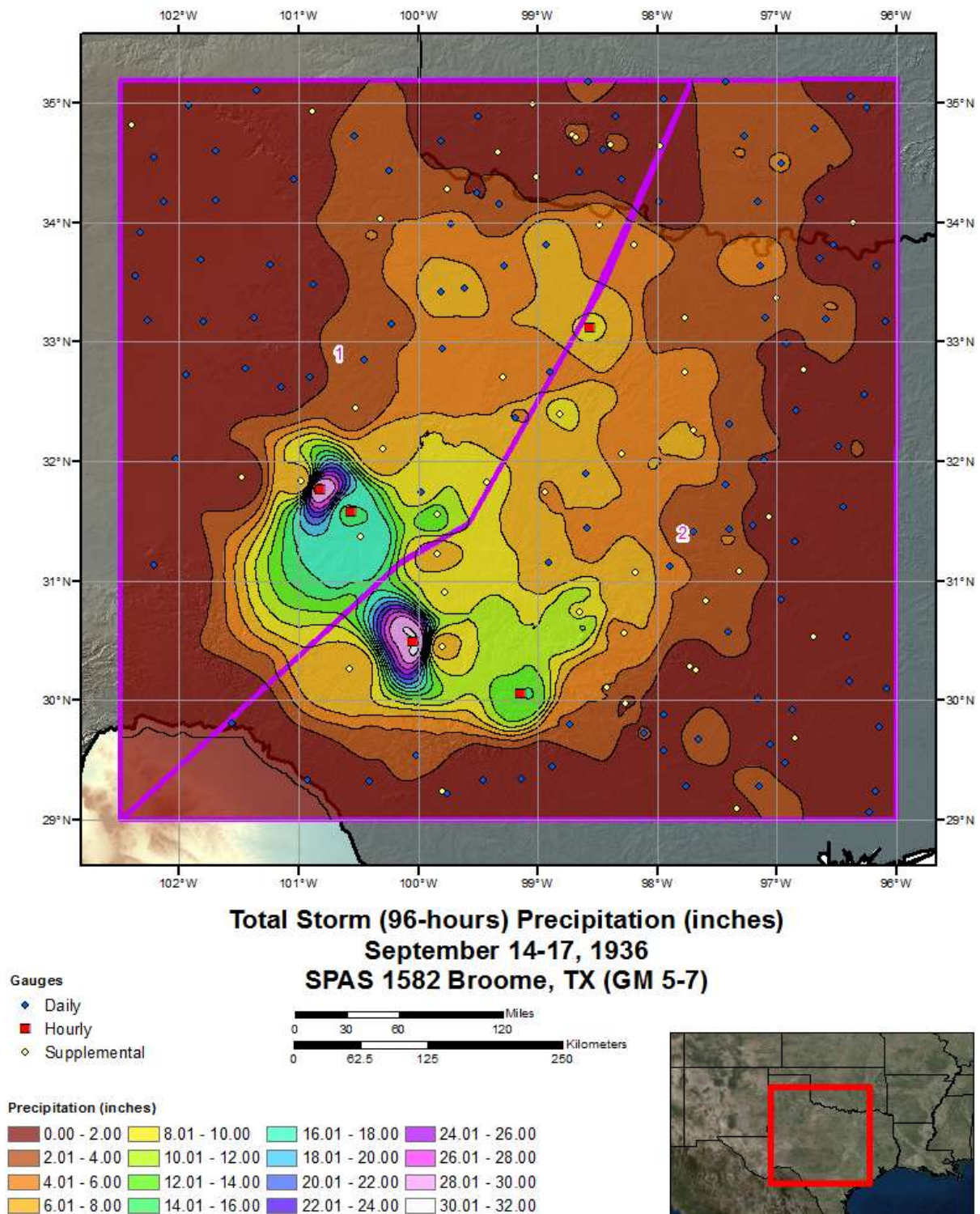



Figure 380: Mass curve chart for Broome, TX September 1936



3/9/2016

Figure 381: Total storm isohyetal analysis for Broome, TX September 1936

DEPARTMENT OF THE ARMY		CORPS OF ENGINEERS								
STORM STUDIES - PERTINENT DATA SHEET (REV.)										
 <p style="text-align: center;">LOCATION MAP</p>		<p>Storm of 14-18 September 1936 Assignment G-5-7 Location Texas-Oklahoma Study Prepared by: Southwestern Division Galveston District Office</p>								
		<p>Part I Reviewed by H. M. Sec. of Weather Bureau, 6/26/44 Part II Approved by Office, Chief of Engineers for Distribution of Factual Data, 6/14/46</p>								
		<p>Remarks: Centers at Broome and Roosevelt, Texas Dewpt. 77° - Ref. Pt. 350 SSE Grid I-17</p>								
DATA AND COMPUTATIONS COMPILED										
PART I										
Preliminary isohyetal map, in 1 sheet, scale 1:1,000,000										
Precipitation data and mass curves: (Number of Sheets)										
Form 5001-C (Hourly precip. data).....			47							
Form 5001-B (24-hour " " " ").....			138							
Form 5001-D (" " " " " ").....			-							
Misc. precip. records, meteorological data, etc.....			33							
Form 5002 (Mass rainfall curves).....			85							
PART II										
Final isohyetal maps, in 1 sheet, scale 1:1,000,000										
Data and computation sheets:										
Form S-10 (Data from mass rainfall curves).....			5							
Form S-11 (Depth-area data from isohyetal map).....			2							
Form S-12 (Maximum depth-duration data).....			6							
Maximum duration-depth-area curves.....			1							
Data relating to periods of maximum rainfall.....			3							
MAXIMUM AVERAGE DEPTH OF RAINFALL IN INCHES										
Area in Sq. Mi.	Duration of Rainfall in Hours									
	6	12	18	24	30	36	48	60	72	96
10	16.0	22.0	24.1	26.0	26.0	26.0	27.6	28.0	30.0	30.0
100	10.9	15.4	18.3	20.4	21.0	21.7	23.5	25.8	28.6	28.6
200	9.5	13.6	16.5	18.5	19.3	20.0	21.4	24.5	27.7	27.7
500	7.7	11.2	14.0	15.8	16.8	17.2	18.2	22.1	25.7	25.7
1,000	6.4	9.5	12.0	13.8	14.5	14.8	15.4	19.9	23.6	23.7
2,000	5.2	7.9	9.9	11.6	11.9	12.3	13.0	17.1	20.9	21.0
5,000	3.7	5.8	7.3	8.7	8.9	9.4	10.2	13.5	16.5	16.7
10,000	2.7	4.3	5.5	6.7	6.9	7.4	8.4	11.1	13.2	13.6
20,000	1.9	3.0	3.9	4.9	5.2	5.8	6.8	8.9	10.4	11.0
50,000	1.1	1.8	2.4	3.1	3.4	4.0	4.7	6.2	7.2	7.9
70,000	0.8	1.4	2.0	2.6	2.9	3.3	3.9	5.2	6.1	6.7

Form S-2

K&G-20K 11-49 171

Figure 382: USACE Depth-area-duration values for Broome, TX September 1936

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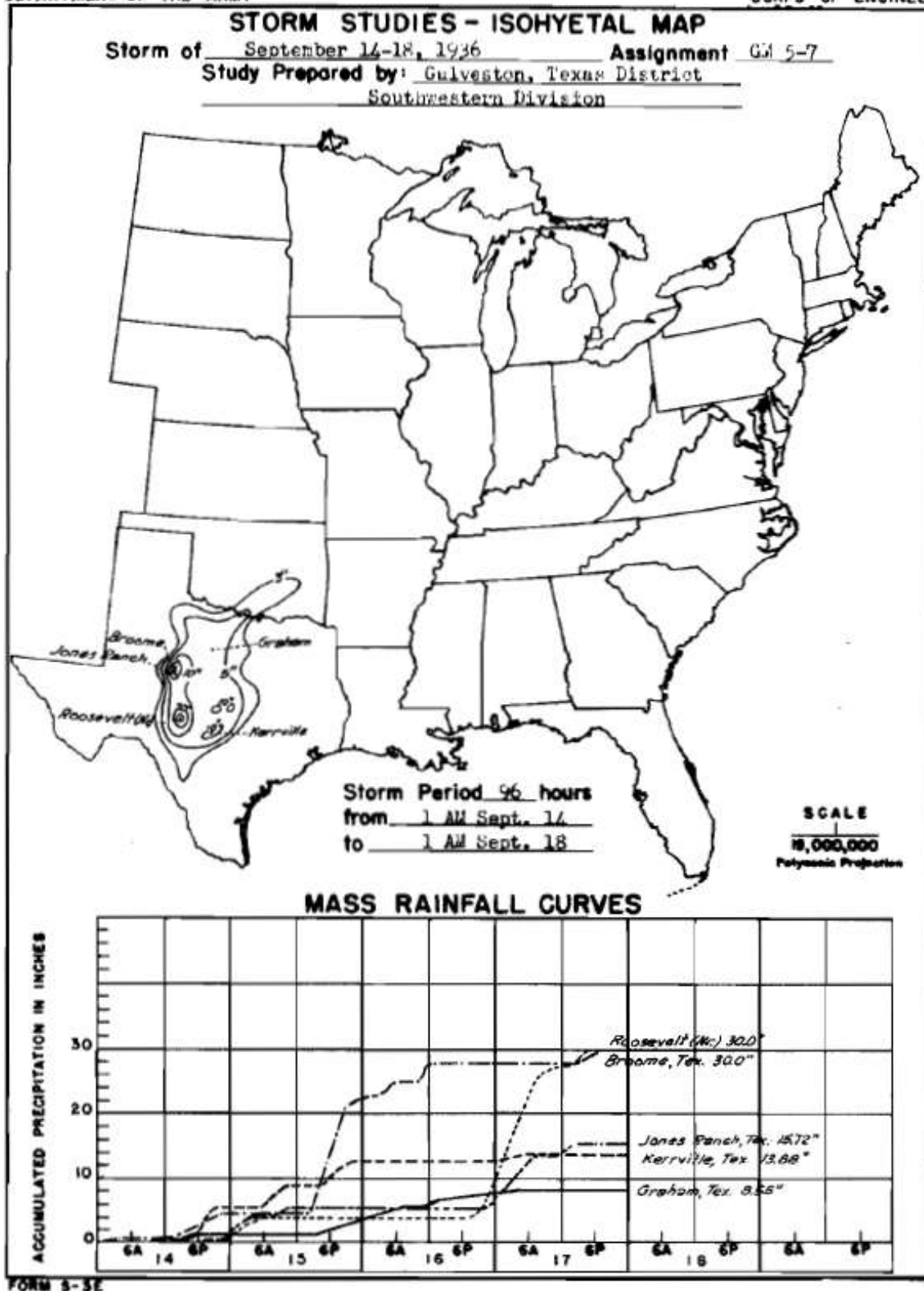


Figure 383: USACE Total storm isohyetal and mass curve chart for Broome, TX September 1936

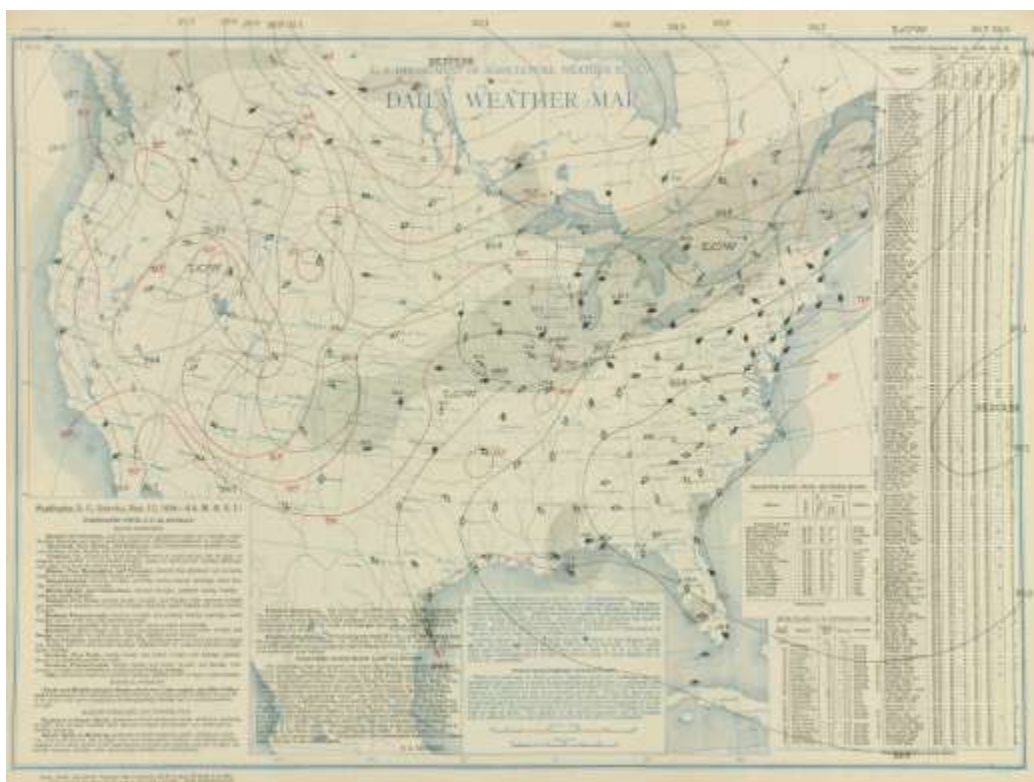


Figure 384: Daily Weather Map for Broome, TX September 12, 1936



Figure 385: Daily Weather Map for Broome, TX September 13, 1936

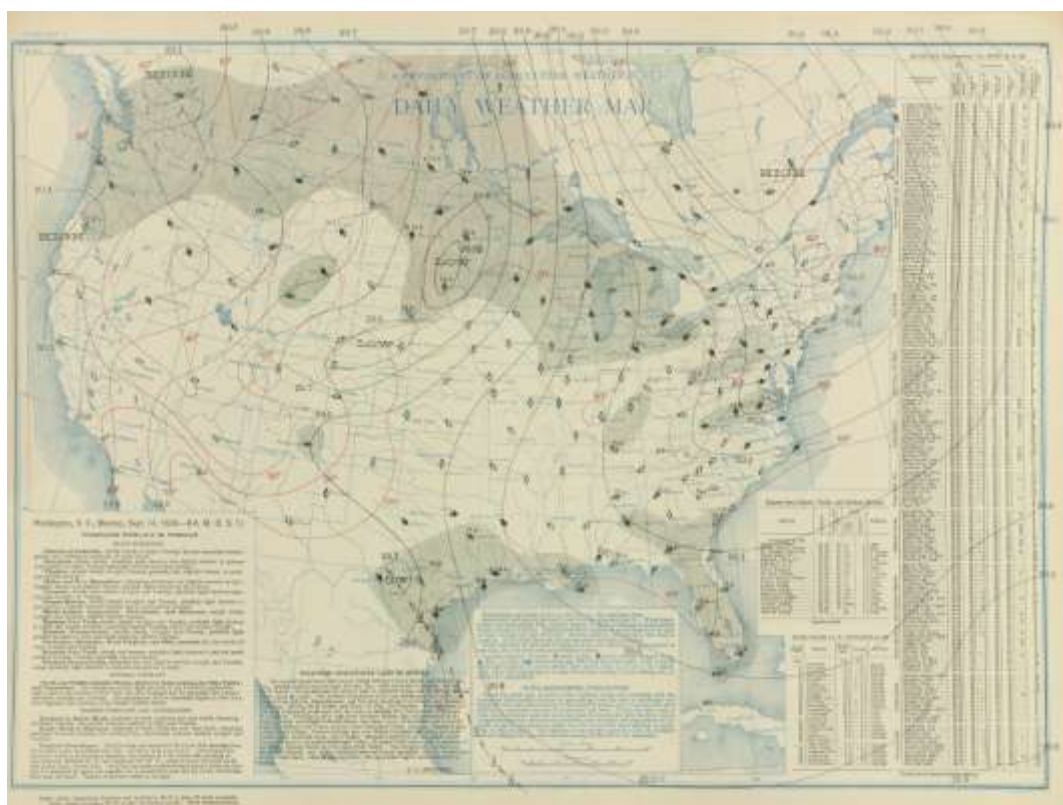


Figure 386: Daily Weather Map for Broome, TX September 14, 1936



Figure 387: Daily Weather Map for Broome, TX September 15, 1936

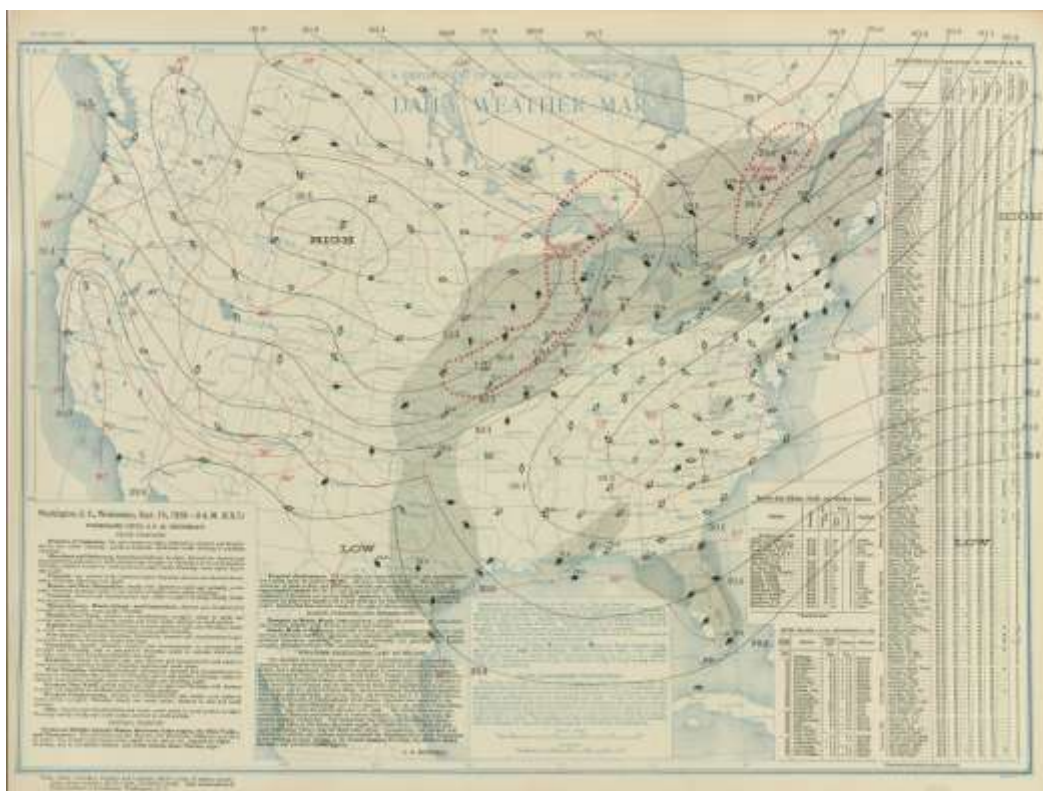


Figure 388: Daily Weather Map for Broome, TX September 16, 1936

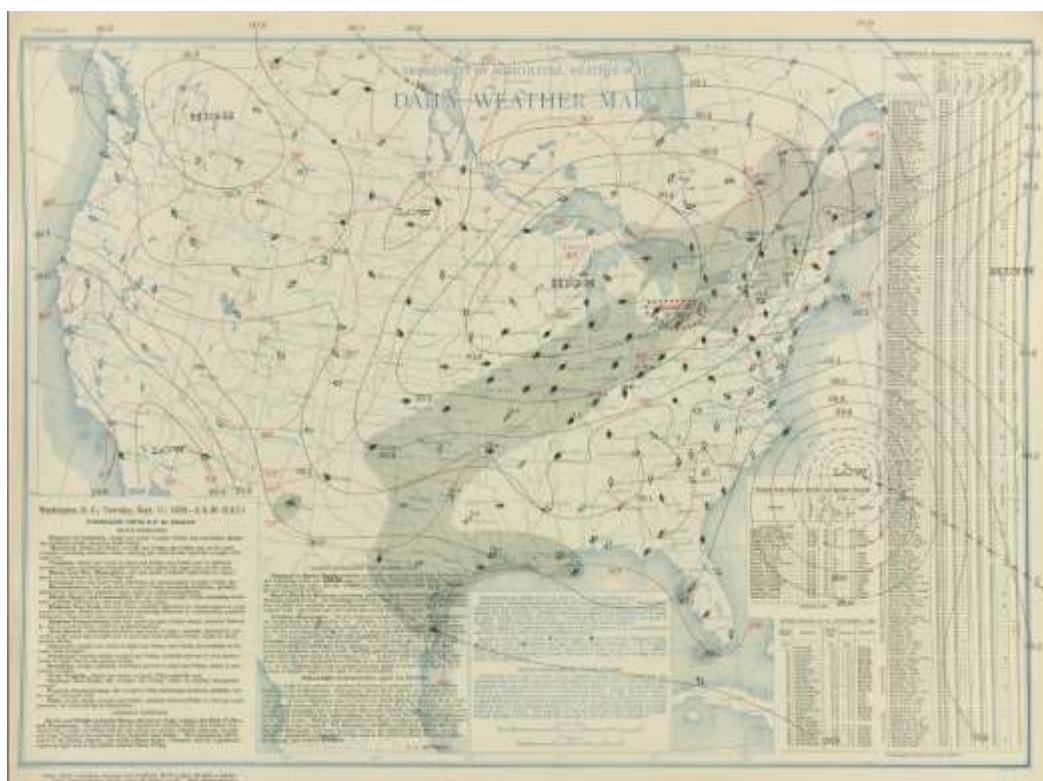


Figure 389: Daily Weather Map for Broome, TX September 17, 1936

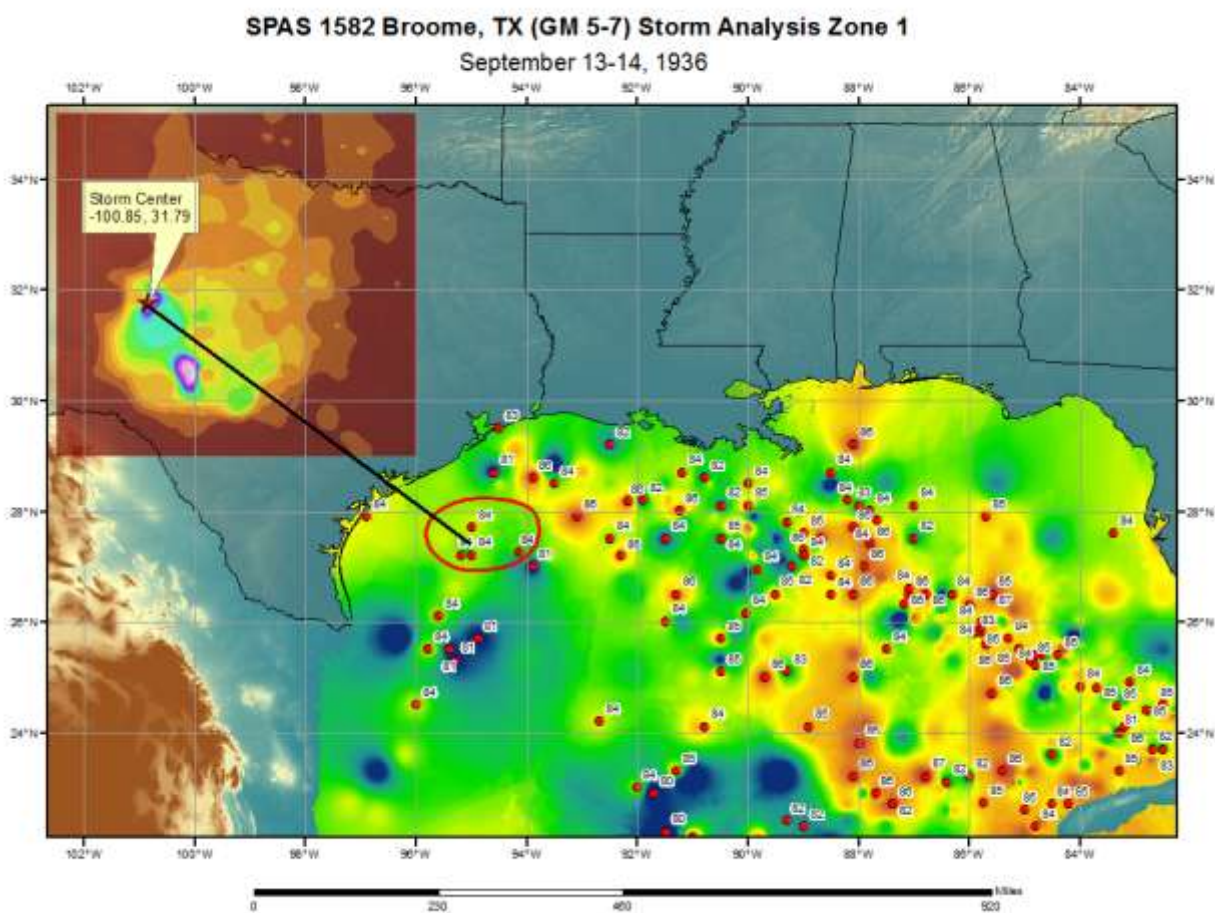


Figure 390: In-place storm representative SST analysis for Broome, TX September 13-14, 1936

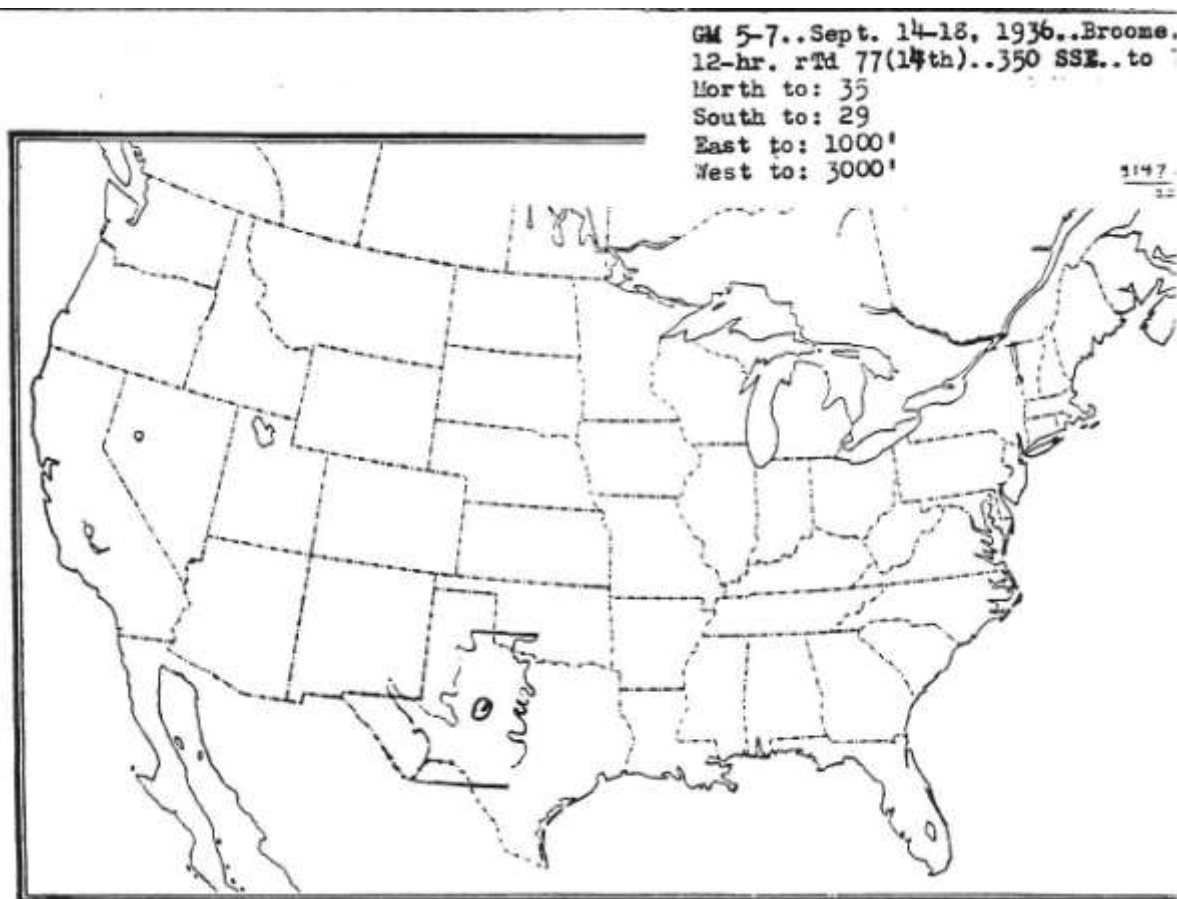


Figure 391: NWS Transposition Limit Map for Broome, TX September 1936

Storm Precipitation Analysis System (SPAS) For Storm #1582

General Storm Location: Texas, Oklahoma (35.2 -102.5 29.0 -96.0)

Storm Dates: September 14-17, 1936 (96-hours)

Event: Broome, TX (GM 5-7)

DAD Zone 1

Latitude: 31.788

Longitude: -100.854

Max. Grid Rainfall Amount: 30.34" Broome, TX

Max. Observed Rainfall Amount: 30.00"

DAD Zone 2

Latitude: 30.454

Longitude: -100.038

Max. Grid Rainfall Amount: 30.13" Roosevelt, TX

Max. Observed Rainfall Amount: 30.00"

Number of Stations: 213

SPAS Version: 10.0

Basemap: conus_prism_ppt_in_1971_2000_09

Radar Included: No

Depth-Area-Duration (DAD) analysis: Yes

Reliability of results: This analysis was based on hourly data (H), daily data (D) and supplemental data (S). We have a good degree of confidence in the station based storm total results. The spatial pattern is dependent on basemap and the timing is based on five hourly stations.

SPAS Storm ID	NAME	LON	LAT	ELEV Round	Storm Representative				Climatological Maximum				IPMF
					T _d	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	T _d	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	
1582_2	ROOSEVELT	-100.038	30.454	2,200	84.00	4.30"	0.69"	3.610	86.0	4.67"	0.73"	3.940	1.09

Storm 1582 Zone 2 - Sep. 14 (0700 UTC) - Sep. 17 (0600 UTC), 1936															
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)															
areassqmi	Duration (hours)														
	1	2	3	4	5	6	12	18	24	36	48	72	96	120	Total
0.3	2.75	5.17	7.59	10.17	12.62	15.06	18.47	20.55	23.30	25.87	27.84	30.09	30.09	30.13	30.13
1	2.74	5.16	7.58	10.17	12.61	15.05	18.46	20.48	23.23	25.79	27.75	30.00	30.00	30.00	30.00
10	2.72	5.10	7.51	10.08	12.49	14.91	18.27	20.32	23.04	25.58	27.53	29.76	29.76	29.76	29.76
25	2.71	5.08	7.48	10.04	12.45	14.86	18.20	20.26	22.97	25.50	27.45	29.67	29.67	29.67	29.67
50	2.70	5.06	7.45	10.01	12.41	14.81	18.15	20.21	22.92	25.44	27.38	29.60	29.60	29.60	29.60
100	2.66	5.02	7.36	9.87	12.24	14.61	17.92	19.98	22.67	25.16	27.08	29.28	29.28	29.28	29.28
150	2.59	4.88	7.17	9.61	11.92	14.22	17.44	19.45	22.09	24.52	26.38	28.55	28.55	28.55	28.55
200	2.50	4.72	6.93	9.29	11.52	13.74	16.86	18.82	21.40	23.75	25.55	27.68	27.68	27.68	27.68
300	2.37	4.45	6.54	8.77	10.87	12.97	15.91	17.76	20.19	22.41	24.12	26.13	26.13	26.13	26.13
400	2.27	4.27	6.27	8.41	10.43	12.44	15.26	17.04	19.38	21.51	23.15	25.09	25.09	25.09	25.09
500	2.18	4.09	6.01	8.07	10.00	11.94	14.62	16.33	18.60	20.61	22.19	24.14	24.14	24.14	24.14
1,000	1.74	3.29	4.83	6.47	8.03	9.58	11.75	13.14	14.97	16.70	18.09	20.53	20.65	20.65	20.65
2,000	1.33	2.50	3.67	4.94	6.13	7.29	8.93	9.99	11.39	13.15	14.53	17.00	17.19	17.19	17.19
5,000	0.93	1.80	2.64	3.54	4.38	5.14	6.28	7.03	8.05	10.01	11.03	12.92	13.15	13.15	13.15
10,000	0.75	1.41	2.06	2.71	3.35	3.84	4.70	5.47	6.30	8.16	9.00	10.51	10.79	10.79	10.79
20,000	0.55	1.06	1.54	2.03	2.52	2.77	3.50	4.10	4.75	6.26	7.16	8.52	8.84	8.84	8.84
50,000	0.30	0.57	0.84	1.08	1.36	1.47	1.92	2.31	2.74	3.71	4.47	5.52	5.69	5.69	5.69
75,000	0.22	0.42	0.62	0.82	1.04	1.11	1.44	1.72	2.09	2.74	3.33	4.14	4.30	4.30	4.30
90,957	0.19	0.37	0.54	0.70	0.88	0.96	1.25	1.49	1.81	2.34	2.90	3.61	3.73	3.73	3.73

Figure 392: Depth-area-duration values for Roosevelt, TX September 1936

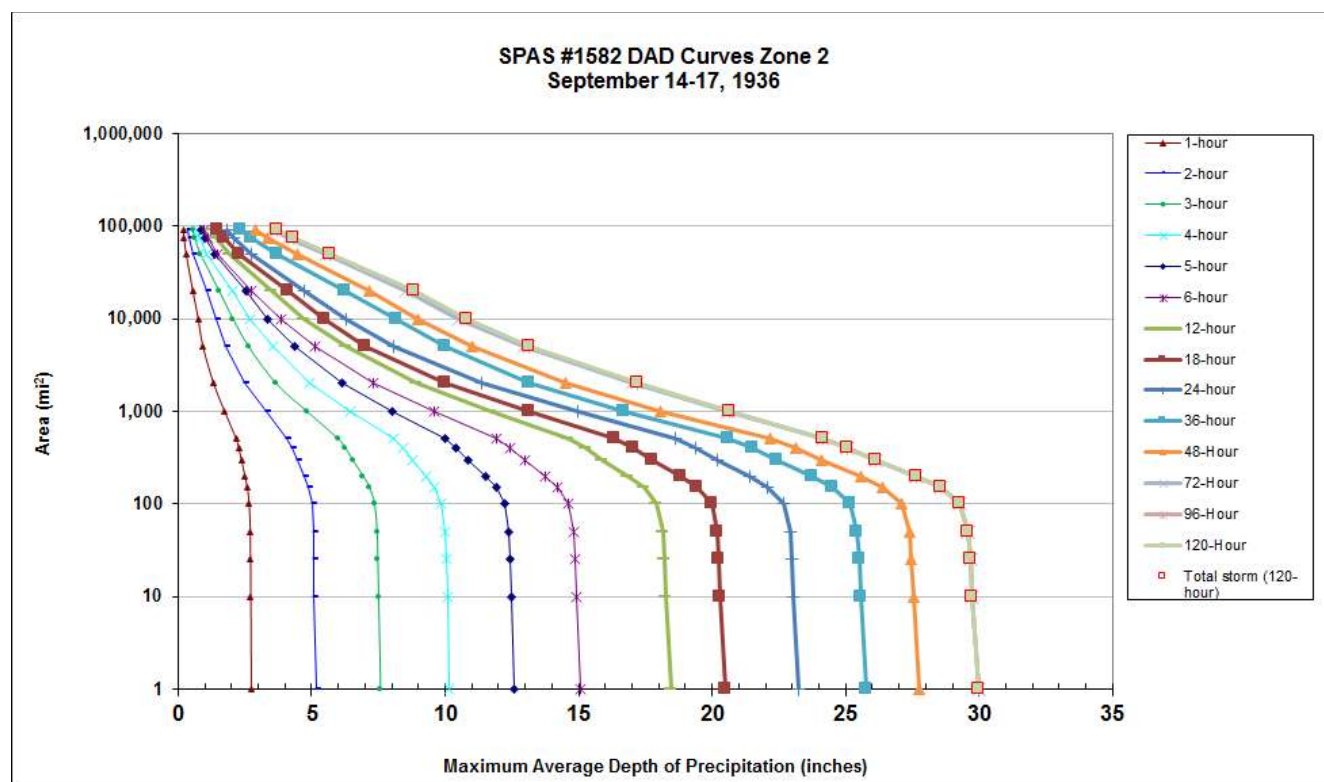


Figure 393: Depth-area-duration chart for Roosevelt, TX September 1936

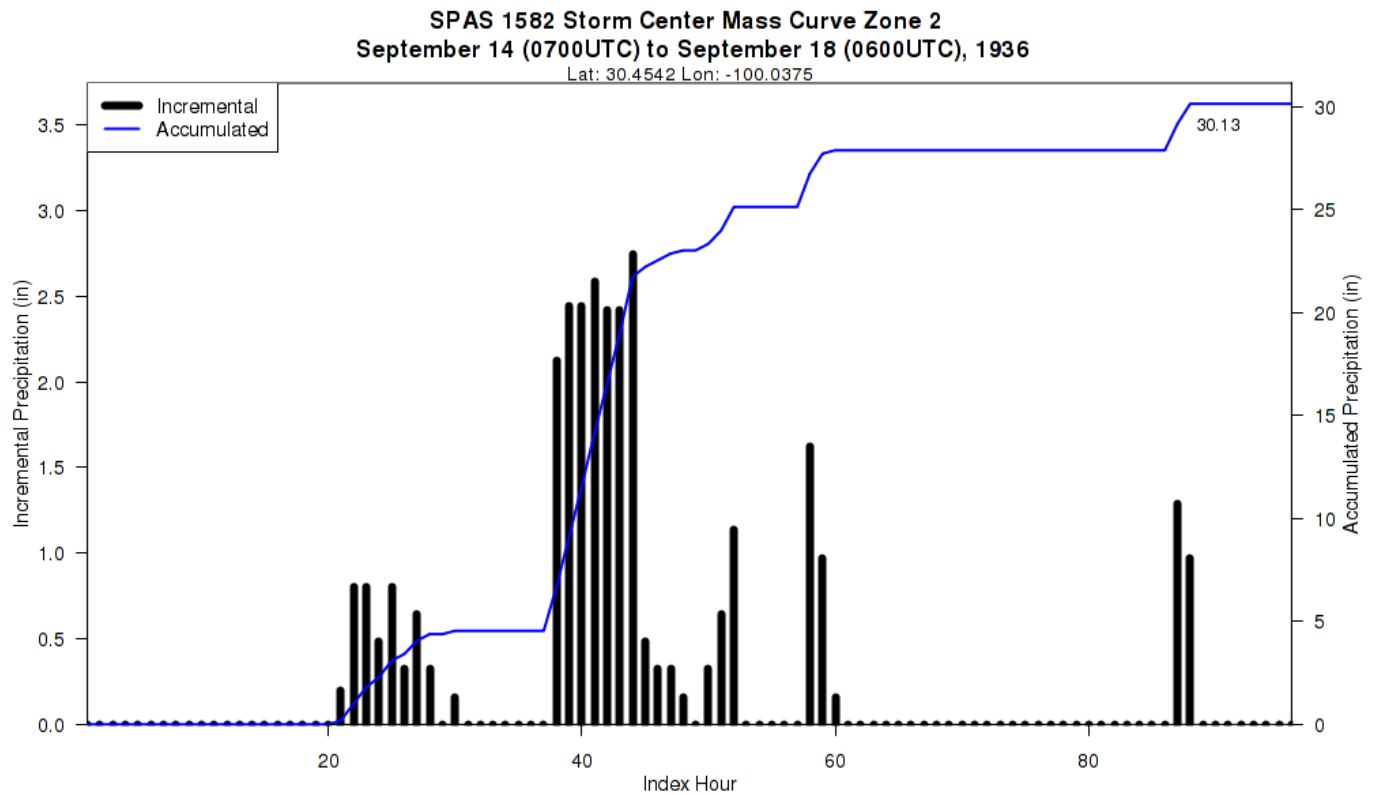
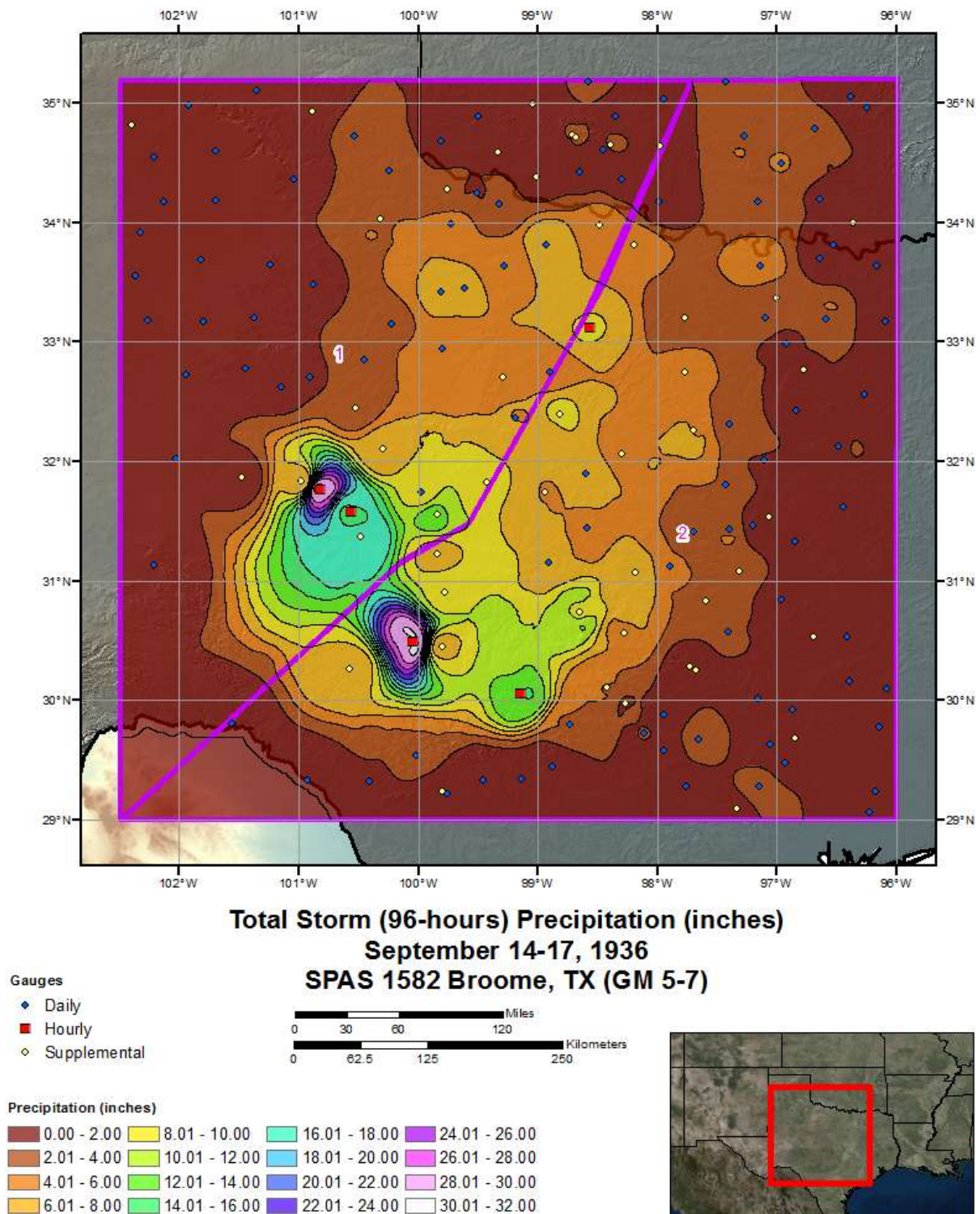


Figure 394: Mass curve chart for Roosevelt, TX September 1936



3/9/2016

Figure 395: Total storm isohyetal analysis for Roosevelt, TX September 1936

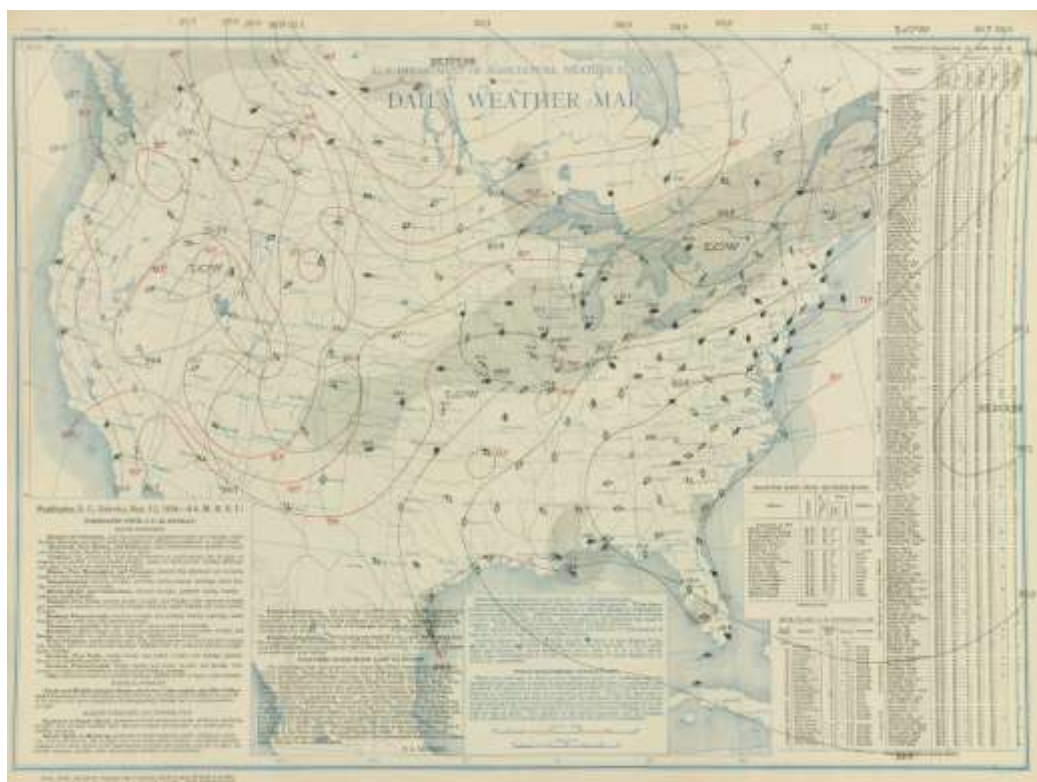


Figure 396: Daily Weather Map for Roosevelt, TX September 12, 1936



Figure 397: Daily Weather Map for Roosevelt, TX September 13, 1936

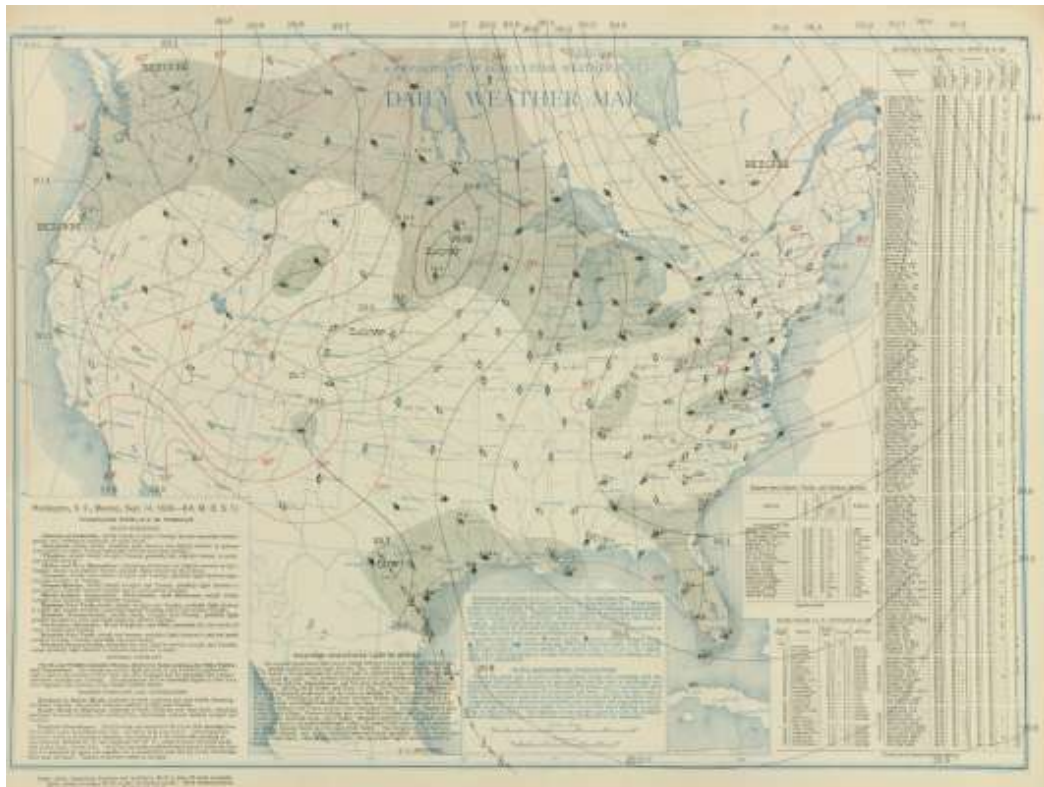


Figure 398: Daily Weather Map for Roosevelt, TX September 14, 1936

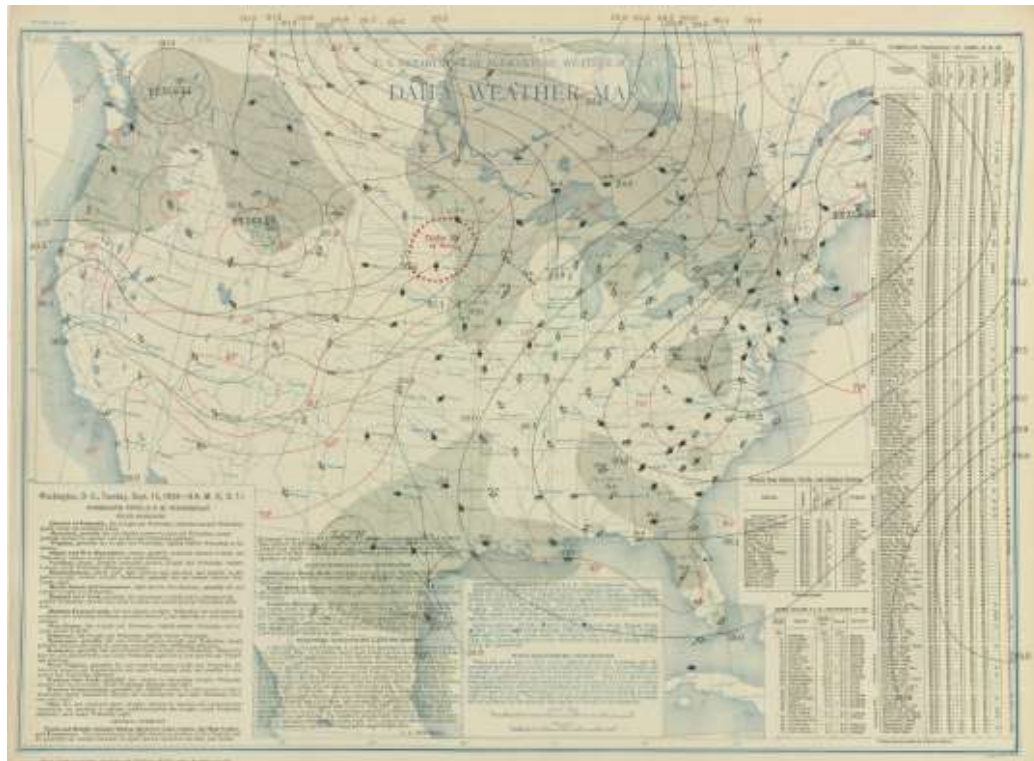


Figure 399: Daily Weather Map for Roosevelt, TX September 15, 1936

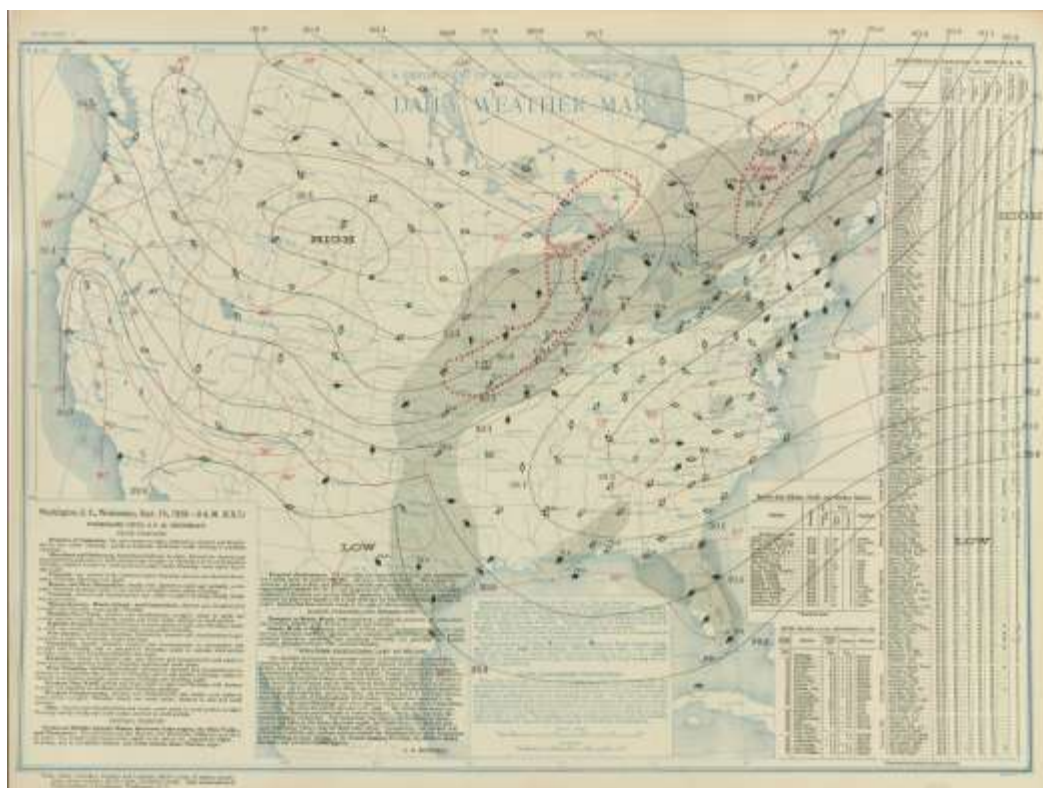


Figure 400: Daily Weather Map for Roosevelt, TX September 16, 1936

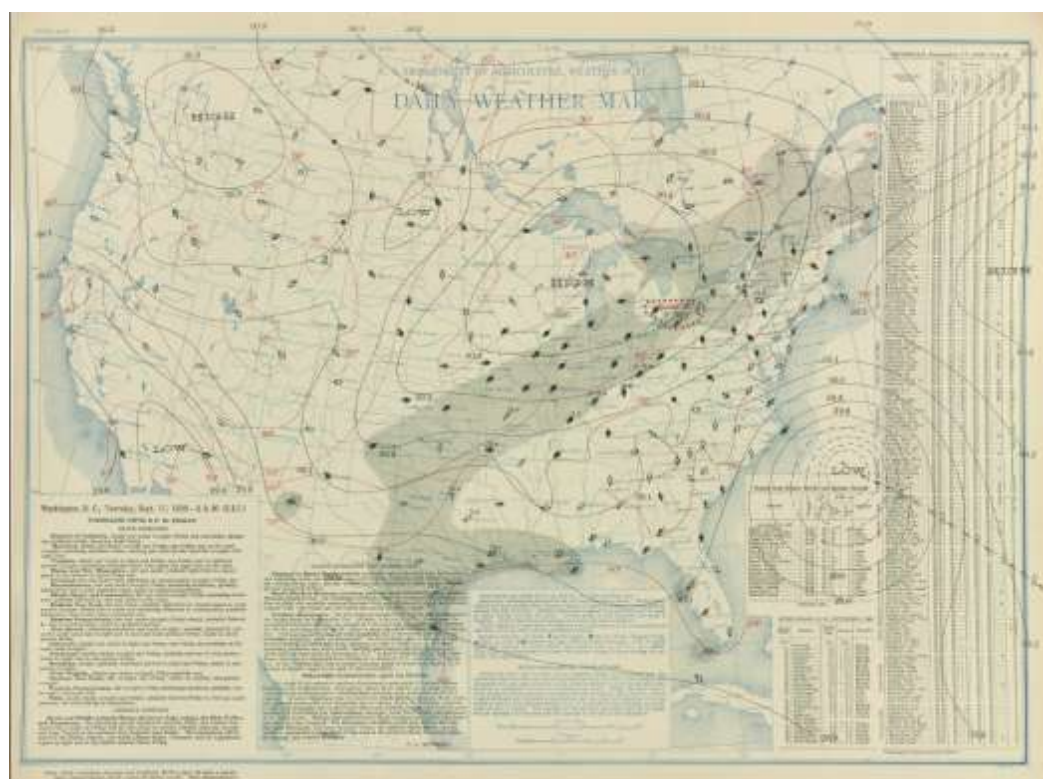


Figure 401: Daily Weather Map for Roosevelt, TX September 17, 1936

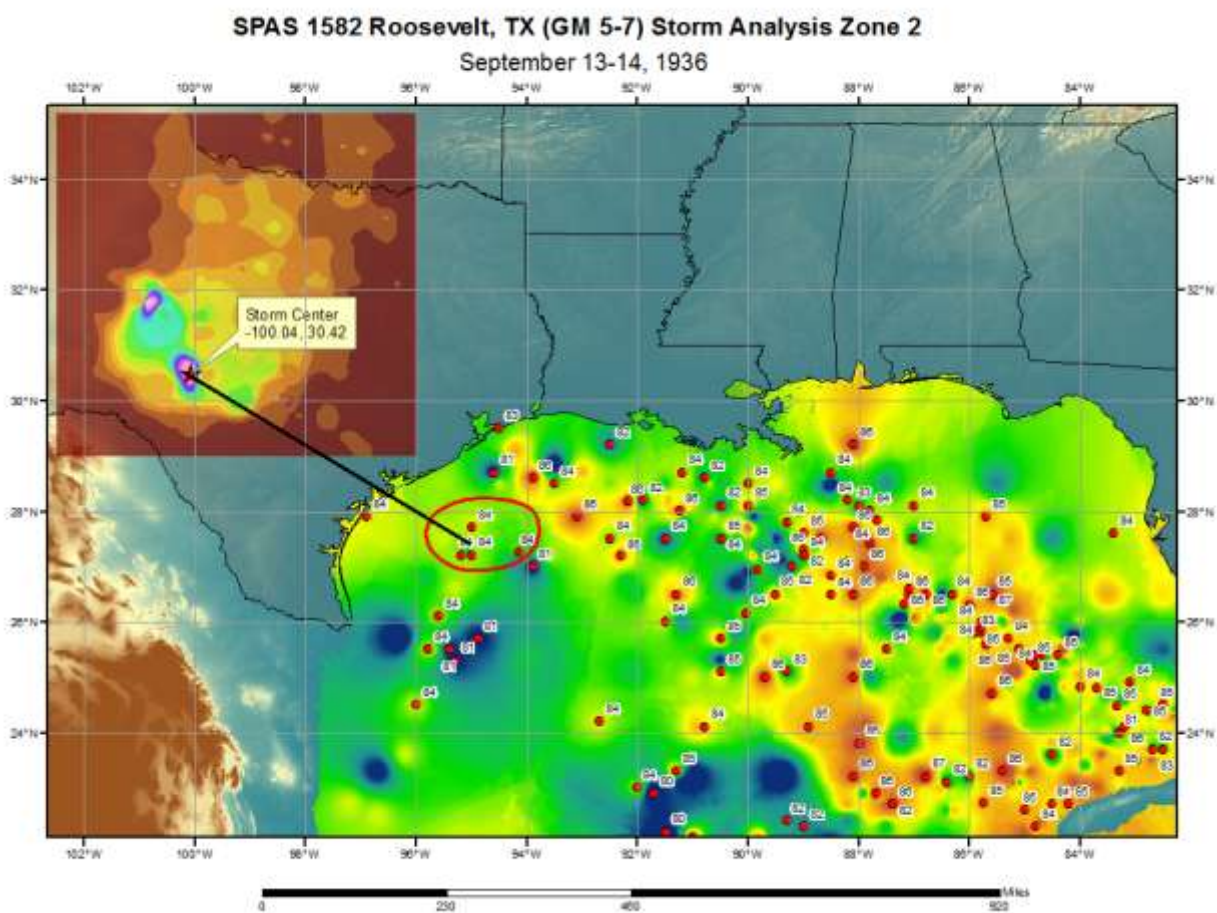


Figure 402: In-place storm representative SST analysis for Roosevelt, TX September 13-14, 1936

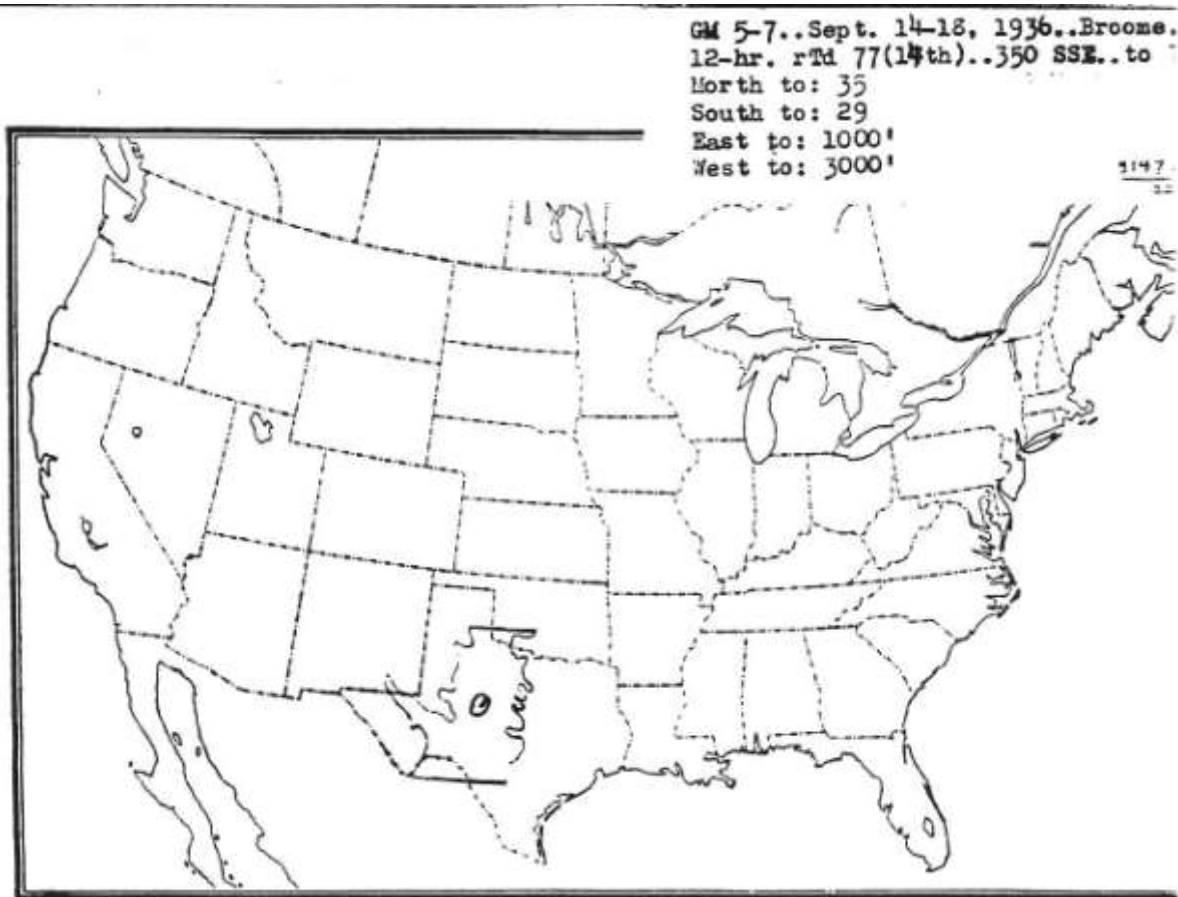


Figure 403: NWS Transposition Limit Map for Roosevelt, TX September 1936

Storm Precipitation Analysis System (SPAS) For Storm #1596

General Storm Location: Louisiana Coast (32.9, -95.25, 28.95, -88.95)

Storm Dates: August 5-10, 1940

Event: Tropical

DAD Zone 1

Latitude: 29.8542

Longitude: -92.2458

Max. Grid Rainfall Amount: 37.85" Miller Island, LA

Max. Observed Rainfall Amount: 37.53"

Number of Stations: 174

SPAS Version: 10.0

Basemap: USACE Isohyetal Image provided by Lower Mississippi Valley Division

Radar Included: No

Depth-Area-Duration (DAD) analysis: Yes

Reliability of results: This analysis was based on 174 hourly stations, daily data, and supplemental station data. We have a good degree of confidence for the station based storm total results. The spatial pattern is dependent heavily on the basemap created from the USACE Isohyetal image provided by the Lower Mississippi Valley Division. Timing is based on the hourly and hourly pseudo stations near the storm center. Several daily stations were moved to supplemental due to timing issues and to ensure data consistency.

SPAS Storm ID	NAME	LON	LAT	ELEV Round	Storm Representative				Climatological Maximum				IPMF
					T _g	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	T _g	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	
1596_1	MILLER ISLAND	-92.246	29.854	0	85.50	4.58"	0.00"	4,580	87.0	4.86"	0.00"	4,860	1.06

Storm 1596 - August 5 (0700 UTC) - August 11 (0600 UTC), 1940														
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)														
Area (mi ²)	Duration (hours)													
	1	2	3	4	5	6	12	18	24	36	48	72	96	120
0.3	1.80	3.61	5.42	6.36	7.31	8.26	14.23	19.45	23.20	30.21	35.19	37.79	37.79	37.85
1	1.80	3.59	5.41	6.36	7.30	8.25	14.15	19.36	23.08	30.06	35.02	37.61	37.61	37.61
10	1.78	3.56	5.34	6.25	7.20	8.11	13.98	19.12	22.80	29.69	34.59	37.16	37.17	37.17
25	1.76	3.55	5.31	6.21	7.16	8.06	13.91	19.02	22.69	29.55	34.42	36.99	36.99	36.99
50	1.74	3.48	5.21	6.13	7.04	7.95	13.72	18.80	22.43	29.22	34.04	36.58	36.59	36.59
100	1.68	3.36	5.05	5.93	6.82	7.70	13.29	18.31	21.84	28.49	33.19	35.73	35.76	35.77
150	1.64	3.28	4.93	5.79	6.66	7.52	12.98	17.95	21.44	28.05	32.64	35.25	35.28	35.30
200	1.61	3.22	4.83	5.68	6.53	7.38	12.74	17.71	21.15	27.74	32.25	34.91	34.95	34.97
300	1.56	3.12	4.68	5.50	6.33	7.16	12.37	17.33	20.74	27.31	31.70	34.44	34.49	34.51
400	1.52	3.04	4.55	5.35	6.16	6.96	12.04	17.01	20.37	27.01	31.32	34.12	34.16	34.19
500	1.49	2.96	4.44	5.22	6.02	6.81	11.78	16.72	20.06	26.73	30.95	33.86	33.91	33.94
1,000	1.36	2.68	4.02	4.73	5.48	6.20	10.88	15.64	18.86	25.45	29.53	32.51	32.60	32.64
2,000	1.11	2.18	3.28	3.97	4.66	5.37	9.90	13.87	16.88	22.93	26.64	29.45	29.72	29.80
5,000	0.84	1.62	2.38	2.88	3.43	4.06	7.43	10.29	12.81	17.44	21.15	23.63	23.87	23.96
10,000	0.63	1.16	1.69	2.12	2.60	3.04	5.71	7.92	10.07	13.53	16.16	17.94	18.17	18.37
20,000	0.45	0.77	1.14	1.45	1.82	2.16	4.05	5.67	7.21	9.74	11.55	13.18	13.54	13.73
50,000	0.23	0.40	0.54	0.71	0.88	1.03	2.01	2.75	3.45	5.05	6.16	7.32	7.67	7.81
90,974	0.14	0.24	0.34	0.43	0.51	0.61	1.17	1.65	2.08	3.11	3.80	4.51	4.79	4.89

Figure 404: Depth-area-duration values for Miller Island, LA August 1940

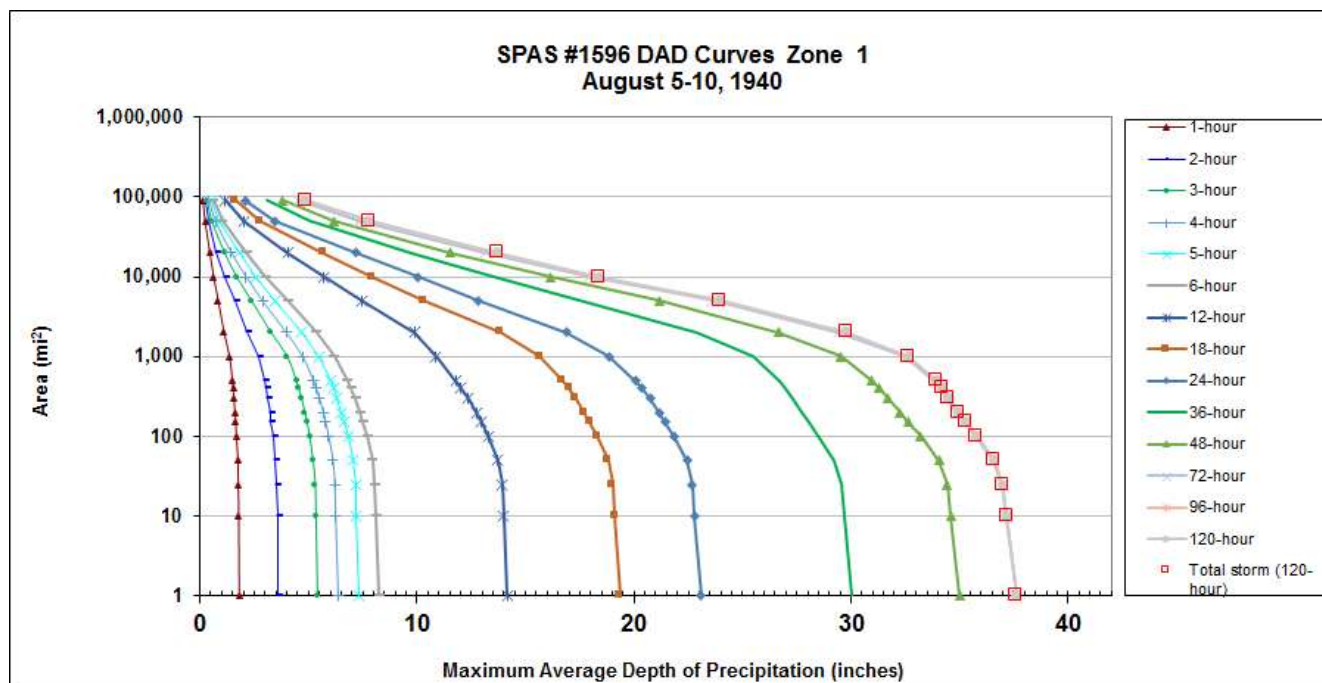


Figure 405: Depth-area-duration chart for Miller Island, LA August 1940

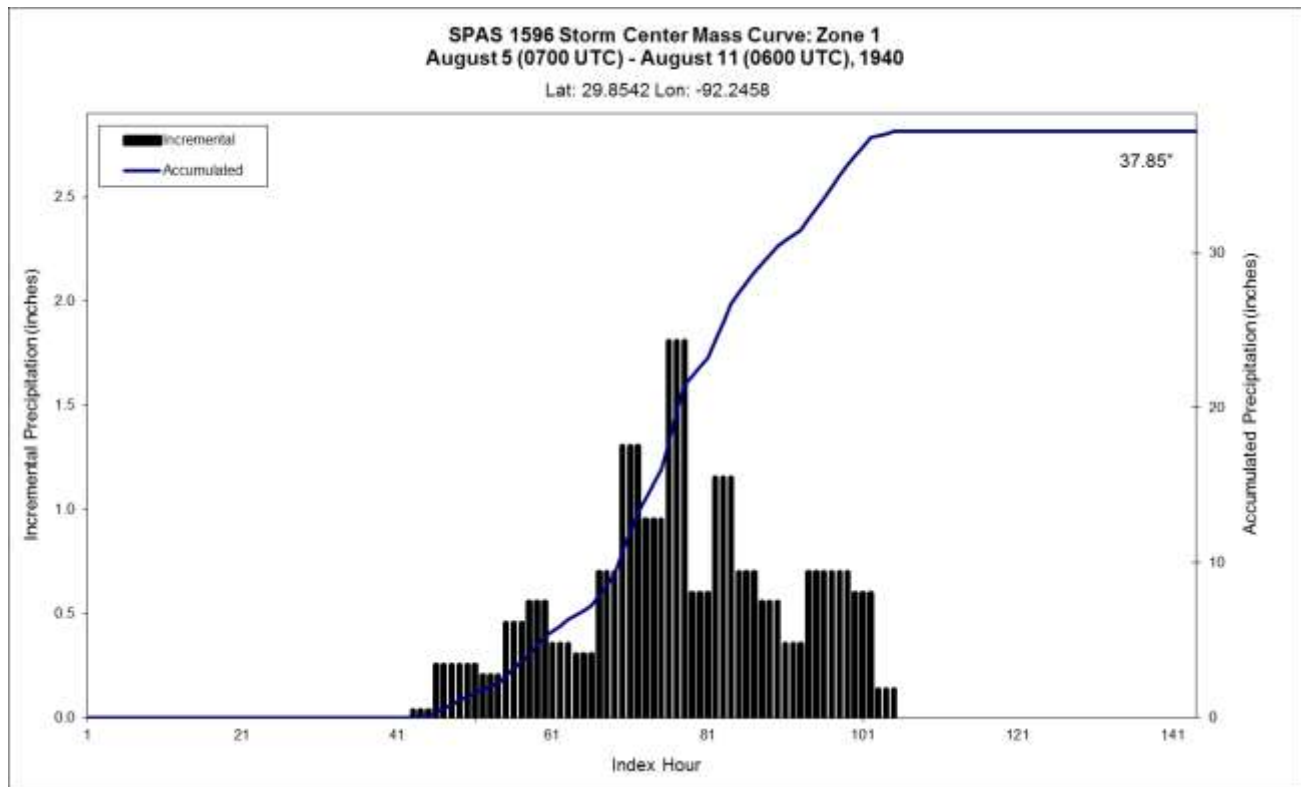


Figure 406: Mass curve chart for Miller Island, LA August 1940

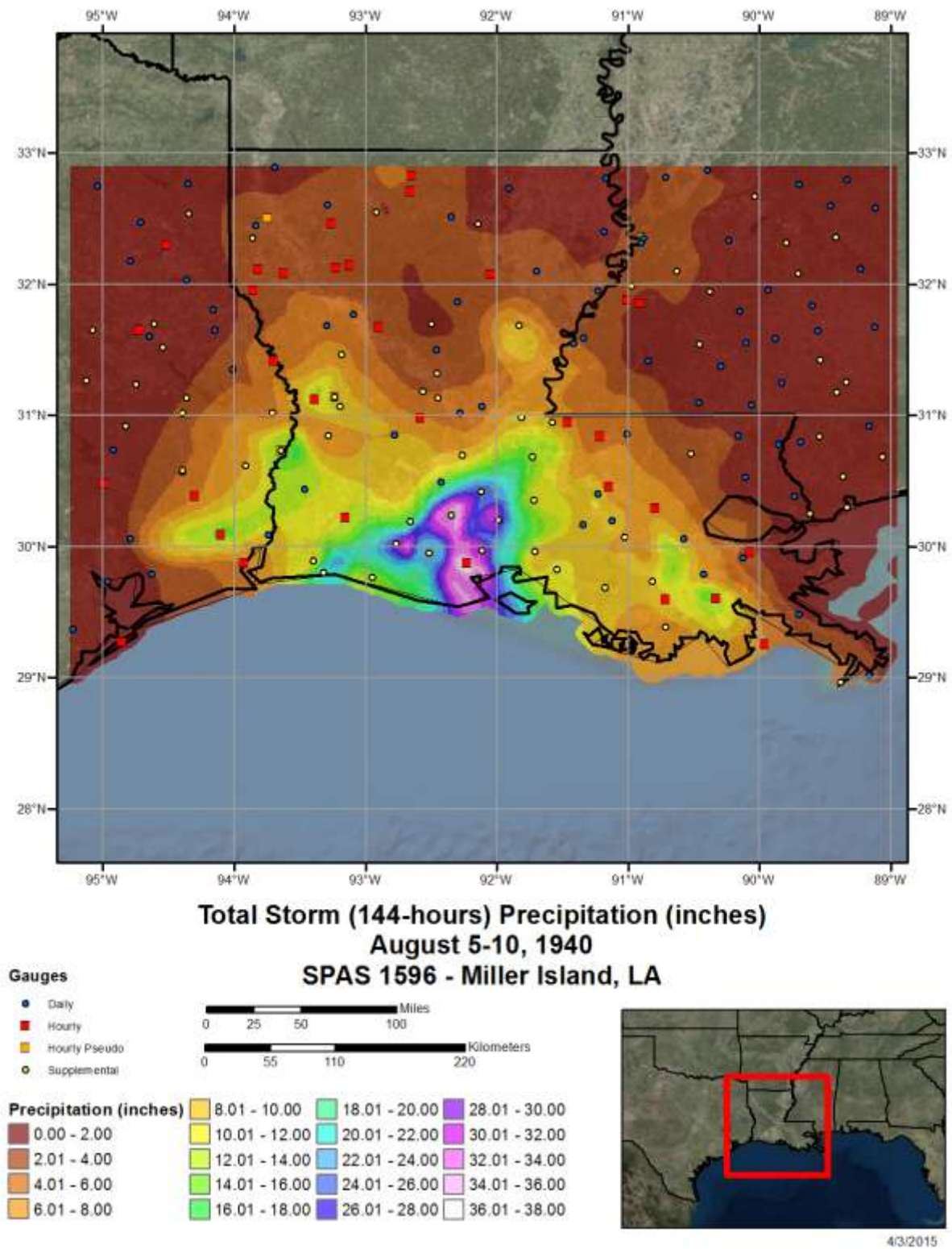
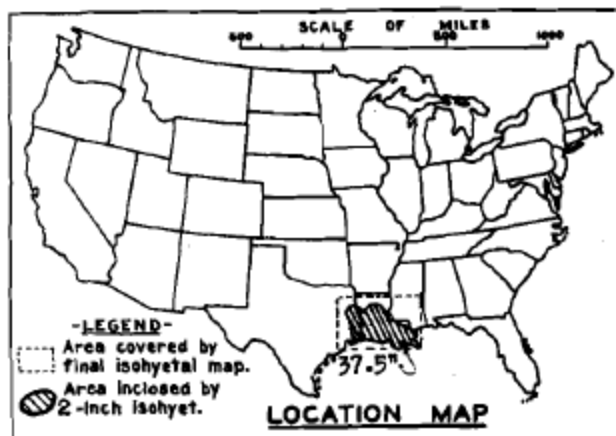


Figure 407: Total storm isohyetal analysis for Miller Island, LA August 1940

WAR DEPARTMENT

CORPS OF ENGINEERS, U. S. ARMY

STORM STUDIES - PERTINENT DATA SHEET

Storm of August 6 - 9, 1940
 Assignment L M V 4 - 24
 Location Louisiana and Texas
 Study Prepared by:
 Lower Mississippi Valley
 Division
 New Orleans District Office
 Part I Reviewed by H. M. Sec. of
 Weather Bureau, 3/7/42
 Part II Approved by Office, Chief
 of Engineers for Distribution
 of Factual Data, 12/30/43
 Remarks: Centers at:
 Miller Island, La., Beaumont,
 Texas, Caney, La., and Delta
 Farms, La.

DATA AND COMPUTATIONS COMPILED**PART I**

Preliminary Isohyetal map, in 2 sheet, scale 1 : 2,500,000

Precipitation data and mass curves: (Number of Sheets)

Form 5001-C (Hourly precip. data)----- 60

Form 5001-B (24-hour " ")----- -

Form 5001-D (" " " ")----- 21

Misc. precip. records, meteorological data, etc. (Copies of Climatological Data)

Form 5002 (Mass rainfall curves)----- 56

PART II

Final Isohyetal maps, in 1 sheet, scale 1 : 1,000,000

Data and computation sheets:

Form S-10 (Data from mass rainfall curves)----- 4

Form S-11 (Depth-area data from isohyetal map)----- 2

Form S-12 (Maximum depth-duration data)----- 6

Maximum duration-depth-area curves----- 1

Data relating to periods of maximum rainfall----- 1

MAXIMUM AVERAGE DEPTH OF RAINFALL IN INCHES

Area in Sq. Mi.	Duration of Rainfall in Hours										
	6	12	18	24	30	36	48	60	72	84	
Max. Station	8.8	16.8	19.6	23.8	26.3	29.7	35.0	37.5	37.5	37.5	
10	8.5	15.8	19.3	22.1	25.6	28.5	34.8	37.3	37.3	37.3	
20	8.4	15.5	19.1	21.7	25.2	28.1	34.1	36.8	36.8	36.8	
100	8.0	14.5	18.4	20.7	24.1	27.1	32.6	35.2	35.2	35.2	
200	7.8	13.4	17.8	20.3	23.5	26.5	31.9	34.5	34.5	34.5	
500	6.9	12.0	16.2	19.4	22.7	25.6	30.3	33.5	33.6	33.6	
1,000	6.0	10.9	14.5	18.4	21.7	24.6	28.8	31.9	32.2	32.2	
2,000	5.0	8.9	12.6	16.7	19.9	22.7	26.3	29.2	29.5	29.5	
5,000	3.7	6.4	9.1	12.3	14.9	17.1	20.3	22.6	22.9	22.9	
10,000	2.6	4.6	6.3	8.5	10.5	12.1	15.0	16.8	17.2	17.2	
20,000	1.5	3.0	4.1	5.5	6.6	7.6	10.1	11.7	12.6	12.7	
36,200	1.0	2.0	3.0	4.0	4.8	5.6	7.3	8.4	9.0	9.1	

Form S-2

Figure 408: USACE Depth-area-duration values for Miller Island, LA August 1940

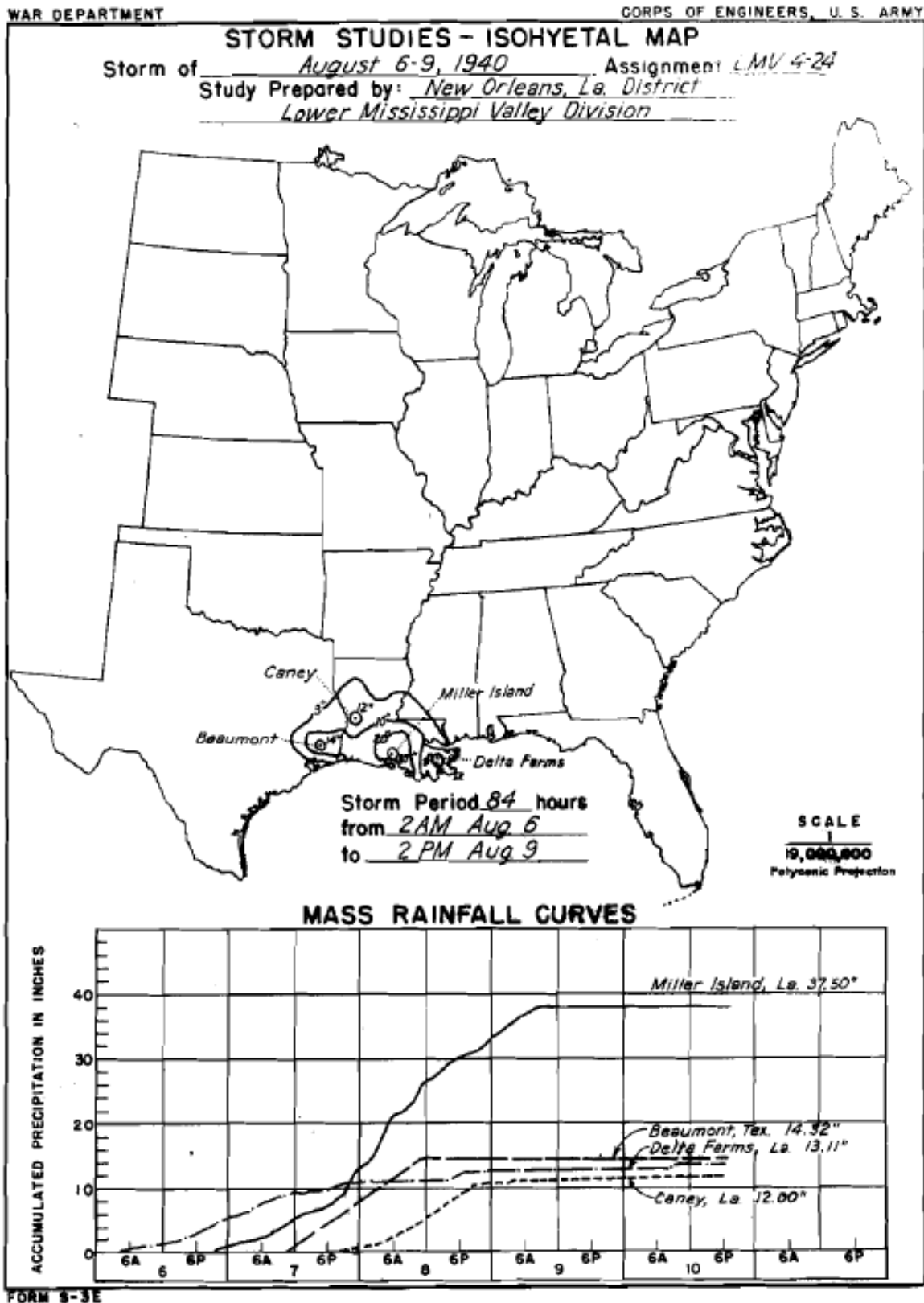


Figure 409: USACE Total storm isohyetal and mass curve chart for Miller Island, LA August 1940



Figure 410: Daily Weather Map for Miller Island, LA August 6, 1940

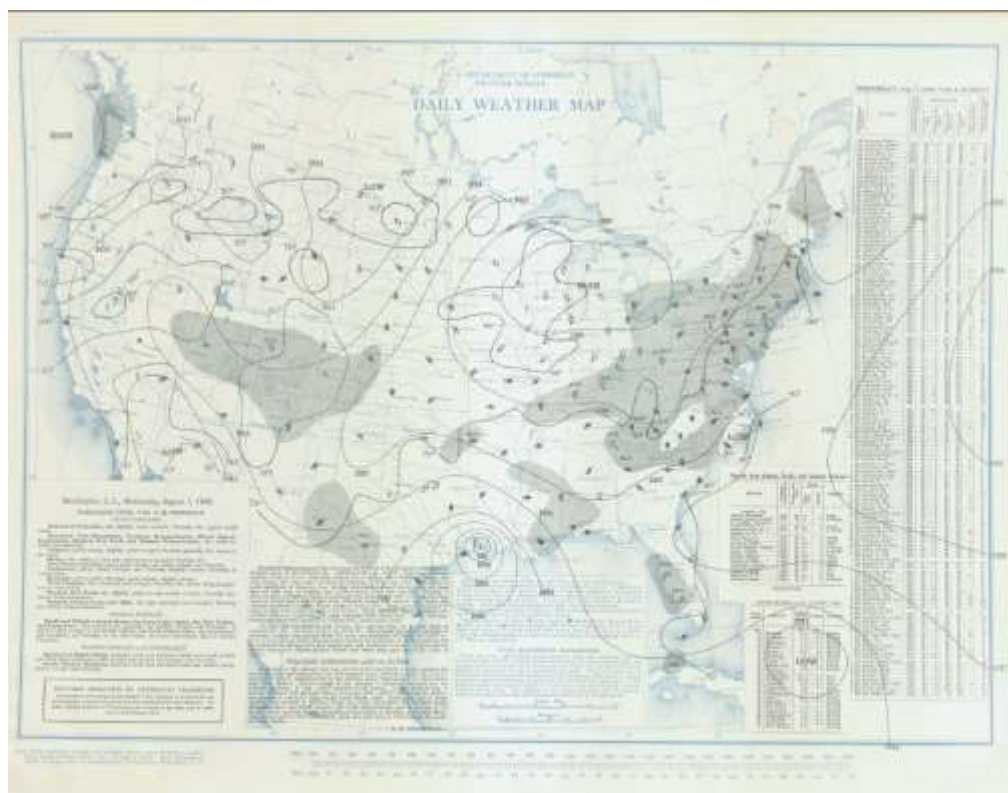


Figure 411: Daily Weather Map for Miller Island, LA August 7, 1940



Figure 412: Daily Weather Map for Miller Island, LA August 8, 1940



Figure 413: Daily Weather Map for Miller Island, LA August 9, 1940

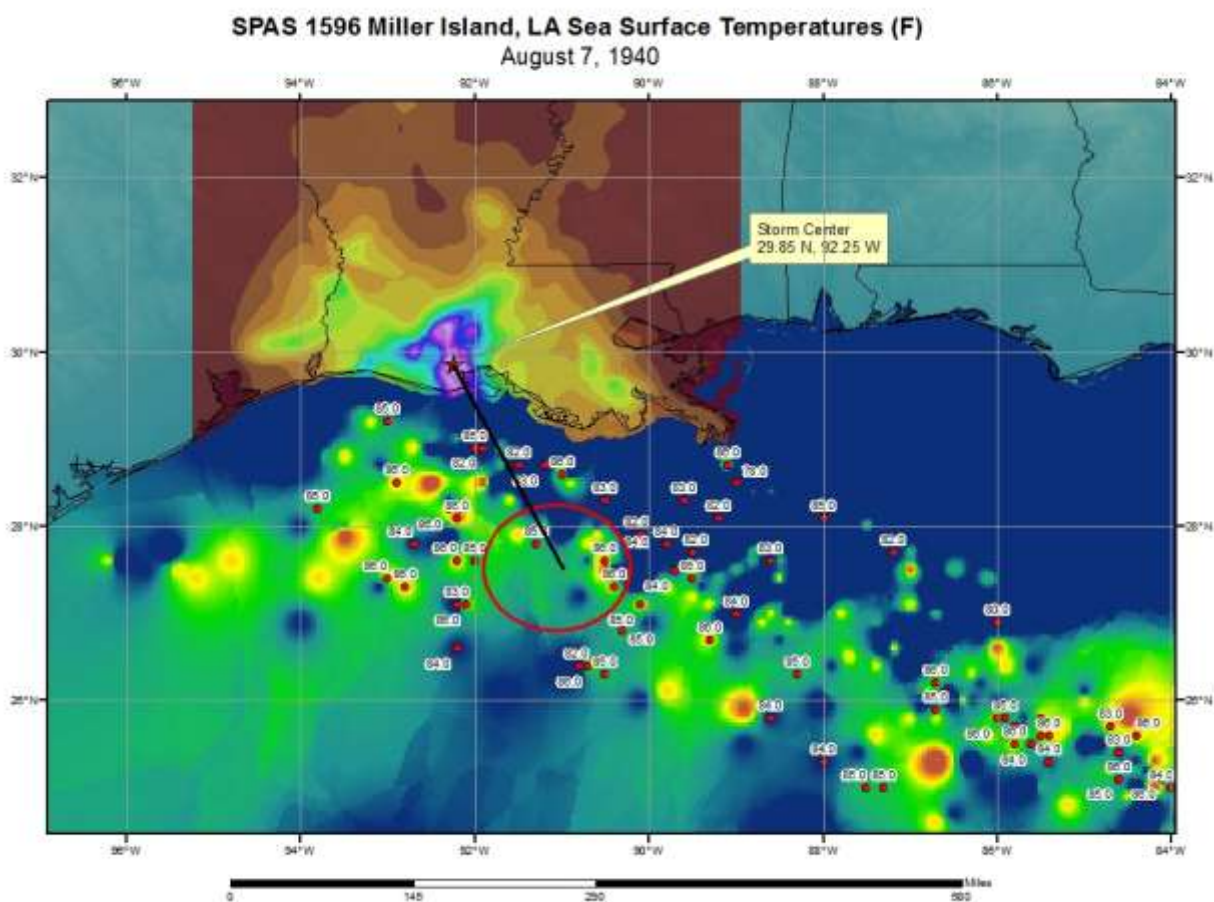


Figure 414: In-place storm representative SST analysis for Miller Island, LA August 7, 1940

Storm Precipitation Analysis System (SPAS) For Storm #1601

General Storm Location: Nuevo León, Texas (30.5, -12.0, 24.5, -94.0)

Storm Dates: September 19 (0700 UTC) – 24 (0600 UTC), 1967 (144-hours)

Event: Hurricane Beulah (USACE SW 3-24)

DAD Zone 1

Latitude: 26.2792

Longitude: -99.9208

Max. Grid Rainfall Amount: 35.87" Sombreretillo, N.L., MX

Max. Observed Rainfall Amount: 34.86"

DAD Zone 2

Latitude: 28.2542

Longitude: -97.9042

Max. Grid Rainfall Amount: 35.01" Dinero 1 S, TX

Max. Observed Rainfall Amount: 34.00"

Number of Stations: 362

SPAS Version: 10.0

Basemap: Us_ppt_in_map_1961_1990_usda_northamerica

Radar Included: No

Depth-Area-Duration (DAD) analysis: Yes

Reliability of results: This analysis was based on hourly data (H), hourly estimated pseudo data (HEP), hourly pseudo data (HP), daily data (D) and supplemental data (S). We have a high degree of confidence in the station based storm total results, the spatial pattern is dependent on basemap and the timing is based on hourly, hourly estimated pseudo and hourly pseudo stations.

SPAS Storm ID	NAME	LON	LAT	ELEV Round	Storm Representative				Climatological Maximum				IPMF
					T _g	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	T _g	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	
1601_1	SOMBRERETILLO	-99.921	26.279	1,400	82.00	3.95"	0.42"	3.530	86.0	4.67"	0.50"	4.170	1.18

Storm 1601 Zone 1 - Sep. 19 (0700 UTC) - Sep. 24 (0600 UTC), 1967															
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)															
areasqmi	Duration (hours)														
	1	2	3	4	5	6	12	18	24	36	48	72	96	120	Total
0.4	4.47	5.06	6.56	6.77	7.53	7.96	10.32	15.47	16.51	23.05	26.26	30.33	33.56	35.87	35.87
1	4.45	5.04	6.53	6.74	7.50	7.93	10.28	15.39	16.44	22.95	26.14	30.19	33.40	35.65	35.65
10	4.39	4.98	6.45	6.66	7.41	7.84	10.17	15.20	16.24	22.68	25.83	29.83	33.02	35.23	35.23
25	4.37	4.96	6.42	6.63	7.38	7.80	10.13	15.13	16.17	22.57	25.71	29.69	32.86	35.06	35.06
50	4.35	4.92	6.40	6.60	7.34	7.75	9.89	15.08	16.09	22.47	25.60	29.57	32.71	34.92	34.92
100	4.33	4.77	6.20	6.39	7.11	7.52	9.57	14.60	15.59	21.77	24.81	28.66	31.71	33.85	33.85
150	4.26	4.62	5.99	6.30	6.88	7.28	9.35	14.13	15.09	21.07	24.02	27.74	30.70	32.78	32.78
200	4.19	4.47	5.99	6.29	6.67	7.05	9.15	13.69	14.62	20.42	23.27	26.89	29.76	31.77	31.77
300	4.07	4.18	5.96	6.25	6.55	6.85	8.88	12.76	13.68	19.10	21.79	25.22	27.89	29.87	29.87
400	3.97	3.98	5.88	6.18	6.47	6.76	8.68	11.93	13.16	17.81	20.53	23.93	26.39	28.47	28.47
500	3.90	3.91	5.77	6.06	6.35	6.64	8.52	11.81	13.01	16.79	19.73	23.08	25.62	27.46	27.46
1,000	3.56	3.56	4.91	5.15	5.40	5.65	8.09	11.38	12.53	14.98	17.45	20.77	23.72	24.89	24.89
2,000	2.99	3.00	3.67	3.86	4.10	5.06	7.60	10.73	11.74	14.23	15.86	19.32	21.87	22.67	22.67
5,000	2.07	2.41	2.81	3.05	3.42	4.34	6.71	9.37	10.35	12.99	14.30	17.28	19.58	20.01	20.01
10,000	1.33	2.02	2.41	2.62	3.00	3.77	5.77	8.08	9.15	11.87	13.09	15.75	17.76	18.15	18.15
20,000	0.92	1.51	2.00	2.17	2.53	3.18	4.77	6.74	7.89	10.46	11.55	14.20	15.91	16.19	16.19
50,000	0.57	0.83	1.20	1.33	1.62	2.00	2.95	4.38	5.31	6.95	8.23	10.24	11.54	11.90	11.90
76,659	0.40	0.60	0.85	0.95	1.17	1.42	2.10	3.16	3.87	5.02	6.18	7.77	8.77	9.10	9.10

Figure 415: Depth-area-duration values for Sombreretillo, MX September 1967

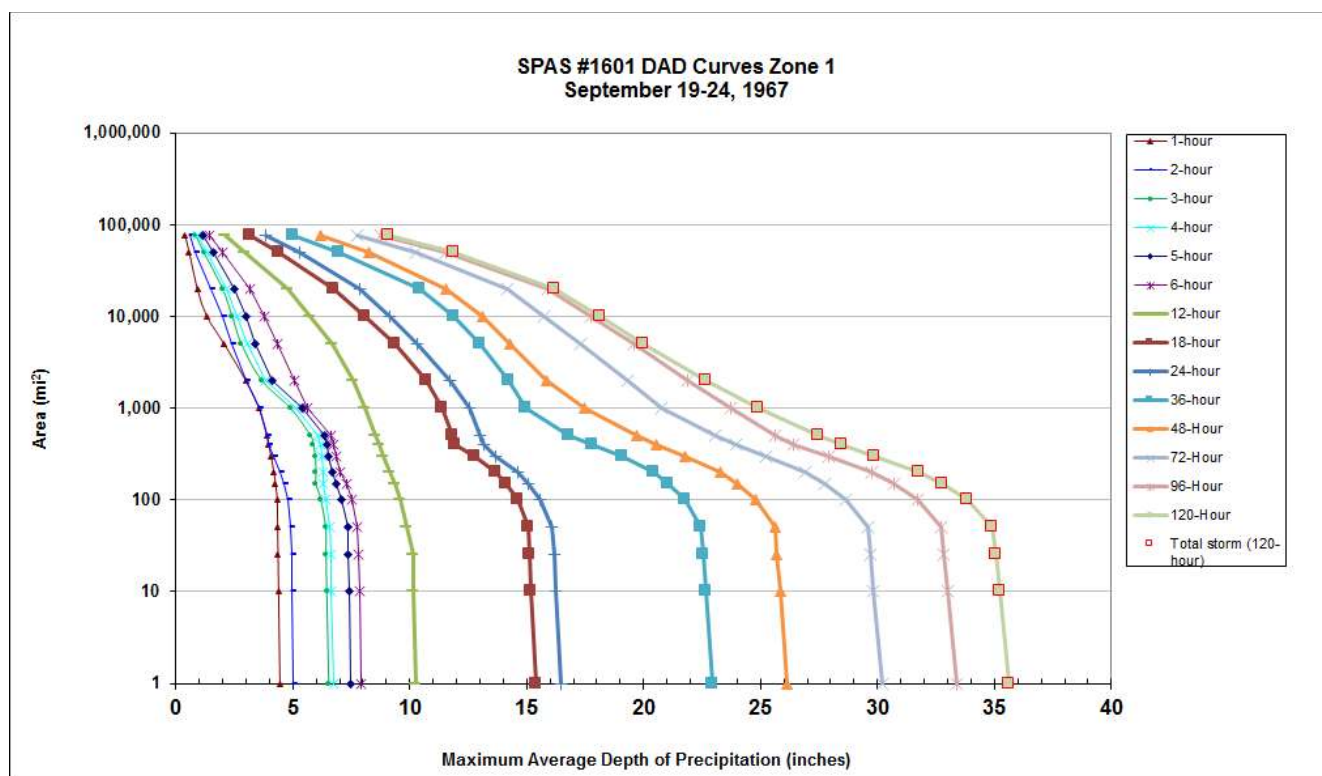


Figure 416: Depth-area-duration chart for Sombreretillo, MX September 1967

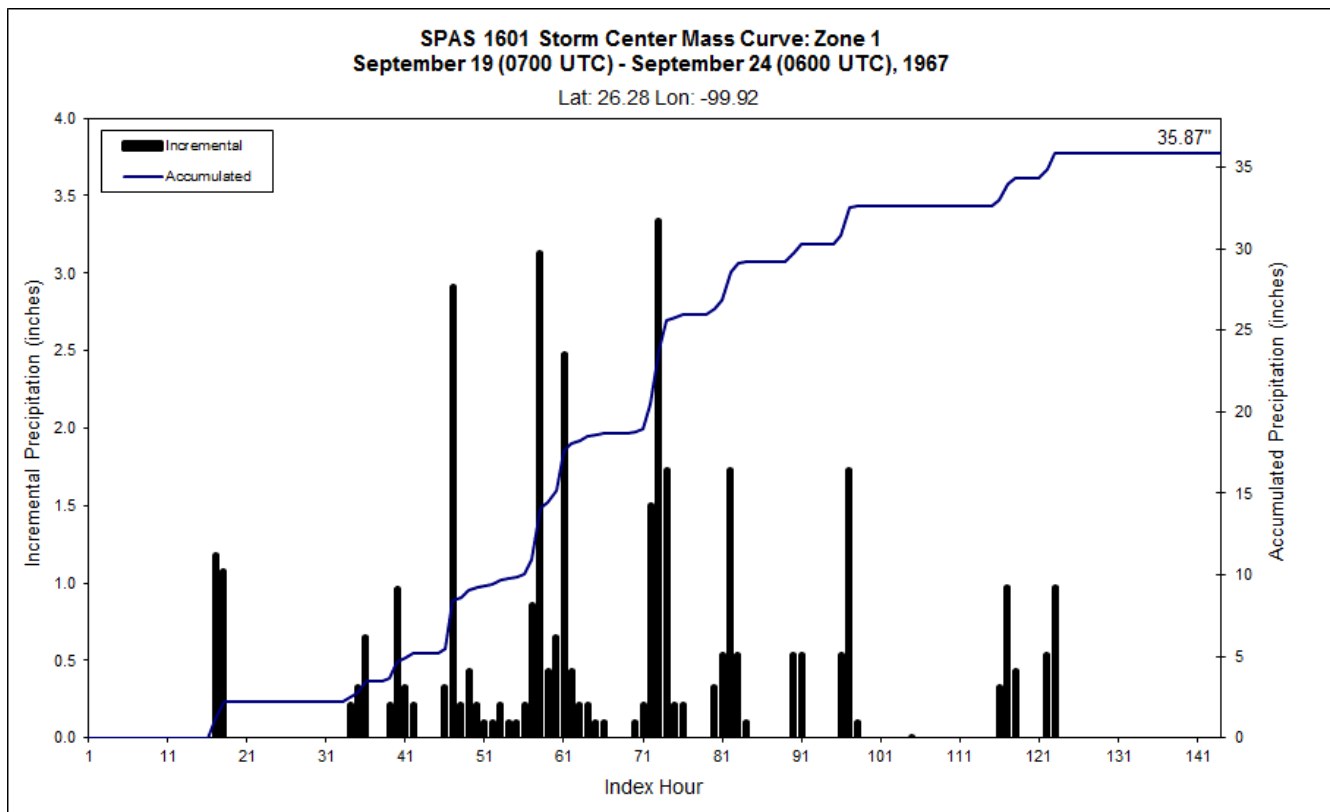


Figure 417: Mass curve chart for Sombrettillo, MX September 1967

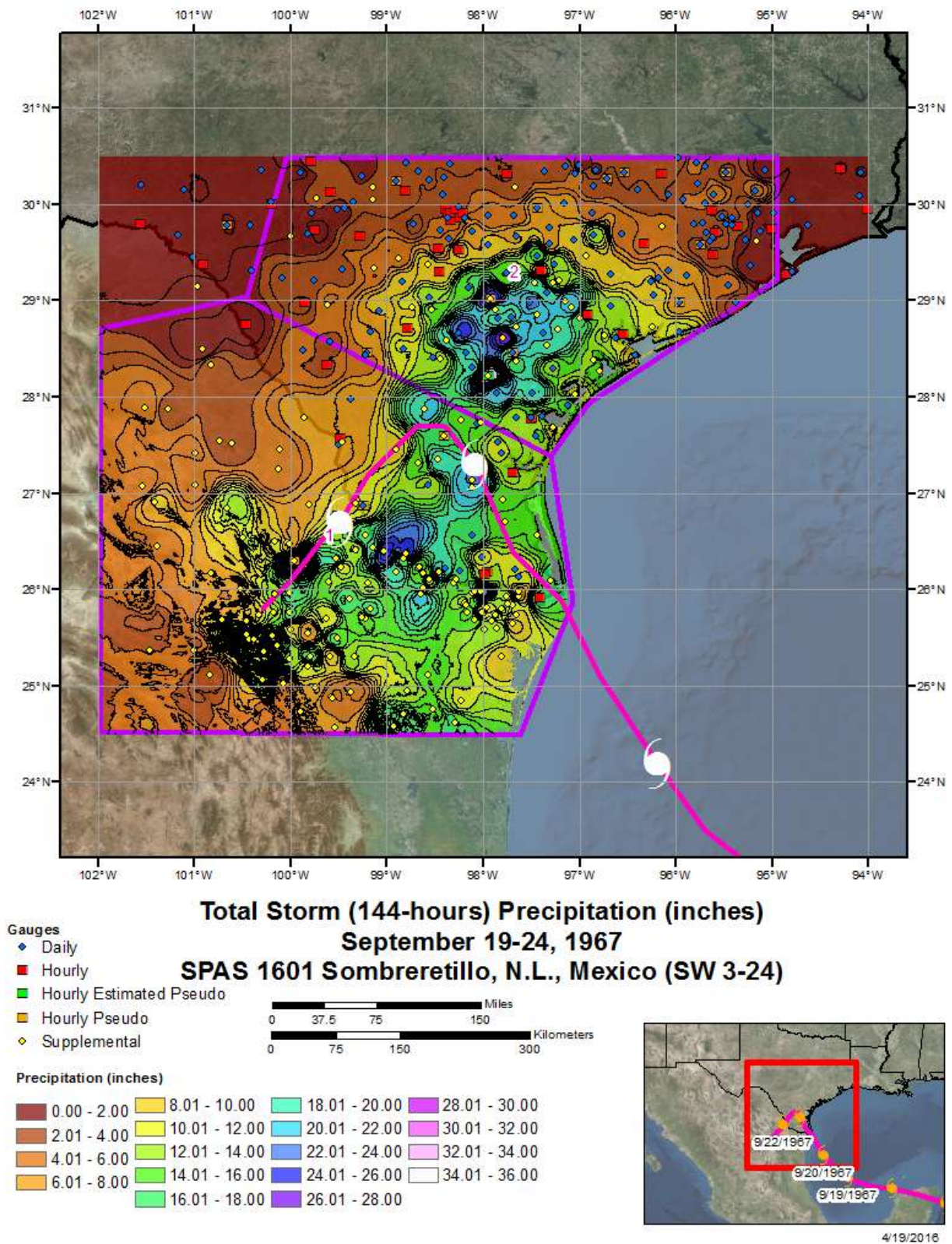


Figure 418: Total storm isohyetal analysis for Sombreretillo, MX September 1967

WAR DEPARTMENT		CORPS OF ENGINEERS, U. S. ARMY										
STORM STUDIES - PERTINENT DATA SHEET												
		Storm of <u>September 19-24 1967</u> Assignment <u>SW 3-24</u> Location <u>Texas and Mexico</u> Study Prepared by: <u>Southwestern Division</u> <u>Fort Worth District</u>										
		Part I Reviewed by Hydromet. Sec. of Weather Bureau, <u>2-26-69</u> Part II Approved by Office, Chief of Engineers for distribution of factual data, <u>2-3-70</u>										
		Remarks _____ _____ _____										
		_____ _____ _____										
		_____ _____ _____										
DATA AND COMPUTATIONS COMPILED												
PART I												
Preliminary Isohyetal map, in <u>1</u> sheet scale <u>1:1,374,400</u>												
Precipitation data and mass curves: (Number of Sheets)												
Form 5001-C (Hourly precip. data).....			32									
Form 5001-D (Hourly precip. data)..... Form SW 418-C.....			7									
Form 5001-D (" " " ").....			20									
Misc. precip. records, meteorological data, etc.			2									
Form 5002 (Mass rainfall curves).....			68									
PART II												
Final isohyetal maps, in <u>1</u> sheet scale <u>1:1,000,000</u>												
Data and computation sheets:												
Form S-10 (Data from mass rainfall curves).....			7									
Form S-11 (Depth-area data from isohyetal map).....			1									
Form S-12 (Maximum depth-duration data).....			13									
Maximum duration-depth-area curves.....			1									
Data relating to periods of maximum rainfall.....			4									
MAXIMUM AVERAGE DEPTH OF RAINFALL IN INCHES												
Area in Sq. Miles	Duration of Rainfall in Hours											
	6	12	18	24	30	36	48	60	72	96	126	
Station P 10	9.2	12.2	15.2	18.7	21.8	24.8	26.2	32.0	32.0	32.5	34.9	
100	7.3	10.4	13.2	17.6	20.7	21.7	23.9	30.0	30.0	30.9	34.0	
200	6.7	9.7	12.3	16.4	19.2	20.3	23.0	28.8	28.8	29.9	33.0	
500	5.9	8.7	11.1	14.0	16.3	18.3	21.5	26.1	26.8	27.8	30.6	
1,000	5.3	7.9	10.0	11.9	14.4	16.8	20.3	23.8	25.1	26.0	27.2	
2,000	4.6	7.0	9.0	10.4	12.7	15.2	19.0	21.6	23.2	24.0	24.8	
5,000	3.7	5.8	7.6	8.9	10.8	13.1	17.2	19.2	20.7	21.7	22.4	
10,000	3.1	4.9	6.5	7.8	9.5	11.4	15.2	17.3	18.5	20.0	20.5	
20,000	2.4	4.0	5.4	6.7	8.1	9.8	13.0	15.0	16.3	18.2	18.7	
40,000	1.7	3.0	4.2	5.5	6.8	8.2	10.7	12.7	13.9	16.1	16.8	
60,000	1.2	2.5	3.6	4.8	6.0	7.2	9.3	11.3	12.5	14.9	15.5	

Figure 419: USACE Depth-area-duration values for Sombreretillo, MX September 1967

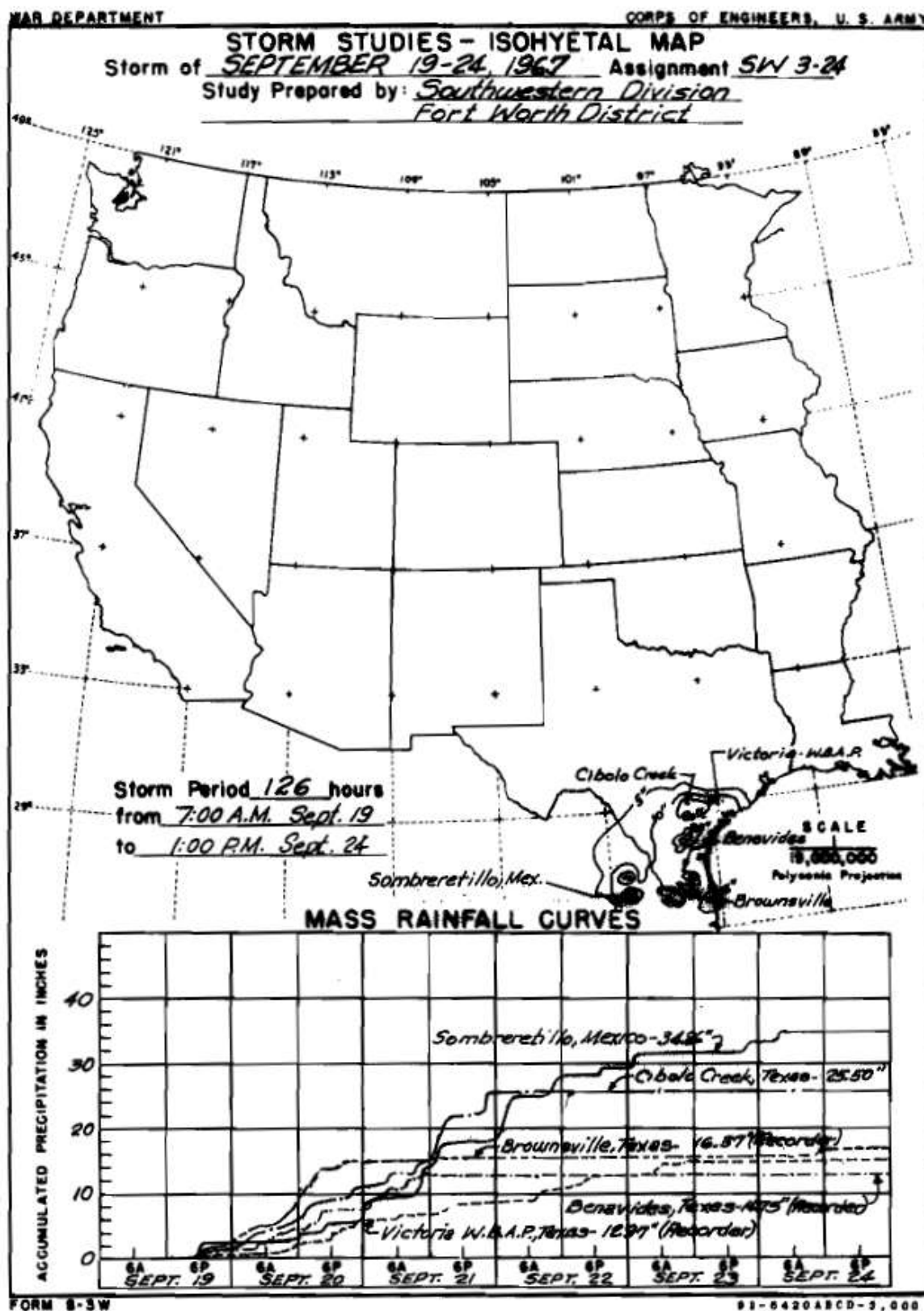


Figure 420: USACE Total storm isohyetal and mass curve chart for Sombretillo, MX September 1967

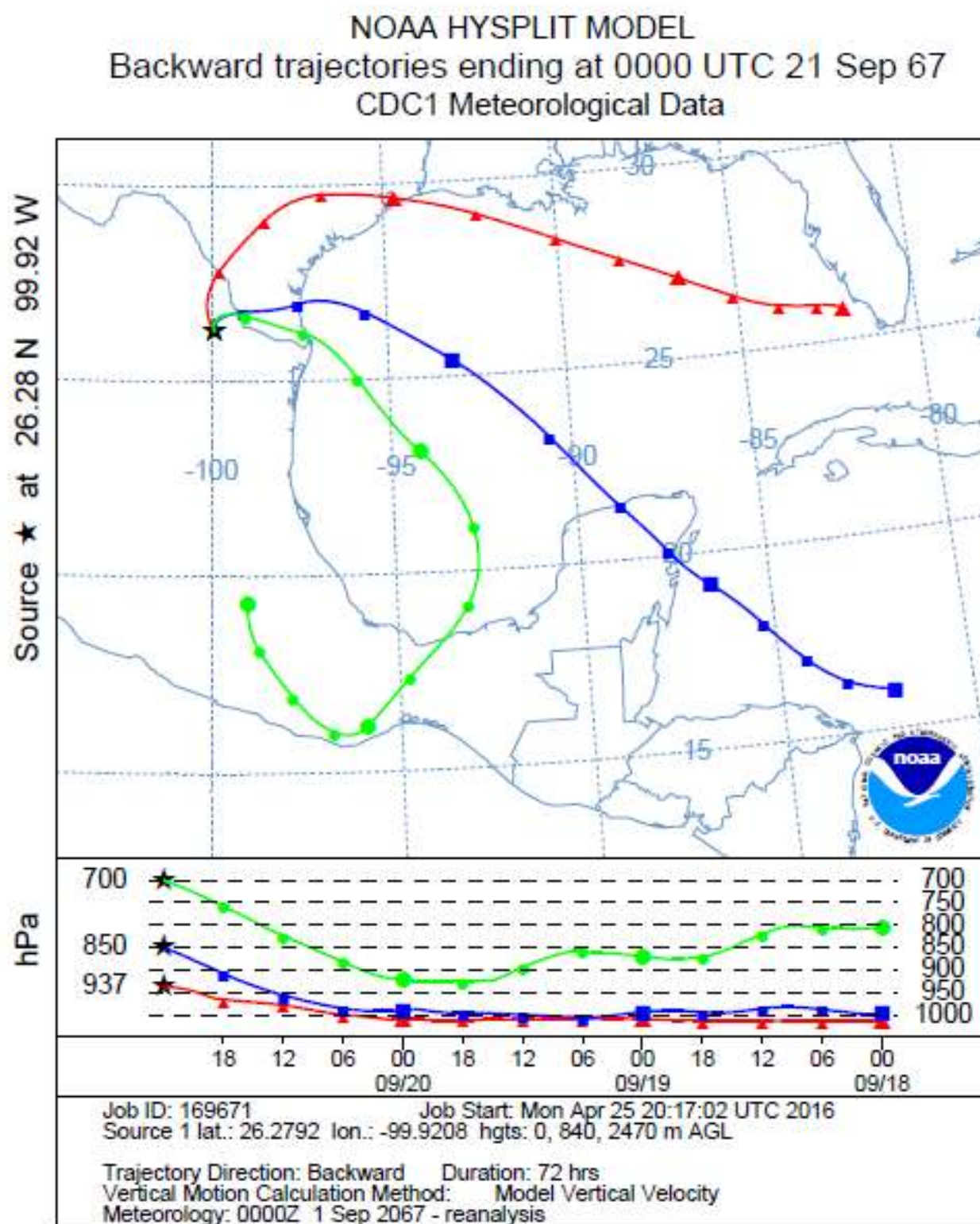


Figure 421: HYSPLIT trajectory analysis at Surface, 850mb and 700mb for Sombreretillo, MX September 1967

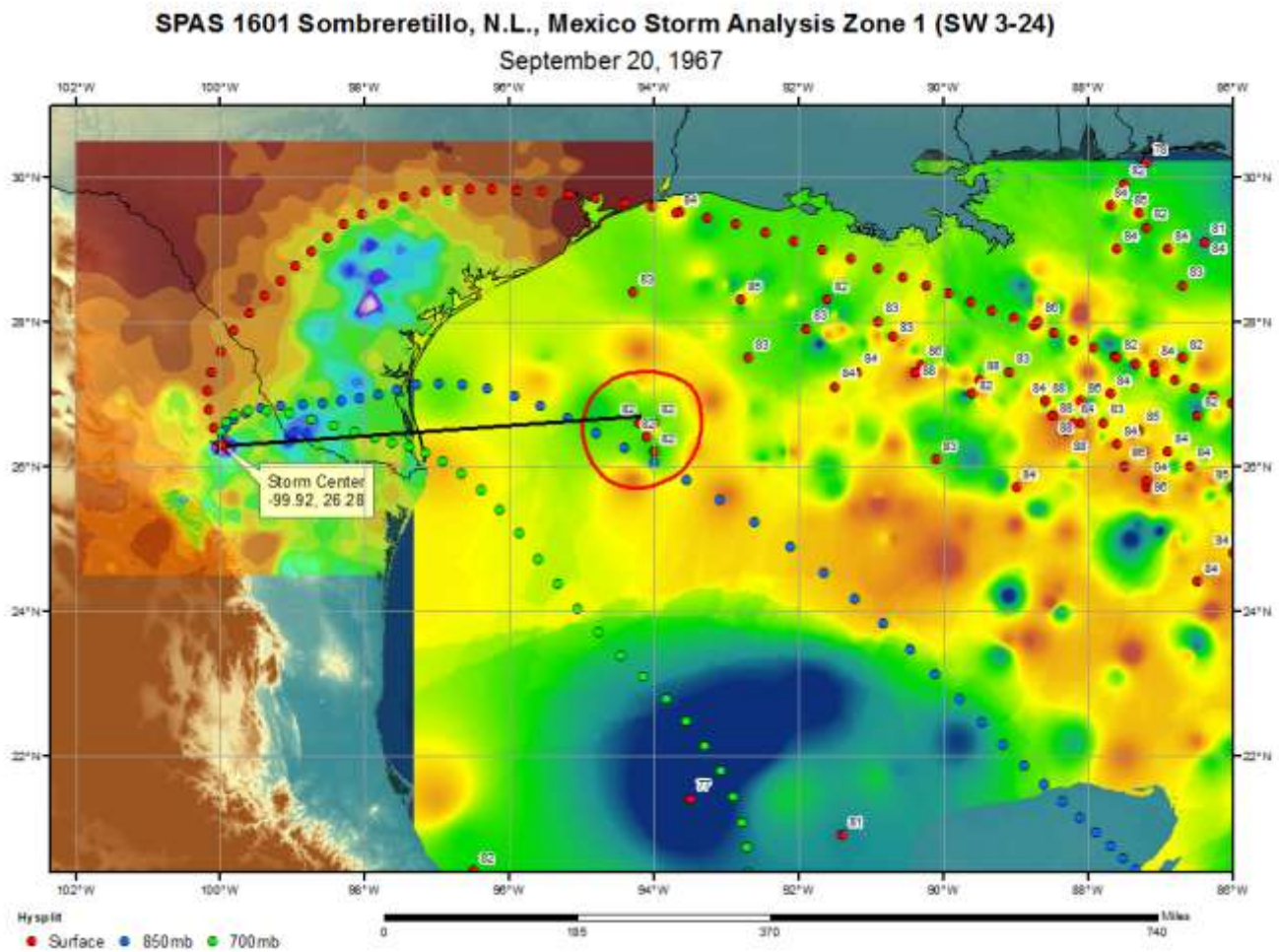


Figure 422: In-place storm representative SST analysis for Sombreretillo, MX September 20, 1967

Storm Precipitation Analysis System (SPAS) For Storm #1601

General Storm Location: Nuevo León, Texas (30.5, -12.0, 24.5, -94.0)

Storm Dates: September 19 (0700 UTC) – 24 (0600 UTC), 1967 (144-hours)

Event: Hurricane Beulah (USACE SW 3-24)

DAD Zone 1

Latitude: 26.2792

Longitude: -99.9208

Max. Grid Rainfall Amount: 35.87" Sombreretillo, N.L., MX

Max. Observed Rainfall Amount: 34.86"

DAD Zone 2

Latitude: 28.2542

Longitude: -97.9042

Max. Grid Rainfall Amount: 35.01" Dinero 1 S, TX

Max. Observed Rainfall Amount: 34.00"

Number of Stations: 362

SPAS Version: 10.0

Basemap: Us_ppt_in_map_1961_1990_usda_northamerica

Radar Included: No

Depth-Area-Duration (DAD) analysis: Yes

Reliability of results: This analysis was based on hourly data (H), hourly estimated pseudo data (HEP), hourly pseudo data (HP), daily data (D) and supplemental data (S). We have a high degree of confidence in the station based storm total results, the spatial pattern is dependent on basemap and the timing is based on hourly, hourly estimated pseudo and hourly pseudo stations.

SPAS Storm ID	NAME	LON	LAT	ELEV Round	Storm Representative				Climatological Maximum				IPMF
					T _a	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	T _a	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	
1601_2	DINERO	-97.904	28.254	200	82.00	3.95"	0.06"	3.890	86.0	4.67"	0.07"	4.600	1.18

Storm 1601 Zone 2 - Sep. 19 (0700 UTC) - Sep. 24 (0600 UTC), 1967															
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)															
areassqmi	Duration (hours)														
	1	2	3	4	5	6	12	18	24	36	48	72	96	120	Total
0.3	3.71	5.49	8.40	10.83	12.98	13.78	16.74	18.06	19.33	27.88	32.01	34.25	34.80	35.01	35.01
1	3.69	5.46	8.36	10.78	12.93	13.72	16.66	17.98	19.25	27.76	31.88	34.10	34.65	34.72	34.72
10	3.64	5.40	8.28	10.67	12.78	13.57	16.48	17.79	19.03	27.45	31.53	33.73	34.28	34.34	34.34
25	3.62	5.37	8.24	10.63	12.73	13.51	16.41	17.71	18.95	27.33	31.40	33.58	34.13	34.19	34.19
50	3.55	5.35	8.22	10.59	12.68	13.46	16.36	17.65	18.88	27.24	31.30	33.47	34.02	34.07	34.07
100	3.29	5.30	8.11	10.45	12.54	13.31	16.16	17.44	18.67	26.95	30.93	33.11	33.65	33.76	33.76
150	3.11	5.20	7.95	10.25	12.28	13.03	15.80	17.05	18.25	26.35	30.25	32.40	32.95	33.07	33.07
200	2.98	5.12	7.81	10.08	12.05	12.77	15.38	16.58	17.75	25.63	29.40	31.46	32.03	32.17	32.17
300	2.83	4.96	7.56	9.75	11.65	12.32	14.79	15.88	16.98	24.50	28.10	29.93	30.42	30.56	30.56
400	2.72	4.79	7.29	9.39	11.22	11.87	14.38	15.31	16.40	23.59	27.18	28.87	29.31	29.44	29.44
500	2.64	4.63	7.04	9.08	10.85	11.47	14.06	14.98	16.06	22.81	26.45	28.07	28.46	28.58	28.58
1,000	2.28	4.10	6.23	8.03	9.59	10.13	12.81	13.76	14.87	20.43	24.14	25.72	26.05	26.15	26.15
2,000	1.98	3.53	5.31	6.84	8.25	8.82	11.44	12.35	13.53	18.49	21.99	23.57	23.84	23.94	23.94
5,000	1.50	2.66	3.77	4.84	5.88	6.58	9.15	10.22	11.49	16.12	19.50	20.97	21.26	21.34	21.34
10,000	1.01	1.81	2.56	3.28	4.09	4.68	6.78	7.88	9.16	13.15	16.19	17.91	18.33	18.44	18.44
20,000	0.57	1.07	1.48	1.92	2.38	2.81	4.45	5.57	6.63	9.92	12.37	13.97	14.28	14.36	14.36
47,522	0.26	0.49	0.70	0.90	1.14	1.31	2.20	3.09	3.68	5.44	6.68	7.71	7.89	7.98	7.98

Figure 423: Depth-area-duration values for Dinero, TX September 1967

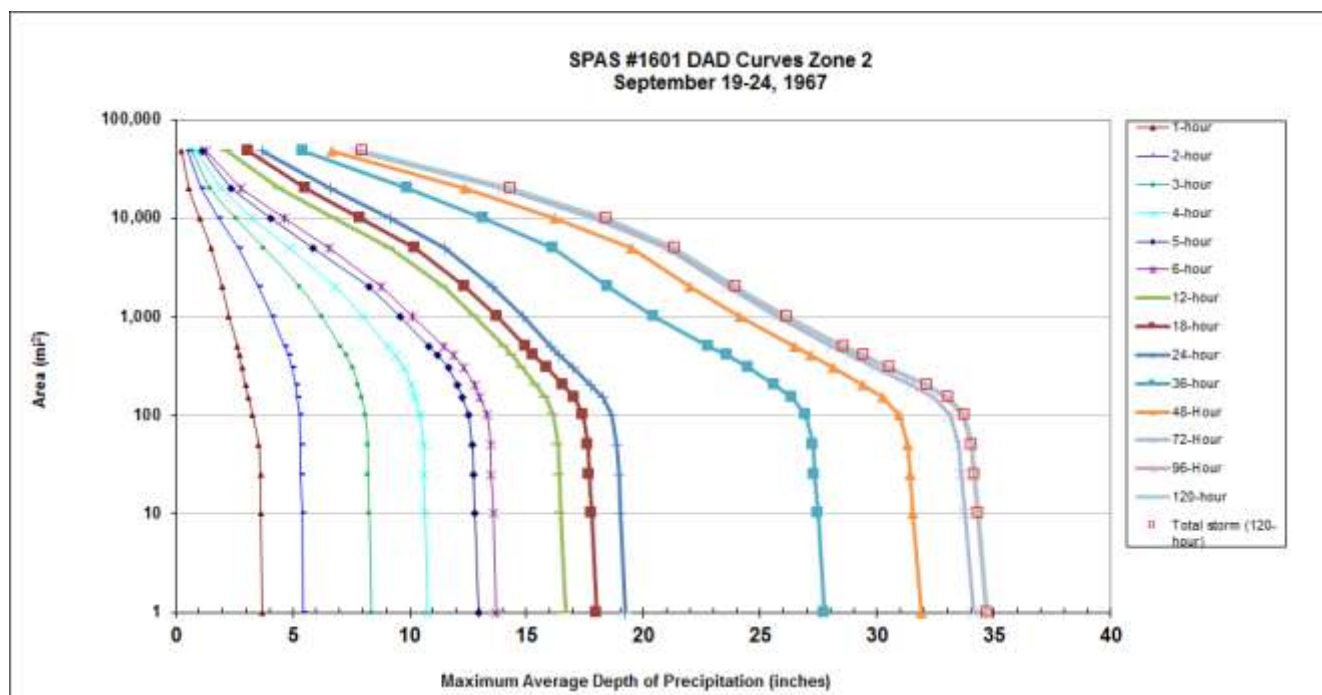


Figure 424: Depth-area-duration chart for Dinero, TX September 1967

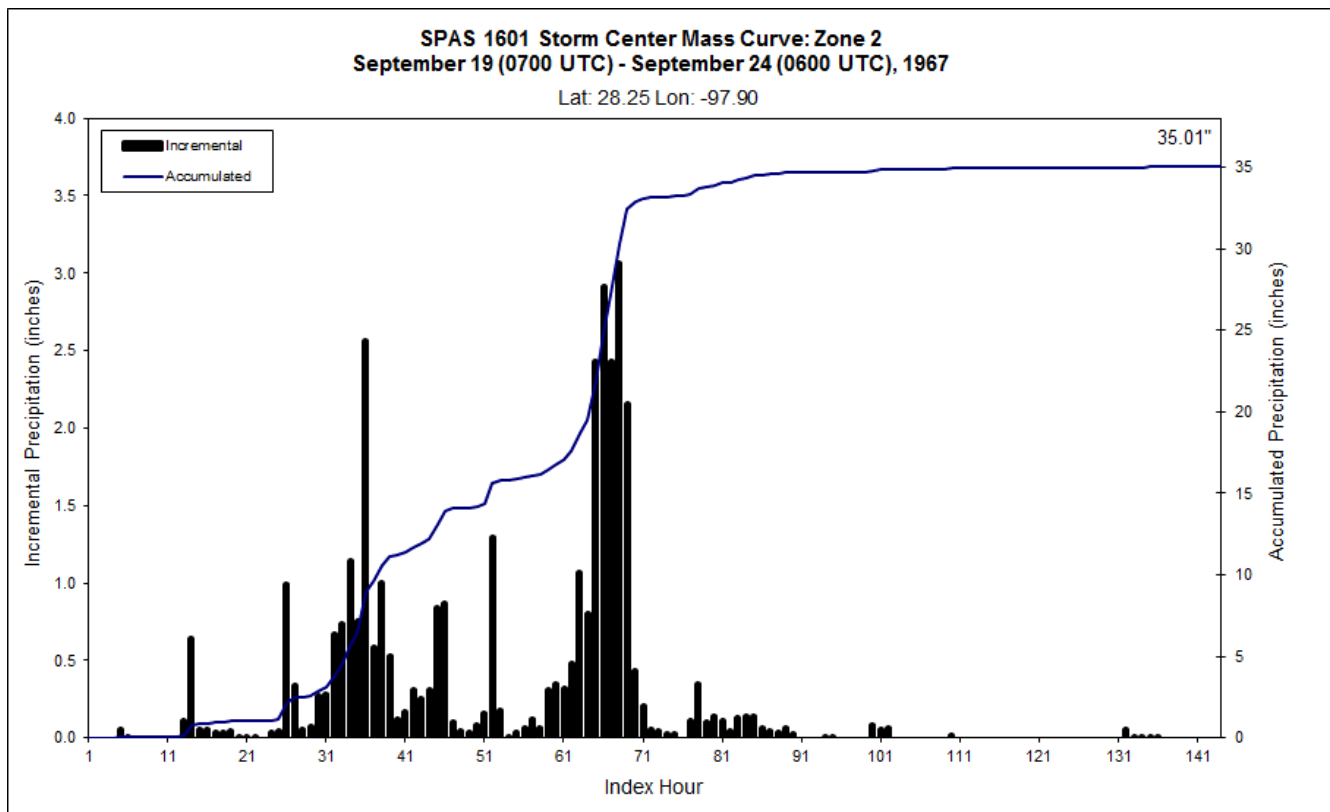


Figure 425: Mass curve chart for Dinero, TX September 1967

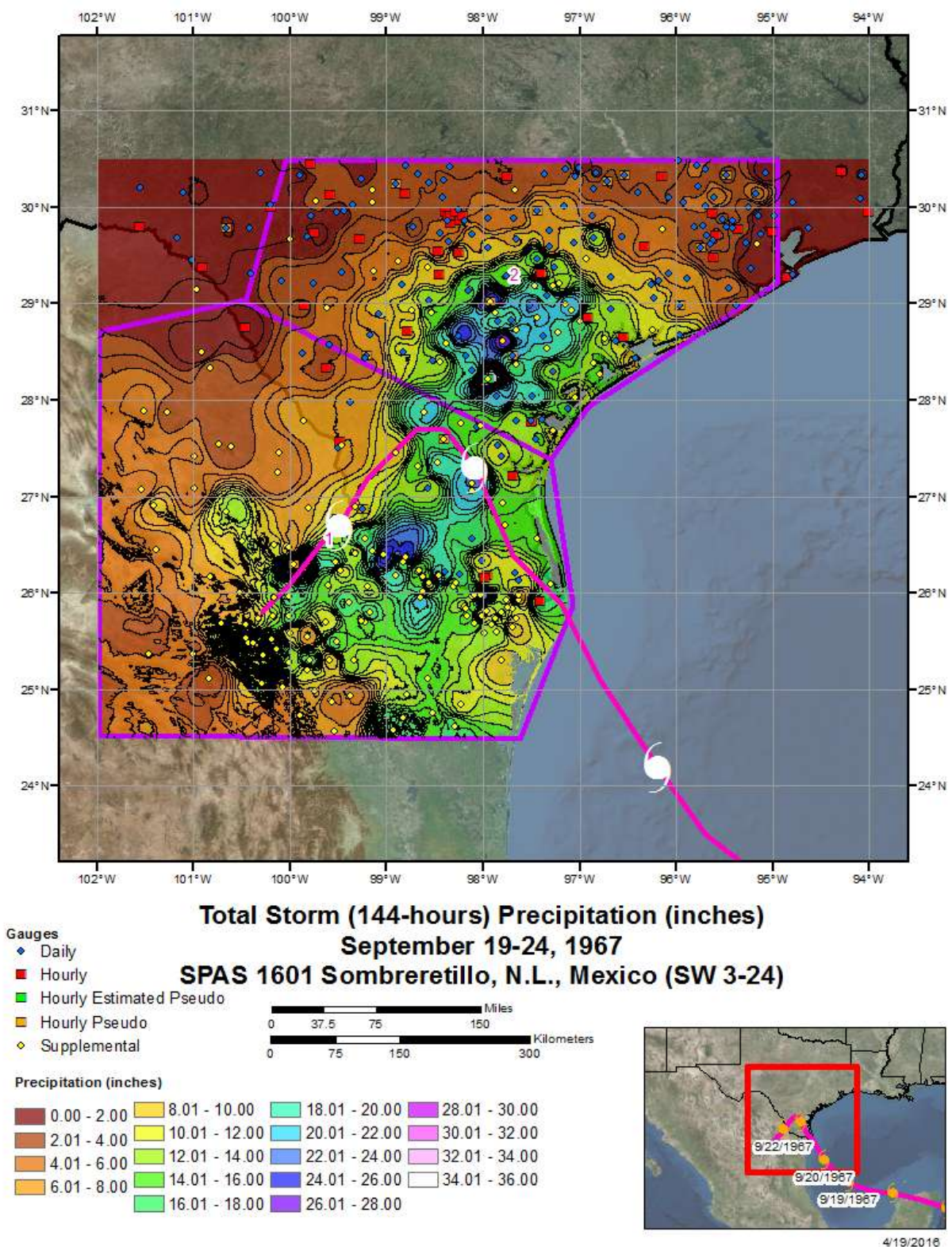


Figure 426: Total storm isohyetal analysis for Dinero, TX September 1967

WAR DEPARTMENT		CORPS OF ENGINEERS, U. S. ARMY										
STORM STUDIES - PERTINENT DATA SHEET												
<p style="text-align: center;">LOCATION MAP</p>		Storm of <u>September 19-24 1967</u> Assignment <u>SW 3-24</u> Location <u>Texas and Mexico</u> Study Prepared by: <u>Southwestern Division</u> <u>Fort Worth District</u>										
		Part I Reviewed by Hydromet. Sec. of Weather Bureau, <u>2-26-69</u> Part II Approved by Office, Chief of Engineers for distribution of factual data, <u>2-3-70</u>										
		Remarks _____ _____ _____										
		_____ _____ _____										
DATA AND COMPUTATIONS COMPILED												
PART I												
Preliminary Isohyetal map, in <u>1</u> sheet scale <u>1:1,374,400</u>												
Precipitation data and mass curves:		(Number of Sheets)										
Form 5001-C (Hourly precip. data).....		32										
Form 5001-D (Hourly precip. data)..... Form SW 418-C.....		7										
Form 5001-D (" " " ").....		20										
Misc. precip. records, meteorological data, etc.		2										
Form 5002 (Mass rainfall curves).....		68										
PART II												
Final isohyetal maps, in <u>1</u> sheet scale <u>1:1,000,000</u>												
Data and computation sheets:												
Form S-10 (Data from mass rainfall curves).....		7										
Form S-11 (Depth-area data from isohyetal map).....		1										
Form S-12 (Maximum depth-duration data).....		13										
Maximum duration-depth-area curves.....		1										
Data relating to periods of maximum rainfall.....		4										
MAXIMUM AVERAGE DEPTH OF RAINFALL IN INCHES												
Area in Sq. Miles	Duration of Rainfall in Hours											
	6	12	18	24	30	36	48	60	72	96	126	
Station P 10	9.2	12.2	15.2	18.7	21.8	24.8	26.2	32.0	32.0	32.5	34.9	
100	7.3	10.4	13.2	17.6	20.7	21.7	23.9	30.0	30.0	30.9	34.0	
200	6.7	9.7	12.3	16.4	19.2	20.3	23.0	28.8	28.8	29.9	33.0	
500	5.9	8.7	11.1	14.0	16.3	18.3	21.5	26.1	26.8	27.8	30.6	
1,000	5.3	7.9	10.0	11.9	14.4	16.8	20.3	23.8	25.1	26.0	27.2	
2,000	4.6	7.0	9.0	10.4	12.7	15.2	19.0	21.6	23.2	24.0	24.8	
5,000	3.7	5.8	7.6	8.9	10.8	13.1	17.2	19.2	20.7	21.7	22.4	
10,000	3.1	4.9	6.5	7.8	9.5	11.4	15.2	17.3	18.5	20.0	20.5	
20,000	2.4	4.0	5.4	6.7	8.1	9.8	13.0	15.0	16.3	18.2	18.7	
40,000	1.7	3.0	4.2	5.5	6.8	8.2	10.7	12.7	13.9	16.1	16.8	
60,000	1.2	2.5	3.6	4.8	6.0	7.2	9.3	11.3	12.5	14.9	15.5	

FORM S-2

16-5888-100

Figure 427: USACE Depth-area-duration values for Dinero, TX September 1967

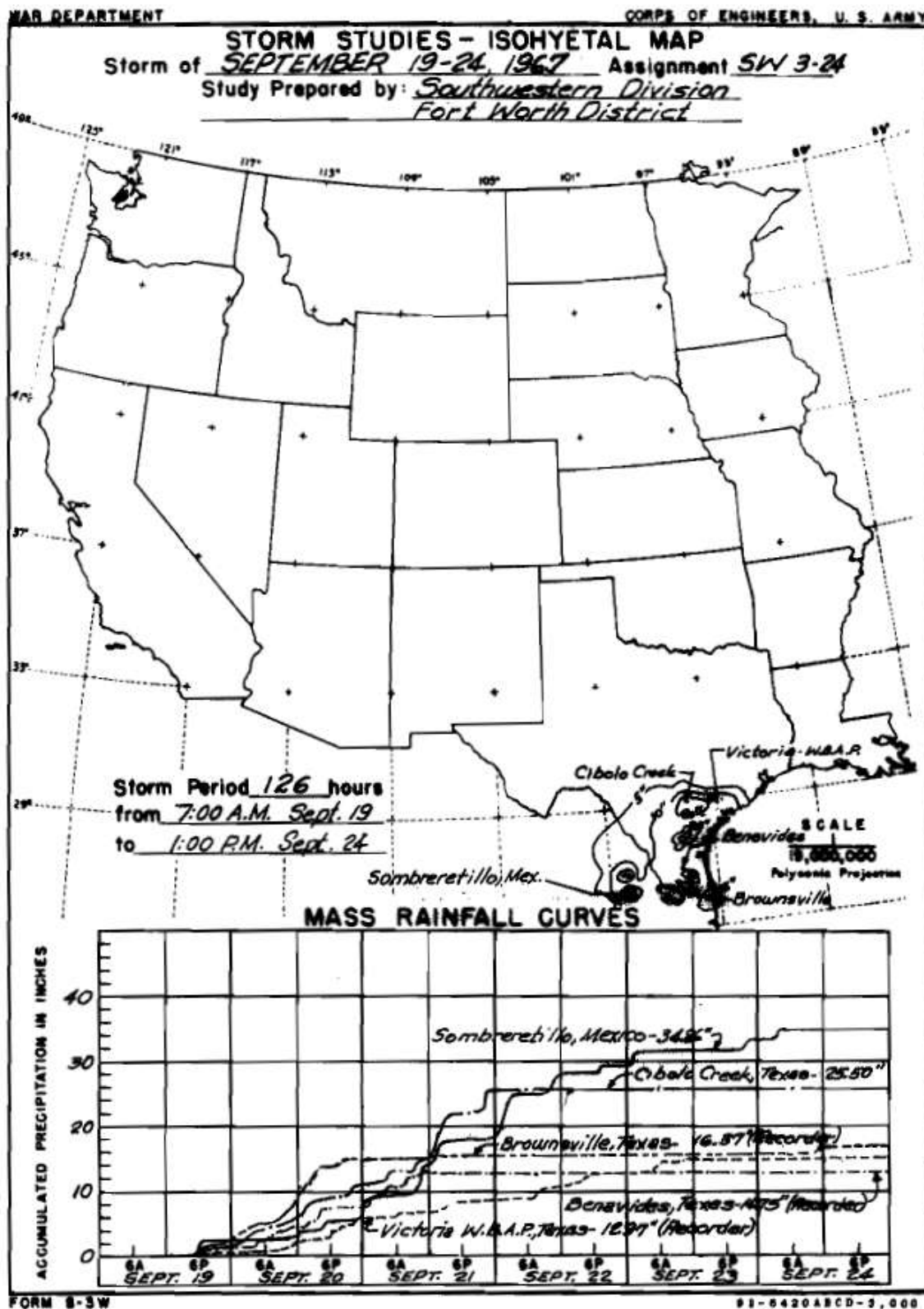


Figure 428: USACE Total storm isohyetal and mass curve chart for Dinero, TX September 1967

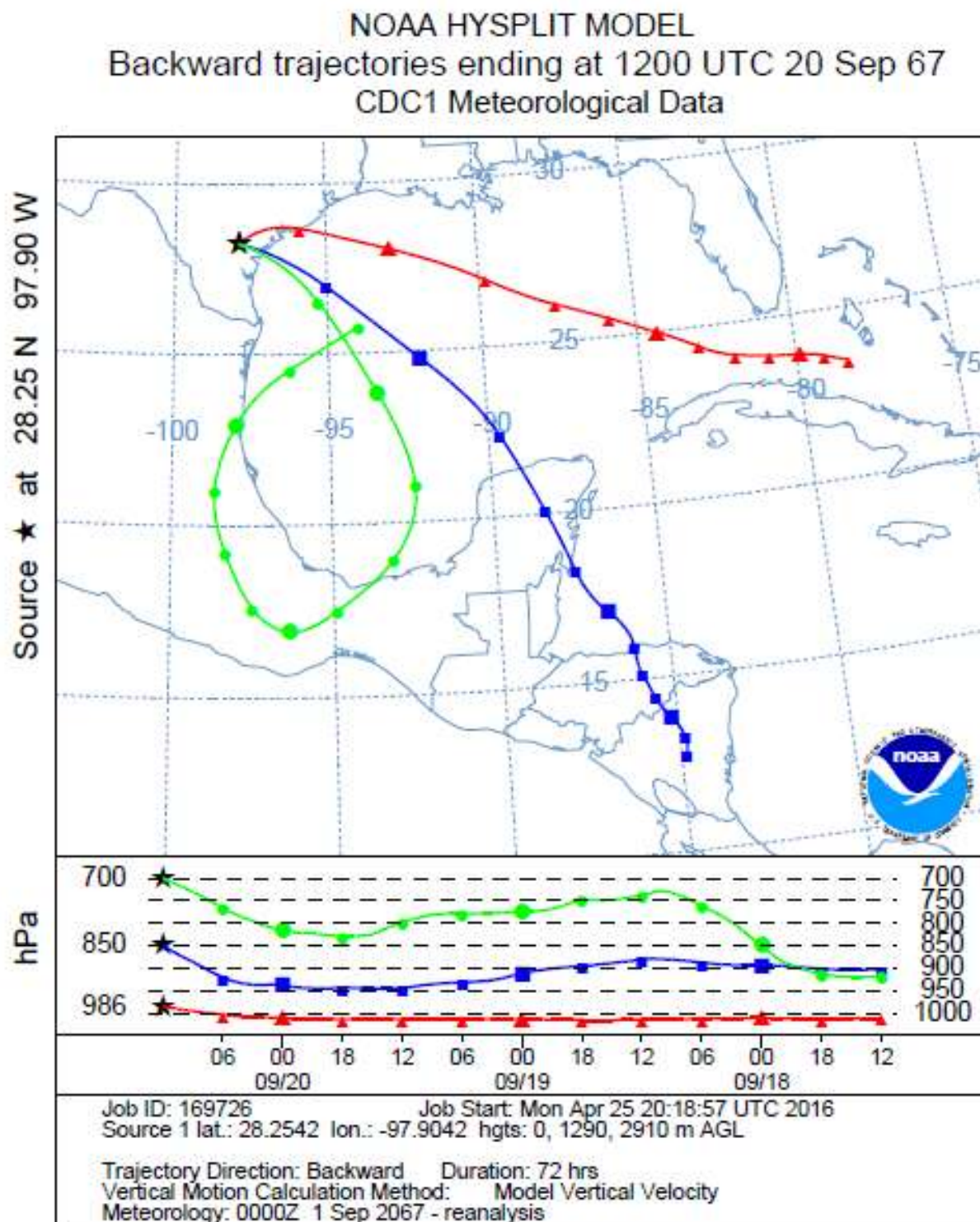


Figure 429: HYSPLIT trajectory analysis at Surface, 850mb and 700mb for Dinero, TX September 1967

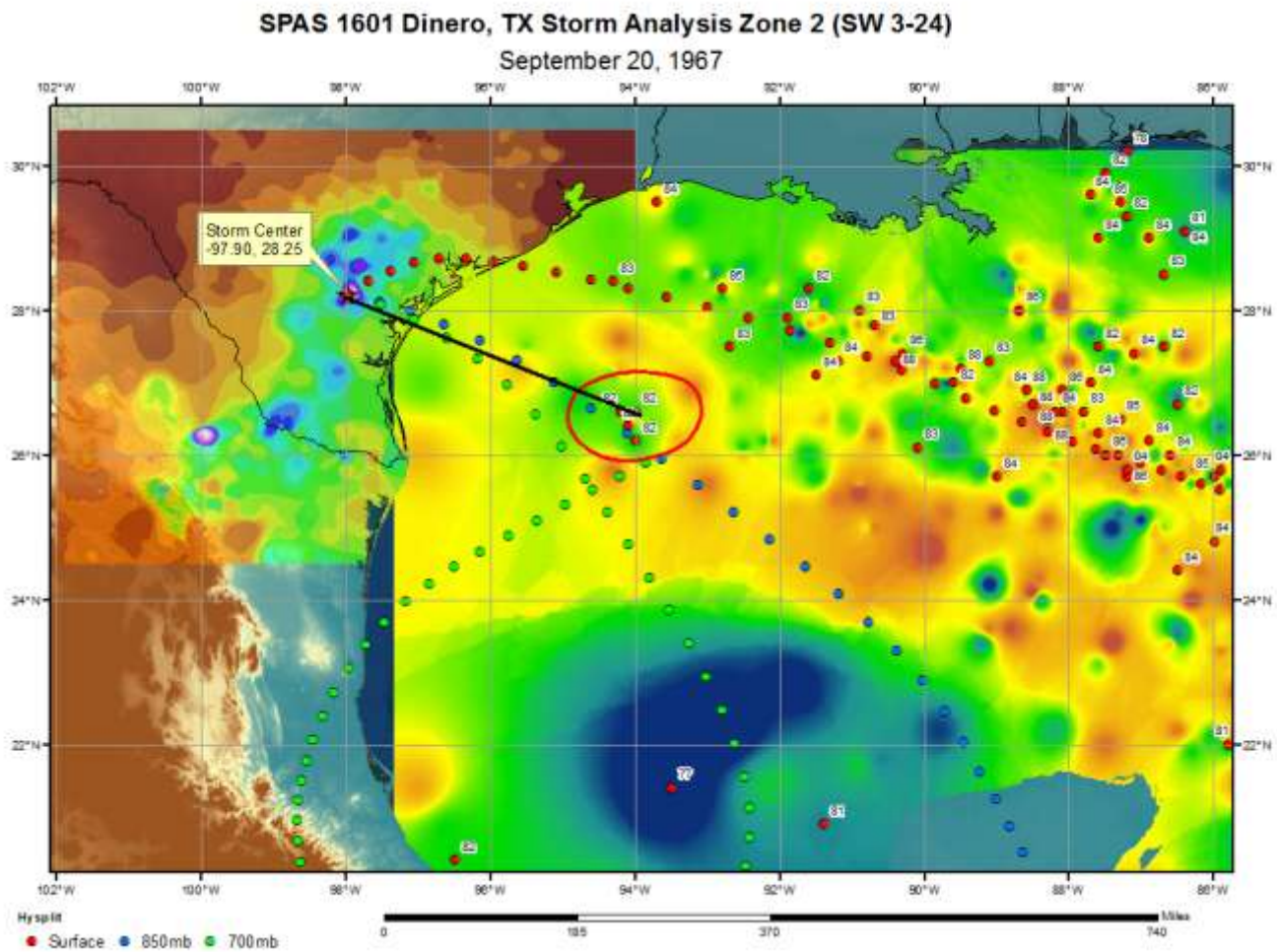


Figure 430: In-place storm representative SST analysis for Dinero, TX September 20, 1967

Storm Precipitation Analysis System (SPAS) For Storm #1600

General Storm Location: Southwest Texas (31.0,-100.5,28.5,-98.0)

Storm Dates: July 31 – August 5, 1978

Event: Tropical Remnant Amelia

DAD Zone 1

Latitude: 29.8875

Longitude: -99.3208

Max. Grid Rainfall Amount: 48.97" Manatt Ranch, TX

Max. Observed Rainfall Amount: 48.03"

Number of Stations: 85

SPAS Version: 10.0

Basemap: Blend between conus_prism_ppt_in_1971_2000_08 and USGS Isohyetal image

Radar Included: No

Depth-Area-Duration (DAD) analysis: Yes

Reliability of results: This analysis was based on 85 hourly stations, daily data, and supplemental station data. We have a good degree of confidence for the station based storm total results. The spatial pattern is dependent heavily on the basemap created from the USGS Isohyetal image. Timing is based on the hourly and hourly pseudo stations near the storm center. Several daily stations were moved to supplemental due to timing issues and to ensure data consistency.

SPAS Storm ID	NAME	LON	LAT	ELEV Round	Storm Representative				Climatological Maximum				IPMF
					T _d	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	T _d	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	
1600_1	MEDINA	-99.321	29.888	2,000	79.00	3.44"	0.55"	2.890	80.0	3.60"	0.57"	3.030	1.05

Storm 1600 - July 31 (0600 UTC) - August 6 (0500 UTC), 1978															
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)															
Area (mi ²)	Duration (hours)														
	1	2	3	4	5	6	12	18	24	36	48	72	96	120	Total
0.3	4.67	9.10	13.31	16.77	19.06	20.83	29.15	29.96	30.91	42.39	43.51	48.82	48.82	48.97	48.97
1	4.63	9.02	13.20	16.62	18.90	20.66	28.90	29.70	30.65	42.04	43.16	48.43	48.43	48.43	48.43
10	4.53	8.81	12.90	16.26	18.45	20.19	28.24	29.06	29.95	41.06	42.17	47.34	47.34	47.34	47.34
25	4.41	8.58	12.57	15.83	17.99	19.67	27.51	28.30	29.19	40.03	41.12	46.16	46.16	46.16	46.16
50	4.24	8.26	12.09	15.23	17.30	18.93	26.47	27.25	28.12	38.52	39.59	44.52	44.54	44.54	44.54
100	3.92	7.64	11.19	14.08	15.99	17.52	24.48	25.24	26.11	35.85	36.72	41.54	41.58	41.58	41.58
150	3.63	7.04	10.33	12.97	14.70	16.16	22.53	23.38	24.25	32.85	34.04	38.80	38.86	38.86	38.86
200	3.40	6.52	9.57	12.00	13.56	14.97	20.76	21.73	22.54	30.36	31.65	36.45	36.56	36.56	36.56
300	3.03	5.71	8.40	10.48	11.76	13.05	17.90	19.16	19.91	26.30	27.95	32.67	32.85	32.85	32.85
400	2.78	5.10	7.53	9.33	10.52	11.63	15.91	17.28	18.11	23.50	25.38	29.93	30.12	30.12	30.12
500	2.59	4.65	6.87	8.44	9.56	10.54	14.34	15.87	16.74	21.54	23.79	27.81	28.04	28.04	28.04
1,000	2.03	3.42	5.04	6.02	6.85	7.58	10.35	11.91	12.74	16.59	18.95	21.59	21.79	21.79	21.79
2,000	1.39	2.30	3.45	4.04	4.69	5.20	7.46	8.78	9.66	12.55	14.65	16.35	16.51	16.51	16.51
5,000	0.70	1.20	1.65	2.05	2.38	2.73	4.57	5.74	6.33	8.34	9.82	10.87	10.97	10.97	10.97
10,000	0.46	0.82	1.08	1.35	1.65	1.85	2.76	3.44	4.52	6.21	6.80	7.71	7.71	7.71	7.71
20,000	0.27	0.50	0.67	0.84	1.01	1.14	1.74	2.21	2.84	4.01	4.41	5.11	5.14	5.14	5.14
25,872	0.22	0.40	0.54	0.67	0.82	0.92	1.39	1.77	2.37	3.38	3.75	4.38	4.42	4.42	4.42

Figure 431: Depth-area-duration values for Medina, TX August 1978

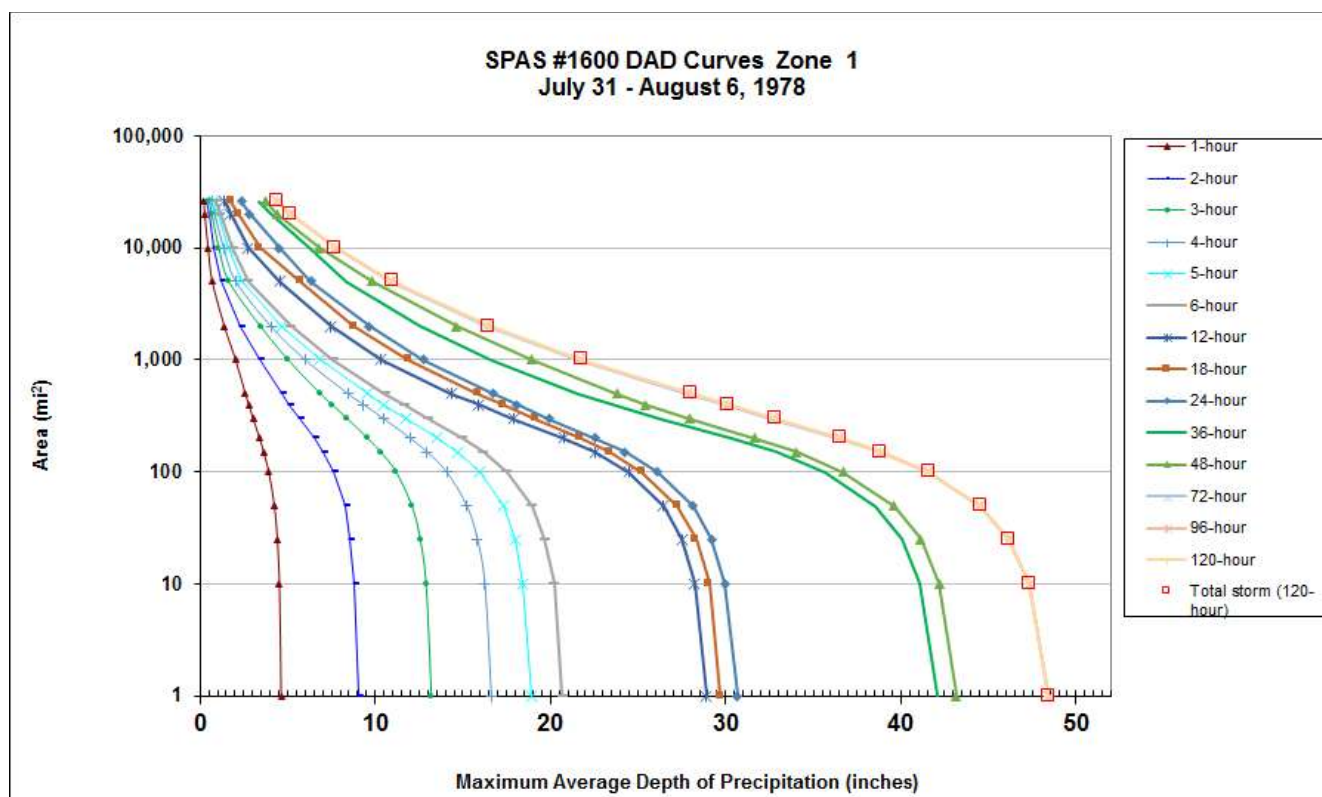


Figure 432: Depth-area-duration chart for Medina, TX August 1978

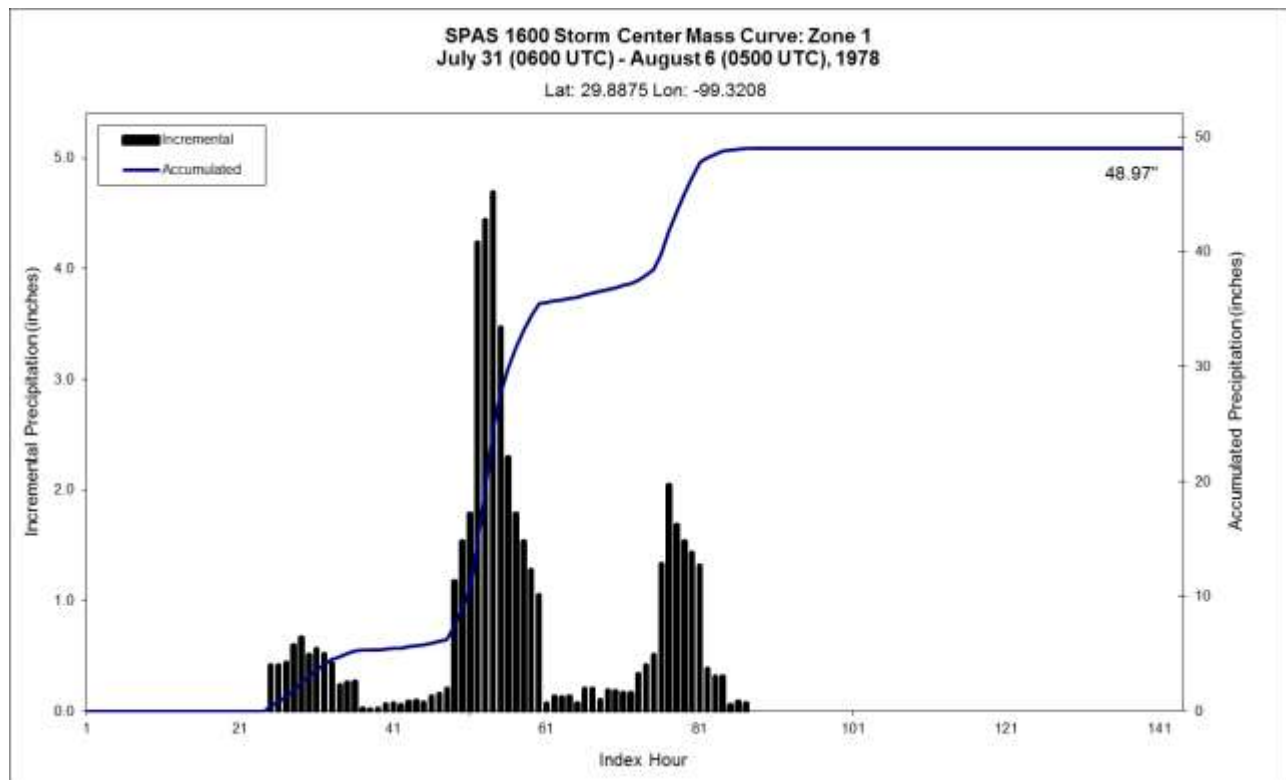


Figure 433: Mass curve chart for Medina, TX August 1978

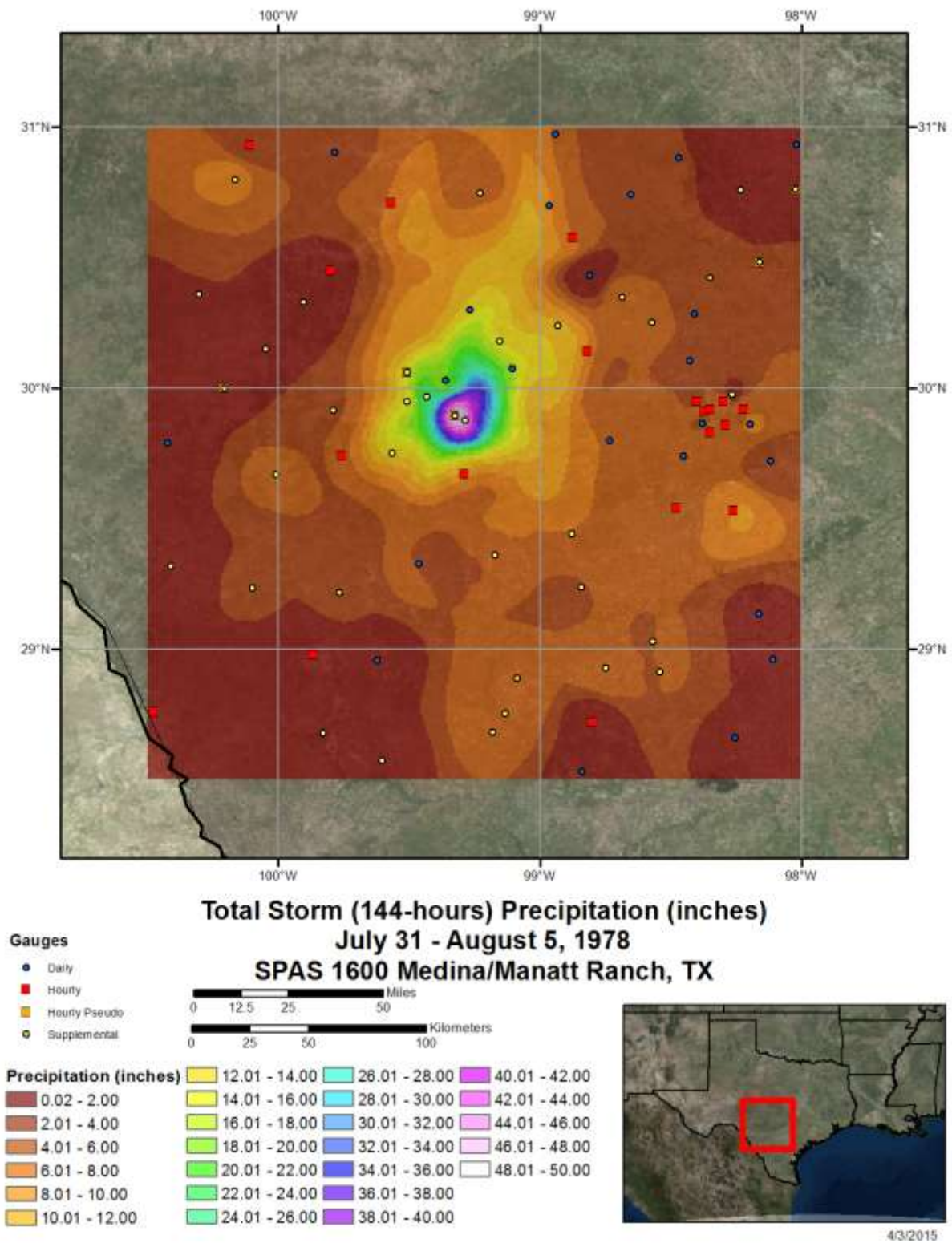


Figure 434: Total storm isohyetal analysis for Medina, TX August 1978

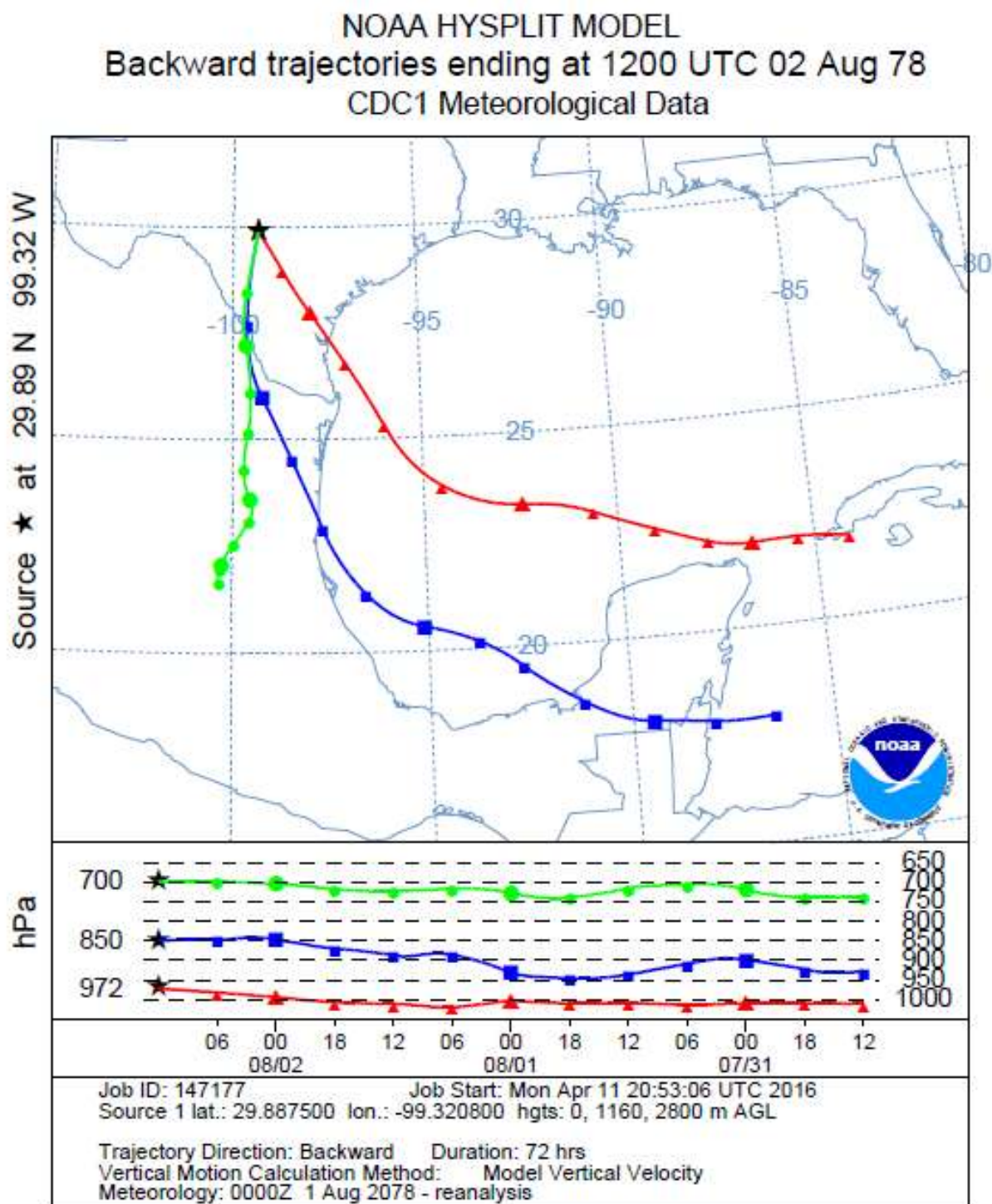


Figure 435: HYSPLIT trajectory analysis at Surface, 850mb and 700mb for Medina, TX August 1978

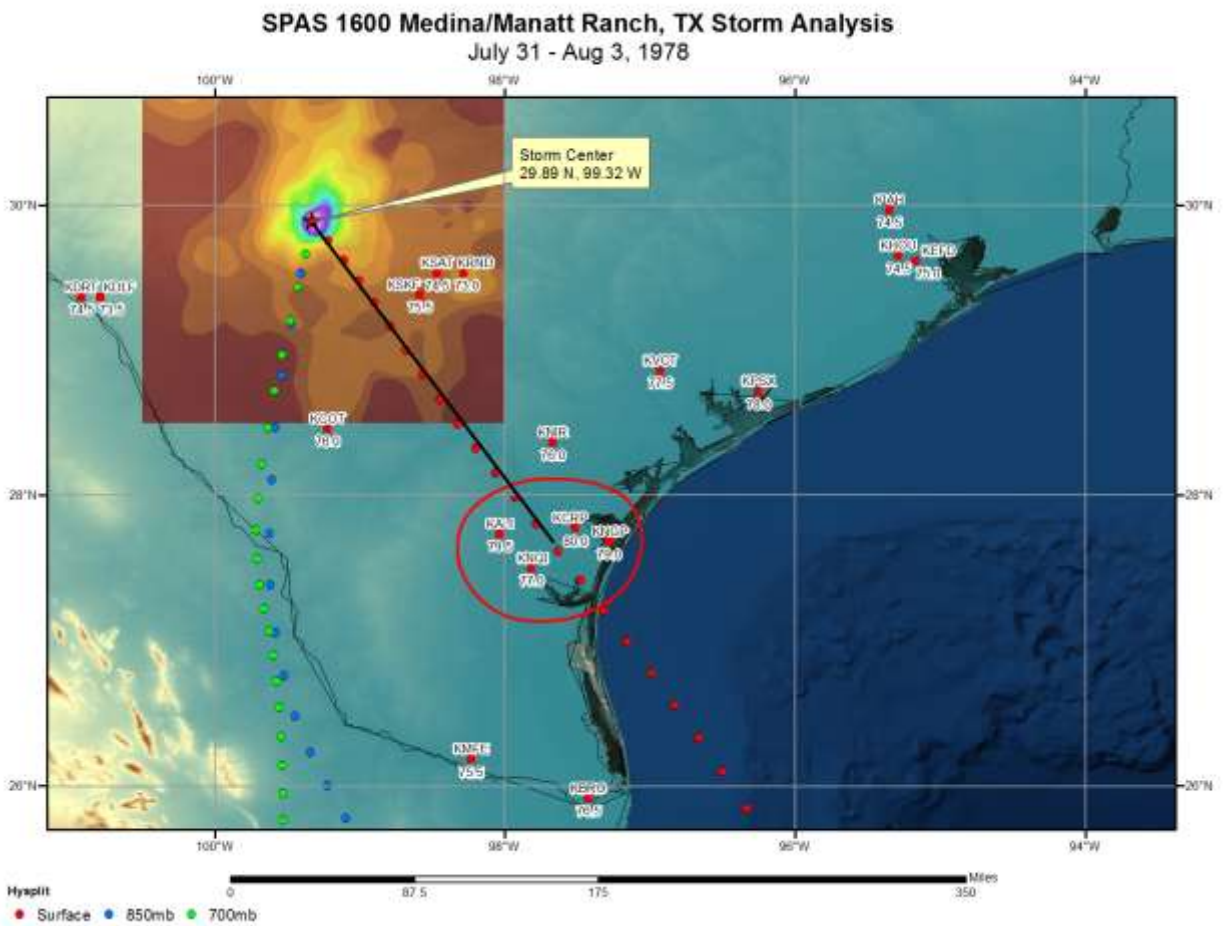


Figure 436: In-place storm representative dew point analysis for Medina, TX July 31 – August 3, 1978

Storm Precipitation Analysis System (SPAS) For Storm #1179

General Storm Location: Albany, Texas

Storm Dates: July 31 - August 6, 1978

Event: Tropical Storm Remnants

Zone 1

Latitude: 32.7375

Longitude: -99.3292

Max. Grid Rainfall Amount: 32.51"

Max. Observed Rainfall Amount: 32.50" at 3W ALBANY TX

Number of Stations: **94** (35 Daily, 29 Hourly, 6 Hourly Pseudo, and 24 Supplemental)

SPAS Version: 8.5

Base Map Used: Yes, basemap was based off of isohyetal: SPAS_1179_total_Storm_Basemap

Spatial resolution: 00:00:30 (0.3 sq. miles)

Radar Included: No

Depth-Area-Duration (DAD) analysis: Yes

SPAS Storm ID	NAME	LON	LAT	ELEV Round	Storm Representative				Climatological Maximum				IPMF
					T _d	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	T _d	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	
1179_1	ALBANY	-99.350	32.726	1,500	78.00	3.29"	0.41"	2.880	80.0	3.60"	0.43"	3.170	1.10

Storm 1179 - July 31 (0600 UTC) - August 6 (0500 UTC), 1978														
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)														
Area (mi ²)	Duration (hours)													
	1	2	3	4	5	6	12	18	24	36	48	72	96	120
0.3	12.43	16.42	18.46	19.70	20.87	21.86	27.09	27.09	30.47	32.15	32.33	32.43	32.44	32.51
1	12.32	16.29	18.29	19.53	20.68	21.66	26.93	26.93	30.31	31.98	32.15	32.25	32.25	32.26
10	11.72	15.50	17.48	18.65	19.80	20.75	26.53	26.53	29.90	31.55	31.71	31.79	31.80	31.80
25	10.96	14.52	16.38	17.51	18.59	19.51	26.12	26.12	29.74	31.38	31.53	31.62	31.62	31.62
50	9.95	13.20	14.92	15.96	16.99	17.84	25.41	25.41	29.11	30.74	30.91	31.01	31.02	31.02
100	8.44	11.23	12.74	13.66	14.57	15.32	23.85	23.85	27.57	29.23	29.44	29.56	29.57	29.57
150	7.40	9.86	11.17	12.02	12.81	13.49	22.37	22.37	26.10	27.84	28.12	28.28	28.28	28.29
200	6.68	8.90	10.10	10.87	11.61	12.25	21.12	21.12	24.69	26.49	26.90	27.10	27.10	27.11
300	5.72	7.65	8.71	9.42	10.09	10.65	18.95	18.95	22.44	24.41	25.35	25.56	25.51	25.52
400	5.11	6.84	7.79	8.46	9.09	9.61	17.32	17.32	20.85	23.17	24.31	24.51	24.45	24.45
500	4.65	6.27	7.12	7.76	8.36	8.85	16.12	16.12	19.64	22.29	23.53	23.73	23.71	23.72
1,000	3.35	4.56	5.18	5.78	6.29	6.69	12.42	12.42	16.11	19.43	20.78	21.03	21.05	21.05
2,000	2.15	2.95	3.54	4.07	4.47	4.86	8.80	8.80	12.46	15.84	17.22	17.67	17.69	17.70
5,000	0.56	1.06	1.43	1.82	2.15	2.71	4.87	4.87	7.84	10.77	12.14	12.88	12.90	12.91
10,000	0.43	0.82	1.05	1.37	1.67	1.97	3.36	3.36	5.32	7.67	8.59	9.31	9.35	9.37
20,000	0.31	0.60	0.74	0.98	1.17	1.36	2.31	2.31	3.37	4.89	5.57	6.26	6.33	6.35
31,010	0.22	0.31	0.54	0.64	0.49	0.95	1.27	1.27	2.35	3.57	3.62	2.26	4.74	4.75

Figure 437: Depth-area-duration values for Albany, TX August 1978

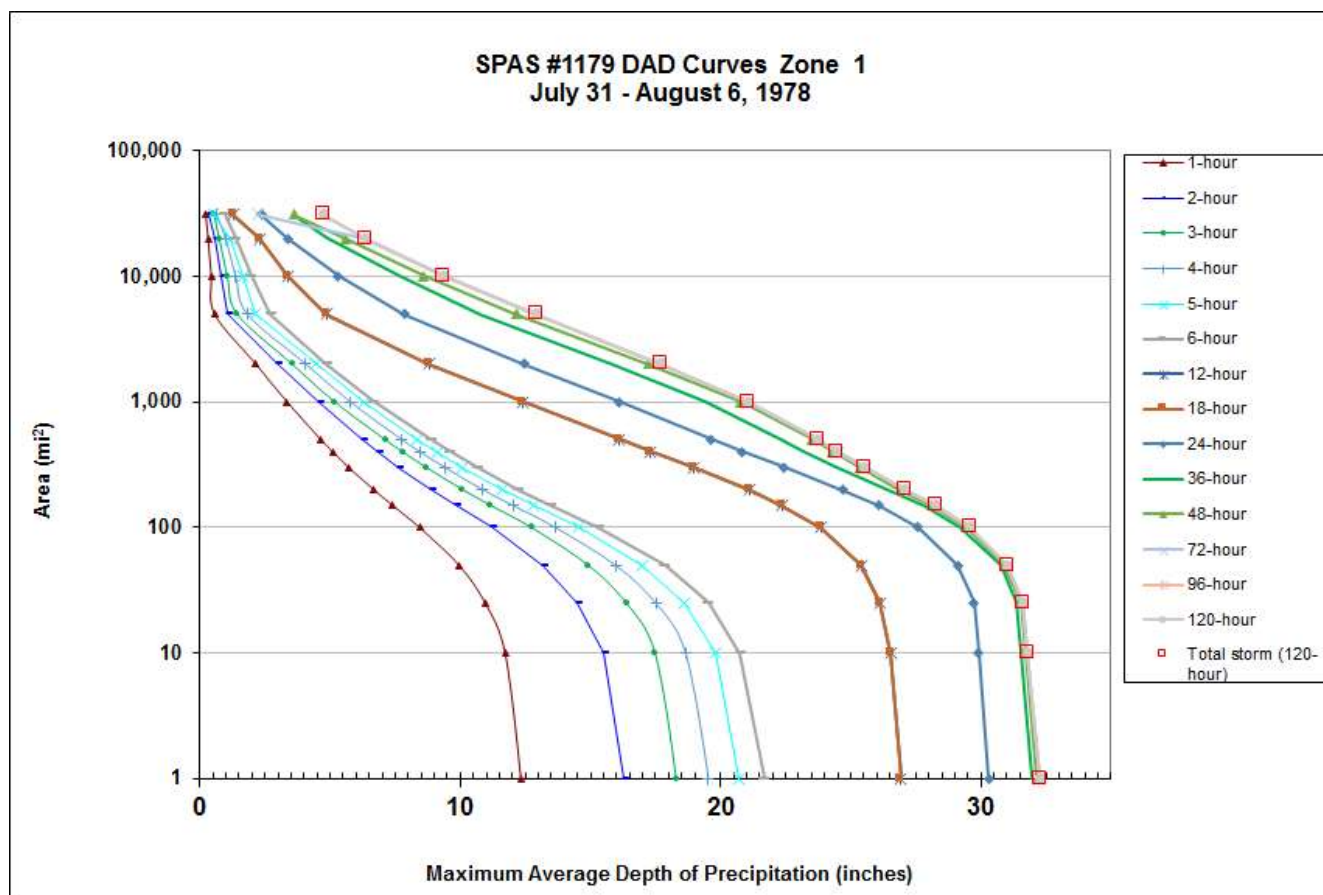


Figure 438: Depth-area-duration chart for Albany, TX August 1978

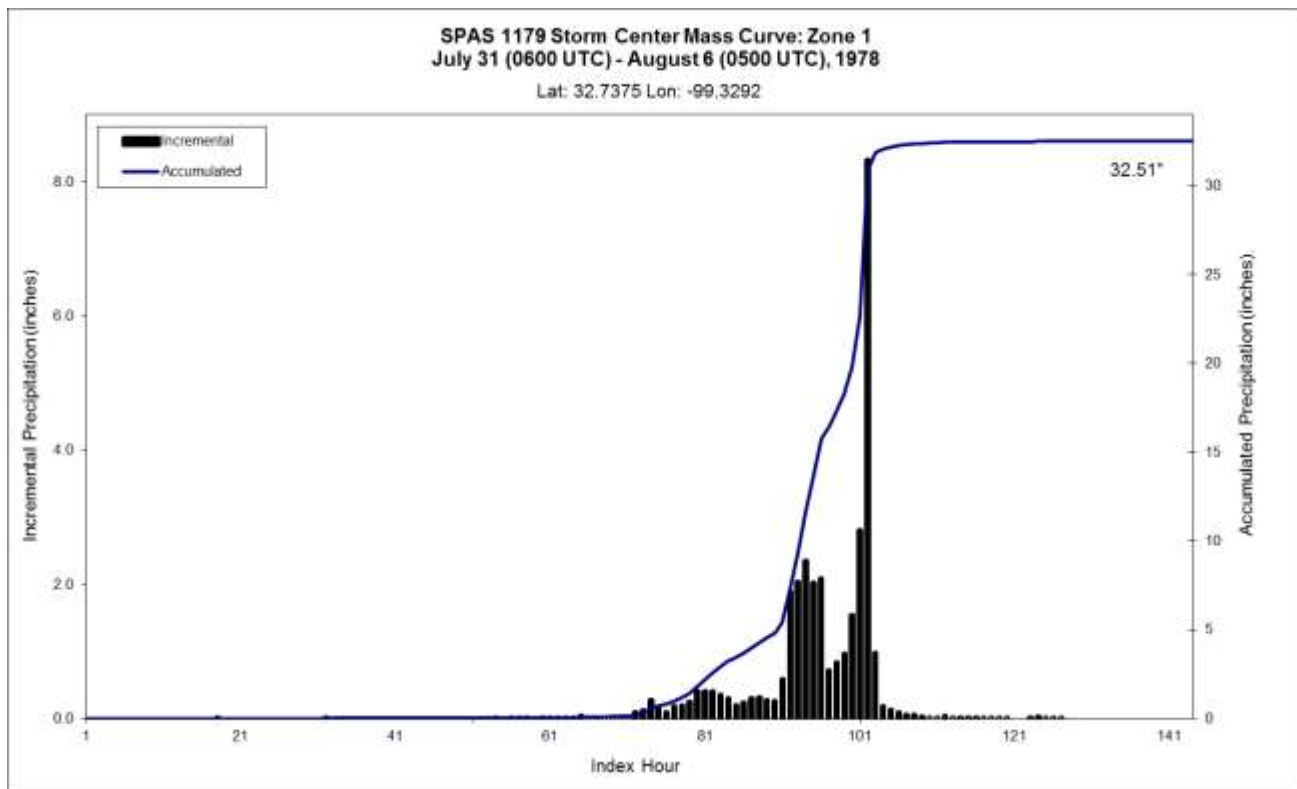


Figure 439: Mass curve chart for Albany, TX August 1978

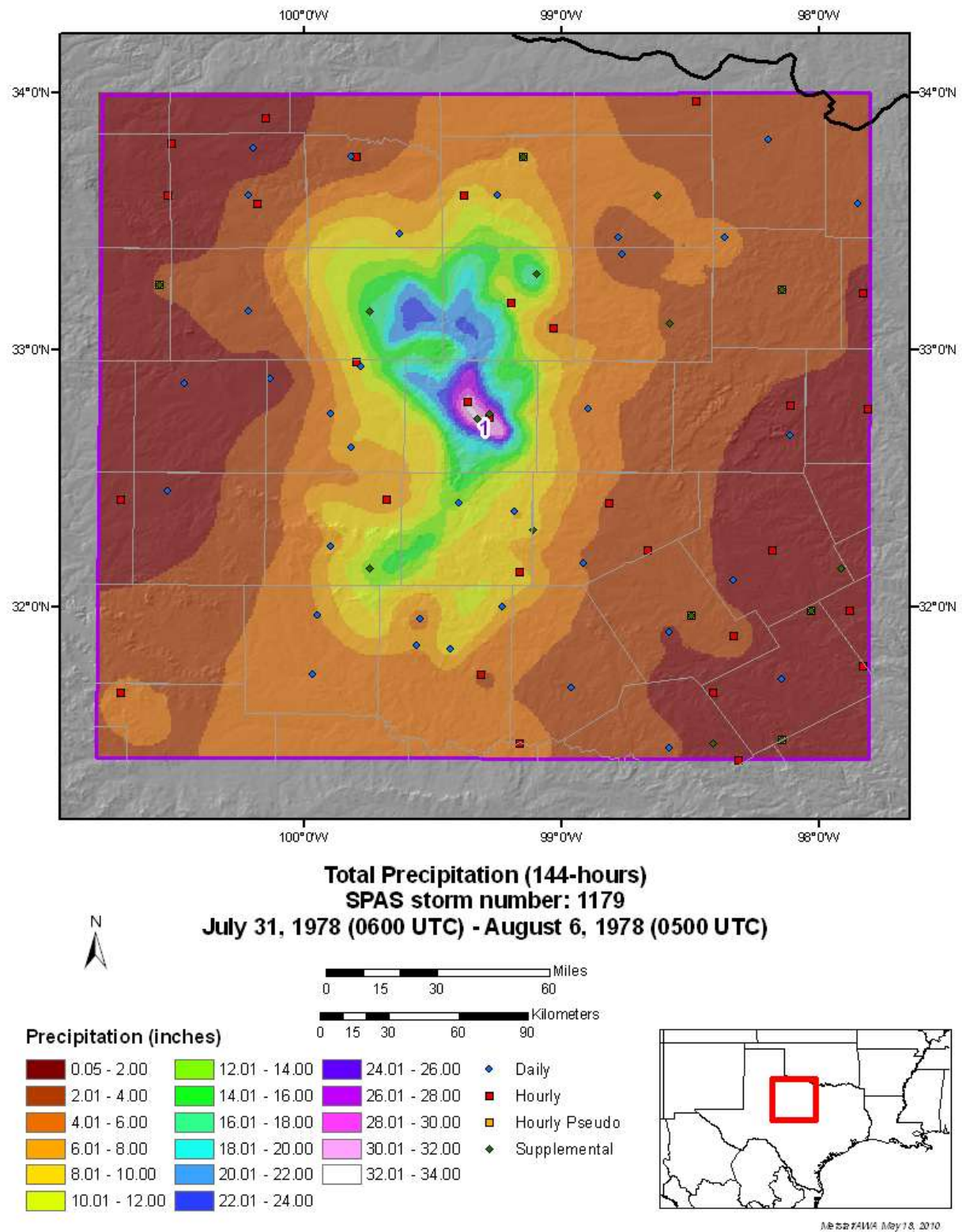


Figure 440: Total storm isohyetal analysis for Albany, TX August 1978

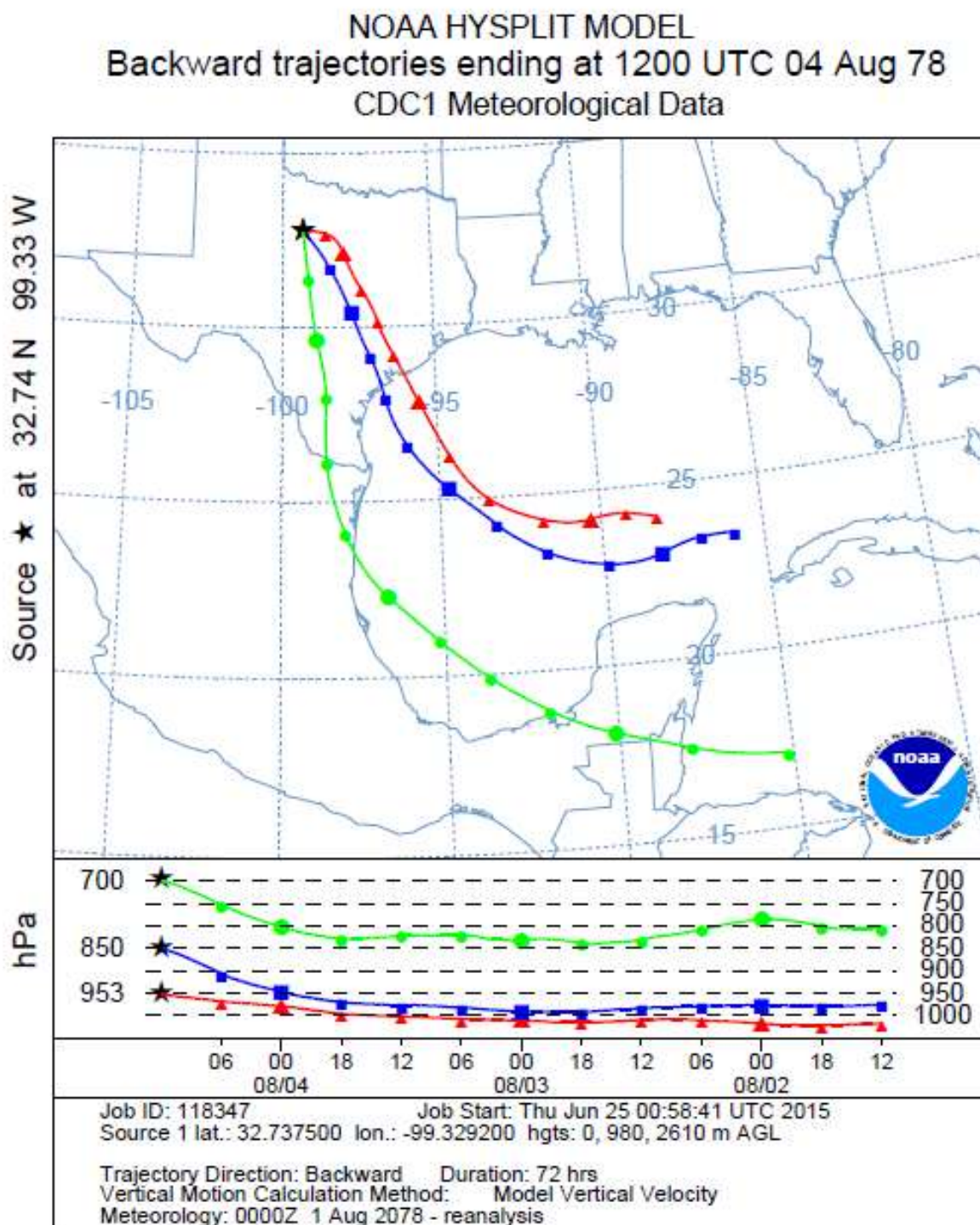


Figure 441: HYSPLIT trajectory analysis at Surface, 850mb and 700mb for Albany, TX August 1978

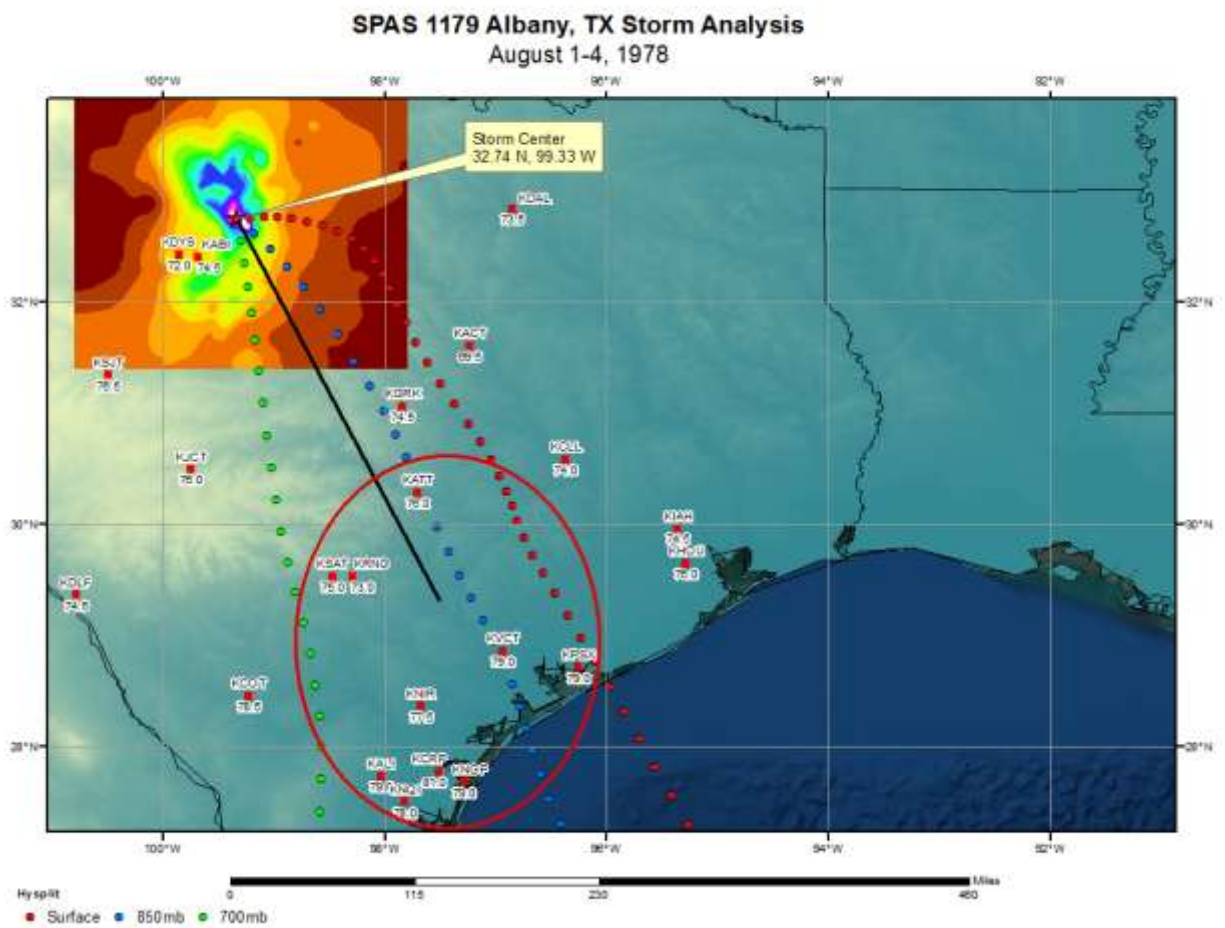


Figure 442: In-place storm representative dew point analysis for Albany, TX August 1-4, 1978

Storm Precipitation Analysis System (SPAS) For Storm #1463

General Storm Location: Alvin, TX (Tropical Storm Claudette)

Storm Dates: July 23-27, 1979

Event: Tropical Storm Claudette

DAD Zone 1

Latitude: 29.4292

Longitude: -95.2708

Max. Grid Rainfall Amount: 45.49"

Max. Observed Rainfall Amount: 45.00"

Number of Stations: 560 (299 Daily, 80 Hourly, 18 Hourly Pseudo, and 163 Supplemental)

SPAS Version: 10.0

Basemap: Blended NWS total storm map and PRISM July 1971-2000 Precipitation Climatology

Spatial resolution: 0:00:30 second ($\sim 0.3 \text{ mi}^2$)

Radar Included: No

Depth-Area-Duration (DAD) analysis: Yes

Reliability of results: This analysis was based on hourly data, daily data, supplemental station data and bucket survey data. Hourly station FM528 Clear Creek near Friendswood was digitized from the NWS report. Bucket survey rainfall timing and magnitude at the storm center (Alvin, TX) were diligently recorded and utilized in the SPAS storm analysis. We have a good degree of confidence in the station based storm total results, the spatial pattern is dependent on the station data and the NWS basemap, the timing is based on hourly and hourly pseudo stations.

SPAS Storm ID	NAME	LON	LAT	ELEV Round	Storm Representative				Climatological Maximum				IPMF
					T_g	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	T_g	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	
1463_1	ALVIN	-95.271	29.429	100	85.00	4.48"	0.04"	4.440	86.5	4.77"	0.04"	4.730	1.07

Storm 1463 - July 23 (0700 UTC) - July 28 (0600 UTC), 1979															
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)															
Area (mi ²)	Duration (hours)														
	1	2	3	4	5	6	12	18	24	36	48	72	96	120	Total
0.3	6.44	10.43	13.75	17.03	19.39	20.46	32.42	39.67	42.95	45.33	45.33	45.34	45.35	45.49	45.49
1	6.39	10.35	13.64	16.89	19.23	20.30	32.15	39.34	42.58	44.95	44.95	44.95	44.97	44.97	44.97
10	6.25	10.11	13.35	16.50	18.81	19.86	30.42	37.19	40.13	42.24	42.30	42.38	42.42	42.40	42.40
25	6.08	9.84	13.03	16.08	18.32	19.35	27.85	33.93	36.14	37.69	37.88	38.17	38.37	38.38	38.38
50	5.88	9.56	12.72	15.64	17.79	18.80	25.92	31.46	33.12	34.34	34.59	35.22	35.60	35.62	35.62
100	5.59	9.17	12.22	15.01	17.05	18.03	24.01	29.10	30.45	31.33	31.77	32.94	33.86	33.93	33.93
150	5.40	8.86	11.79	14.51	16.48	17.43	22.91	27.79	28.86	29.60	30.27	31.67	32.88	32.97	32.97
200	5.22	8.60	11.43	14.08	15.99	16.91	22.00	26.65	27.69	28.42	29.27	30.80	32.20	32.31	32.31
300	4.88	8.05	10.68	13.18	14.98	15.83	20.53	24.94	26.06	26.80	27.91	29.62	31.27	31.40	31.40
400	4.57	7.52	9.97	12.30	13.99	14.78	19.08	23.22	24.65	25.63	26.98	28.81	30.63	30.78	30.78
500	4.25	7.03	9.30	11.47	13.03	13.77	18.01	21.97	23.61	24.76	26.28	28.21	30.14	30.30	30.30
1,000	3.37	5.62	7.40	9.09	10.27	10.82	14.96	18.42	20.50	22.23	23.97	26.23	27.64	27.78	27.78
2,000	2.61	4.44	5.81	7.11	7.96	8.36	12.06	15.12	17.35	19.17	21.38	22.91	24.09	24.22	24.22
5,000	1.66	2.67	3.41	4.16	4.82	5.08	7.81	10.10	12.28	14.96	16.88	17.75	18.83	18.95	18.95
10,000	1.02	1.51	1.95	2.50	2.93	3.17	5.17	7.08	9.13	11.27	12.81	13.63	14.60	14.68	14.68
20,000	0.56	0.85	1.12	1.50	1.78	1.95	3.19	4.11	5.57	7.37	8.49	9.65	10.48	10.54	10.54
50,000	0.25	0.40	0.53	0.68	0.79	0.88	1.60	2.15	2.69	3.74	4.30	4.99	5.40	5.45	5.45
63,986	0.24	0.37	0.50	0.63	0.73	0.82	1.51	2.04	2.55	3.47	3.98	4.72	5.10	5.15	5.15

Figure 443: Depth-area-duration values for Alvin, TX July 1979

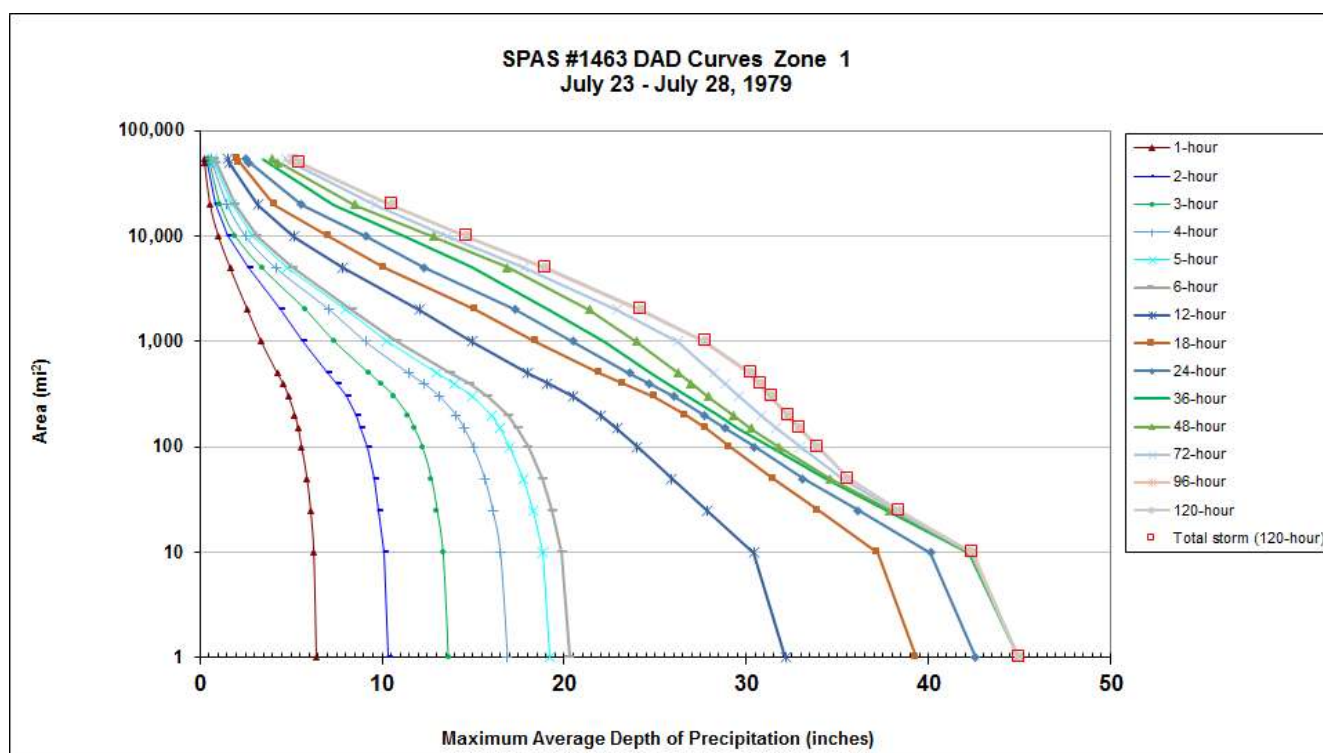


Figure 444: Depth-area-duration chart for Alvin, TX July 1979

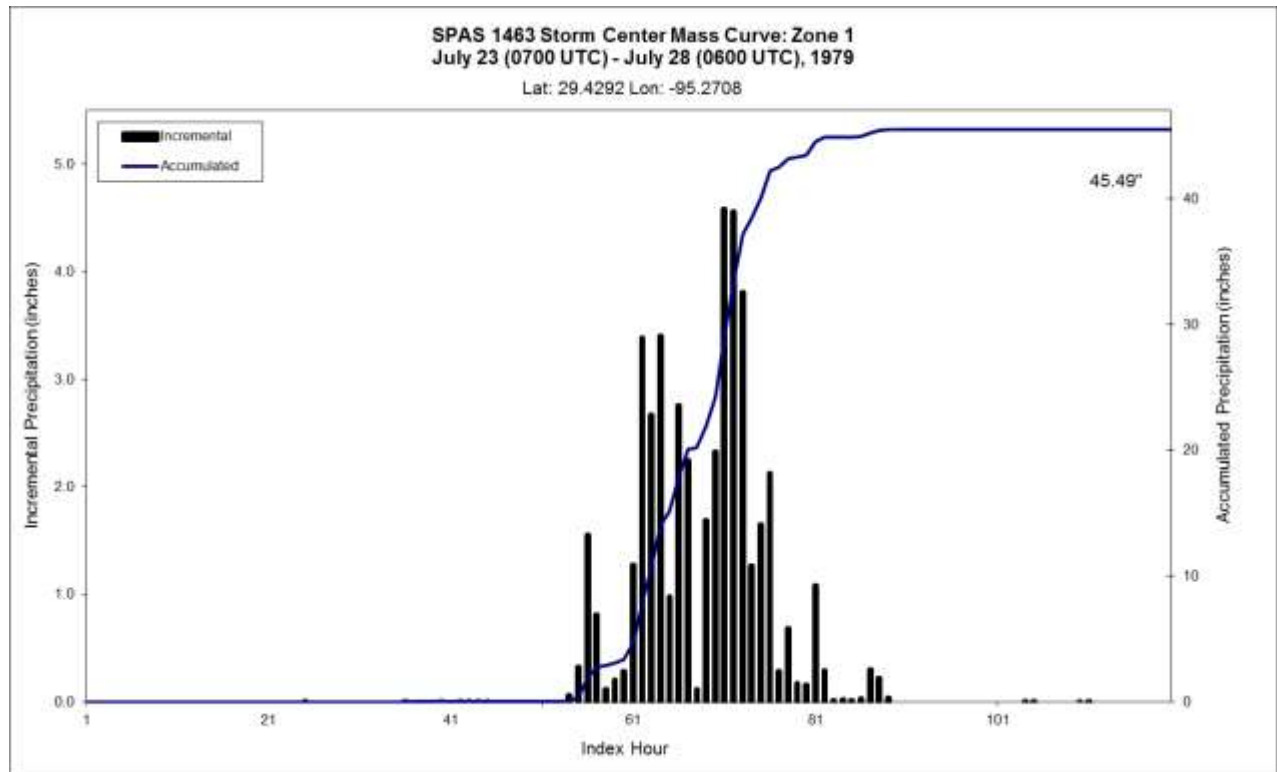
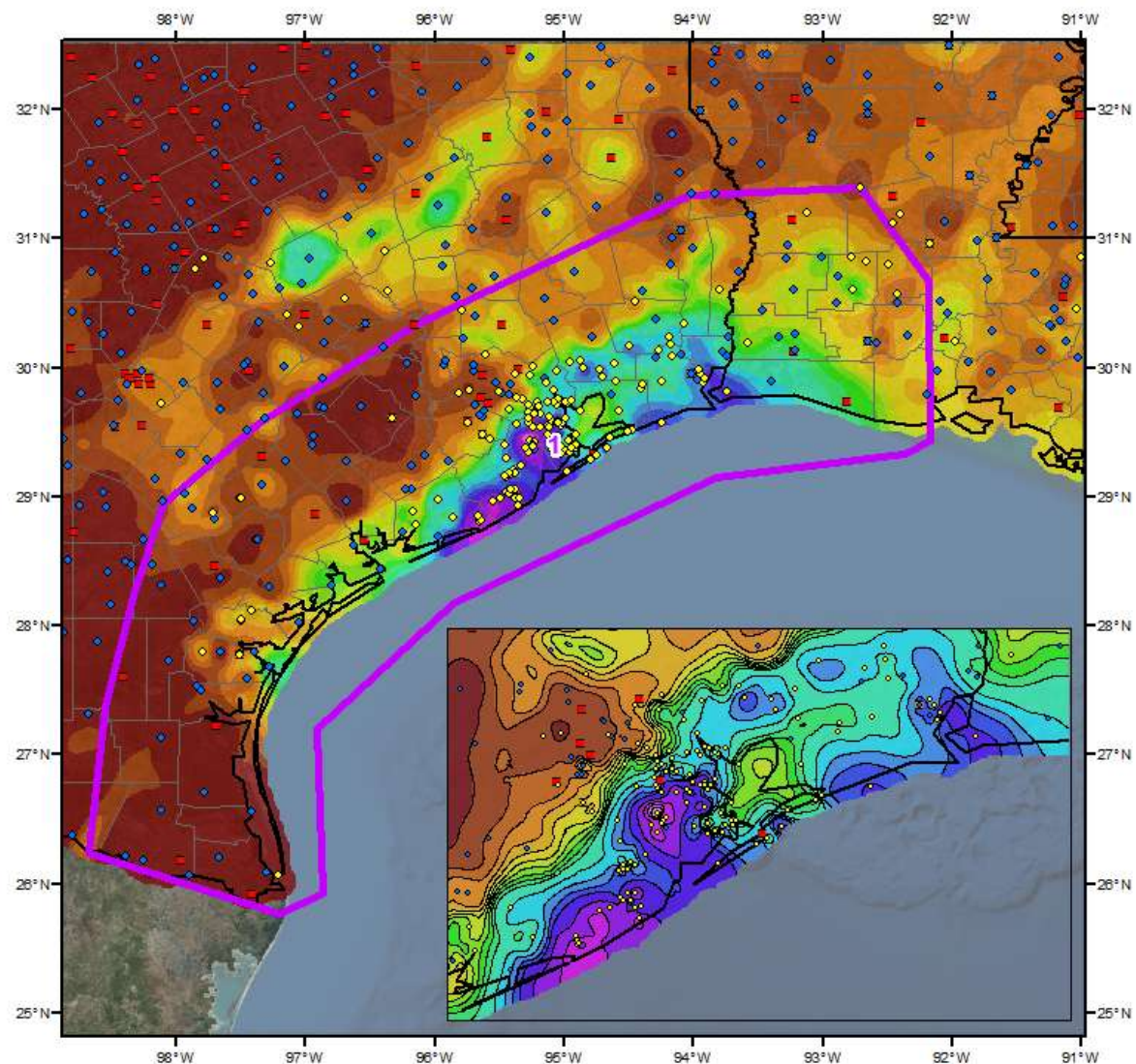


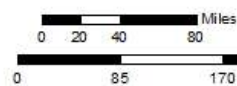
Figure 445: Mass curve chart for Alvin, TX July 1979



Total Storm (120-hr) Precipitation (inches)
07/23/1979 0700 UTC - 07/28/1979 0600 UTC
SPAS- #1463

Gauges

- ◆ Daily
- Hourly
- Hourly Pseudo
- ◆ Supplemental



Precipitation (inches)



2/10/2015

Figure 446: Total storm isohyetal analysis for Alvin, TX July 1979

NOAA HYSPLIT MODEL
 Backward trajectories ending at 0600 UTC 26 Jul 79
 CDC1 Meteorological Data

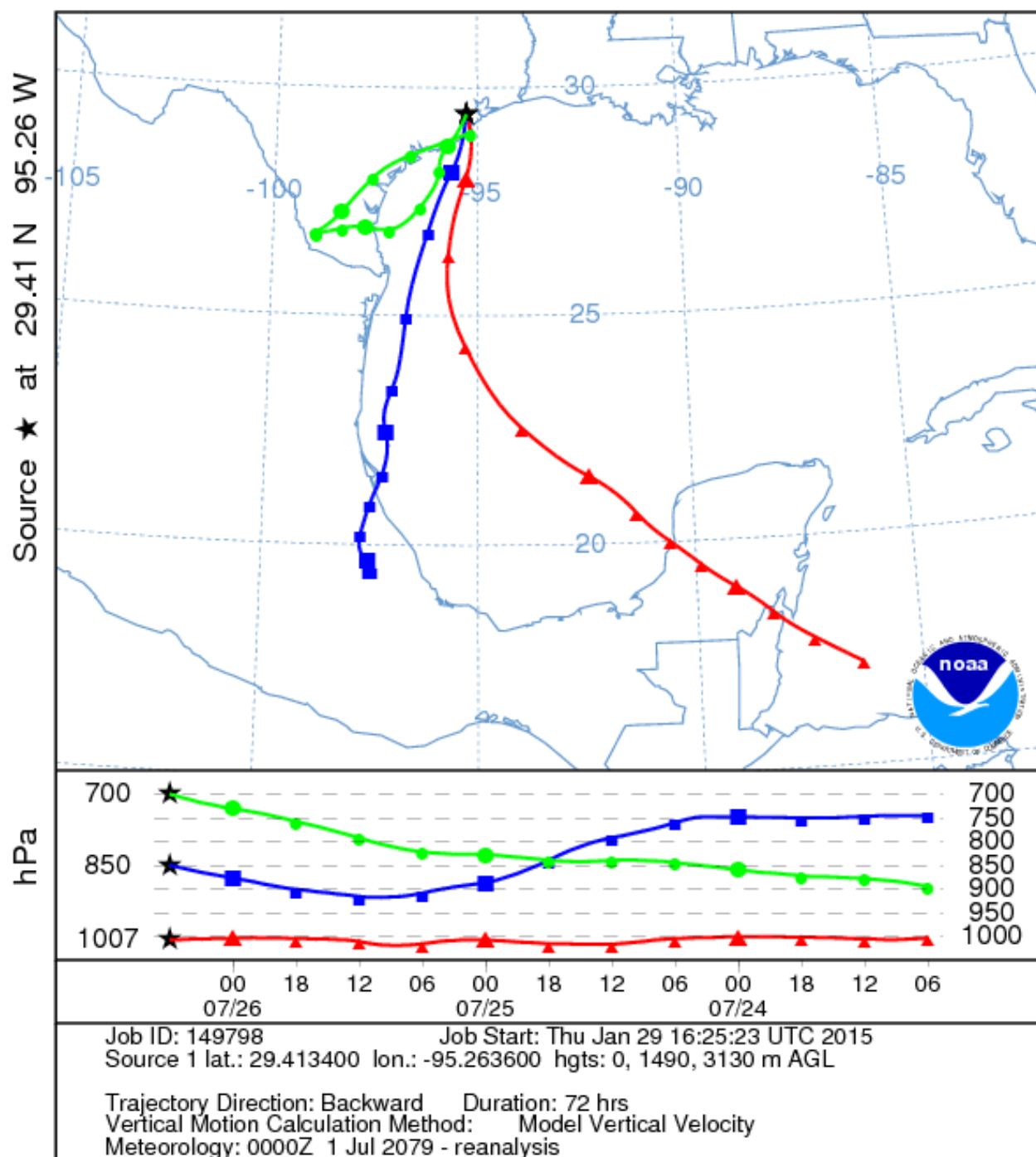


Figure 447: HYSPLIT trajectory analysis at Surface, 850mb and 700mb for Alvin, TX July 1979

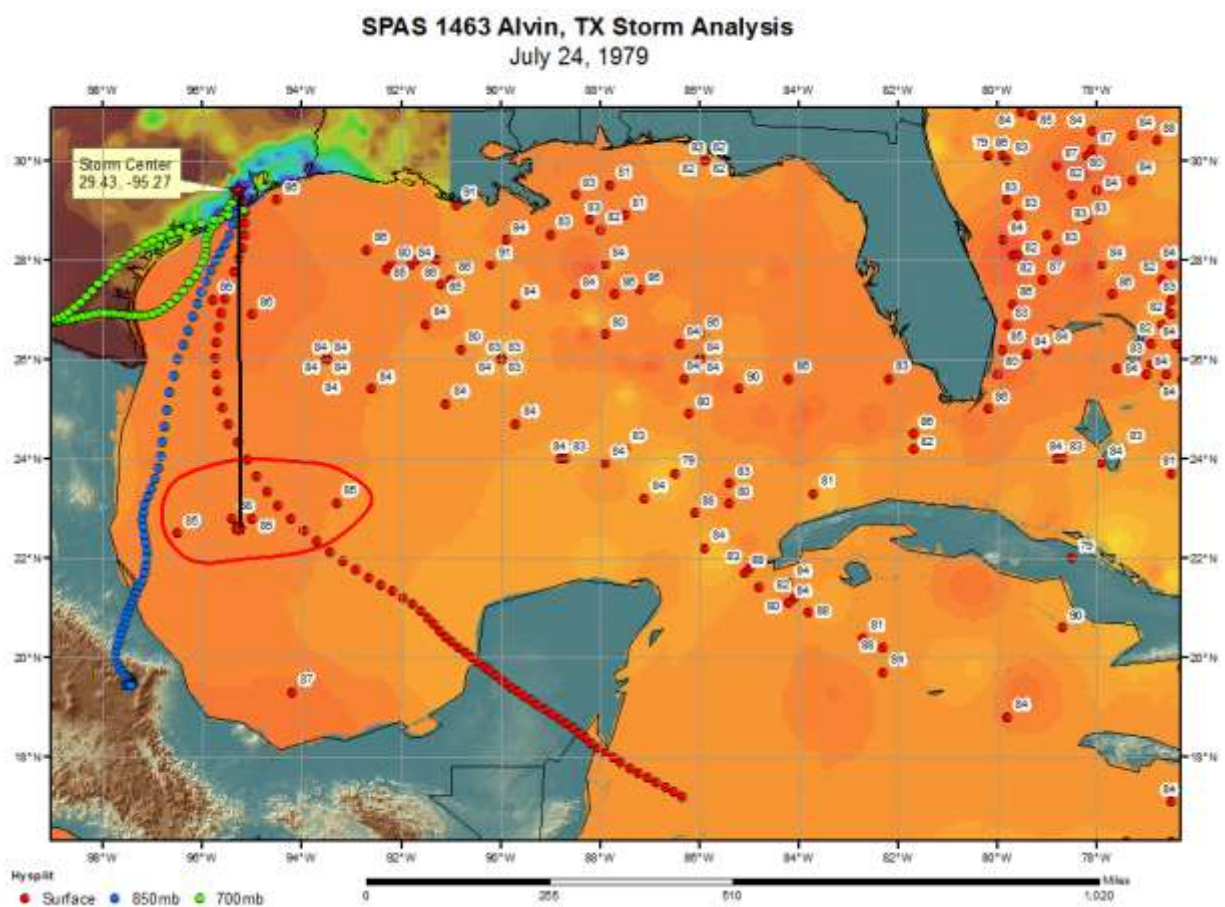


Figure 448: In-place storm representative SST analysis for Alvin, TX July 24, 1979

Storm Precipitation Analysis System (SPAS) For Storm #1184

General Storm Location: North-central Texas and southeastern Oklahoma

Storm Dates: October 10 1400 UTC - October 14, 1981 1100 UTC (CPP: 93 hours)

Event: Synoptic + hurricane Norma remnants

Zone 1

Latitude: 32.479

Longitude: -99.479

Max. Grid Rainfall Amount: 23.00"

Max. Observed Rainfall Amount: 23.00"

Number of Stations: 500 (205 Daily, 93 Hourly, 1 Hourly Estimated, 25 Hourly Pseudo, and 170 Supplemental, 6 Supplemental estimated)

SPAS Version: 8.5

Base Map Used: Yes, conus_prism_ppt_in_1971_2000_10

Spatial resolution: 00:00:30 decimal degrees

Radar Included: No

Depth-Area-Duration (DAD) analysis: Yes (1,2,3,4,5,6,12,24,36,48,72,93 hours)

SPAS Storm ID	NAME	LON	LAT	ELEV Round	Storm Representative				Climatological Maximum				IPMF
					T _s	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	T _s	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	
1184_1	CLYDE	-99.479	32.479	2,000	76.00	2.99"	0.50"	2.490	77.5	3.22"	0.53"	2.690	1.08

Storm 1184 - October 10 (1400 UTC) - October 14 (1100 UTC), 1981														
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)														
Area (mi ²)	Duration (hours)													
	1	2	3	4	5	6	12	18	24	36	48	72	96	120
0.3	3.96	5.36	7.30	7.82	9.35	10.41	14.53	14.53	18.59	22.21	22.81	22.94	22.94	23.00
1	3.93	5.33	7.24	7.76	9.29	10.33	14.43	14.43	18.46	22.06	22.66	22.79	22.79	22.79
10	3.85	5.21	7.00	7.61	9.07	10.13	14.18	14.18	18.14	21.89	22.27	22.40	22.40	22.40
25	3.75	5.05	6.87	7.37	8.75	9.75	13.71	13.71	17.58	20.99	21.66	21.82	21.82	21.82
50	3.59	4.90	6.35	7.14	8.38	9.34	13.20	13.20	16.85	20.28	21.09	21.29	21.29	21.29
100	3.38	4.65	6.00	6.77	7.91	8.78	12.44	12.44	15.86	19.46	20.44	20.63	20.63	20.63
150	3.25	4.47	5.76	6.43	7.54	8.31	11.87	11.87	15.24	18.99	19.96	20.15	20.15	20.15
200	3.13	4.31	5.56	6.11	7.23	7.95	11.47	11.47	14.85	18.61	19.61	19.81	19.81	19.81
300	2.94	4.07	5.28	5.73	6.83	7.42	10.84	10.84	14.31	18.00	18.99	19.22	19.24	19.24
400	2.80	3.91	5.01	5.52	6.52	7.04	10.41	10.41	13.86	17.50	18.56	18.81	18.84	18.84
500	2.69	3.77	4.80	5.34	6.28	6.77	10.08	10.08	13.51	17.12	18.20	18.49	18.53	18.53
1,000	2.36	3.34	4.13	4.64	5.58	5.98	9.13	9.13	12.45	15.83	17.11	17.44	17.48	17.48
2,000	2.04	2.88	3.63	4.08	4.89	5.25	8.36	8.36	11.33	14.64	15.97	16.28	16.31	16.31
5,000	1.49	2.27	2.88	3.32	3.88	4.27	7.11	7.11	9.85	13.12	14.38	14.67	14.70	14.70
10,000	1.09	1.79	2.29	2.73	3.12	3.56	5.92	5.92	8.59	11.60	12.90	13.18	13.20	13.20
20,000	0.70	1.16	1.62	2.00	2.32	2.64	4.68	4.68	7.00	9.46	10.75	11.04	11.05	11.05
50,000	0.31	0.49	0.81	0.94	1.17	1.43	2.75	2.75	4.48	5.51	6.94	7.33	7.34	7.34
124,877	0.14	0.19	0.30	0.44	0.53	0.59	1.26	1.26	2.18	2.56	3.48	4.14	4.15	4.15

Figure 449: Depth-area-duration values for Clyde, TX October 1981

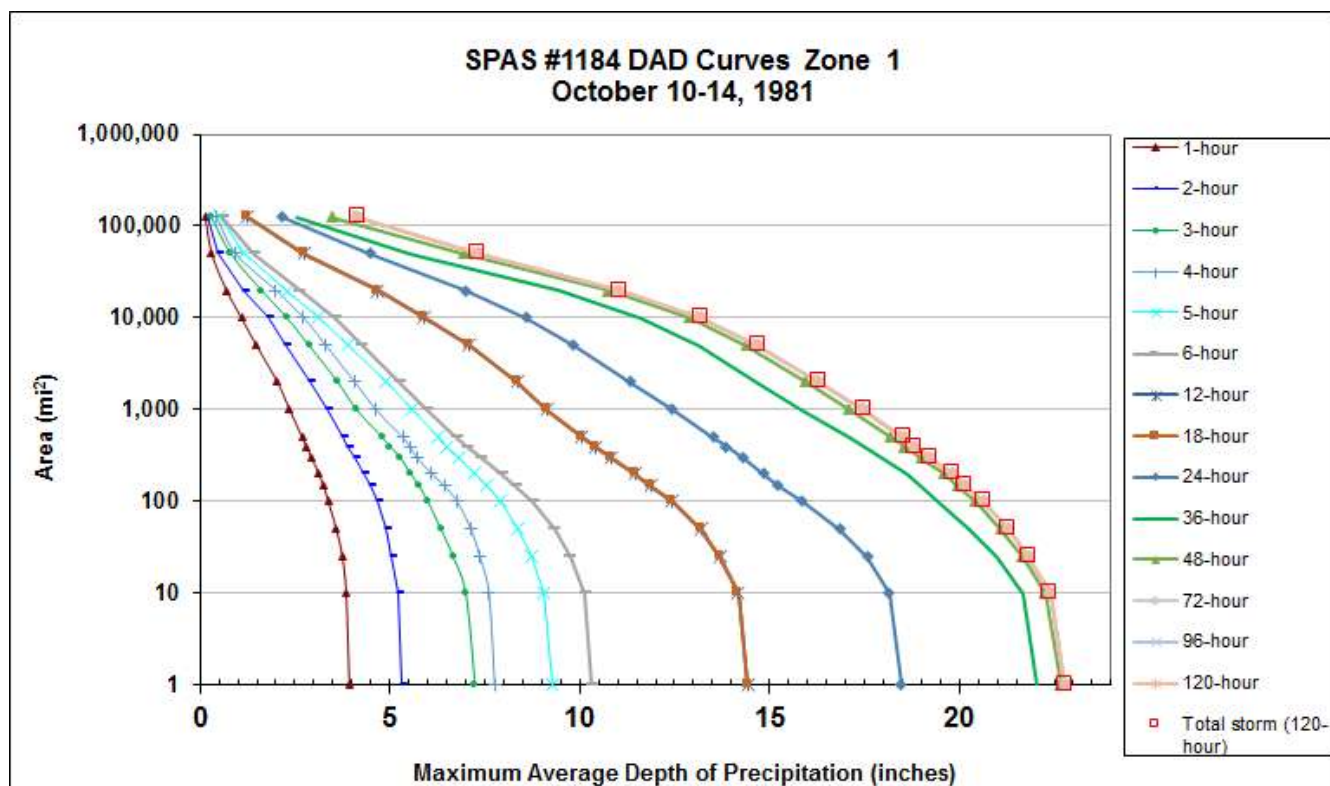


Figure 450: Depth-area-duration chart for Clyde, TX October 1981

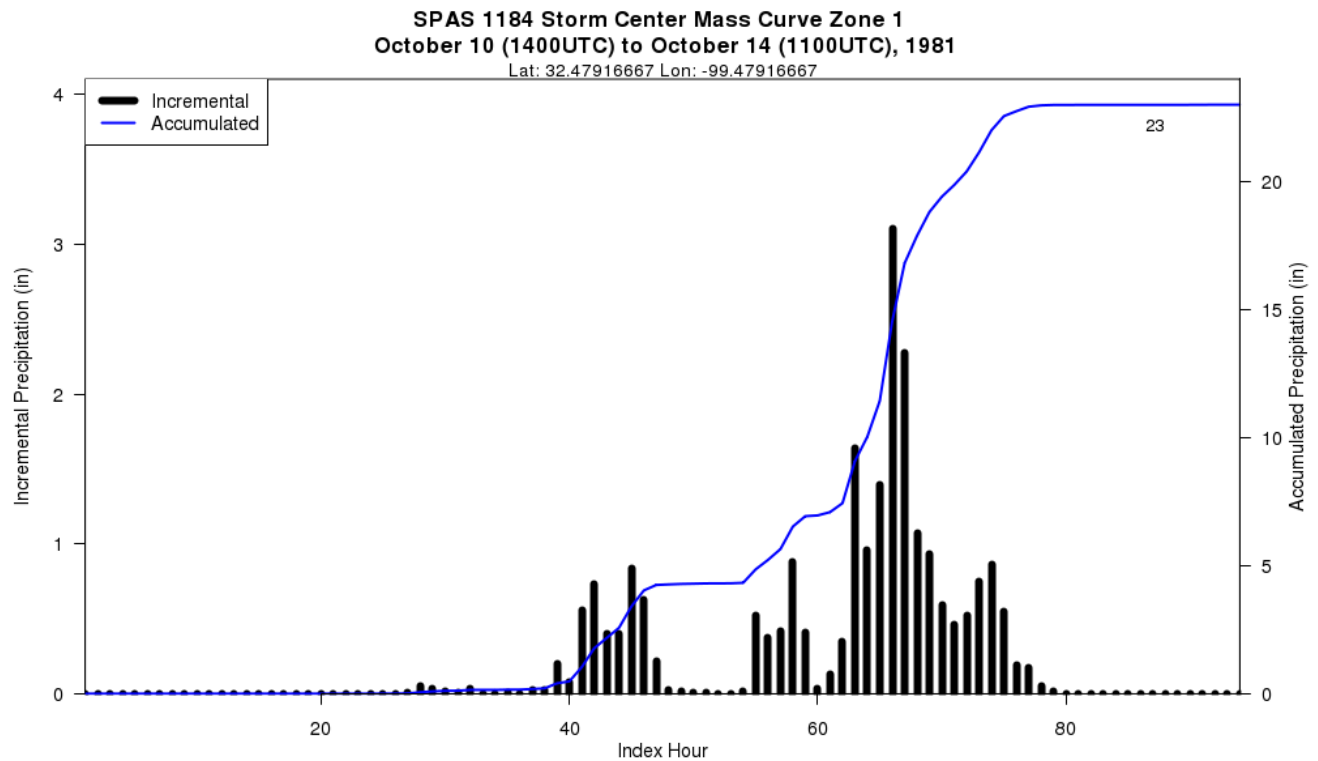
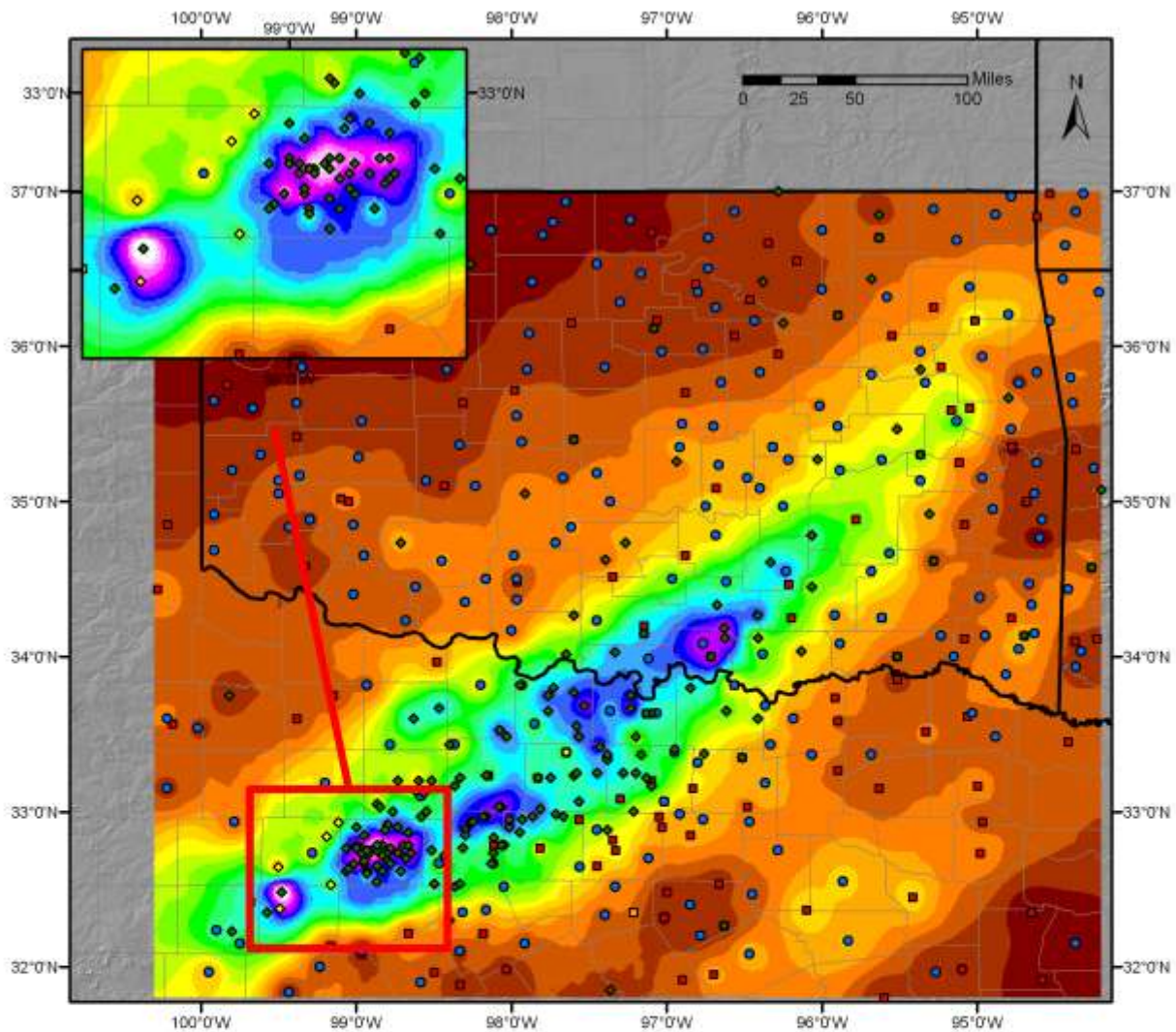


Figure 451: Mass curve chart for Clyde, TX October 1981



Total Precipitation (inches)
SPAS storm number: 1184 - Breckenridge, TX
Lat/Lon box: 37.0 -100.3 31.8 -94.2
October 10 1400 UTC - October 14, 1981 1100 UTC (CPP: 93 hours)

Precipitation (inches)



Melton/AVR May 13, 2010

Figure 452: Total storm isohyetal analysis for Clyde, TX October 1981

**Figure 453: HYSPLIT trajectory and In-place storm representative dew point analysis for Clyde, TX
October 13, 1981**

Storm Precipitation Analysis System (SPAS) For Storm #1317

General Storm Location: Americus, GA

Storm Dates: June 30-July 7, 1994

Event: Tropical Storm Alberto

DAD Zone 1

Latitude: 32.0958

Longitude: -84.2292

Max. Grid Rainfall Amount: 28.09"

Max. Observed Rainfall Amount: 27.85"

Number of Stations: 272 stations (189 daily, 44 hourly, 13 hourly pseudo, and 26 supplemental)

SPAS Version: 9.5

Base Map Used: Digitized NWS Isohyetal Map (storm total Jun 30 - Jul 8, 1994)

Spatial resolution: 30 seconds

Radar Included: No

Depth-Area-Duration (DAD) analysis: Yes

Reliability of Results: This analysis was based on hourly data, daily data, supplemental station data and NWS total storm basemap. We have a good level of confidence in the station based storm total results, the spatial pattern is dependent on the station data and NWS basemap. The timing is based on hourly and hourly pseudo stations.

SPAS Storm ID	NAME	LON	LAT	ELEV Round	Storm Representative				Climatological Maximum				IPMF
					T _s	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	T _s	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	
1317_1	AMERICUS	-84.229	32.096	500	76.00	2.99"	0.13"	2.860	80.0	3.60"	0.15"	3.450	1.21

Storm 1317 - June 30 (0700 UTC) - July 9 (0600 UTC), 1994														
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)														
Area (mi ²)	Duration (hours)													
	1	2	3	4	5	6	12	18	24	36	48	72	96	120
0.3	4.41	8.35	9.93	9.93	9.93	12.76	15.11	18.74	21.20	22.08	24.23	27.53	27.85	28.09
1	4.40	8.35	9.93	9.93	9.93	12.76	15.11	18.74	21.20	22.08	24.23	27.53	27.85	27.96
10	4.35	8.24	9.80	9.80	9.80	12.61	14.92	18.52	20.95	21.81	23.91	27.20	27.51	27.61
25	4.33	8.19	9.73	9.73	9.73	12.53	14.83	18.40	20.81	21.67	23.76	27.02	27.34	27.48
50	4.27	8.12	9.67	9.67	9.67	12.41	14.68	18.24	20.64	21.50	23.63	26.90	27.21	27.37
100	4.14	7.86	9.36	9.36	9.36	12.02	14.20	17.71	20.01	20.88	23.07	26.38	26.72	26.97
150	4.01	7.63	9.10	9.10	9.10	11.66	13.74	17.24	19.44	20.35	22.74	26.05	26.38	26.63
200	3.91	7.44	8.87	8.87	8.87	11.36	13.38	16.84	18.95	20.03	22.42	25.82	26.14	26.39
300	3.73	7.10	8.49	8.49	8.49	10.88	12.77	16.19	18.16	19.58	21.97	25.32	25.71	25.96
400	3.55	6.78	8.11	8.11	8.11	10.37	12.21	15.59	17.43	19.18	21.50	24.94	25.32	25.57
500	3.37	6.45	7.76	7.76	7.76	9.94	11.67	14.95	16.72	18.81	21.10	24.53	24.94	25.21
1,000	2.89	5.17	6.35	6.35	6.35	8.33	9.58	12.60	14.35	17.53	19.49	22.94	23.37	23.65
2,000	2.18	3.84	5.00	5.00	5.00	6.76	7.74	10.47	12.54	16.06	17.64	20.60	21.10	21.69
5,000	1.55	2.35	3.16	3.16	3.16	4.42	5.93	7.99	9.67	12.83	14.33	17.00	18.06	18.74
10,000	1.04	1.66	2.32	2.32	2.32	3.31	4.73	5.85	7.02	9.54	11.07	14.11	15.71	16.37
20,000	0.82	0.97	1.46	1.46	1.46	2.15	3.28	4.32	4.88	6.59	8.04	10.69	12.91	13.49
50,000	0.28	0.45	0.65	0.65	0.65	1.02	1.62	2.17	2.54	3.58	4.55	6.30	7.91	8.52
81,682	0.17	0.28	0.42	0.42	0.42	0.64	1.04	1.44	1.69	2.43	2.98	4.20	5.32	5.74

Figure 454: Depth-area-duration values for Americus, GA June 1994

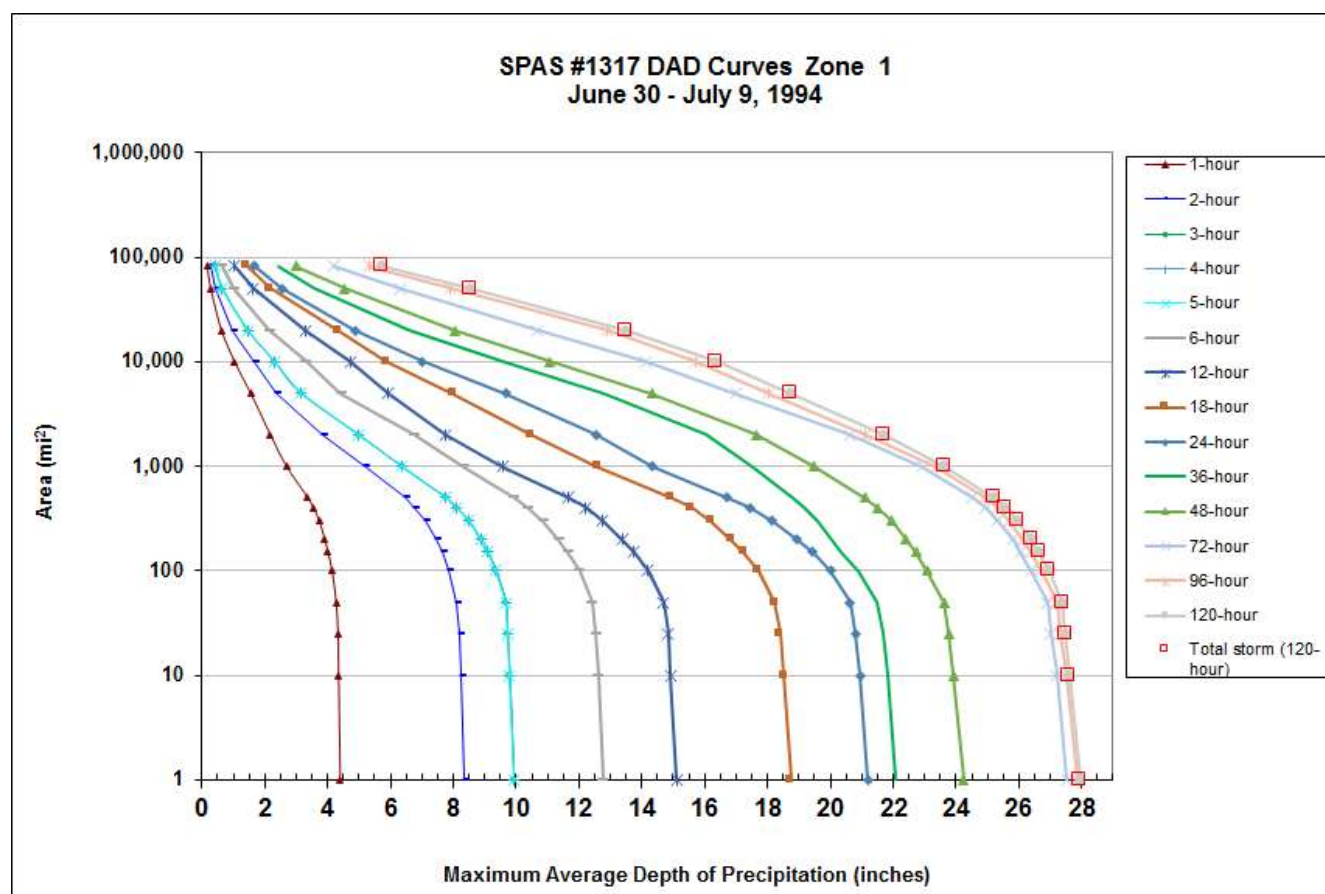


Figure 455: Depth-area-duration chart for Americus, GA June 1994

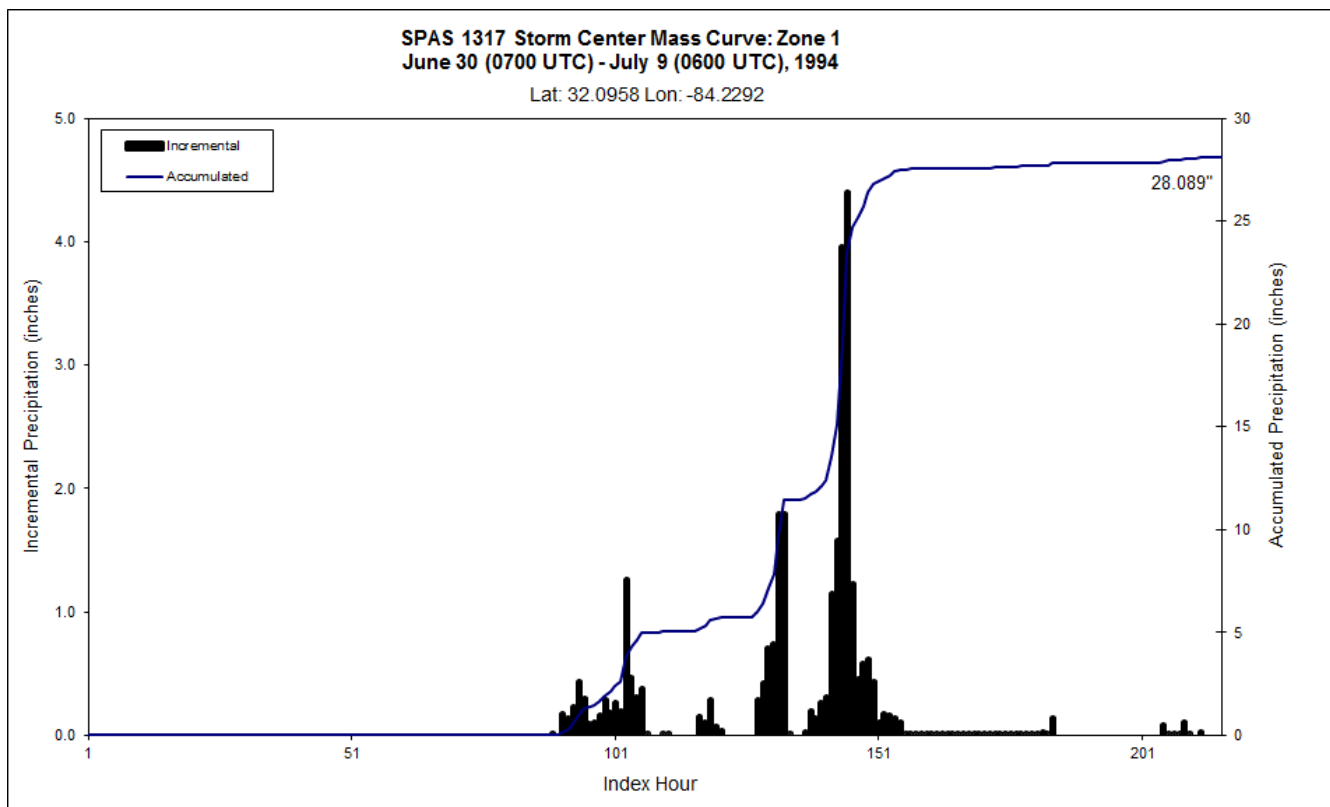


Figure 456: Mass curve chart for Americus, GA June 1994

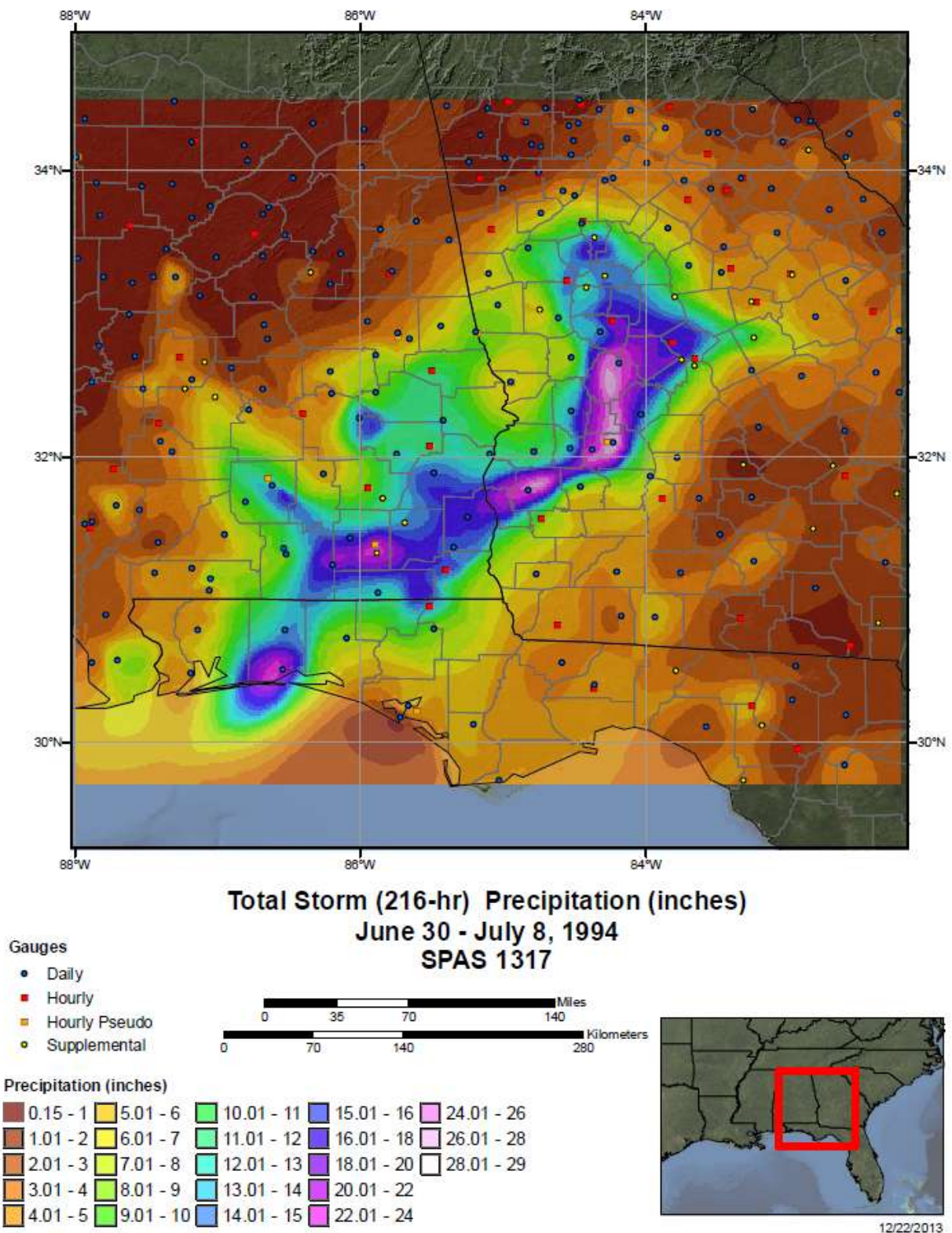


Figure 457: Total storm isohyetal analysis for Americus, GA June 1994

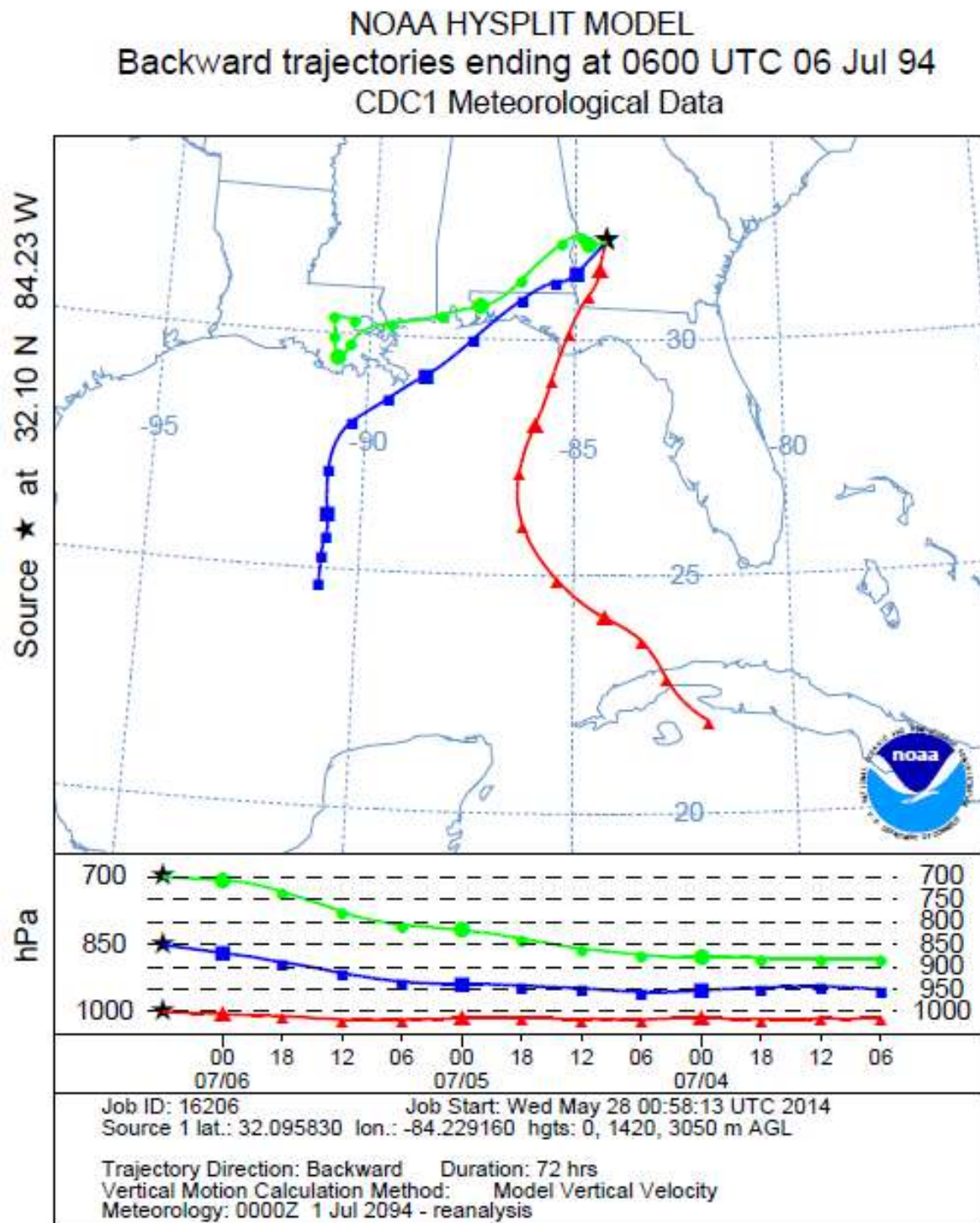


Figure 458: HYSPLIT trajectory analysis at Surface, 850mb and 700mb for Americus, GA June 1994

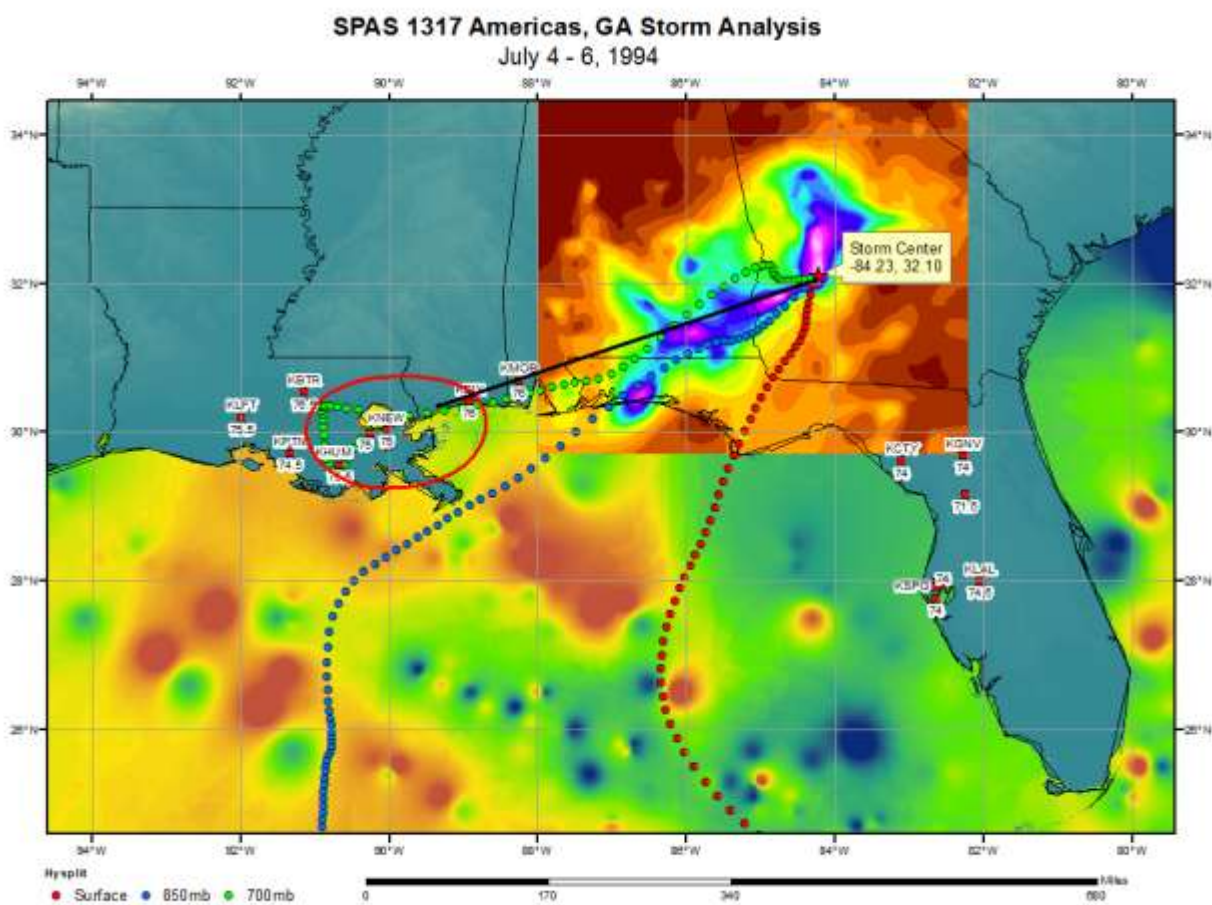


Figure 459: In-place storm representative dew point analysis for Americus, GA July 4-6, 1994

Storm Precipitation Analysis System (SPAS) For Storm #1569

General Storm Location: Alabama, Mississippi, Florida, Louisiana (32.5, -90.0, 28.0, -85.0)

Storm Dates: July 18-20, 1997 (72-hours)

Event: Hurricane Danny

DAD Zone 1

Latitude: 30.315

Longitude: -88.035

Max. Grid Rainfall Amount: 45.27" Dauphin Island, AL

Max. Observed Rainfall Amount: 42.12"

Number of Stations: 132

SPAS Version: 10.0

Base Map Used: Conus_prism_ppt_in_1981_2010_07 and default_zr_ppt

Spatial resolution: 00:00:36

Radar Included: Yes

Depth-Area-Duration (DAD) analysis: Yes

Reliability of Results: This analysis was based on hourly data, hourly pseudo data, daily data, supplemental data, and supplemental estimated station data. We have a high degree of confidence in the station based storm total results, the spatial pattern is dependent on basemap, and the timing is based on hourly and hourly pseudo stations. Radar data was used for this event and had good coverage throughout the storm.

SPAS Storm ID	NAME	LON	LAT	ELEV Round	Storm Representative				Climatological Maximum				IPMF
					T _g	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	T _g	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	
1569_1	DAUPHIN ISLAND	-88.035	30.315	0	85.50	4.58"	0.00"	4.580	87.0	4.86"	0.00"	4.860	1.06

Storm 1569 Zone 1 - Jul. 18 (0000 UTC) - Jul. 20 (2300 UTC), 1997															
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)															
areasqmi	Duration (hours)														
	1	2	3	4	5	6	12	18	24	36	48	72	96	120	Total
0.4	6.22	10.10	12.98	16.37	18.83	20.75	27.49	31.94	37.07	42.90	44.97	45.27	45.27	45.27	45.27
1	6.16	9.99	12.88	16.25	18.69	20.62	27.31	31.71	36.80	42.58	44.66	44.96	44.96	44.96	44.96
10	5.86	9.41	12.42	15.67	18.07	20.03	26.86	31.14	36.12	41.77	43.85	44.15	44.15	44.15	44.15
25	5.45	8.77	11.69	14.73	17.06	19.04	26.69	30.86	35.37	41.23	43.32	43.61	43.61	43.61	43.61
50	5.10	8.11	10.74	13.49	15.75	17.66	26.03	30.10	34.46	40.42	42.48	42.74	42.74	42.74	42.74
100	4.75	7.48	9.55	11.88	14.00	15.73	24.63	28.54	32.68	38.54	40.66	40.90	40.90	40.90	40.90
150	4.54	7.10	8.74	10.88	12.86	14.43	23.32	27.05	30.99	36.65	38.87	39.12	39.12	39.12	39.12
200	4.36	6.75	8.14	10.12	12.03	13.51	22.16	25.70	29.49	34.90	37.20	37.49	37.49	37.49	37.49
300	4.07	6.26	7.31	9.08	10.82	12.08	20.37	23.61	26.96	32.12	34.46	34.76	34.76	34.76	34.76
400	3.86	5.86	6.64	8.33	9.90	11.08	18.98	21.99	25.10	29.96	32.23	32.81	32.81	32.81	32.81
500	3.65	5.57	6.16	7.76	9.22	10.34	17.75	20.60	23.53	28.32	30.57	31.34	31.34	31.34	31.34
1,000	2.85	4.34	4.85	6.11	7.26	8.14	14.12	16.44	19.19	23.52	25.69	27.10	27.10	27.10	27.10
2,000	2.07	3.08	3.73	4.48	5.37	6.06	10.57	12.63	15.36	19.15	21.34	22.85	22.85	22.85	22.85
5,000	1.30	1.88	2.44	2.70	2.96	3.28	6.15	8.00	9.94	12.57	14.38	16.20	16.20	16.20	16.20
10,000	0.81	1.30	1.72	1.92	2.10	2.35	3.82	5.04	6.41	8.54	10.40	12.07	12.07	12.07	12.07
20,000	0.51	0.76	1.04	1.18	1.36	1.56	2.38	3.12	3.96	5.59	7.17	8.98	8.98	8.98	8.98
50,000	0.26	0.38	0.51	0.61	0.68	0.76	1.27	1.69	2.20	3.05	3.92	4.94	4.94	4.94	4.94
76,822	0.17	0.27	0.35	0.41	0.46	0.54	0.88	1.24	1.54	2.24	2.95	3.69	3.69	3.69	3.69

Figure 460: Depth-area-duration values for Dauphin Island, AL July 1997

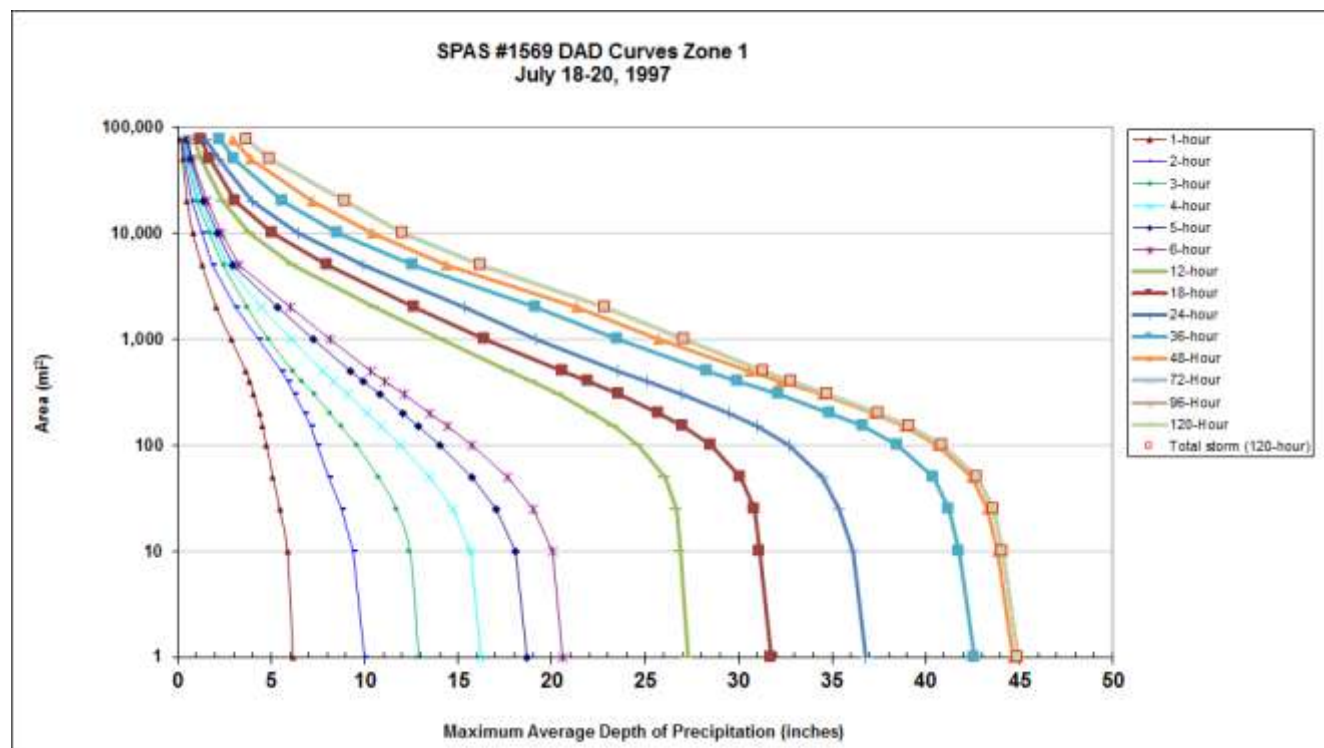


Figure 461: Depth-area-duration chart for Dauphin Island, AL July 1997

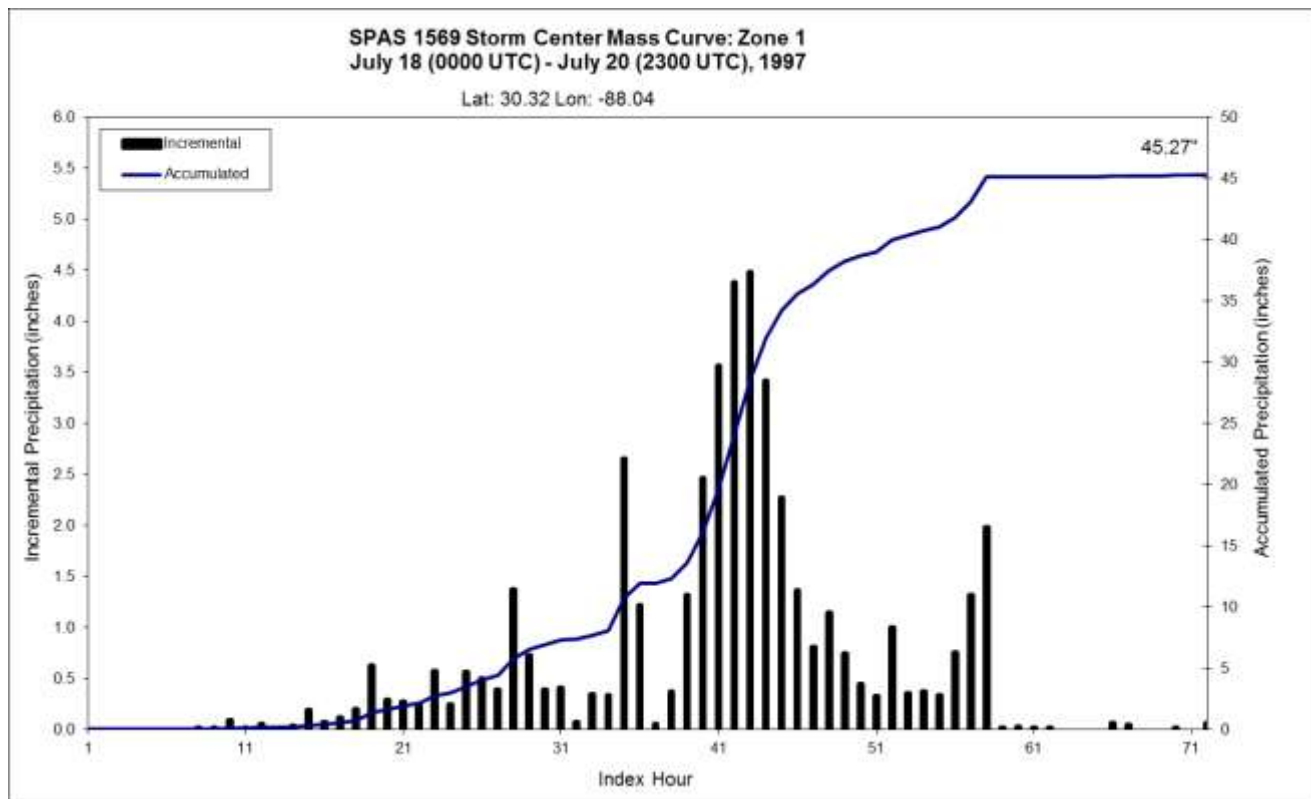


Figure 462: Mass curve chart for Dauphin Island, AL July 1997

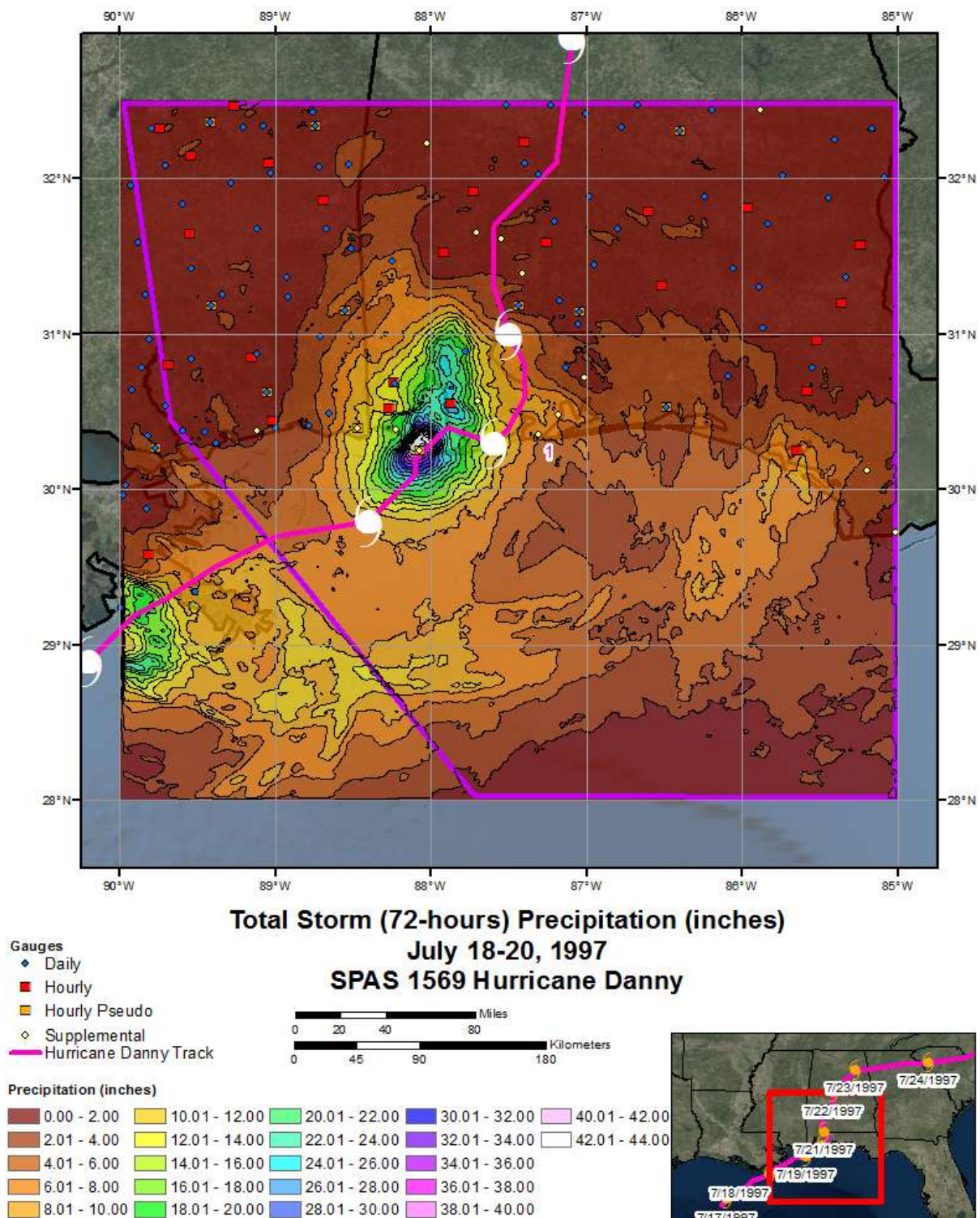


Figure 463: Total storm isohyetal analysis for Dauphin Island, AL July 1997

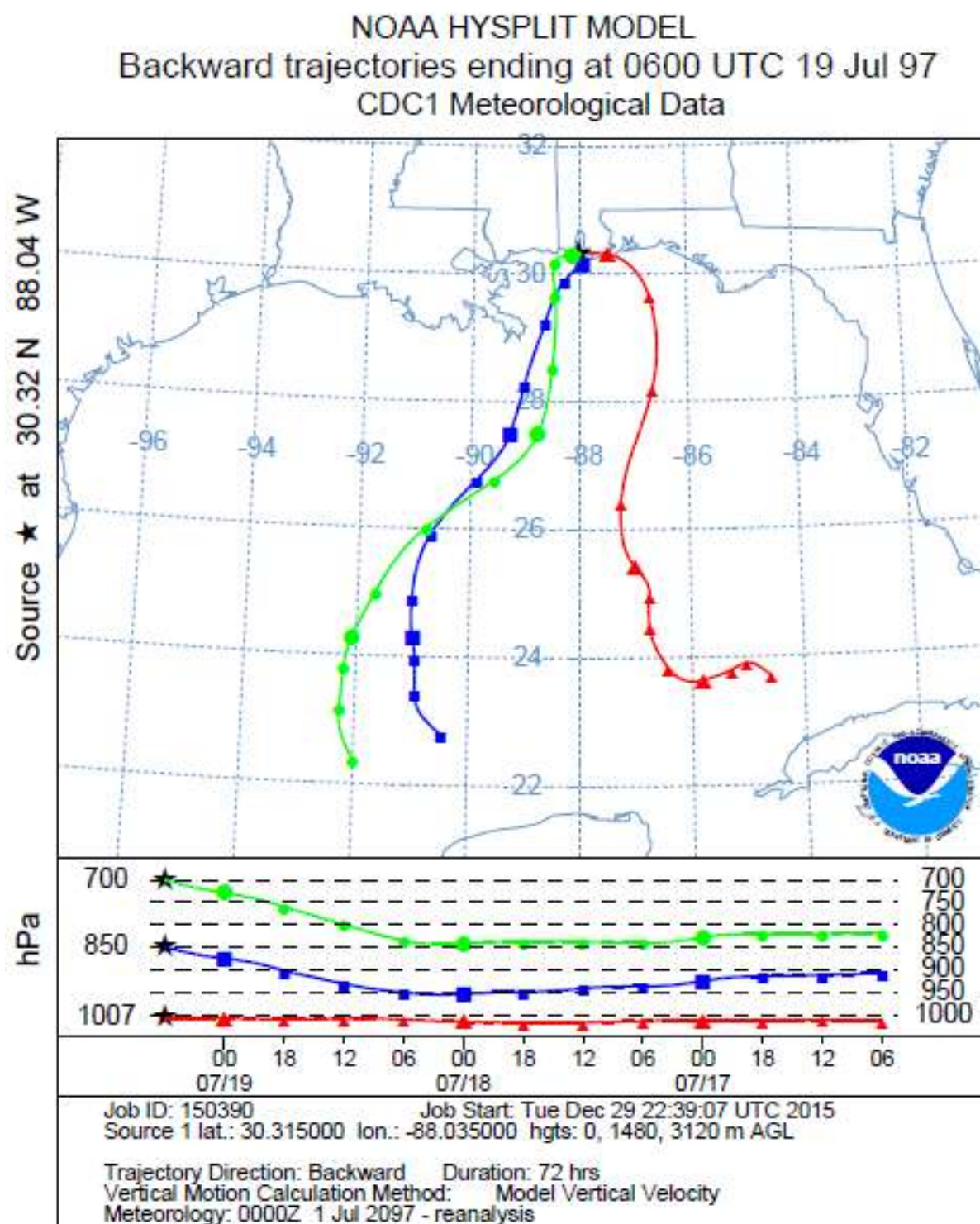


Figure 464: HYSPLIT trajectory analysis at Surface, 850mb and 700mb for Dauphin Island, AL July 1997

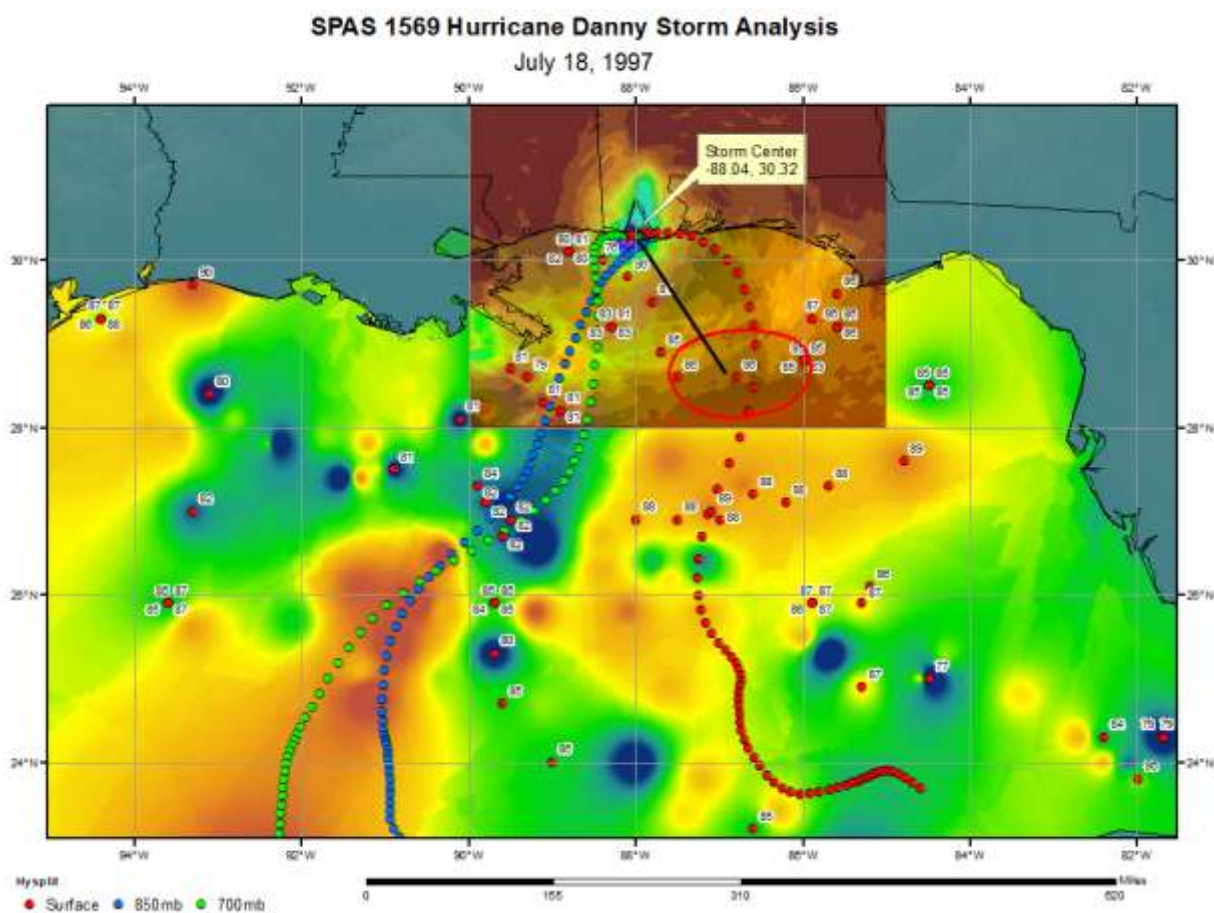


Figure 465: In-place storm representative SST analysis for Dauphin Island, AL July 18, 1997

Storm Precipitation Analysis System (SPAS) For Storm #1593

General Storm Location: Alabama, Mississippi, Florida, Louisiana (33.5, -90.0, 29.0, -84.5)

Storm Dates: September 27-30, 1998 (84-hours)

Event: Hurricane Georges

DAD Zone 1

Latitude: 30.855

Longitude: -87.725

Max. Grid Rainfall Amount: 24.92" Andalusia, AL

Max. Observed Rainfall Amount: 24.06"

Number of Stations: 229

SPAS Version: 10.0

Base Map Used: conus_prism_ppt_in_1981_2010_09 and basemap_ippt_ppt (50/50 ippt, ppt blend with ppt over ocean)

Spatial resolution: 00:00:36

Radar Included: Yes

Depth-Area-Duration (DAD) analysis: Yes

Reliability of Results: This analysis was based on hourly data (H), hourly estimated pseudo data (HEP), hourly pseudo data (HP), daily data (D) and supplemental data (S). We have a high degree of confidence in the station based storm total results, the spatial pattern is dependent on basemap which is a 50/50 blend between ippt and ppt, and the timing is based on hourly, hourly estimated pseudo and hourly pseudo stations. Radar data was used for this event and had good coverage despite KEVX missing in FL.

SPAS Storm ID	NAME	LON	LAT	ELEV Round	Storm Representative				Climatological Maximum				IPMF
					T _g	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	T _g	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	
1593_1	MUNSON	-87.725	30.855	200	82.50	4.03"	0.06"	3.970	86.0	4.67"	0.07"	4.600	1.16

Storm 1593 Zone 1 - Sep. 27 (0000 UTC) - Sep. 30 (1100 UTC), 1998															
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)															
areasqmi	Duration (hours)														
	1	2	3	4	5	6	12	18	24	36	48	72	96	120	Total
0.4	6.52	6.90	6.91	8.66	9.03	10.27	15.85	17.27	20.69	22.89	24.59	24.92	24.92	24.92	24.92
1	6.43	6.80	6.80	8.55	8.97	10.21	15.77	17.18	20.59	22.78	24.45	24.79	24.79	24.79	24.91
10	6.09	6.44	6.46	8.14	8.81	10.04	15.56	16.94	20.32	22.49	24.11	24.46	24.48	24.48	24.85
25	5.89	6.25	6.34	7.89	8.75	9.97	15.48	16.85	20.21	22.37	23.98	24.34	24.35	24.35	24.74
50	5.70	6.06	6.22	7.66	8.58	9.83	15.42	16.57	20.09	22.26	23.88	24.24	24.26	24.26	24.56
100	5.42	5.75	6.07	7.31	8.31	9.53	15.06	16.03	19.56	21.71	23.70	24.12	24.17	24.17	24.21
150	5.18	5.51	5.94	7.09	8.05	9.22	14.65	15.60	19.07	21.26	23.42	23.85	23.93	23.93	24.02
200	4.98	5.28	5.81	6.85	7.82	8.95	14.23	15.25	18.65	21.09	23.22	23.67	23.74	23.74	23.86
300	4.69	4.98	5.62	6.44	7.49	8.55	13.47	14.68	18.01	20.87	22.93	23.42	23.48	23.48	23.54
400	4.44	4.73	5.47	6.14	7.21	8.21	12.91	14.32	17.53	20.71	22.63	23.17	23.24	23.24	23.29
500	4.26	4.53	5.33	5.92	6.96	7.92	12.46	14.05	17.16	20.51	22.41	22.95	23.02	23.02	23.11
1,000	3.51	3.84	4.68	5.18	6.20	6.97	11.08	13.19	15.94	19.76	21.62	22.18	22.25	22.25	22.31
2,000	2.77	3.14	3.95	4.67	5.33	5.99	9.74	12.07	14.77	18.55	20.42	21.09	21.20	21.20	21.27
5,000	1.96	2.38	3.08	3.75	4.33	4.80	8.33	10.60	13.04	16.61	18.33	19.26	19.45	19.45	19.49
10,000	1.45	1.88	2.44	3.00	3.52	3.93	7.17	9.45	11.66	14.92	16.62	17.53	17.77	17.77	17.80
20,000	0.93	1.34	1.79	2.29	2.80	3.12	5.87	8.08	10.07	12.98	14.58	15.49	15.71	15.71	15.76
50,000	0.46	0.68	0.98	1.26	1.56	1.79	3.44	4.84	6.24	8.40	10.05	11.07	11.20	11.20	11.20
62,972	0.44	0.64	0.92	1.20	1.47	1.70	3.28	4.61	5.94	8.01	9.60	10.55	10.68	10.68	10.68

Figure 466: Depth-area-duration values for Munson, FL September 1998

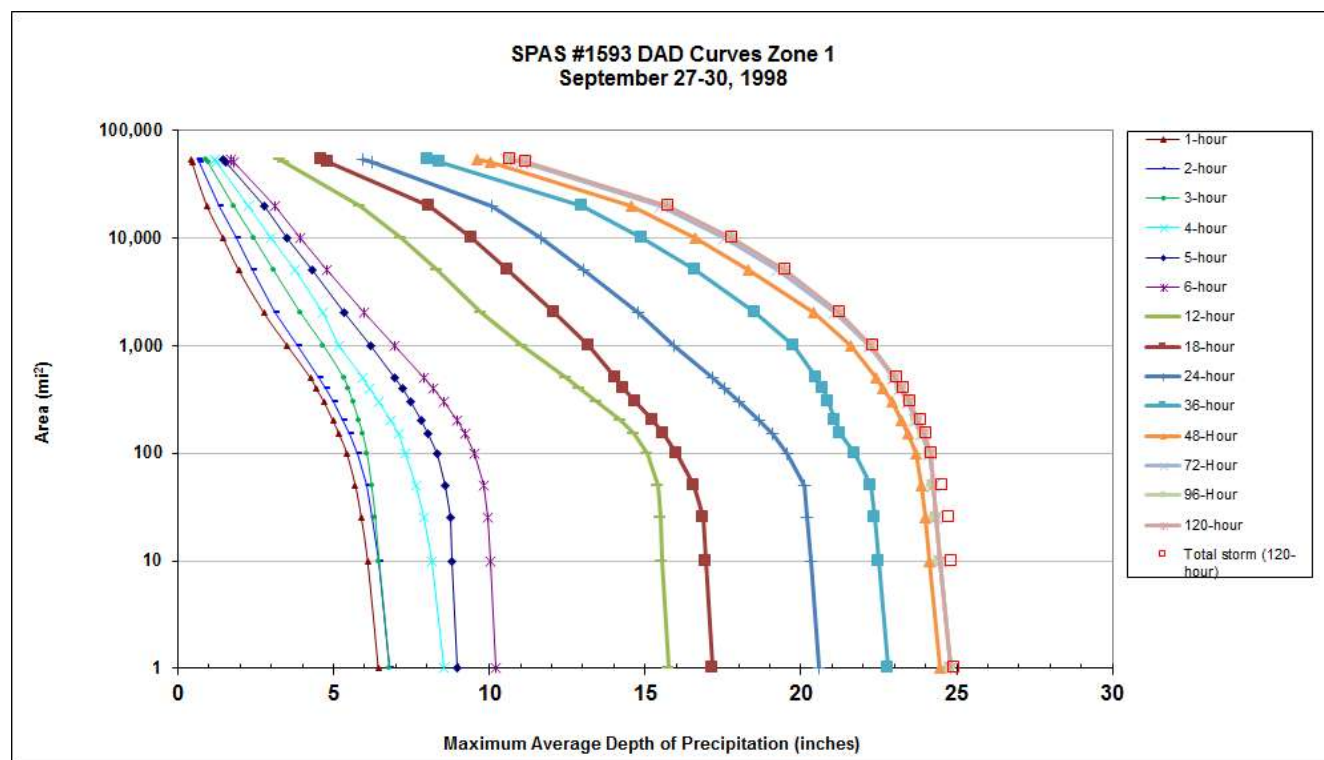


Figure 467: Depth-area-duration chart for Munson, FL September 1998

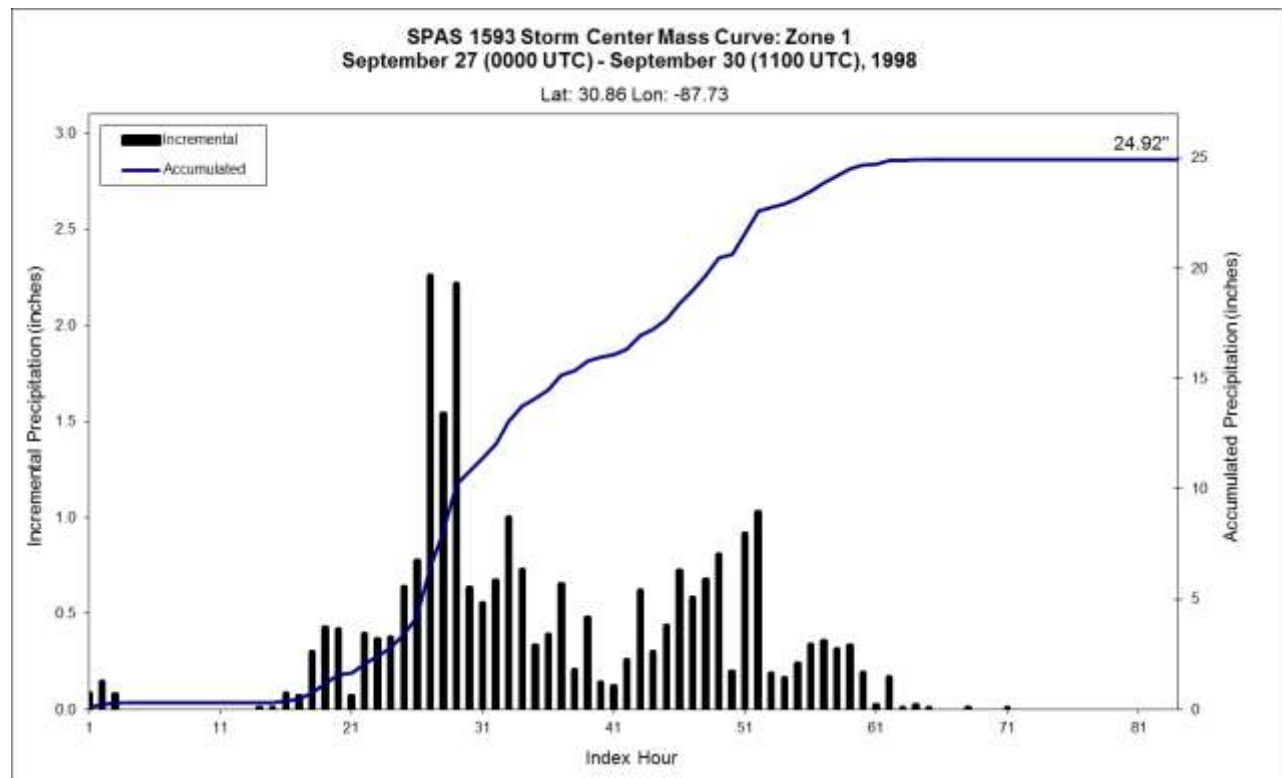


Figure 468: Mass curve chart for Munson, FL September 1998

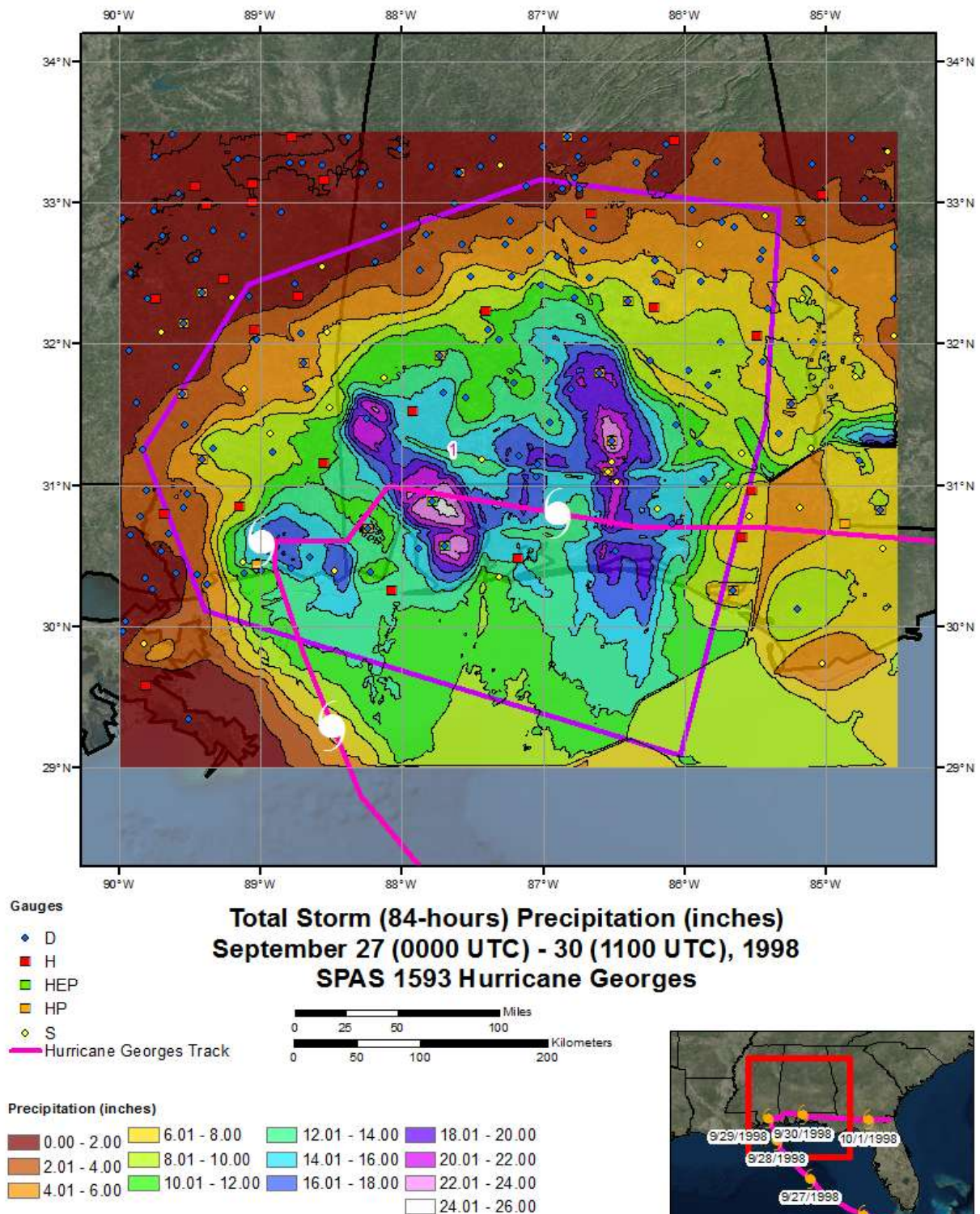


Figure 469: Total storm isohyetal analysis for Munson, FL September 1998

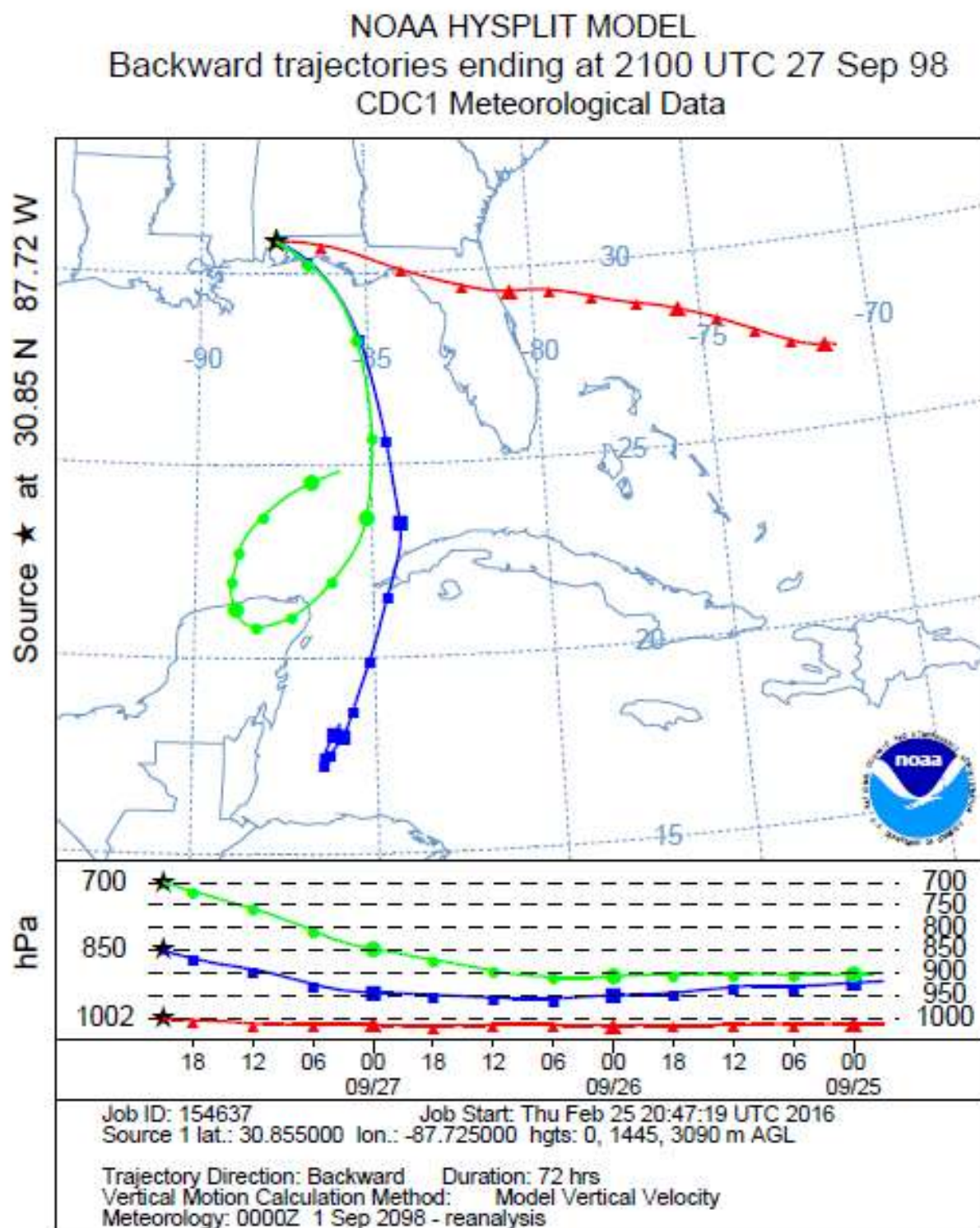


Figure 470: HYSPLIT trajectory analysis at Surface, 850mb and 700mb for Munson, FL September 1998

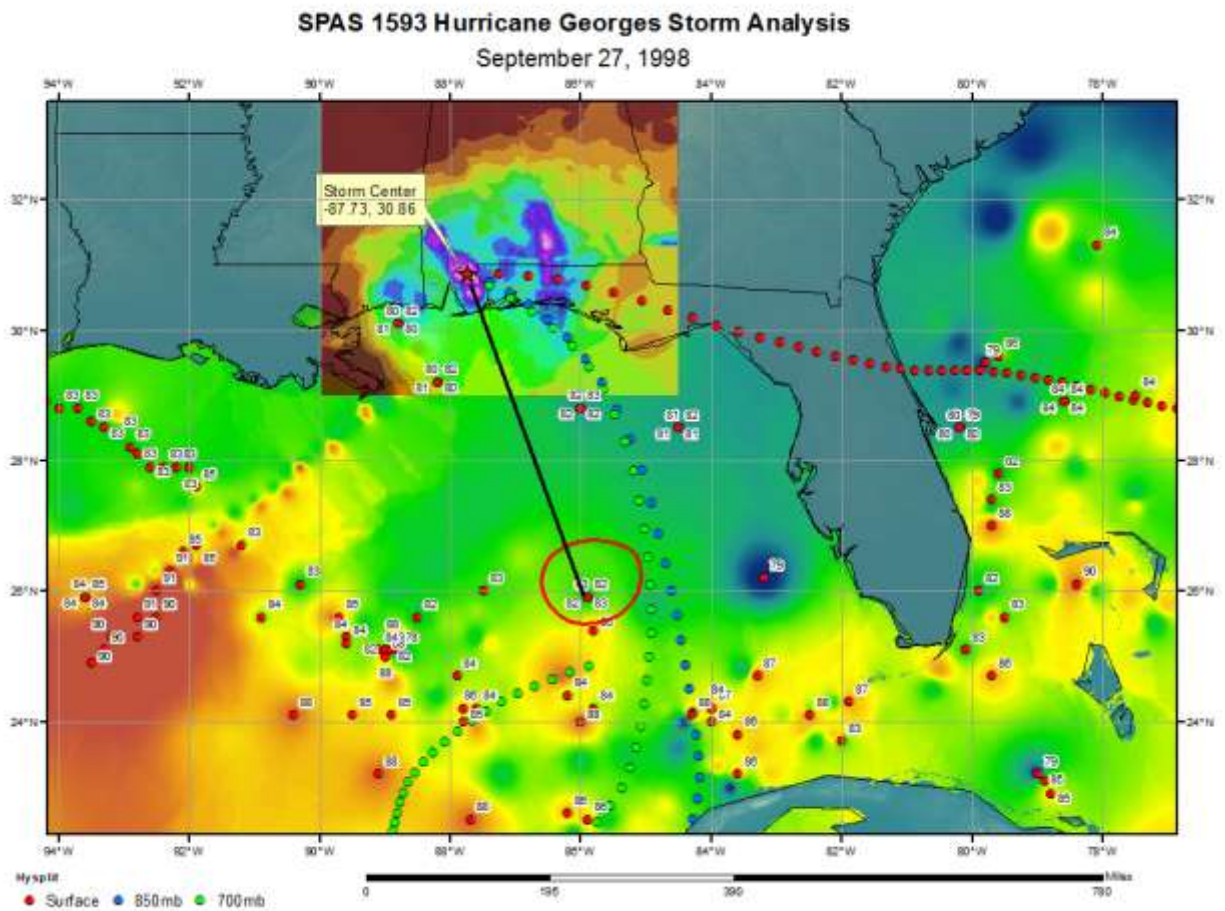


Figure 471: In-place storm representative SST analysis for Munson, FL September 27, 1998

Storm Precipitation Analysis System (SPAS) For Storm #1599

General Storm Location: Gonzalez, MX (26.0, -102.0, 19.0, -96.0)

Storm Dates: October 4-9, 2000 (144-hours)

Event: Hurricane Keith

DAD Zone 1

Latitude: 22.7626

Longitude: -98.6125

Max. Grid Rainfall Amount: 24.83" Gonzalez, MX

Max. Observed Rainfall Amount: 24.55"

Number of Stations: 37

SPAS Version: 10.0

Base Map Used: TRMM total storm

Spatial resolution: 0.008 decimal degree (0.29-sqmi)

Radar Included: No

Depth-Area-Duration (DAD) analysis: Yes

Reliability of Results: This analysis was based on 37 hourly stations, daily data, supplemental station data, and TRMM data (daily and 3-hour). We have a good degree of confidence for the station based storm total results. The spatial pattern is dependent on the TRMM data, gauge data, and TRMM total storm basemap. There is a low degree of confidence with the timing based on the 3-hour TRMM dataset used to derive Hourly Estimates Pseudo stations, no true surface hourly stations were found in Mexico near the storm center. Several hourly pseudo stations were created, based on TRMM 3-hour rainfall timing, to aid in timing of daily stations in Mexico. Some daily stations were moved to supplemental due to timing issues.

SPAS Storm ID	NAME	LON	LAT	ELEV Round	Storm Representative				Climatological Maximum				IPMF
					T _g	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	T _g	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	
1599_1	GONZALEZ	-98.613	22.763	200	76.00	2.99"	0.05"	2.940	80.5	3.68"	0.06"	3.620	1.23

Storm 1599 - October 4 (0700 UTC) - October 10 (0600 UTC), 2000															
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)															
Area (mi ²)	Duration (hours)														
	1	2	3	4	5	6	12	18	24	36	48	72	96	120	Total
0.3	2.58	5.15	7.73	9.07	10.40	11.74	15.93	20.08	21.33	23.35	24.22	24.80	24.80	24.83	24.83
1	2.56	5.12	7.69	9.02	10.35	11.67	15.86	19.99	21.23	23.25	24.11	24.70	24.70	24.70	24.70
10	2.52	5.04	7.59	8.90	10.21	11.50	15.69	19.77	20.99	22.98	23.84	24.43	24.43	24.43	24.43
25	2.51	5.01	7.55	8.85	10.15	11.44	15.63	19.68	20.90	22.87	23.73	24.32	24.32	24.32	24.32
50	2.49	4.99	7.50	8.80	10.10	11.39	15.58	19.61	20.83	22.79	23.65	24.24	24.24	24.24	24.24
100	2.45	4.91	7.36	8.63	9.90	11.23	15.36	19.20	20.40	22.33	23.16	23.72	23.72	23.72	23.72
150	2.42	4.84	7.26	8.52	9.78	11.12	15.18	18.72	19.89	21.77	22.58	23.13	23.13	23.13	23.13
200	2.39	4.77	7.15	8.39	9.64	11.04	15.05	18.25	19.37	21.15	21.93	22.46	22.46	22.46	22.46
300	2.32	4.64	6.97	8.18	9.44	10.85	14.73	17.57	18.63	20.16	20.81	21.33	21.33	21.33	21.33
400	2.26	4.52	6.78	7.97	9.25	10.68	14.47	17.07	18.09	19.46	20.02	20.55	20.55	20.55	20.55
500	2.20	4.39	6.58	7.78	9.09	10.49	14.21	16.65	17.64	18.93	19.42	19.95	19.95	19.95	19.95
1,000	1.95	3.91	5.87	7.10	8.39	9.71	13.13	15.23	16.06	17.16	17.57	18.07	18.07	18.07	18.07
2,000	1.64	3.28	4.93	6.09	7.29	8.48	11.51	13.45	14.24	15.23	15.61	16.05	16.05	16.05	16.05
5,000	1.15	2.30	3.44	4.33	5.23	6.14	8.37	9.79	10.37	11.13	11.45	11.77	11.77	11.77	11.77
10,000	0.85	1.71	2.54	3.27	3.98	4.72	6.45	7.56	8.00	8.68	8.99	9.24	9.24	9.24	9.24
20,000	0.61	1.22	1.84	2.43	3.02	3.62	4.97	5.77	6.11	6.70	6.98	7.17	7.16	7.17	7.17
50,000	0.38	0.75	1.13	1.47	1.84	2.17	2.98	3.49	3.70	4.10	4.29	4.60	4.67	4.71	4.71
94,105	0.22	0.44	0.67	0.88	1.08	1.29	1.78	2.09	2.22	2.47	2.58	2.77	2.85	2.88	2.88

Figure 472: Depth-area-duration values for Gonzalez, MX October 2000

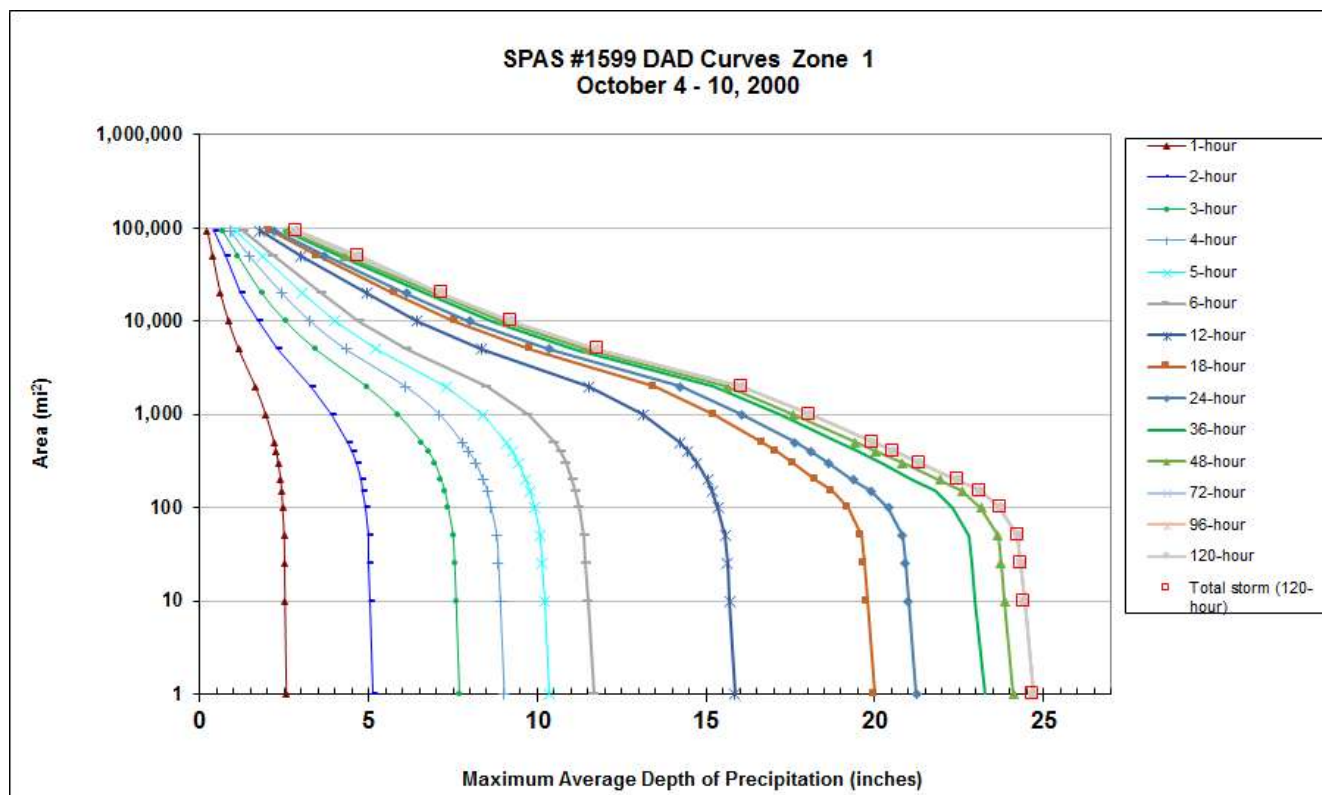


Figure 473: Depth-area-duration chart for Gonzalez, MX October 2000

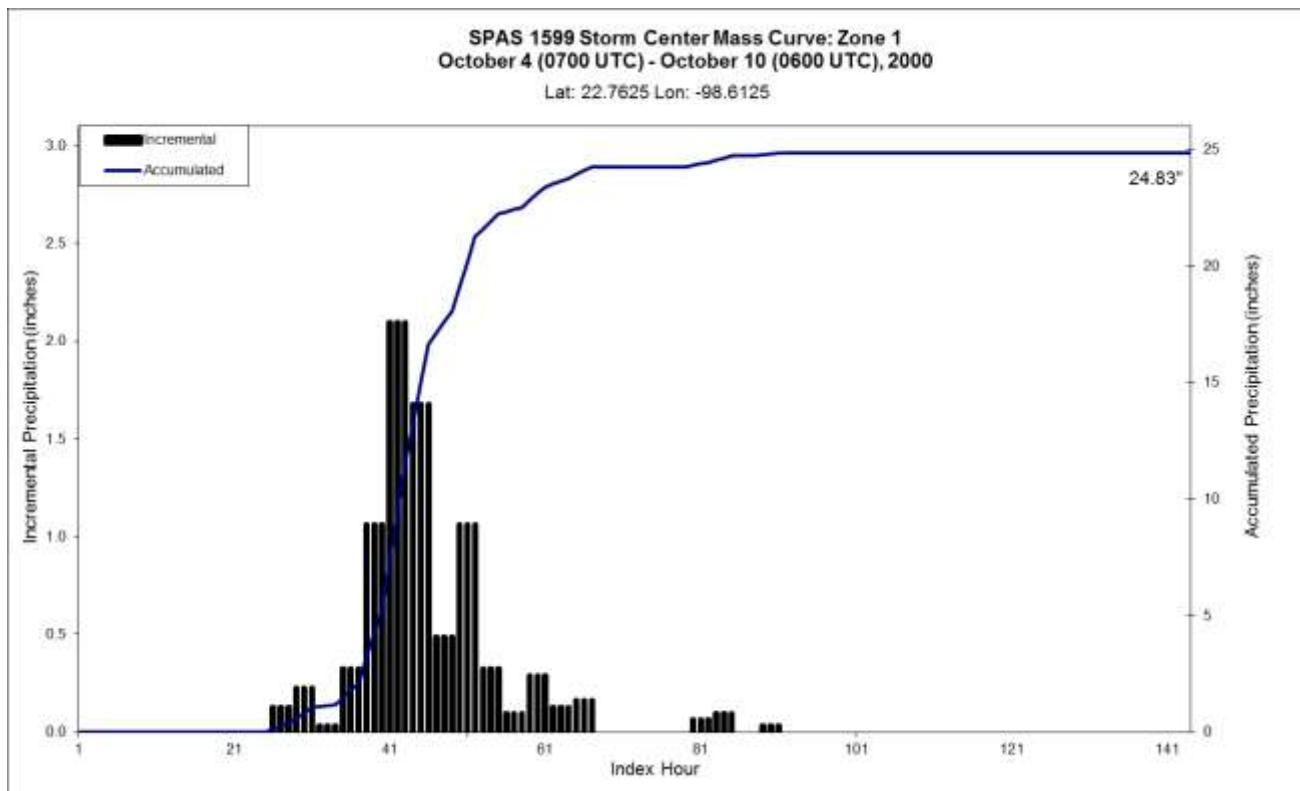


Figure 474: Mass curve chart for Gonzalez, MX October 2000

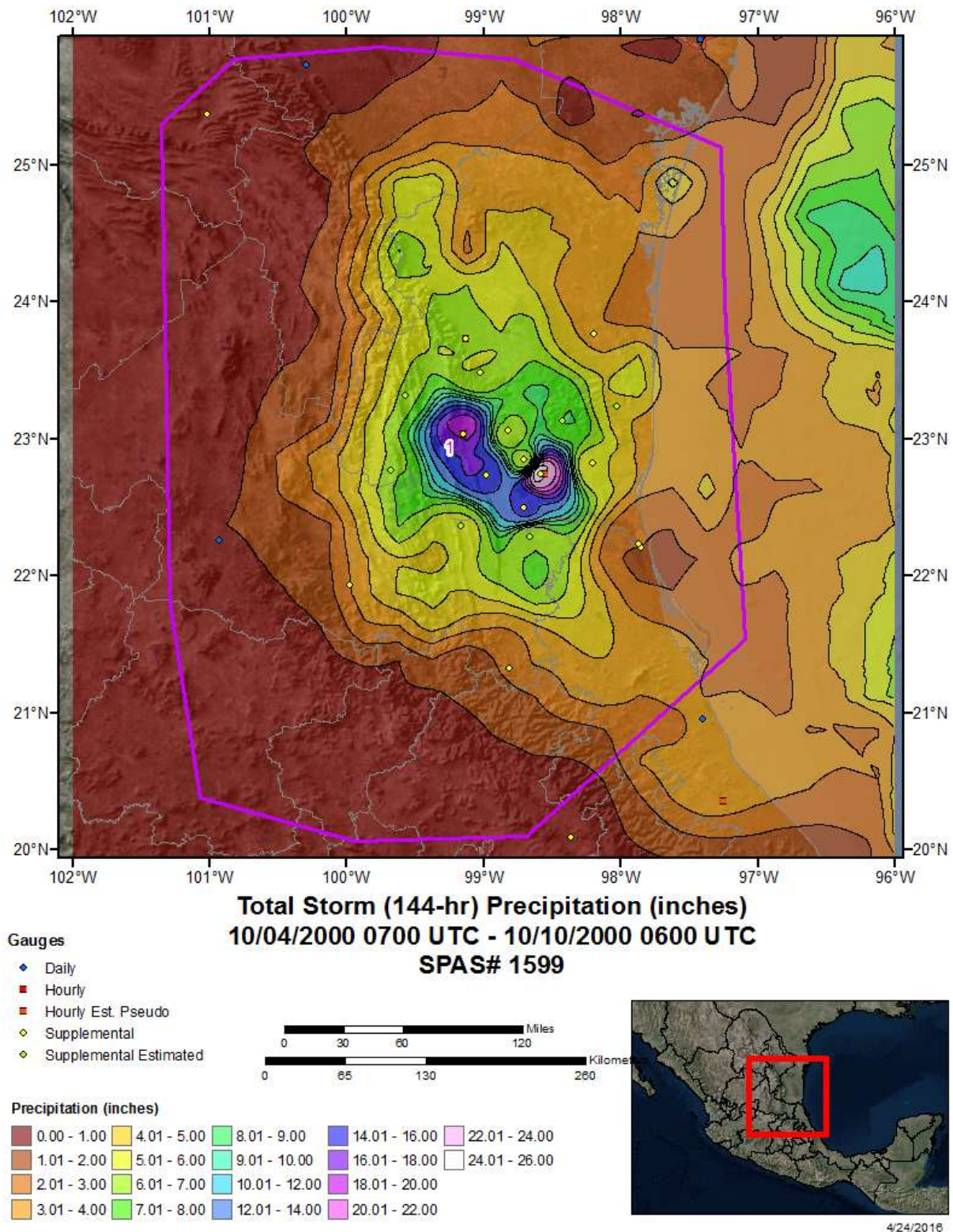


Figure 475: Total storm isohyetal analysis for Gonzalez, MX October 2000

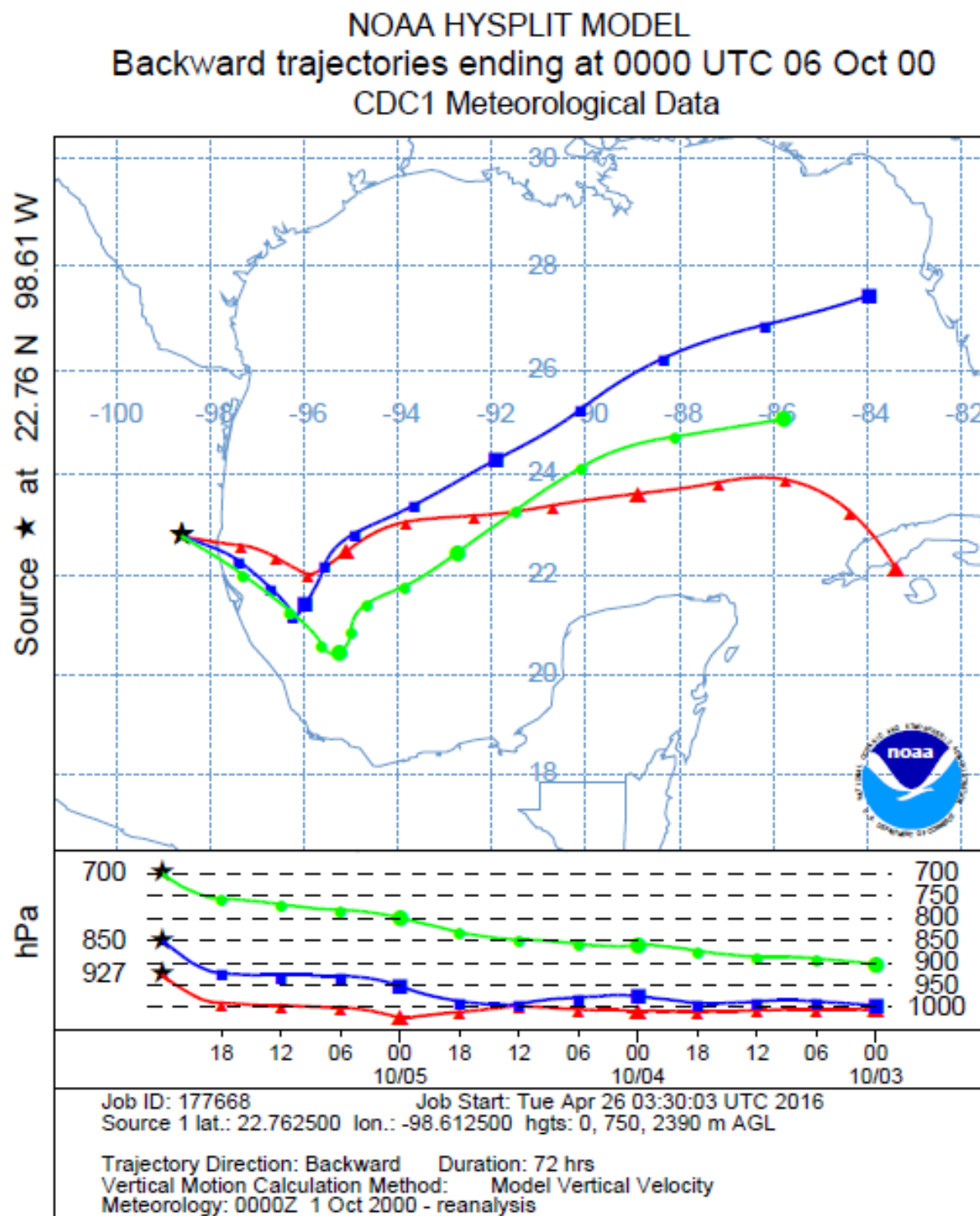


Figure 476: HYSPLIT trajectory analysis at Surface, 850mb and 700mb for Gonzalez, MX October 2000

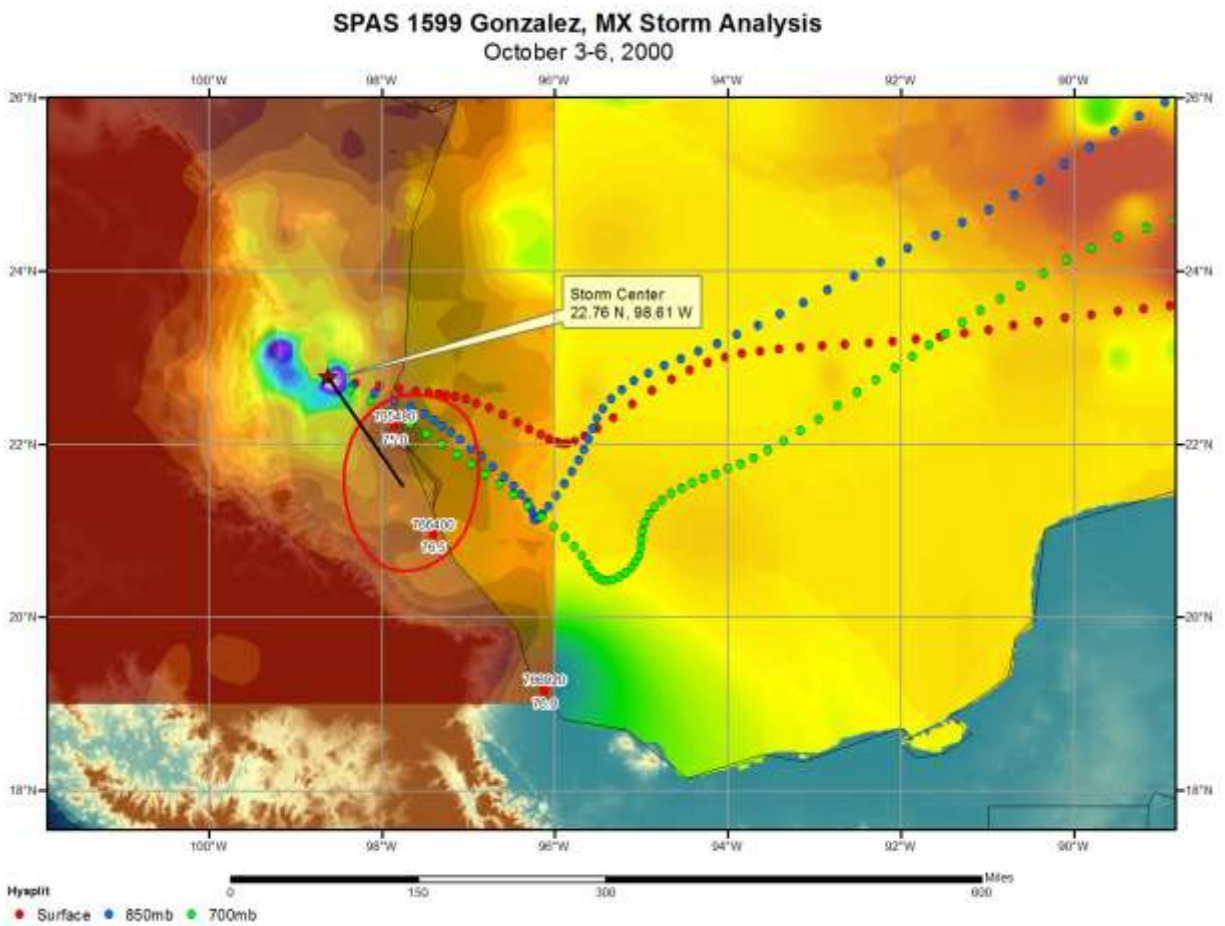


Figure 477: In-place storm representative dew point analysis for Gonzalez, MX October 3-6, 2000

Storm Precipitation Analysis System (SPAS) For Storm #1464

General Storm Location: Tropical Storm Allison, TX and Louisiana (34.0, -97.0, 28.0, -86.5)

Storm Dates: June 5 – 11, 2001 (144-hours)

Event: Land falling TS

DAD Zone 1

Latitude: 29.755

Longitude: -95.275

Max. Grid Rainfall Amount: 40.97"

Max. Observed Rainfall Amount: 39.25"

Number of Stations: 547

SPAS Version: 10.0

Base Map Used: Total Ppt with a default Z-R relationship

Spatial resolution: 00:00:36

Radar Included: Yes

Depth-Area-Duration (DAD) analysis: Yes

Reliability of Results: This analysis was based on hourly data, daily data and supplemental station data paired with SPAS-NEXRAD. We have a high degree of confidence for the radar and station based storm total results. The spatial pattern dependent on the basemap and radar data with a high degree of confidence with the timing based on hourly and hourly pseudo stations (see below). The basemap used was Total Ppt with a default Z-R relationship for continuity over the ocean. An hourly estimated pseudo station was created for Salt Point (6; 29.5685, -91.5384) due to the ZR Outlier Frequency Table Freq % being over 10%. This improved the amount of time Salt Point was an outlier. Next, Friendswood (29.98" to 27.5"), Heights (32" to 33.5") and Houston-Port (36.99" to 38.5") were adjusted in SPAS general so the CPP_SPASppt was close to the observed value. Lastly, over the ocean during two hours of the storm, there were very high Pgrid maximums. To reduce these bulls-eyes, the ratio between the basemap and observations by nearby coastal stations were averaged to create a supplemental value to place at these centers over the ocean.

SPAS Storm ID	NAME	LON	LAT	ELEV Round	Storm Representative				Climatological Maximum				IPMF
					T _g	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	T _g	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	
1464_1	HOUSTON	-95.275	29.755	100	82.50	4.03"	0.03"	4.000	84.5	4.39"	0.04"	4.350	1.09

Storm 1464 - June 5 (1200 UTC) - June 11 (1100 UTC), 2001															
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)															
areasqmi	Duration (hours)														
	1	2	3	4	5	6	12	18	24	36	48	72	96	120	Total
0.4	6.28	6.28	14.09	14.09	14.09	20.98	29.17	29.39	29.41	29.53	29.71	29.89	40.56	40.97	40.97
1	6.24	6.24	13.97	13.97	13.97	20.78	28.88	29.12	29.14	29.23	29.43	29.59	40.15	40.34	40.34
10	5.73	5.73	13.30	13.30	13.30	19.94	27.79	28.04	28.07	28.11	28.30	28.50	38.67	38.90	38.90
25	5.42	5.42	12.12	12.12	12.12	18.00	26.75	27.10	27.12	27.15	27.31	27.66	37.23	37.43	37.43
50	5.27	5.27	11.35	11.35	11.35	16.08	24.75	25.21	25.24	25.30	25.63	26.41	35.60	35.78	35.78
100	5.07	5.07	10.26	10.26	10.26	14.17	21.57	21.99	22.02	22.08	22.53	25.12	31.88	32.93	32.93
160	4.87	4.87	9.46	9.46	9.46	13.14	19.53	19.93	19.96	20.04	20.58	24.39	29.63	31.35	31.35
200	4.68	4.68	8.90	8.90	8.90	12.42	18.23	18.62	18.66	18.79	19.37	23.80	28.22	30.30	30.30
300	4.32	4.32	8.14	8.14	8.14	11.44	16.55	16.97	17.01	17.22	17.85	22.73	26.35	28.87	28.87
400	4.01	4.01	7.60	7.60	7.60	10.77	15.45	15.89	15.93	16.18	16.97	21.72	25.13	27.54	27.54
500	3.77	3.77	7.21	7.21	7.21	10.16	14.61	15.10	15.14	15.42	16.33	20.70	24.24	26.52	26.52
1,000	3.04	3.04	5.84	5.84	5.84	8.27	12.25	12.79	12.84	13.15	14.40	17.73	21.39	23.28	23.28
2,000	2.36	2.36	4.33	4.33	4.33	6.32	9.80	10.33	10.53	11.19	12.35	15.10	18.72	20.31	20.31
5,000	1.53	1.53	2.78	2.78	2.78	4.33	6.82	7.38	7.92	8.64	10.06	12.29	15.63	16.93	16.93
10,000	0.94	0.94	1.81	1.81	1.81	2.86	4.99	5.64	6.16	7.18	8.53	10.57	13.41	14.62	14.62
20,000	0.53	0.53	1.10	1.10	1.10	1.91	3.01	3.81	4.49	5.70	6.86	8.83	11.33	12.49	12.49
50,000	0.25	0.25	0.54	0.54	0.54	0.97	1.64	2.25	2.60	3.37	4.63	6.15	8.03	9.10	9.10
54,779	0.23	0.23	0.50	0.50	0.50	0.90	1.54	2.10	2.43	3.16	4.39	5.82	7.62	8.59	8.59

Figure 478: Depth-area-duration values for Houston, TX June 2001

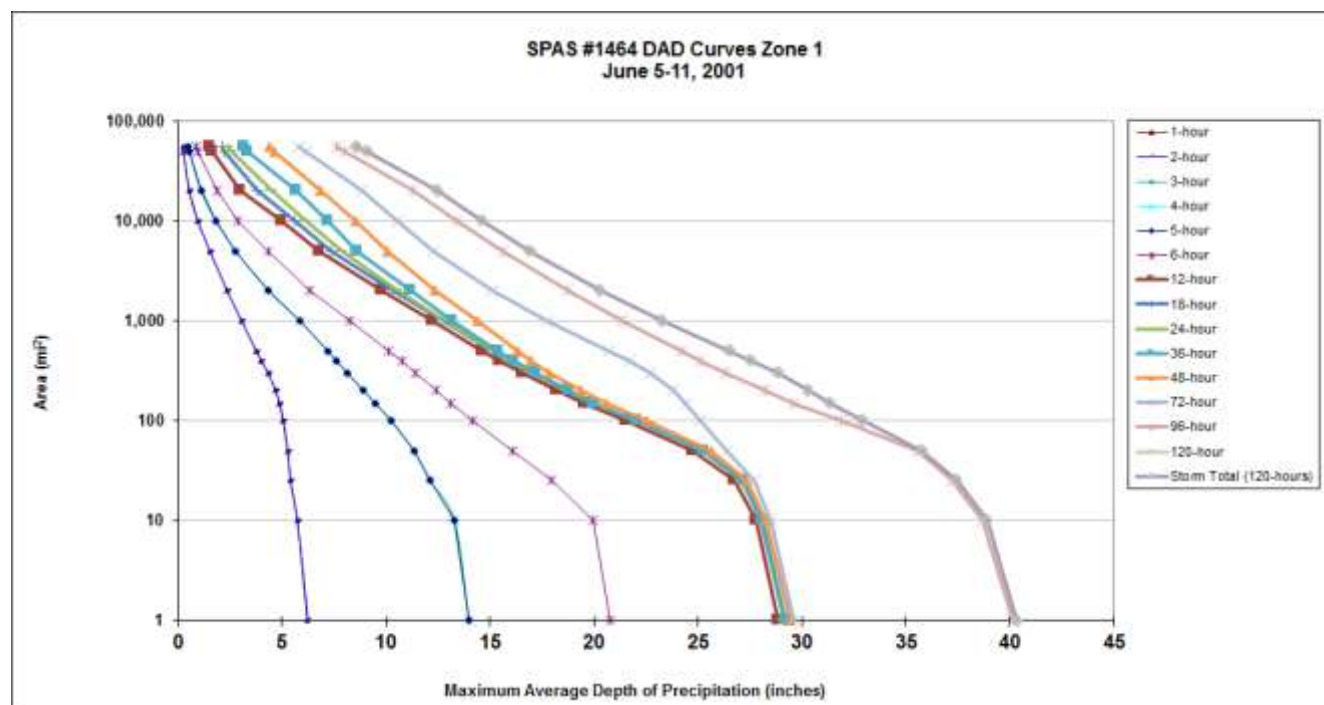


Figure 479: Depth-area-duration chart for Houston, TX June 2001

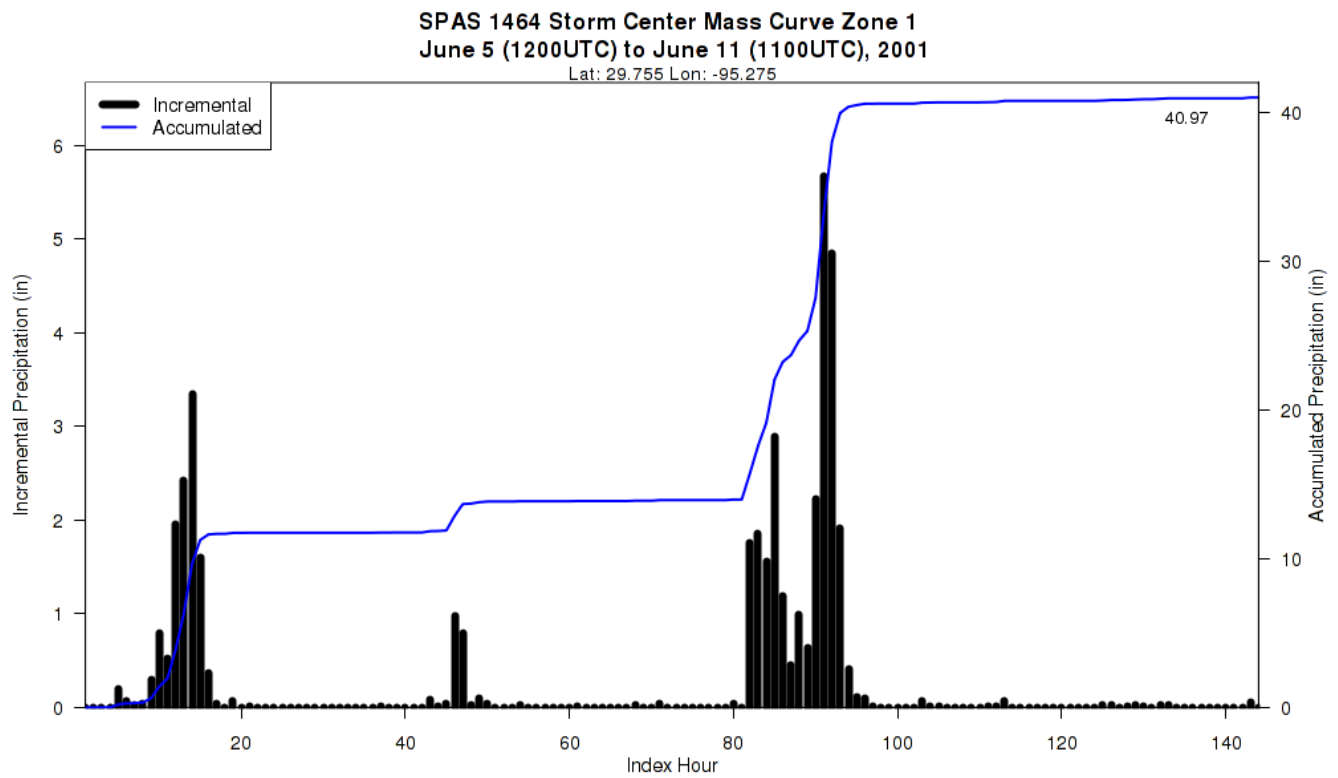


Figure 480: Mass curve chart for Houston, TX June 2001

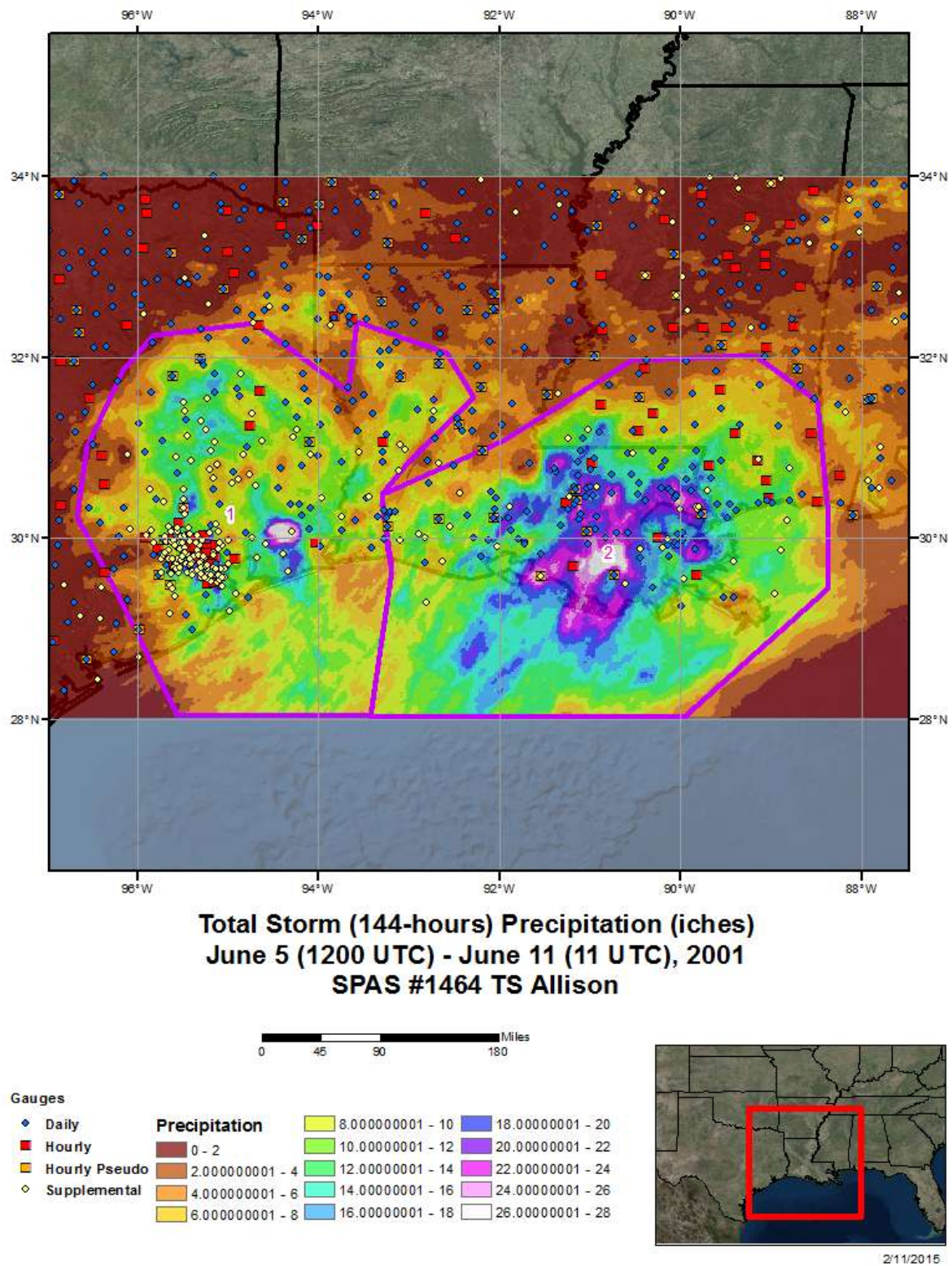


Figure 481: Total storm isohyetal analysis for Houston, TX June 2001

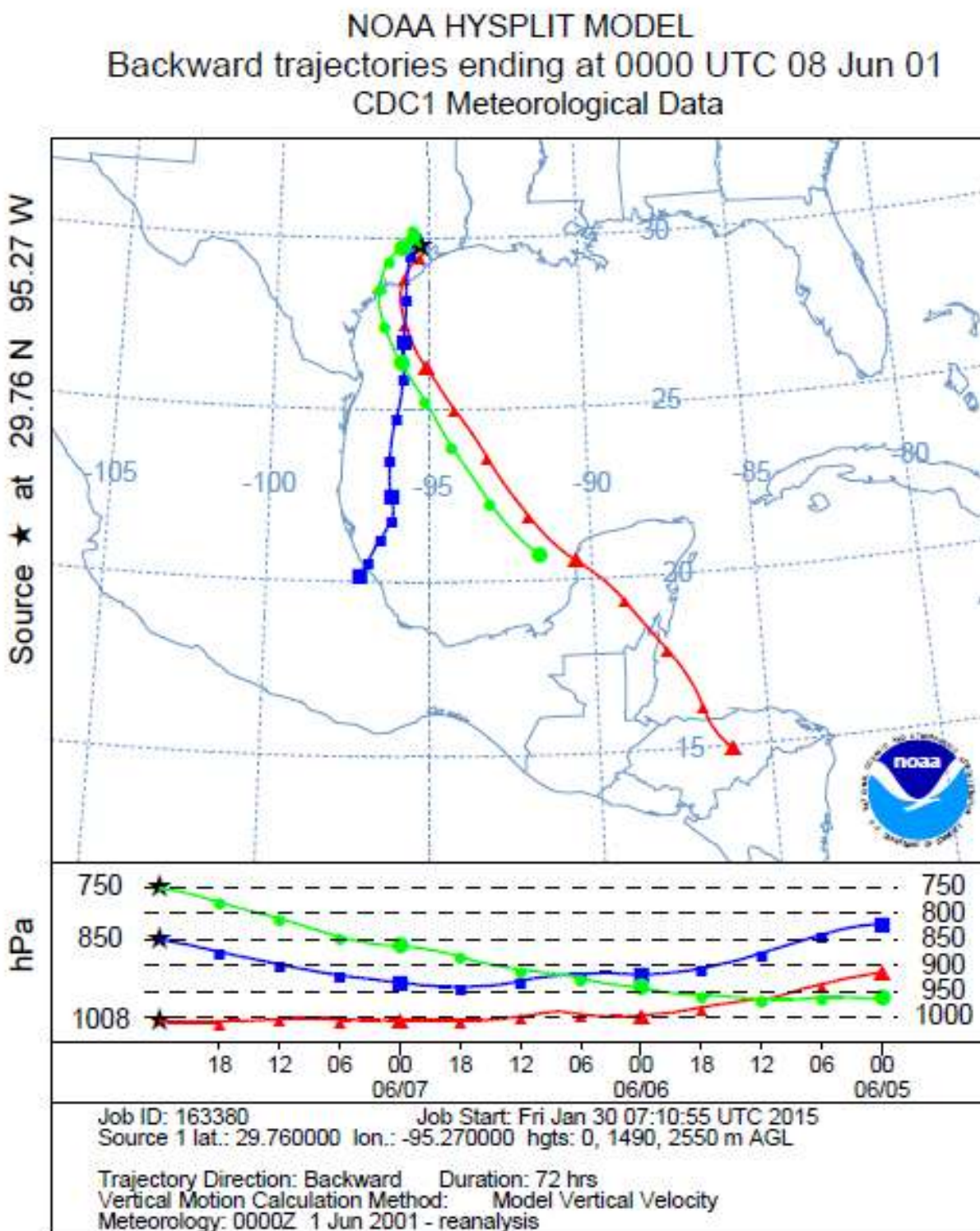


Figure 482: HYSPLIT trajectory analysis at Surface, 850mb and 700mb for Houston, TX June 2001

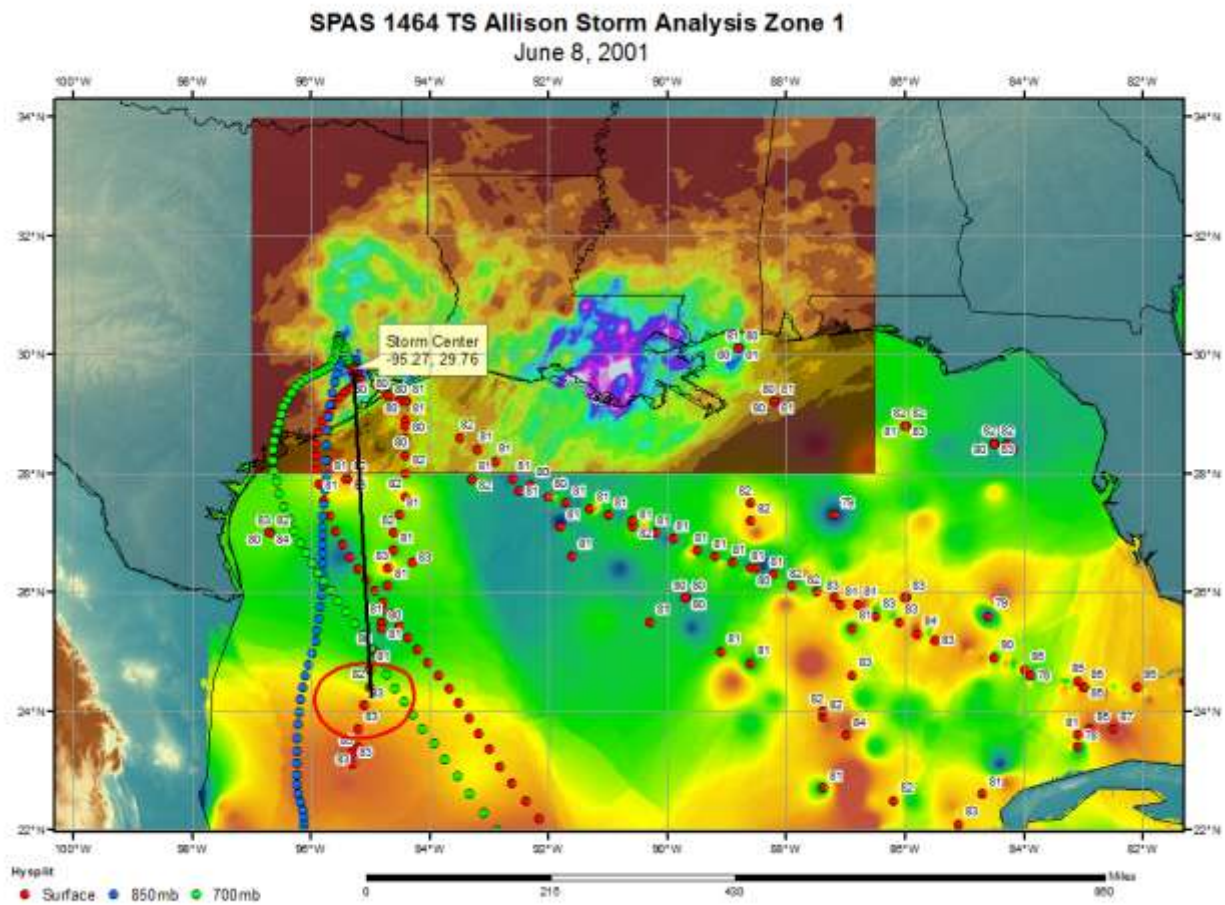


Figure 483: In-place storm representative SST analysis for Houston, TX June 8, 2001

Storm Precipitation Analysis System (SPAS) For Storm #1529

General Storm Location: Sunspot, NM (Ruidoso, NM)

Storm Dates: July 26-27, 2008

Event: Remnants of Hurricane Dolly

DAD Zone 1

Latitude: 33.335

Longitude: -105.795

Max. Grid Rainfall Amount: 8.81"

Max. Observed Rainfall Amount: 8.53"

Number of Stations: 378 (216 Daily, 97 Hourly, 14 Hourly Pseudo, 51 Supplemental, and 0 Supplemental Estimated)

SPAS Version: 10.0

Basemap: NWS Stage IV precipitation and PRISM July (1981-2010) precipitation

Spatial resolution: 0.01 (~ 0.40 mi²)

Radar Included: Yes

Depth-Area-Duration (DAD) analysis: Yes

Reliability of results: This analysis was based on hourly data, daily data, supplemental station data and NEXRAD Radar. We have a high degree of confidence in the radar/station based storm total results, the spatial pattern is dependent on the radar data and basemap, and the timing is based on hourly, hourly pseudo stations, and radar data.

SPAS Storm ID	NAME	LON	LAT	ELEV Round	Storm Representative				Climatological Maximum				IPMF
					T _d	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	T _d	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	
1529_1	SUNSPOT	-105.795	33.335	9,500	77.00	3.14"	1.91"	1.230	79.0	3.44"	2.06"	1.380	1.12

Storm 1529 - July 26 (0200 UTC) - July 27 (2300 UTC), 2008														
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)														
Area (mi ²)	Duration (hours)													
	1	2	3	4	5	6	12	18	24	36	48	72	96	120
0.4	1.89	2.51	3.16	3.44	3.89	4.08	5.61	6.18	7.16	8.81	8.81	8.81	8.81	8.81
1	1.85	2.46	3.12	3.40	3.64	4.04	5.58	6.14	7.10	8.75	8.75	8.75	8.75	8.75
10	1.66	2.13	2.85	3.13	3.41	3.77	5.41	6.03	6.95	8.59	8.59	8.59	8.59	8.59
25	1.58	2.04	2.74	3.04	3.23	3.64	5.18	5.93	6.82	8.40	8.53	8.53	8.53	8.53
50	1.52	1.94	2.62	2.95	3.12	3.51	4.96	5.80	6.69	8.30	8.41	8.41	8.41	8.41
100	1.45	1.86	2.43	2.80	2.95	3.34	4.66	5.63	6.51	8.10	8.21	8.21	8.21	8.21
150	1.40	1.78	2.27	2.65	2.80	3.18	4.46	5.46	6.33	7.87	8.00	8.00	8.00	8.00
200	1.36	1.71	2.14	2.52	2.67	3.04	4.34	5.31	6.16	7.67	7.80	7.80	7.80	7.80
300	1.30	1.58	1.95	2.31	2.51	2.83	4.16	5.06	5.89	7.31	7.43	7.43	7.43	7.43
400	1.24	1.50	1.80	2.15	2.39	2.68	4.01	4.88	5.68	7.02	7.14	7.14	7.14	7.14
500	1.19	1.42	1.70	2.02	2.30	2.57	3.90	4.72	5.50	6.79	6.91	6.91	6.91	6.91
1,000	0.94	1.14	1.39	1.72	2.02	2.27	3.45	4.30	5.06	6.13	6.23	6.23	6.23	6.23
2,000	0.65	0.92	1.14	1.38	1.67	1.87	2.93	3.84	4.56	5.50	5.61	5.61	5.61	5.61
5,000	0.40	0.69	0.84	1.01	1.19	1.36	2.23	3.05	3.76	4.63	4.72	4.72	4.72	4.72
10,000	0.30	0.50	0.62	0.77	0.92	1.06	1.73	2.42	3.02	3.90	3.98	3.98	3.98	3.98
20,000	0.21	0.33	0.43	0.55	0.67	0.77	1.33	1.80	2.30	3.12	3.23	3.23	3.23	3.23
50,000	0.11	0.18	0.24	0.29	0.37	0.44	0.80	1.15	1.48	1.97	2.14	2.14	2.14	2.14
100,000	0.06	0.10	0.14	0.18	0.23	0.27	0.50	0.70	0.91	1.19	1.31	1.31	1.31	1.31
145,575	0.04	0.08	0.10	0.13	0.16	0.19	0.36	0.52	0.67	0.87	0.98	0.98	0.98	0.98

Figure 484: Depth-area-duration values for Sunspot, NM July 2008

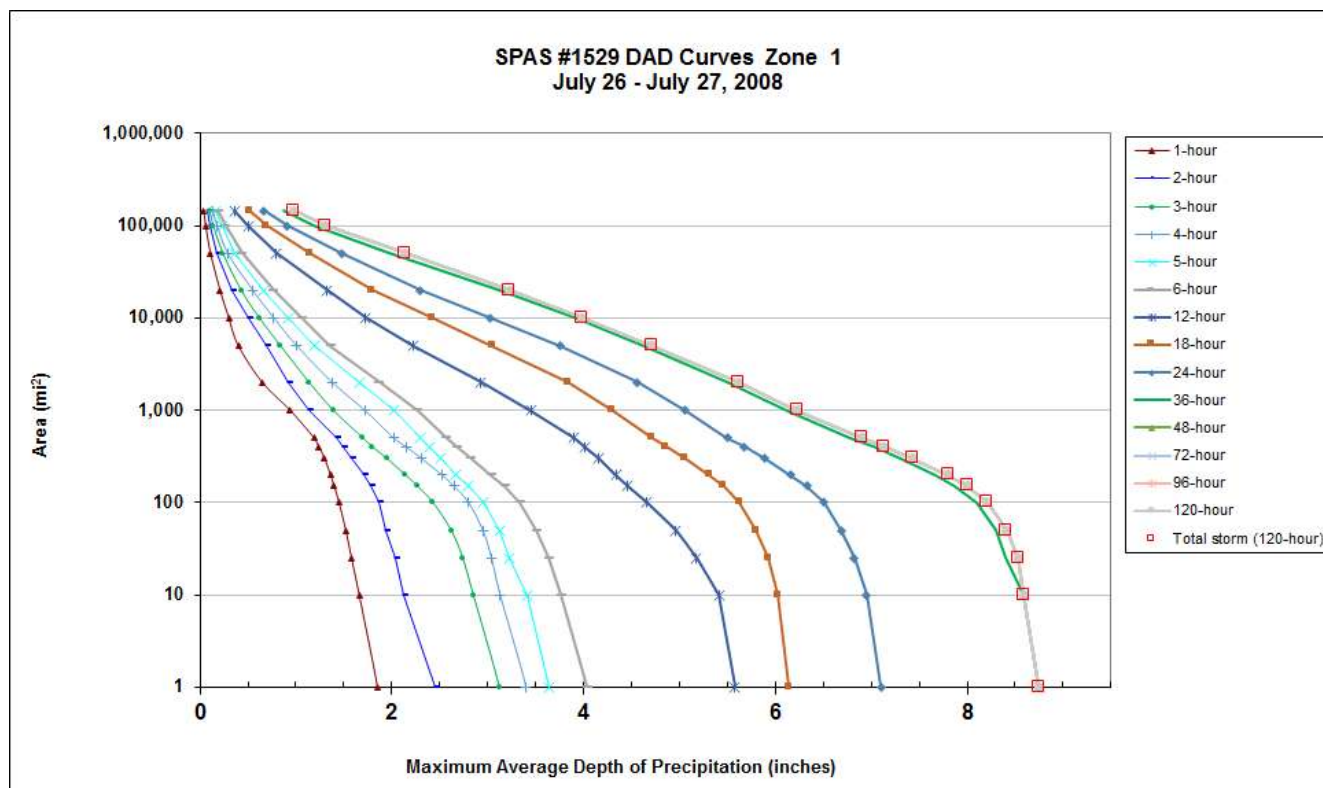


Figure 485: Depth-area-duration chart for Sunspot, NM July 2008

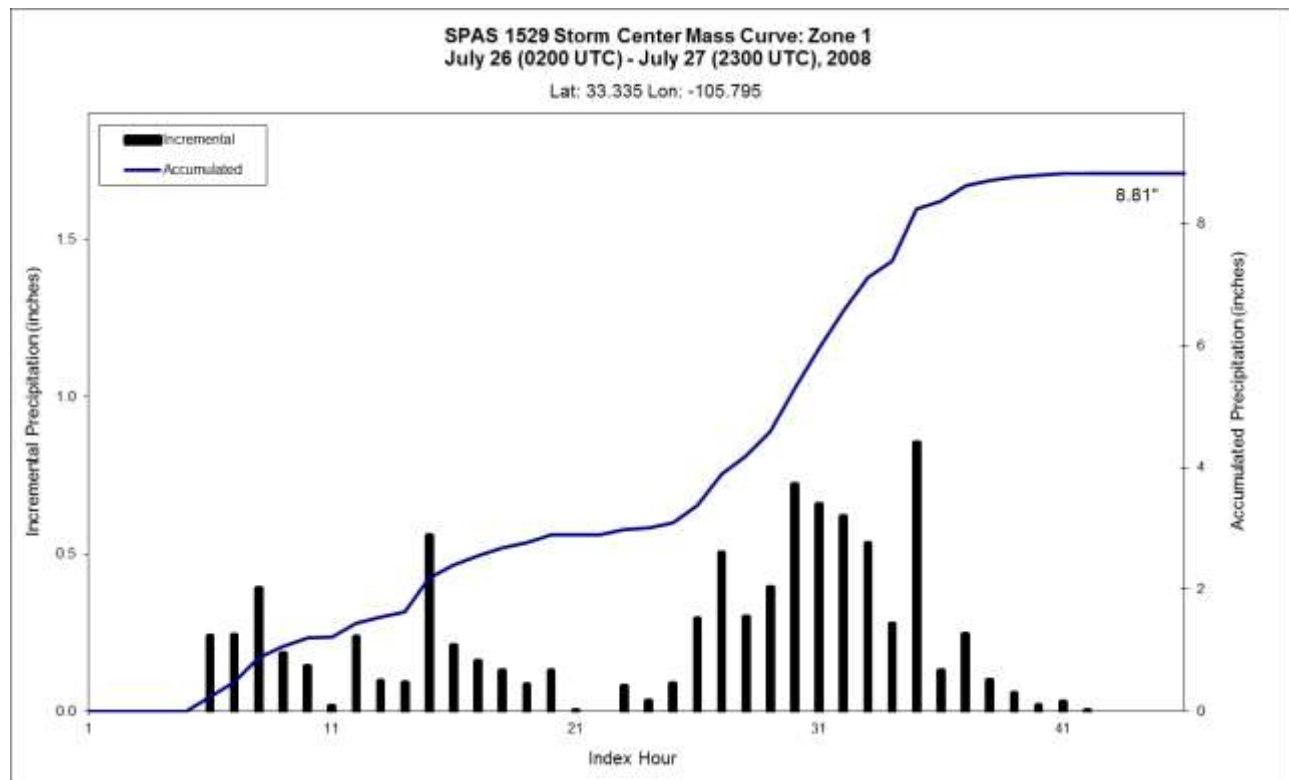


Figure 486: Mass curve chart for Sunspot, NM July 2008

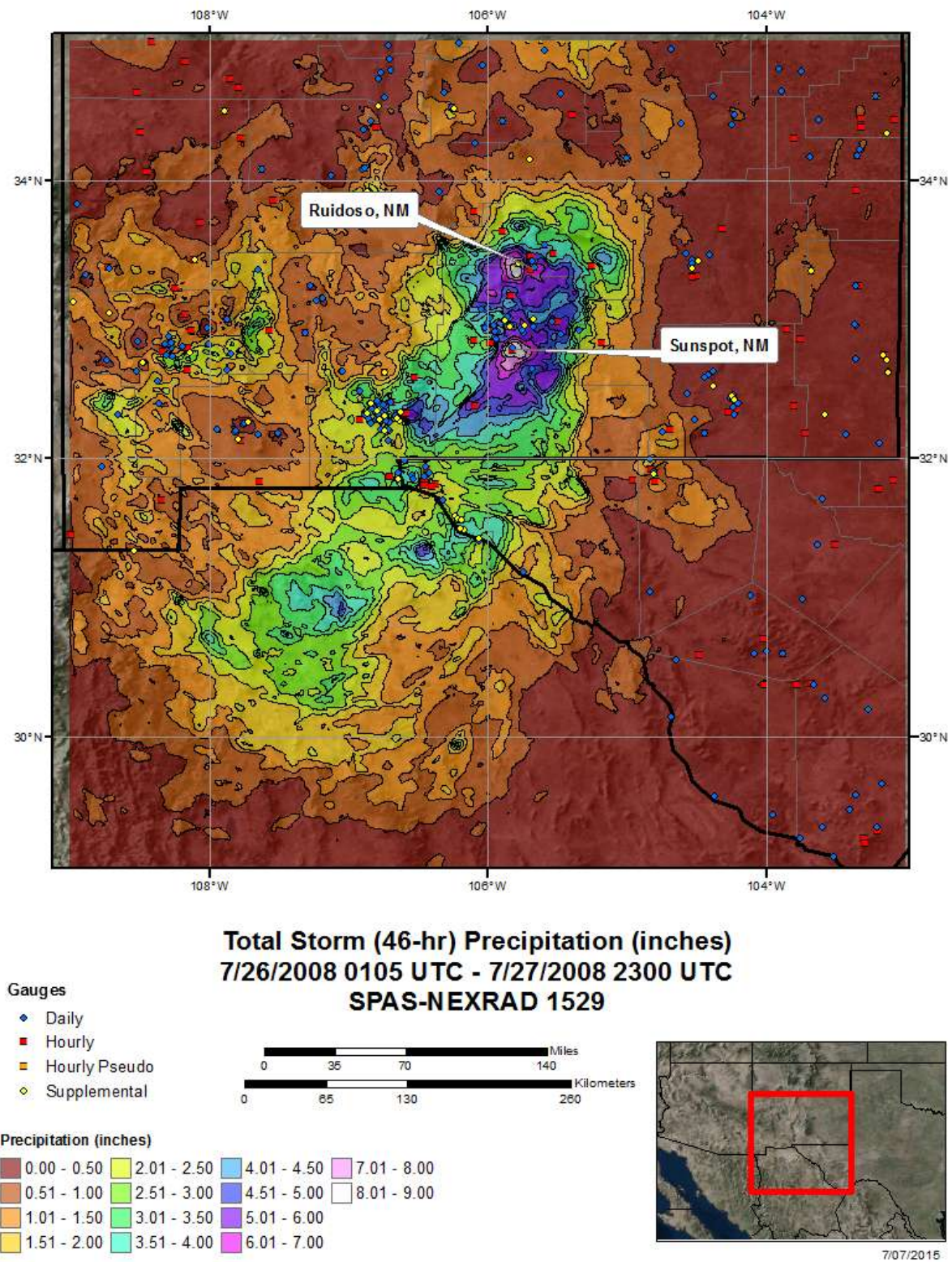


Figure 487: Total storm isohyetal analysis for Sunspot, NM July 2008

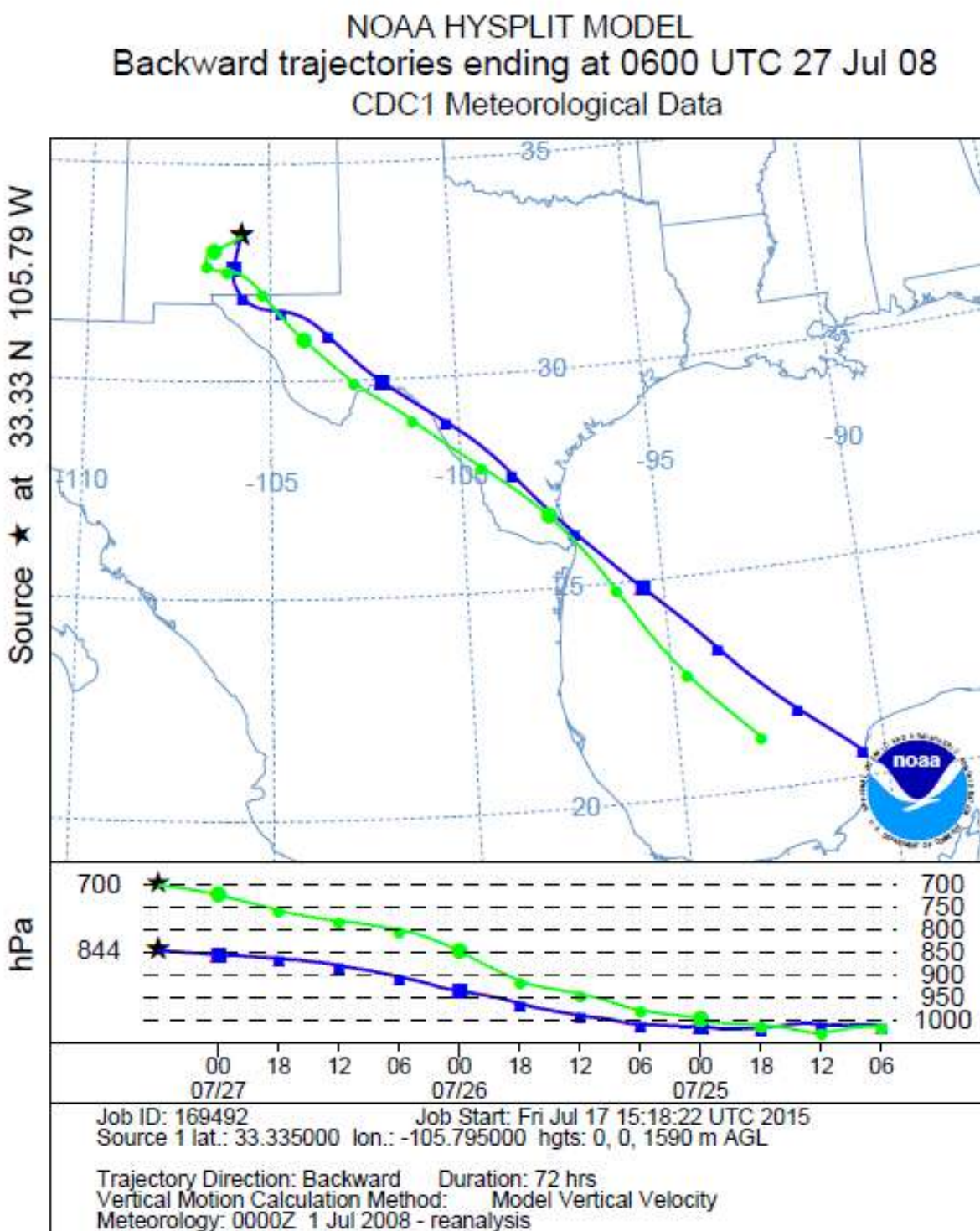


Figure 488: HYSPLIT trajectory analysis at Surface, 850mb and 700mb for Sunspot, NM July 2008

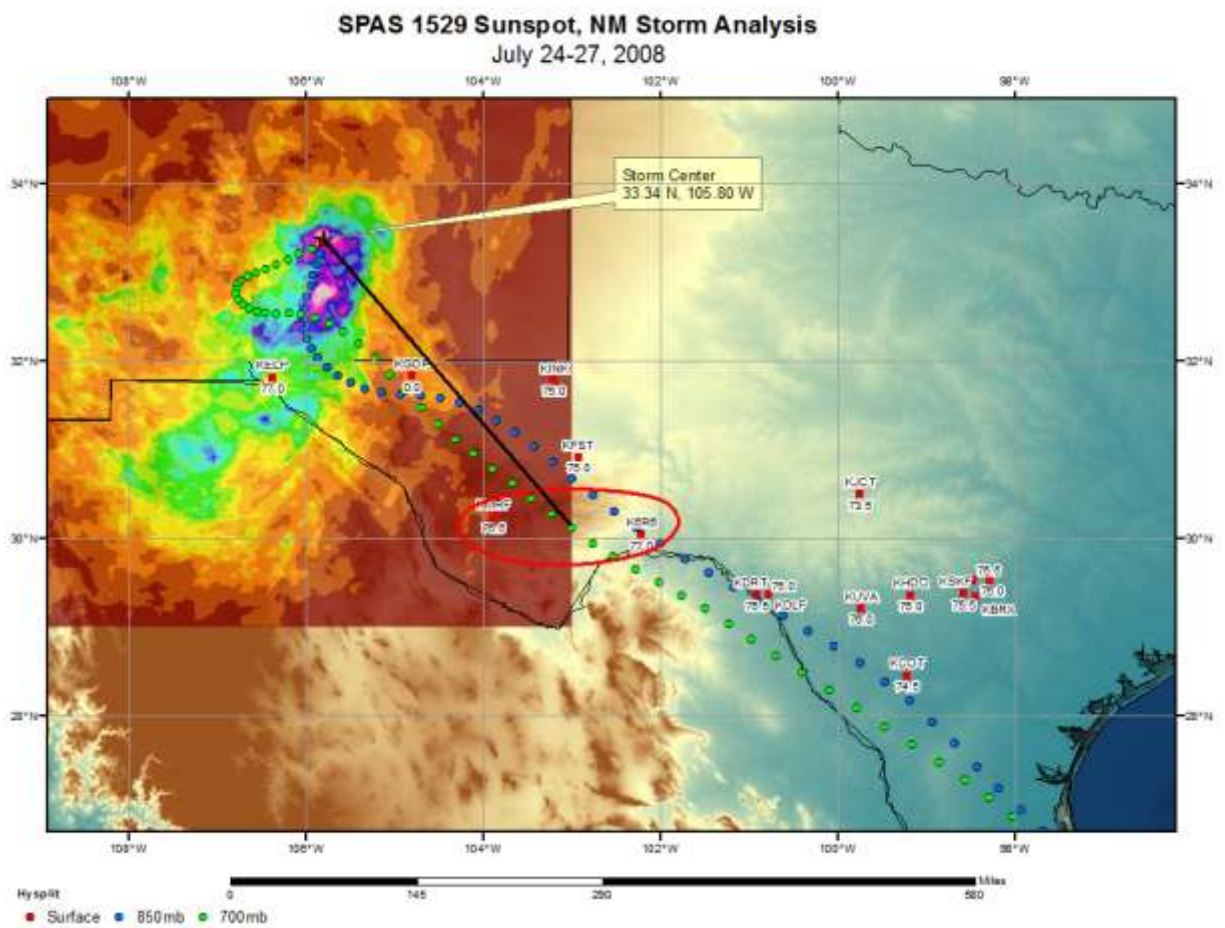


Figure 489: In-place storm representative dew point analysis for Sunspot, NM July 24-27, 2008

Storm Precipitation Analysis System (SPAS) For Storm #1182

General Storm Location: LA/AR/MS

Storm Dates: September 1 – 5, 2008

Event: Tropical storm remnants (Gustav)

DAD Zone 1

Latitude: 31.22

Longitude: -92.13

Max. Grid Rainfall Amount: 23.31

Max. Observed Rainfall Amount: Larto Lake, LA (20.80")

Number of Stations: 469 (290 Daily, 95 Hourly, 4 Hourly Estimated Pseudo, 78 Supplemental, and 2 Supplemental Estimated)

SPAS Version: 8.5

Base Map Used: Yes, conus_prism_ppt_in_1971_2000_09

Spatial resolution: 00:00:30 degrees (0.40 sq. miles)

Radar Included: Yes, but just KLIX.

Depth-Area-Duration (DAD) analysis: Yes

SPAS Storm ID	NAME	LON	LAT	ELEV Round	Storm Representative				Climatological Maximum				IPMF
					T _g	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	T _g	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	
1182_1	LARTO LAKE	-92.130	31.220	100	76.00	2.99"	0.03"	2.960	80.0	3.60"	0.03"	3.570	1.21

Storm 1182 - September 1 (0100 UTC) - September 5 (0000 UTC), 2008															
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)															
Area (mi ²)	Duration (hours)														
	1	2	3	4	5	6	12	18	24	36	48	72	96	120	Total
0.4	6.35	7.53	9.89	10.53	11.07	11.34	13.44	15.26	16.55	19.37	22.93	23.31	23.31	23.31	23.31
1	6.27	7.47	9.80	10.44	10.99	11.25	13.29	15.13	16.42	19.18	22.67	23.06	23.06	23.06	23.06
10	5.89	6.91	9.41	10.04	10.62	10.88	12.83	14.82	16.10	18.63	21.94	22.30	22.30	22.30	22.30
25	5.25	6.30	8.82	9.41	10.00	10.27	12.53	14.51	15.72	18.20	21.48	21.86	21.86	21.86	21.86
50	4.52	5.58	7.99	8.62	9.14	9.42	12.24	14.25	15.41	17.89	21.15	21.52	21.52	21.52	21.52
100	3.53	4.78	6.88	7.51	7.92	8.20	11.91	13.87	14.95	17.42	20.72	21.08	21.08	21.08	21.08
150	2.95	4.33	6.16	6.81	7.21	7.47	11.65	13.64	14.65	17.15	20.47	20.83	20.83	20.83	20.83
200	2.68	4.03	5.67	6.31	6.74	7.34	11.46	13.43	14.40	16.93	20.29	20.65	20.65	20.65	20.65
300	2.47	3.64	5.11	5.75	6.41	7.14	11.13	13.08	13.98	16.61	19.97	20.32	20.32	20.32	20.32
400	2.30	3.38	4.89	5.46	6.16	6.95	10.83	12.75	13.60	16.39	19.71	20.05	20.05	20.05	20.05
500	2.18	3.20	4.67	5.21	6.01	6.76	10.51	12.41	13.27	16.20	19.50	19.85	19.85	19.85	19.85
1,000	1.79	2.64	3.91	4.42	5.35	6.04	9.37	11.15	12.08	15.56	18.53	18.97	18.97	18.97	18.97
2,000	1.42	2.17	3.03	3.64	4.47	5.18	8.18	9.89	10.83	14.42	17.16	17.72	17.73	17.73	17.73
5,000	1.02	1.75	2.46	2.99	3.44	4.06	6.68	8.27	9.21	12.38	14.77	15.39	15.41	15.41	15.41
10,000	0.76	1.37	1.95	2.41	2.75	3.23	5.70	7.08	8.14	10.89	12.66	13.58	13.60	13.60	13.60
20,000	0.50	1.00	1.46	1.84	2.10	2.49	4.61	5.87	6.89	8.92	10.62	11.81	11.83	11.83	11.83
50,000	0.24	0.51	0.80	1.04	1.24	1.41	2.69	3.82	4.68	6.37	7.76	8.93	8.98	8.98	8.98
97,261	0.12	0.28	0.34	0.49	0.67	0.76	1.11	2.22	2.90	3.98	4.88	5.86	5.94	5.94	5.94

Figure 490: Depth-area-duration values for Larto Lake, LA September 2008

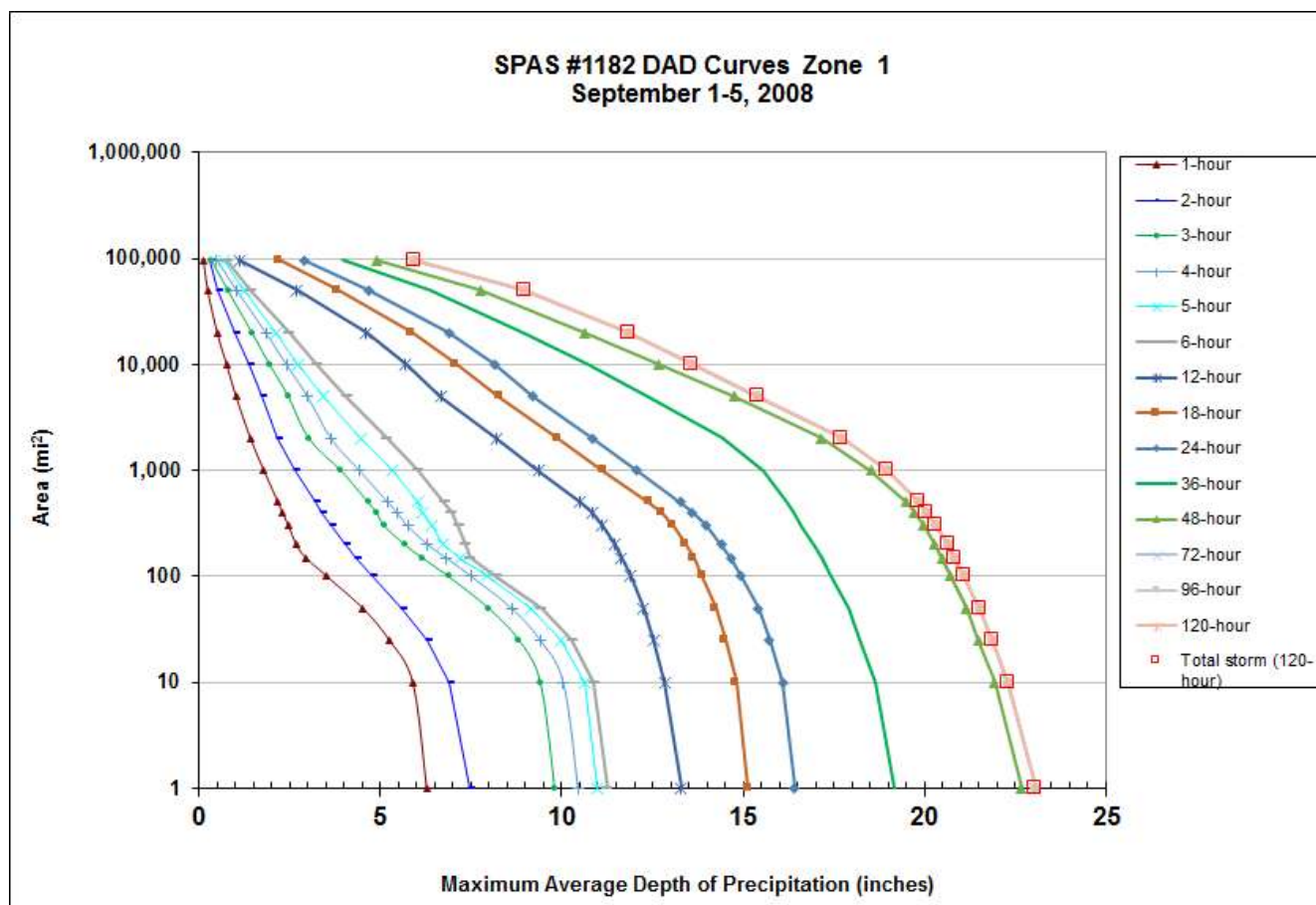


Figure 491: Depth-area-duration chart for Larto Lake, LA September 2008

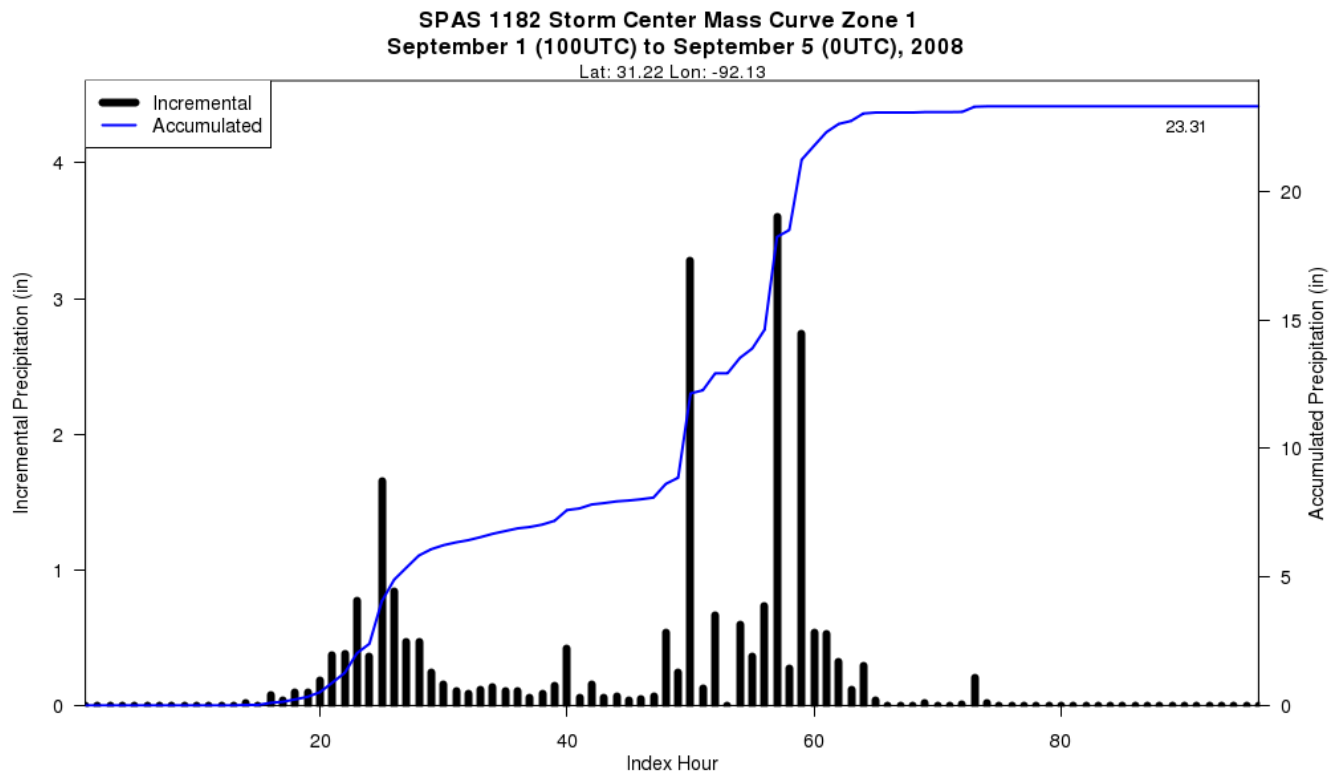


Figure 492: Mass curve chart for Larto Lake, LA September 2008

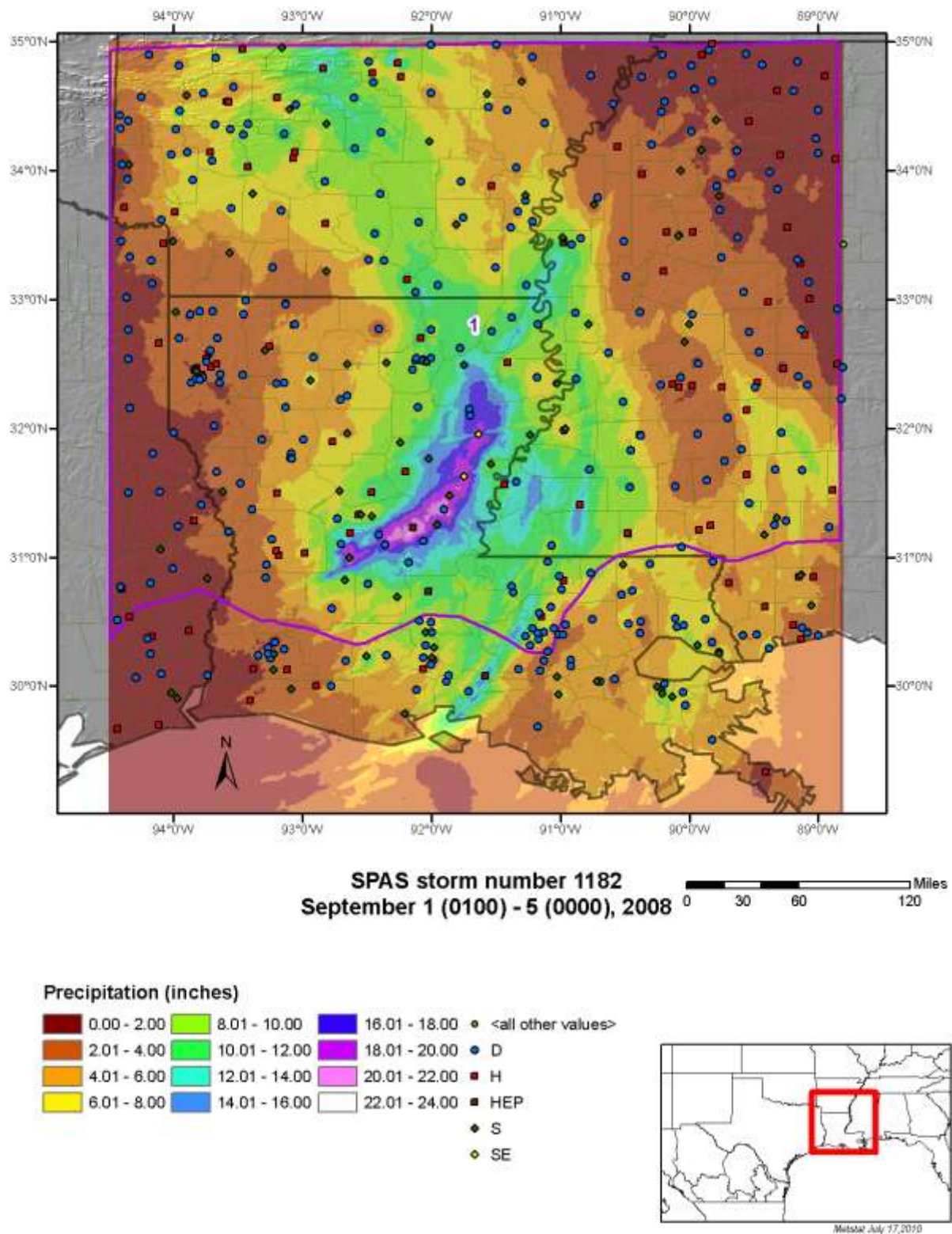
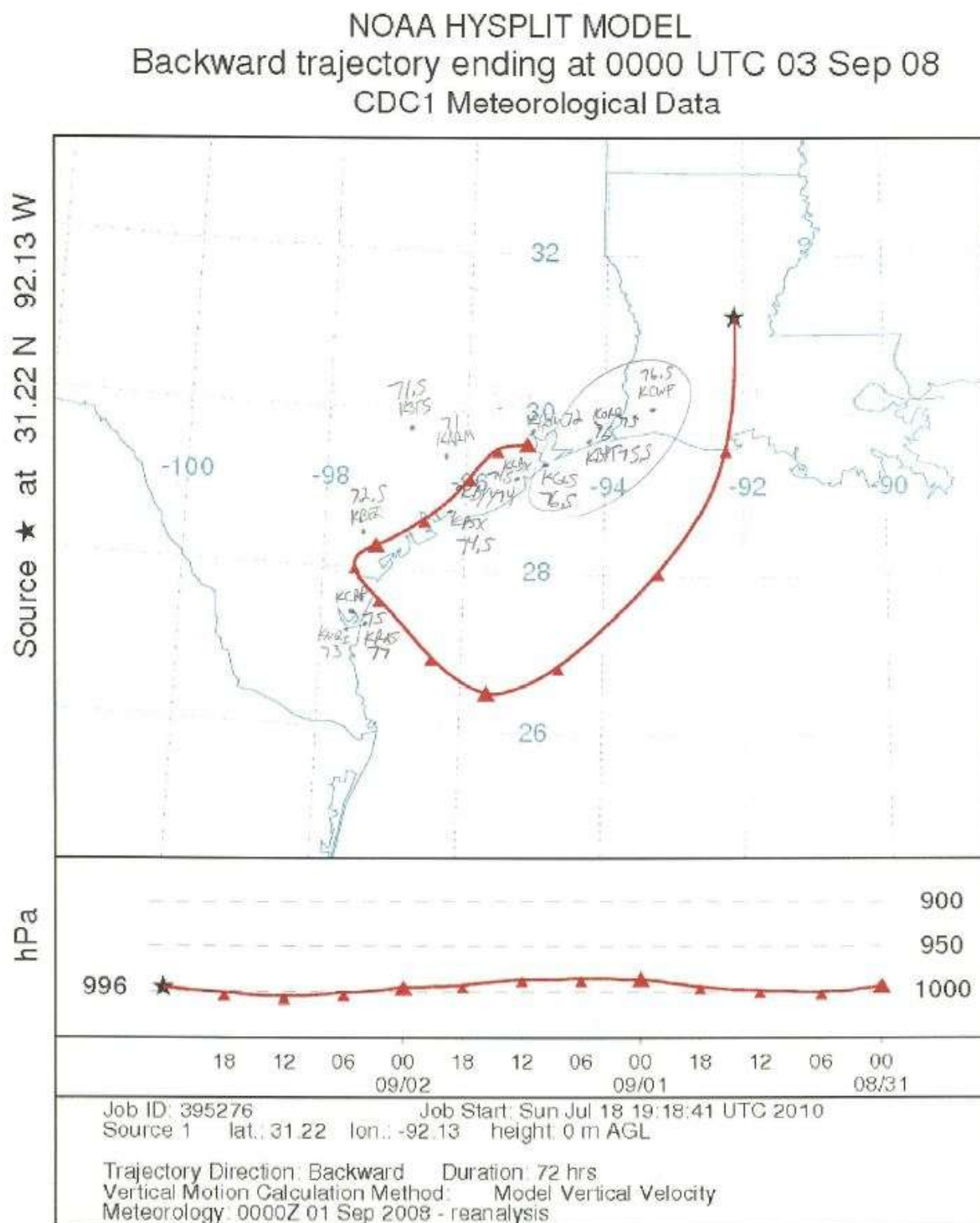


Figure 493: Total storm isohyetal analysis for Larto Lake, LA September 2008



**Figure 494: HYSPLIT trajectory and In-place storm representative dew point analysis for Larto Lake, LA
September 3, 2008**

Storm Precipitation Analysis System (SPAS) For Storm #1598

General Storm Location: Estanzuela/Monterrey, MX (31.0, -105.0, 20.0, -97.0)

Storm Dates: June 29 - July 5, 2010 (168-hours)

Event: Hurricane Alex

DAD Zone 1

Latitude: 25.5958

Longitude: -100.2042

Max. Grid Rainfall Amount: 36.87" La Estanzuela, MX

Max. Observed Rainfall Amount: 36.25"

Number of Stations: 758

SPAS Version: 10.0

Base Map Used: TRMM total storm

Spatial resolution: 0.008 decimal degree (0.29-sqmi)

Radar Included: No

Depth-Area-Duration (DAD) analysis: Yes

Reliability of results: This analysis was based on 758 hourly stations, daily data, supplemental station data, and TRMM data (daily and 3-hour). We have a good degree of confidence for the station based storm total results. The spatial pattern is dependent on the TRMM data, gauge data, and TRMM total storm basemap. There is a good degree of confidence with the timing based on the Mexican hourly stations near the storm center. Several hourly pseudo stations were created, based on TRMM 3-hour rainfall timing, to aid in timing of daily stations in Mexico. Some daily stations were moved to supplemental due to timing issues.

SPAS Storm ID	NAME	LON	LAT	ELEV Round	Storm Representative				Climatological Maximum				IPMF
					T _s	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	T _s	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	
1598_1	ESTANZUELA_COAHUILA	-100.204	25.596	2,000	83.50	4.21"	0.62"	3.590	85.5	4.58"	0.67"	3.910	1.09

Storm 1598 - June 29 (0700 UTC) - July 6 (0600 UTC), 2010														
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)														
Area (mi ²)	Duration (hours)													
	1	2	3	4	5	6	12	18	24	36	48	72	96	120
Total														
0.3	2.55	3.62	5.05	6.48	7.25	7.93	10.40	14.71	17.96	24.93	28.18	35.42	35.65	36.87
1	2.53	3.60	5.01	6.44	7.20	7.90	10.35	14.64	17.87	24.80	28.02	35.28	35.45	35.77
10	2.49	3.56	4.93	6.34	7.10	7.80	10.22	14.45	17.63	24.48	27.62	34.73	34.97	35.28
25	2.40	3.44	4.80	6.17	6.91	7.57	9.97	14.09	17.18	23.86	26.92	33.95	34.53	34.96
50	2.30	3.29	4.60	5.90	6.60	7.23	9.63	13.59	16.59	23.01	25.87	32.77	33.64	34.14
100	2.17	3.11	4.31	5.52	6.18	7.08	9.15	12.93	15.76	21.84	24.42	31.13	32.29	33.01
150	2.09	3.00	4.31	5.29	6.15	7.06	8.87	12.52	15.24	21.09	23.53	30.08	31.37	32.17
200	2.05	2.91	4.30	5.21	6.15	7.05	8.68	12.23	14.87	20.54	22.86	29.31	30.61	31.47
300	1.99	2.84	4.30	5.20	6.14	7.04	8.40	11.82	14.33	19.63	21.69	27.90	29.29	30.12
400	1.94	2.84	4.29	5.19	6.13	7.03	8.16	11.51	13.93	18.89	20.79	26.72	28.15	29.02
500	1.91	2.83	4.27	5.19	6.11	7.03	7.97	11.24	13.58	18.33	19.97	25.83	27.21	28.01
1,000	1.80	2.78	4.18	5.08	5.98	6.87	7.20	10.28	12.39	16.30	17.22	22.52	24.07	24.71
2,000	1.70	2.67	4.01	4.87	5.73	6.59	6.74	8.99	10.88	14.16	15.04	19.27	20.84	21.37
5,000	1.49	2.44	3.66	4.45	5.23	6.02	6.16	7.37	8.80	11.56	12.53	15.77	17.13	18.52
10,000	1.23	2.15	3.23	3.93	4.61	5.31	5.44	6.46	7.52	9.94	10.96	13.57	14.81	16.38
20,000	0.86	1.72	2.58	3.14	3.69	4.24	4.44	5.81	6.70	8.43	9.48	11.39	12.48	14.16
50,000	0.56	1.10	1.65	2.00	2.34	2.69	3.40	4.67	5.46	6.68	7.50	8.84	9.69	11.09
100,000	0.38	0.73	1.08	1.32	1.57	1.82	2.51	3.57	4.30	5.23	5.93	7.04	7.66	8.50
377,846	0.14	0.26	0.39	0.48	0.58	0.68	0.93	1.35	1.68	2.19	2.60	3.28	3.64	4.07

Figure 495: Depth-area-duration values for Estanzuela, MX June 2010

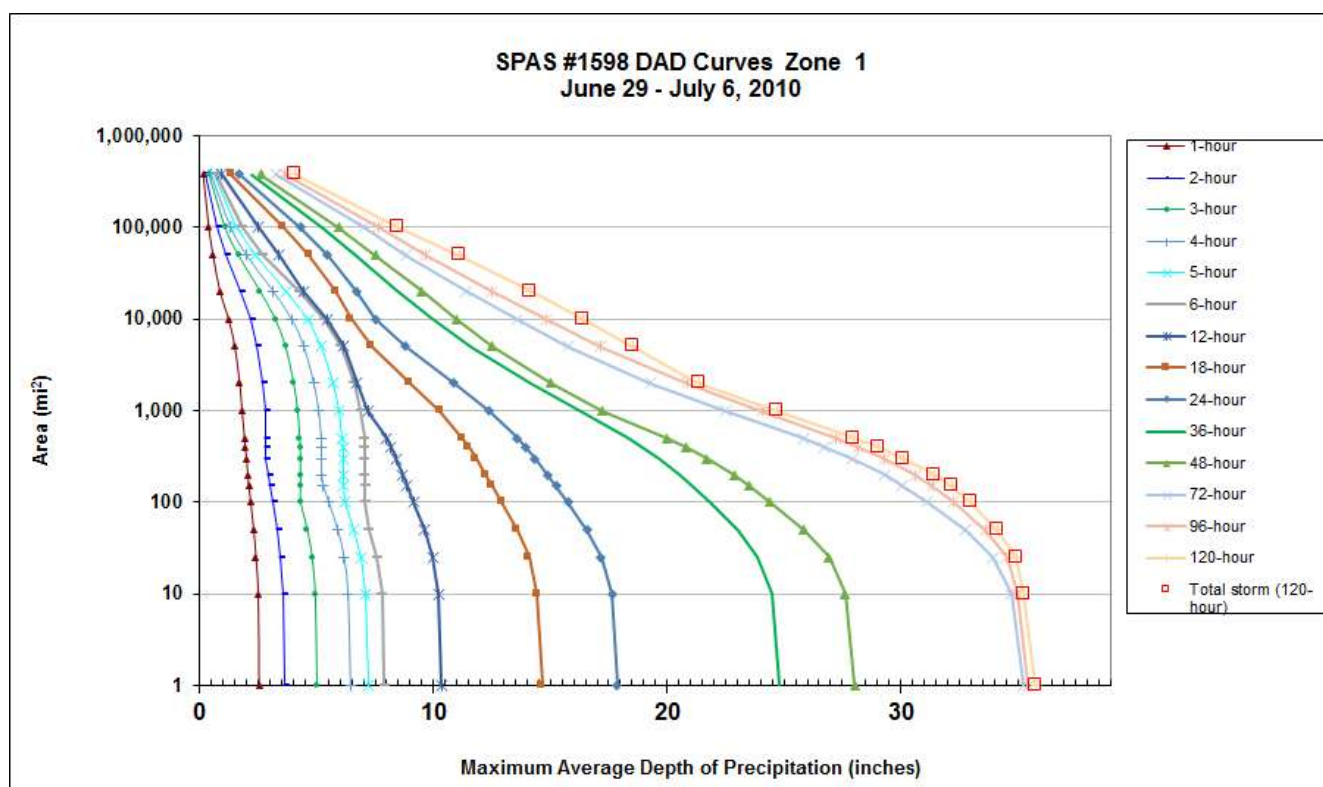


Figure 496: Depth-area-duration chart for Estanzuela, MX June 2010

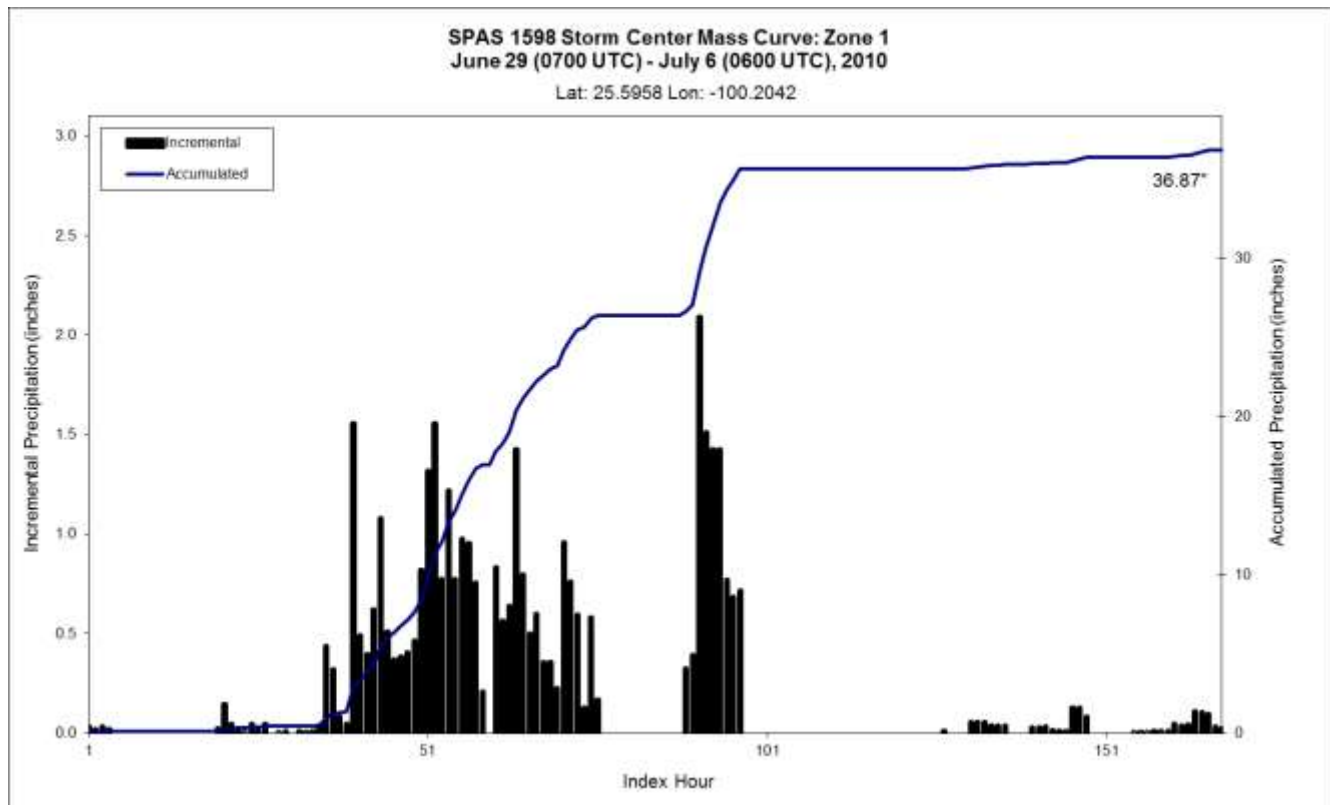


Figure 497: Mass curve chart for Estanduela, MX June 2010

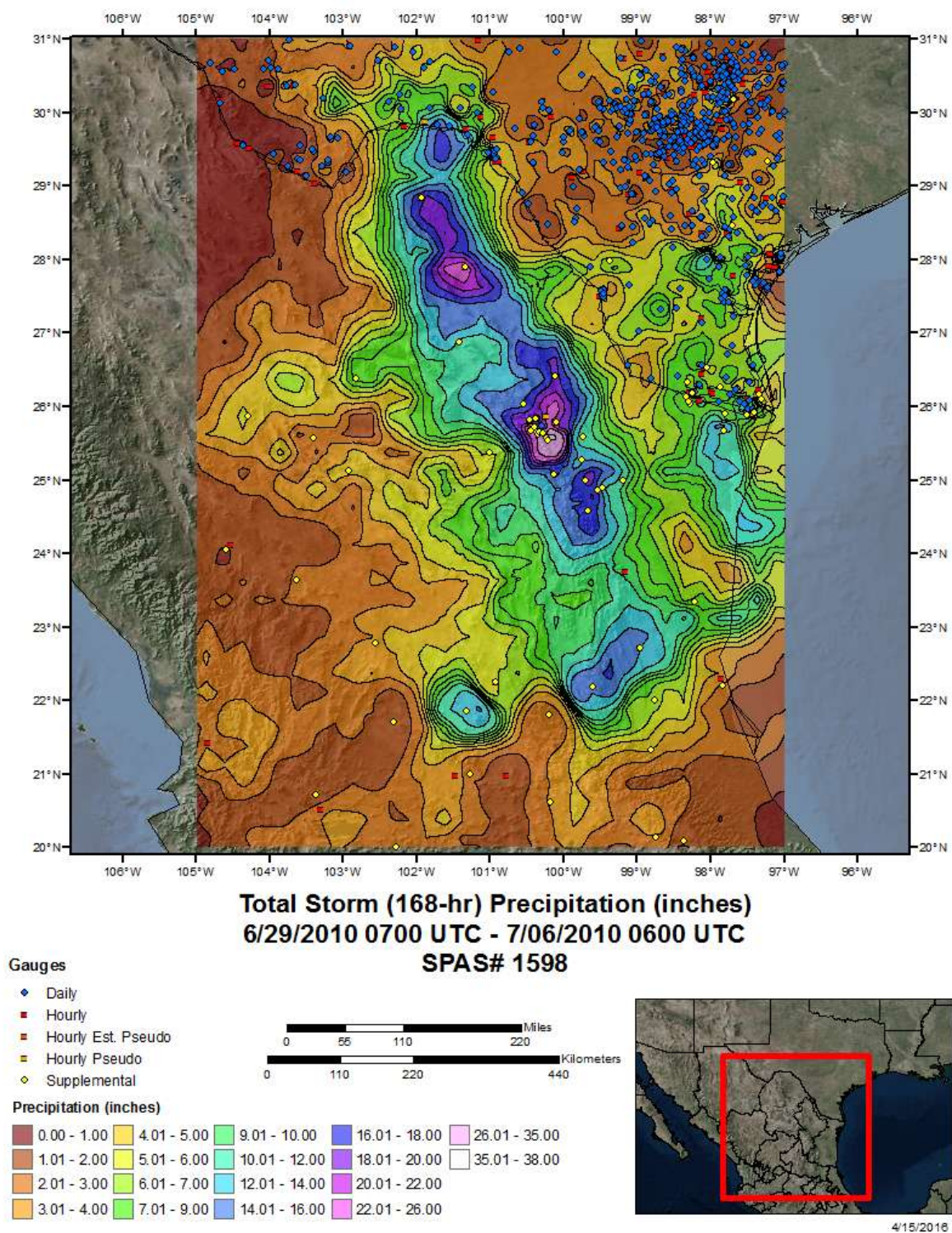


Figure 498: Total storm isohyetal analysis for Estanzuela, MX June 2010

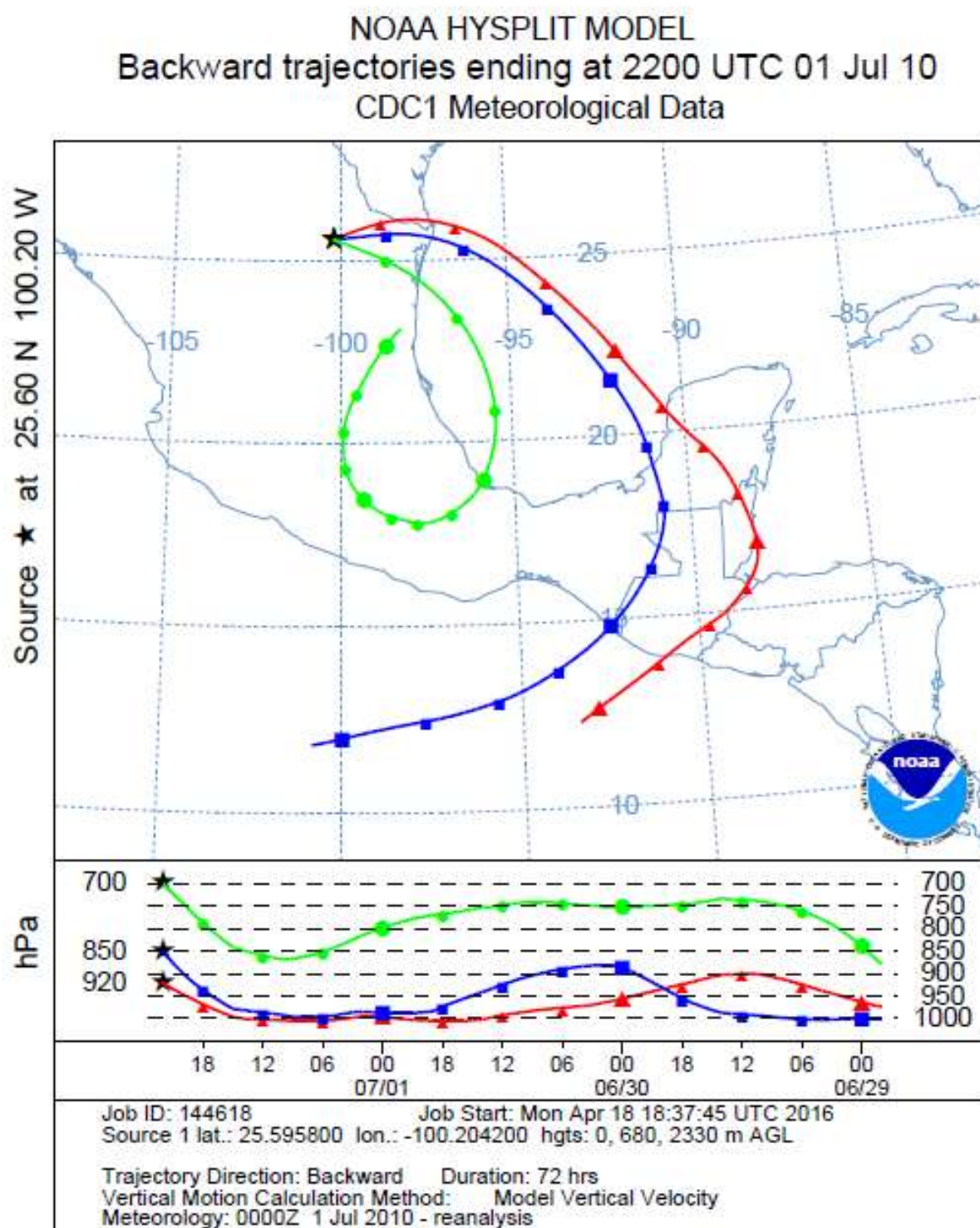


Figure 499: HYSPLIT trajectory analysis at Surface, 850mb and 700mb for Estanzuela, MX June 2010

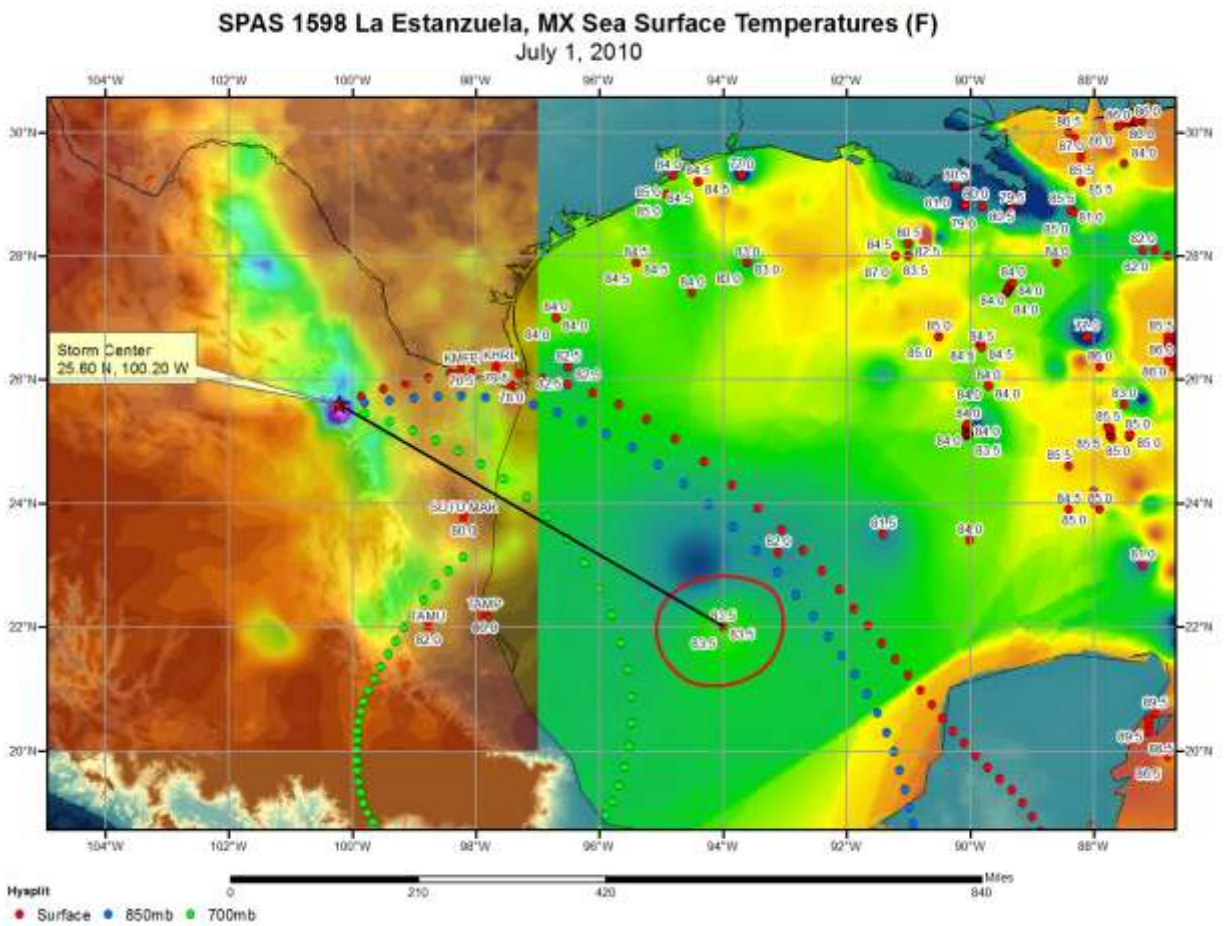


Figure 500: In-place storm representative SST analysis for Estanzuela, MX July 1, 2010

Storm Precipitation Analysis System (SPAS) For Storm #1531

General Storm Location: The Bowl, TX

Storm Dates: September 21-23, 2014

Event: Synoptic, Remnants of Hurricane Odile

DAD Zone 1

Latitude: 31.935

Longitude: -104.825

Max. Grid Rainfall Amount: 10.83"

Max. Observed Rainfall Amount: 10.80"

Number of Stations: 204 (93 Daily, 78 Hourly, 2 Hourly Pseudo, 31 Supplemental, and 0 Supplemental Estimated)

SPAS Version: 10.0

Basemap: PRISM September 1981-2010 precipitation climatology

Spatial resolution: 0.01 (~ 0.40 mi²)

Radar Included: Yes

Depth-Area-Duration (DAD) analysis: Yes

Reliability of results: This analysis was based on hourly data, daily data, supplemental station data and NEXRAD Radar. We have a high degree of confidence in the radar/station based storm total results, the spatial pattern is dependent on the radar data and basemap, and the timing is based on hourly, hourly pseudo stations, and radar data.

SPAS Storm ID	NAME	LON	LAT	ELEV Round	Storm Representative				Climatological Maximum				IPMF
					T _d	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	T _d	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	
1531_1	THE BOWL	-104.825	31.935	8,000	76.50	3.07"	1.66"	1.405	77.5	3.22"	1.72"	1.500	1.07

Storm 1531 - September 21 (0600 UTC) - September 23 (1300 UTC), 2014														
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)														
Area (mi ²)	Duration (hours)													
	1	2	3	4	5	6	12	18	24	36	48	72	96	120
0.4	3.30	4.75	4.86	4.91	4.98	5.24	6.62	8.56	9.00	10.65	10.83	10.83	10.83	10.83
1	3.25	4.68	4.79	4.84	4.91	5.16	6.57	8.49	8.93	10.57	10.80	10.75	10.75	10.75
10	2.94	4.05	4.15	4.22	4.31	4.52	6.22	8.19	8.59	10.16	10.33	10.33	10.33	10.33
25	2.61	3.42	3.53	3.67	3.96	4.09	5.43	7.58	7.92	9.38	9.57	9.57	9.57	9.57
50	2.30	3.02	3.32	3.62	3.71	3.80	4.78	6.99	7.46	8.77	9.00	9.01	9.01	9.01
100	1.97	2.74	3.08	3.33	3.45	3.52	4.40	6.42	6.99	8.25	8.48	8.48	8.48	8.48
150	1.76	2.57	2.91	3.14	3.27	3.33	4.24	6.09	6.64	7.86	8.08	8.08	8.08	8.08
200	1.61	2.45	2.79	3.00	3.14	3.20	4.09	5.83	6.40	7.56	7.77	7.78	7.78	7.78
300	1.38	2.27	2.59	2.81	2.96	3.03	3.84	5.45	6.04	7.10	7.33	7.32	7.32	7.32
400	1.24	2.13	2.46	2.67	2.82	2.91	3.64	5.09	5.76	6.78	6.99	7.00	7.00	7.00
500	1.16	2.01	2.33	2.57	2.71	2.81	3.48	4.84	5.56	6.53	6.74	6.75	6.75	6.75
1,000	0.94	1.63	1.93	2.21	2.40	2.51	3.05	4.10	4.80	5.64	5.82	5.84	5.84	5.84
2,000	0.71	1.24	1.50	1.78	2.02	2.11	2.61	3.41	4.01	4.70	4.88	4.88	4.88	4.88
5,000	0.42	0.79	1.01	1.22	1.39	1.47	2.00	2.39	2.93	3.51	3.74	3.75	3.75	3.75
10,000	0.24	0.44	0.66	0.82	0.95	1.03	1.58	1.85	2.18	2.79	2.98	2.98	2.98	2.98
20,000	0.15	0.27	0.40	0.49	0.58	0.66	1.17	1.42	1.58	2.11	2.28	2.29	2.29	2.29
50,000	0.06	0.12	0.18	0.23	0.27	0.31	0.58	0.74	0.82	1.12	1.23	1.25	1.25	1.25
67,931	0.06	0.11	0.16	0.20	0.24	0.27	0.51	0.64	0.72	1.00	1.10	1.11	1.11	1.11

Figure 501: Depth-area-duration values for The Bowl, TX September 2014

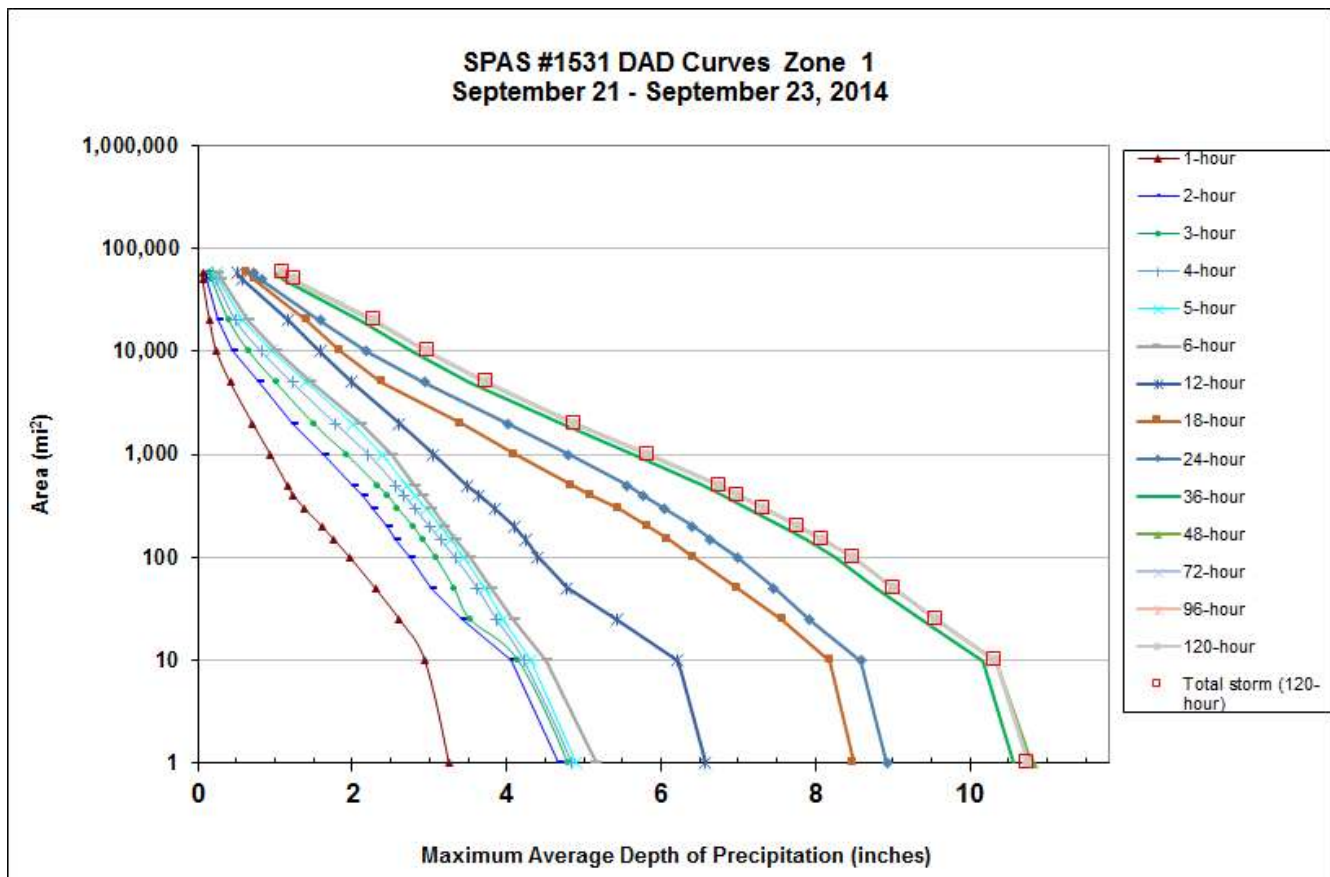


Figure 502: Depth-area-duration chart for The Bowl, TX September 2014

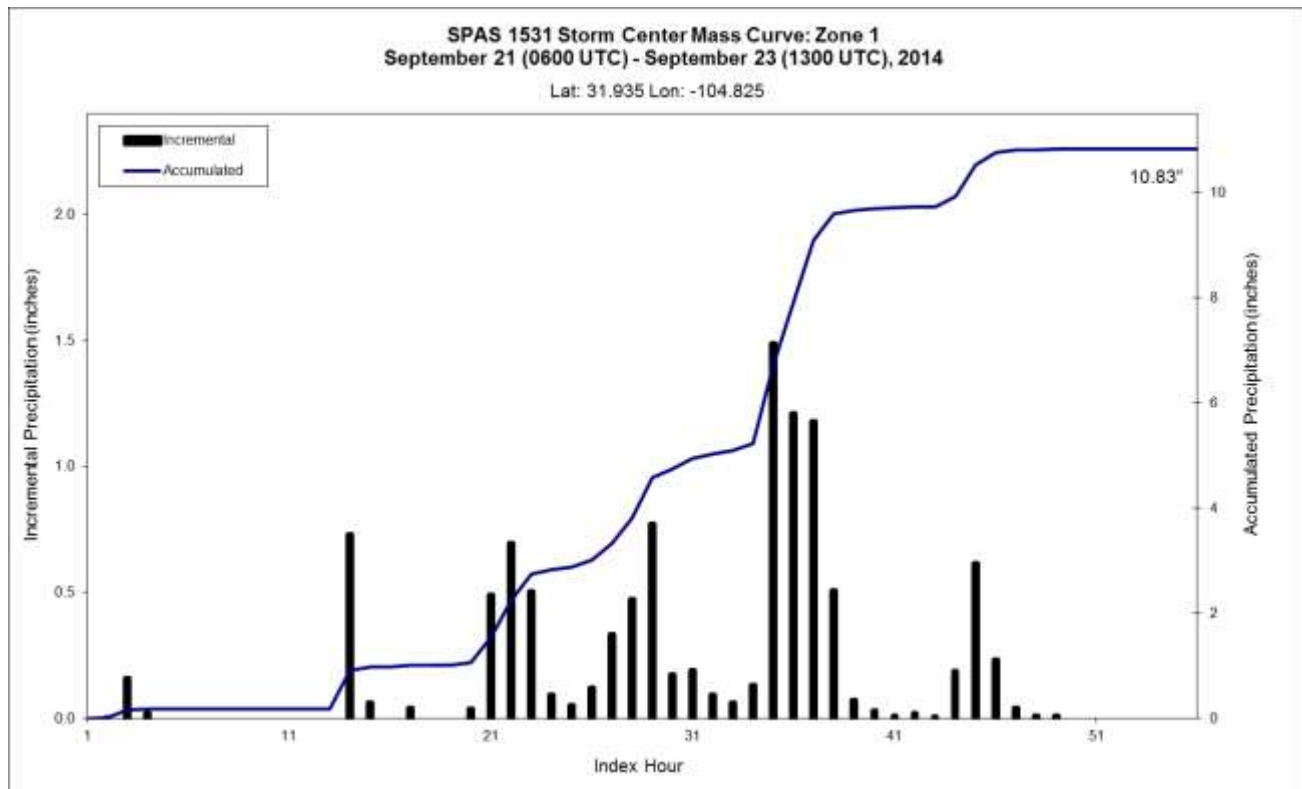


Figure 503: Mass curve chart for The Bowl, TX September 2014

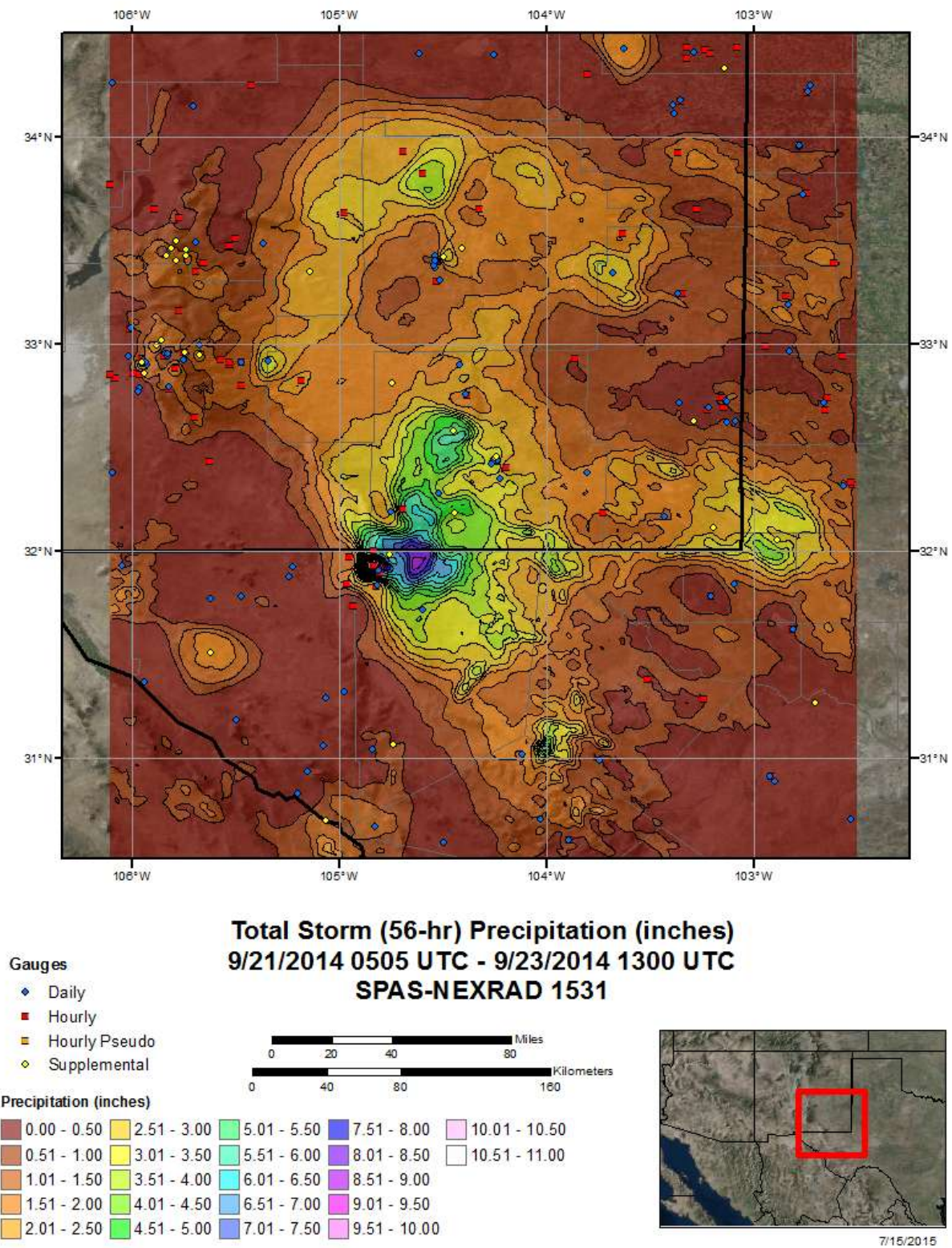


Figure 504: Total storm isohyetal analysis for The Bowl, TX September 2014

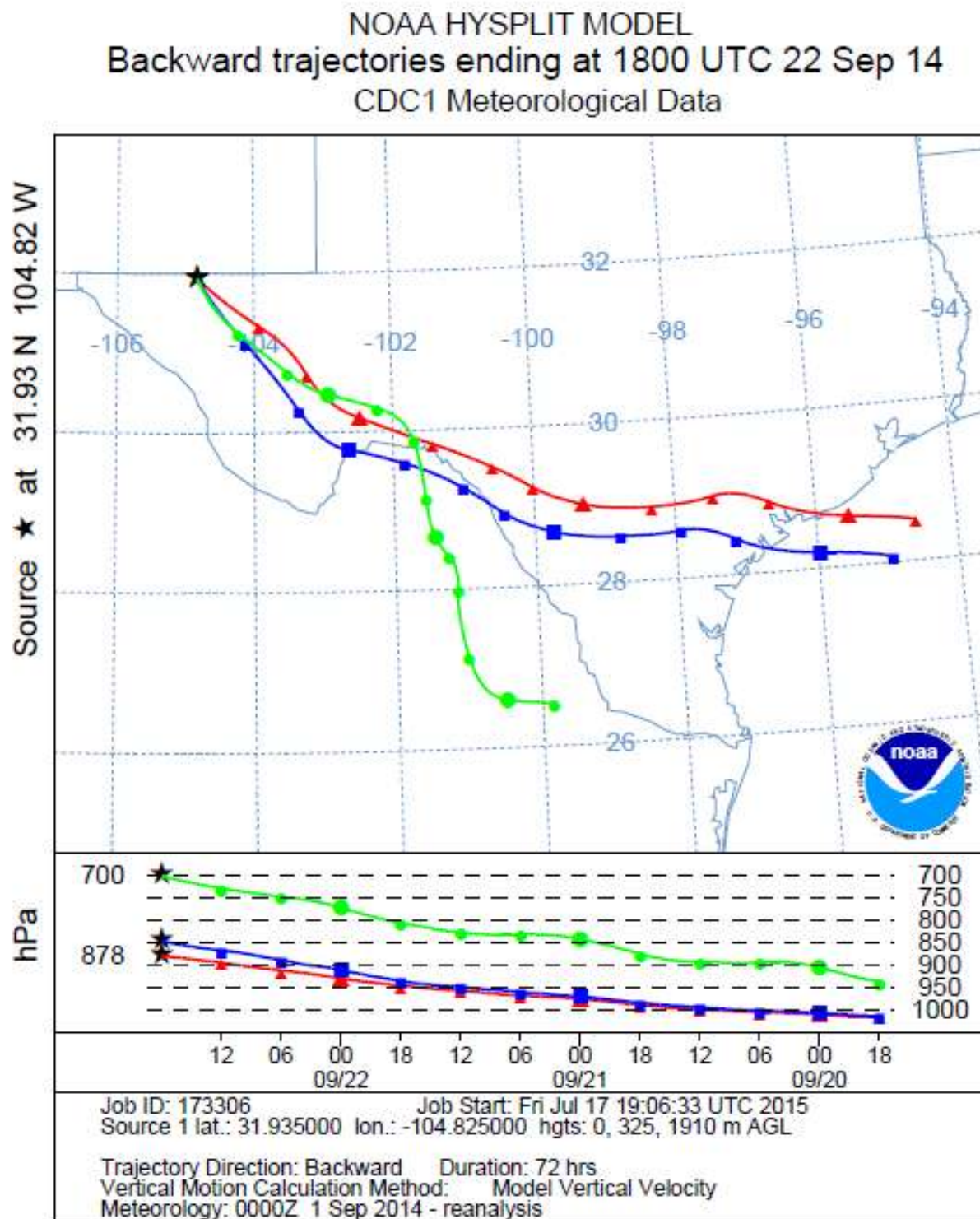


Figure 505: HYSPLIT trajectory analysis at Surface, 850mb and 700mb for The Bowl, TX September 2014

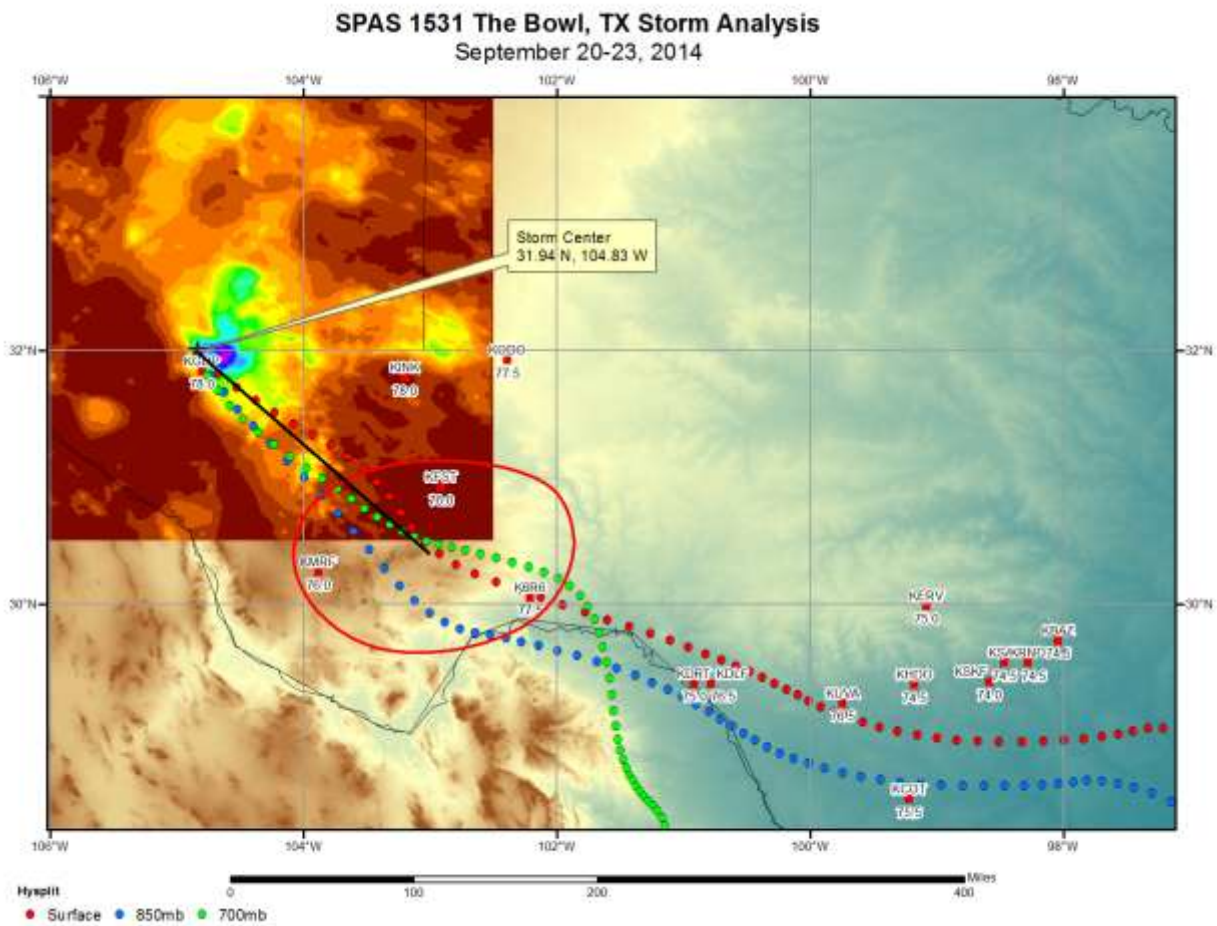


Figure 506: In-place storm representative dew point analysis for The Bowl, TX September 20-23, 2014

Hybrid Storms

Storm Precipitation Analysis System (SPAS) For Storm #1592

General Storm Location: Thrall, TX (32.0,-100.0,26.0,-94.0)

Storm Dates: September 7-11, 1921

Event: Tropical Remnants

DAD Zone 1

Latitude: 30.6292

Longitude: -97.3875

Max. Grid Rainfall Amount: 39.90" Thrall, TX

Max. Observed Rainfall Amount: 39.72"

Number of Stations: 103

SPAS Version: 10.0

Basemap: Blended Basemap of Weather Bureau Isohyetal Image (90%) and PRISM Mean September 1971-2000 Climatology (10%)

Spatial resolution: 0.2891

Radar Included: No

Depth-Area-Duration (DAD) analysis: Yes

Reliability of results: This analysis was based on hourly data, daily data, and supplemental station data. We have a high degree of confidence in the station based storm total results. The spatial pattern is dependent heavily on the Weather Bureau Isohyetal basemap, and the timing is based on hourly, hourly pseudo, and hourly estimated pseudo stations. An additional 56 supplemental stations were created to ensure data consistency.

SPAS Storm ID	NAME	LON	LAT	ELEV Round	Storm Representative				Climatological Maximum				IPMF
					T _g	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	T _g	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	
1592_1	THRALL	-97.388	30.629	600	79.00	3.44"	0.17"	3.270	80.5	3.68"	0.18"	3.500	1.07

Storm 1592 - September 7 (0700 UTC) - September 12 (0600 UTC), 1921														
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)														
Area (mi ²)	Duration (hours)													
	1	2	3	4	5	6	12	18	24	36	48	72	96	120
0.3	6.29	12.59	18.88	20.40	21.93	23.45	31.86	36.47	38.28	39.82	39.82	39.82	39.82	39.90
1	6.26	12.52	18.77	20.29	21.81	23.33	31.68	36.27	38.07	39.60	39.60	39.60	39.60	39.60
10	6.18	12.36	18.51	20.00	21.52	23.01	31.23	35.77	37.54	39.05	39.05	39.05	39.05	39.05
25	6.07	12.14	18.21	19.68	21.14	22.61	30.70	35.19	36.95	38.44	38.44	38.44	38.44	38.44
50	5.85	11.70	17.55	18.96	20.38	21.80	29.56	33.97	35.68	37.11	37.11	37.11	37.11	37.11
100	5.47	10.93	16.39	17.72	19.04	20.36	27.56	31.80	33.44	34.79	34.79	34.79	34.79	34.79
150	5.16	10.32	15.46	16.72	17.96	19.22	25.92	30.11	31.69	32.97	32.97	32.98	32.98	32.98
200	4.91	9.82	14.69	15.91	17.06	18.29	24.62	28.71	30.17	31.43	31.43	31.44	31.40	31.40
300	4.57	9.13	13.68	14.79	15.87	16.95	22.63	26.58	28.06	29.22	29.22	29.25	29.25	29.25
400	4.35	8.69	13.02	14.08	15.06	16.05	21.23	25.05	26.48	27.58	27.58	27.61	27.61	27.61
500	4.18	8.37	12.54	13.55	14.46	15.39	20.21	23.92	25.30	26.36	26.37	26.41	26.41	26.41
1,000	3.71	7.41	11.13	12.00	12.75	13.52	17.39	20.66	21.87	22.94	22.98	23.08	23.08	23.08
2,000	3.26	6.51	9.77	10.54	11.18	11.82	14.77	17.63	18.70	19.98	20.03	20.23	20.23	20.23
5,000	2.43	4.81	7.21	7.77	8.26	8.73	10.93	13.29	14.14	15.54	15.56	15.97	15.97	15.97
10,000	1.68	3.26	4.87	5.23	5.55	5.87	7.41	9.09	9.72	11.74	11.75	12.20	12.20	12.20
20,000	1.08	2.09	3.05	3.30	3.53	3.85	4.73	6.14	7.17	8.60	8.61	9.02	9.02	9.02
50,000	0.60	1.16	1.64	1.79	1.93	2.09	2.62	3.70	4.29	4.97	4.97	5.34	5.33	5.33
100,000	0.37	0.73	1.03	1.13	1.22	1.33	1.69	2.29	2.64	3.16	3.16	3.40	3.36	3.36
113,470	0.33	0.64	0.94	1.03	1.12	1.21	1.49	2.04	2.38	2.83	2.85	3.09	3.09	3.09

Figure 507: Depth-area-duration values for Thrall, TX September 1921

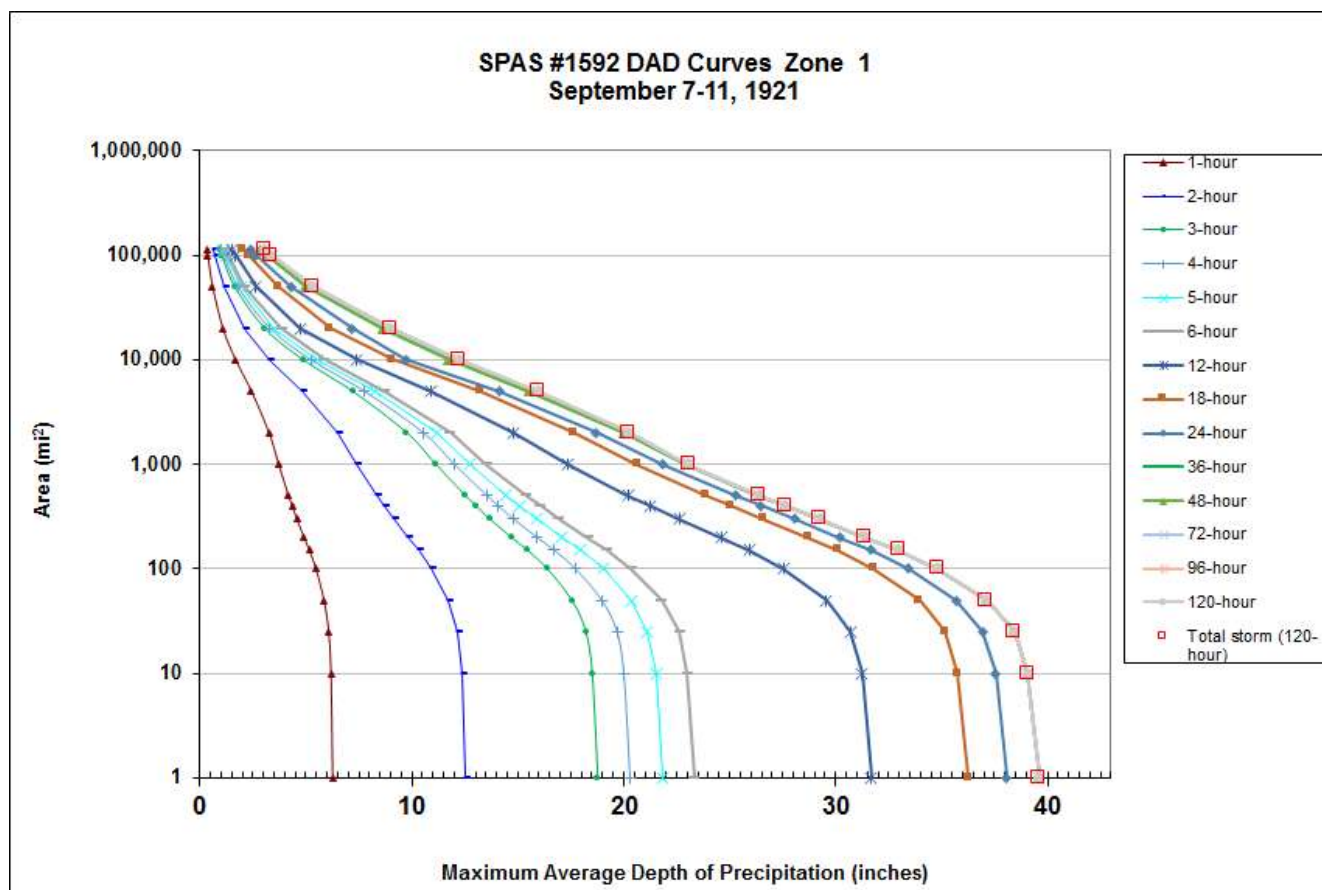


Figure 508: Depth-area-duration chart for Thrall, TX September 1921

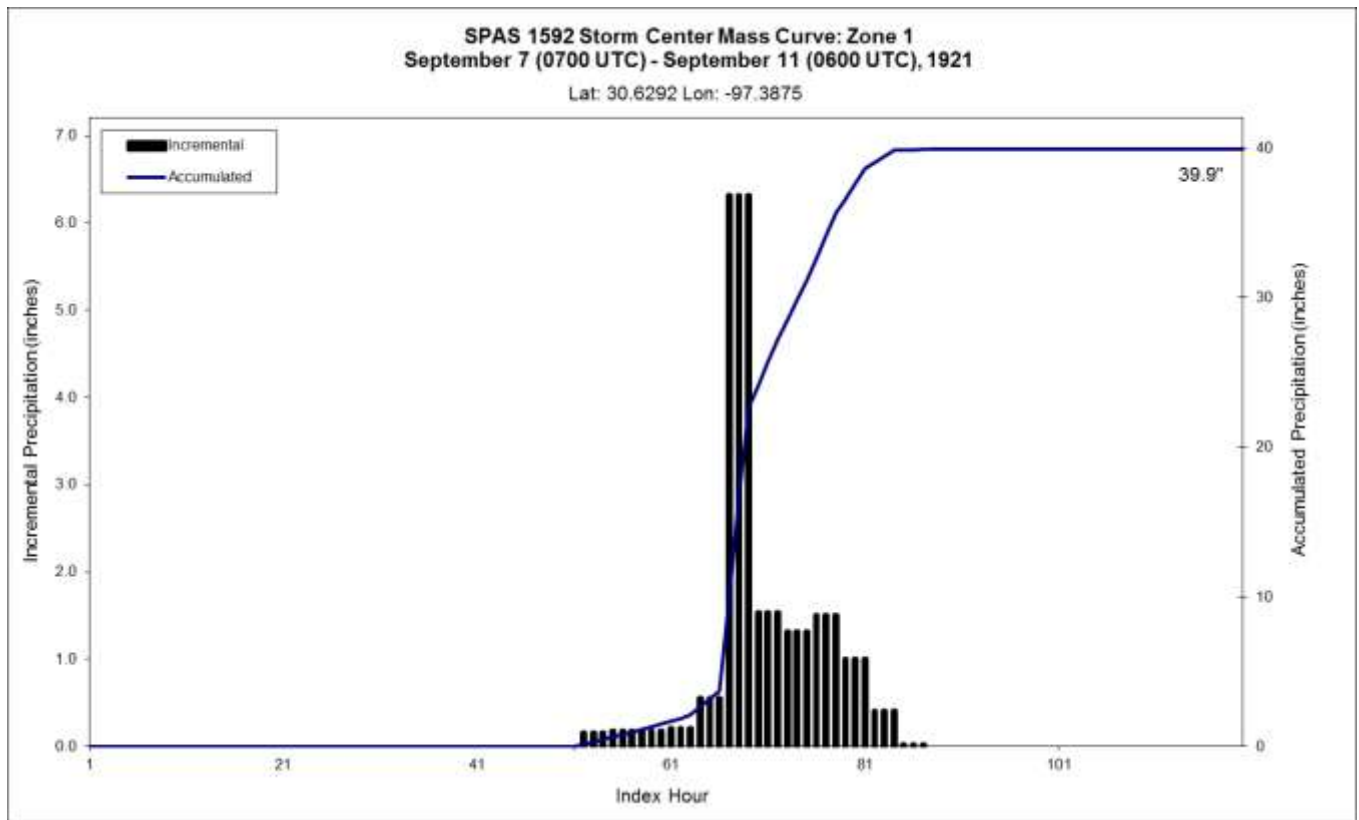


Figure 509: Mass curve chart for Thrall, TX September 1921

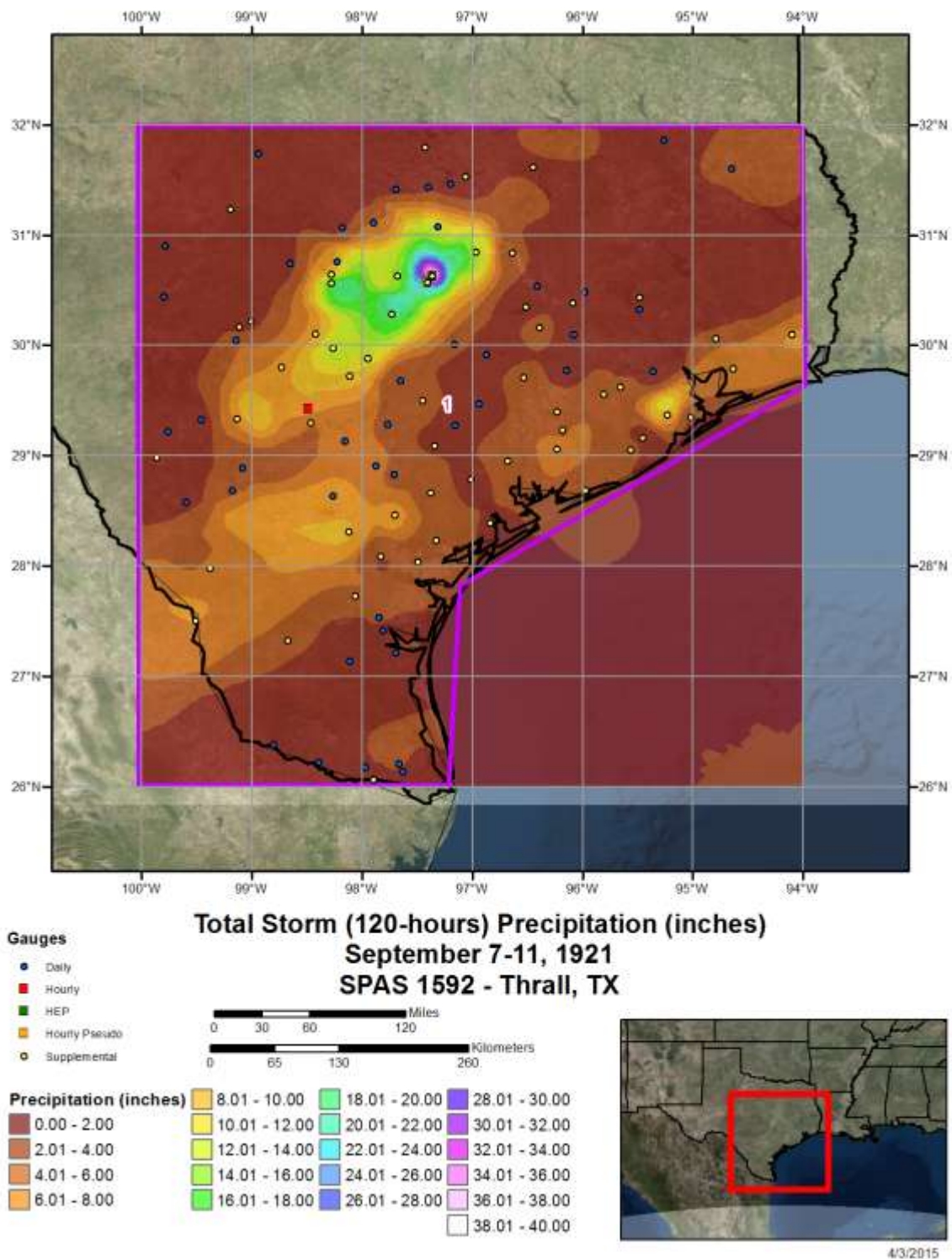



Figure 510: Total storm isohyetal analysis for Thrall, TX September 1921

WAR DEPARTMENT		CORPS OF ENGINEERS, U.S. ARMY																																																																																																																																																				
STORM STUDIES - PERTINENT DATA SHEET																																																																																																																																																						
 <p style="text-align: center;">LOCATION MAP</p>		<p>Storm of 8-10 Sept. 1921 Assignment CM 4-12 Location Central Texas Study Prepared by: Southwestern Division Galveston District Office & Hydrometeorological Section</p> <p>Part I Reviewed by H. M. Sec. of Weather Bureau, 8/20/45 Part II Approved by Office, Chief of Engineers for Distribution of Factual Data, 11/7/46</p> <p>Remarks: Center near Thrall (Taylor), Texas</p>																																																																																																																																																				
		<p style="text-align: center;">DATA AND COMPUTATIONS COMPILED</p> <p style="text-align: center;">PART I</p> <p>Preliminary Isohyetal map, in <u>1</u> sheet, scale <u>1:1,000,000</u></p> <p>Precipitation data and mass curves: (Number of Sheets)</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td>Form 5001-C (Hourly precip. data).....</td> <td style="text-align: right;">7</td> </tr> <tr> <td>Form 5001-B (24-hour " " " ").....</td> <td style="text-align: right;">23</td> </tr> <tr> <td>Form 5001-D (" " " " " ").....</td> <td style="text-align: right;">2</td> </tr> <tr> <td>Misc. precip. records, meteorological data, etc.....</td> <td style="text-align: right;">30</td> </tr> <tr> <td>Form 5002 (Mass rainfall curves).....</td> <td style="text-align: right;">35</td> </tr> </table> <p style="text-align: center;">PART II</p> <p>Final Isohyetal maps, in <u>1</u> sheet, scale <u>1:500,000</u></p> <p>Data and computation sheets:</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td>Form S-10 (Data from mass rainfall curves).....</td> <td style="text-align: right;">2</td> </tr> <tr> <td>Form S-11 (Depth-area data from isohyetal map).....</td> <td style="text-align: right;">2</td> </tr> <tr> <td>Form S-12 (Maximum depth-duration data).....</td> <td style="text-align: right;">38</td> </tr> <tr> <td>Maximum duration-depth-area curves.....</td> <td style="text-align: right;">1</td> </tr> <tr> <td>Data relating to periods of maximum rainfall.....</td> <td style="text-align: right;">—</td> </tr> </table> <p style="text-align: center;">MAXIMUM AVERAGE DEPTH OF RAINFALL IN INCHES</p> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th rowspan="2">Area in Sq. Mi.</th> <th colspan="8">Duration of Rainfall in Hours</th> </tr> <tr> <th>6</th> <th>12</th> <th>18</th> <th>24</th> <th>30</th> <th>36</th> <th>48</th> <th></th> <th></th> <th></th> </tr> </thead> <tbody> <tr> <td>Max. Station</td> <td>23.4</td> <td>31.8</td> <td>36.4</td> <td>38.2</td> <td>39.2</td> <td>39.7</td> <td>39.7</td> <td></td> <td></td> <td></td> </tr> <tr> <td>10</td> <td>22.4</td> <td>29.8</td> <td>35.0</td> <td>36.5</td> <td>37.2</td> <td>37.6</td> <td>37.6</td> <td></td> <td></td> <td></td> </tr> <tr> <td>100</td> <td>19.6</td> <td>26.2</td> <td>30.7</td> <td>31.9</td> <td>32.6</td> <td>32.9</td> <td>32.9</td> <td></td> <td></td> <td></td> </tr> <tr> <td>200</td> <td>17.9</td> <td>24.3</td> <td>28.7</td> <td>29.7</td> <td>30.4</td> <td>30.7</td> <td>30.8</td> <td></td> <td></td> <td></td> </tr> <tr> <td>500</td> <td>15.4</td> <td>21.4</td> <td>25.6</td> <td>26.6</td> <td>27.3</td> <td>27.6</td> <td>27.7</td> <td></td> <td></td> <td></td> </tr> <tr> <td>1,000</td> <td>13.4</td> <td>18.8</td> <td>22.9</td> <td>24.0</td> <td>24.6</td> <td>24.9</td> <td>25.1</td> <td></td> <td></td> <td></td> </tr> <tr> <td>2,000</td> <td>11.2</td> <td>15.7</td> <td>19.5</td> <td>20.6</td> <td>21.2</td> <td>21.5</td> <td>21.6</td> <td></td> <td></td> <td></td> </tr> <tr> <td>5,000</td> <td>8.1</td> <td>11.1</td> <td>14.1</td> <td>15.0</td> <td>15.9</td> <td>16.2</td> <td>16.3</td> <td></td> <td></td> <td></td> </tr> <tr> <td>10,000</td> <td>5.6</td> <td>7.7</td> <td>9.7</td> <td>10.7</td> <td>11.8</td> <td>12.1</td> <td>12.2</td> <td></td> <td></td> <td></td> </tr> <tr> <td>12,500</td> <td>4.7</td> <td>6.7</td> <td>8.4</td> <td>9.4</td> <td>10.3</td> <td>10.7</td> <td>10.9</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>		Form 5001-C (Hourly precip. data).....	7	Form 5001-B (24-hour " " " ").....	23	Form 5001-D (" " " " " ").....	2	Misc. precip. records, meteorological data, etc.....	30	Form 5002 (Mass rainfall curves).....	35	Form S-10 (Data from mass rainfall curves).....	2	Form S-11 (Depth-area data from isohyetal map).....	2	Form S-12 (Maximum depth-duration data).....	38	Maximum duration-depth-area curves.....	1	Data relating to periods of maximum rainfall.....	—	Area in Sq. Mi.	Duration of Rainfall in Hours								6	12	18	24	30	36	48				Max. Station	23.4	31.8	36.4	38.2	39.2	39.7	39.7				10	22.4	29.8	35.0	36.5	37.2	37.6	37.6				100	19.6	26.2	30.7	31.9	32.6	32.9	32.9				200	17.9	24.3	28.7	29.7	30.4	30.7	30.8				500	15.4	21.4	25.6	26.6	27.3	27.6	27.7				1,000	13.4	18.8	22.9	24.0	24.6	24.9	25.1				2,000	11.2	15.7	19.5	20.6	21.2	21.5	21.6				5,000	8.1	11.1	14.1	15.0	15.9	16.2	16.3				10,000	5.6	7.7	9.7	10.7	11.8	12.1	12.2				12,500	4.7	6.7	8.4	9.4	10.3	10.7	10.9	
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12,500	4.7	6.7	8.4	9.4	10.3	10.7	10.9																																																																																																																																															

Form S-2

Figure 511: USACE Depth-area-duration values for Thrall, TX September 1921

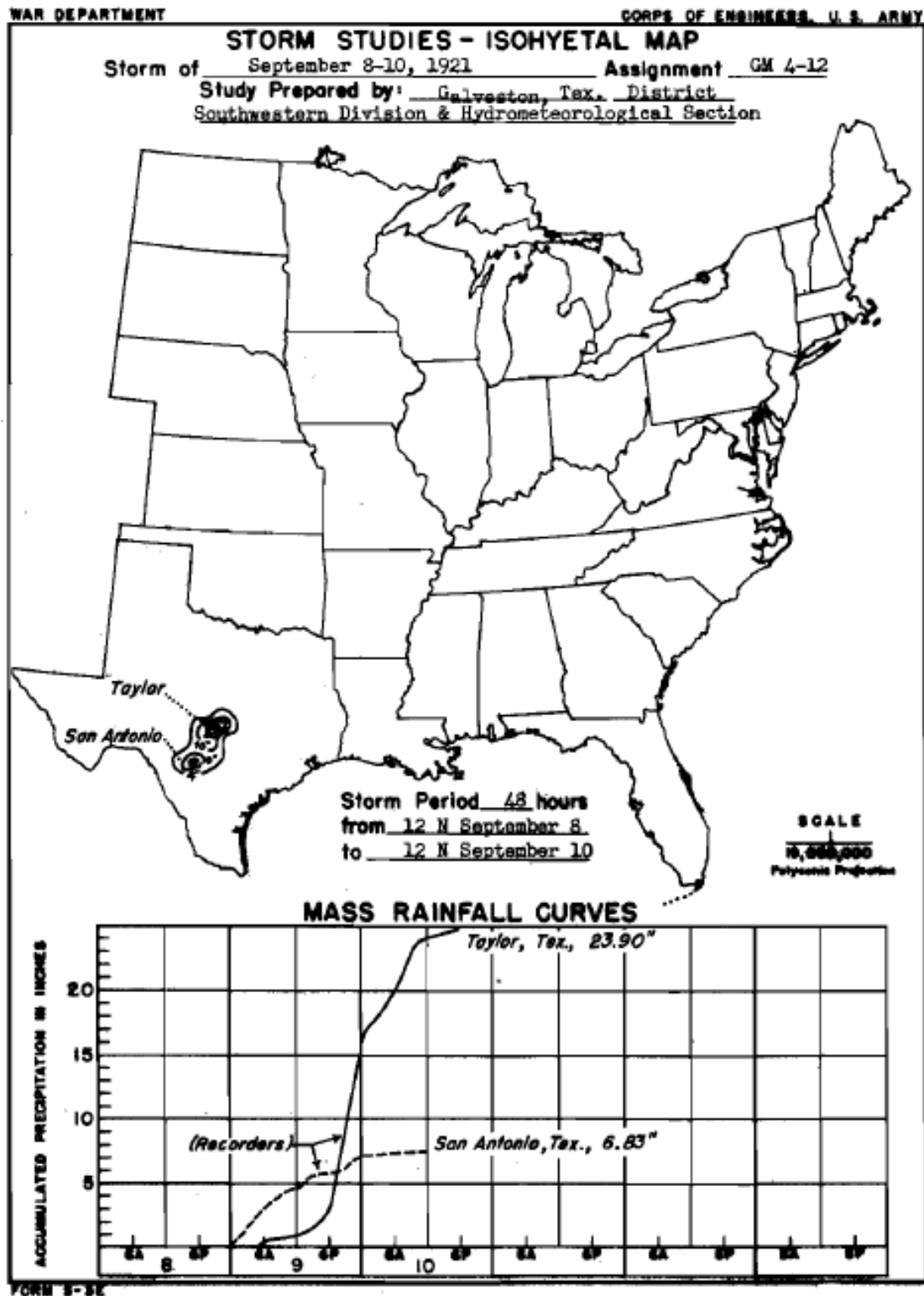


Figure 512: USACE Total storm isohyetal and mass curve chart for Thrall, TX September 1921

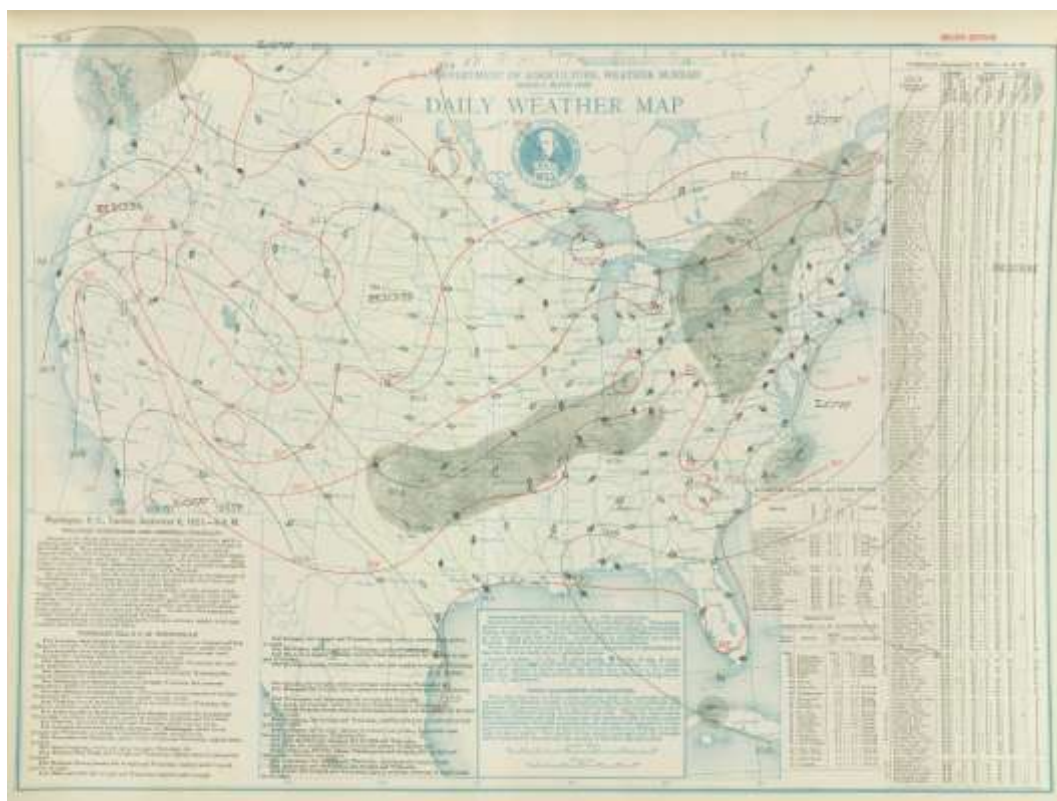


Figure 513: Daily Weather Map for September 6, 1921

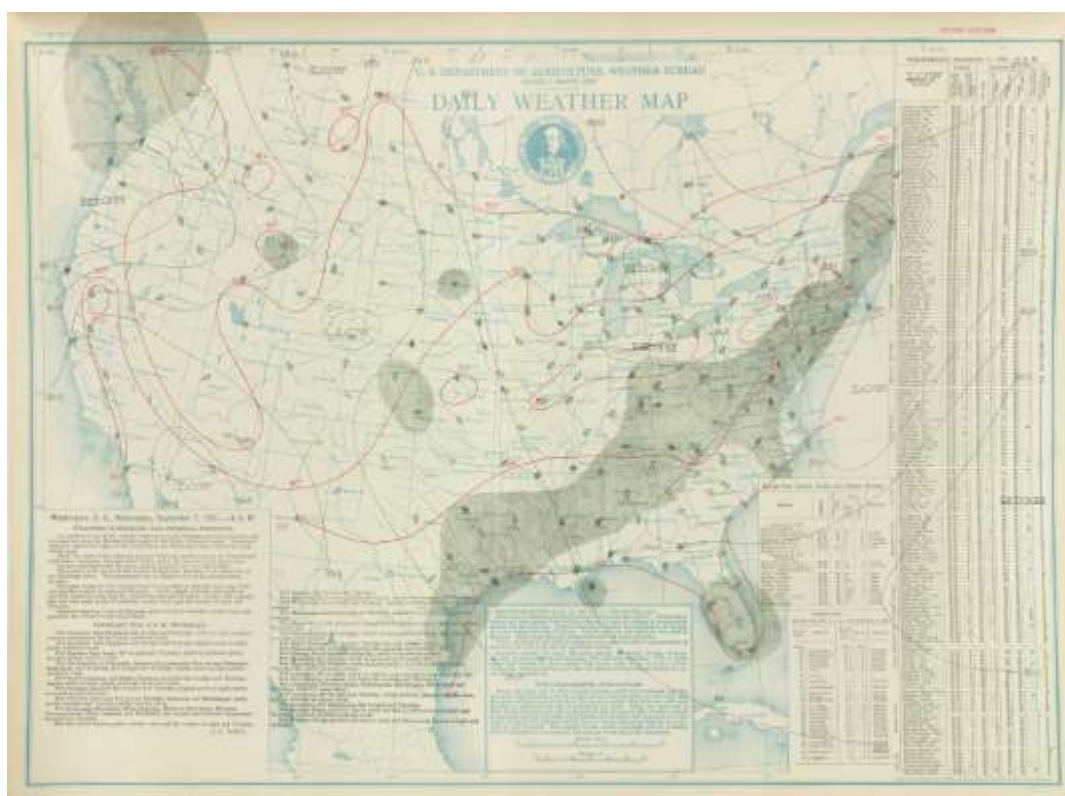


Figure 514: Daily Weather Map for September 7, 1921

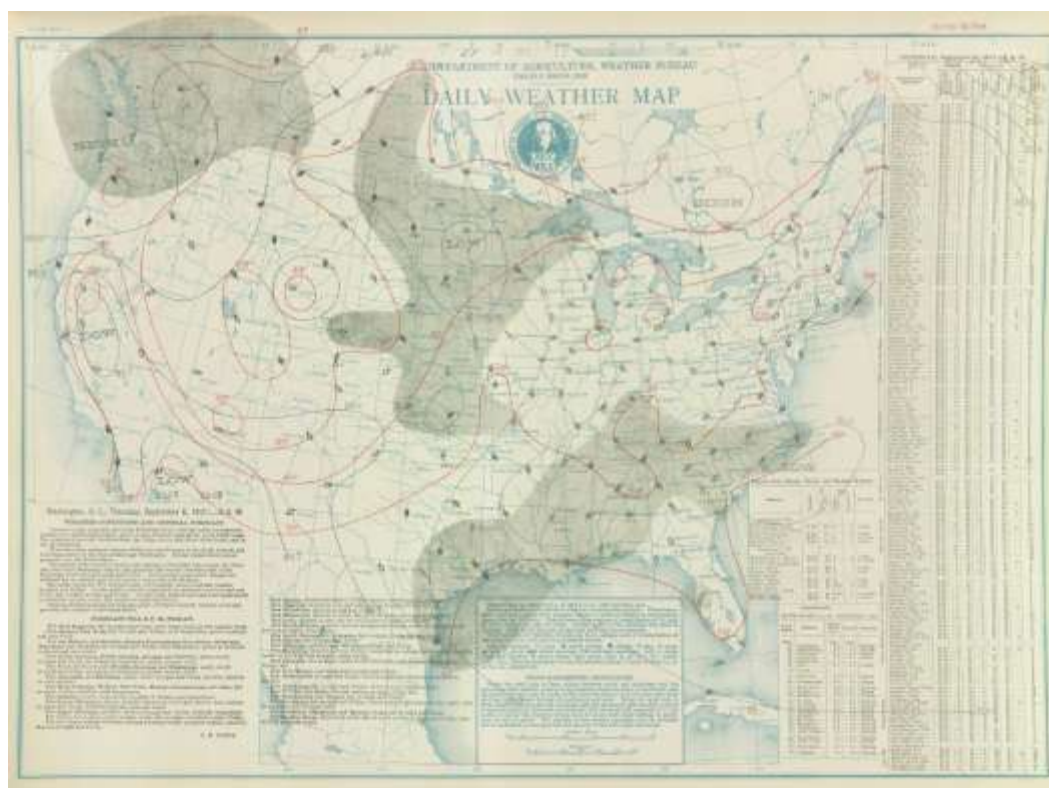


Figure 515: Daily Weather Map for September 8, 1921

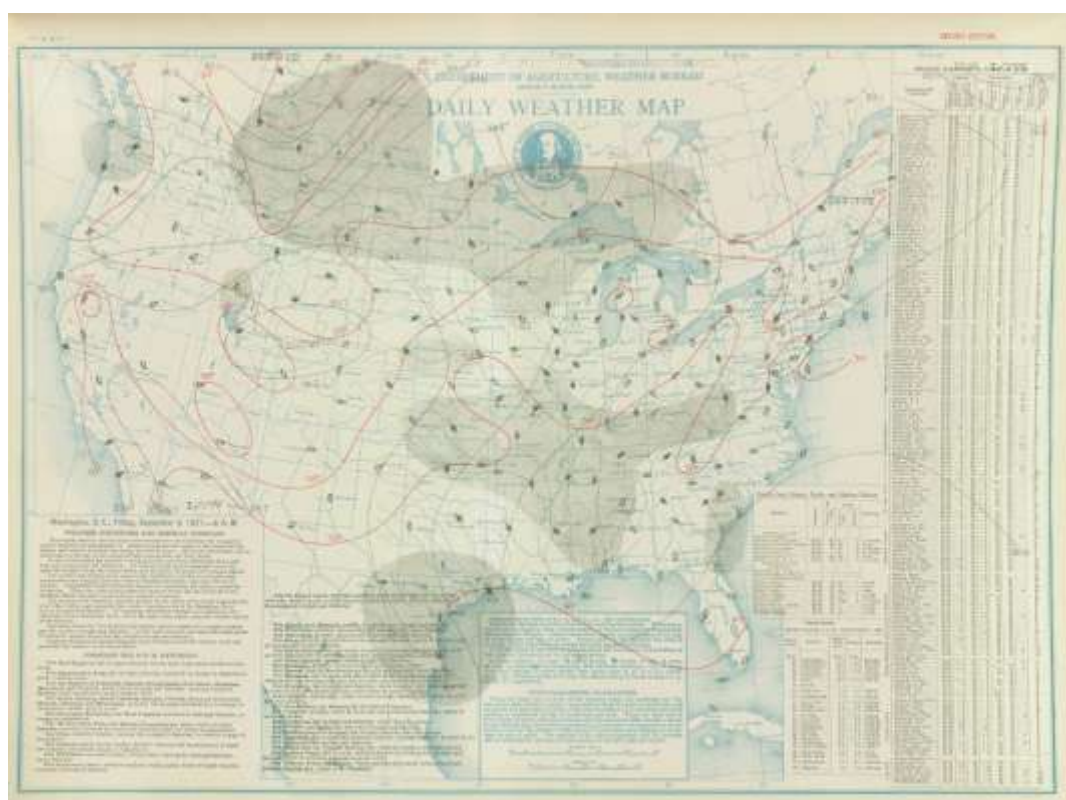


Figure 516: Daily Weather Map for September 9, 1921

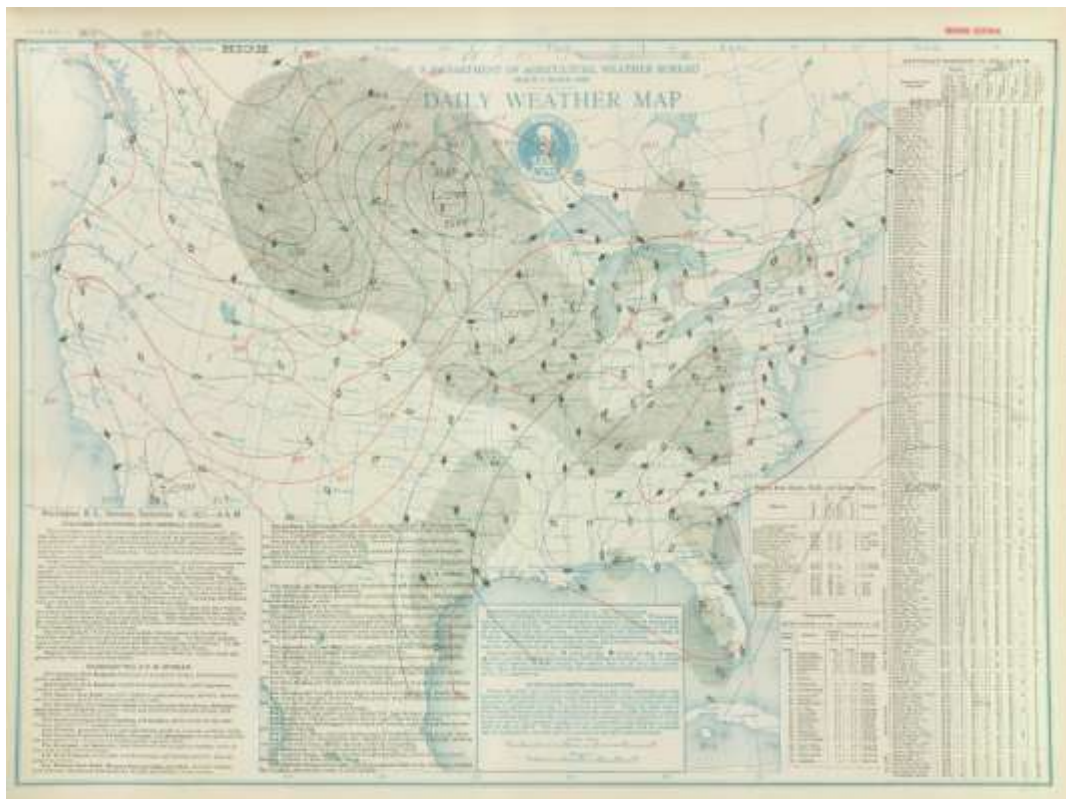


Figure 517: Daily Weather Map for September 10, 1921

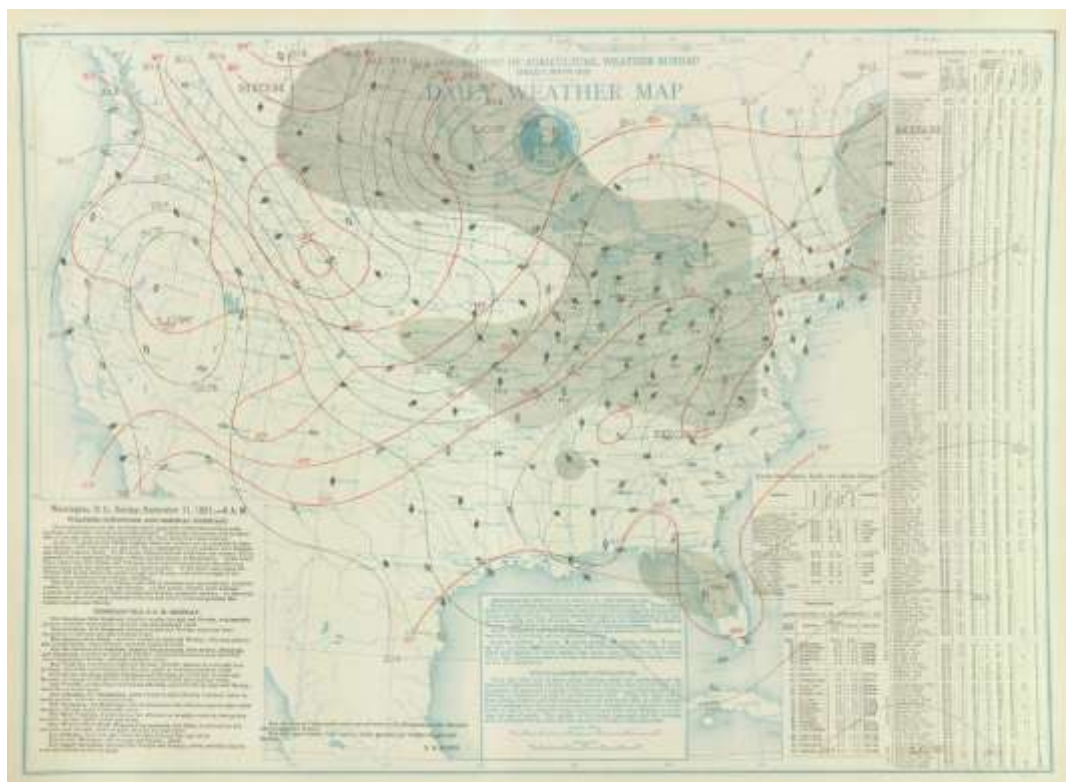


Figure 518: Daily Weather Map for September 11, 1921

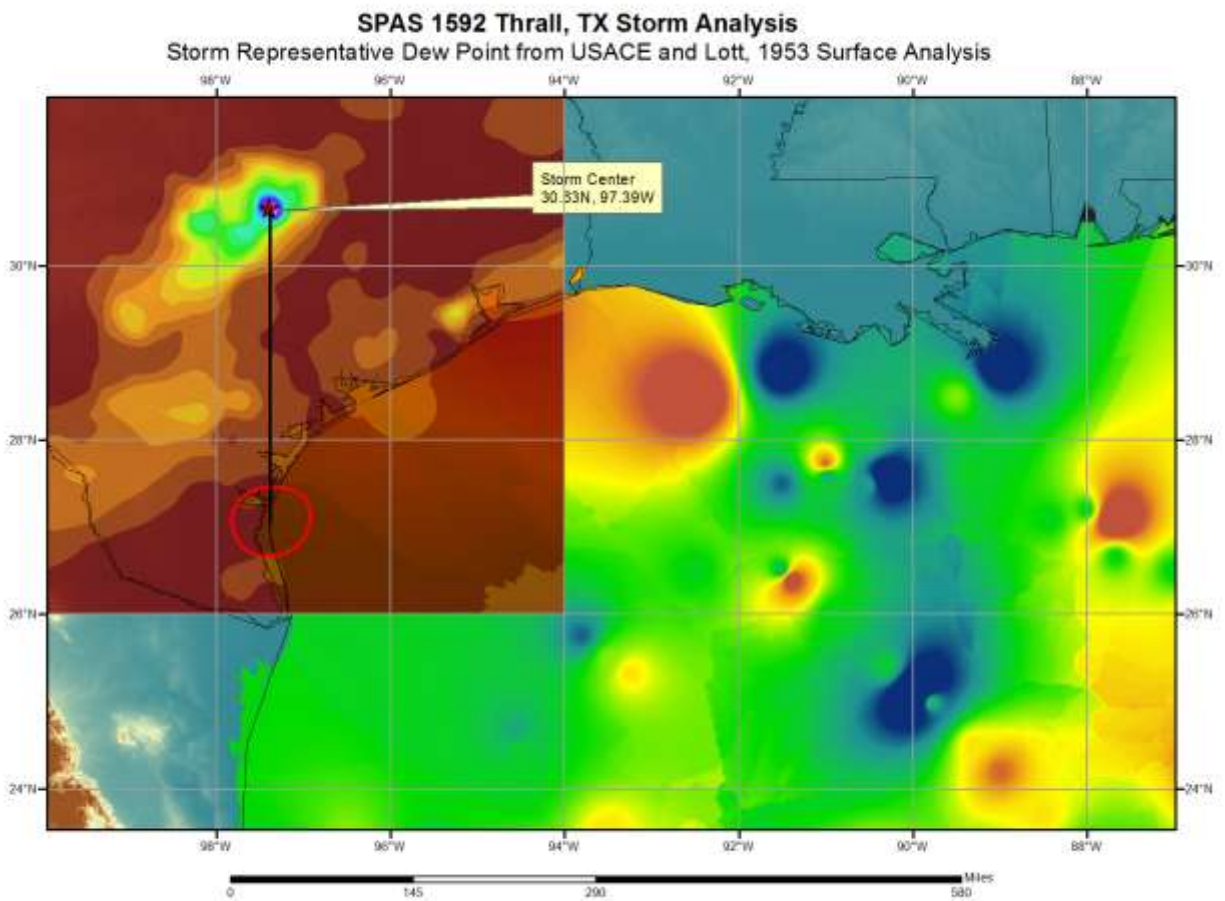


Figure 519: In-place storm representative dew point analysis for Thrall, TX September 1921

Storm Date	Assignment Number	Representative Storm Dewpoint	Reference Point
<u>1919 (cont.)</u>			
Sep 14-15	GM 5-15A	75	125 E of George West, Tex.
Sep 15-17	GM 5-15B	72	390 ESE of Meek, W. Mex.
Sep 16-19	MR 2-23	70	325 SE of Bruning, Nebr.
Sep 27-28	MR 5-24	41	450 ESE of Browning, Mont.
Oct 25-28	LMV 1-13A	70	125 SE of Steelville, Mo.
Oct 30-Nov 1	LMV 1-13B	67	150 SSE of Leitchfield, Ky.
Dec 6-10	GM 1-22	71	140 SSW of Selma, Ala.
<u>1920</u>			
Jan 21-24	OR 6-23	63	150 SE of Pontotoc, Miss.
May 10-13	MR 4-17	63	550 SE of Vale, S. Dak.
Jun 15-18	GL 1-18	69	200 SW of W. Newton, Pa.
Jul 16-17	MR 4-18	68	135 SSE of Oakdale, Nebr.
Aug 18	SA 1-8	66	50 SE of Lancaster, Pa.
Sep 5-7	UMV 3-7B	68	210 ESE of Alva, Okla.
Sep 6-9	UMV 3-7A	74	225 SW of Memphis, Tenn.
<u>1921</u>			
Mar 11-14	LMV 2-15	68	80 S of Magnolia, Miss.
Apr 14-16	MR 4-19	56	550 ESE of Fry's Ranch, Colo.
Apr 25-26	UMV 3-8	68	35 S of Marshall, Tex.
Jun 2-6	SW 1-23	67	400 SE of Penrose, Colo.
Jun 17-21	MR 4-21	71	500 ESE of Springbrook, Mont.
Sep 8-10	GM 4-12	77	250 S of Thrall, Tex.
Oct 29-Nov 2	OR 3-12	63	150 WSW of Marion, N. C.
Nov 16-19	SW 1-24	69	190 SW of Searcy, Ark.
<u>1922</u>			
Feb 19-23	GL 4-17	52	275 SW of West Branch, Mich.
Mar 23-25	MR 2-27	58	200 S of Strawn, Kans.
Apr 6-11	MR 2-28	(66	400 SSW of Warsaw, Mo.
		(68	400 SSW of Whitestown, Ind.
Apr 24-27	GM 4-15	73	340 SSE of Weatherford, Tex.
Jun 8-11	GL 2-21	70	130 SW of Wrightstown, Wis.
Jun 9-12	GL 1-19	71	255 SW of Syracuse, N. Y.
Jul 9-12	MR 2-29	72	250 SSE of Grant City, Mo.
Sep 1	UMV 3-9B	72	200 SSW of Jackson, Mo.
Sep 1-4	OR 1-27	73	100 SW of Oxford, Ohio.
Sep 2-3	UMV 3-9A	69	220 SW of Harrisville, Mo.
Oct 9-10	SA 1-9	70	150 S of Baltimore, Md.
Nov 12-15	LMV 3-29	73	225 E of Lakeside, La.
Dec 27	UMV 3-10	57	250 SSW of Benton, Ill.

Figure 520: USACE storm representative dew point for Thrall, TX September 1921



Figure 521: NWS Transposition Limit Map for Thrall, TX September 1921

Storm Precipitation Analysis System (SPAS) For Storm #1560

General Storm Location: Texas/Oklahoma Panhandle (-103.5, 38.0, 33.5, -97.0)

Storm Dates: May 13-19, 1951

Event: Local

DAD Zone 1

Latitude: 35.2208

Longitude: -101.3958

Max. Grid Rainfall Amount: 15.21" Conway, TX

Max. Observed Rainfall Amount: 15.06"

Number of Stations: 393

SPAS Version: 10.0

Basemap: Blended Basemap of PRISM Mean May 1971-2000 Climatology and USGS Isohyetal Pattern

Spatial resolution: 0.2688

Radar Included: No

Depth-Area-Duration (DAD) analysis: Yes

Reliability of results: This analysis was based on hourly data, daily data, and supplemental station data. We have a high degree of confidence in the station based storm total results. The spatial pattern is dependent on the blended basemap, and the timing is based on hourly and hourly pseudo stations. An additional 138 supplemental stations were created to ensure data consistency.

SPAS Storm ID	NAME	LON	LAT	ELEV Round	Storm Representative				Climatological Maximum				IPMF
					T _g	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	T _g	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	
1560_1	CONWAY	-101.396	35.221	3,500	71.50	2.42"	0.72"	1.700	78.0	3.29"	0.89"	2.400	1.41

Storm 1560 - May 13 (0700 UTC) - May 20 (0600 UTC), 1951														
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)														
Area (mi ²)	Duration (hours)													
	1	2	3	4	5	6	12	18	24	36	48	72	96	120
0.3	3.29	3.88	4.60	6.24	7.56	8.21	10.01	10.09	12.20	13.76	14.56	15.16	15.17	15.21
1	3.28	3.86	4.57	6.20	7.51	8.16	9.95	10.03	12.12	13.67	14.47	15.06	15.07	15.07
10	3.25	3.80	4.49	6.11	7.40	8.05	9.80	9.89	11.92	13.45	14.23	14.82	14.82	14.82
25	3.24	3.74	4.43	6.01	7.28	7.91	9.69	9.81	11.50	12.97	13.74	14.31	14.32	14.32
50	3.19	3.60	4.27	5.79	7.01	7.62	9.37	9.55	11.13	12.56	13.31	13.87	13.89	13.89
100	3.05	3.51	3.99	5.32	6.44	7.00	8.74	9.15	10.73	12.06	12.84	13.40	13.42	13.42
150	2.86	3.39	3.87	4.83	5.84	6.35	8.10	8.86	10.47	11.75	12.57	13.08	13.11	13.11
200	2.67	3.27	3.73	4.37	5.29	5.74	7.53	8.64	10.25	11.47	12.35	12.84	12.89	12.89
300	2.47	3.02	3.46	3.76	4.43	4.95	6.75	8.31	9.92	11.05	11.99	12.48	12.53	12.53
400	2.34	2.83	3.23	3.54	3.89	4.53	6.25	8.04	9.64	10.73	11.65	12.15	12.22	12.22
500	2.23	2.69	3.06	3.38	3.68	4.29	5.89	7.78	9.38	10.42	11.34	11.86	11.96	11.97
1,000	1.86	2.27	2.57	2.99	3.30	3.60	5.13	6.81	8.28	9.45	10.21	10.77	10.96	10.98
2,000	1.44	1.92	2.28	2.67	2.90	3.18	4.52	5.85	7.16	8.51	9.14	9.84	10.03	10.09
5,000	1.03	1.57	1.93	2.18	2.41	2.65	3.75	4.88	5.89	7.34	7.93	8.74	8.94	9.08
10,000	0.76	1.17	1.48	1.74	1.96	2.18	3.13	4.21	5.09	6.49	7.13	7.91	8.12	8.30
20,000	0.52	0.87	1.13	1.37	1.59	1.81	2.57	3.48	4.25	5.64	6.25	7.11	7.37	7.56
50,000	0.29	0.48	0.65	0.85	1.01	1.21	1.88	2.52	3.11	4.25	4.93	5.82	6.07	6.35
100,000	0.15	0.26	0.35	0.45	0.55	0.67	1.14	1.60	2.10	2.89	3.49	4.40	4.63	4.86
105,430	0.14	0.24	0.33	0.43	0.52	0.64	1.09	1.53	2.00	2.76	3.36	4.24	4.46	4.71

Figure 522: Depth-area-duration values for Conway, TX May 1951

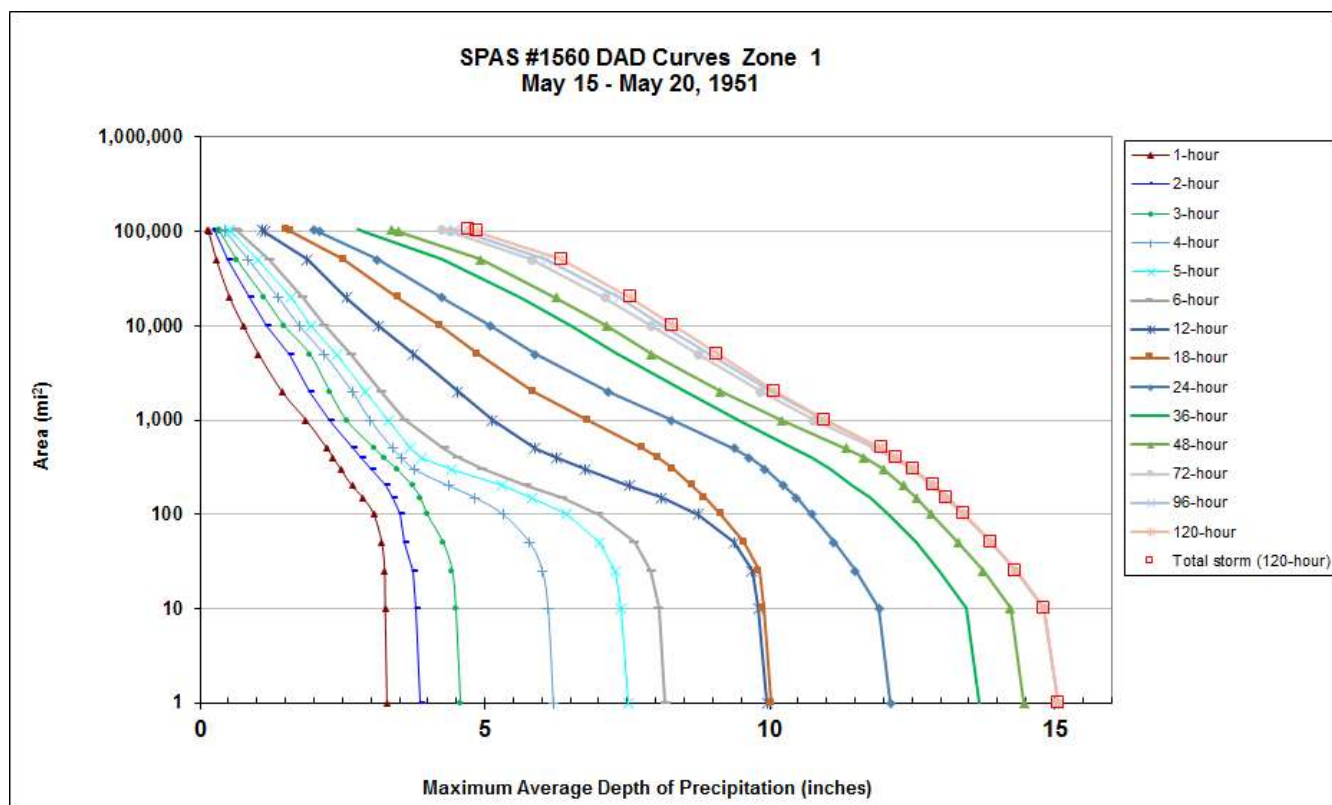


Figure 523: Depth-area-duration chart for Conway, TX May 1951

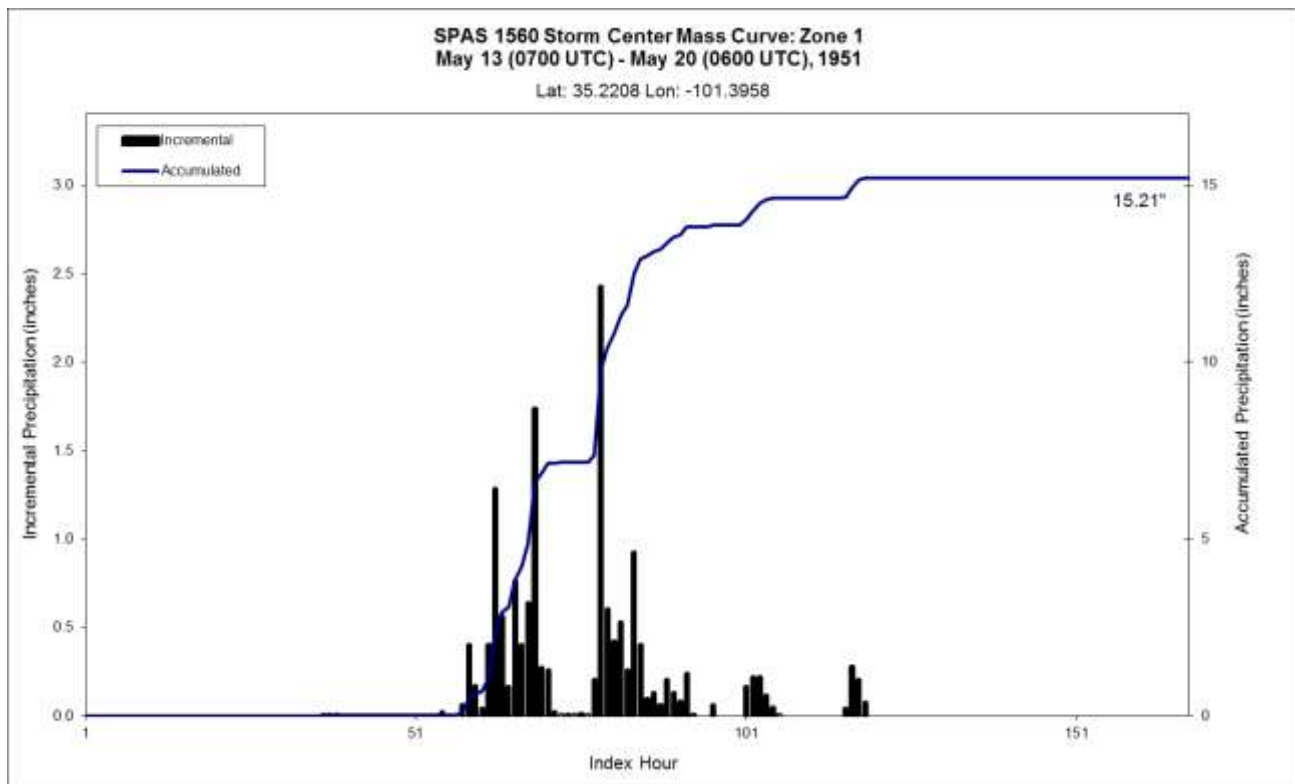


Figure 524: Mass curve chart for Conway, TX May 1951

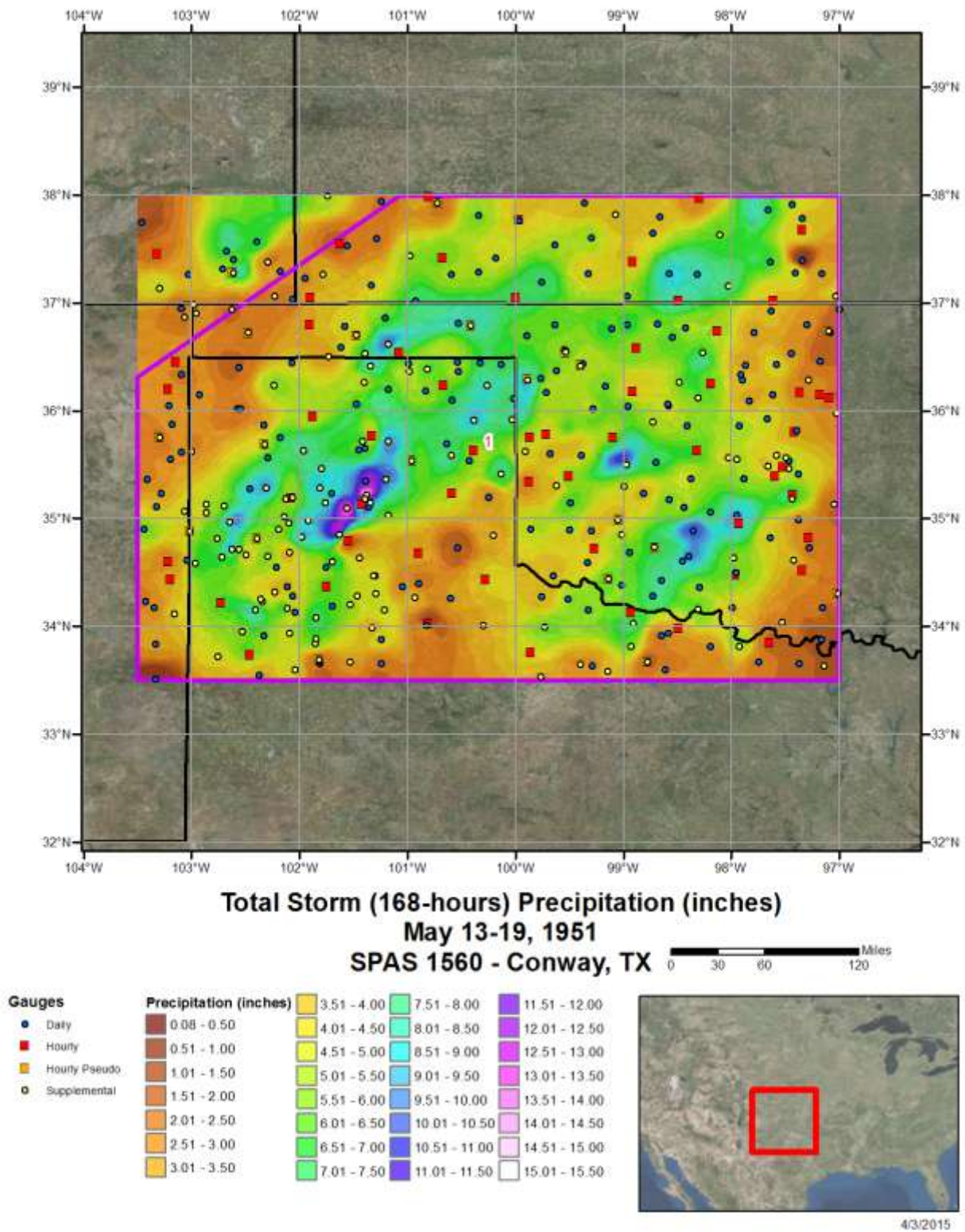


Figure 525: Total storm isohyetal analysis for Conway, TX May 1951

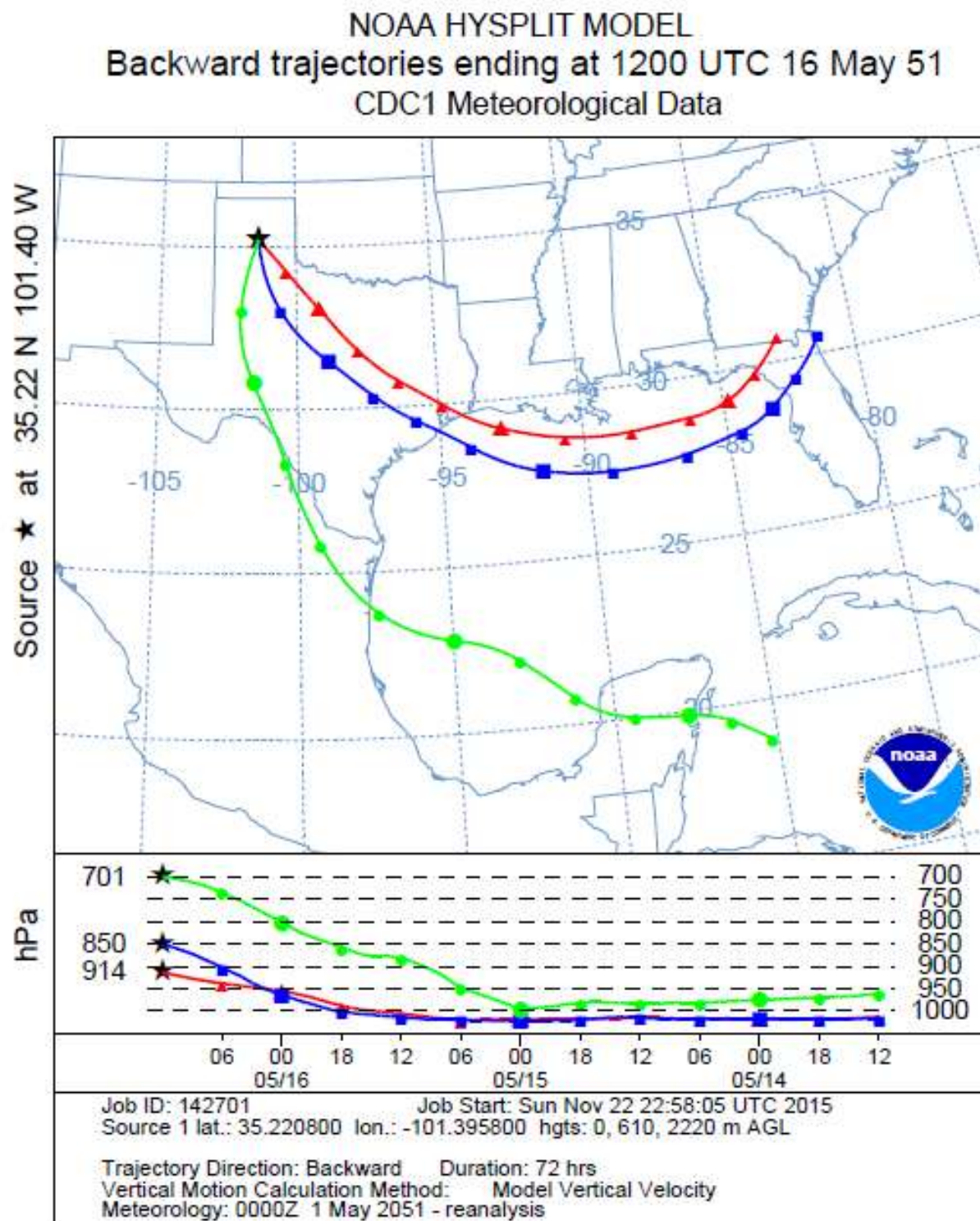


Figure 526: HYSPLIT trajectory analysis at Surface, 850mb and 700mb for Conway, TX May 1951

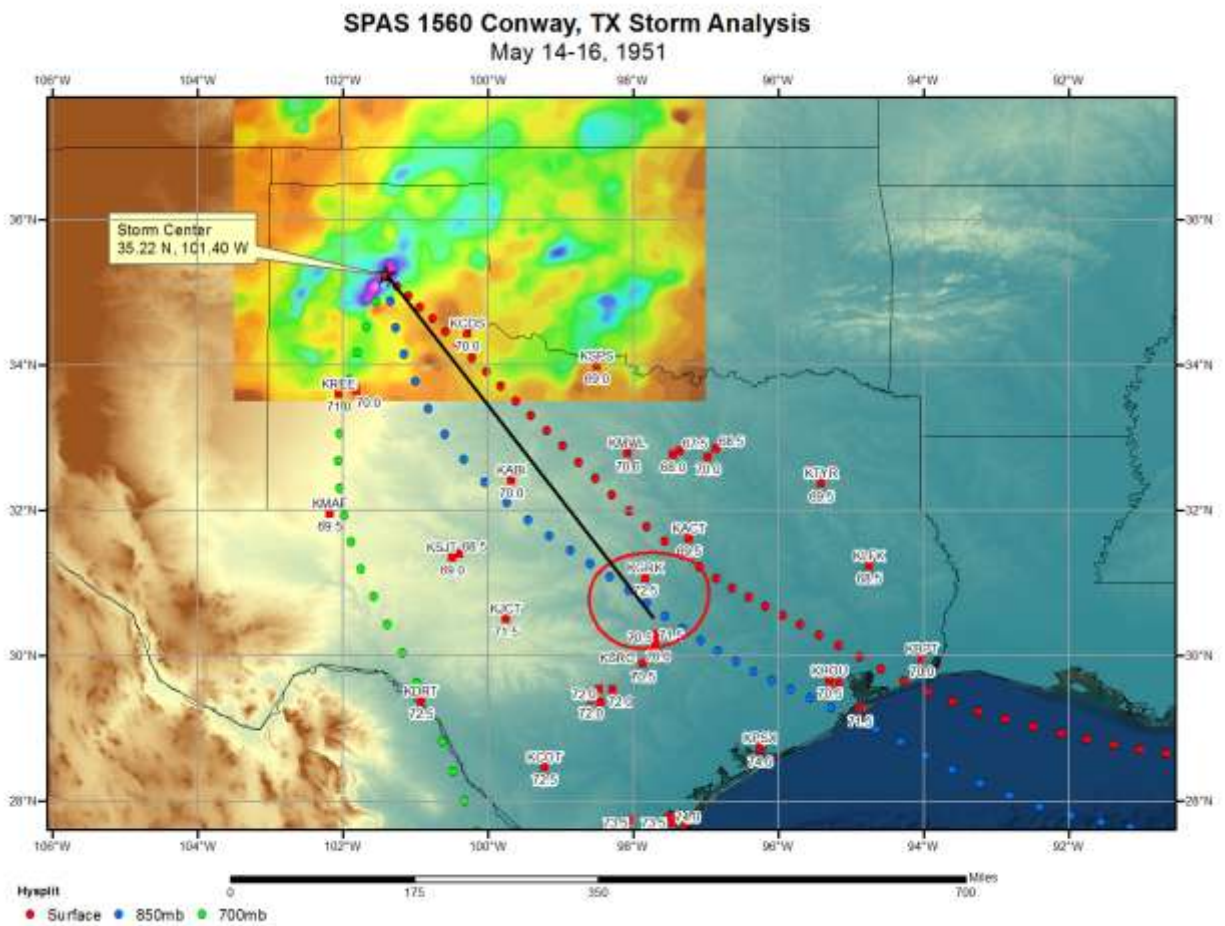


Figure 527: In-place storm representative dew point analysis for Conway, TX May 14-16, 1951

Storm Precipitation Analysis System (SPAS) For Storm #1602

General Storm Location: Southern Texas (31.75,-102.5,26.0,-97.0)

Storm Dates: June 24-29, 1954

Event: Hurricane Alice

DAD Zone 1

Latitude: 30.4042

Longitude: -101.4375

Max. Grid Rainfall Amount: 35.79" RJEverett, TX

Max. Observed Rainfall Amount: 35.10"

Number of Stations: 279

SPAS Version: 10.0

Basemap: Blend between us_ppt_in_map_1961_1990_usda_northamerica and USGS Isohyetal image

Spatial resolution: 0.2894

Radar Included: No

Depth-Area-Duration (DAD) analysis: Yes

Reliability of results: This analysis was based on 279 hourly stations, daily data, and supplemental station data. We have a good degree of confidence for the station based storm total results. The spatial pattern is dependent heavily on the basemap created from the USGS Isohyetal image. Timing is based on the hourly and hourly pseudo stations near the storm center. Several daily stations were moved to supplemental due to timing issues and to ensure data consistency.

					Storm Representative				Climatological Maximum				
SPAS Storm ID	NAME	LON	LAT	ELEV Round	T _s	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	T _s	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	IPMF
1602_1	VIC PIERCE	-101.438	30.404	2,300	76.50	3.07"	0.58"	2.485	79.5	3.52"	0.64"	2.880	1.16

Storm 1602 - June 24 (0700 UTC) - July 29 (0600 UTC), 1954															
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)															
Area (mi ²)	Duration (hours)														
	1	2	3	4	5	6	12	18	24	36	48	72	96	120	Total
0.3	6.18	10.03	13.73	14.96	16.20	17.43	22.97	24.78	27.63	33.10	35.70	35.72	35.72	35.79	35.79
1	6.14	9.97	13.64	14.87	16.10	17.33	22.84	24.64	27.46	32.96	35.52	35.55	35.55	35.55	35.55
10	6.05	9.81	13.44	14.65	15.85	17.06	22.54	24.30	27.05	32.60	35.09	35.11	35.11	35.11	35.11
25	5.90	9.61	12.92	14.09	15.25	16.42	22.26	24.05	26.66	32.46	34.91	34.94	34.94	34.94	34.94
50	5.64	9.25	11.92	13.01	14.11	15.21	21.52	23.30	26.09	32.35	34.79	34.81	34.81	34.81	34.81
100	5.18	8.57	10.37	11.52	12.17	13.23	20.08	22.69	25.60	31.78	34.33	34.36	34.36	34.36	34.36
150	4.78	8.03	9.67	10.70	11.32	12.64	18.92	22.27	25.26	31.28	33.81	33.84	33.84	33.84	33.84
200	4.44	7.63	9.12	10.08	10.85	12.15	18.20	21.91	24.92	30.70	33.19	33.22	33.22	33.22	33.22
300	3.88	7.01	8.32	9.17	10.11	11.30	17.23	21.31	24.32	29.70	32.05	32.08	32.08	32.08	32.08
400	3.46	6.54	7.70	8.48	9.57	10.72	16.57	20.86	23.74	28.81	30.97	30.99	30.99	30.99	30.99
500	3.24	6.13	7.23	8.12	9.16	10.24	16.06	20.50	23.24	28.03	30.03	30.05	30.05	30.05	30.05
1,000	2.73	4.85	5.76	6.64	7.60	8.56	14.13	18.99	21.45	25.26	26.93	26.93	26.93	26.93	26.93
2,000	2.13	3.57	4.10	4.72	5.51	6.25	10.83	15.79	18.48	21.69	22.83	22.86	22.86	22.86	22.86
5,000	1.31	1.98	2.32	2.64	3.23	3.92	6.87	10.14	12.72	15.61	16.51	16.73	16.74	16.74	16.74
10,000	0.80	1.15	1.39	1.57	1.95	2.36	4.16	6.31	8.23	10.70	11.97	12.25	12.27	12.27	12.27
20,000	0.47	0.64	0.83	0.94	1.09	1.39	2.34	3.44	4.45	6.19	7.40	7.85	7.89	7.89	7.89
48,658	0.20	0.31	0.37	0.43	0.52	0.63	1.09	1.60	2.05	2.97	3.67	4.04	4.07	4.08	4.08

Figure 528: Depth-area-duration values for Vic Pierce, TX June 1954

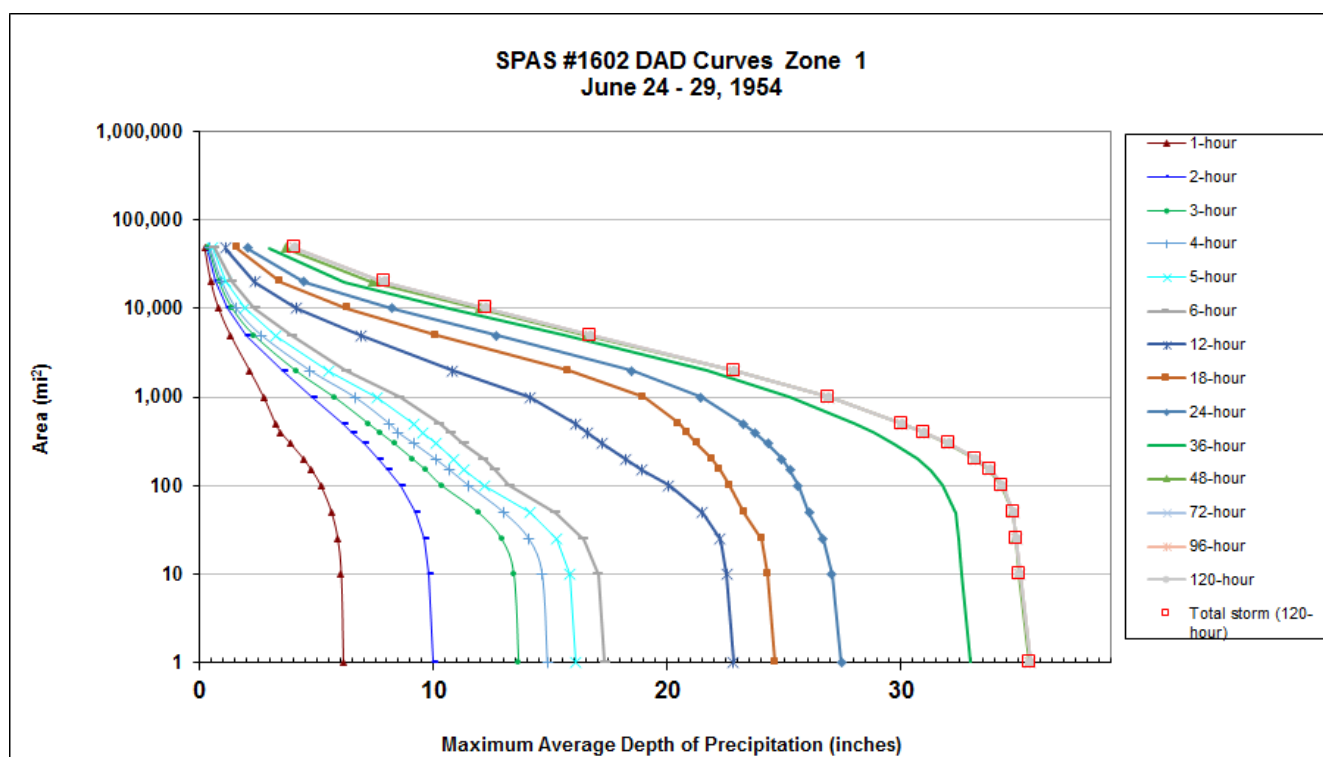


Figure 529: Depth-area-duration chart for Vic Pierce, TX June 1954

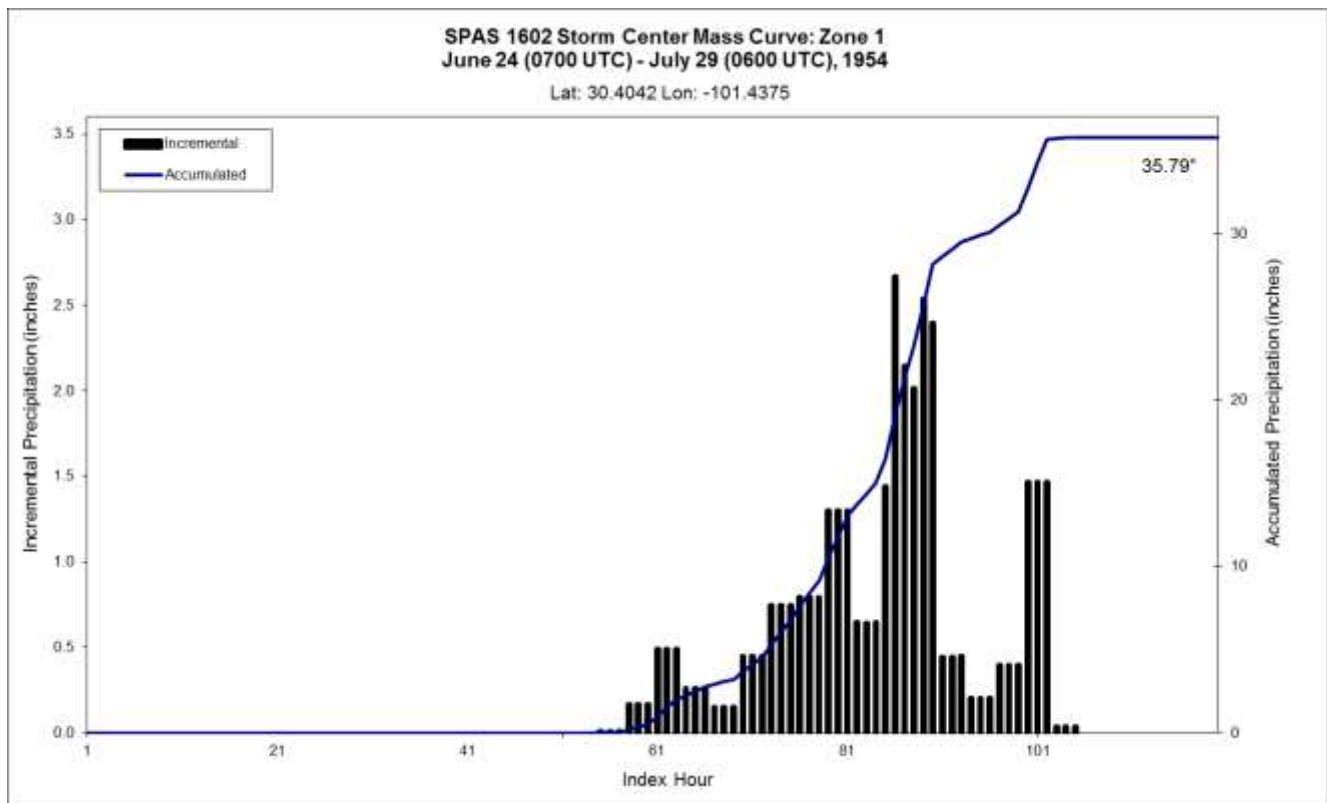


Figure 530: Mass curve chart for Vic Pierce, TX June 1954

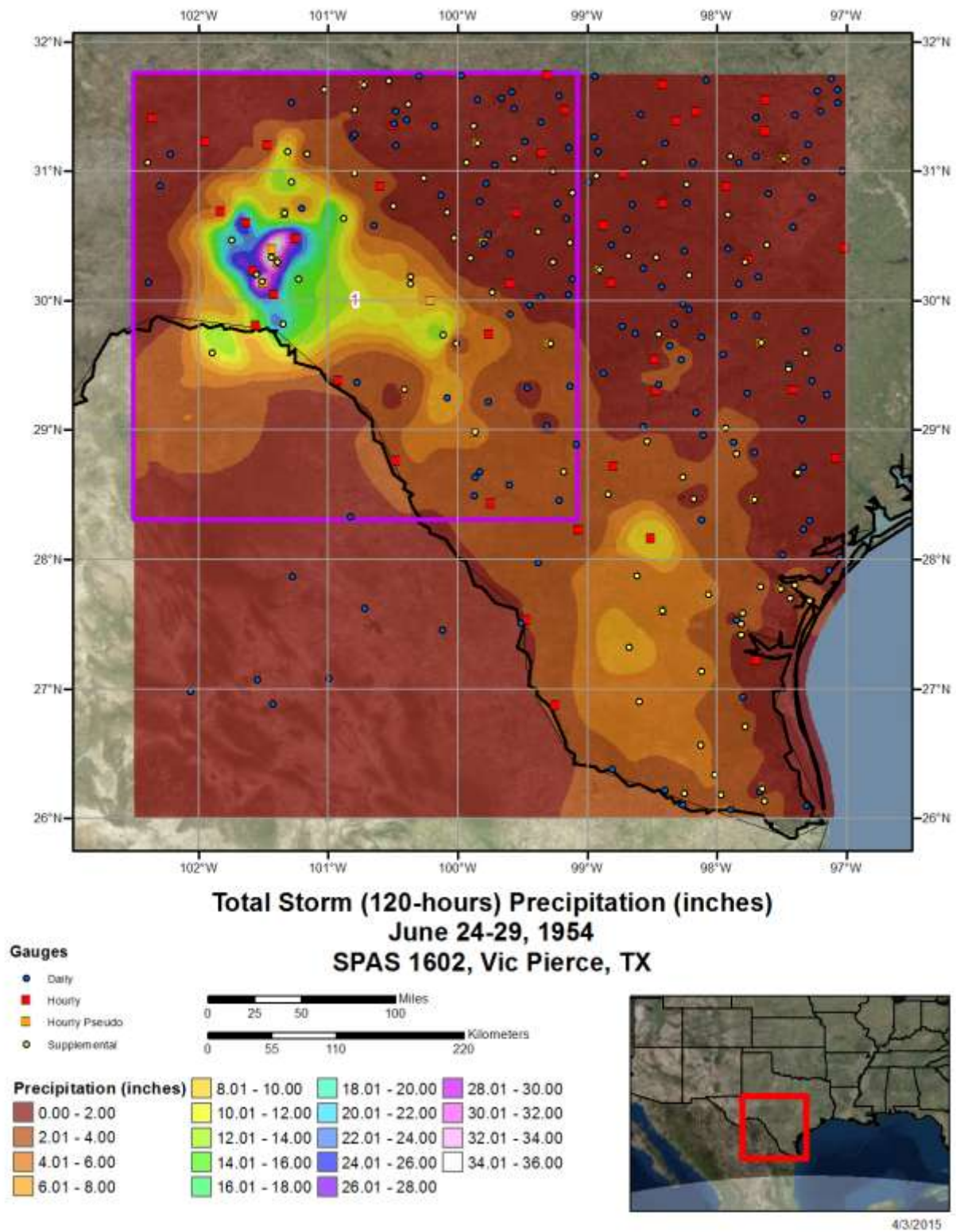


Figure 531: Total storm isohyetal analysis for Vic Pierce, TX June 1954

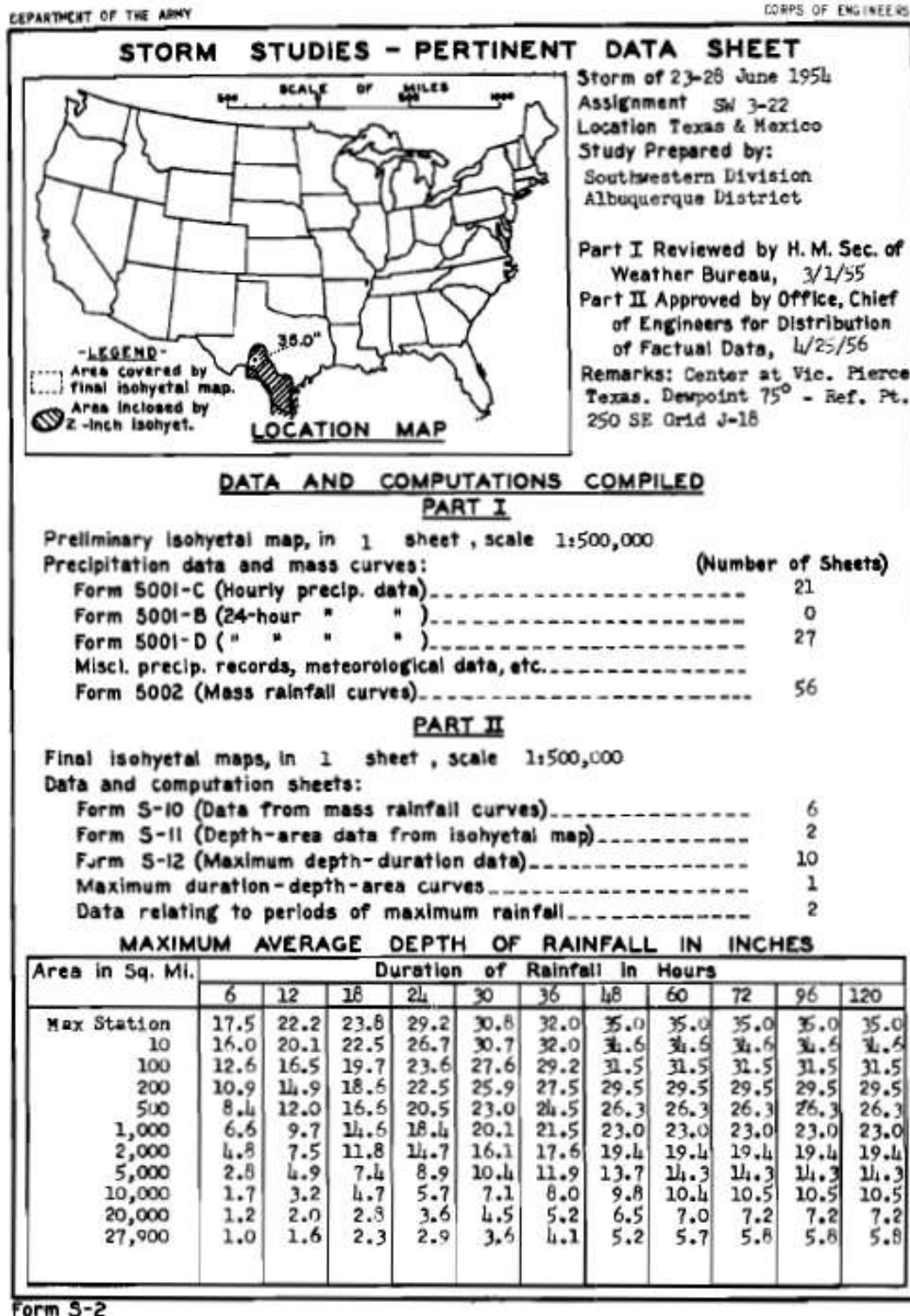


Figure 532: USACE Depth-area-duration values for Vic Pierce, TX June 1954

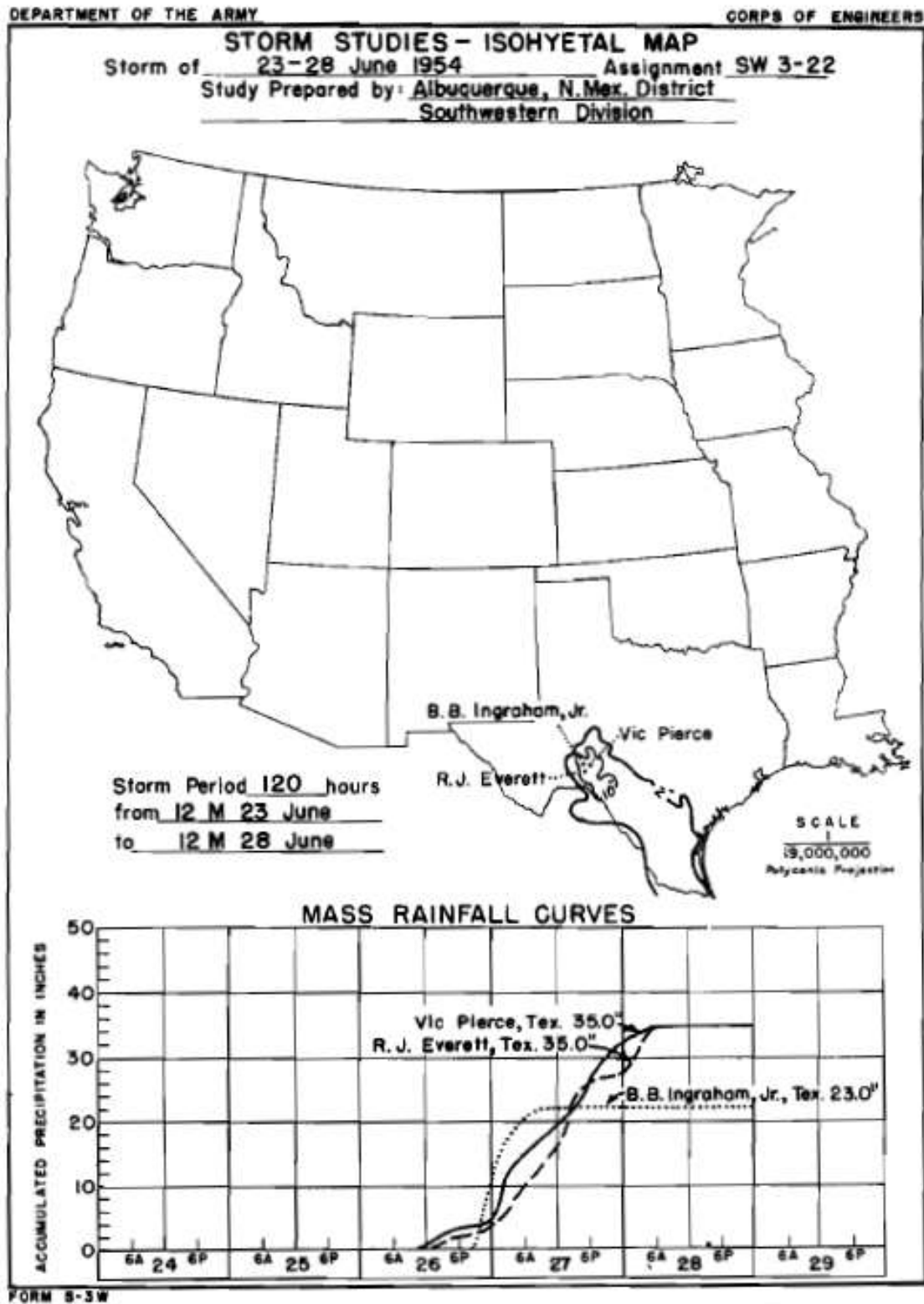


Figure 533: USACE Total storm isohyetal and mass curve for Vic Pierce, TX June 1954

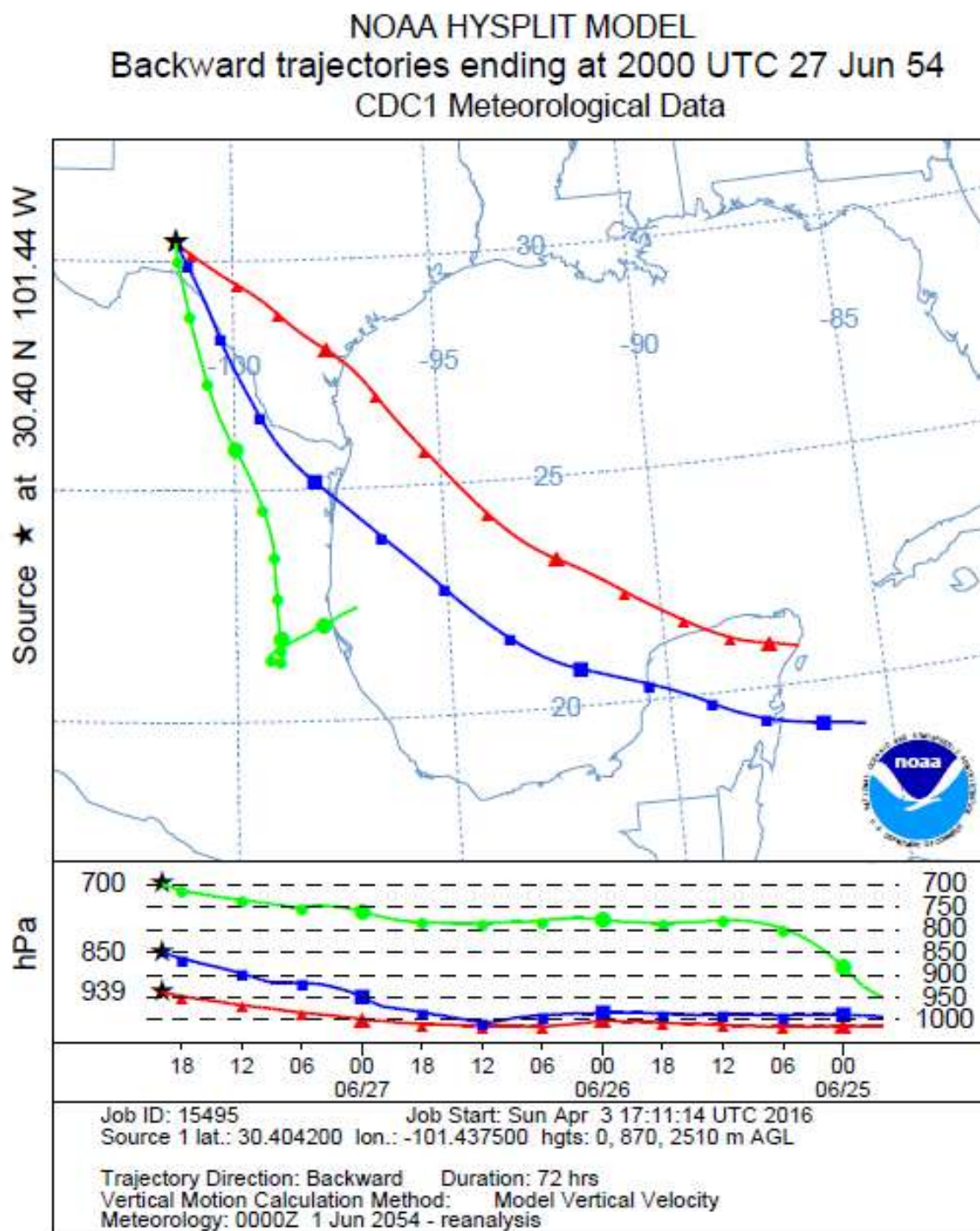


Figure 534: HYSPLIT trajectory analysis at Surface, 850mb and 700mb for Vic Pierce, TX June 1954

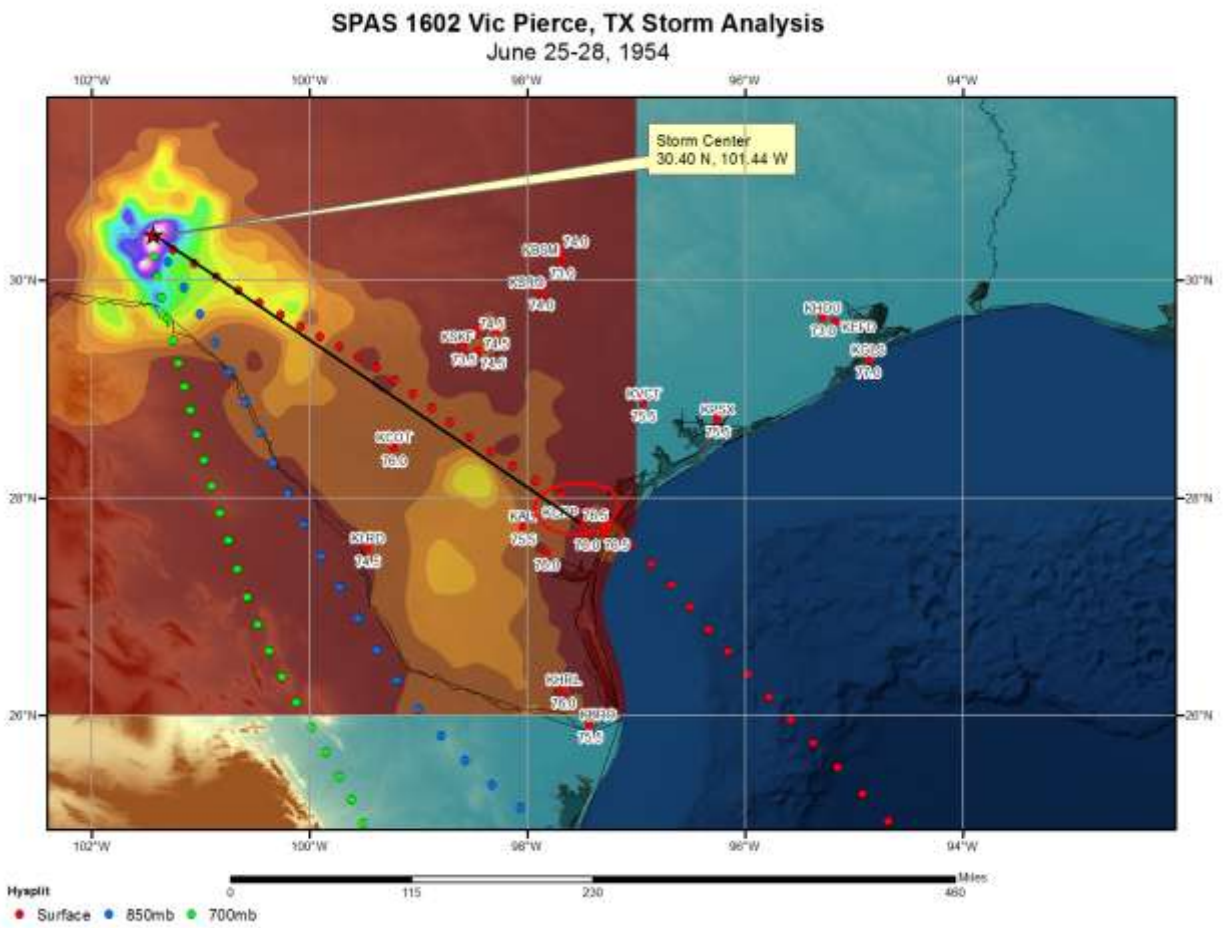


Figure 535: In-place storm representative dew point analysis for Vic Pierce, TX June 25-28, 1954

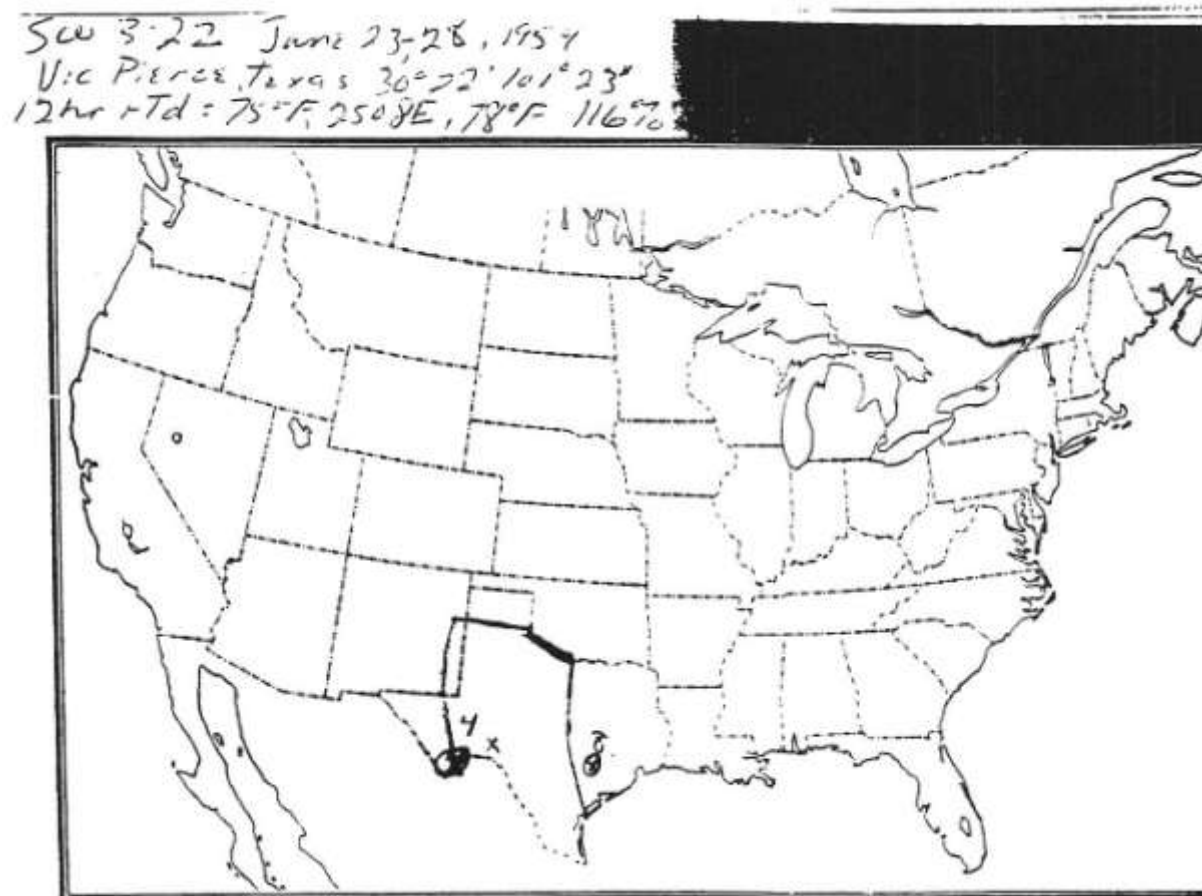


Figure 536: NWS Transposition Limit Map for Vic Pierce, TX June 1954

Storm Precipitation Analysis System (SPAS) For Storm #1568

General Storm Location: Southeastern New Mexico/Southwestern Texas (33.25,-106.5,30.0,-103.25)

Storm Dates: August 21-24, 1966

Event: Synoptic

DAD Zone 1

Latitude: 32.2542

Longitude: -104.6125

Max. Grid Rainfall Amount: 17.35" Carlsbad, NM

Max. Observed Rainfall Amount: 17.00"

Number of Stations: 64

SPAS Version: 10.0

Basemap: Blended Basemap of PRISM Mean August 1971-2000 Climatology and USACE Isohyetal Pattern.

Spatial resolution: 0.2819

Radar Included: No

Depth-Area-Duration (DAD) analysis: Yes

Reliability of results: This analysis was based on hourly data, daily data, and supplemental station data. We have a high degree of confidence in the station based storm total results. The spatial pattern is dependent on the blended basemap, and the timing is based on hourly and hourly pseudo stations. An additional 22 supplemental stations were created to ensure data consistency.

SPAS Storm ID	NAME	LON	LAT	ELEV Round	Storm Representative				Climatological Maximum				IPMF
					T _g	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	T _g	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	
1568_1	CARLSBAD	-104.613	32.254	4,400	74.00	2.73"	0.94"	1.790	79.0	3.44"	1.12"	2.320	1.30

Storm 1568 - August 21 (0800 UTC) - August 25 (0700 UTC), 1966															
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)															
Area (mi ²)	Duration (hours)														
	1	2	3	4	5	6	12	18	24	36	48	72	96	120	Total
0.3	1.96	3.56	4.46	5.53	6.66	7.50	11.40	11.81	13.32	16.38	16.95	17.29	17.31	17.35	17.35
1	1.95	3.53	4.43	5.50	6.62	7.46	11.33	11.75	13.24	16.29	16.85	17.19	17.21	17.21	17.21
10	1.94	3.48	4.36	5.42	6.52	7.36	11.17	11.59	13.05	16.07	16.62	16.94	16.95	16.95	16.95
25	1.94	3.40	4.26	5.33	6.42	7.22	10.97	11.47	12.75	15.70	16.26	16.59	16.61	16.61	16.61
50	1.93	3.27	4.12	5.16	6.22	7.02	10.60	11.28	12.44	15.14	15.69	16.01	16.02	16.02	16.02
100	1.91	3.09	3.97	4.97	5.92	6.69	10.01	10.93	11.99	14.35	14.90	15.21	15.23	15.23	15.23
150	1.89	2.95	3.84	4.81	5.70	6.40	9.61	10.62	11.66	13.80	14.29	14.58	14.59	14.59	14.59
200	1.86	2.84	3.74	4.68	5.51	6.16	9.27	10.36	11.37	13.38	13.82	14.10	14.11	14.11	14.11
300	1.81	2.66	3.56	4.45	5.18	5.77	8.71	9.86	10.86	12.80	13.19	13.45	13.47	13.47	13.47
400	1.76	2.53	3.39	4.24	4.93	5.45	8.26	9.44	10.49	12.38	12.76	13.02	13.04	13.04	13.04
500	1.70	2.41	3.24	4.04	4.68	5.19	7.90	9.11	10.17	12.06	12.43	12.69	12.71	12.71	12.71
1,000	1.46	2.05	2.71	3.38	3.92	4.34	6.80	8.03	9.08	10.90	11.26	11.52	11.54	11.54	11.54
2,000	1.21	1.67	2.23	2.77	3.21	3.61	5.68	6.84	7.81	9.52	9.87	10.10	10.11	10.11	10.11
5,000	0.86	1.21	1.67	2.07	2.37	2.73	4.20	5.12	5.87	7.20	7.48	7.85	8.04	8.04	8.04
10,000	0.57	0.81	1.16	1.45	1.68	1.91	2.99	3.75	4.31	5.36	5.76	6.27	6.44	6.44	6.44
20,000	0.31	0.47	0.62	0.81	0.91	1.04	1.67	2.07	2.51	3.58	3.97	4.50	4.63	4.63	4.63
30,587	0.22	0.31	0.42	0.53	0.62	0.71	1.11	1.44	1.78	2.62	2.90	3.34	3.45	3.45	3.45

Figure 537: Depth-area-duration values for Carlsbad, NM August 1966

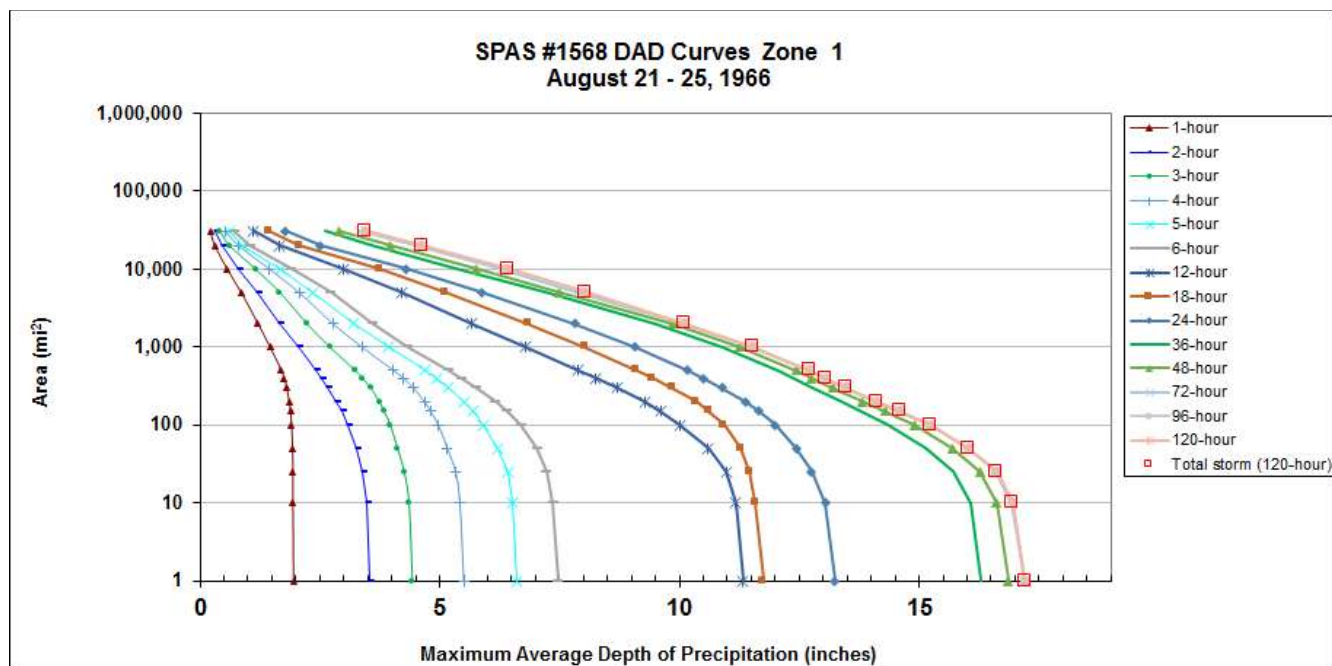


Figure 538: Depth-area-duration chart for Carlsbad, NM August 1966

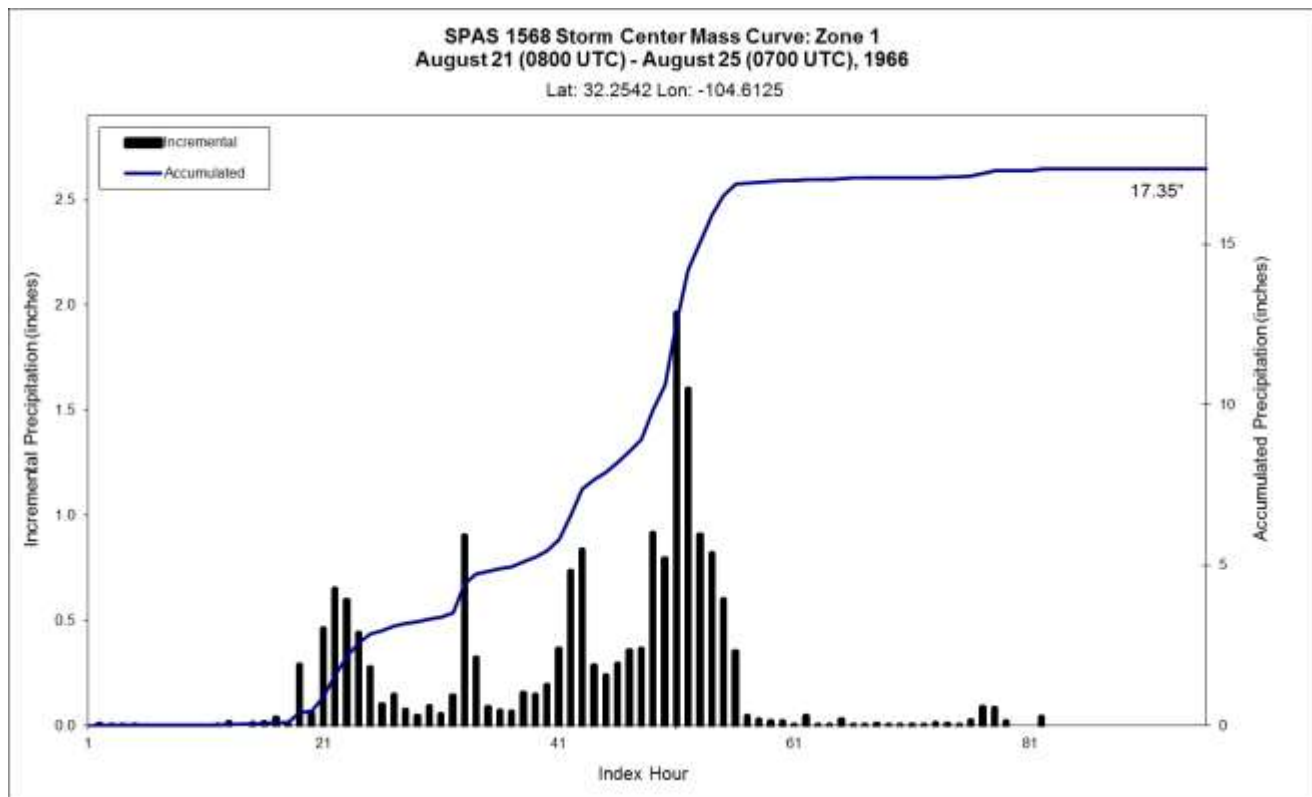


Figure 539: Mass curve chart for Carlsbad, NM August 1966

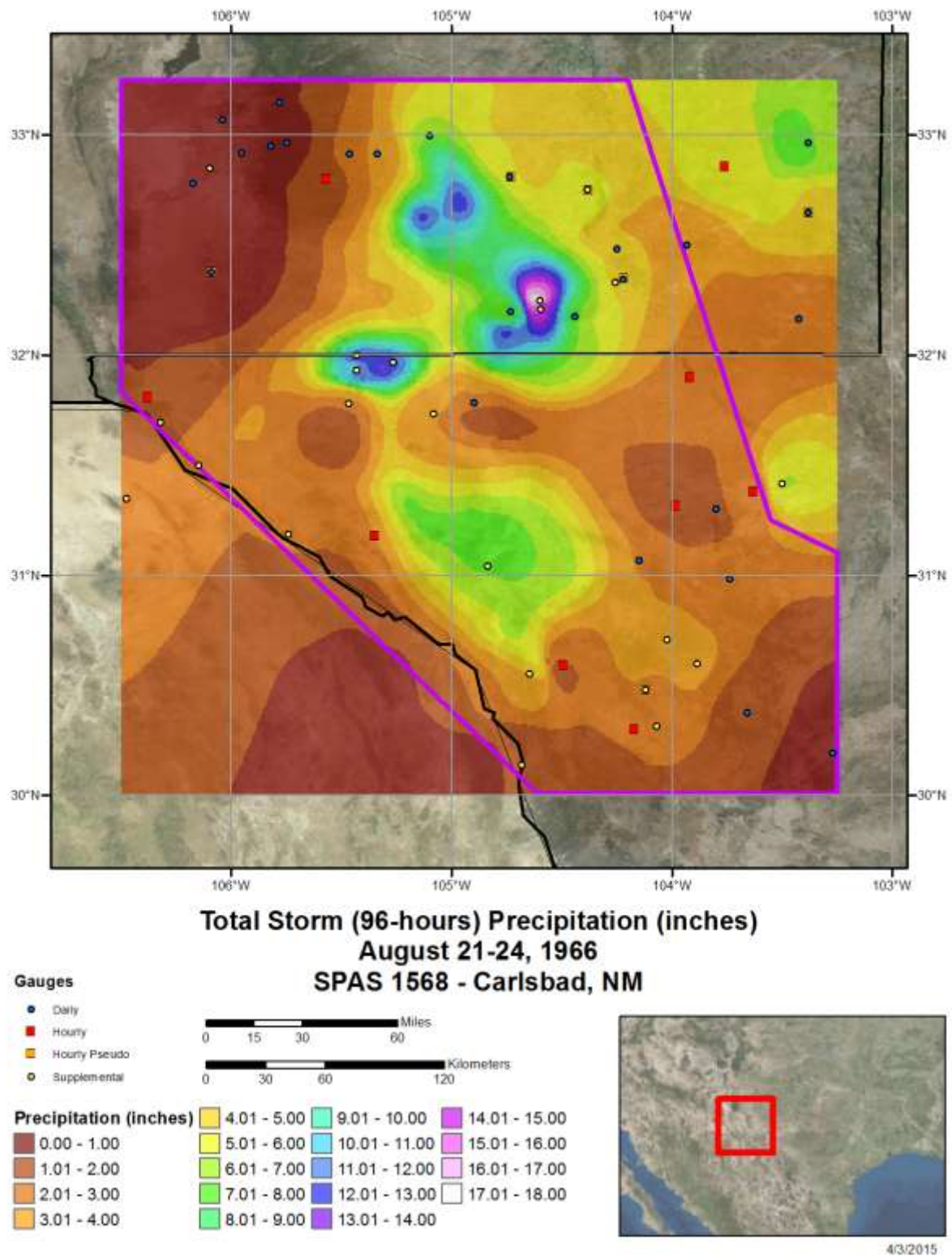


Figure 540: Total storm isohyetal analysis for Carlsbad, NM August 1966

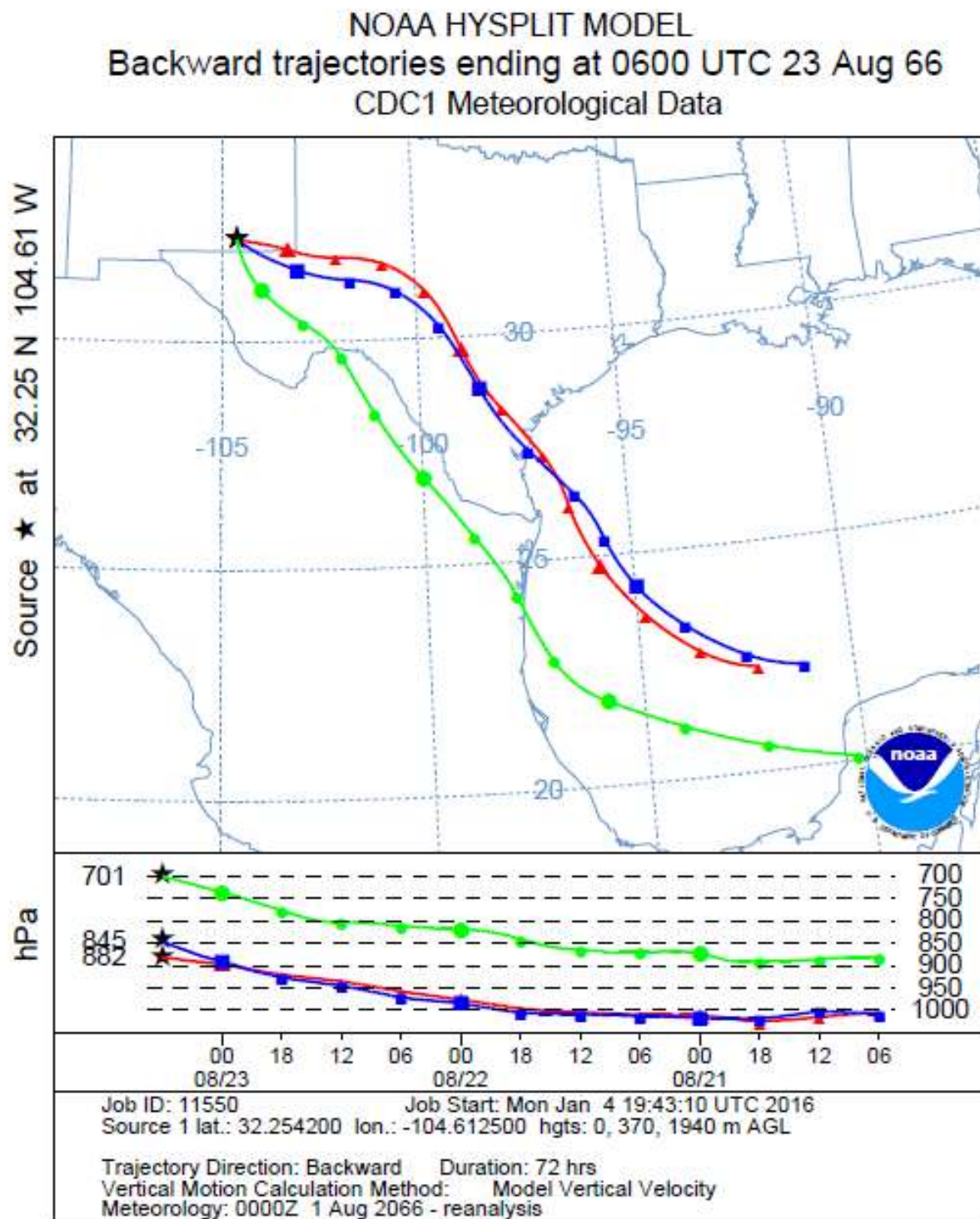


Figure 541: HYSPLIT trajectory analysis at Surface, 850mb and 700mb for Carlsbad, NM August 1966

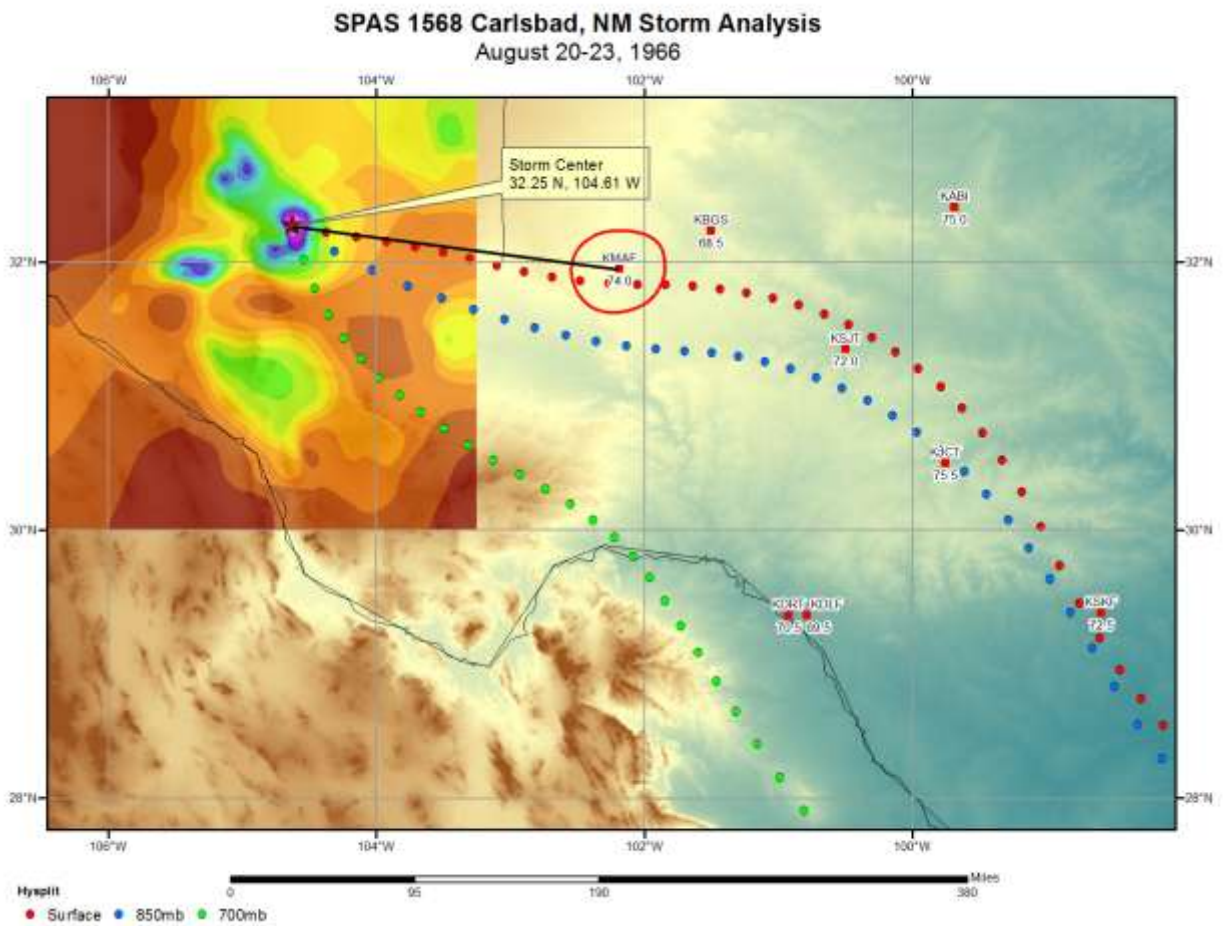


Figure 542: In-place storm representative dew point analysis for Carlsbad, NM August 20-23, 1966

Storm Precipitation Analysis System (SPAS) For Storm #1180

General Storm Location: New Braunfels, Texas

Storm Dates: October 17 (500 UTC) to 20 (2300 UTC), 1998

Event: Thunderstorms

DAD Zone 1:

Latitude: 29.775

Longitude: -98.045

Max. Grid/Radar Rainfall Amount: 35.43"

Max. Observed Rainfall Amount: 30.00" *only for a 48-hr period, total storm is 91-hrs.

Maximum 1-hour (grid cell) precipitation: 4.68"

- Time (storm index hour): 11

Maximum 1-hour (gauge) precipitation: 4.53"

- Time (storm index hour): 11

Number of Stations: 178 (104-daily, 22-hourly, 17-hourly estimated, 35-supplemental)

SPAS Version: 8.5

Base Map Used: Yes, dynamic hourly ZR precipitation based on default ZR relationship

Spatial resolution: 0.40 mi²

Radar Included: Yes

Depth-Area-Duration (DAD) analysis: Yes, 1, 2, 3, 4, 5, 6, 9, 12, 18, 24, 36, 48, 72, and 91-hours

SPAS Storm ID	NAME	LON	LAT	ELEV Round	Storm Representative				Climatological Maximum				IPMF
					T _g	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	T _g	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	
1180_1	NEW BRAUNFELS	-98.045	29.775	700	76.50	3.07"	0.19"	2.880	78.0	3.29"	0.19"	3.100	1.08

Storm 1180 - October 17 (0500 UTC) - October 20 (2300 UTC), 1998														
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)														
Area (mi ²)	Duration (hours)													
	1	2	3	4	5	6	12	18	24	36	48	72	96	120
0.4	4.68	8.75	12.58	15.78	17.65	19.45	23.47	24.01	29.42	30.96	32.37	33.16	35.42	35.43
1	4.61	8.66	12.46	15.65	17.48	19.28	23.25	23.80	29.13	30.67	32.10	32.90	35.09	35.08
10	4.23	8.00	11.53	14.52	16.38	18.05	21.83	22.53	27.24	28.81	30.17	30.99	33.26	33.26
25	4.08	7.33	10.50	13.24	15.10	16.73	20.16	21.05	25.02	26.63	27.96	28.79	31.07	31.07
50	3.92	6.64	9.44	11.96	13.93	15.66	18.63	19.69	22.77	24.50	25.77	26.58	28.86	28.87
100	3.71	5.97	8.43	10.74	12.97	14.71	17.46	18.65	20.80	22.57	23.61	24.45	26.54	26.55
150	3.54	5.60	7.97	10.18	12.45	14.15	16.88	18.01	19.56	21.50	22.57	23.29	25.42	25.42
200	3.39	5.36	7.77	9.90	12.09	13.78	16.52	17.53	18.87	20.79	21.88	22.51	24.67	24.67
300	3.14	5.11	7.45	9.52	11.45	13.21	15.93	16.86	17.93	19.84	20.90	21.48	23.62	23.62
400	2.96	4.94	7.16	9.14	10.97	12.66	15.46	16.41	17.31	19.20	20.22	20.78	22.80	22.80
500	2.81	4.77	6.94	8.82	10.61	12.24	15.10	15.88	16.85	18.72	19.72	20.25	22.19	22.19
1,000	2.33	4.17	6.04	7.70	9.23	10.71	13.26	14.04	15.21	17.01	17.99	18.45	20.16	20.17
2,000	1.88	3.43	4.88	6.22	7.47	8.75	10.92	11.62	13.01	14.79	15.90	16.31	17.96	17.97
5,000	1.25	2.29	3.28	4.24	5.15	6.02	7.60	8.17	9.90	11.64	12.93	13.53	14.99	15.00
10,000	0.88	1.62	2.36	3.00	3.72	4.38	5.45	6.08	7.67	9.42	10.58	11.23	12.60	12.61
20,000	0.53	1.01	1.52	1.98	2.41	2.89	3.64	4.46	5.88	7.22	8.26	8.81	9.95	10.00
50,000	0.27	0.35	0.72	0.90	0.77	0.39	1.69	2.29	3.14	4.08	4.87	5.20	5.89	6.14
51,556	0.27	0.34	0.71	0.88	0.75	0.38	1.66	2.24	3.07	3.99	4.76	5.08	5.75	6.01

Figure 543: Depth-area-duration values for New Braunfels, TX October 1998

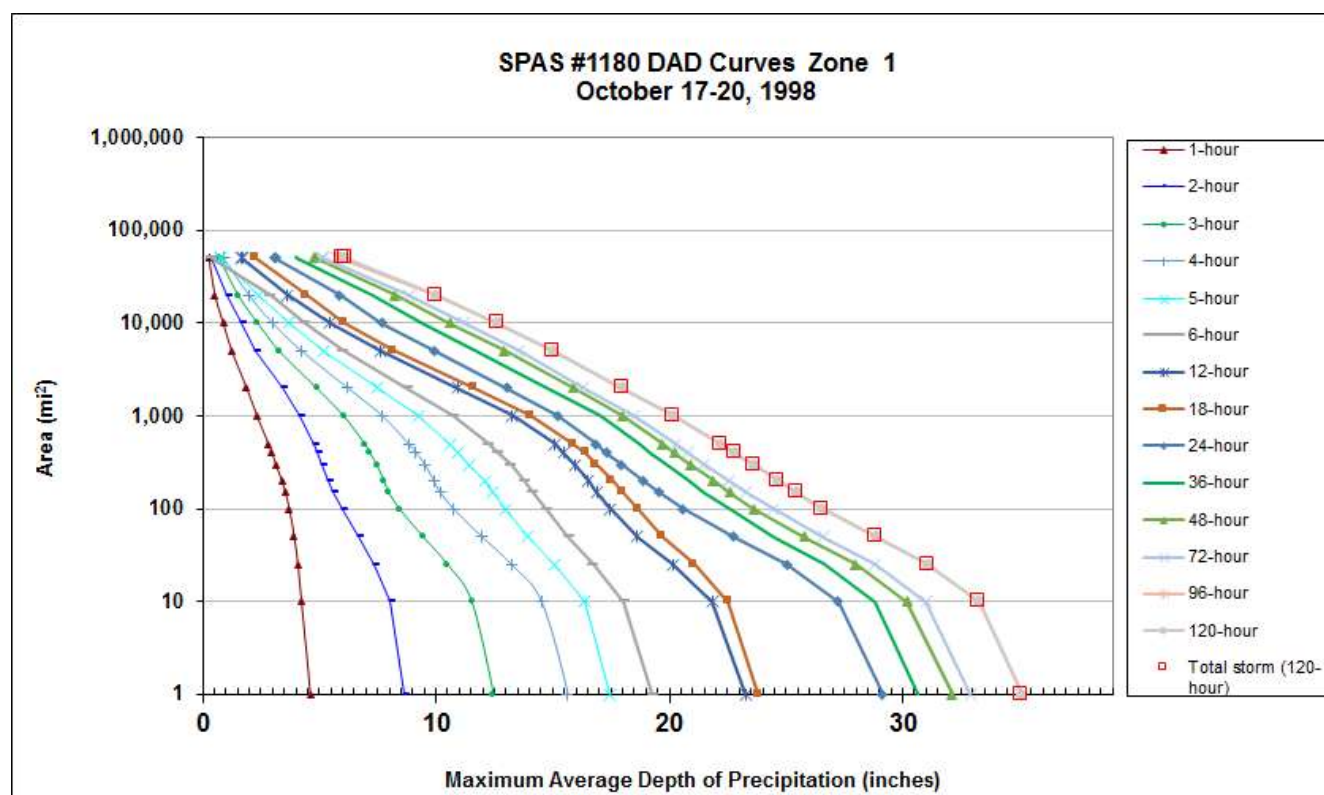


Figure 544: Depth-area-duration chart for New Braunfels, TX October 1998

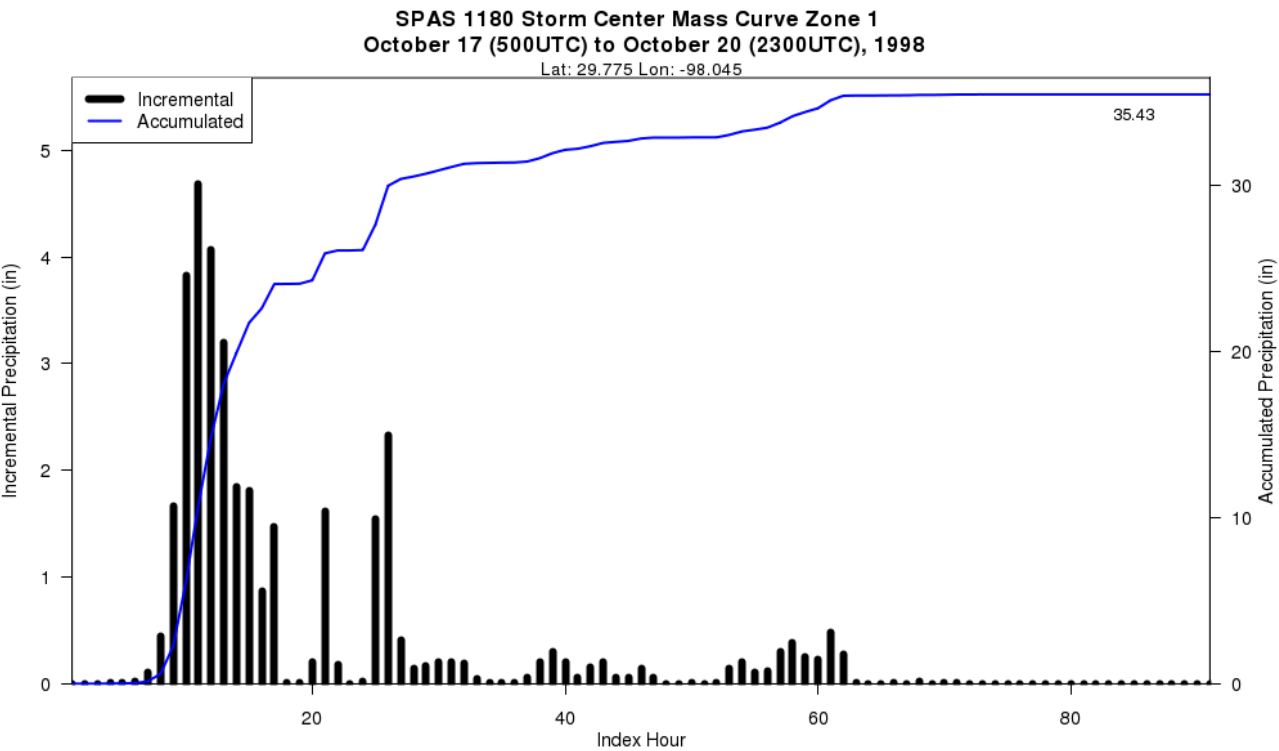
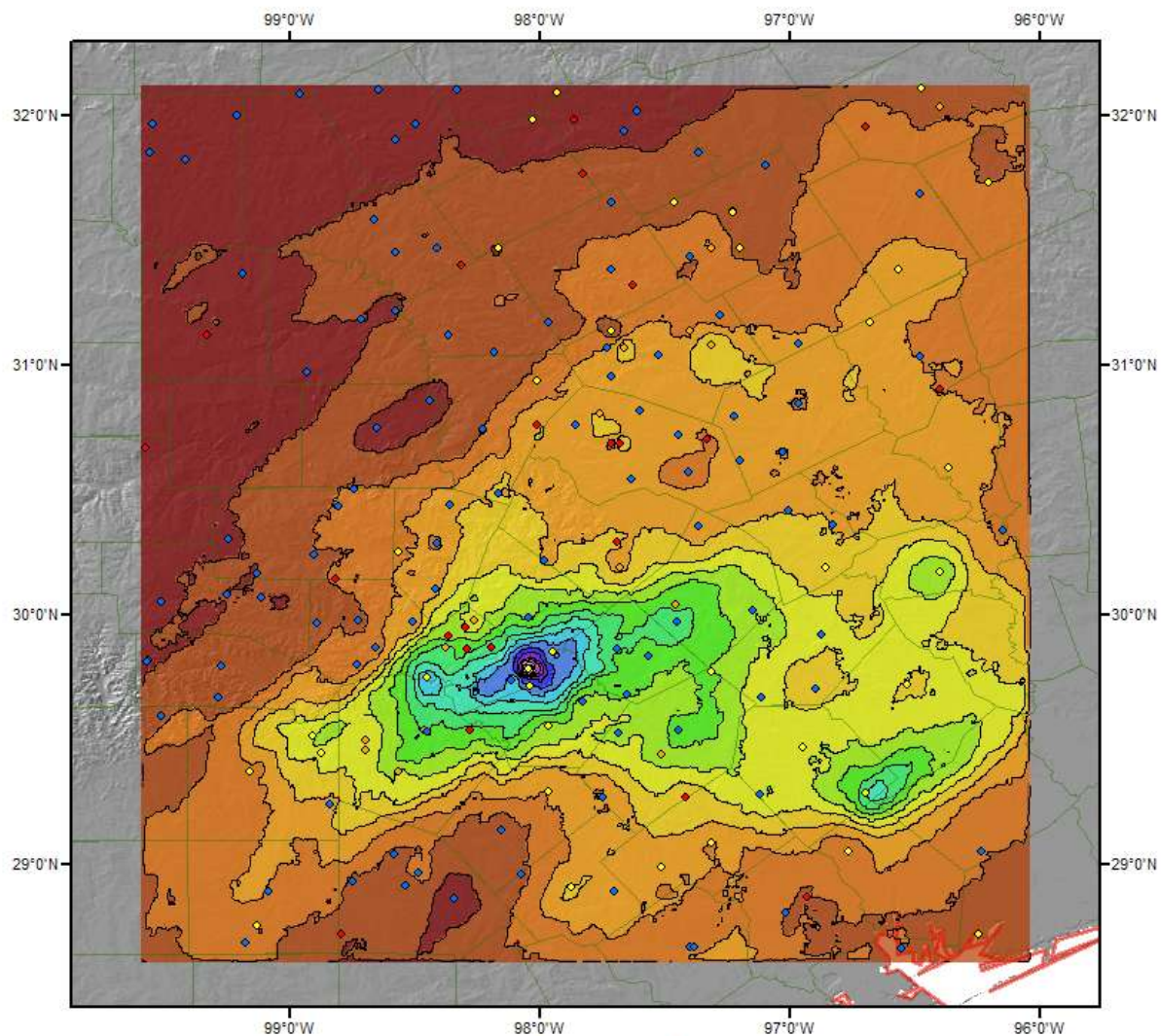


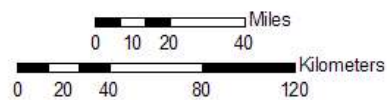
Figure 545: Mass curve chart for New Braunfels, TX October 1998



Total Rainfall (91-hrs)
SPAS # 1180 New Braunfels, TX 1998 Storm
October 17 (500 UTC) to 20 (2300 UTC), 1998

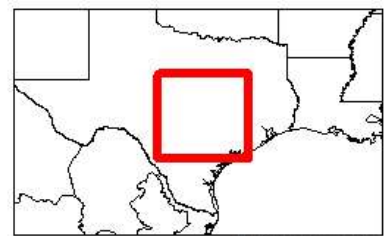
Gauging Stations

- ◆ Daily
- ◆ Hourly Estimated
- ◆ Hourly
- ◆ Supplemental



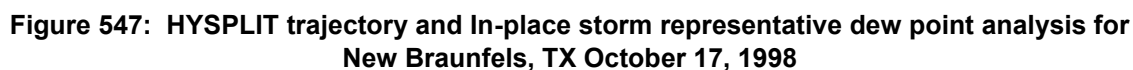
Precipitation (inches)

0.07 - 2.00	10.01 - 12.00	20.01 - 22.00	30.01 - 32.00
2.01 - 4.00	12.01 - 14.00	22.01 - 24.00	32.01 - 34.00
4.01 - 6.00	14.01 - 16.00	24.01 - 26.00	34.01 - 36.00
6.01 - 8.00	16.01 - 18.00	26.01 - 28.00	
8.01 - 10.00	18.01 - 20.00	28.01 - 30.00	



MetStat AWR May 13, 2010

Figure 546: Total storm isohyetal analysis for New Braunfels, TX October 1998



Storm Precipitation Analysis System (SPAS) For Storm #1594

General Storm Location: Texas (31.5, -100.5, 28.0, -97.0)

Storm Dates: June 30 (0000 UTC) – July 5 (2300 UTC), 2002 (144-hours)

Event: Synoptic

DAD Zone 1

Latitude: 29.855

Longitude: -98.885

Max. Grid Rainfall Amount: 38.55" Camp Verde, TX

Max. Observed Rainfall Amount: 34.17"

Number of Stations: 182

SPAS Version: 10.0

Basemap: conus_prism_ppt_in_1981_2010_06 and zr_default_ppt

Spatial resolution: 00:00:36

Radar Included: Yes

Depth-Area-Duration (DAD) analysis: Yes

Reliability of results: This analysis was based on hourly data (H), hourly estimated pseudo data (HEP), hourly pseudo data (HP), daily data (D) and supplemental data (S). We have a high degree of confidence in the station based storm total results, the spatial pattern is dependent on basemap and the timing is based on hourly, hourly estimated pseudo and hourly pseudo stations. Radar data was used for this event and had excellent coverage.

					Storm Representative				Climatological Maximum				
SPAS Storm ID	NAME	LON	LAT	ELEV Round	T _s	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	T _s	Precip. Water @ 30,000'	Precip. Water @ Storm Elev.	Avail. Moisture	IPMF
1594_1	HELOTES	-98.885	29.855	2,000	78.00	3.29"	0.53"	2.760	79.5	3.52"	0.56"	2.960	1.07

Storm 1594 Zone 1 - Jun. 30 (0000 UTC) - Jul. 5 (2300 UTC), 2002															
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)															
areasqmi	Duration (hours)														
	1	2	3	4	5	6	12	18	24	36	48	72	96	120	Total
0.4	5.46	7.03	7.42	8.12	8.72	9.55	12.08	14.59	17.52	19.20	23.46	29.41	34.75	38.55	38.55
1	5.41	6.96	7.35	8.05	8.64	9.48	11.98	14.49	17.40	19.08	23.31	29.19	34.52	35.71	35.71
10	5.21	6.69	7.14	7.76	8.45	9.29	11.65	14.13	17.04	18.76	22.90	28.61	33.91	35.09	35.09
25	4.99	6.37	6.94	7.44	8.33	9.15	11.17	13.45	16.28	17.97	22.03	27.66	33.03	34.33	34.33
50	4.72	6.03	6.60	7.12	8.12	8.95	10.61	12.62	15.38	17.05	20.97	26.66	32.01	33.57	33.57
100	4.29	5.49	6.10	6.69	7.77	8.57	9.86	11.60	14.27	15.89	19.76	25.47	30.82	32.71	32.71
150	3.94	5.05	5.79	6.37	7.54	8.31	9.60	10.88	13.51	15.09	19.01	24.70	30.08	32.21	32.21
200	3.64	4.68	5.56	6.13	7.33	8.08	9.41	10.35	12.91	14.52	18.63	24.14	29.53	31.80	31.80
300	3.21	4.34	5.21	5.75	6.94	7.68	9.02	9.66	11.96	13.88	18.00	23.22	28.70	31.10	31.10
400	3.01	4.11	4.94	5.44	6.62	7.36	8.70	9.56	11.31	13.41	17.29	22.34	27.96	30.39	30.39
500	2.91	3.90	4.74	5.22	6.38	7.10	8.43	9.32	10.84	13.04	16.72	21.66	27.30	29.78	29.78
1,000	2.59	3.35	4.06	4.48	5.57	6.24	7.55	8.49	9.48	11.65	14.47	19.05	24.60	27.17	27.17
2,000	2.19	2.88	3.31	3.92	4.69	5.29	6.71	7.62	8.25	9.94	12.38	16.49	21.47	24.01	24.01
5,000	1.33	1.86	2.40	2.87	3.45	3.93	5.33	6.09	6.47	8.20	10.01	13.21	16.91	19.12	19.12
10,000	0.74	1.28	1.72	2.12	2.52	2.87	3.99	4.69	5.34	6.82	8.26	10.70	13.55	15.35	15.35
20,000	0.40	0.69	1.00	1.29	1.56	1.76	2.69	3.30	3.97	5.26	6.36	8.22	10.26	11.64	11.64
35,000	0.25	0.46	0.63	0.82	0.99	1.14	1.68	2.11	2.59	3.68	4.53	6.07	7.61	8.70	8.70

Figure 548: Depth-area-duration values for Helotes, TX June 2002

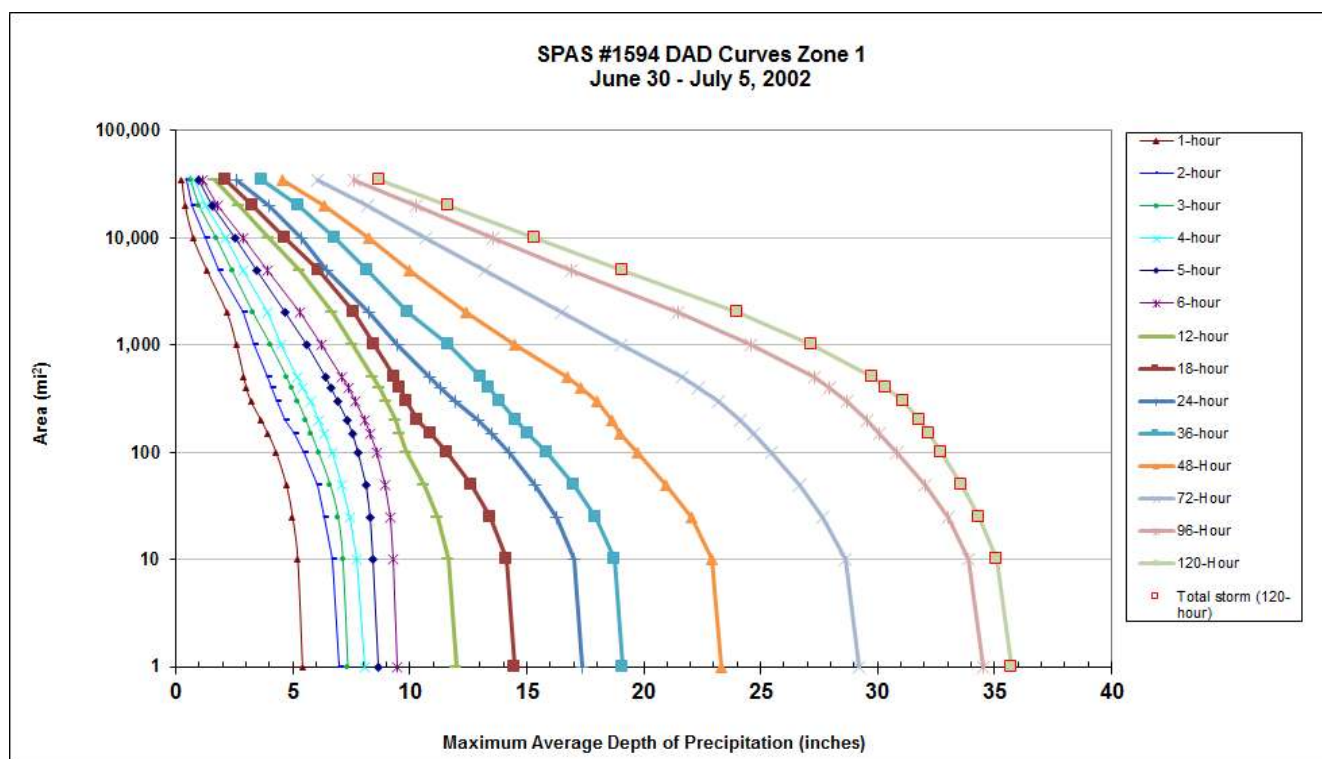


Figure 549: Depth-area-duration chart for Helotes, TX June 2002

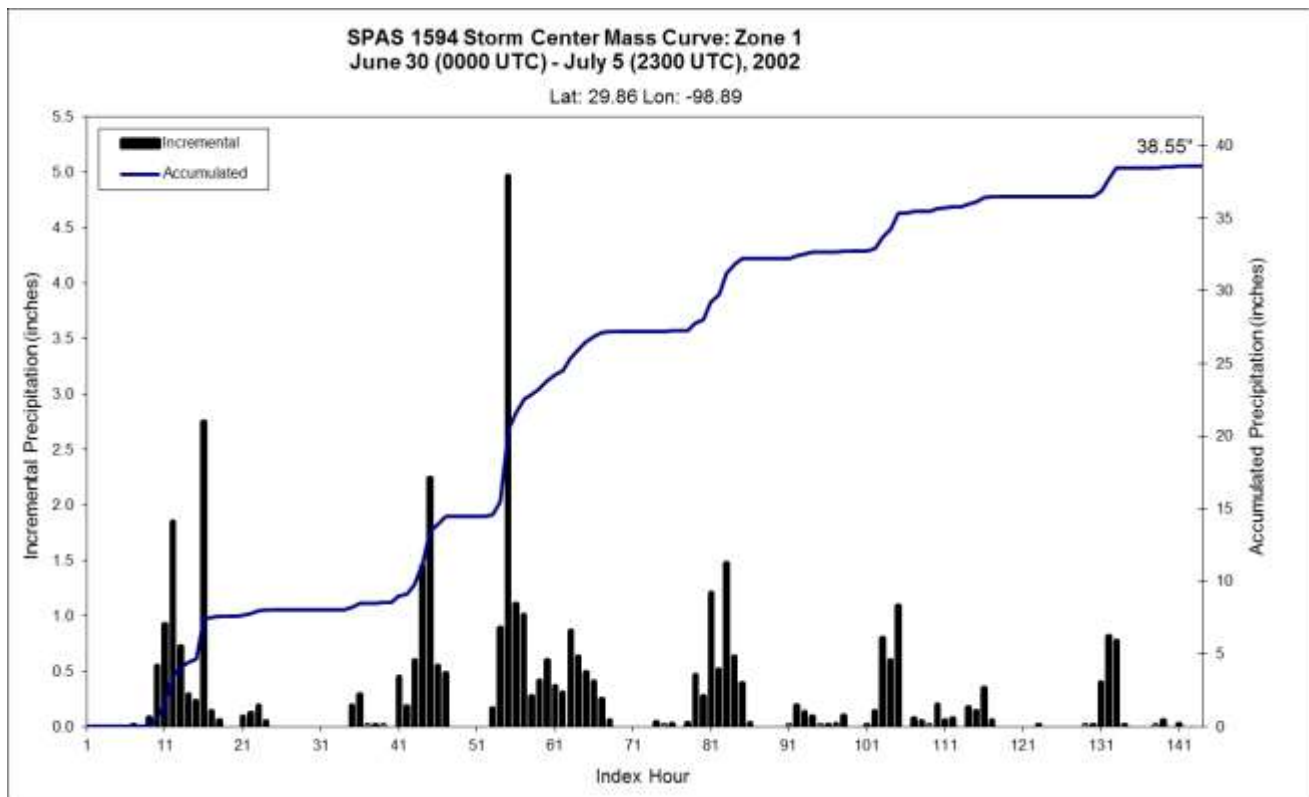


Figure 550: Mass curve chart for Helotes, TX June 2002

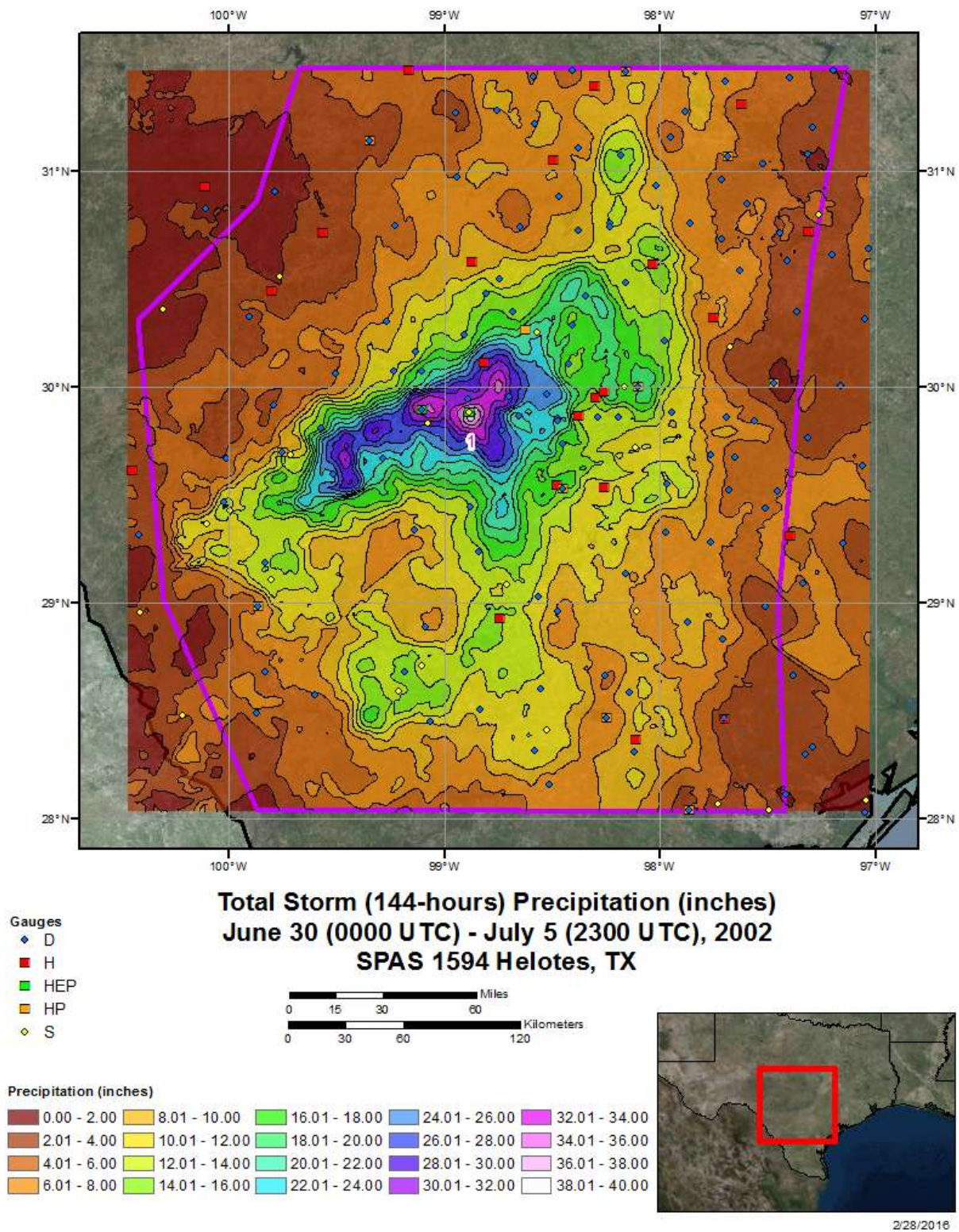


Figure 551: Total storm isohyetal analysis for Helotes, TX June 2002

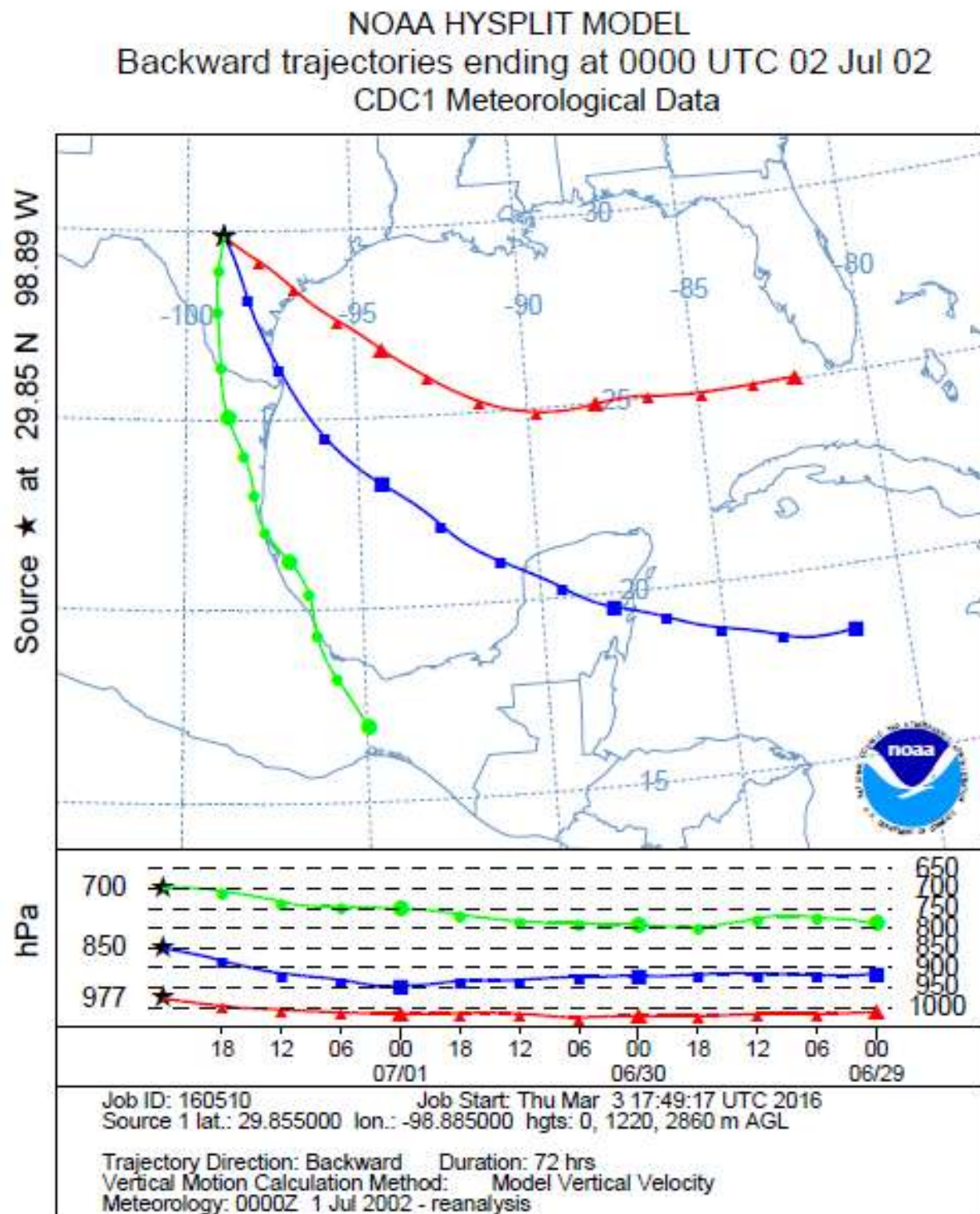


Figure 552: HYSPLIT trajectory analysis at Surface, 850mb and 700mb for Helotes, TX June 2002

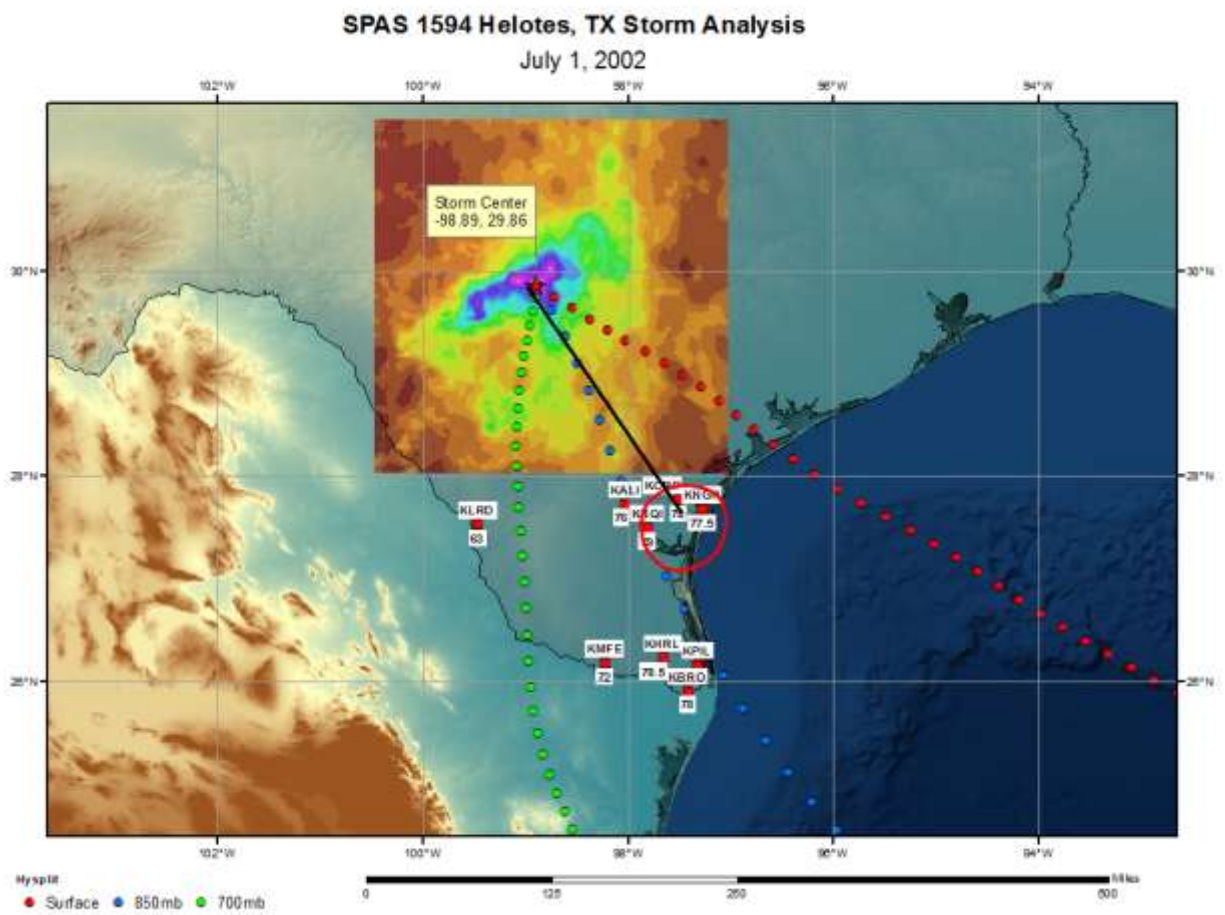


Figure 553: In-place storm representative dew point analysis for Helotes, TX July 1, 2002