

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.

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 2019 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	STORM_NAME	STATE	LAT	LON	YEAR	MONTH	DAY	MAX_PPT	PMP_TYPE
SPAS_1614_2	LAKE MORAIN	CO	38.804	-104.946	1894	5	30	8.91	GENERAL
SPAS_1305_1	ELBA	AL	31.363	-86.121	1929	3	12	29.73	GENERAL
SPAS_1587_1	PRAIRIEVIEW	NM	33.138	-103.079	1941	5	20	11.08	GENERAL
SPAS_1486_1	MCCOLLEUM RANCH	NM	32.146	-104.746	1941	9	20	21.81	GENERAL
SPAS_1431_1	WARNER	OK	35.479	-95.329	1943	5	6	25.24	GENERAL
SPAS_1433_1	COLLINSVILLE	IL	38.672	-89.980	1946	8	12	18.70	GENERAL
SPAS_1583_1	COUNCIL GROVE	KS	38.646	-96.621	1951	7	9	18.56	GENERAL
SPAS_1251_1	LAKE MALOYA	NM	37.009	-104.341	1955	5	19	14.82	GENERAL
SPAS_1183_1	EDGERTON	MO	40.413	-95.513	1965	7	18	20.76	GENERAL
SPAS_1253_1	BIG ELK MEADOW	CO	40.267	-105.417	1969	5	4	20.01	GENERAL
SPAS_1219_1	BIG FORK	AR	35.871	-92.121	1982	12	1	15.92	GENERAL
SPAS_1719_1	NECAISE	LA	30.565	-89.495	1995	5	8	28.51	GENERAL
SPAS_1286_1	AURORA COLLEGE	IL	41.458	-88.070	1996	7	16	18.13	GENERAL
SPAS_1242_1	ALLEY SPRING	MO	37.160	-91.450	2008	3	17	15.10	GENERAL
SPAS_1218_1	DOUGLASVILLE	GA	33.870	-84.760	2009	9	19	25.37	GENERAL
SPAS_1208_1	WARNER PARK	TN	36.061	-86.906	2010	5	1	19.71	GENERAL
SPAS_1530_1	GUADALUPE PASS	TX	32.035	-104.555	2013	9	10	18.34	GENERAL

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	STORM_NAME	STATE	LAT	LON	YEAR	MONTH	DAY	MAX_PPT	PMP_TYPE
SPAS_1426_1	COOPER	MI	42.376	-85.610	1914	8	31	12.60	LOCAL
SPAS_1427_1	BOYDEN	IA	43.190	-96.010	1926	9	17	24.00	LOCAL
SPAS_1494_1	MOUNTAIN HOME	TX	30.171	-99.379	1932	6	30	35.56	LOCAL
SPAS_1495_1	CHEYENNE	OK	35.621	-99.679	1934	4	3	23.01	LOCAL
SPAS_1295_1	ELBERT CHERRY CREEK	CO	39.238	-104.488	1935	5	30	24.00	LOCAL
SPAS_1295_2	GENOA	CO	39.329	-103.538	1935	5	30	12.65	LOCAL
SPAS_1295_3	HALE	CO	39.613	-102.263	1935	5	30	18.00	LOCAL
SPAS_1485_1	LAS CRUCES	NM	32.304	-106.796	1935	8	30	10.03	LOCAL
SPAS_1496_1	WOODWARD RANCH	TX	29.479	-99.388	1935	5	31	21.93	LOCAL
SPAS_1429_2	HALLETT	OK	36.246	-96.613	1940	9	2	24.00	LOCAL
SPAS_1432_1	MOUNDS	OK	35.846	-96.071	1943	5	16	19.27	LOCAL
SPAS_1434_1	HOLT	MO	39.453	-94.342	1947	6	18	17.60	LOCAL
SPAS_1613_1	GOLDEN	CO	39.788	-105.288	1948	6	7	6.00	LOCAL
SPAS_1602_1	VIC PIERCE	TX	30.404	-101.438	1954	6	23	35.79	LOCAL
SPAS_1226_1	COLLEGE HILL	OH	40.085	-81.648	1963	6	3	19.39	LOCAL
SPAS_1030_1	DAVID CITY	NE	41.213	-97.071	1963	6	24	15.98	LOCAL
SPAS_1293_1	HOLLY	CO	37.713	-102.404	1965	6	16	19.18	LOCAL
SPAS_1034_1	ENID	OK	36.381	-97.868	1973	10	10	19.45	LOCAL
SPAS_1247_1	FRIJOLE CREEK	CO	37.096	-104.379	1981	7	3	16.33	LOCAL
SPAS_1185_1	CORRIGAN	TX	30.260	-94.890	1994	10	16	23.31	LOCAL
SPAS_1036_1	PAWNEE CREEK	CO	40.775	-103.625	1997	7	29	13.58	LOCAL
SPAS_1662_1	SAGUACHE	CO	38.215	-106.295	1999	7	25	6.68	LOCAL
SPAS_1220_1	DUBUQUE	IA	42.440	-90.750	2011	7	27	15.14	LOCAL
SPAS_1590_1	DAWSON	TX	31.895	-96.645	2015	10	23	32.92	LOCAL

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	STORM_NAME	STATE	LAT	LON	YEAR	MONTH	DAY	MAX_PPT	PMP_TYPE
SPAS_1591_1	HEARNE	TX	30.840	-96.570	1899	6	27	34.50	TROPICAL
SPAS_1582_1	BROOME	TX	31.788	-100.854	1936	9	13	30.34	TROPICAL
SPAS_1596_1	MILLER ISLAND	LA	29.854	-92.246	1940	8	6	37.85	TROPICAL
SPAS_1519_1	YANKEETOWN	FL	29.029	-82.721	1950	9	3	45.18	TROPICAL
SPAS_1601_1	SOMBRERETILLO	MX	26.279	-99.921	1967	9	19	35.87	TROPICAL
SPAS_1601_2	DINERO	MX	28.254	-97.904	1967	9	19	35.01	TROPICAL
SPAS_1179_1	ALBANY	TX	32.726	-99.350	1978	8	3	32.50	TROPICAL
SPAS_1463_1	ALVIN	TX	29.429	-95.271	1979	7	25	45.49	TROPICAL
SPAS_1184_1	CLYDE	TX	32.479	-99.479	1981	10	10	23.23	TROPICAL
SPAS_1317_1	AMERICUS	GA	32.096	-84.229	1994	7	4	28.09	TROPICAL
SPAS_1569_1	DAUPHIN ISLAND	AL	30.315	-88.035	1997	7	19	45.27	TROPICAL
SPAS_1593_1	MUNSON	FL	30.855	-87.725	1998	9	24	24.92	TROPICAL
SPAS_1464_1	HOUSTON	TX	29.755	-95.275	2001	6	5	40.97	TROPICAL
SPAS_1631_1	WATSON	LA	30.555	-90.965	2016	8	10	34.65	TROPICAL
SPAS_1631_2	LAFAYETTE	LA	30.145	-92.085	2016	8	10	28.74	TROPICAL
SPAS_1667_1	HARVEY	TX	29.965	-93.915	2017	8	28	61.11	TROPICAL

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	STORM_NAME	STATE	LAT	LON	YEAR	MONTH	DAY	MAX_PPT	PMP_TYPE
SPAS_1294_1	PENROSE	CO	38.464	-105.070	1921	6	2	12.20	HYBRID (G/L)
SPAS_1294_2	ADELAIDE	CO	38.564	-105.071	1921	6	2	10.14	HYBRID (G/L)
SPAS_1592_1	THRALL	TX	30.629	-97.388	1921	9	9	39.90	HYBRID (T/L)
SPAS_1560_1	CONWAY	TX	35.221	-101.396	1951	5	13	15.21	HYBRID (G/L)
SPAS_1293_3	ELBERT	CO	39.188	-104.296	1965	6	16	16.28	HYBRID (G/L)
SPAS_1568_1	CARLSBAD	NM	32.254	-104.613	1966	8	22	17.35	HYBRID (G/L)

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General Storms

Storm Precipitation Analysis System (SPAS) For Storm #1614_2

General Storm Location: Ward District and Lake Moraine Colorado

Storm Dates: May 29 - June 1, 1894

Event: Synoptic

DAD Zone 2

Latitude: 38.8042

Longitude: -104.9458

Max. Grid Rainfall Amount: 8.91"

Max. Observed Rainfall Amount: 7.50" (Lake Moraine, CO)

Number of Stations: 43

SPAS Version: 10.0

Basemap: USACE Isohyetal Map

Spatial resolution: 0.2568

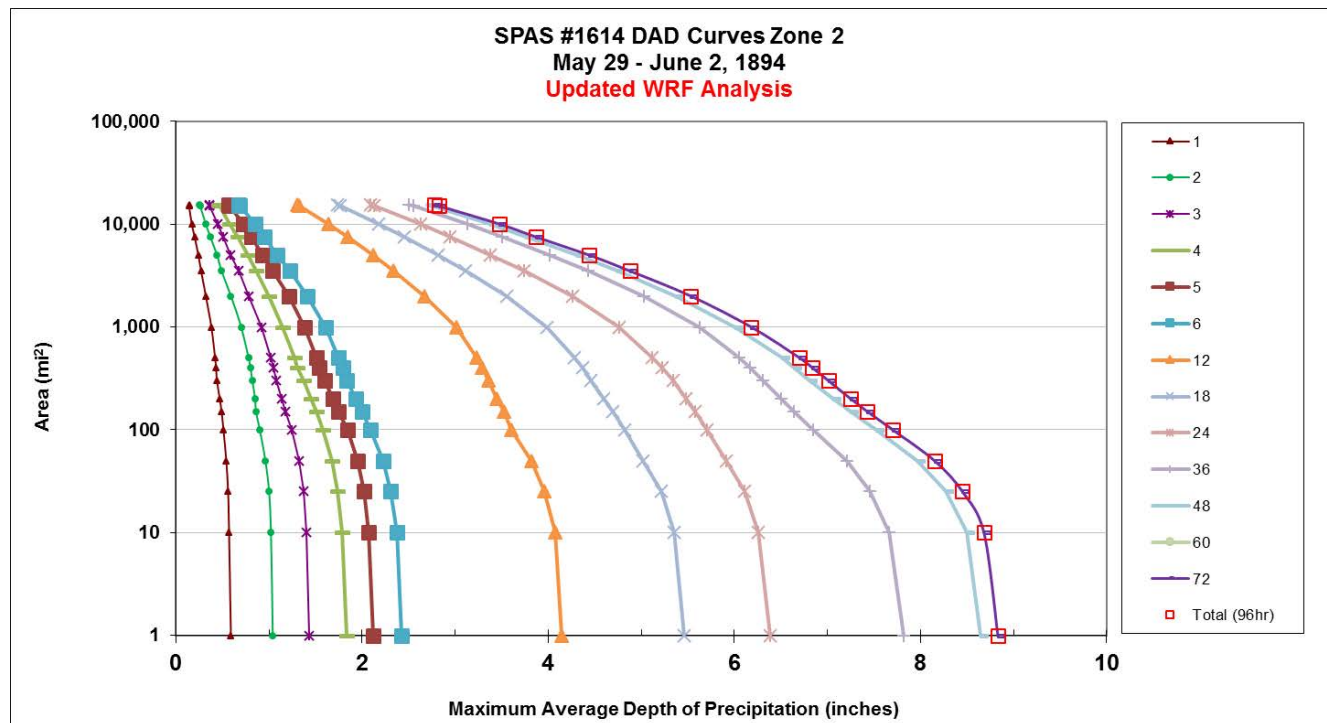
Radar Included: No

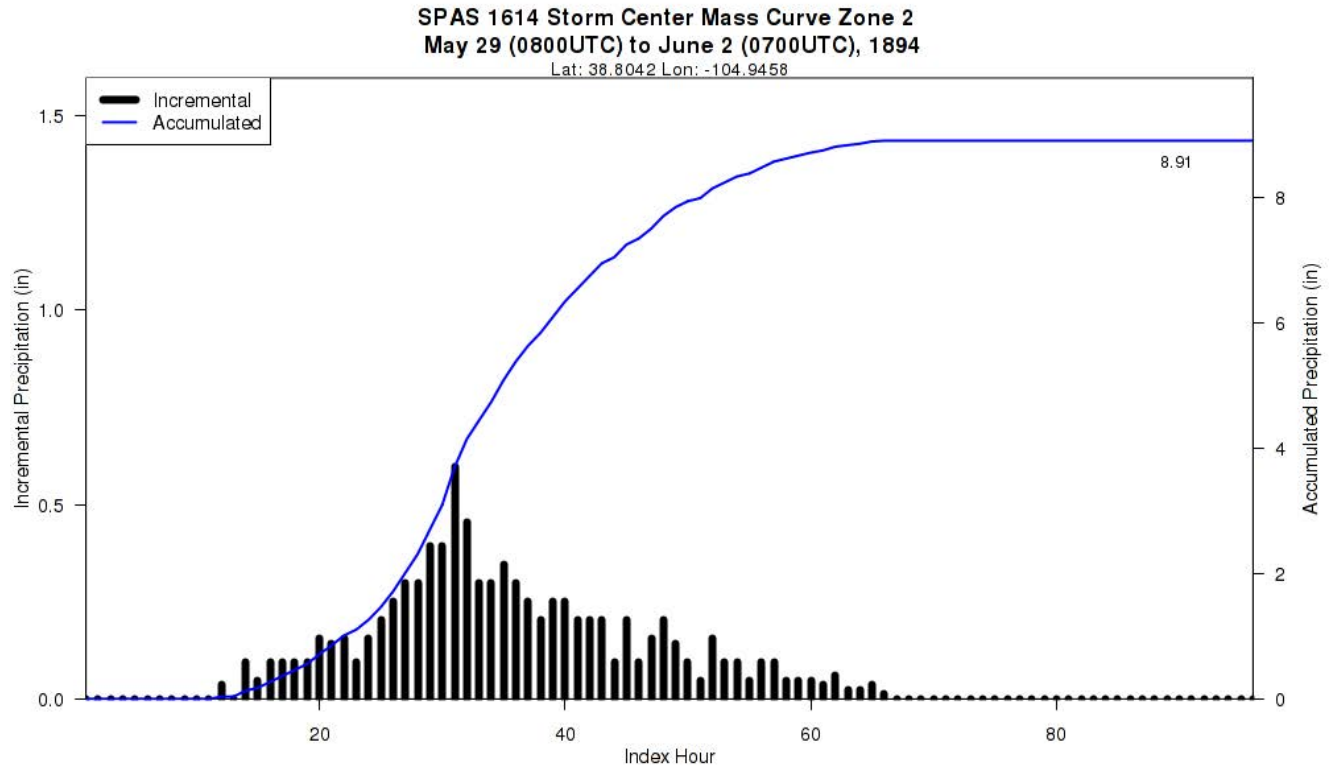
Depth-Area-Duration (DAD) analysis: Yes

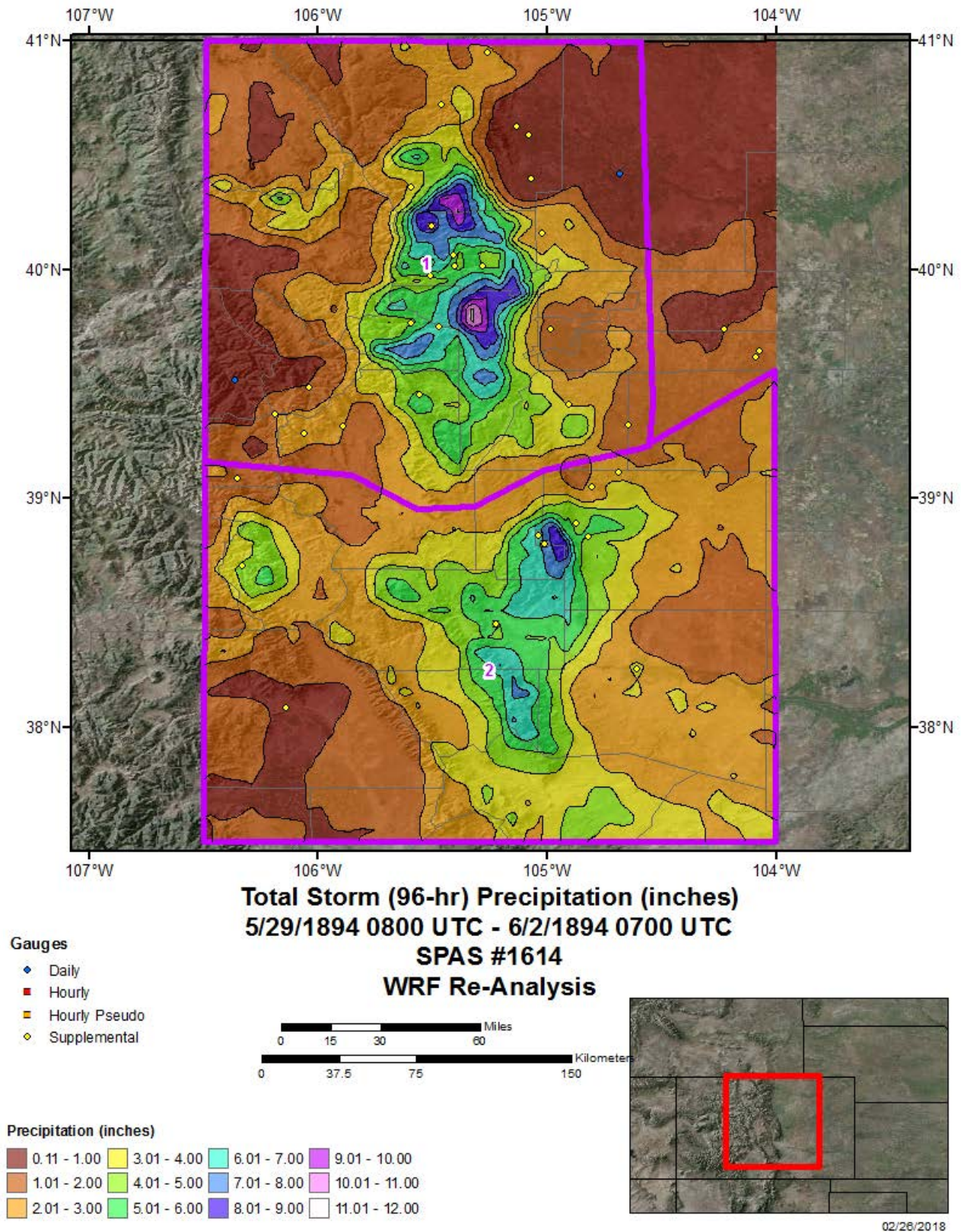
Reliability of results: This analysis was based on 43 hourly stations, daily data, and supplemental station data. We have a good degree of confidence for the station based storm total results. The spatial pattern is dependent heavily on the basemap created from the USACE MR 6-14 Isohyetal image. Timing is based on the hourly pseudo stations near the storm center (based on USACE MR 6-14). Several daily stations were moved to supplemental stations due to timing issues and to ensure data consistency.

					Storm Rep. Dew Point					Climatological Max. Dew Point						
SPAS Storm ID	LON	LAT	ELEV	ELEV Round	T _d	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	T _d	T _d Round	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	IPMF
1614 2	-104.946	38.804	10,380	10,500	66.00	1.86	1.34	54	0.520	77.41	77.5	3.22	2.08	77	1.135	1.500

Storm 1614 Zone 2 - May 29 (0800 UTC) - June 2 (0700 UTC), 1894														
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES) Updated WRF Analysis														
areasqmi	Duration (hours)													
	1	2	3	4	5	6	12	18	24	36	48	60	72	Total (96hr)
0.4	0.60	1.05	1.44	1.84	2.13	2.43	4.16	5.49	6.42	7.87	8.69		8.88	8.88
1	0.59	1.04	1.43	1.83	2.12	2.42	4.14	5.46	6.38	7.82	8.64		8.83	8.83
10	0.57	1.02	1.40	1.78	2.07	2.37	4.07	5.35	6.26	7.66	8.50		8.68	8.68
25	0.56	1.00	1.37	1.74	2.02	2.31	3.96	5.21	6.11	7.46	8.27		8.45	8.45
50	0.54	0.96	1.32	1.68	1.95	2.23	3.82	5.02	5.91	7.21	7.97		8.15	8.15
100	0.51	0.90	1.24	1.58	1.84	2.09	3.60	4.82	5.71	6.85	7.52		7.70	7.7
150	0.49	0.86	1.18	1.51	1.75	2.00	3.52	4.69	5.58	6.64	7.25		7.43	7.43
200	0.47	0.85	1.14	1.45	1.69	1.93	3.45	4.60	5.48	6.50	7.06		7.25	7.25
300	0.44	0.82	1.08	1.37	1.60	1.83	3.36	4.46	5.34	6.31	6.81		7.01	7.01
400	0.43	0.80	1.05	1.30	1.54	1.79	3.29	4.37	5.22	6.17	6.64		6.84	6.84
500	0.42	0.78	1.02	1.27	1.51	1.75	3.23	4.28	5.12	6.05	6.51		6.70	6.7
1,000	0.38	0.70	0.92	1.15	1.38	1.61	3.01	3.99	4.76	5.63	6.01		6.18	6.18
2,000	0.32	0.59	0.78	1.00	1.21	1.41	2.67	3.55	4.26	5.03	5.37		5.53	5.53
3,500	0.27	0.49	0.67	0.86	1.04	1.22	2.34	3.11	3.74	4.43	4.74		4.88	4.88
5,000	0.24	0.44	0.59	0.77	0.93	1.09	2.12	2.82	3.38	4.02	4.31		4.44	4.44
7,500	0.20	0.37	0.51	0.66	0.81	0.95	1.84	2.45	2.94	3.50	3.76		3.87	3.87
10,000	0.17	0.32	0.45	0.58	0.72	0.85	1.64	2.18	2.63	3.13	3.38		3.48	3.48
15,000	0.14	0.26	0.36	0.47	0.58	0.68	1.32	1.77	2.13	2.55	2.75		2.83	2.83
15,417	0.14	0.25	0.36	0.46	0.57	0.67	1.30	1.74	2.09	2.50	2.70		2.78	2.78

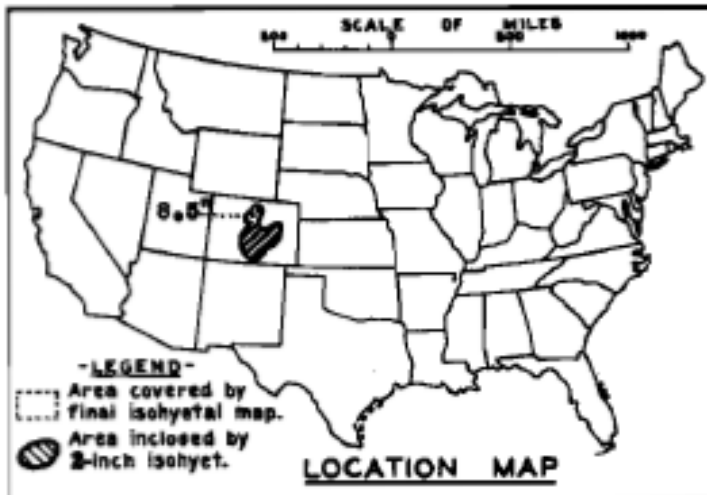






DEPARTMENT OF THE ARMY

CORPS OF ENGINEERS

STORM STUDIES - PERTINENT DATA SHEET

Storm of 29 May - 31 May 1894

Assignment MR 6-14

Location Central Colorado

Study Prepared by:
Missouri River Division
Denver District OfficePart I Reviewed by H. M. Sec. of
Weather Bureau, 9/12/47Part II Approved by Office, Chief
of Engineers for Distribution
of Factual Data, 6/14/49Remarks: Center at Ward
District, Colorado
Dewpt. 62°-Ref. Pt. 325 SE
Grid B-20**DATA AND COMPUTATIONS COMPILED****PART I**

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

Precipitation data and mass curves:

(Number of Sheets)

Form 5001-C (Hourly precip. data).....	4
Form 5001-B (24-hour " " " ").....	6
Form 5001-D (" " " " " ").....	8
Misc. precip. records, meteorological data, etc.....	16
Form 5002 (Mass rainfall curves).....	9

PART II

Final isohyetal maps, in 1 sheet, scale 1: 500,000

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).....	12
Maximum duration-depth-area curves.....	1
Data relating to periods of maximum rainfall.....	1

MAXIMUM AVERAGE DEPTH OF RAINFALL IN INCHES

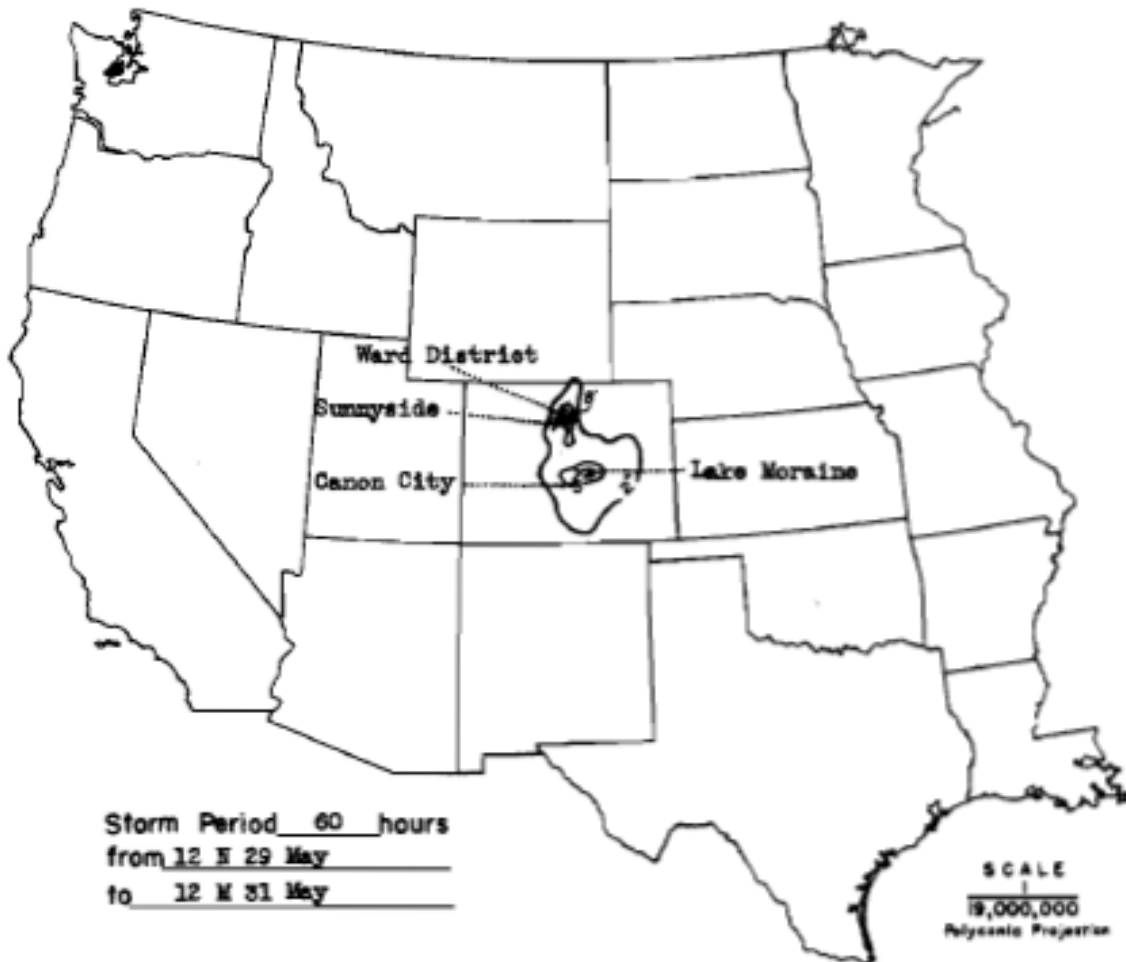
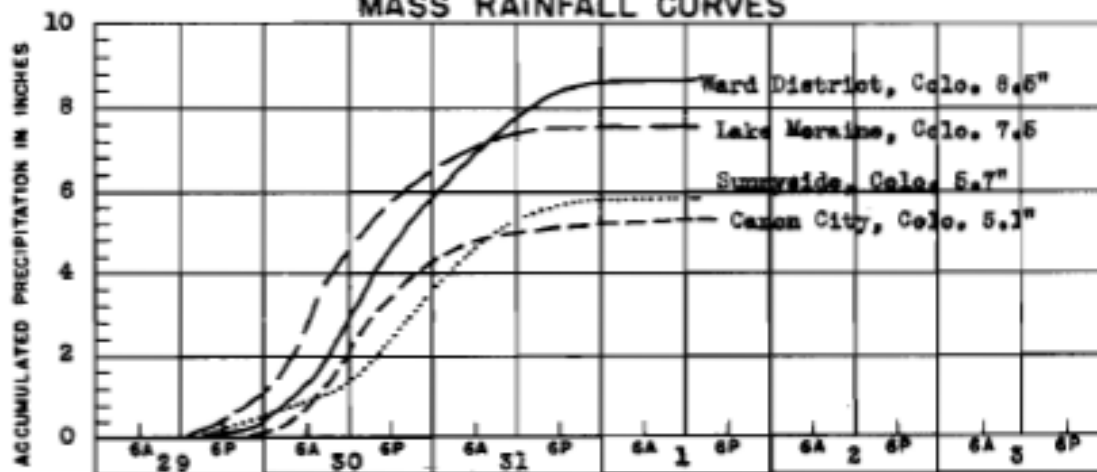
Area in Sq. Mi.	Duration of Rainfall in Hours										
	6	12	18	24	30	36	48	60			
10	1.7	3.3	4.7	5.6	6.6	7.3	8.2	8.5			
100	1.7	3.2	4.3	5.2	6.0	6.5	7.3	7.5			
200	1.7	3.1	4.2	5.0	5.8	6.3	7.0	7.2			
500	1.7	3.0	4.0	4.8	5.5	5.9	6.6	6.8			
1,000	1.6	2.9	3.8	4.6	5.3	5.7	6.3	6.5			
2,000	1.6	2.7	3.6	4.4	5.0	5.3	5.9	6.1			
5,000	1.5	2.5	3.2	3.9	4.5	4.7	5.3	5.5			
10,000	1.3	2.2	2.8	3.5	4.0	4.3	4.7	4.9			
20,000	1.0	1.8	2.3	2.8	3.2	3.5	3.8	4.0			
25,300	0.9	1.5	2.1	2.5	2.9	3.1	3.4	3.6			

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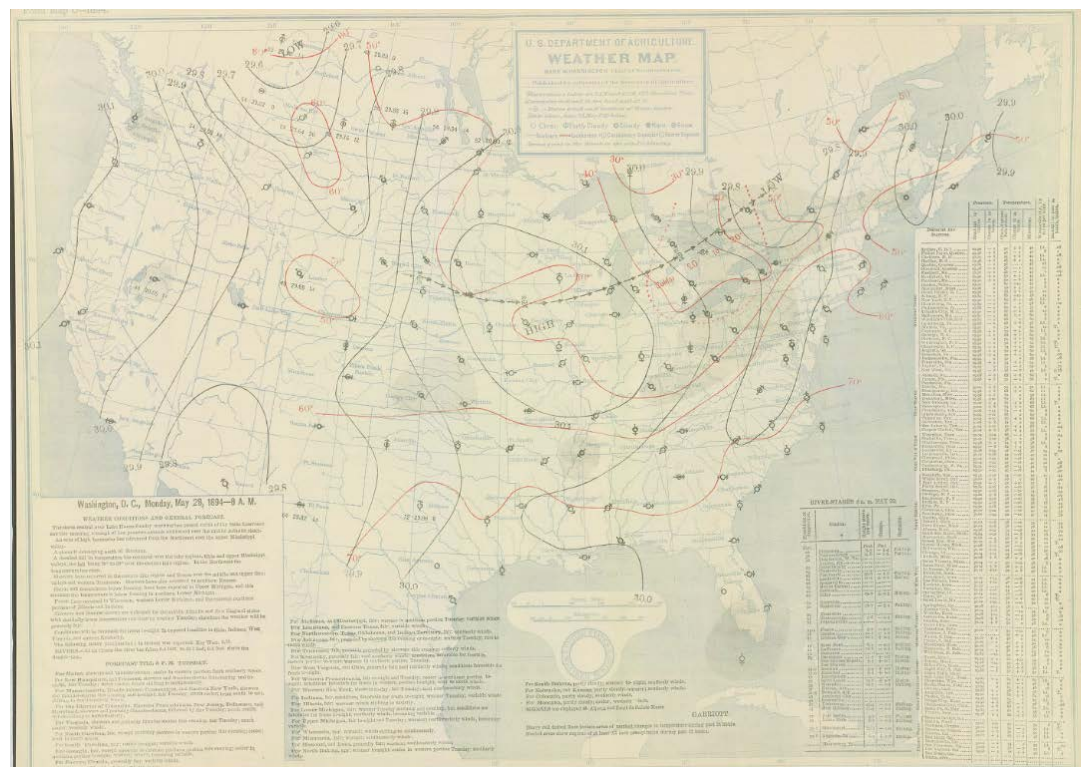
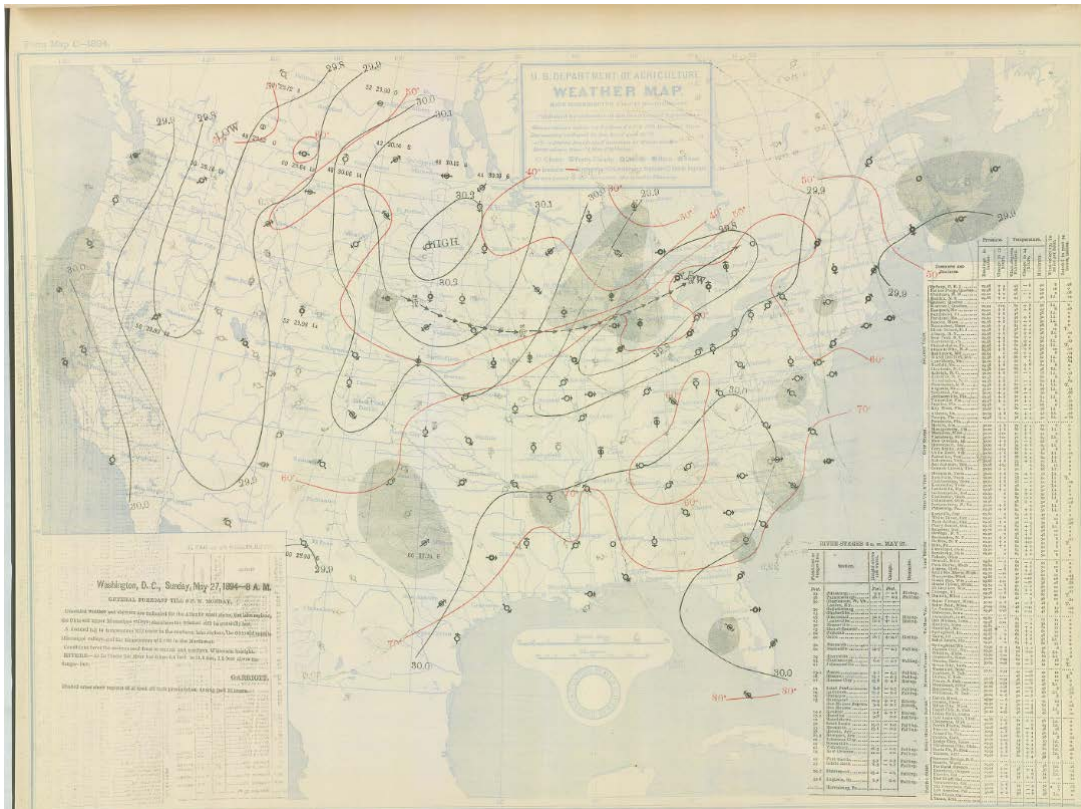
CORPS OF ENGINEERS

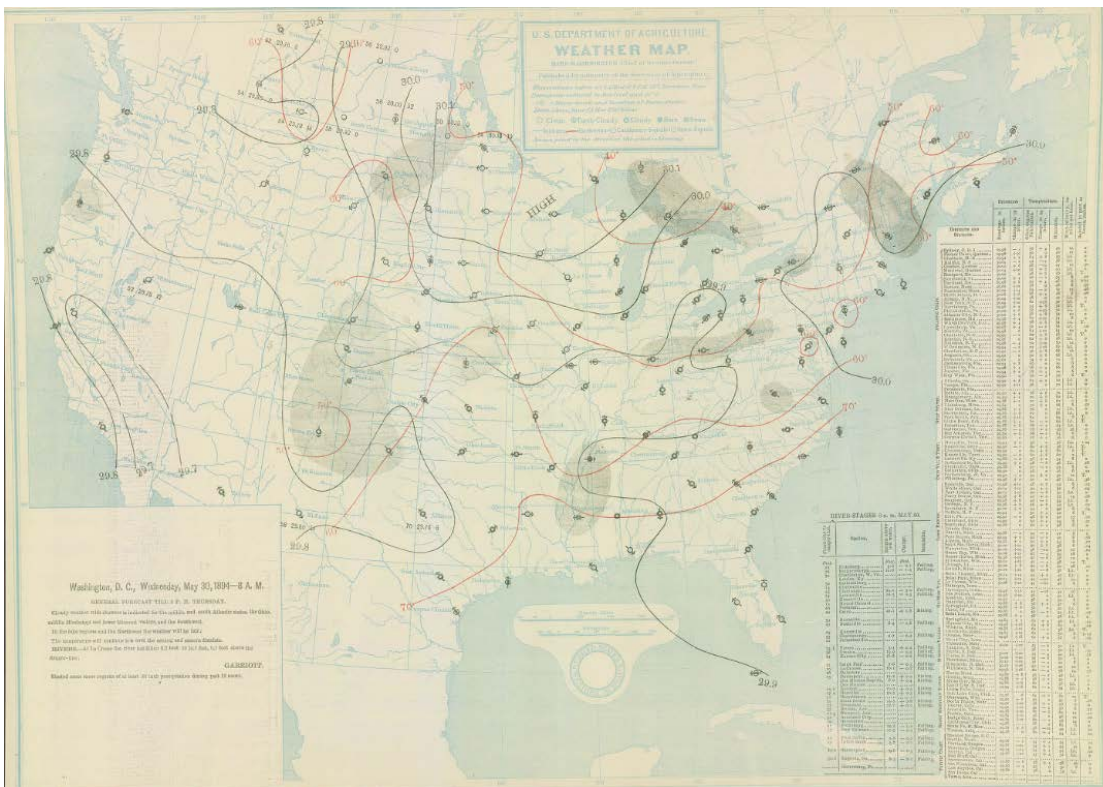
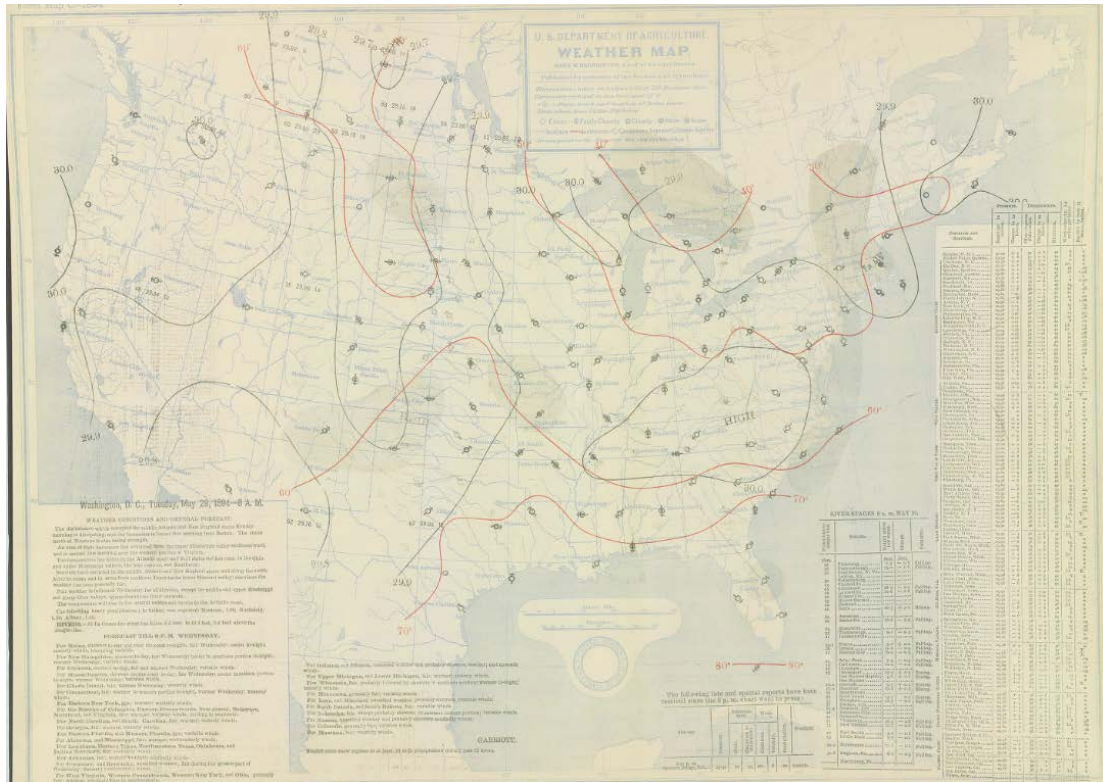
STORM STUDIES - ISOHYETAL MAP

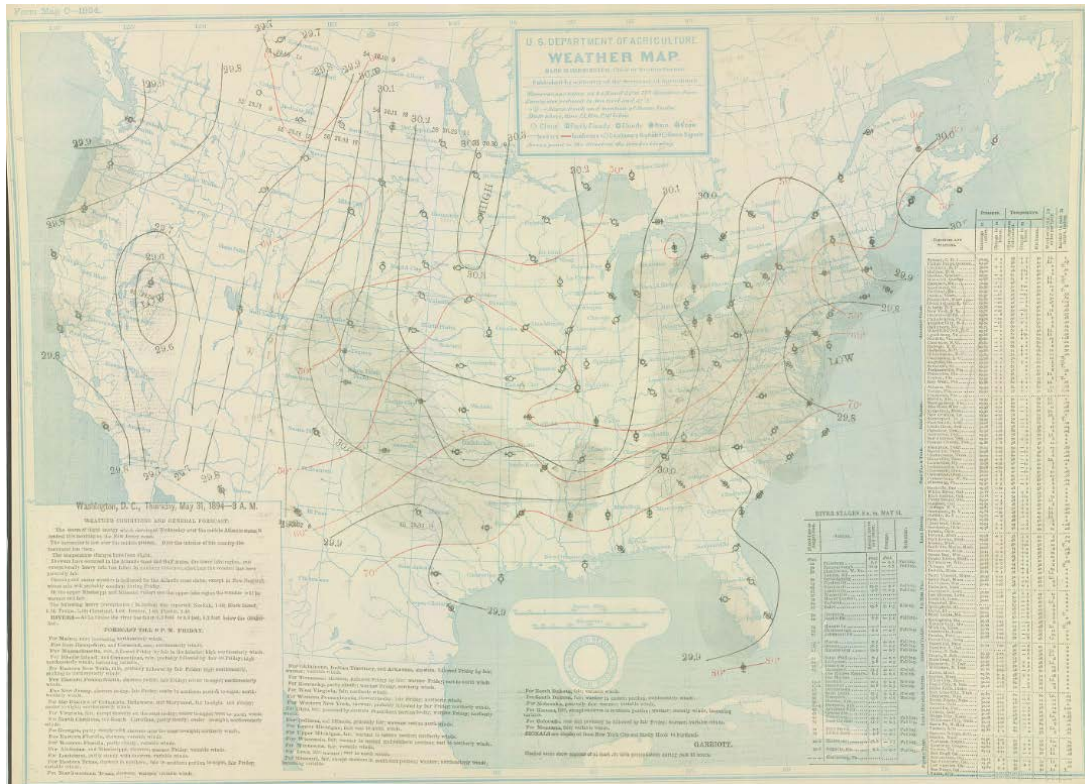
Storm of 29 May - 31 May 1894 Assignment MR 8-14
 Study Prepared by: Denver, Colo. District
Missouri River Division

**MASS RAINFALL CURVES**

FORM 8-3W





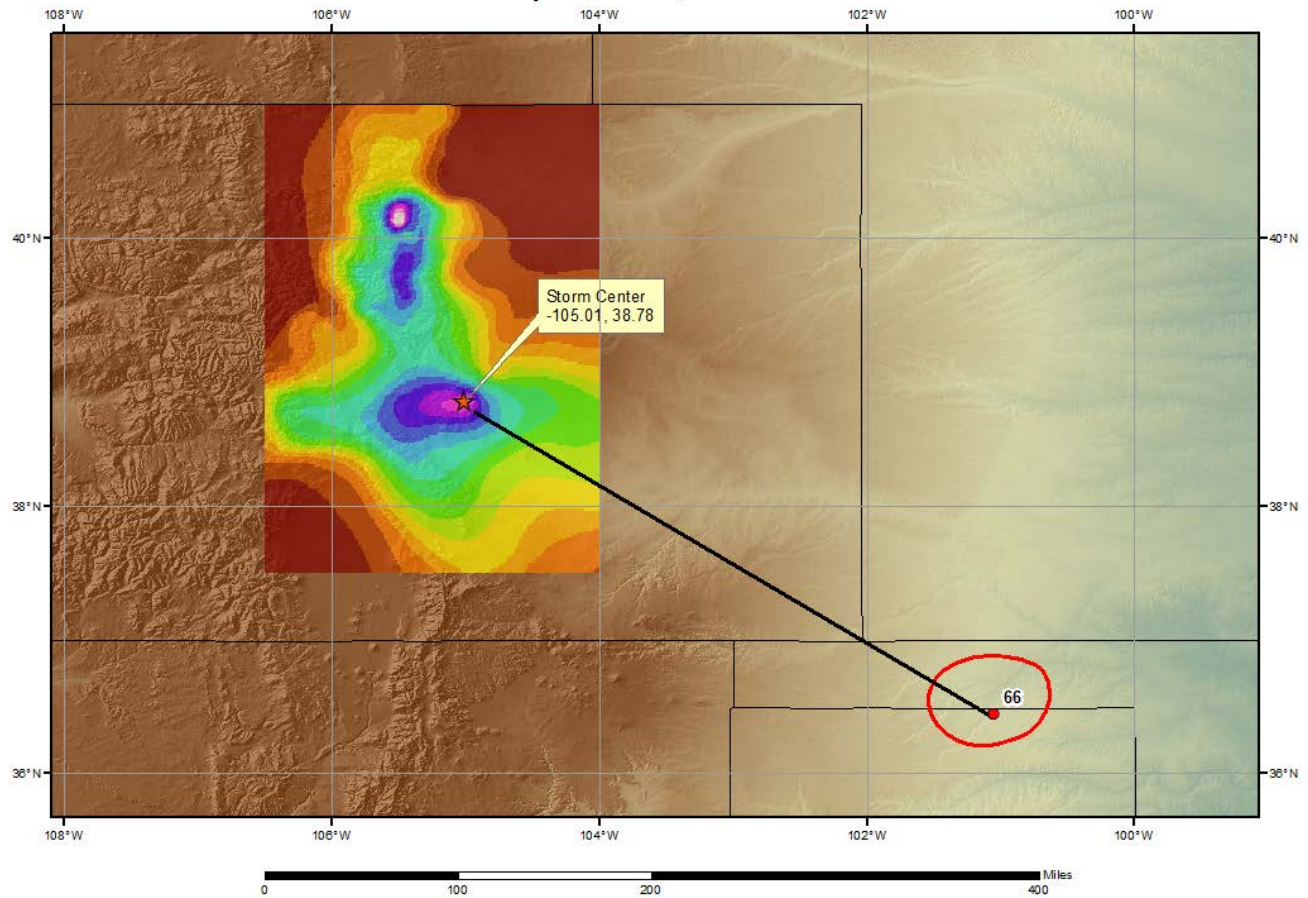


6.

Storm Date	Assignment Number	Representative Storm Dewpoint	Reference Point
<u>1890</u>			
Jul 1-5	GL 1-2	69	250 SW of Constableville, N. Y.
Sep 8-13	GL 4-1	70	330 SSE of S.Canistota, N. Y.
<u>1891</u>			
Jun 23-28	MR 4-2	72	200 S of Larrabee, Iowa.
Dec 13-15	GL 2-7	55	410 SSE of Lincoln, Wis.
<u>1892</u>			
Jul 24-28	UMW 1-1	72	200 S of Minneapolis, Minn.
Aug 24-27	GL 1-3	70	270 S of North Hammond, N. Y.
<u>1893</u>			
Aug 24-29	GL 1-4	72	220 S of Lowville, N. Y.
Aug 26-28	SA 2-1	75	80 E of Manning, S. C.
Sep 6-10	LMW 3-2	71	100 E of Franklin, La.
<u>1894</u>			
Mar 17-20	LMW 1-1	67	120 SSE of Washington, Ark.
May 17-22	NA 1-4	64	50 W of Bridgeton, N. J.
May 29-Jun 1	MR 6-14	62	325 SE of Lake Moraine, Colo.
Sep 18-20	SA 1-13	67	250 SSW of Smith's Corner, Pa.
<u>1895</u>			
Oct 11-15	NA 1-5	60	100 ESE of Grosvonordale, Conn.
Dec 16-20	MR 1-1	59	260 S of Phillipsburg, Mo.
Dec 16-21	GL 2-8	51	350 SW of Three Rivers, Mich.
<u>1896</u>			
Jun 4-5	MR 4-3	68	250 SSE of Greeley Center, Nebr.
Sep 27-30	SA 1-19	71	240 SE of Bloomery, W. Va.
Dec 31-Jan 3	UMW 2-1	61	125 S of Pine Bluff, Ark.

SPAS 1614 Ward District, CO Storm Analysis Zone 2

May 29 - June 1, 1894



Storm Precipitation Analysis System (SPAS) For Storm #1305_1

General Storm Location: Southern Alabama (Elba, AL)

Storm Dates: Mar 11-16, 1929

Event: Stalled Front

DAD Zone 1

Latitude: 31.3625

Longitude: -86.12083

Max. Grid Rainfall Amount: 29.73" (29.6" at Elba, AL)

Number of Stations: 118 (includes 3 omitted stations)

SPAS Version: 9.5

Base Map Used: NWS-MetStat Blended Isohyetal Map

Spatial resolution: 30 seconds

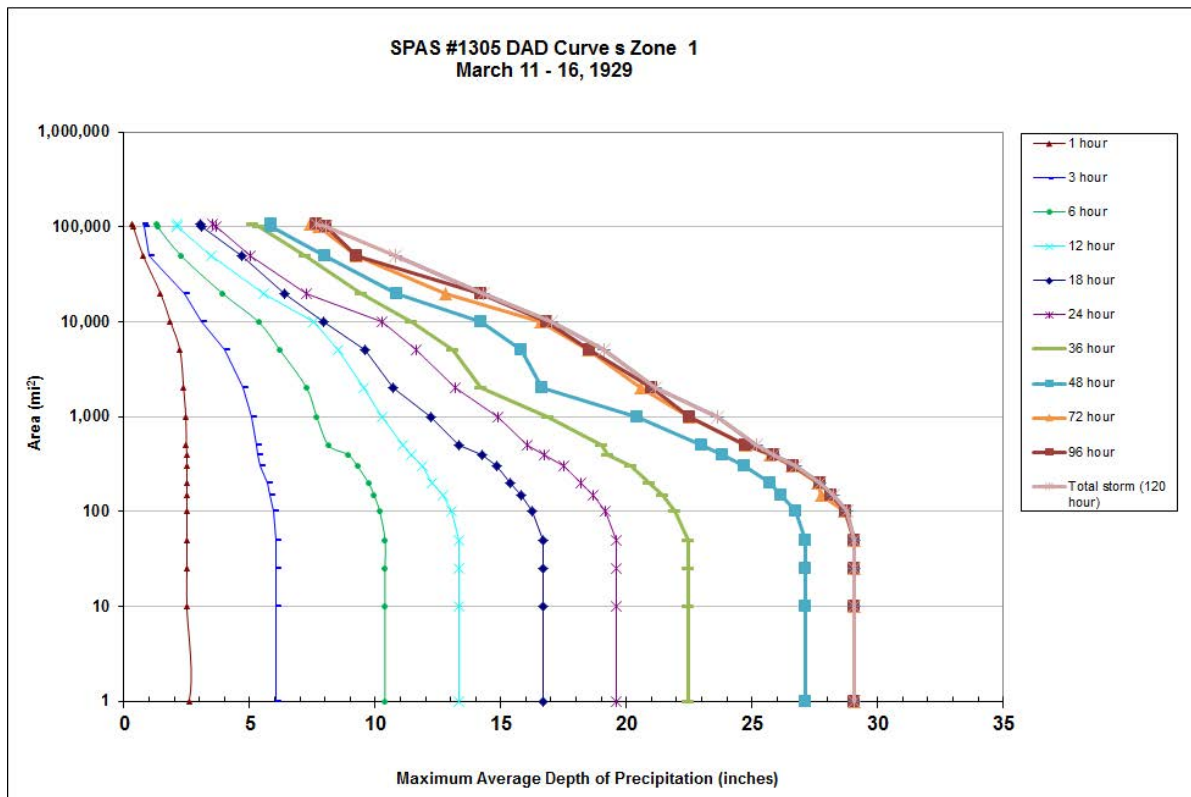
Radar Included: No

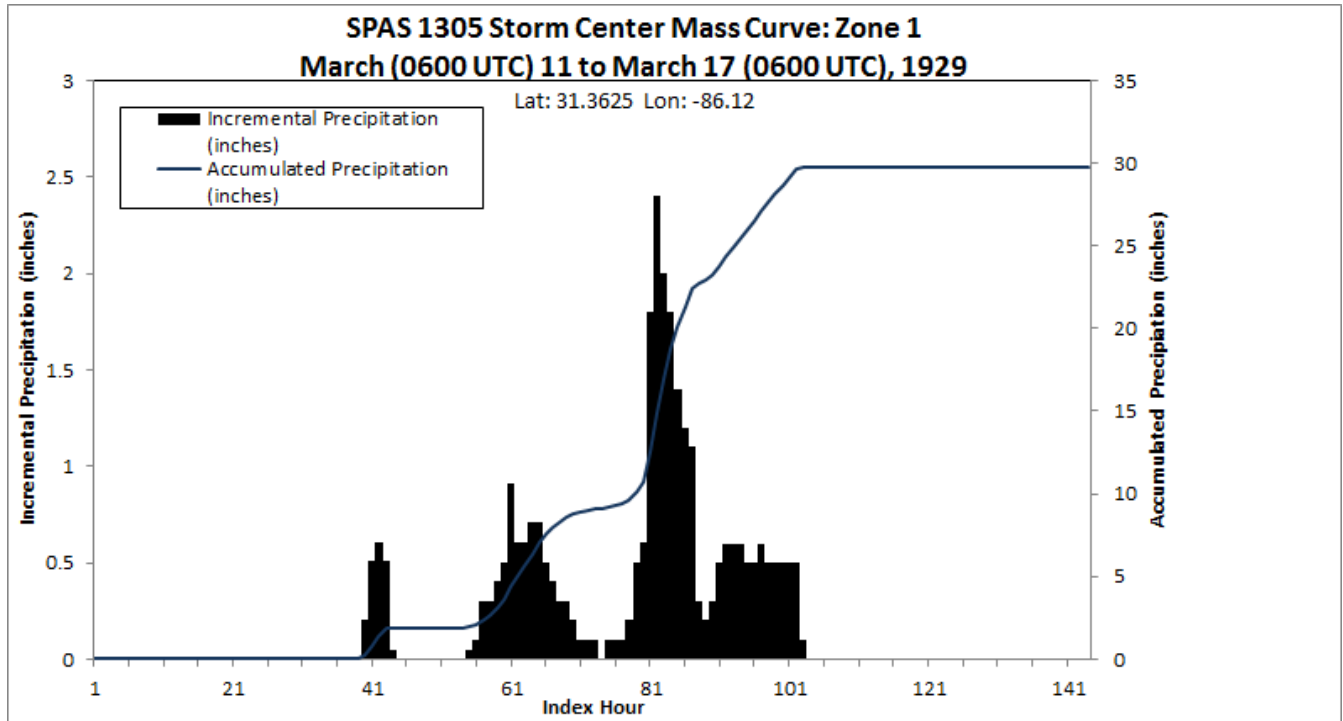
Depth-Area-Duration (DAD) analysis: Yes

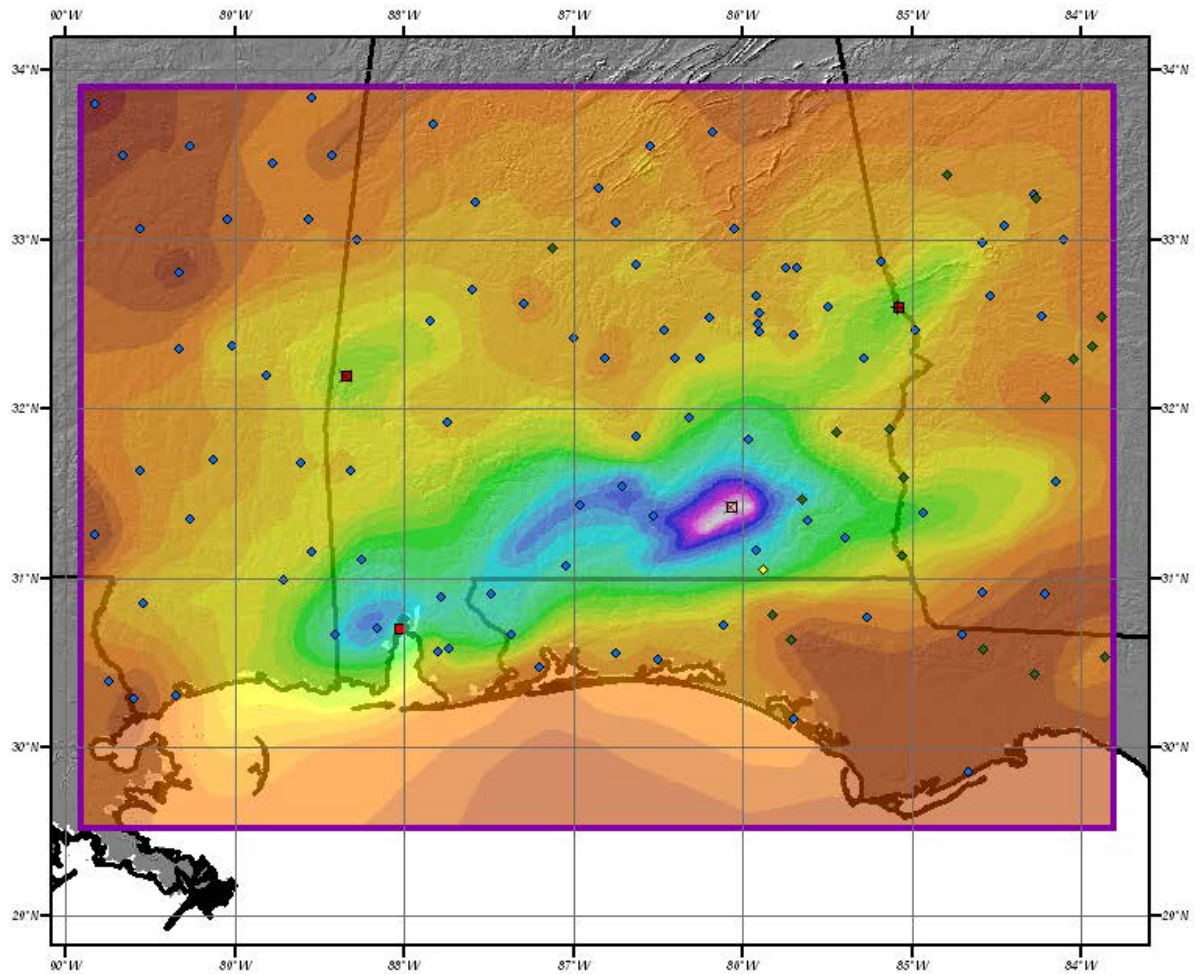
Reliability of Results: Given the lack of hourly data (only 4 stations), there is limited confidence in the timing across much of the region. The timing of the storm center is tied entirely to the estimated hourly data from the USACE storm report. The extent and magnitude of the rainfall is moderately reliable given the surprising large number of daily rain gauges available. The exception to this is the precipitation exists across southern Mississippi where very little rain gauge data was available; We followed the trends of the NWS isohyetal pattern in this area.

					Storm Rep. Dew Point					Climatological Max. Dew Point						
SPAS Storm ID	LON	LAT	ELEV	ELEV Round	T _d	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	T _d	T _d Round	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	IPMF
1305 1	-86.121	31.363	304	300	69.00	2.14	0.06	60	2.080	72.87	73.0	2.60	0.07	68	2.530	1.216

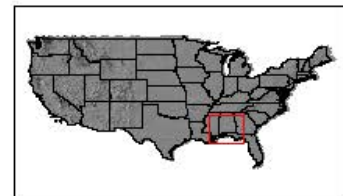
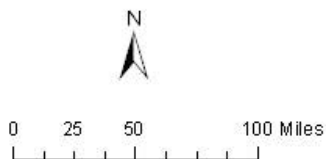
Storm 1305- March 11-16, 1929												
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)												
area (mi sq)	Duration (hours)											
	1	3	6	12	18	24	36	48	72	96	120	Total
0.3	2.58	6.22	10.64	13.65	17.07	20.08	22.99	27.81	29.72	29.73	29.73	29.73
1	2.5	6.07	10.39	13.33	16.67	19.6	22.44	27.13	29.07	29.07	29.07	29.07
10	2.5	6.07	10.39	13.33	16.67	19.6	22.44	27.13	29.07	29.07	29.07	29.07
25	2.5	6.07	10.39	13.33	16.67	19.6	22.44	27.13	29.07	29.07	29.07	29.07
50	2.5	6.07	10.39	13.33	16.67	19.6	22.44	27.13	29.07	29.07	29.07	29.07
100	2.5	5.96	10.18	13.02	16.23	19.14	21.95	26.73	28.66	28.71	28.77	28.77
150	2.5	5.82	9.95	12.7	15.82	18.68	21.42	26.17	27.76	28.16	28.24	28.24
200	2.5	5.69	9.73	12.25	15.39	18.2	20.92	25.71	27.63	27.71	27.72	27.72
300	2.5	5.44	9.3	11.86	14.85	17.51	20.16	24.69	26.6	26.64	26.73	26.73
400	2.48	5.33	8.91	11.42	14.27	16.73	19.24	23.82	25.72	25.85	25.87	25.87
500	2.46	5.26	8.14	11.1	13.35	16.07	19.03	23.02	24.77	24.77	25.2	25.2
1000	2.37	5.07	7.67	10.26	12.21	14.87	16.87	20.41	22.5	22.5	23.61	23.61
2000	2.23	4.75	7.27	9.53	10.7	13.2	14.19	16.62	20.55	20.99	21.16	21.16
5000	1.85	4	6.22	8.51	9.58	11.63	13.07	15.82	18.5	18.52	19.1	19.1
10000	1.45	3.1	5.35	7.54	7.93	10.29	11.44	14.22	16.59	16.84	17.02	17.02
20000	0.76	2.42	3.92	5.56	6.38	7.26	9.47	10.86	12.8	14.2	14.3	14.3
50000	0.37	1.01	2.27	3.49	4.67	5.04	7.22	8.01	9.25	9.25	10.82	10.82
100000	0.3	0.82	1.35	2.14	3.09	3.66	5.39	5.87	7.77	8.04	8.04	8.04







Total 6-day Precipitation (inches)
Mar 11-16, 1929
Elba, AL Storm
SPAS #1305



Inches

1.78 - 2.00	7.01 - 8.00	13.01 - 14.00	19.01 - 20.00	25.01 - 26.00	◆ Daily	□ Hourly est.
2.01 - 3.00	8.01 - 9.00	14.01 - 15.00	20.01 - 21.00	26.01 - 27.00	◇ Daily est.	◆ Supplemental
3.01 - 4.00	9.01 - 10.00	15.01 - 16.00	21.01 - 22.00	27.01 - 28.00	× Daily omitted	◇ Supplemental est.
4.01 - 5.00	10.01 - 11.00	16.01 - 17.00	22.01 - 23.00	28.01 - 29.00	■ Hourly	+ Supplemental omitted
5.01 - 6.00	11.01 - 12.00	17.01 - 18.00	23.01 - 24.00	29.01 - 30.00		
6.01 - 7.00	12.01 - 13.00	18.01 - 19.00	24.01 - 25.00			

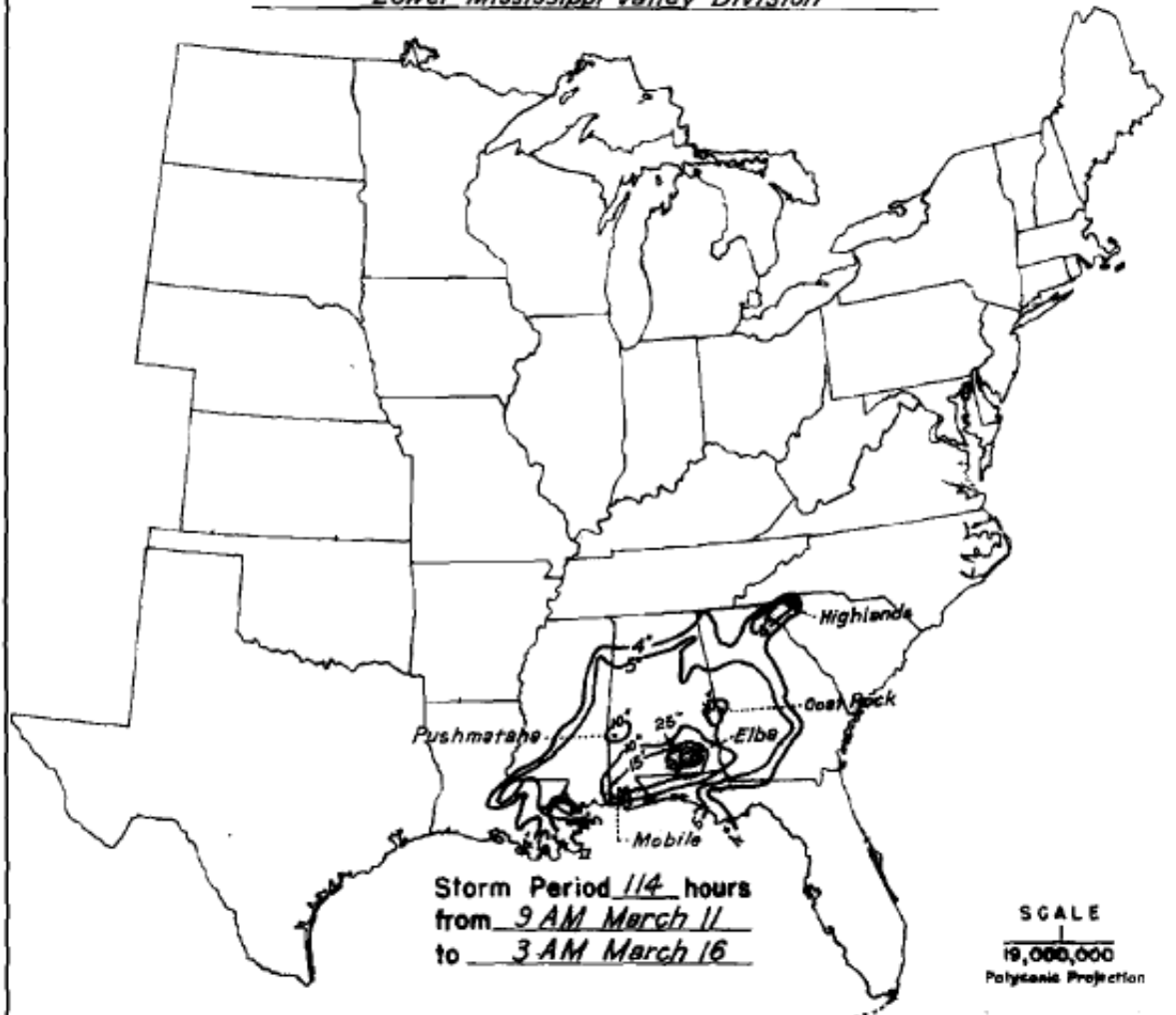
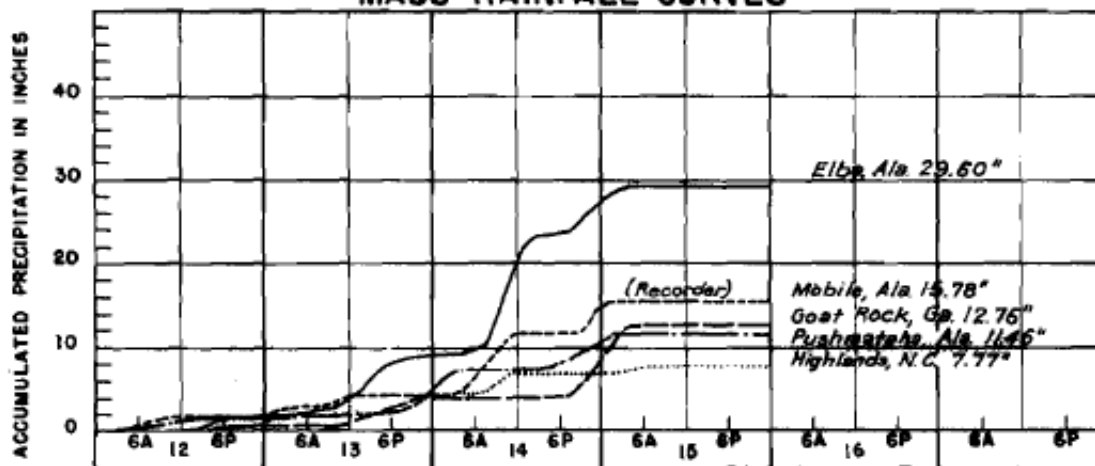
TWP Oct 30, 2013

Als.

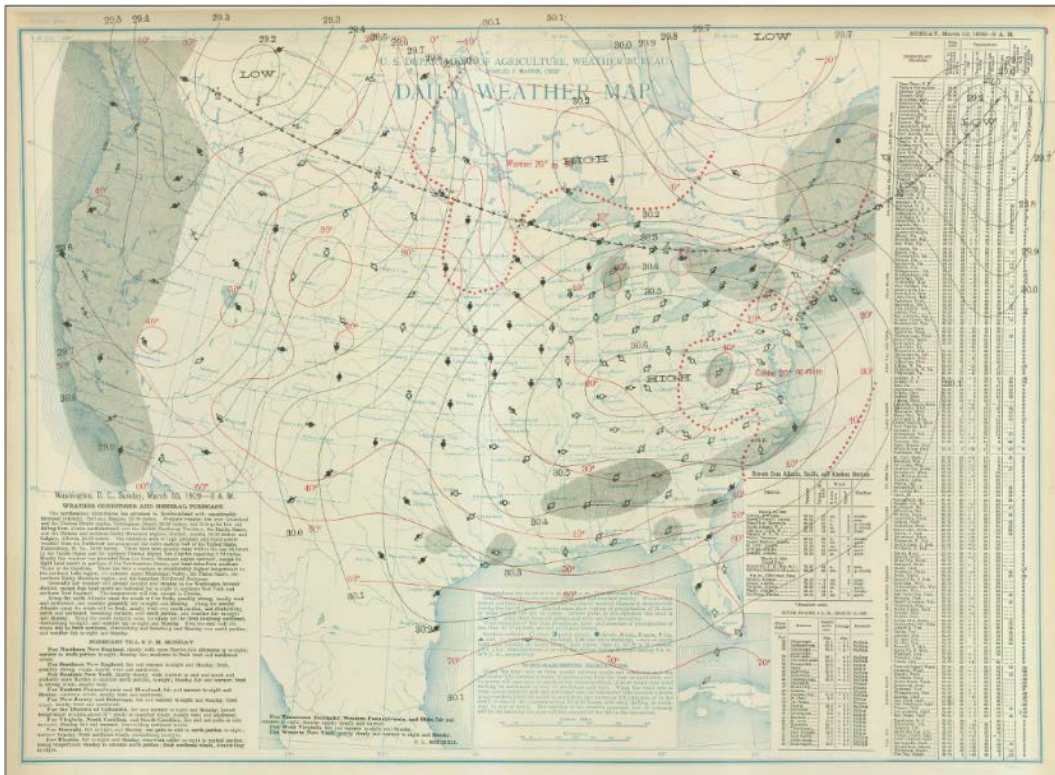
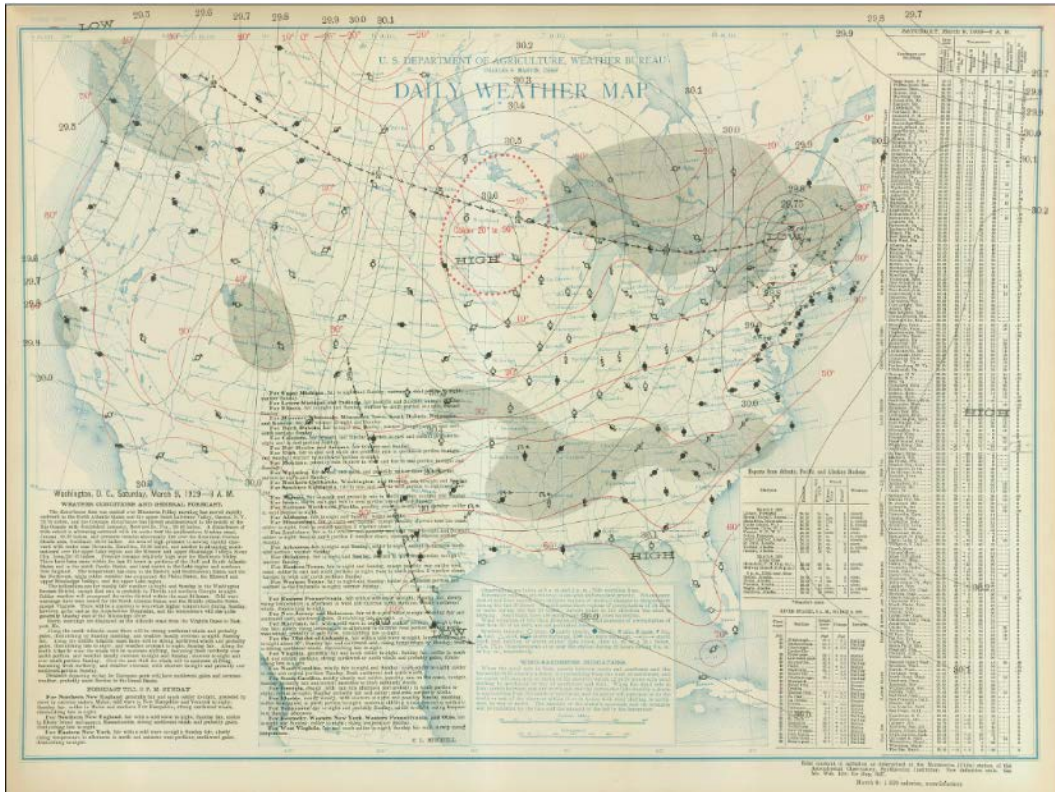
Area in Sq. Mi.	Duration of Rainfall in Hours										
	6	12	18	24	30	36	48	60	72	96	144
10	14.0	15.4	19.5	20.0	21.4	23.8	27.4	28.0	29.6	29.6	29.6
100	13.6	14.9	18.9	19.3	20.7	22.9	26.1	26.6	28.4	28.4	28.4
200	13.1	14.4	18.3	18.6	20.0	22.2	25.5	26.0	27.6	27.6	27.6
500	11.6	13.2	16.7	17.2	18.3	20.2	24.0	24.7	26.1	26.1	26.1
1,000	10.2	11.8	15.4	16.1	17.0	18.6	22.1	22.9	24.4	24.6	24.6
2,000	8.9	10.4	14.1	15.0	15.7	17.0	20.0	20.8	22.3	22.5	22.5
5,000	7.1	8.6	12.2	13.5	13.9	14.8	17.3	18.1	19.4	19.7	19.7
10,000	5.6	7.2	10.1	12.1	12.5	13.1	15.2	15.9	17.1	17.5	17.5
20,000	3.8	5.4	7.9	9.6	10.1	11.0	12.5	13.3	14.3	14.7	14.7
50,000	2.5	3.6	5.3	6.3	7.1	7.9	8.9	9.7	10.5	10.8	10.8
100,000	1.6	2.4	3.5	4.3	5.0	5.6	6.5	7.2	7.8	8.2	8.2

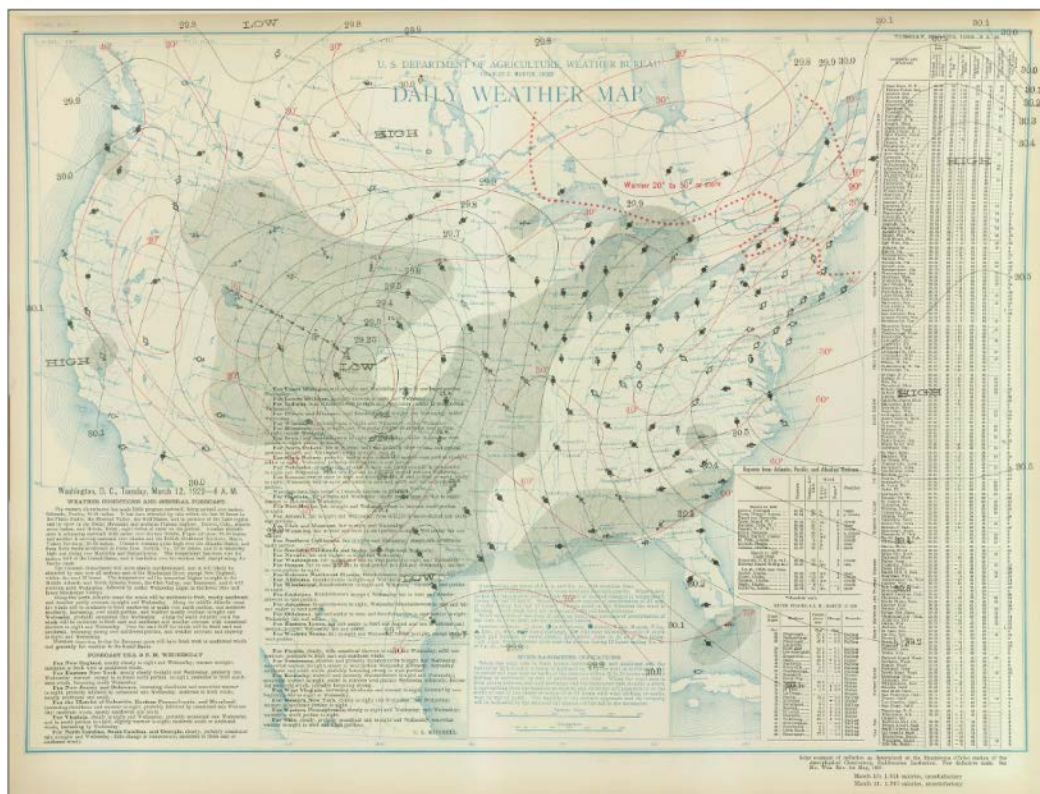
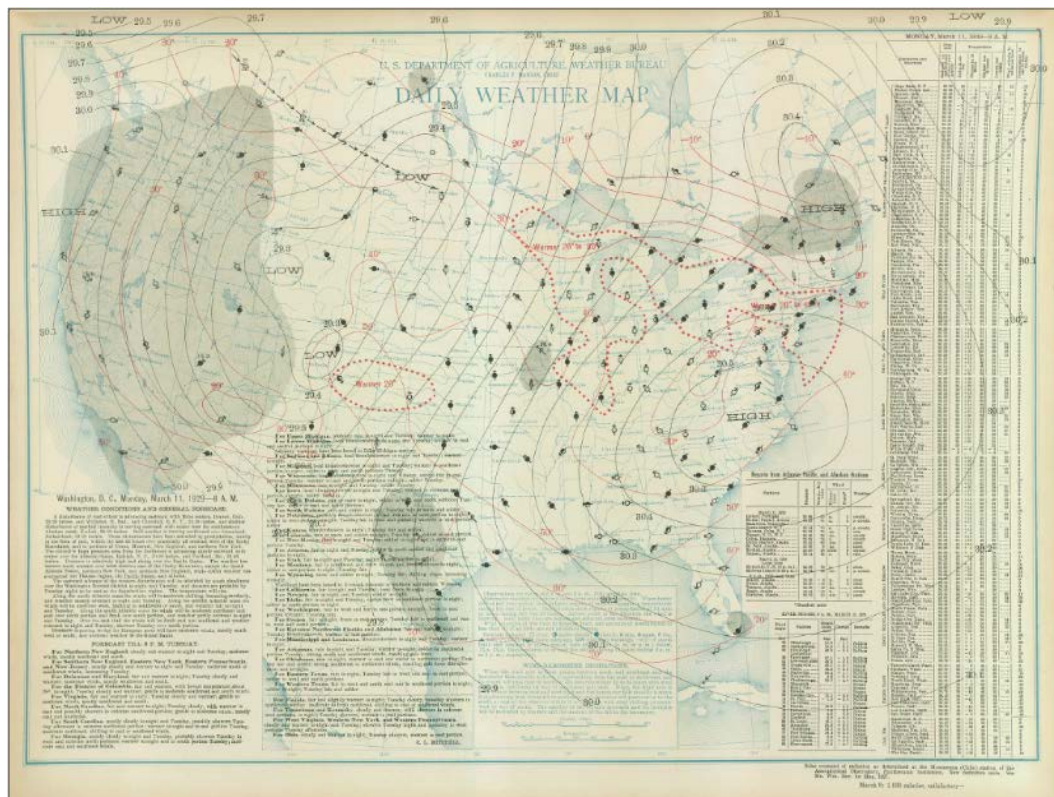
WAR DEPARTMENT

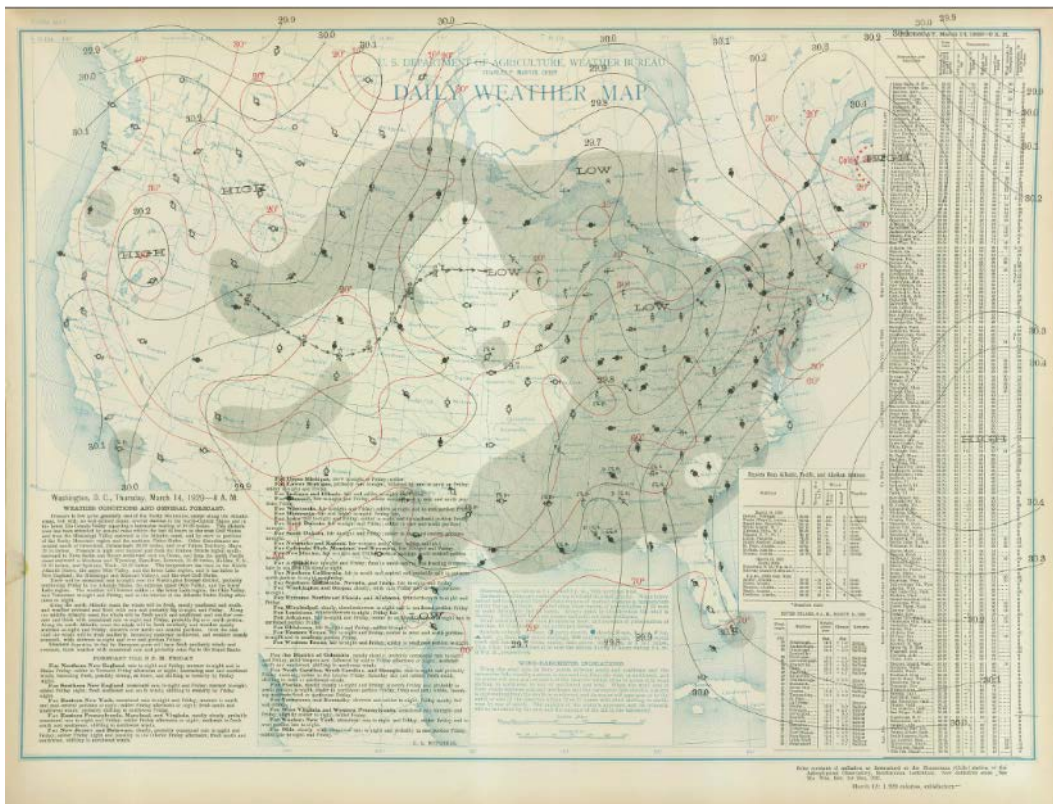
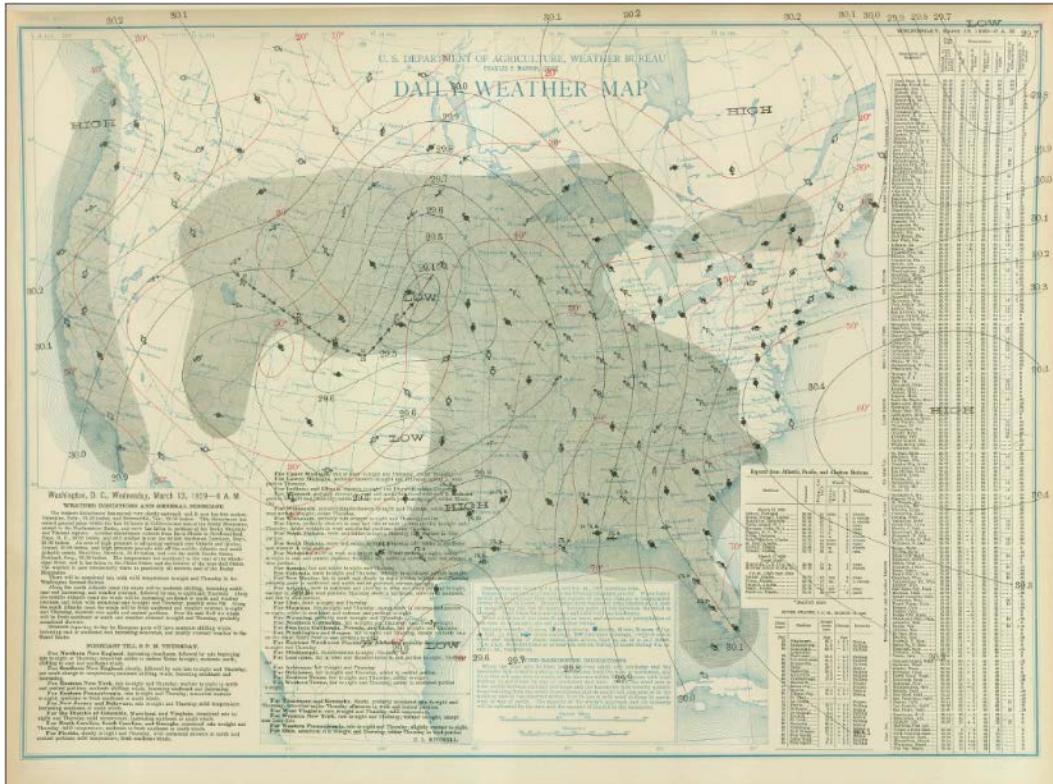
CORPS OF ENGINEERS, U. S. ARMY

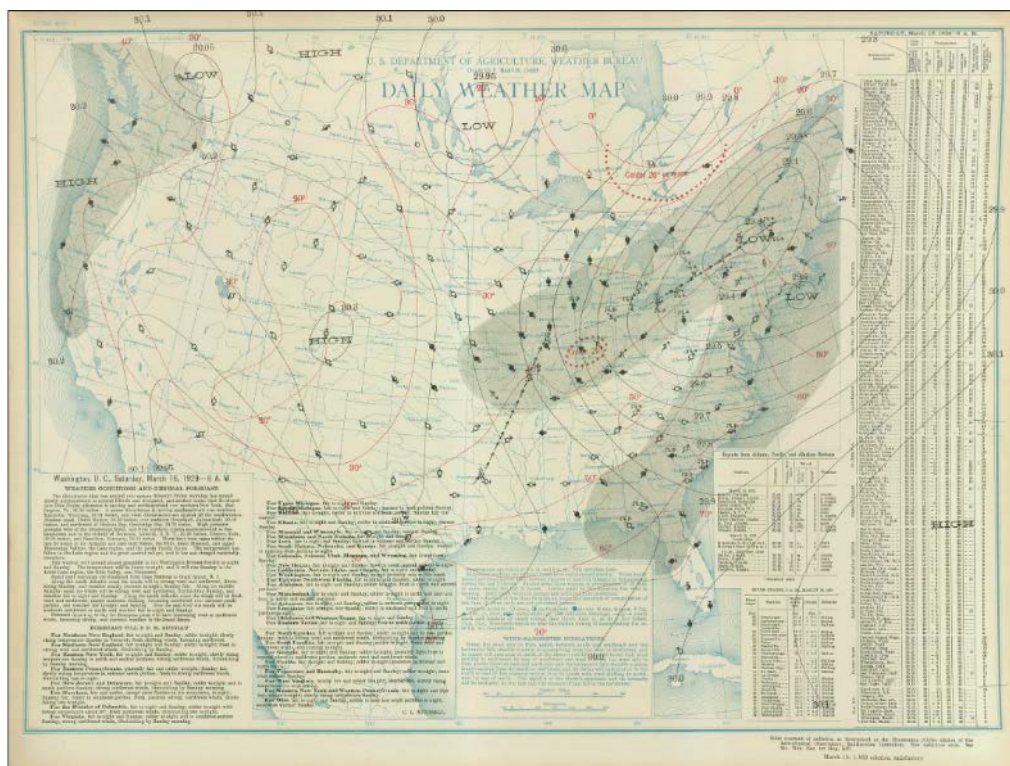
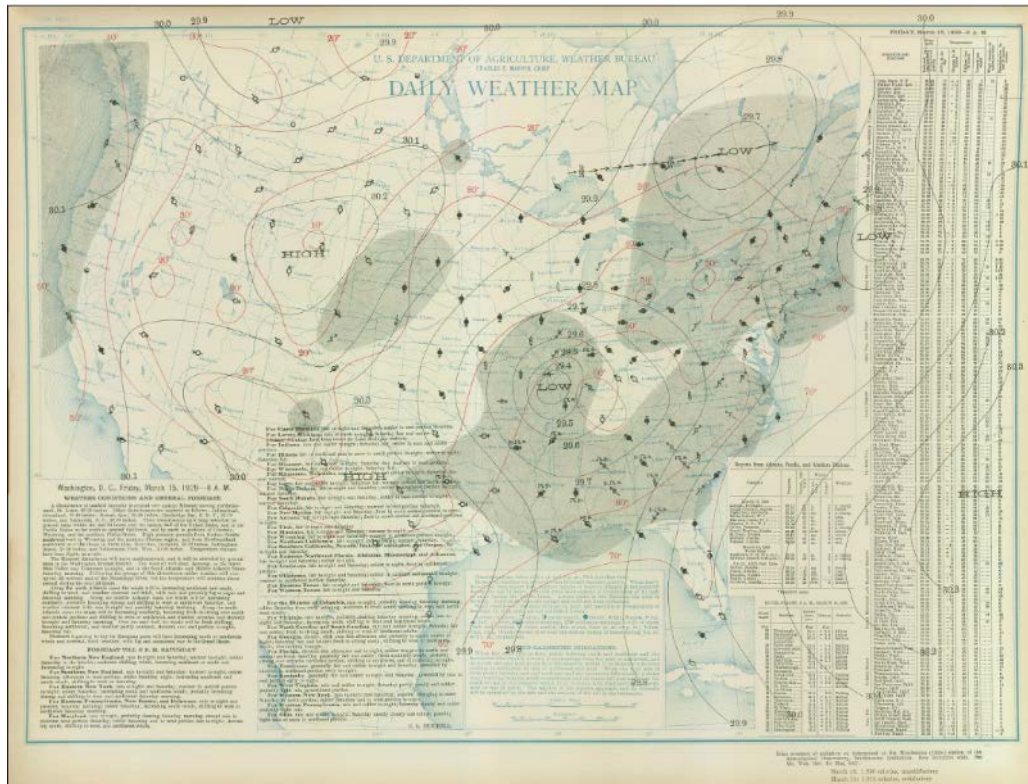
STORM STUDIES - ISOHYETAL MAPStorm of March 11-16, 1929 Assignment LMV 2-20Study Prepared by: Vicksburg, Miss. District
Lower Mississippi Valley Division**MASS RAINFALL CURVES**

FORM S-3E





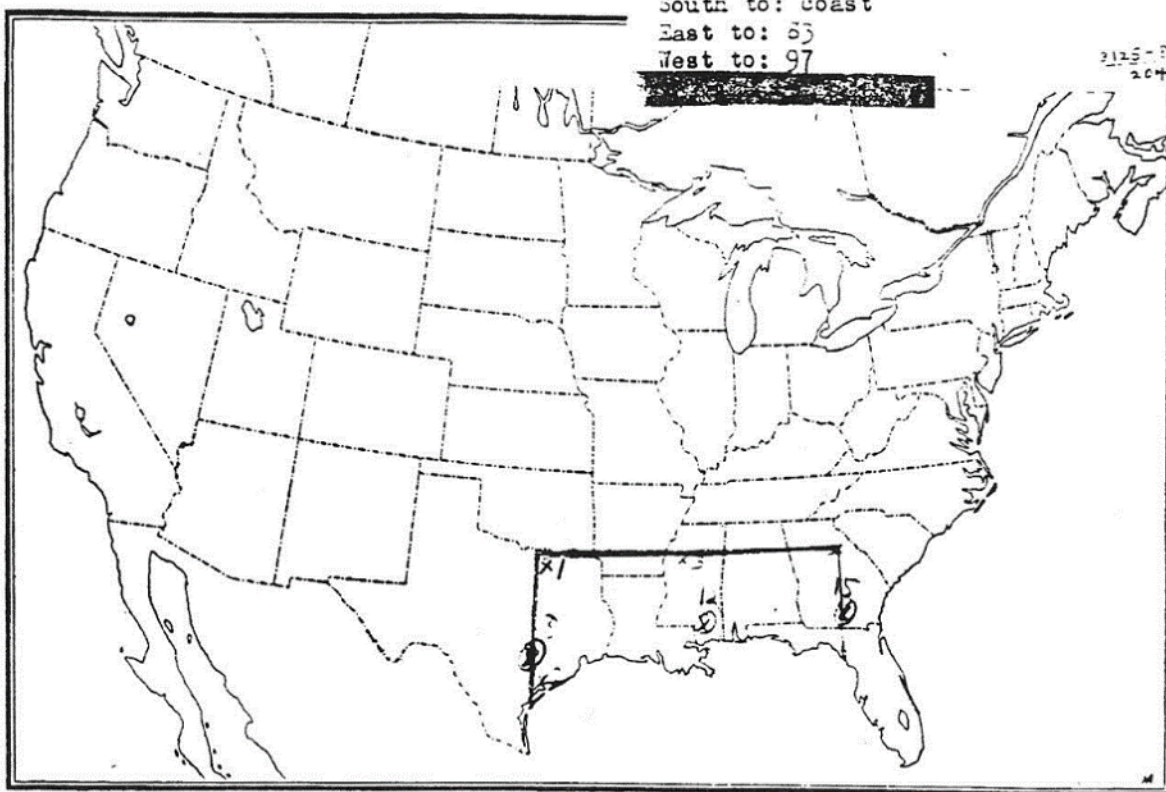




16.

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 Lawton, Okla.
May 25-30	GM 4-26	76	190 SSE of Kenly, 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	NA 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.

LEV 2-20...Mar. 11-16, 1929...Elba, Ala.
12-hr. rfd b7(14th)...75 S..to 75, 34.6
North to: 34
South to: coast
East to: 53
West to: 97



Storm Precipitation Analysis System (SPAS) For Storm #1587_1

General Storm Location: Prairieview, NM

Storm Dates: May 21-26, 1941

Event: Mid-latitude cyclone

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

Basemap: Mean annual maximum 48-hour precipitation associated with MLCs

Spatial resolution: 0.2735

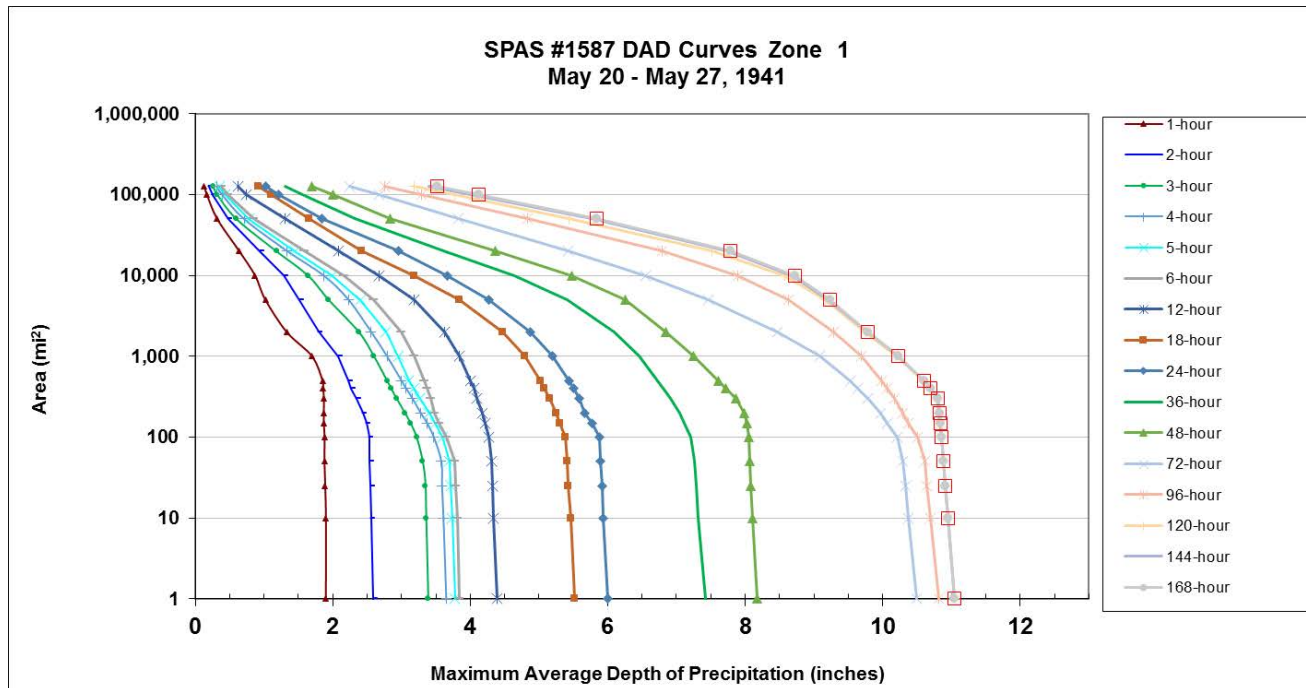
Radar Included: No

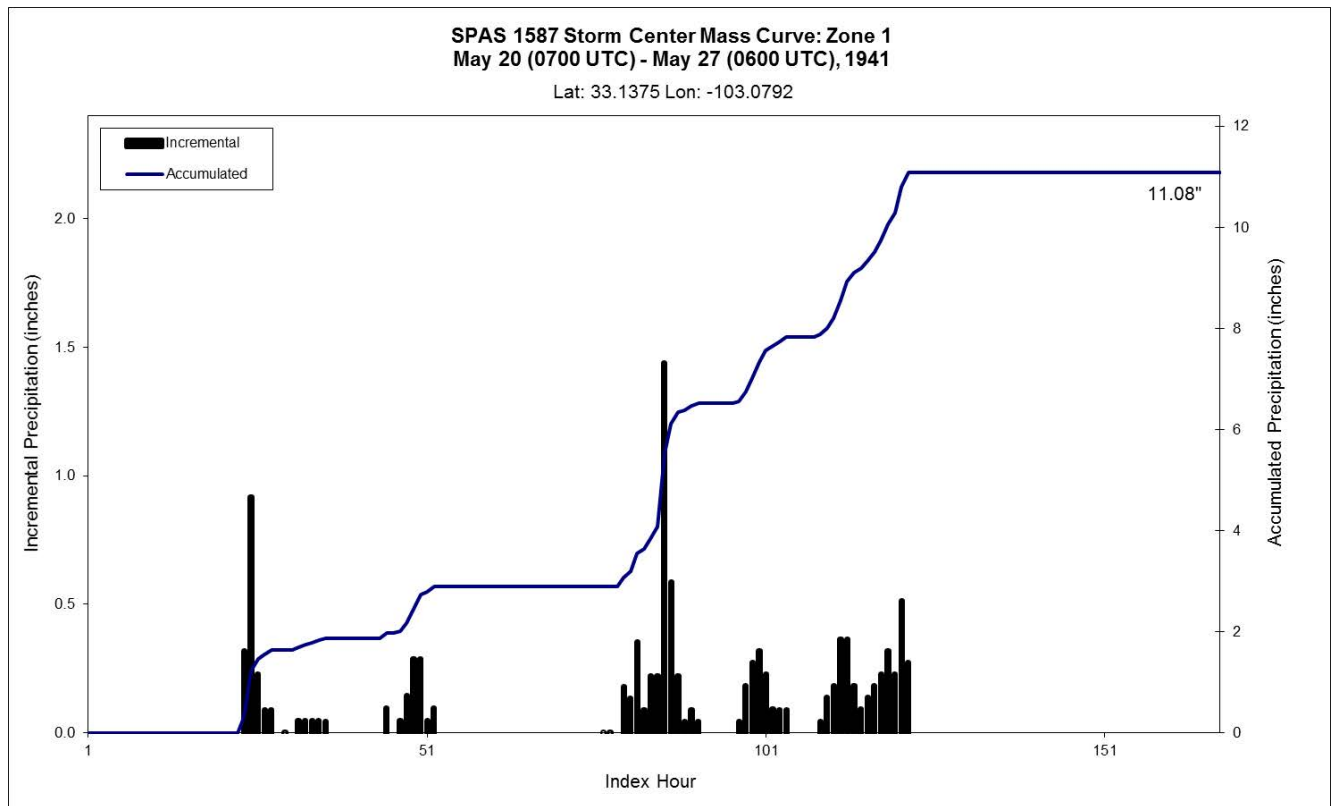
Depth-Area-Duration (DAD) analysis: Yes

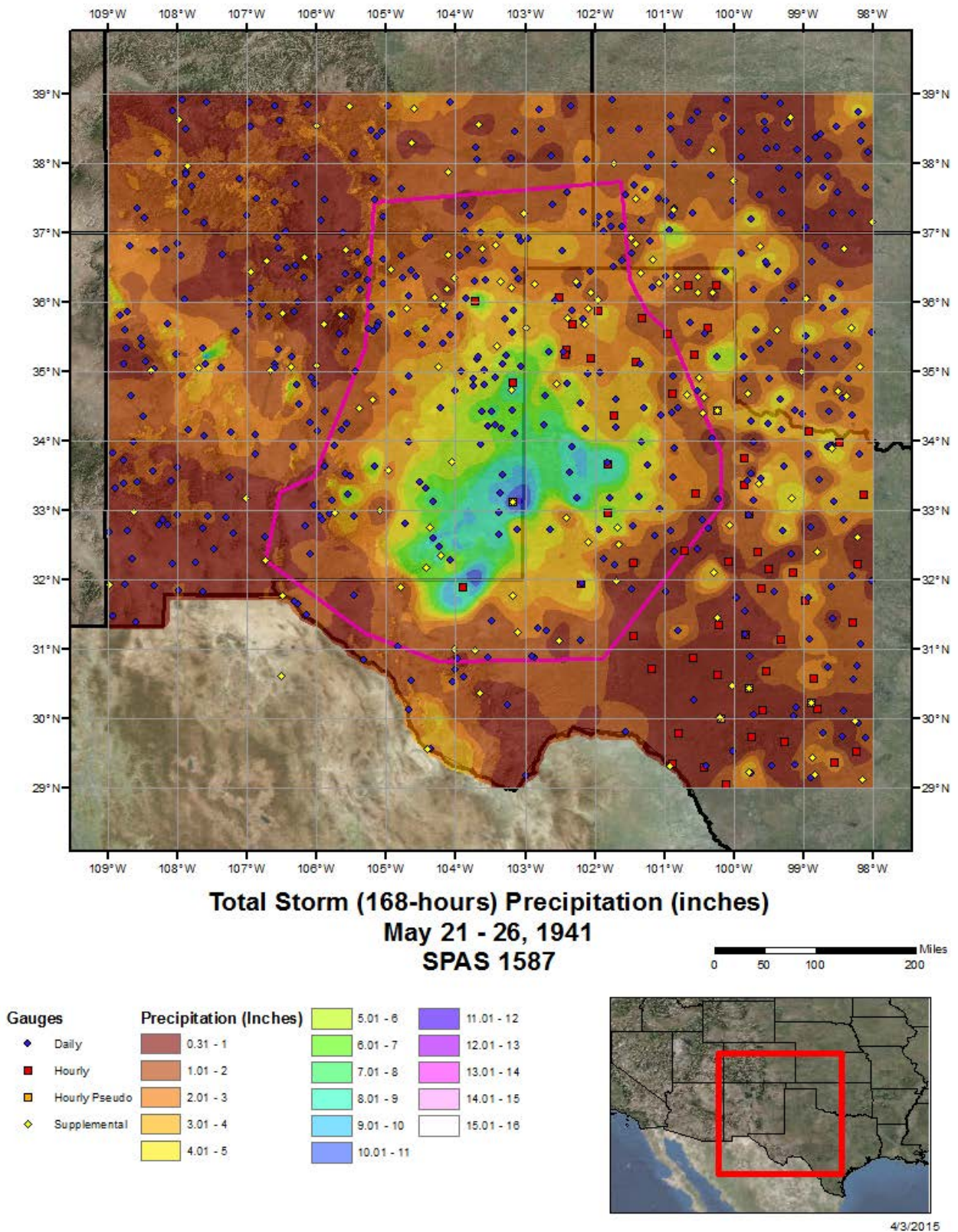
Reliability of results: In addition to the NCDC stations, there were also four hourly stations added via digitizing some of the stations listed in the ACE report. With the density of stations available for this storm and with how closely the resulting SPAS analysis was to the ACE report, this analysis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

					Storm Rep. Dew Point					Climatological Max. Dew Point						
SPAS Storm ID	LON	LAT	ELEV	ELEV Round	T _d	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	T _d	T _d Round	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	IPMF
1587_1	-103.079	33.138	3,800	3,800	71.00	2.36	0.75	64	1.610	78.77	79.0	3.44	0.99	80	2.450	1.500

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	11.08	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	11.05	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	10.95	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	10.91	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
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
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
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
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
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







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:

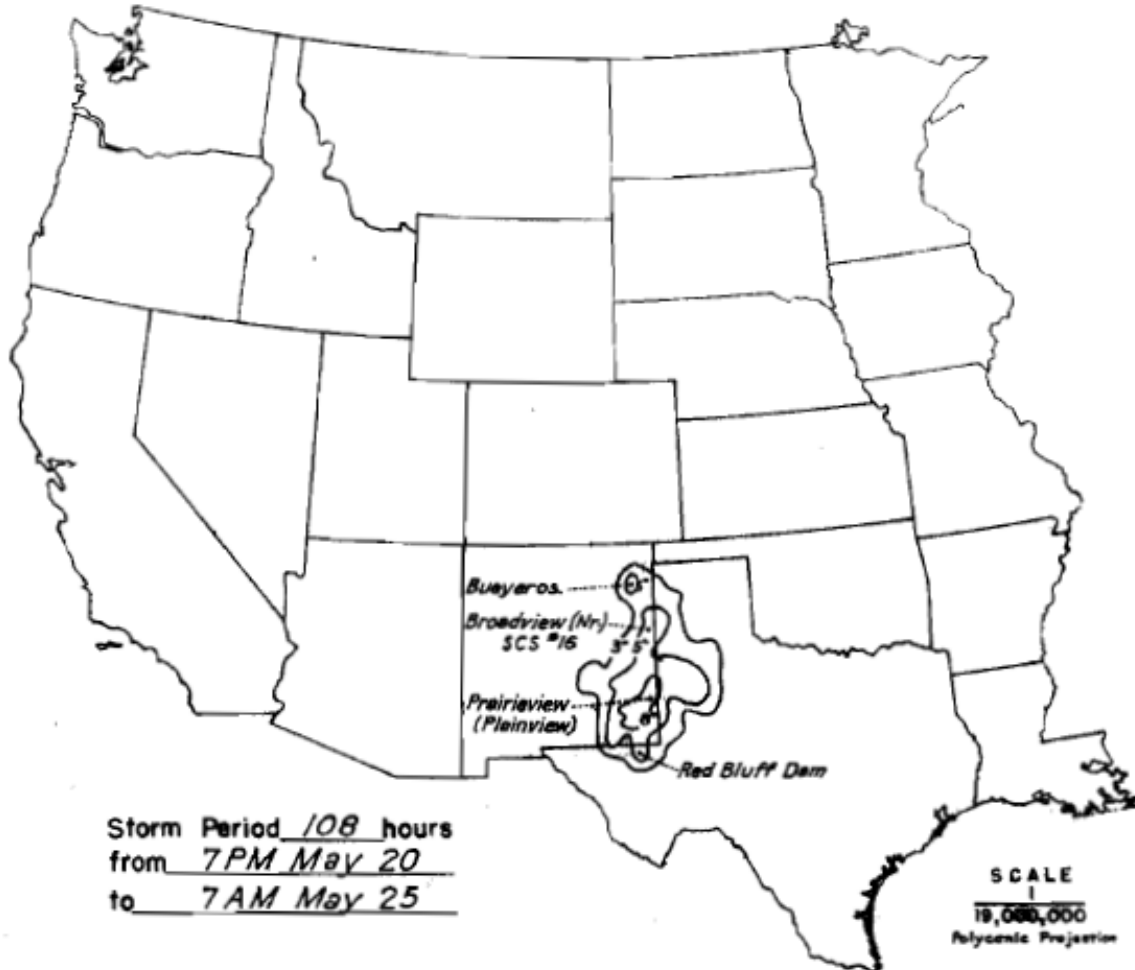
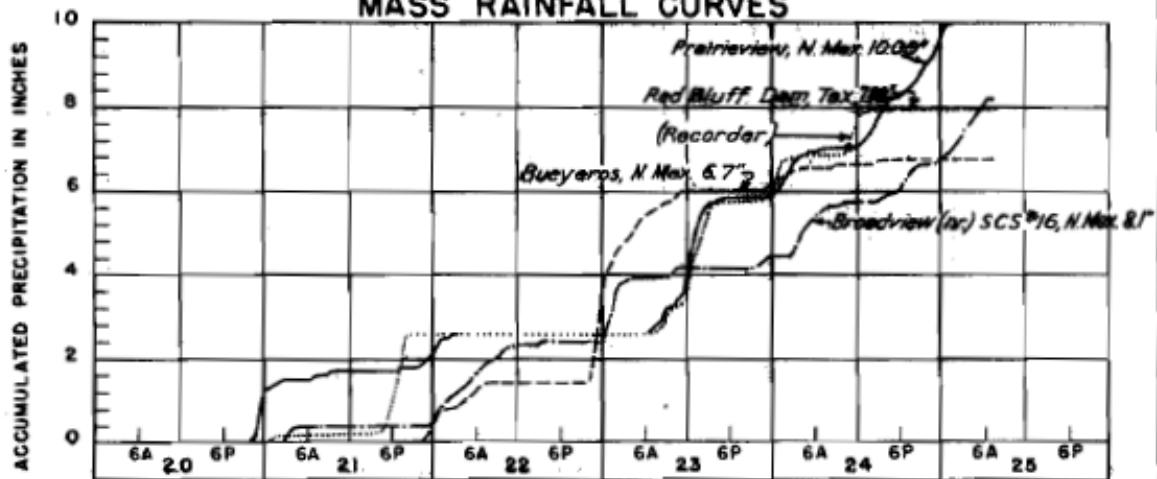
Form S-10 (Data from mass rainfall curves)-----	4
Form S-11 (Depth-area data from isohyetal map)-----	2
Form S-12 (Maximum depth-duration data)-----	15
Maximum duration-depth-area curves-----	1
Data relating to periods of maximum rainfall-----	2

MAXIMUM AVERAGE DEPTH OF RAINFALL IN INCHES

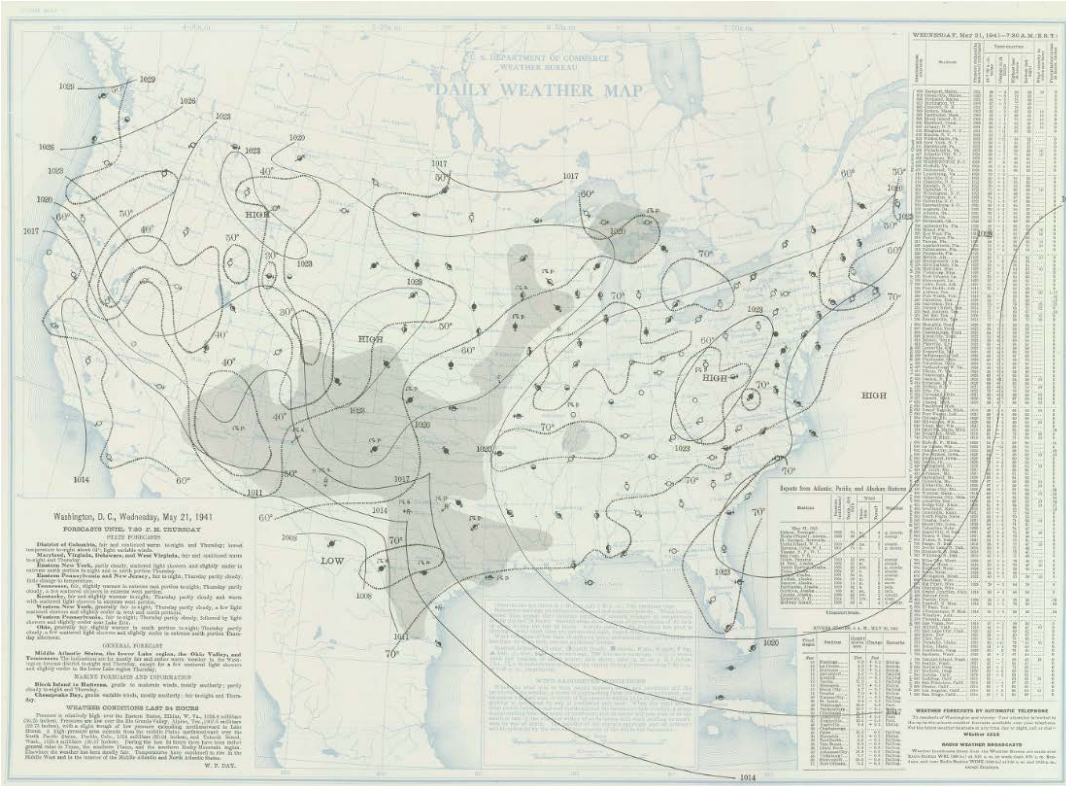
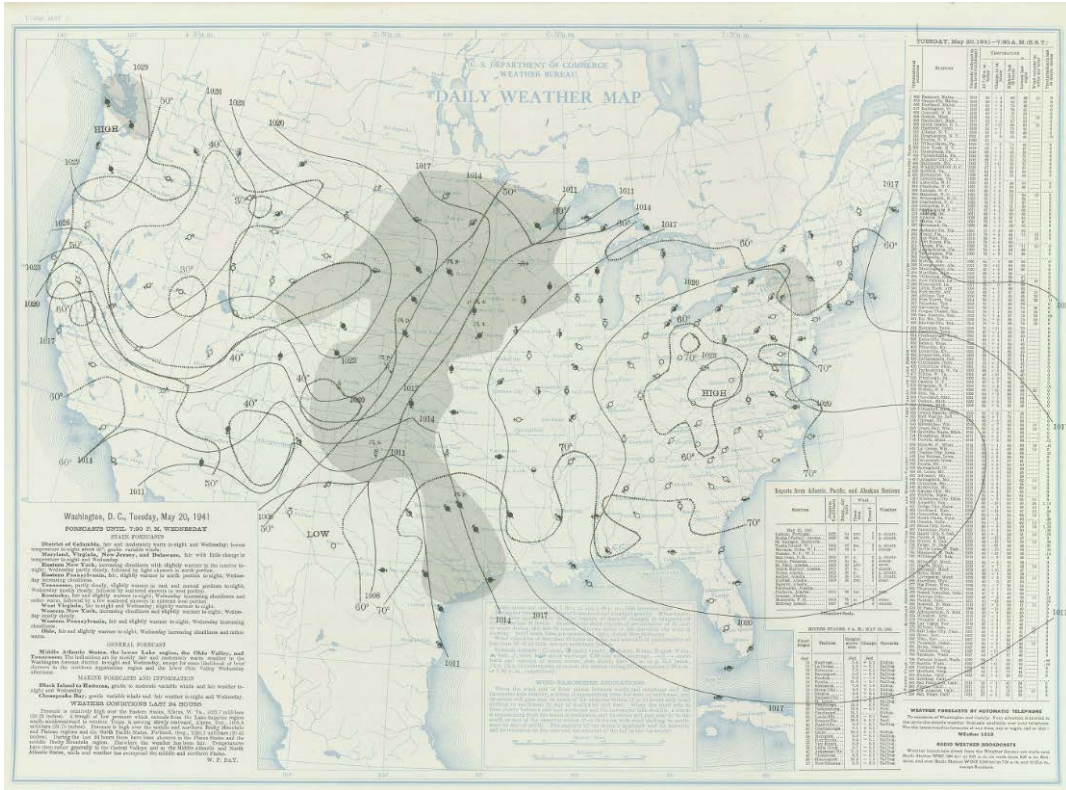
Area in Sq. Mi.	Duration of Rainfall in Hours										
	6	12	18	24	30	36	48	60	72	96	108
10	3.8	4.8	6.0	6.5	6.9	7.0	7.4	7.4	8.4	9.3	10.0
100	3.0	4.0	5.2	6.3	6.7	6.8	6.9	7.0	8.1	9.0	9.6
200	2.7	3.7	4.7	6.0	6.4	6.6	6.7	6.9	8.0	8.8	9.5
500	2.3	3.3	4.1	5.4	5.8	6.1	6.4	6.7	7.7	8.6	9.2
1,000	2.1	3.0	3.7	4.9	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

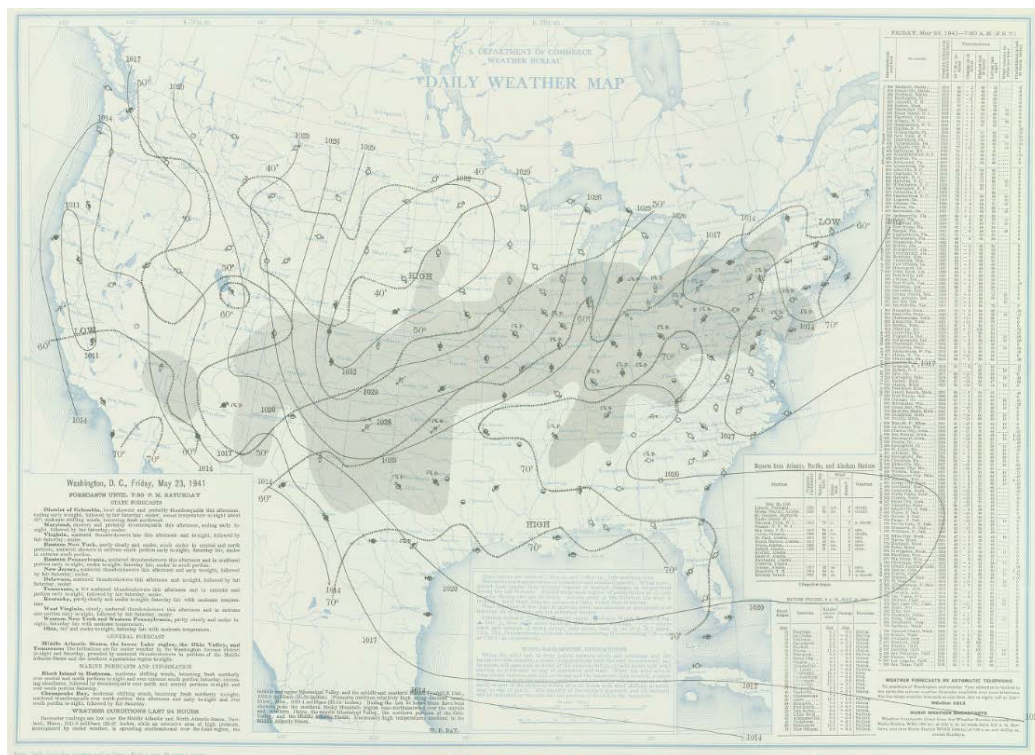
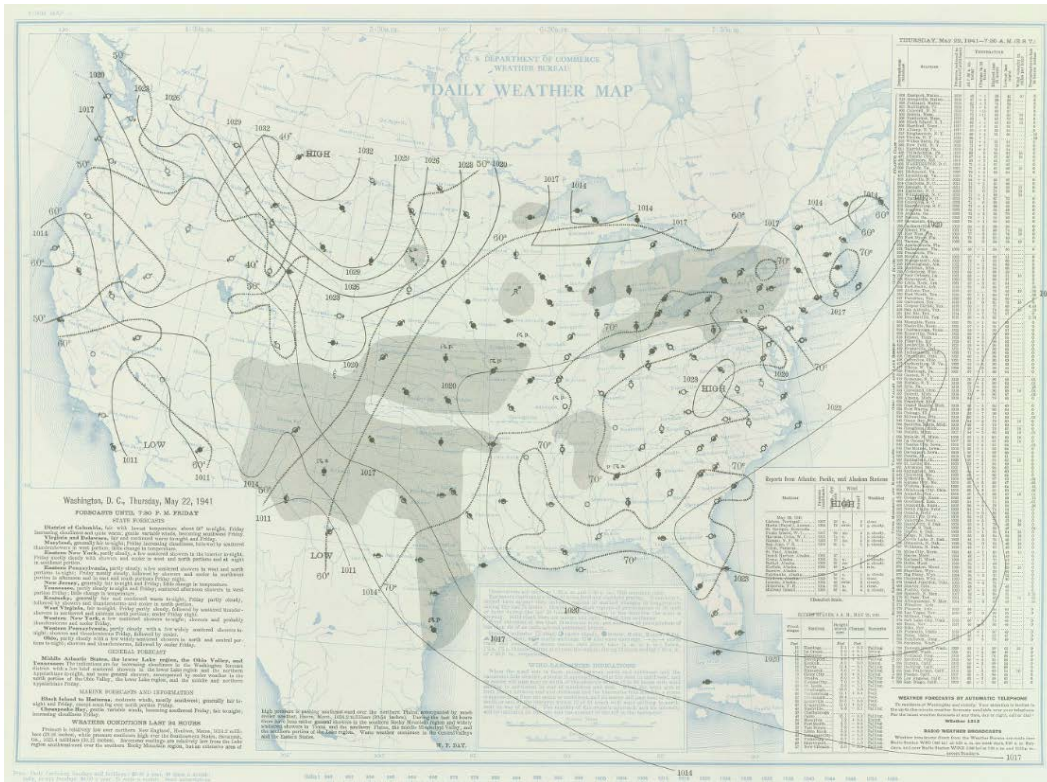
WAR DEPARTMENT

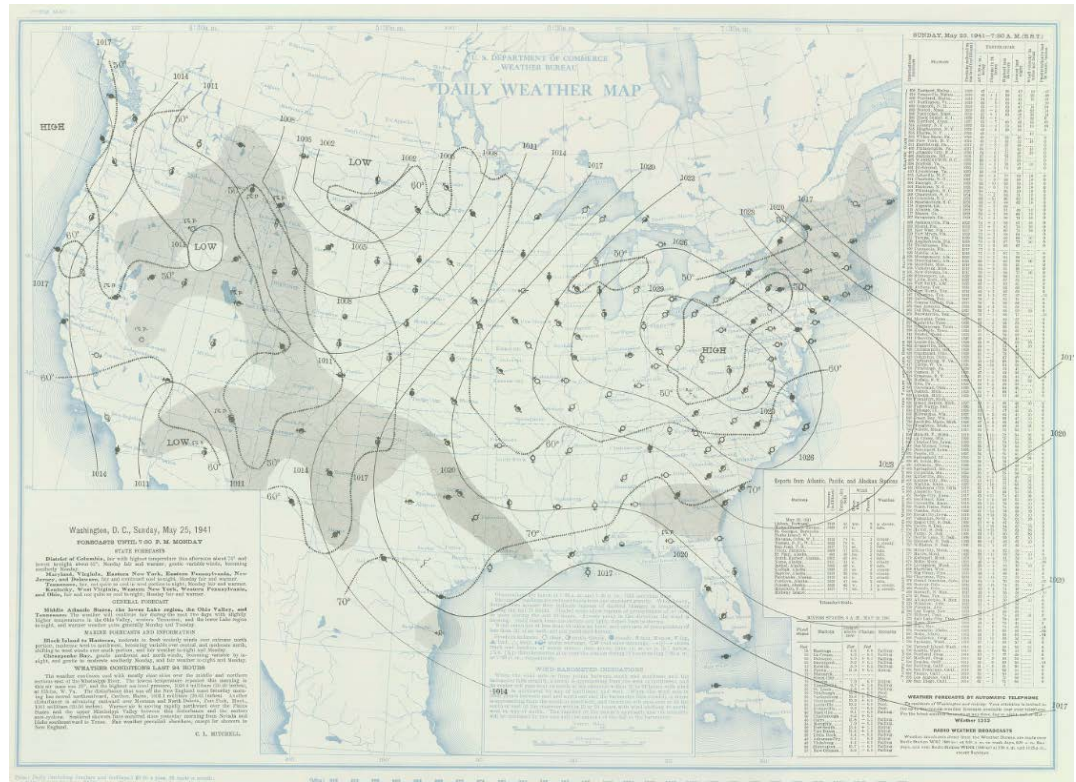
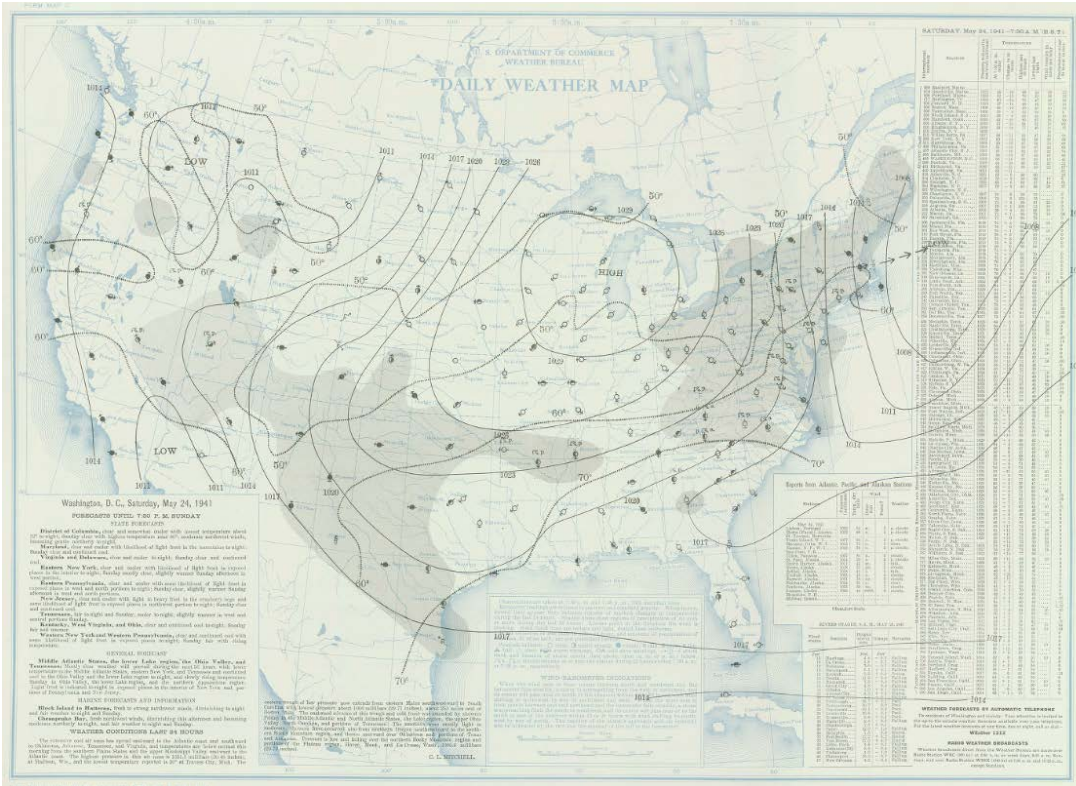
CORPS OF ENGINEERS, U. S. ARMY

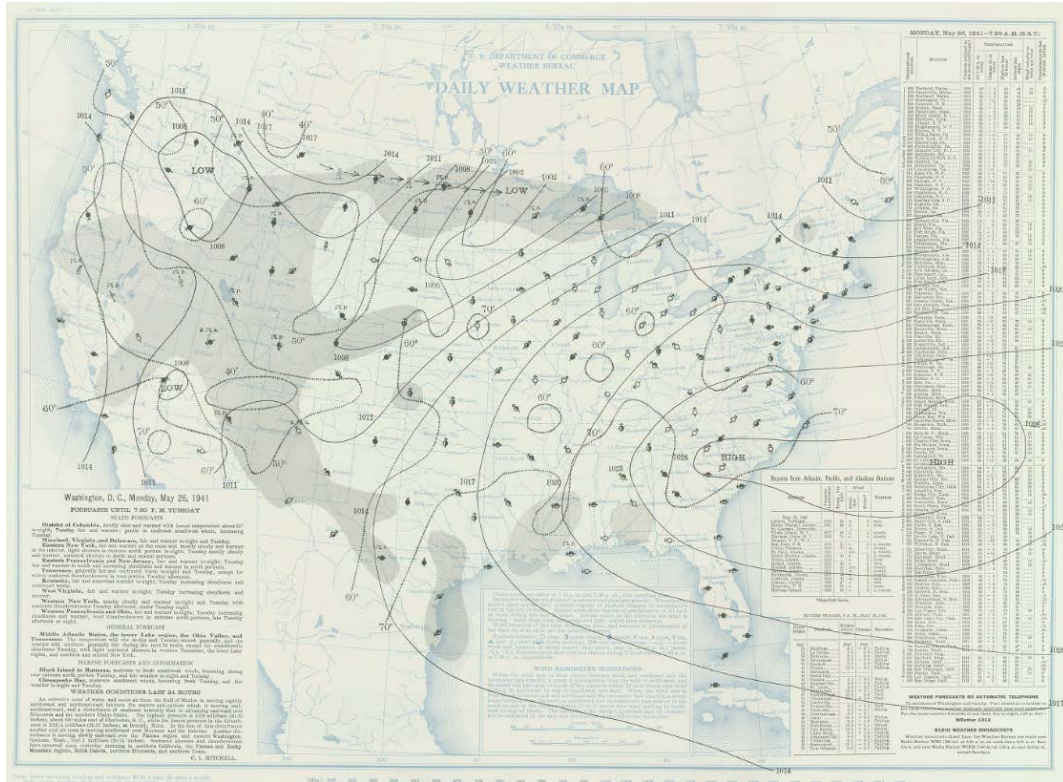
STORM STUDIES - ISOHYETAL MAPStorm of May 20-25, 1941 Assignment GM 5-18Study Prepared by: Galveston, Tex., District
Southwestern Division**MASS RAINFALL CURVES**

FORM 8-3W

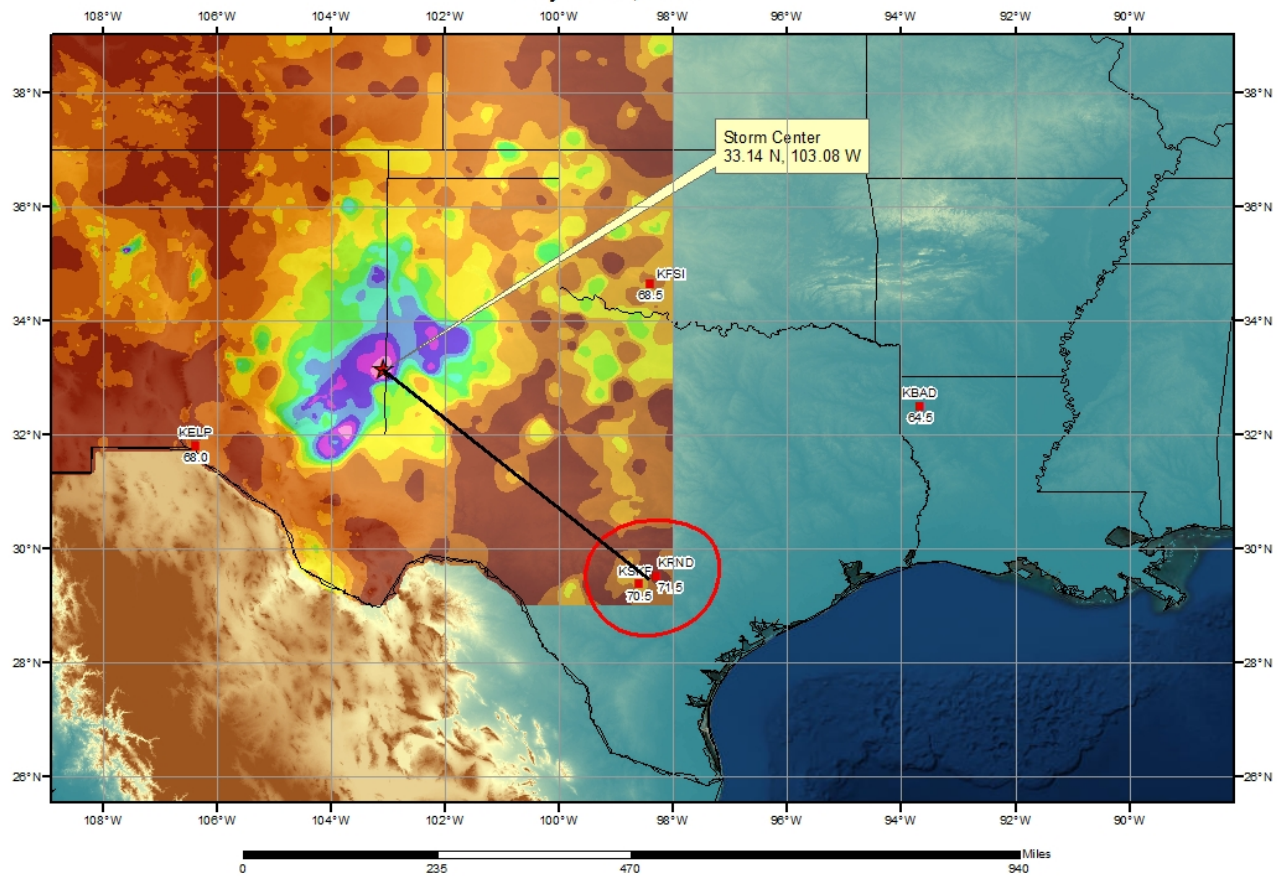








SPAS 1587 Prairieview, NM Storm Analysis May 22-25, 1941



Storm Precipitation Analysis System (SPAS) For Storm #1486_1

General Storm Location: Dave 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

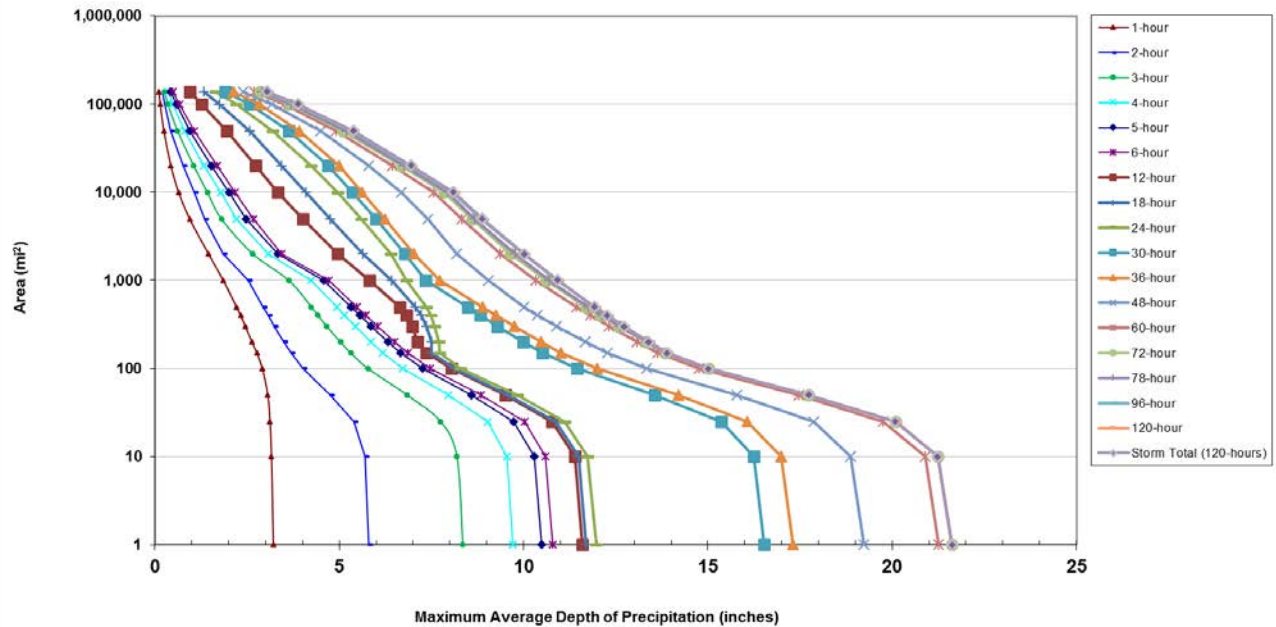
Depth-Area-Duration (DAD) analysis: Yes

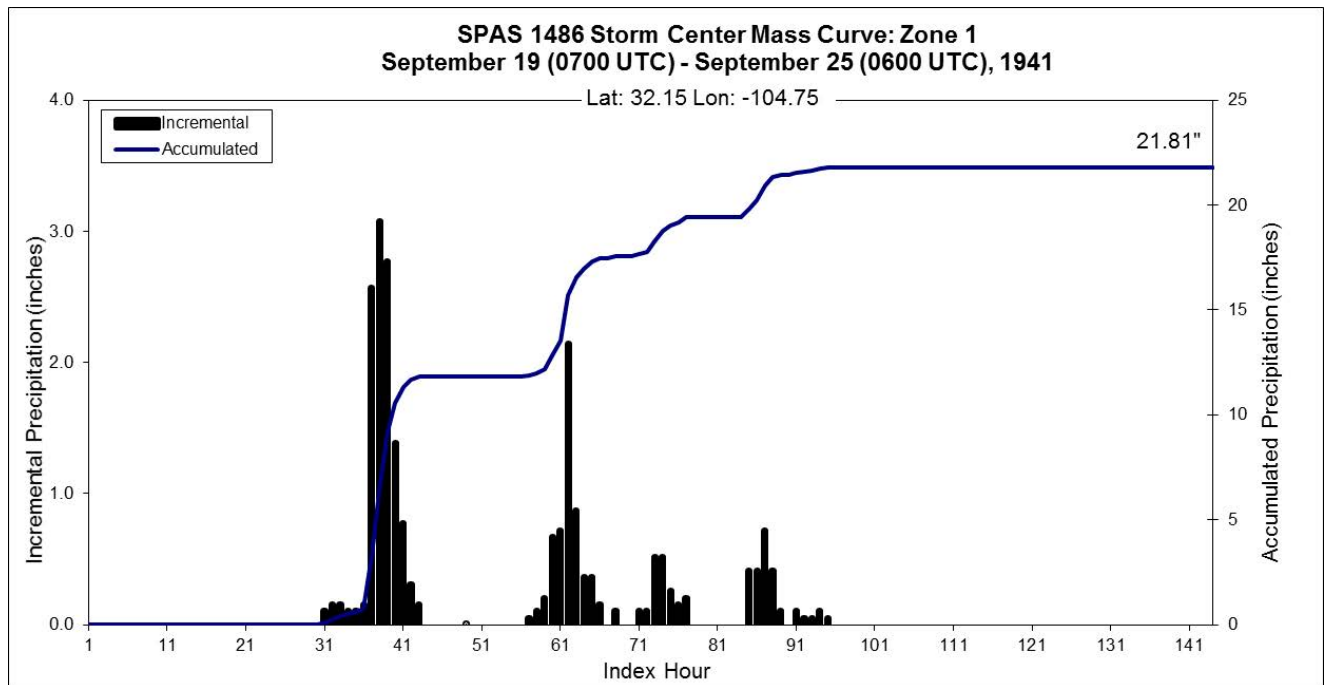
SPAS Storm ID	LON	LAT	ELEV	ELEV Round	Storm Rep. Dew Point					Climatological Max. Dew Point						IPMF
					T _d	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	T _d	T _d Round	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	
1486_1	-104.746	32.146	5,840	6,000	74.00	2.73	1.22	70	1.510	77.95	78.0	3.29	1.41	78	1.880	1.245

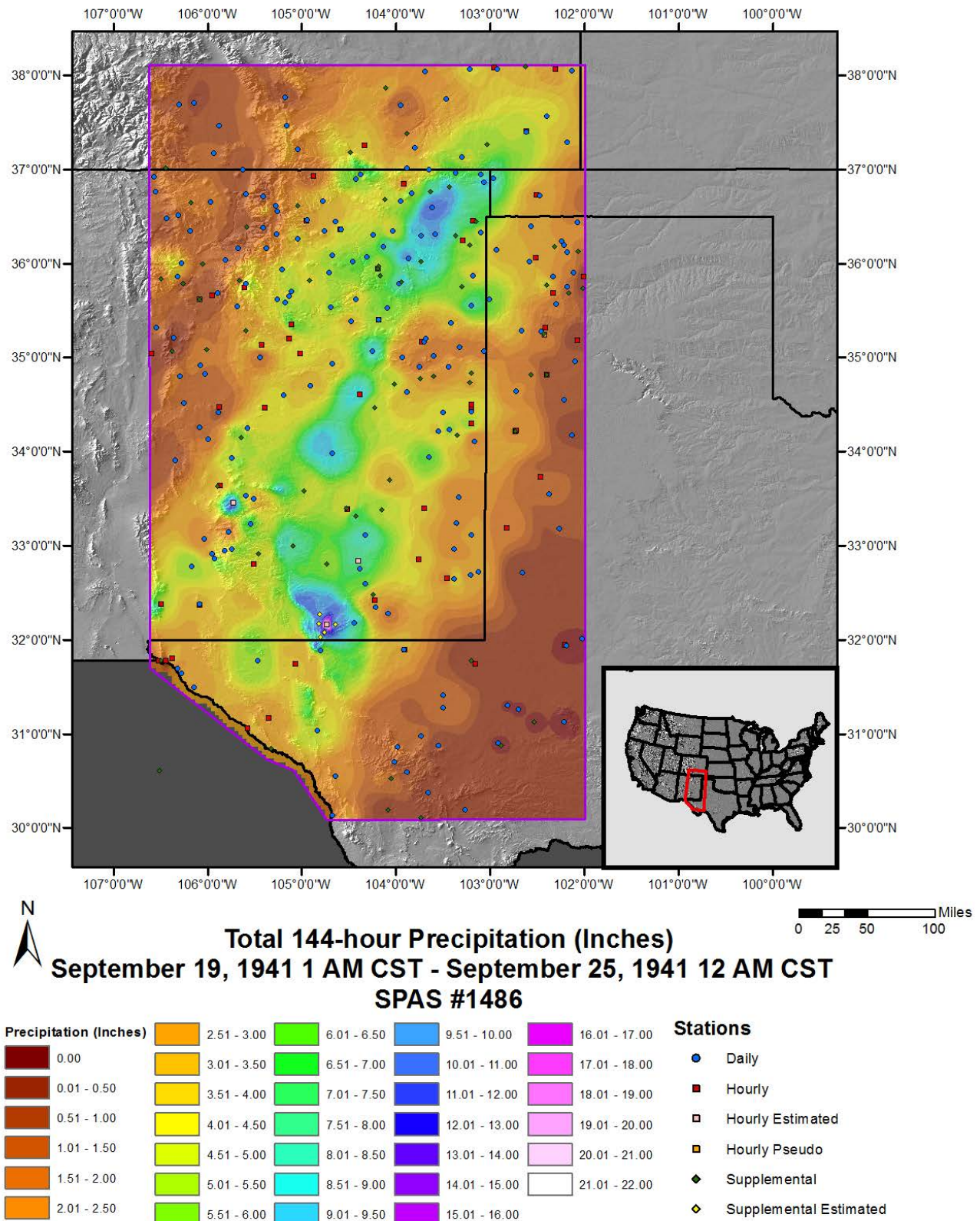
Storm 1486 Zone 1 - Sep 19 (0700 UTC) - Sep 25 (0600 UTC), 1941
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)

	Duration (hours)																	
areasqmi	1	2	3	4	5	6	12	18	24	30	36	48	60	72	78	96	120	Total
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	21.75	21.75	21.75	21.75	21.75
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	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	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	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	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	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	13.86	13.89	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	13.33	13.39	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	12.61	12.71	12.72	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	12.13	12.26	12.27	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	11.76	11.91	11.93	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	10.70	10.91	10.93	10.93
2,000	1.45	1.85	2.65	3.08	3.33	3.43	4.95	5.64	6.40	6.79	7.02	8.18	9.37	9.65	9.76	9.99	10.01	10.01
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	8.67	8.85	8.88	8.88
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	7.94	8.07	8.10	8.10
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	6.76	6.89	6.95	6.95
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	5.20	5.33	5.38	5.38
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	3.70	3.81	3.88	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	2.92	3.00	3.05	3.05

SPAS #1486 DAD Curves Zone 1
September 19 - 25, 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	

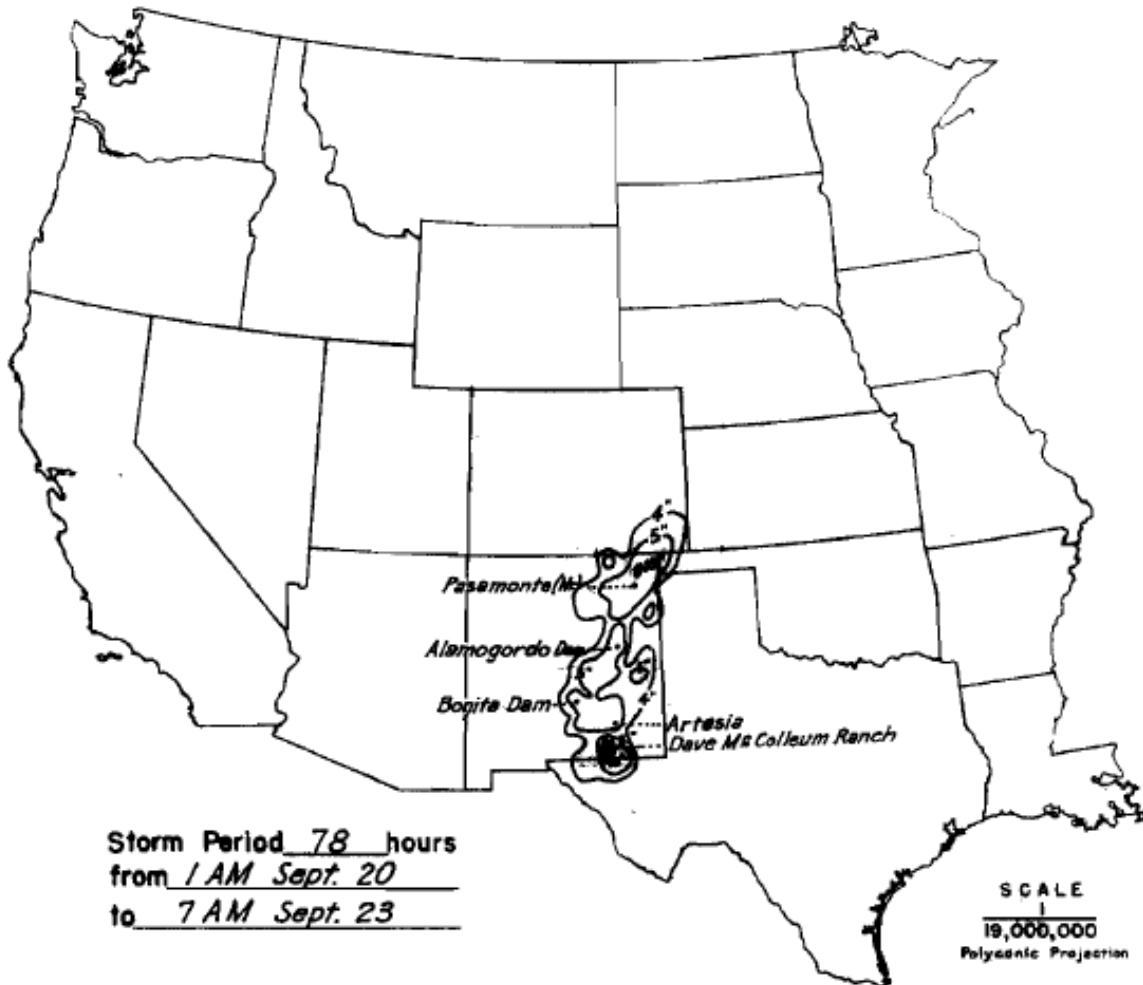
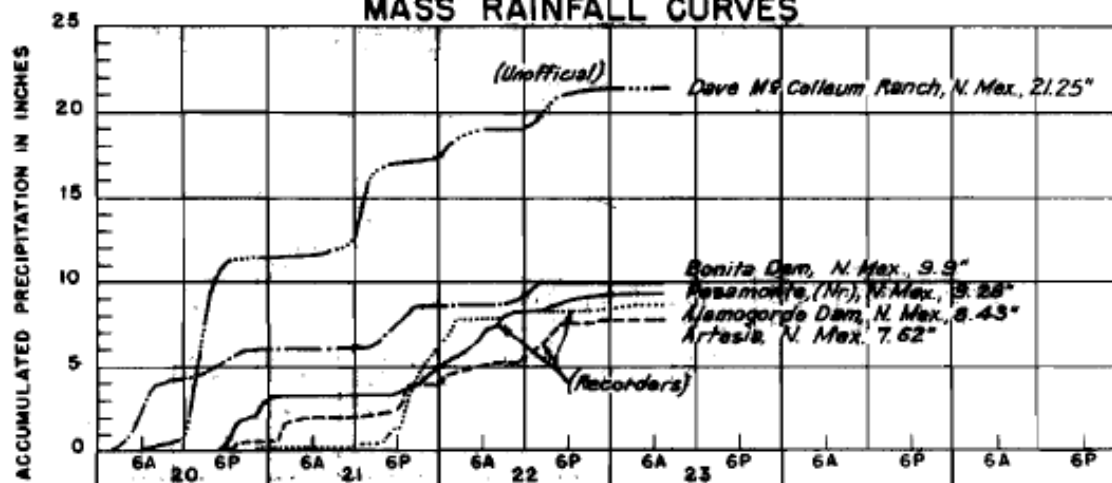
Form S-2

WAR DEPARTMENT

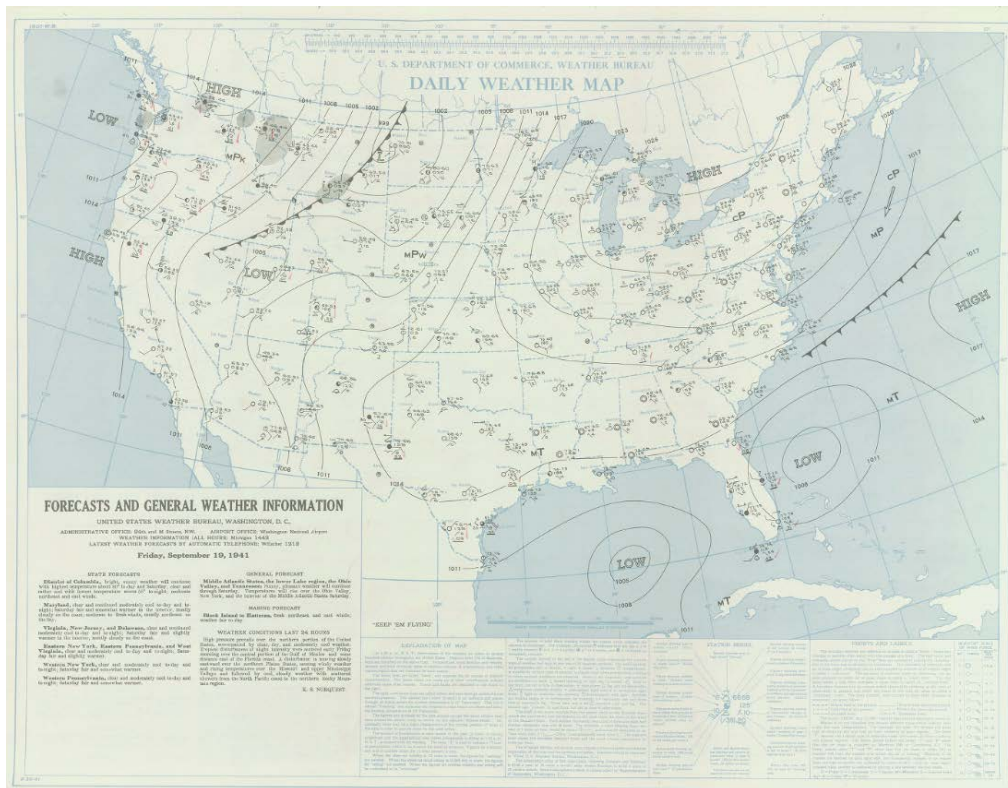
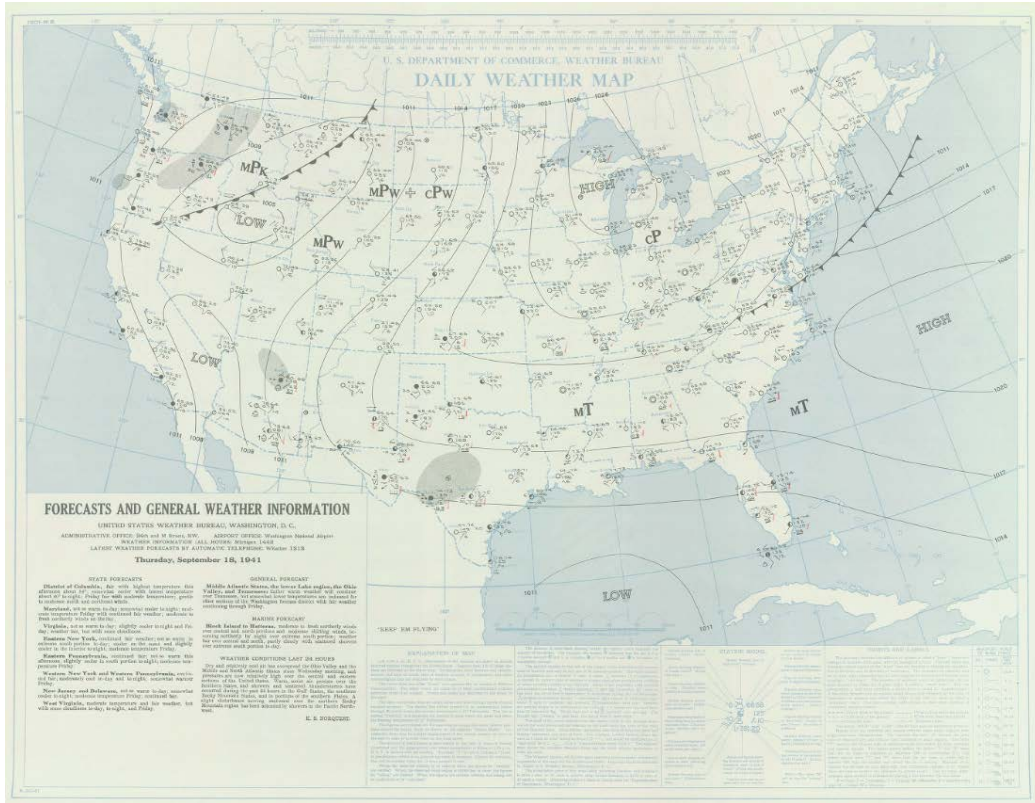
CORPS OF ENGINEERS, U. S. ARMY

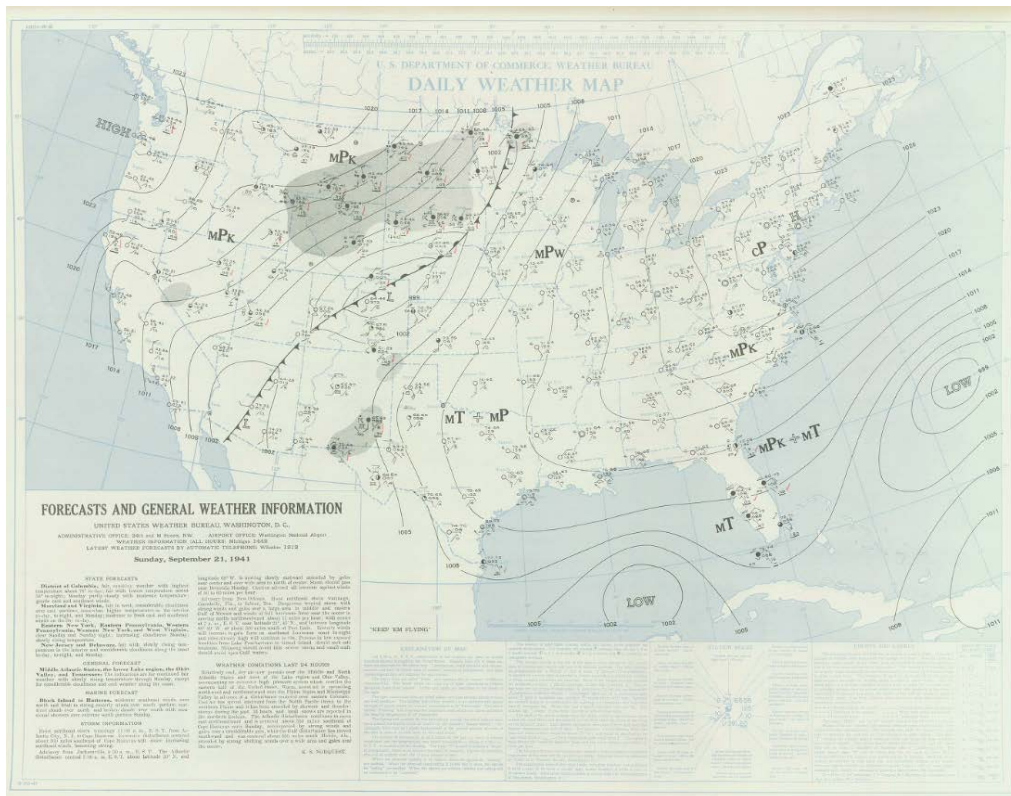
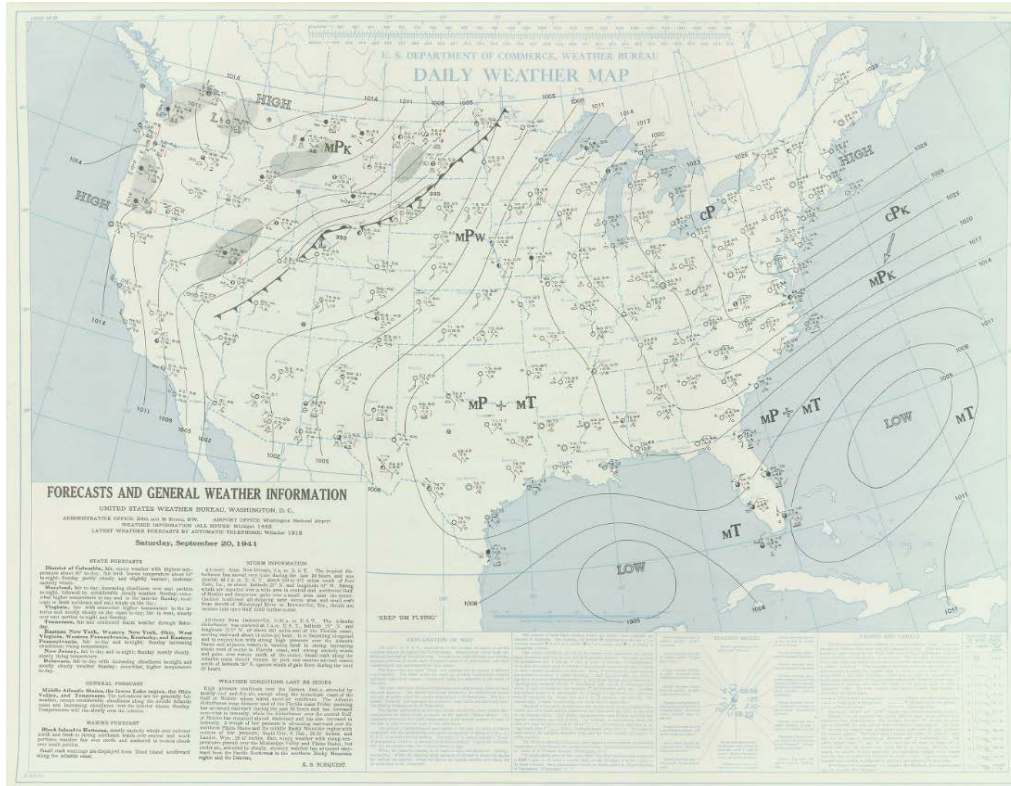
STORM STUDIES - ISOHYETAL MAP

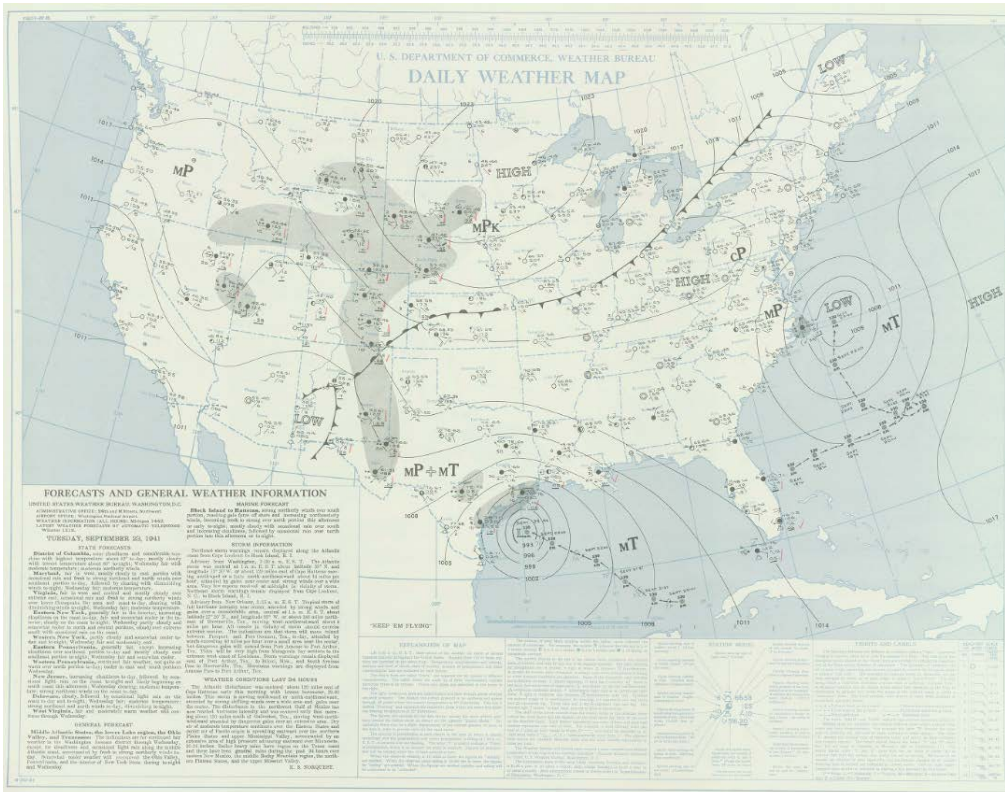
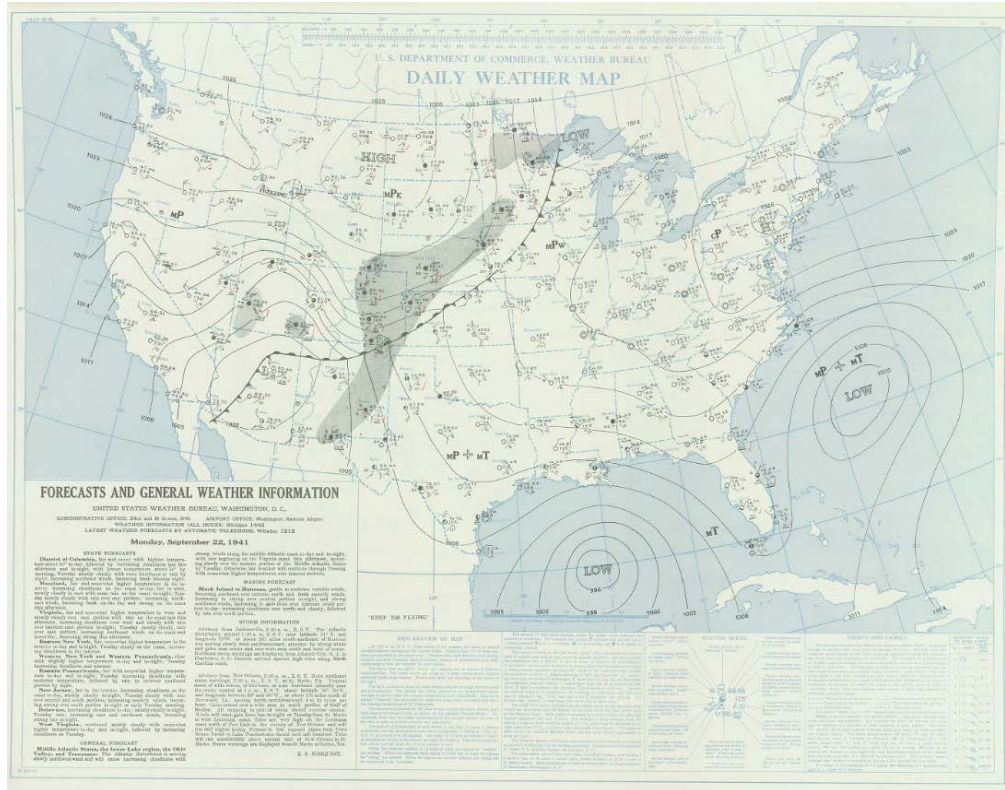
Storm of September 20-23, 1941 Assignment GM 5-19
 Study Prepared by: Galveston, Tex., District
Southwestern Division

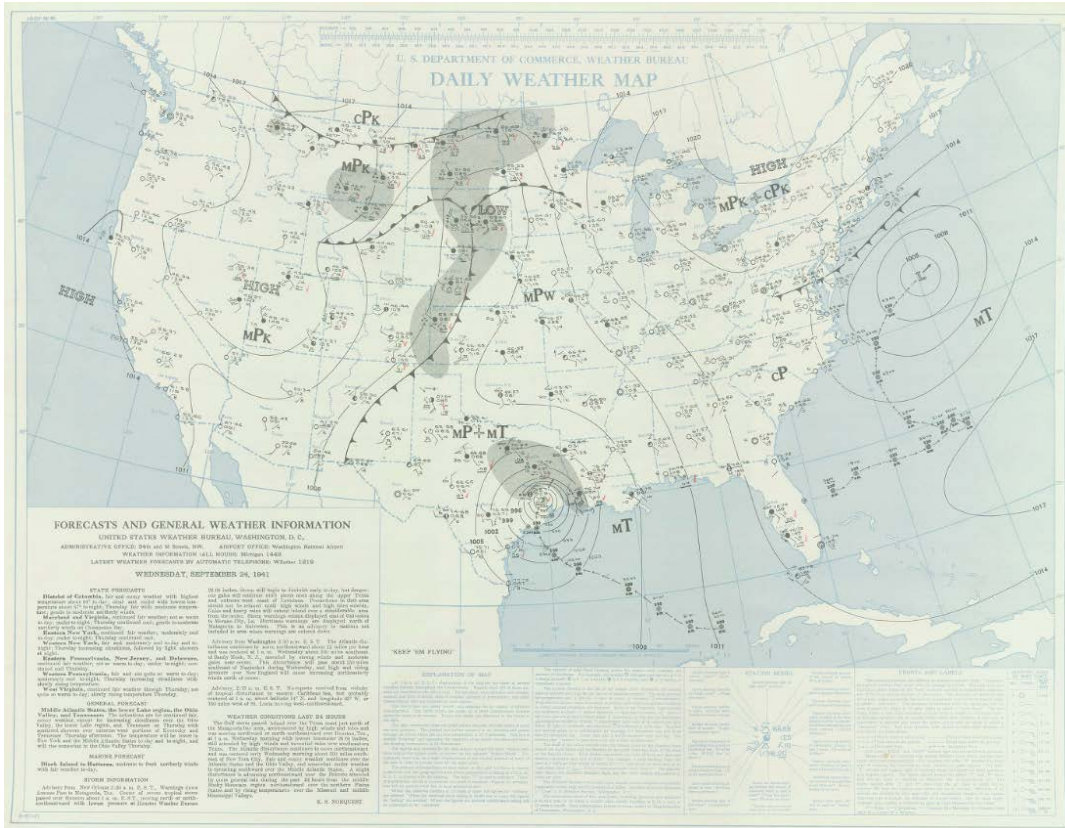
**MASS RAINFALL CURVES**

FORM 8-3W

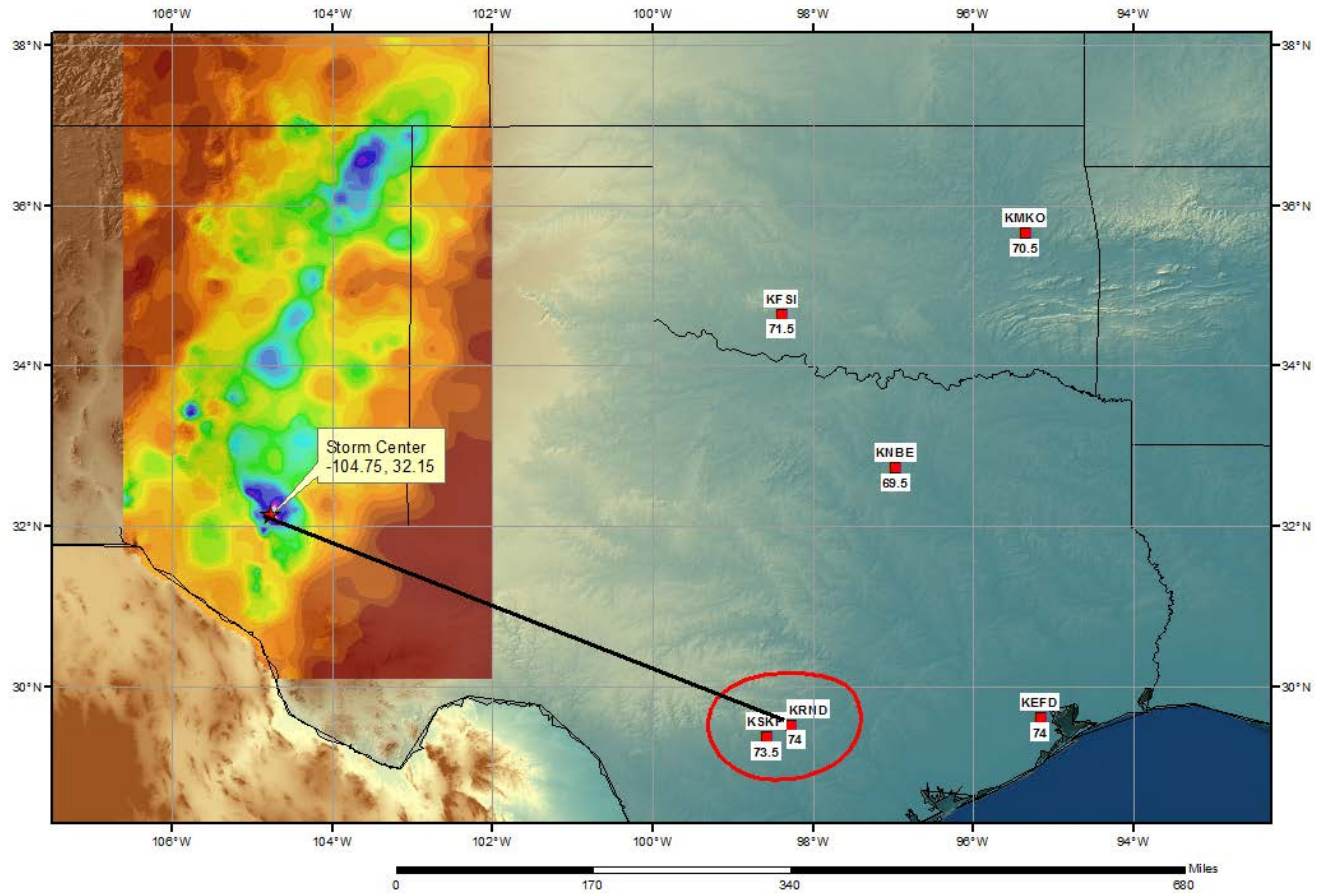




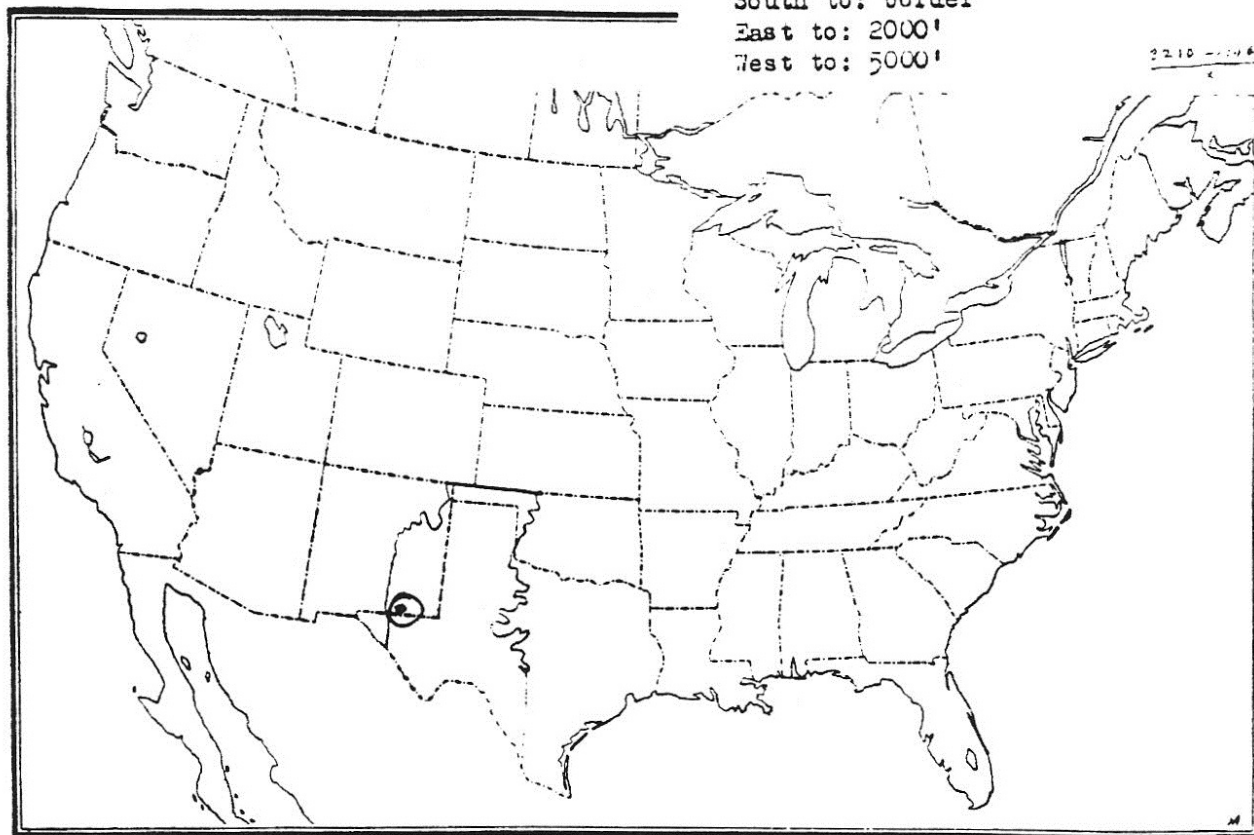




SPAS 1486 Dave McColleum Ranch, NM Storm Analysis September 19 - 20, 1941



GM 5-19..Sept. 19-24, 1941. McCollieus
12-hr. rTd 72..50SE..to 76,22#
North to: 37
South to: border
East to: 2000'
West to: 5000'



Storm Precipitation Analysis System (SPAS) For Storm #1431_1

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

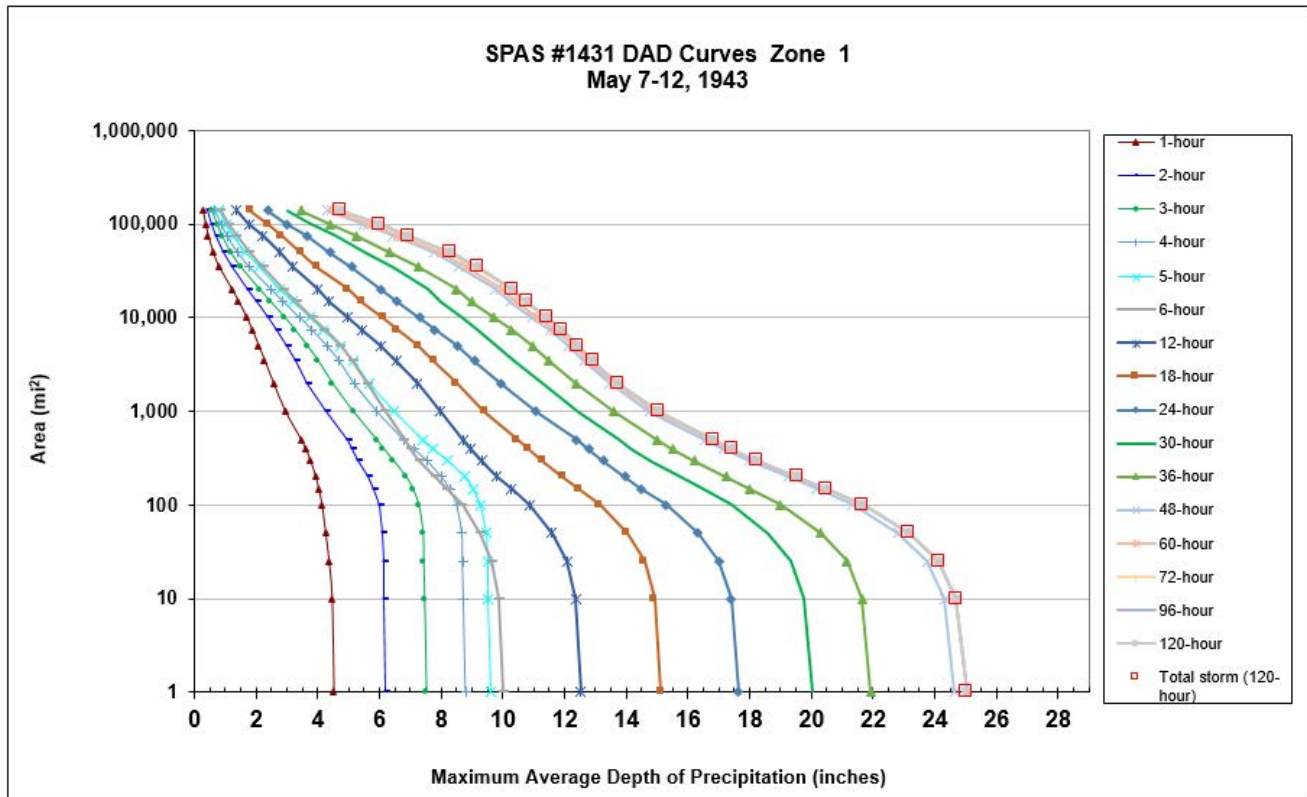
Radar Included: No

Depth-Area-Duration (DAD) analysis: Yes

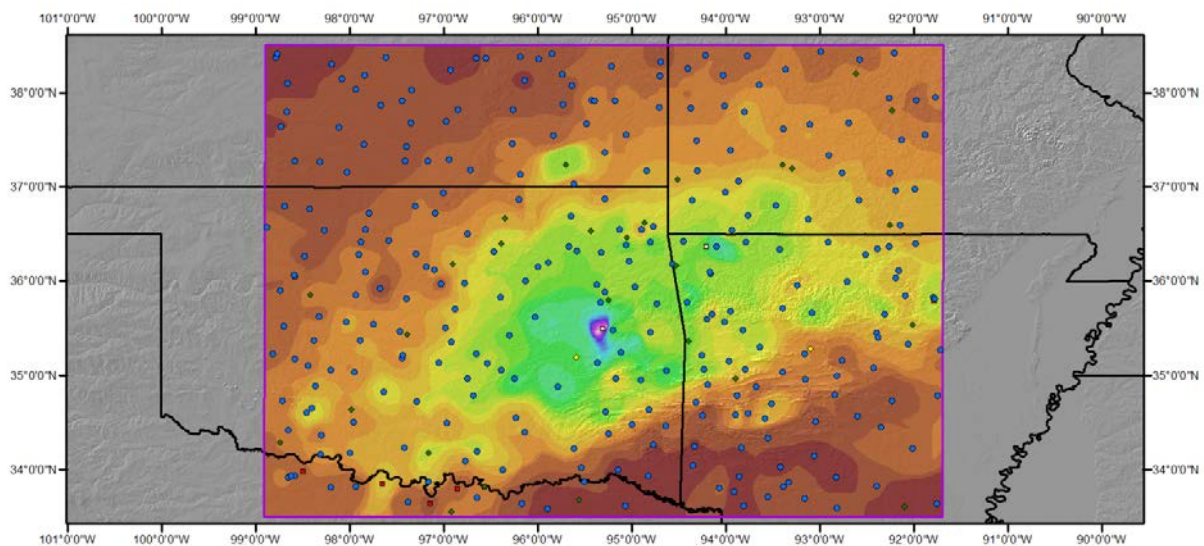
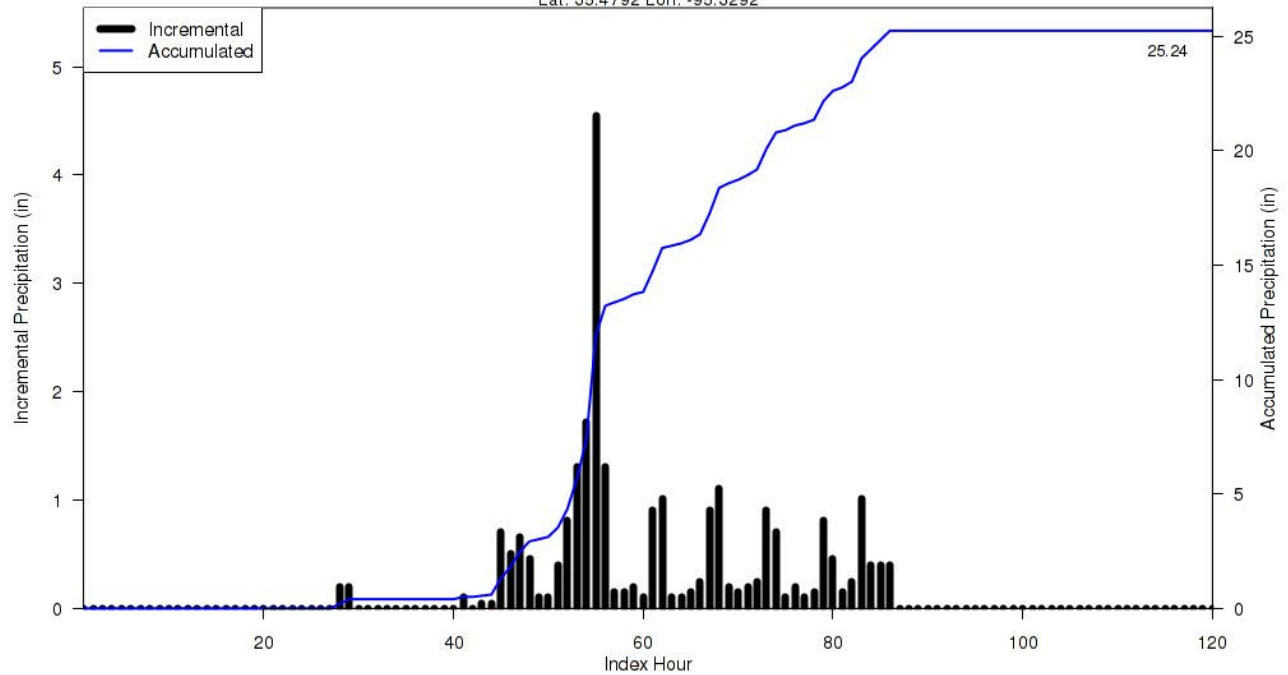
Reliability of Results: In addition to the NCDC stations, twenty-seven supplemental stations along with two supplemental estimated stations were added to ensure data consistency. Due to the amount and integrity of the U.S. Army Corps of Engineers (USACE), three hourly stations were digitized based on 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.

					Storm Rep. Dew Point					Climatological Max. Dew Point						
SPAS Storm ID	LON	LAT	ELEV	ELEV Round	T _d	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	T _d	T _d Round	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	IPMF
1431_1	-95.329	35.479	579	600	71.50	2.42	0.14	65	2.280	77.49	77.5	3.22	0.17	77	3.050	1.338

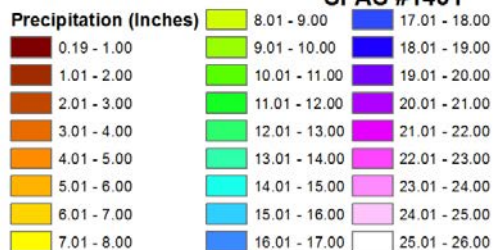
Storm 1431 - May 7 (0700 UTC) - May 12 (0600 UTC), 1943																	
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)																	
Area (mi ²)	Duration (hours)																Total
	1	2	3	4	5	6	12	18	24	30	36	48	60	72	96	120	
0.4	4.53	6.22	7.52	8.83	9.64	10.07	12.59	15.21	17.73	20.14	22.05	24.77	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



SPAS 1431 Storm Center Mass Curve Zone 1
May 7 (0700UTC) to May 12 (0600UTC), 1943
 Lat: 35.4792 Lon: -95.3292



Total 120-hour Precipitation (Inches)
May 7, 1943 0700 UTC - May 11, 1943 0600 UTC
SPAS #1431



Stations

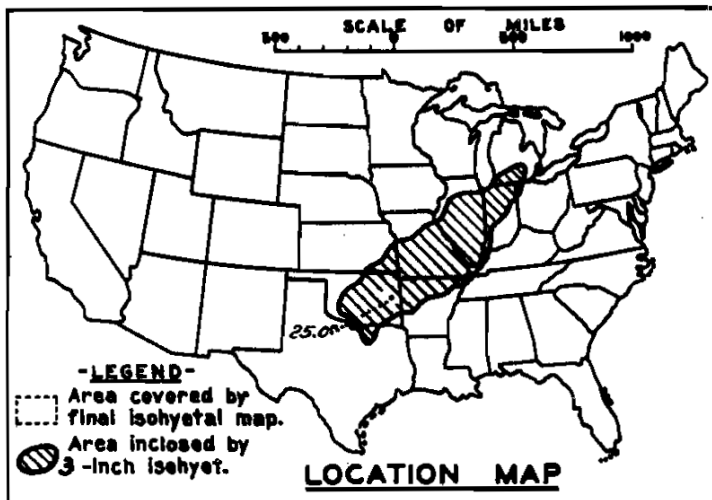
- Daily
- Hourly
- Hourly Estimated
- Hourly Pseudo
- ◆ Supplemental
- ◆ Supplemental Estimated



WJM 10/20/2014

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 OfficePart 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:

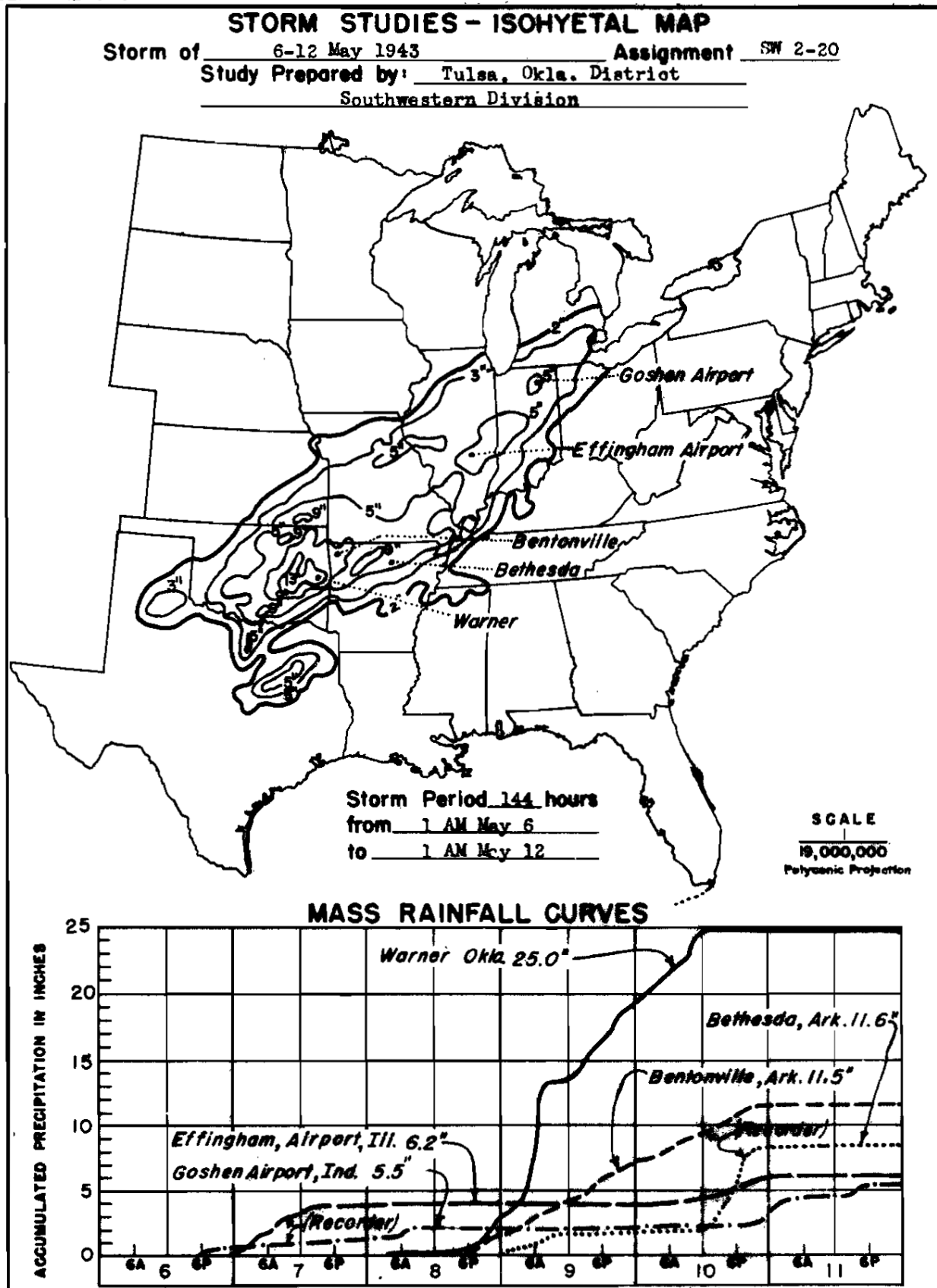
Form S-10 (Data from mass rainfall curves).....	42
Form S-11 (Depth-area data from isohyetal map).....	12
Form S-12 (Maximum depth-duration data).....	12
Maximum duration-depth-area curves.....	1
Data relating to periods of maximum rainfall.....	2

MAXIMUM AVERAGE DEPTH OF RAINFALL IN INCHES

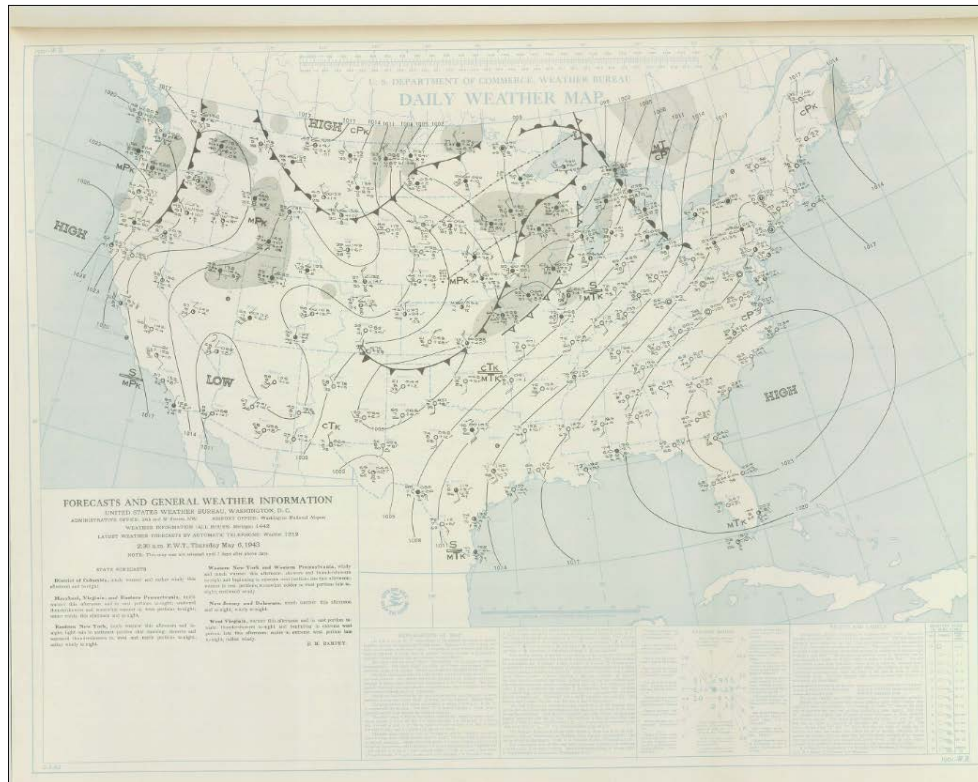
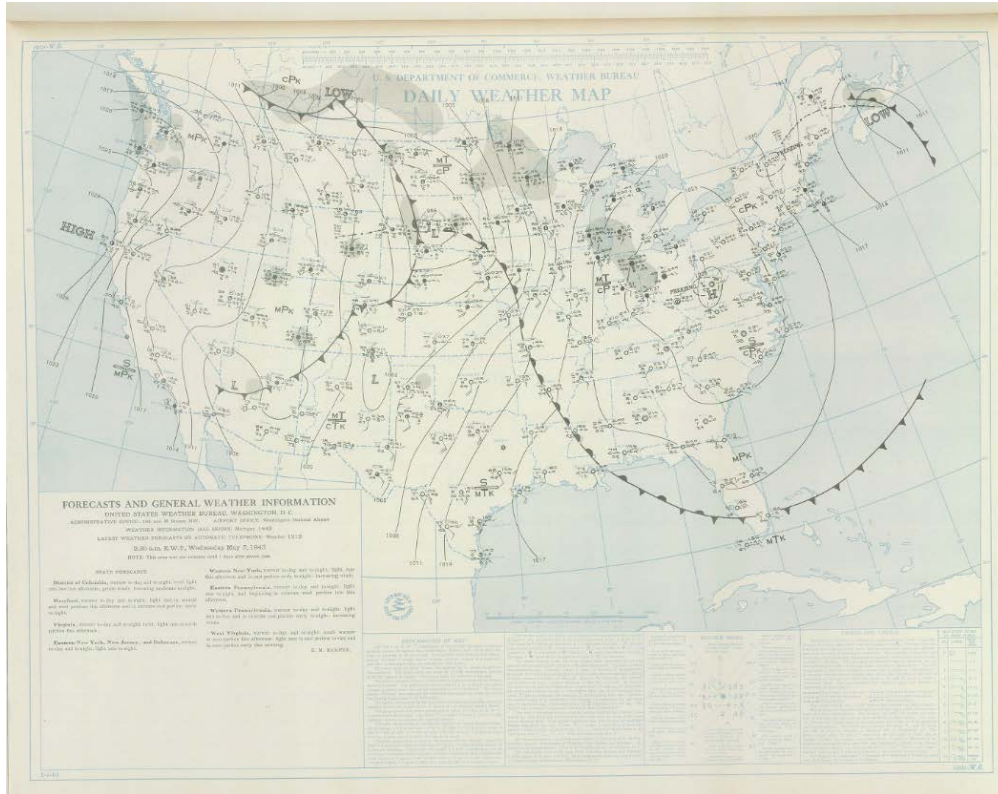
Area in Sq. Mi.	Duration of Rainfall in Hours										
	6	12	18	24	30	36	48	60	72	96	120/
Max. Station	10.0	12.5	15.0	17.6	20.0	21.8	24.6	25.0	25.0	25.0	25.0
10	9.9	12.3	14.6	17.2	19.5	21.5	24.4	24.9	24.9	24.9	24.9
100	8.7	10.8	12.4	14.9	17.1	19.3	21.8	22.5	22.5	22.5	22.5
200	7.4	9.5	11.4	13.8	16.0	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

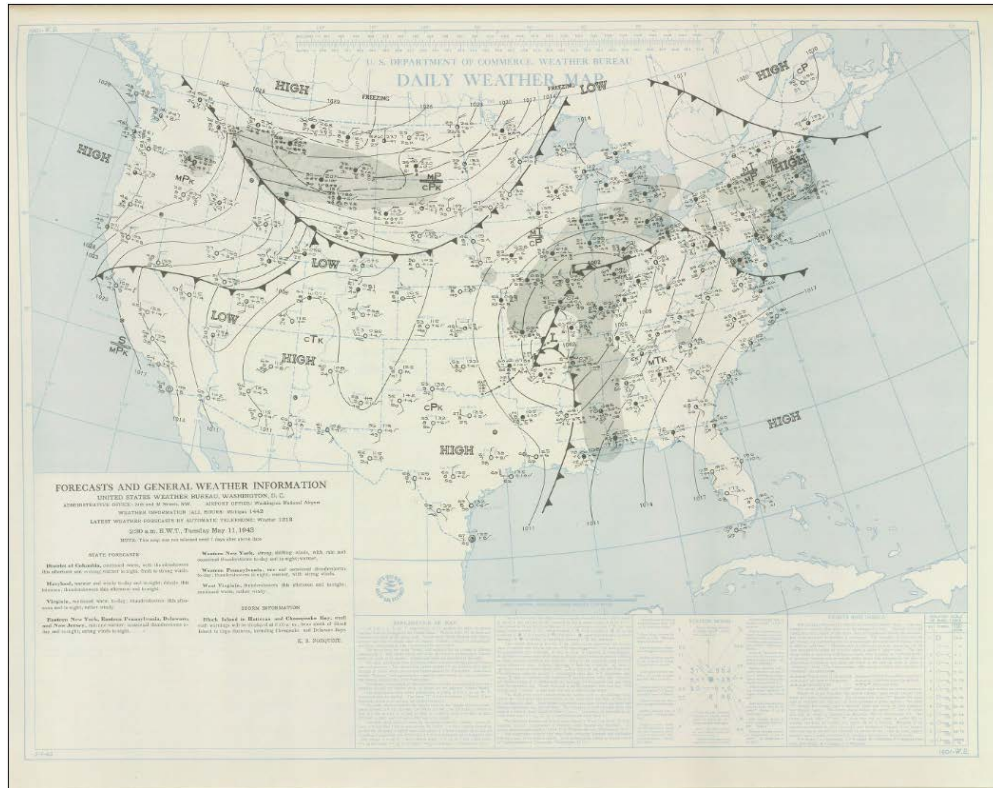
DEPARTMENT OF THE ARMY

CORPS OF ENGINEERS

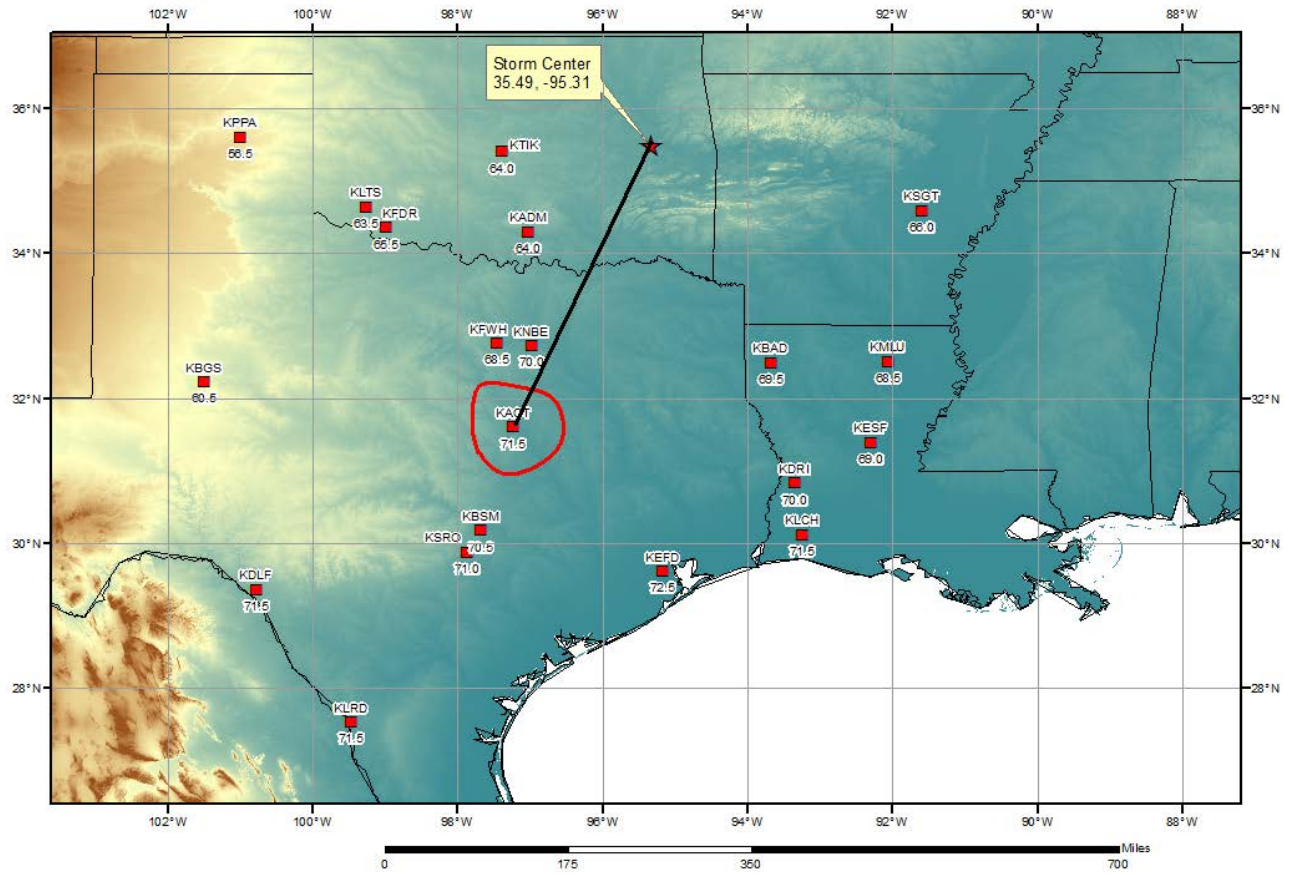


FORM 8-32



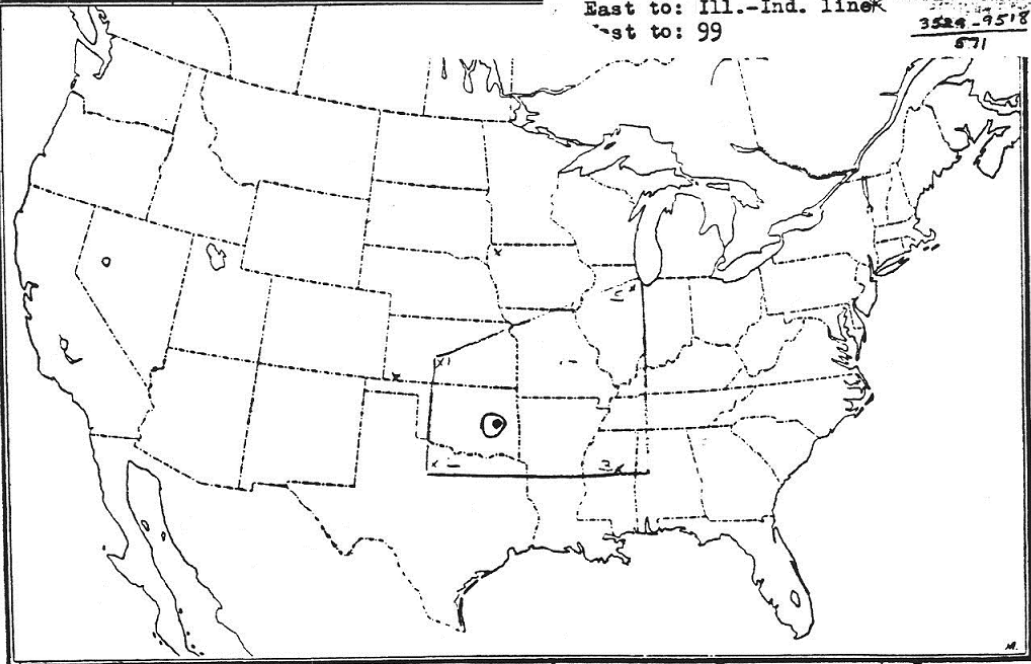


Warner, OK Storm Analysis May 6-7, 1943



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

SW 2-20..May 6-11, 1943..Warner, Okla.
12-hr. rtd 70(10th)..225 ~~225~~ to 76, 34%
North to: Chicago-St. Joseph line.
South to: 32
East to: Ill.-Ind. line
West to: 99
3524-9518
571



* Justified to ≈ 86 in Hypo #30
numberland

Storm Precipitation Analysis System (SPAS) For Storm #1433_1

General Storm Location: Collinsville, Illinois (40.0, -91.5, 36.9, -87.3)

Storm Dates: August 13 – August 16, 1946

Event: Extreme Precipitation Event

DAD Zone 1

Latitude: 38.6708

Longitude: -90.0042

Max. Grid rainfall amount: 19.07”

Max. Observed rainfall amount: 19.07” (Collinsville, IL)

Number of Stations: 166

SPAS Version: 10.0

Base Map Used: Derived basemap based off of SPAS analysis

Spatial resolution: 0.2596

Radar Included: No

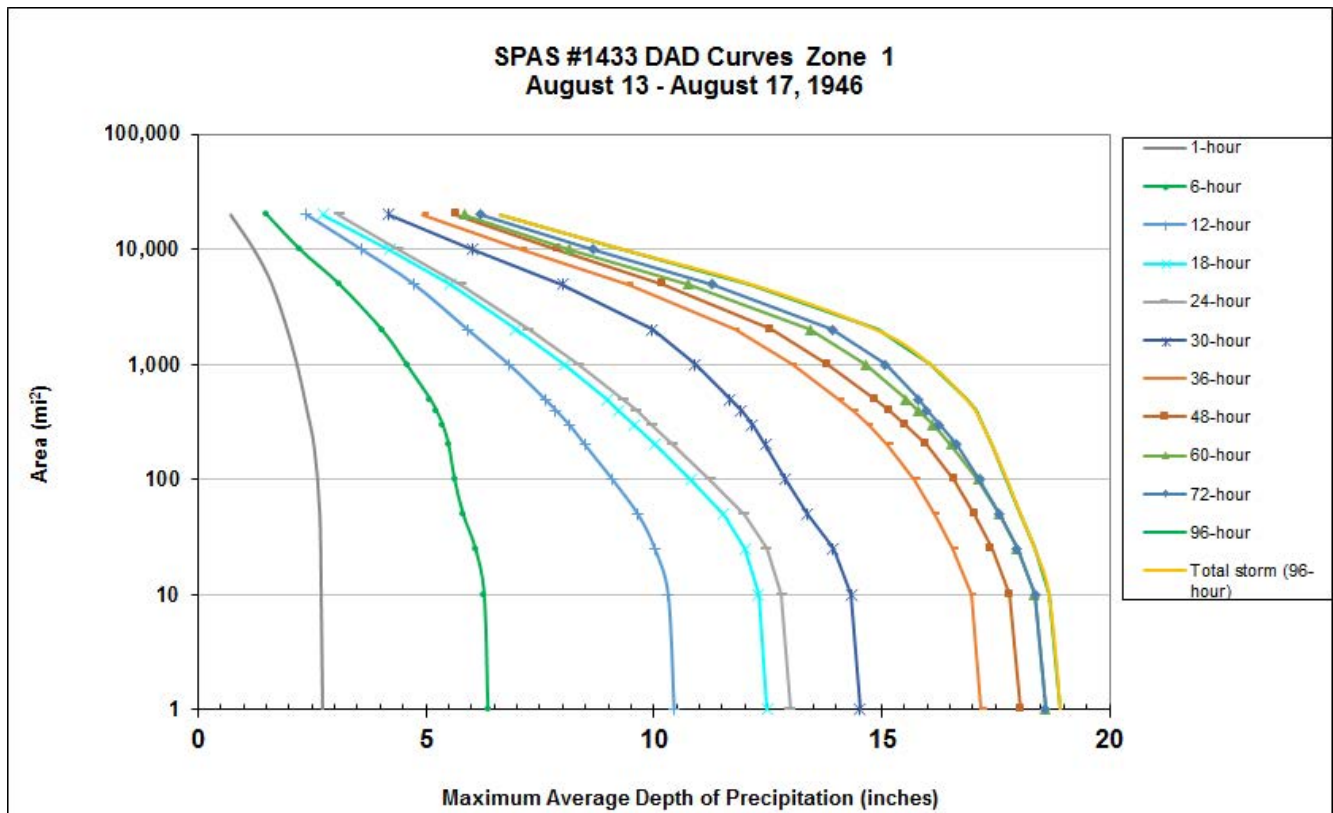
Depth-Area-Duration (DAD) analysis: Yes

Reliability of Results: In addition to the NCDC stations, twenty-four supplemental 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 added based on the mass rainfall curves. Three hourly stations were also added from local climatology from NCDC. 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.

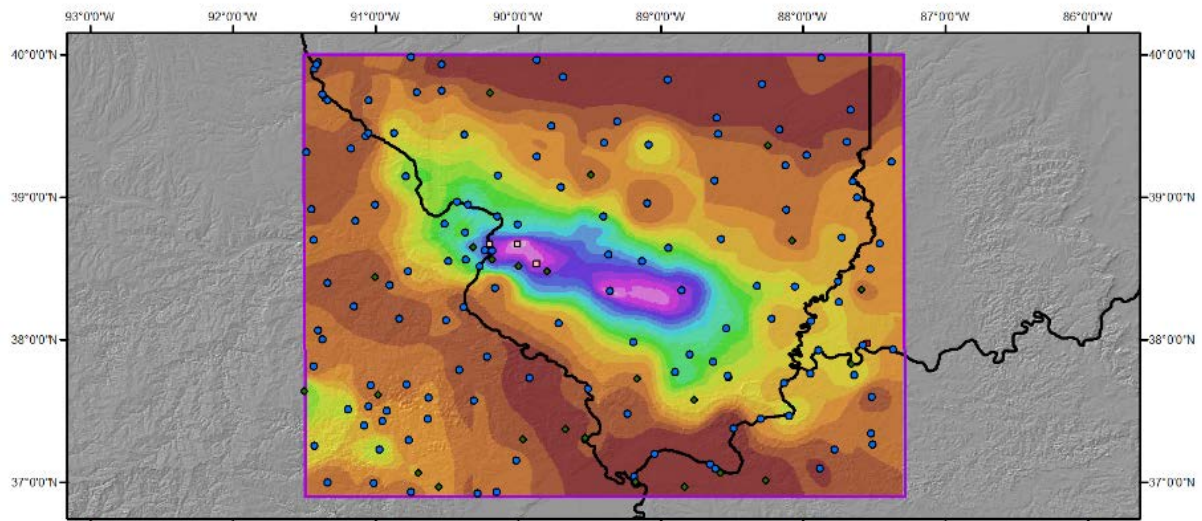
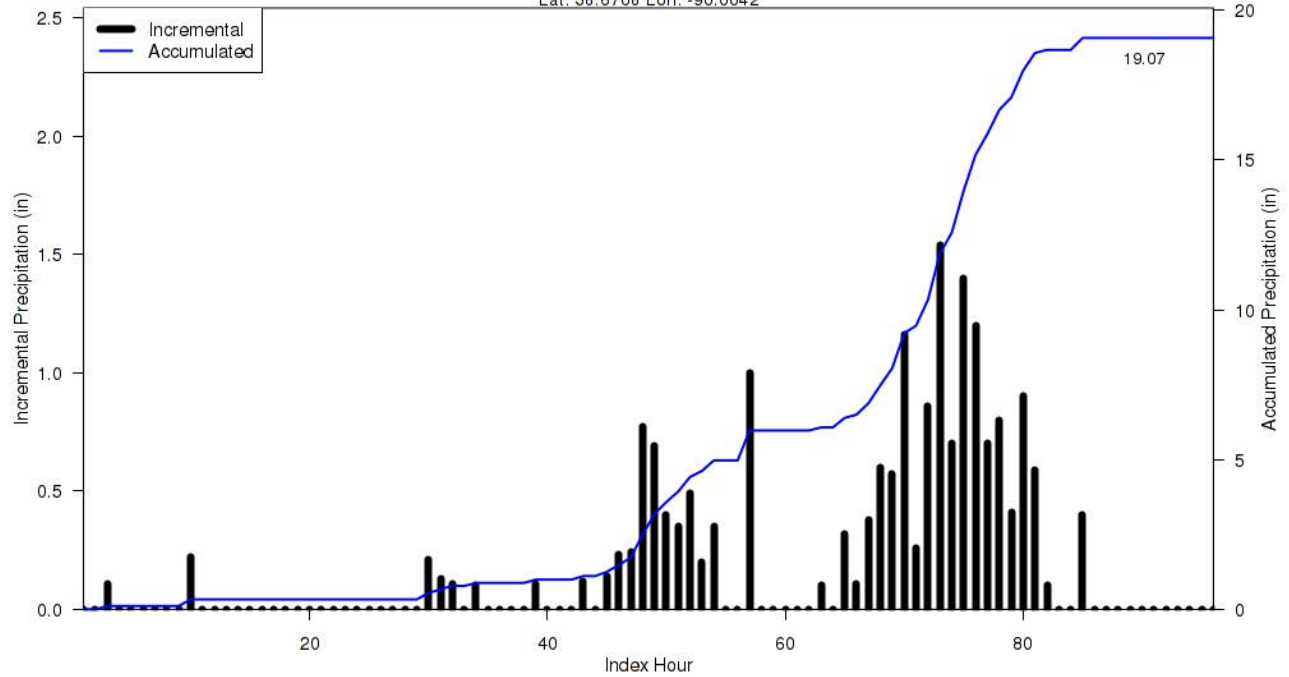
					Storm Rep. Dew Point					Climatological Max. Dew Point						
SPAS Storm ID	LON	LAT	ELEV	ELEV Round	T _d	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	T _d	T _d Round	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	IPMF
1433 1	-90.004	38.671	567	600	76.00	2.99	0.16	74	2.830	80.41	80.5	3.68	0.18	83	3.500	1.237

Storm 1433 - August 13 (0700 UTC) - August 17 (0600 UTC), 1946
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)

Area (mi ²)	Duration (hours)											
	1	6	12	18	24	30	36	48	60	72	96	Total
0.4	2.72	6.39	10.49	12.56	13.07	14.60	17.28	18.15	18.69	18.70	19.02	19.02
1	2.72	6.36	10.44	12.49	12.99	14.53	17.18	18.05	18.60	18.60	18.92	18.92
10	2.69	6.28	10.31	12.30	12.81	14.33	16.96	17.82	18.36	18.37	18.67	18.67
25	2.68	6.09	10.02	12.00	12.47	13.94	16.56	17.42	17.97	17.97	18.36	18.36
50	2.66	5.82	9.65	11.54	11.99	13.38	16.16	17.04	17.58	17.59	18.05	18.05
100	2.61	5.63	9.09	10.81	11.23	12.89	15.72	16.59	17.12	17.16	17.75	17.75
200	2.53	5.50	8.49	10.04	10.42	12.46	15.14	15.98	16.53	16.64	17.42	17.42
300	2.45	5.37	8.14	9.56	9.95	12.16	14.70	15.52	16.13	16.26	17.21	17.21
400	2.38	5.23	7.85	9.22	9.61	11.91	14.36	15.16	15.80	15.99	17.06	17.06
500	2.33	5.10	7.61	8.97	9.33	11.67	14.05	14.86	15.54	15.81	16.86	16.86
1,000	2.16	4.58	6.82	8.03	8.34	10.91	13.02	13.82	14.65	15.08	16.08	16.08
2,000	1.95	4.04	5.92	6.97	7.25	9.96	11.78	12.57	13.42	13.91	14.90	14.90
5,000	1.61	3.10	4.73	5.55	5.77	8.00	9.44	10.21	10.76	11.28	12.14	12.14
10,000	1.22	2.24	3.58	4.21	4.39	6.04	7.12	7.90	8.15	8.68	9.35	9.35
20,000	0.71	1.51	2.37	2.75	3.09	4.18	4.94	5.66	5.84	6.21	6.64	6.64



SPAS 1433 Storm Center Mass Curve Zone 1
August 13 (0700UTC) to August 17 (0600UTC), 1946
 Lat: 38.6708 Lon: -90.0042



Total 96-hour Precipitation (Inches)
August 13, 1946 0700 UTC - August 16, 1946 0600 UTC
SPAS #1433



WJM 10/27/2014

DEPARTMENT OF THE ARMY

CORPS OF ENGINEERS

STORM STUDIES - PERTINENT DATA SHEET

Storm of 12-16 August 1946
 Assignment MR 7-2B
 Location Mo., Ill., Ind. & Ky.
 Study Prepared by:
 Upper Mississippi Valley
 Division
 St. Louis District

Part I Reviewed by H. M. Sec. of
 Weather Bureau, 3/8/49
 Part II Approved by Office, Chief
 of Engineers for Distribution
 of Factual Data, 3/20/50

Remarks: Center near
 Collinsville, Ill.
 Dewpt. 74° Ref. Pt. 225 S
 Grid F-12

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)-----	58
Form 5001-B (24-hour " " " ")-----	—
Form 5001-D (" " " " " ")-----	16
Misc. precip. records, meteorological data, etc.-----	15
Form 5002 (Mass rainfall curves)-----	44

PART II

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

Data and computation sheets:

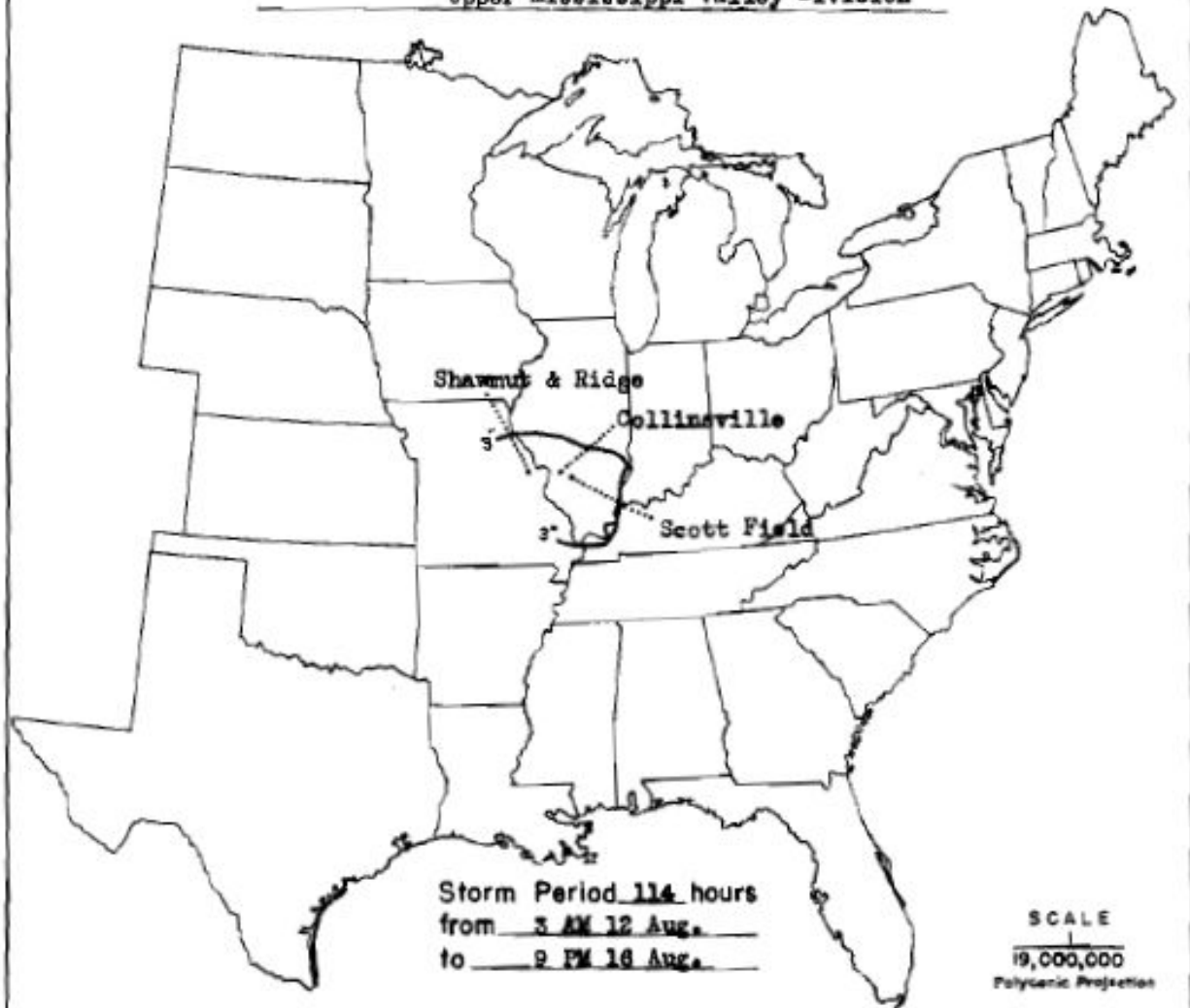
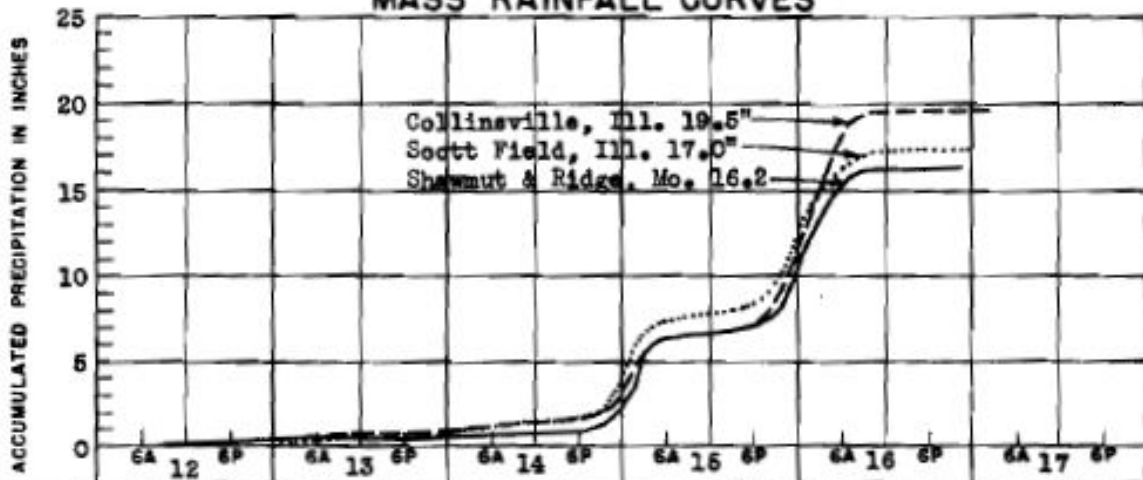
Form S-10 (Data from mass rainfall curves)-----	5
Form S-11 (Depth-area data from isohyetal map)-----	3
Form S-12 (Maximum depth-duration data)-----	7
Maximum duration-depth-area curves-----	1
Data relating to periods of maximum rainfall-----	2

MAXIMUM AVERAGE DEPTH OF RAINFALL IN INCHES

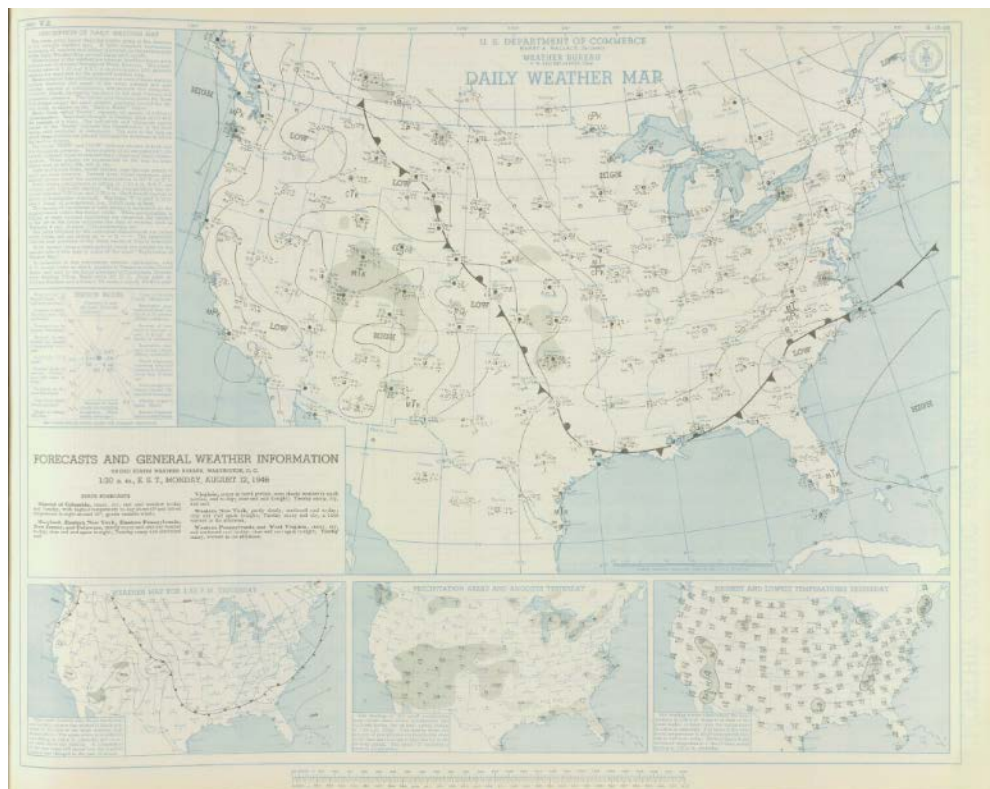
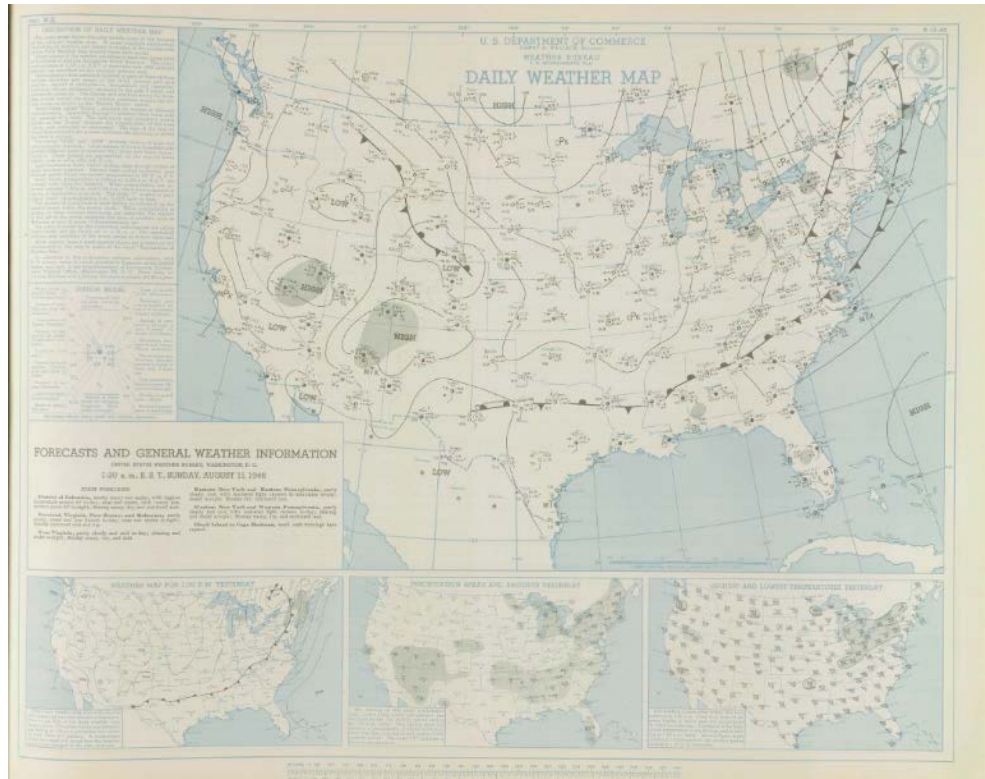
Area in Sq. Mi.	Duration of Rainfall in Hours										
	6	12	18	24	30	36	48	60	72	96	114
Max. Sta.	6.4	10.2	12.6	12.7	14.1	18.0	18.1	18.6	18.7	19.4	19.5
10	6.0	9.8	12.1	12.1	13.7	17.5	17.6	18.3	18.3	18.9	19.0
100	5.6	8.8	10.9	11.1	13.2	16.6	16.7	17.5	17.6	18.0	18.1
200	5.4	8.3	10.5	10.6	13.0	16.2	16.3	17.2	17.3	17.7	17.8
500	5.2	7.7	9.7	9.9	12.8	15.5	15.6	16.7	16.9	17.1	17.2
1,000	4.9	7.0	8.9	9.0	12.6	14.7	14.8	15.9	16.0	16.3	16.4
2,000	4.3	6.1	7.6	7.8	11.2	13.3	13.4	14.3	14.3	14.6	14.7
5,000	3.3	4.8	5.9	6.0	8.6	10.4	10.6	11.3	11.4	11.6	11.8
10,000	2.4	3.7	4.5	4.6	6.6	8.0	8.2	8.7	8.8	9.0	9.1
20,000	1.5	2.5	3.1	3.2	4.5	5.6	5.8	6.0	6.1	6.3	6.5
20,400	1.5	2.5	3.1	3.2	4.5	5.5	5.7	6.0	6.1	6.3	6.4

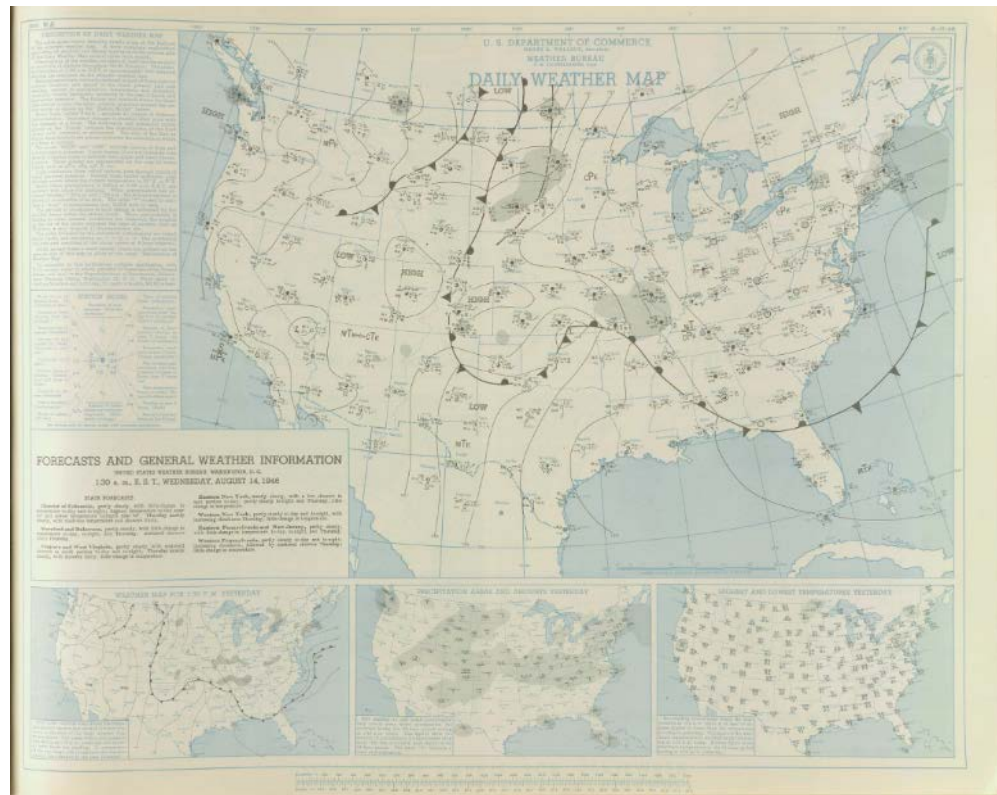
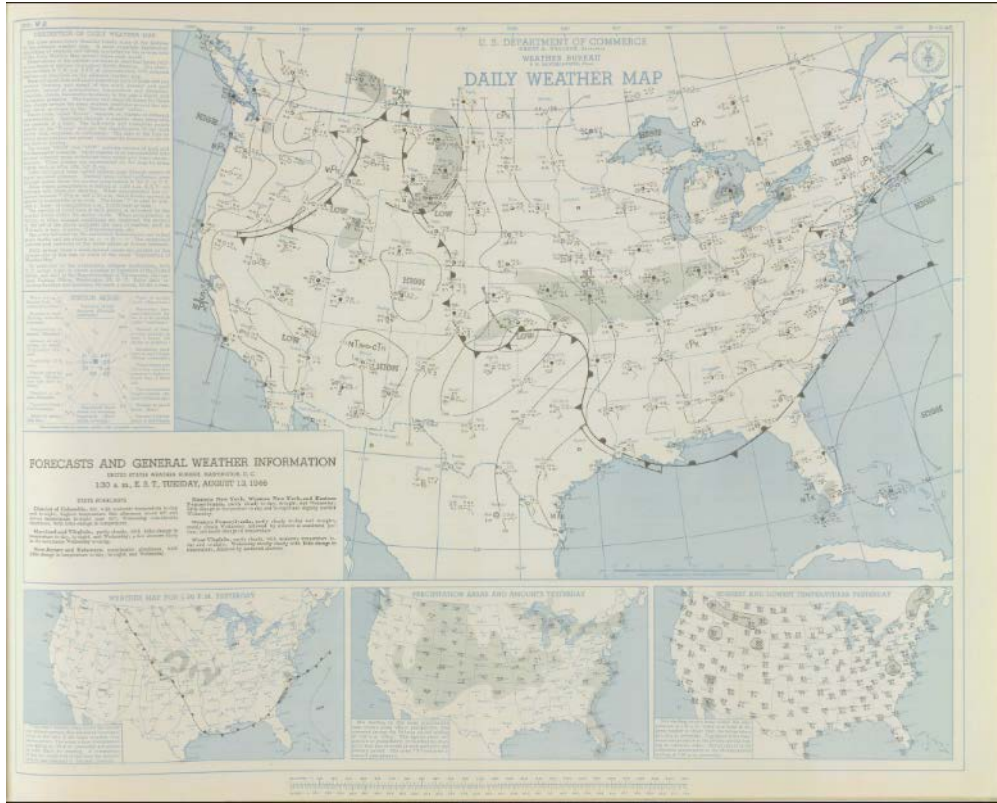
DEPARTMENT OF THE ARMY

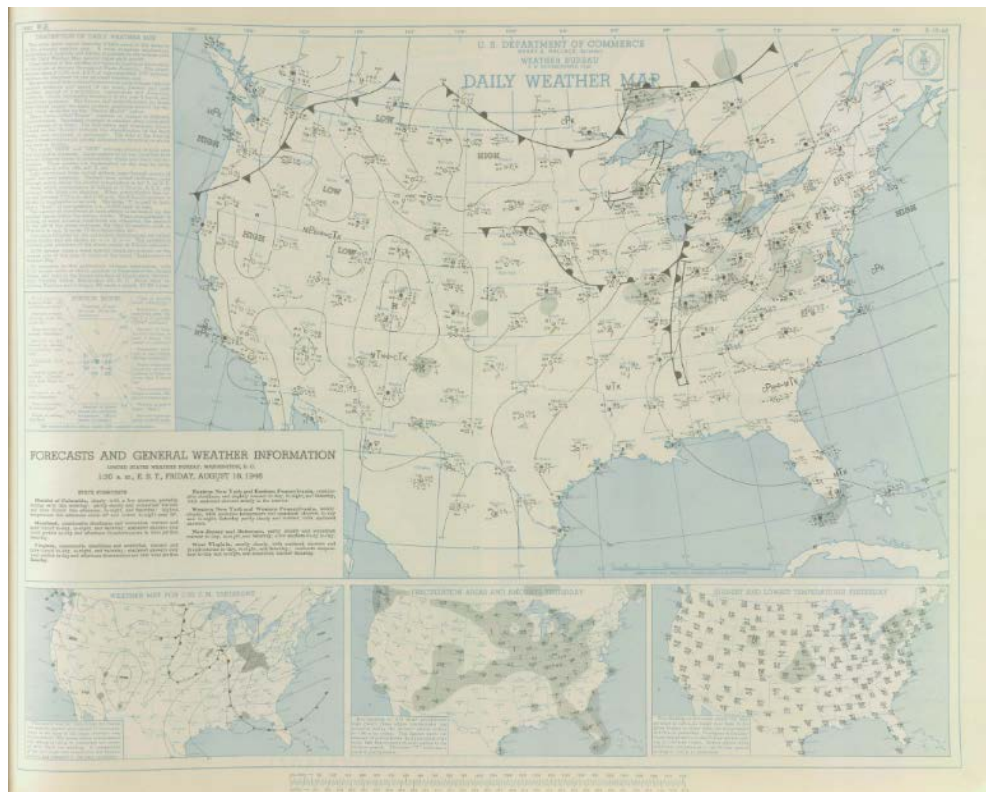
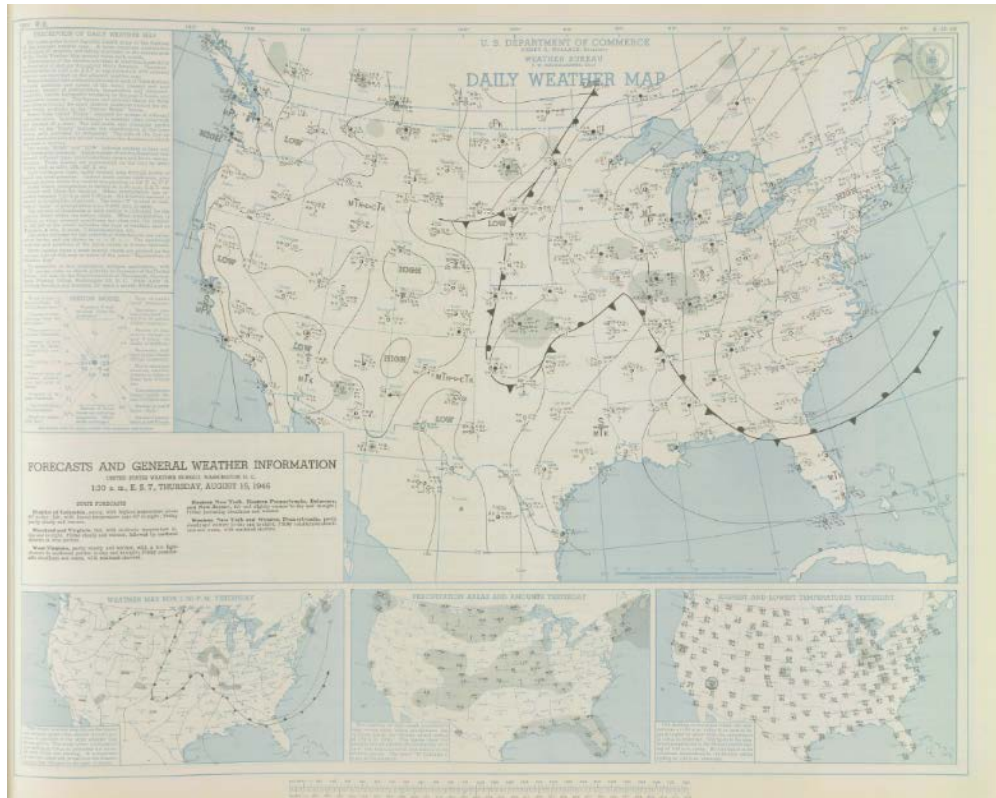
CORPS OF ENGINEERS

STORM STUDIES - ISOHYETAL MAPStorm of 12-16 August 1946Assignment MR 7-2BStudy Prepared by: St. Louis, Mo. DistrictUpper Mississippi Valley Division**MASS RAINFALL CURVES**

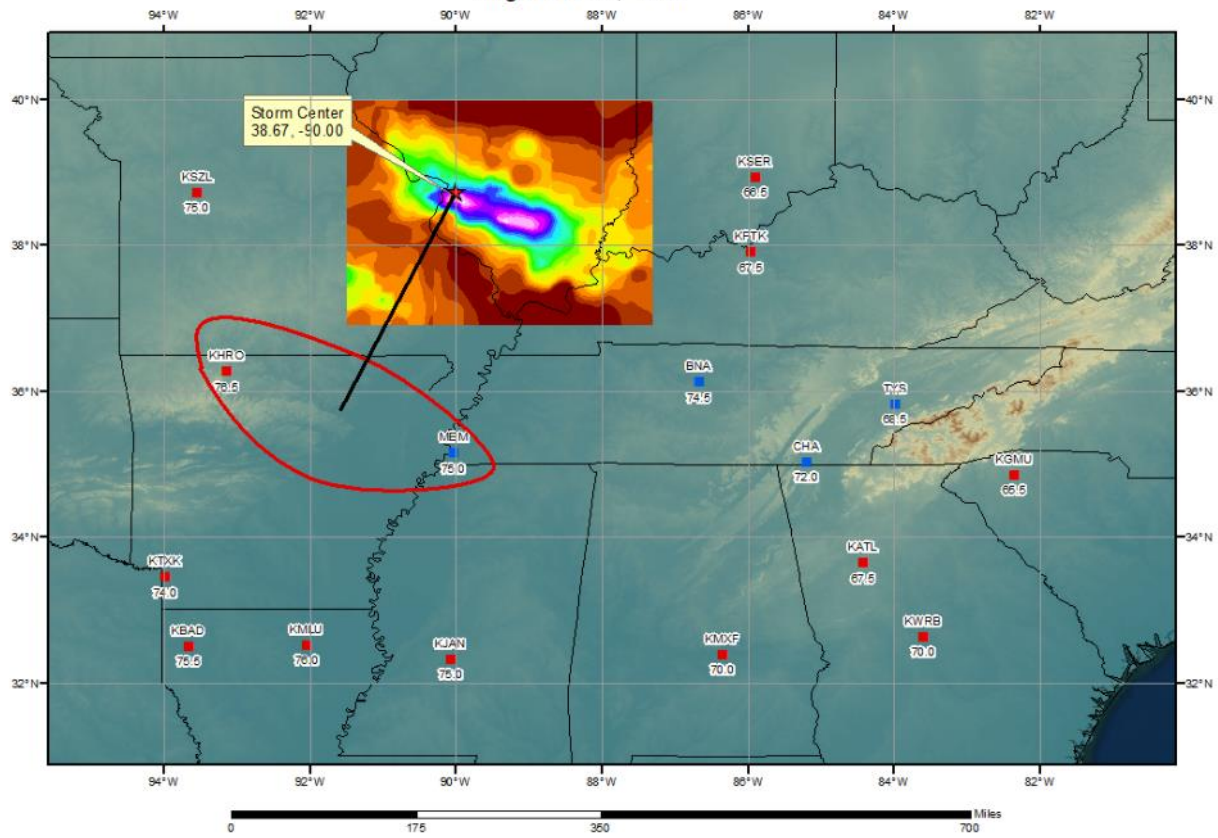
FORM 8-3E



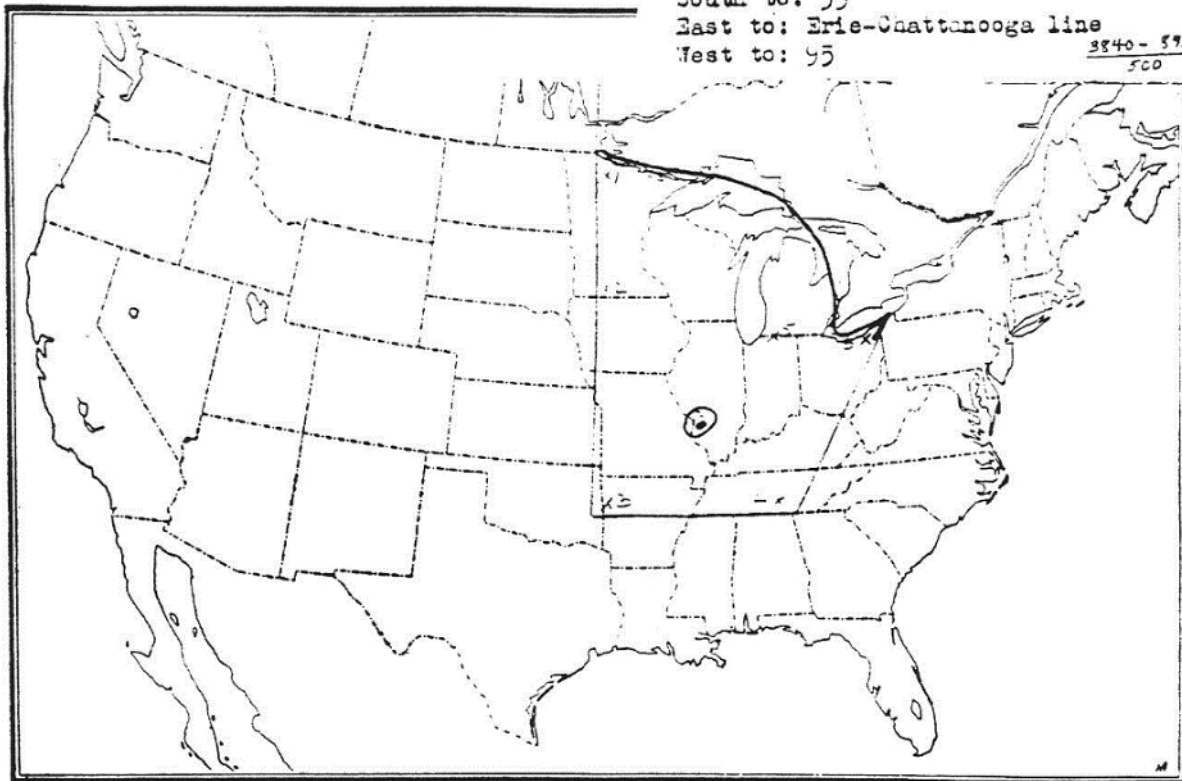




SPAS 1433 Collinsville, IL Storm Analysis August 14-15, 1946



MR 7-2B...Aug. 12-16, 1946...Collinsville:
12-hr. rTd 74...225 S..to 78, 21 1/2
North to border
South to: 35
East to: Erie-Chattanooga line
West to: 95 3840 - 395
500



Storm Precipitation Analysis System (SPAS) For Storm #1583_1

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

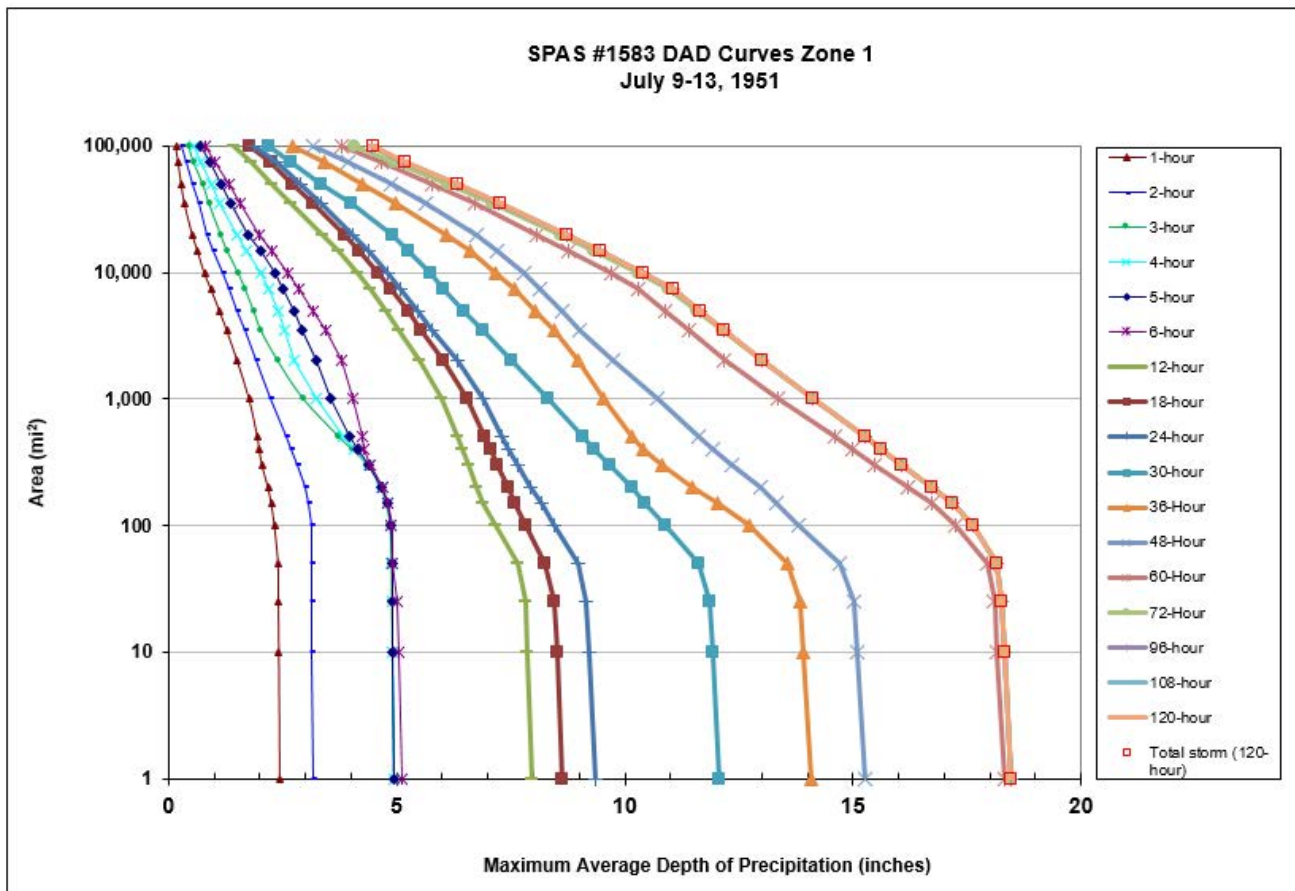
Radar Included: No

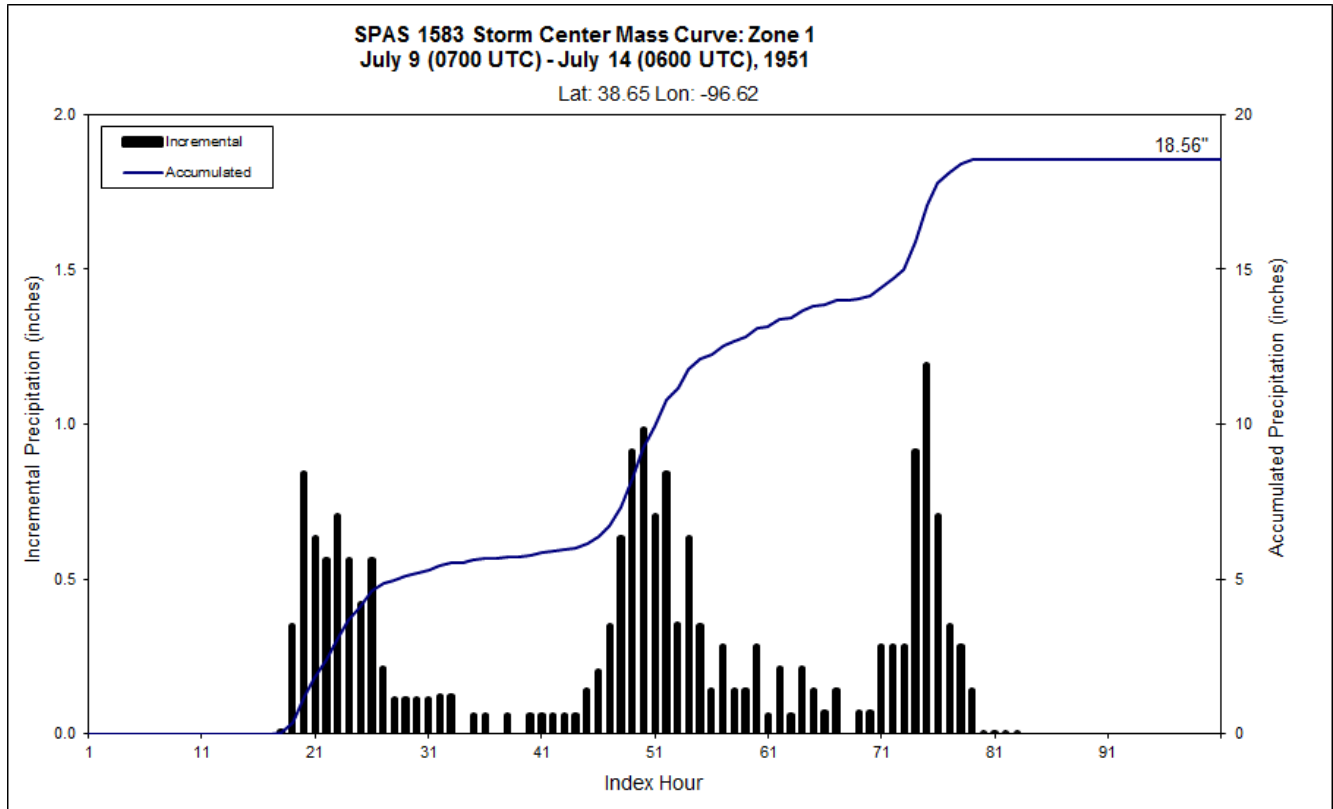
Depth-Area-Duration (DAD) analysis: Yes

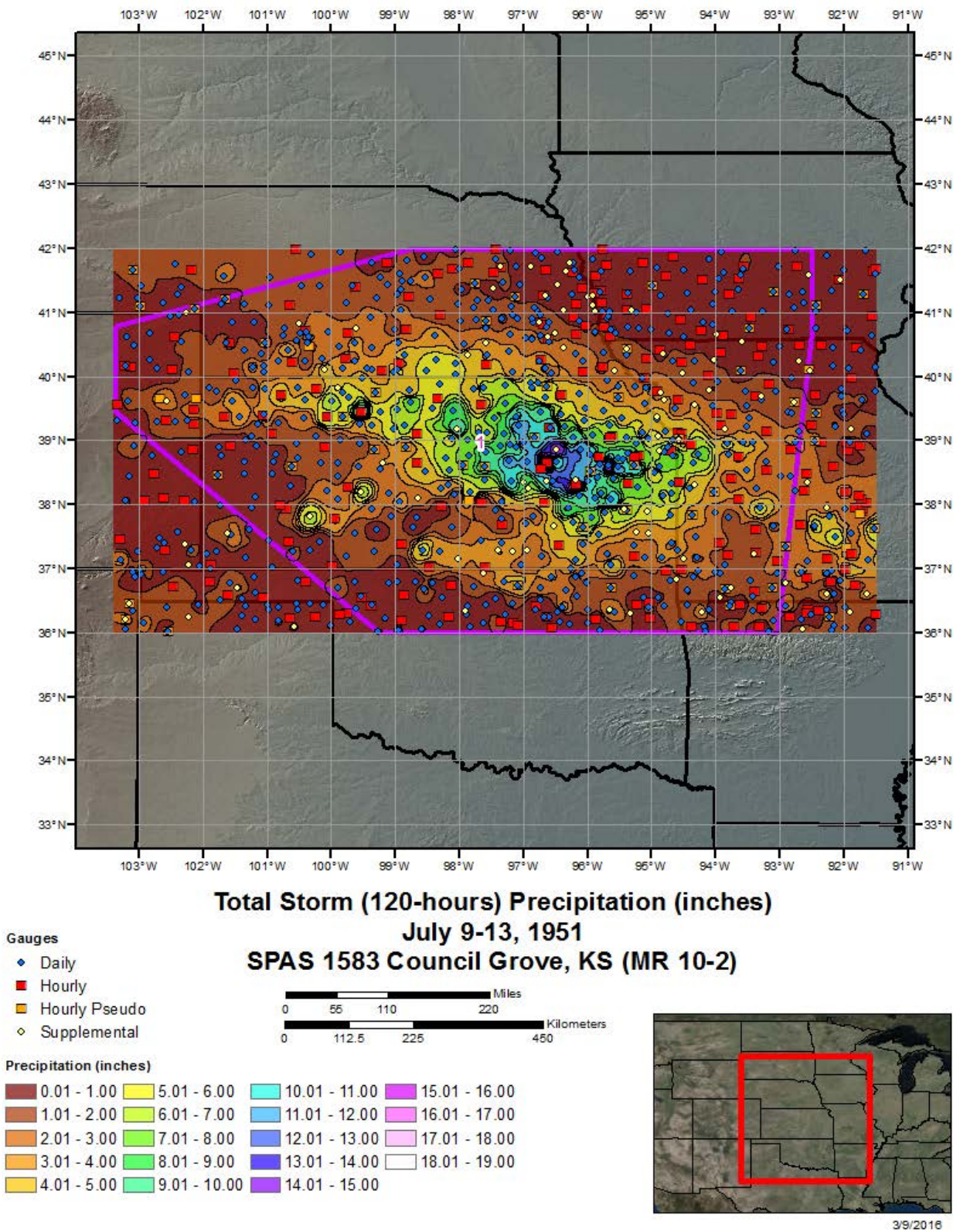
Reliability of Results: This analysis was based on hourly data (H), hourly pseudo data (HP), daily data (D) and supplemental data (S). We have a high degree of confidence in the station based storm total results. The spatial pattern is dependent on basemap, and the timing is based on hourly and hourly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

					Storm Rep. Dew Point					Climatological Max. Dew Point						
SPAS Storm ID	LON	LAT	ELEV	ELEV Round	T _d	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	T _d	T _d Round	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	IPMF
1583_1	-96.621	38.646	1,434	1,400	75.00	2.85	0.34	72	2.510	80.70	80.5	3.68	0.42	83	3.260	1.299

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	Total
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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	2.68







DEPARTMENT OF THE ARMY

CORPS OF ENGINEERS

STORM STUDIES - PERTINENT DATA SHEET

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

DEPARTMENT OF THE ARMY

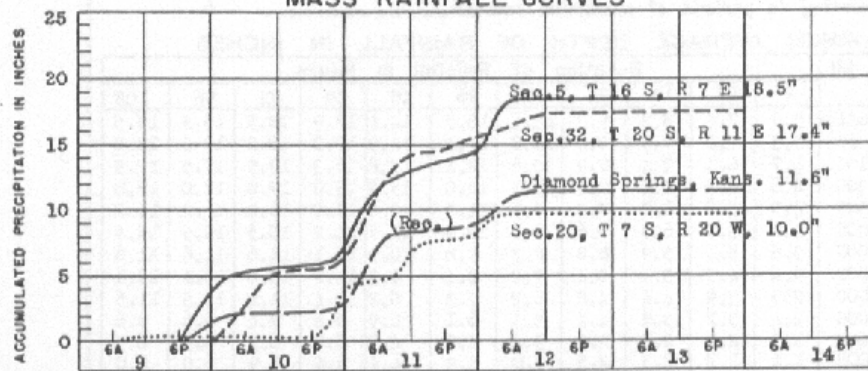
CORPS OF ENGINEERS

STORM STUDIES - ISOHYETAL MAP

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

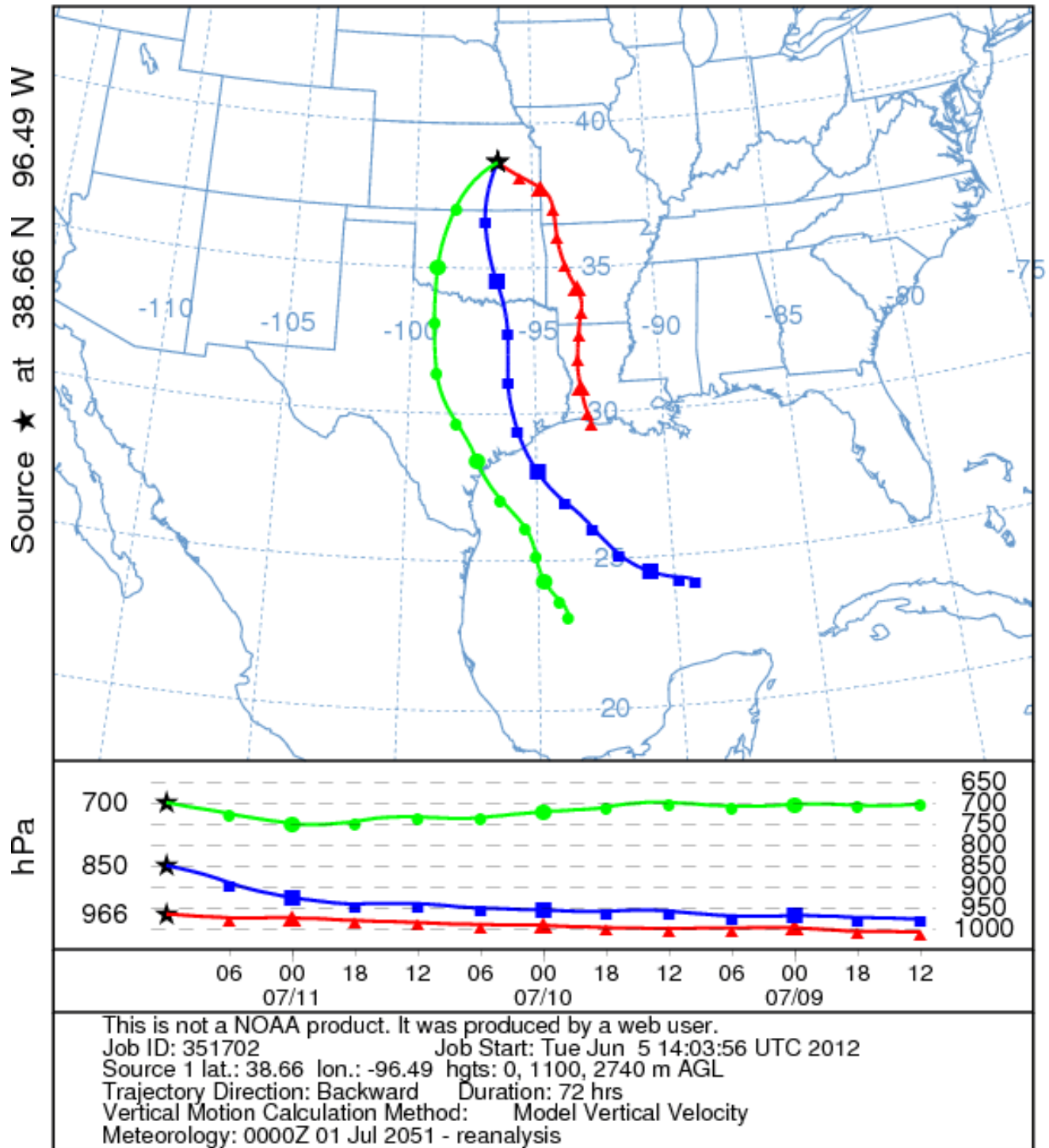


MASS RAINFALL CURVES



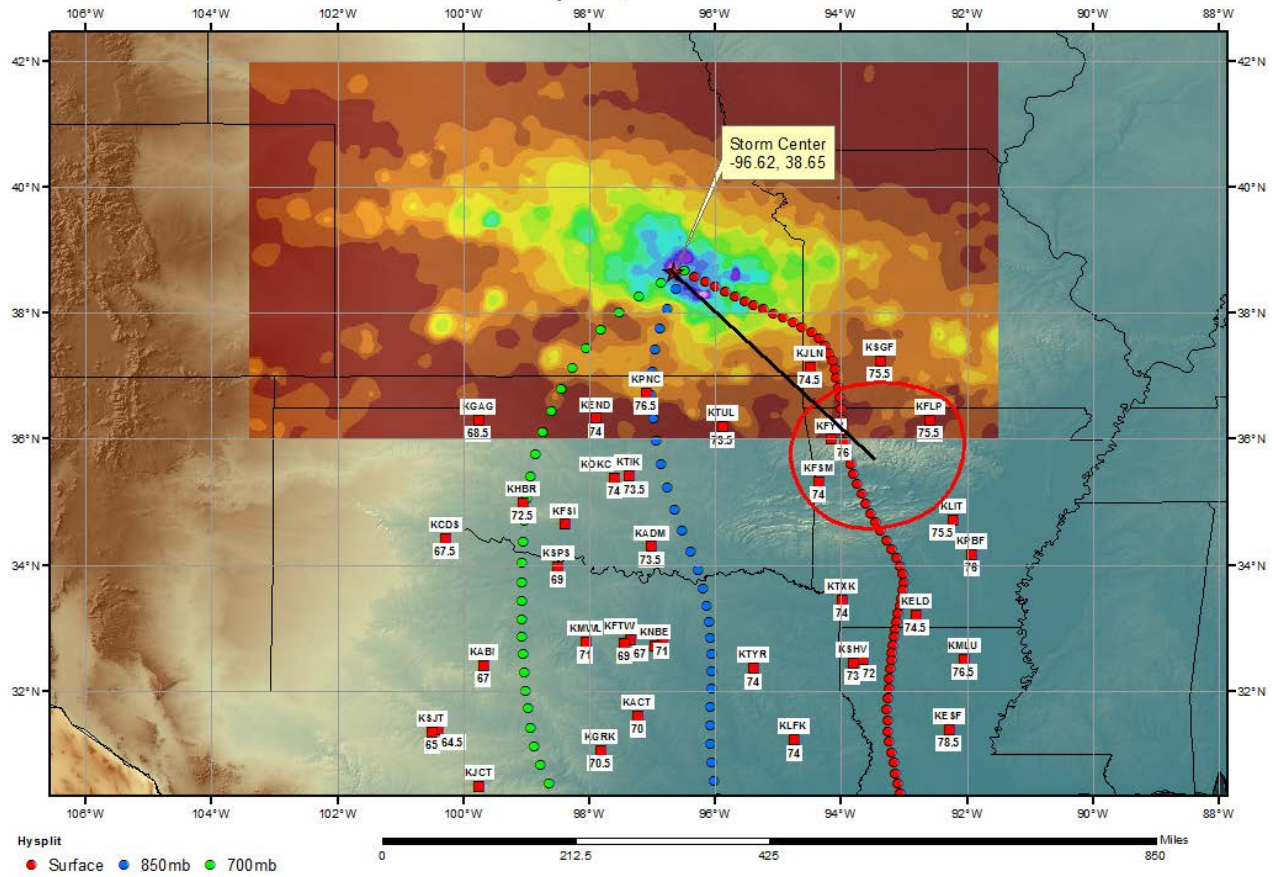
FORM 5-3E

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

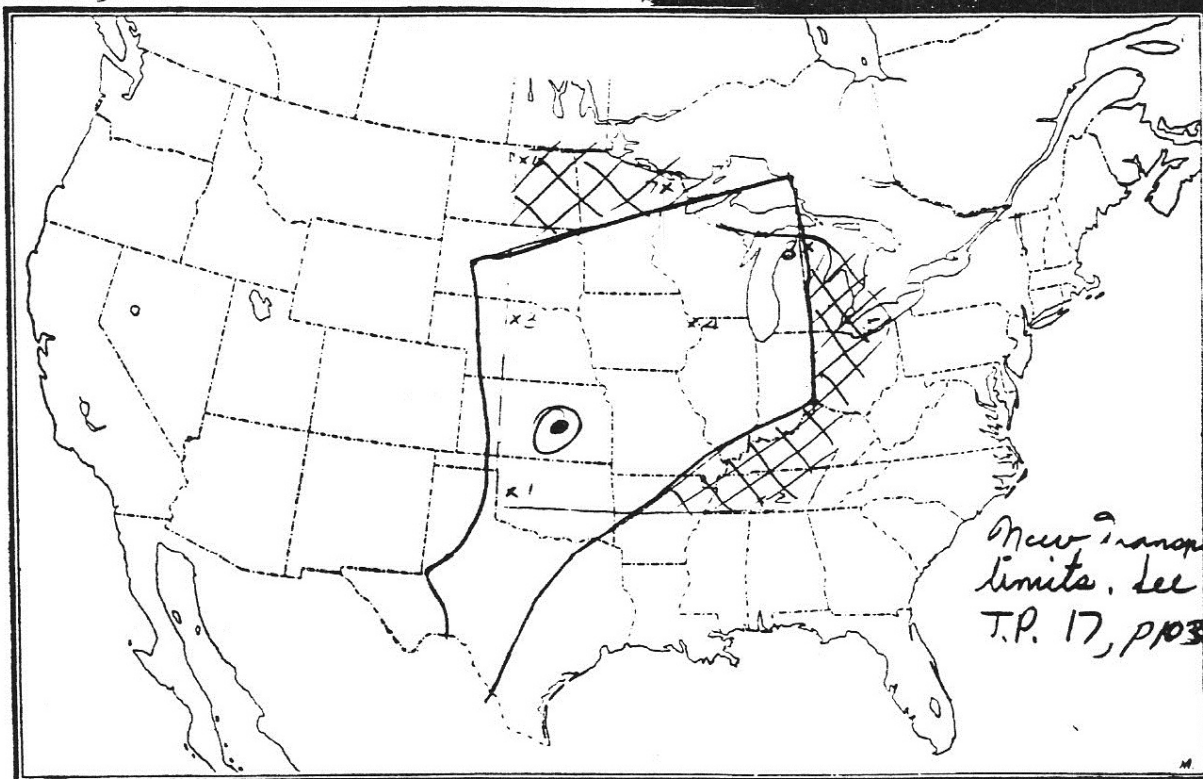


SPAS 1583 Council Grove (MR 10-2) Storm Analysis

July 9-11, 1951



MR10-2 July 9-13, 1951
Council Grove, Kansas
- Tol 73°F 205 SSN



Storm Precipitation Analysis System (SPAS) For Storm #1251_1

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)

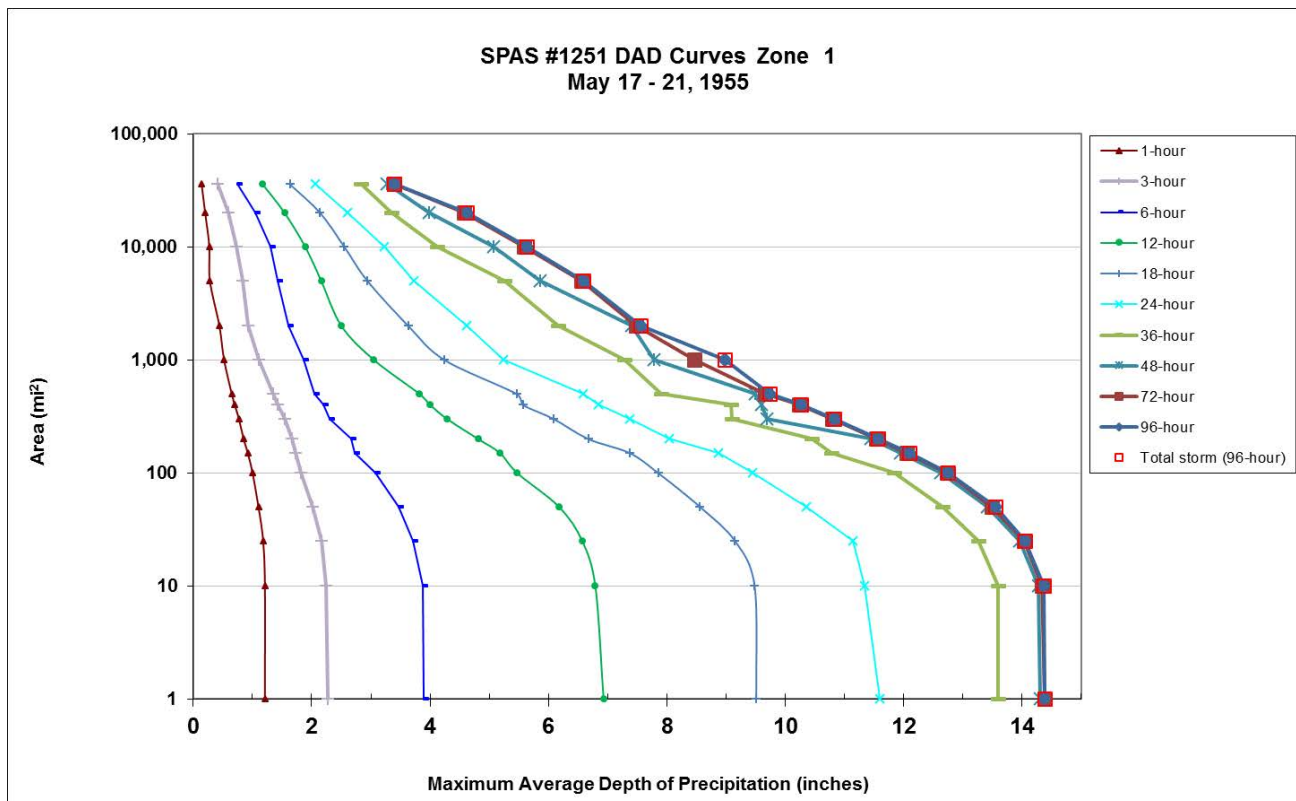
Radar Included: No

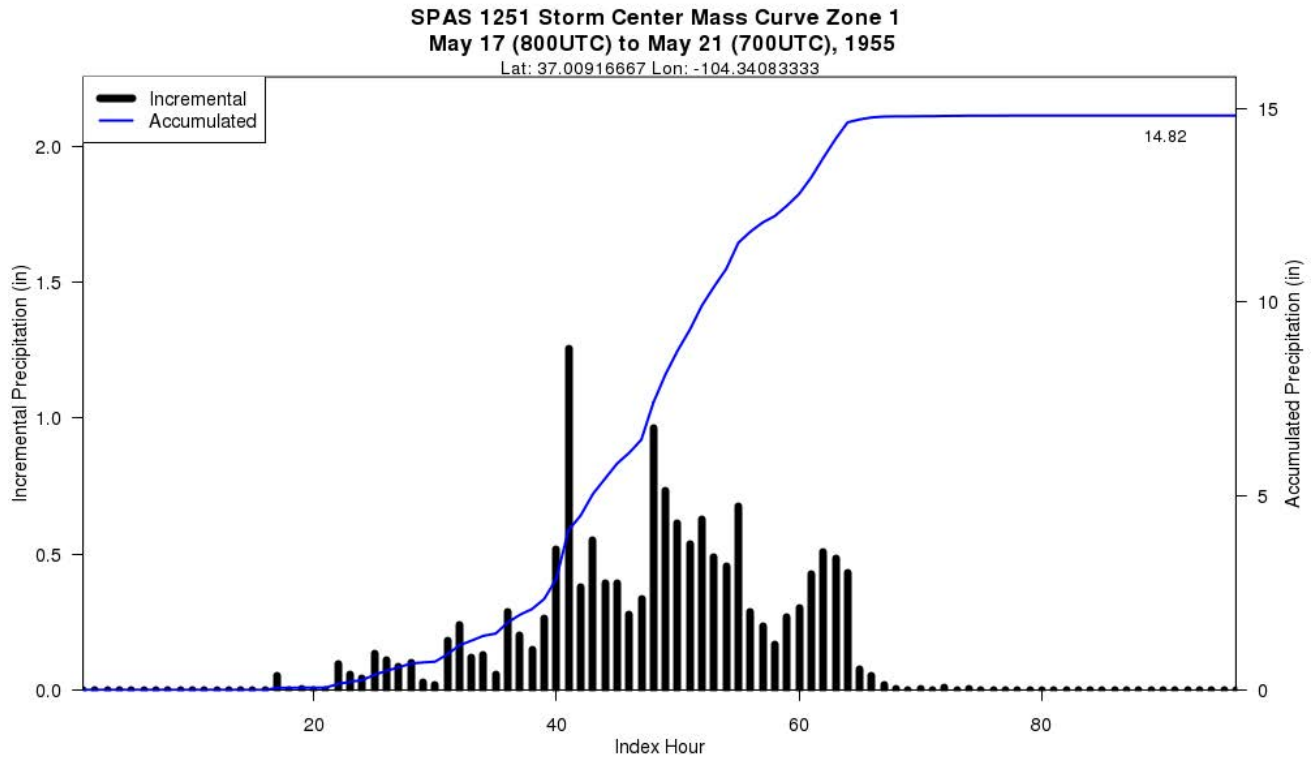
Depth-Area-Duration (DAD) analysis: Yes

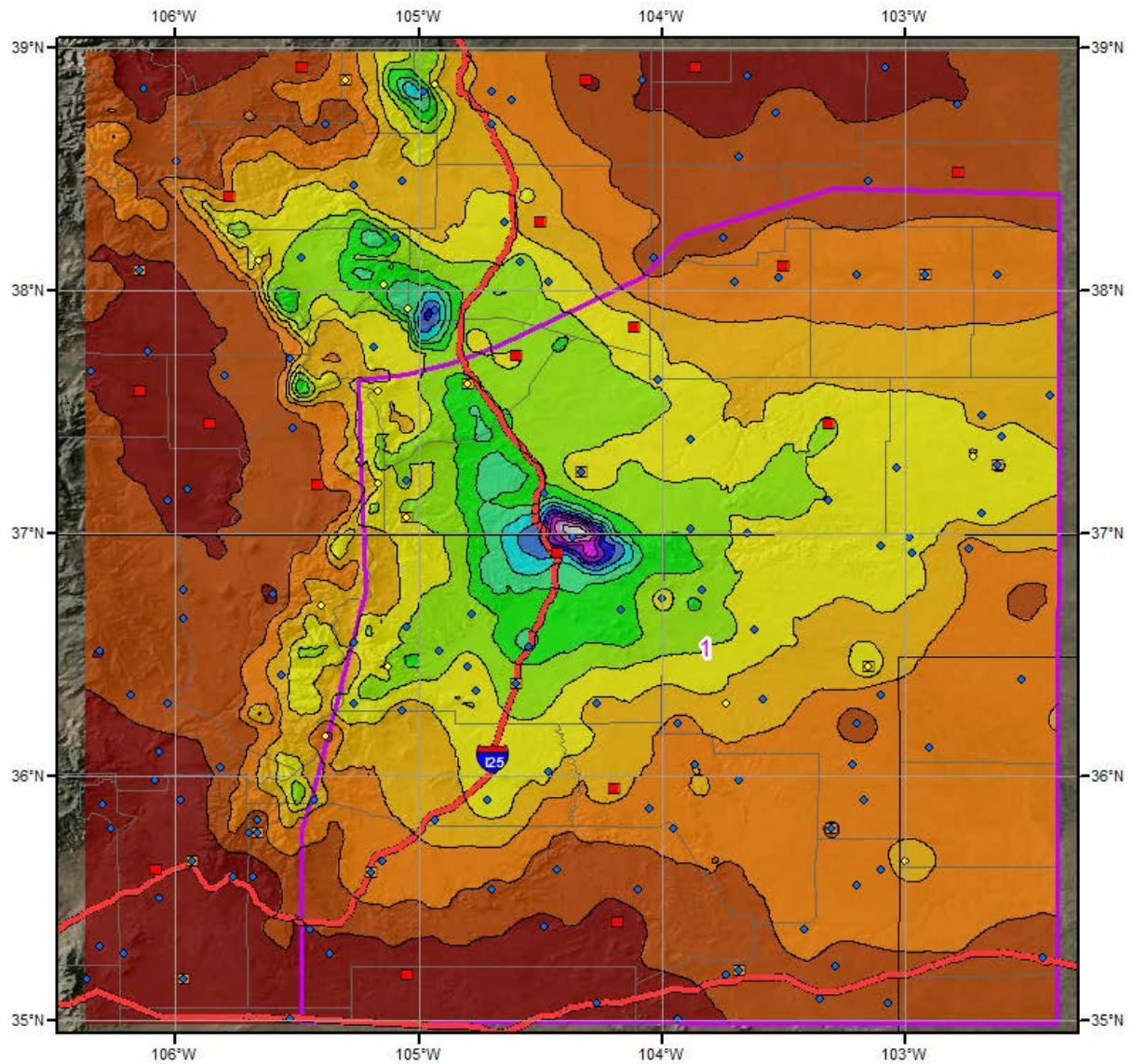
Reliability of results: This analysis was based on hourly data, daily data, and previously analyzed isohyetal pattern. We have a high degree of confidence in the station based results, and spatial pattern is dependent on PRISM basemap. The closest hourly station to Lake Maloya, NM was Raton, NM. The Lake Maloya, NM station recorded 11.28; in a 24-hr period, this value is a state record for New Mexico.

					Storm Rep. Dew Point					Climatological Max. Dew Point						
SPAS Storm ID	LON	LAT	ELEV	ELEV Round	T _d	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	T _d	T _d Round	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	IPMF
1251_1	-104.341	37.009	7,954	8,000	70.50	2.31	1.34	63	0.970	78.26	78.5	3.37	1.78	79	1.585	1.500

SPAS 1251 - May 17 (800 UTC) - May 21 (700 UTC), 1955											
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)											
Area (mi ²)	Duration (hours)										
	1	3	6	12	18	24	36	48	72	96	Total
0.3	1.26	2.32	3.98	7.09	9.77	11.90	14.04	14.74	14.82	14.82	14.82
1	1.21	2.27	3.89	6.93	9.51	11.60	13.60	14.30	14.38	14.38	14.38
10	1.21	2.25	3.87	6.79	9.48	11.34	13.60	14.27	14.34	14.36	14.36
25	1.18	2.16	3.71	6.57	9.15	11.14	13.26	13.95	14.03	14.04	14.04
50	1.10	2.02	3.47	6.18	8.56	10.36	12.65	13.41	13.49	13.54	13.54
100	1.00	1.82	3.08	5.47	7.85	9.45	11.84	12.63	12.73	12.74	12.74
150	0.92	1.73	2.72	5.18	7.37	8.87	10.78	11.95	12.05	12.10	12.10
200	0.85	1.67	2.66	4.81	6.67	8.04	10.44	11.44	11.54	11.57	11.57
300	0.77	1.54	2.30	4.29	6.09	7.37	9.10	9.69	10.80	10.83	10.83
400	0.70	1.42	2.20	4.00	5.57	6.85	9.08	9.59	10.23	10.26	10.26
500	0.65	1.35	2.04	3.82	5.46	6.58	7.91	9.49	9.66	9.74	9.74
1,000	0.52	1.11	1.86	3.05	4.24	5.24	7.28	7.78	8.47	8.97	8.97
2,000	0.44	0.93	1.60	2.50	3.63	4.62	6.16	7.40	7.48	7.55	7.55
5,000	0.28	0.83	1.42	2.16	2.94	3.73	5.25	5.86	6.56	6.59	6.59
10,000	0.27	0.73	1.31	1.89	2.55	3.22	4.12	5.08	5.59	5.63	5.63
20,000	0.20	0.60	1.04	1.54	2.14	2.60	3.35	3.98	4.58	4.62	4.62
35,752	0.14	0.41	0.75	1.17	1.63	2.06	2.83	3.27	3.40	3.40	3.40



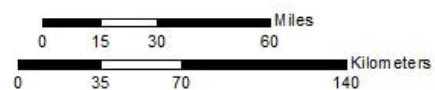




Total Precipitation (96-hours)
SPAS1251 - Lake Maloya, NM
5/17/1955 0800 GMT - 5/21/1955 0700 GMT

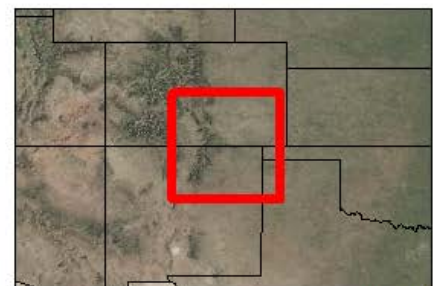
Gauges

- ◆ Daily
- Hourly
- Hourly Pseudo
- ◆ Supplemental



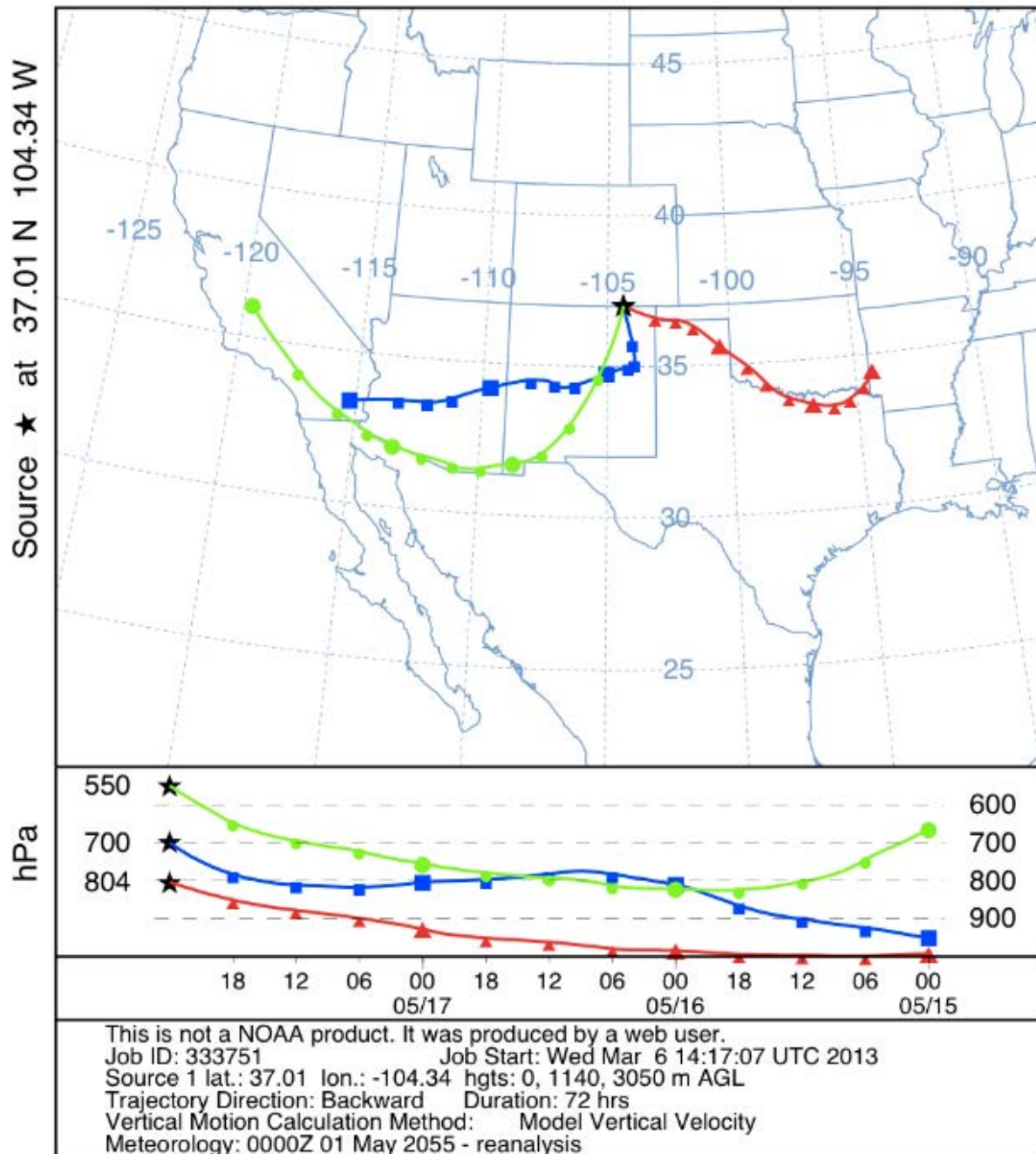
Precipitation (inches)

0.00 - 1.00	3.01 - 4.00	6.01 - 7.00	9.01 - 10.00	12.01 - 13.00
1.01 - 2.00	4.01 - 5.00	7.01 - 8.00	10.01 - 11.00	13.01 - 14.00
2.01 - 3.00	5.01 - 6.00	8.01 - 9.00	11.01 - 12.00	14.01 - 15.00

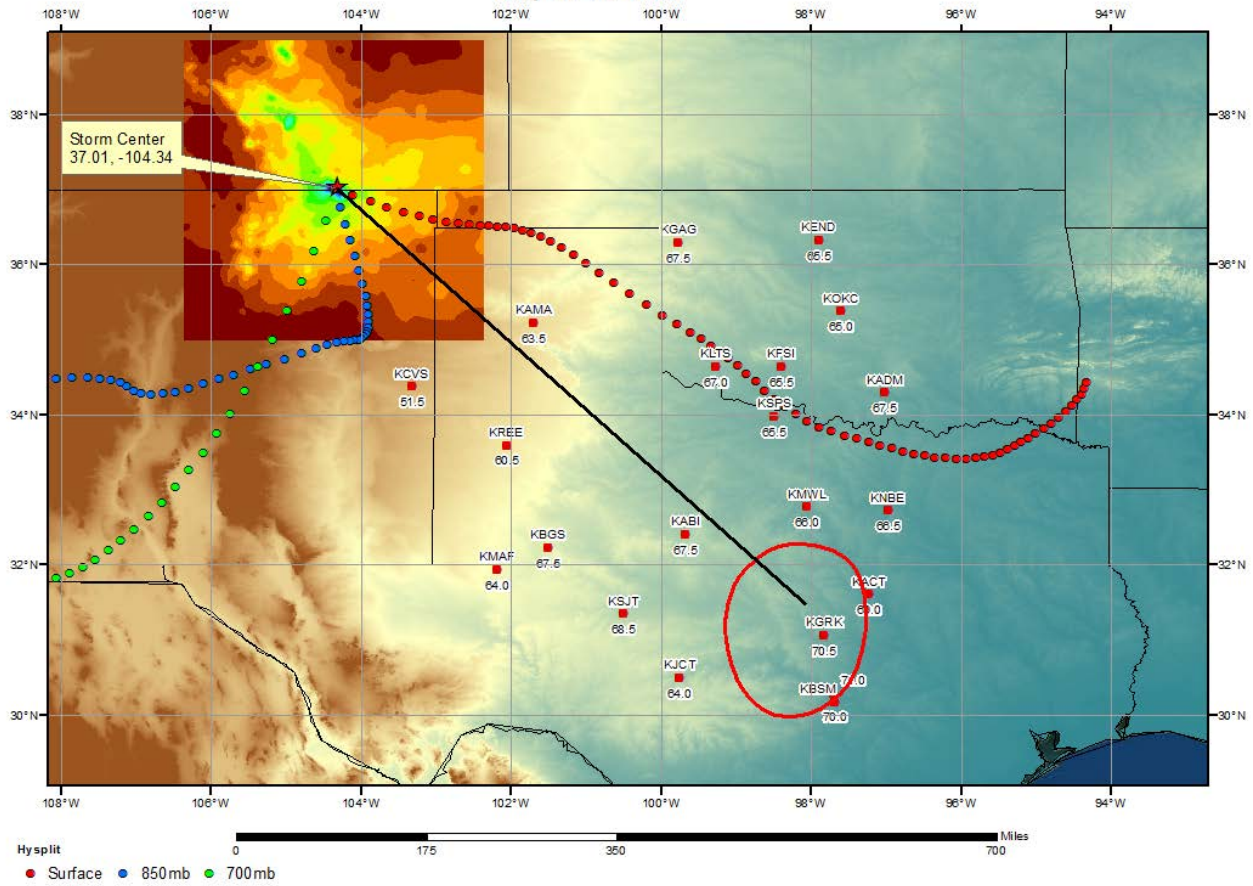


9/11/2012

NOAA HYSPLIT MODEL
Backward trajectories ending at 0000 UTC 18 May 55
CDC1 Meteorological Data



SPAS 1251 Lake Mayola, NM Storm Analysis May 16-17, 1955



Storm Precipitation Analysis System (SPAS) For Storm #1183_1

General Storm Location: Edgerton, Missouri

Storm Dates: July 18-20, 1965

Event: Synoptic

DAD Zone 1

Latitude: 40.4125

Longitude: -95.5125

Max. Grid Rainfall Amount: 20.76"

Max. Observed Rainfall Amount: 20.10" at ATCHISON 65N 41W SCT34

Number of Stations: 387 (90 Daily, 41 Hourly, 4 Hourly Estimated, 2 Hourly Estimated Pseudo, 13 Hourly Pseudo, and 237 Supplemental)

SPAS Version: 8.5

Base Map Used: Yes, conus_prism_ppt_in_1971_2000_07

Spatial resolution: 00:00:30 (0.3 sq. miles)

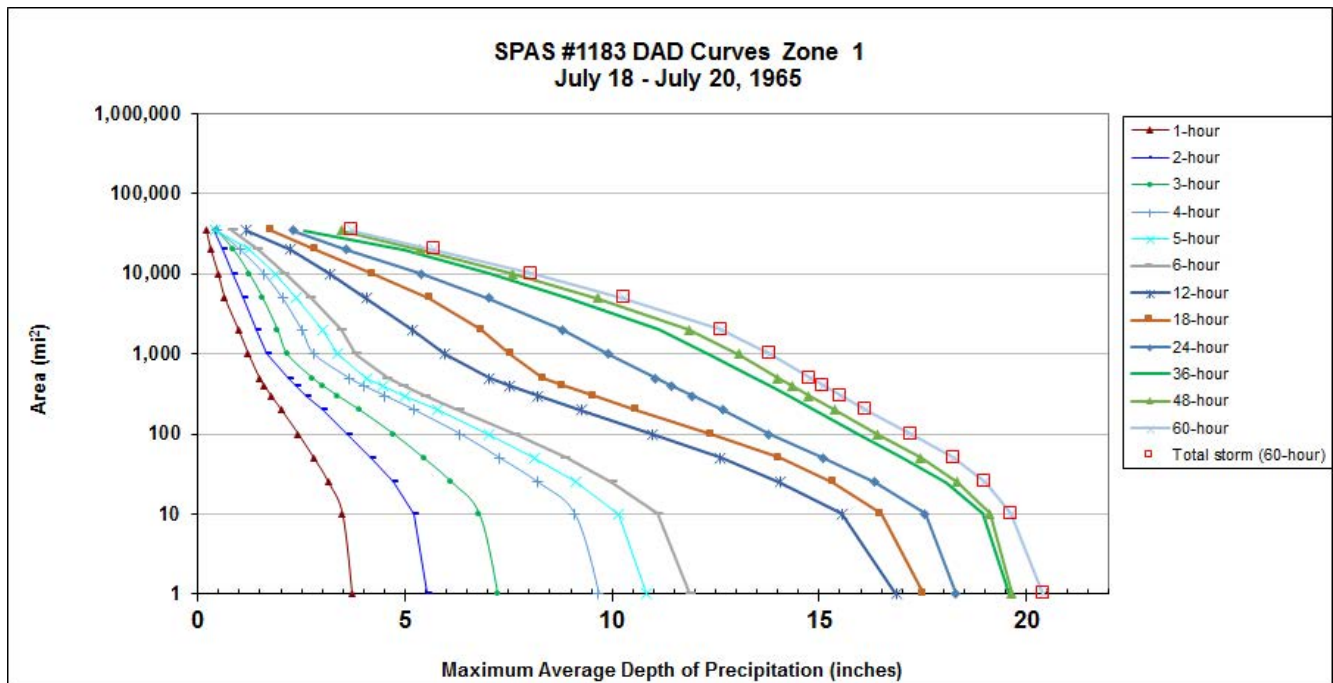
Radar Included: No

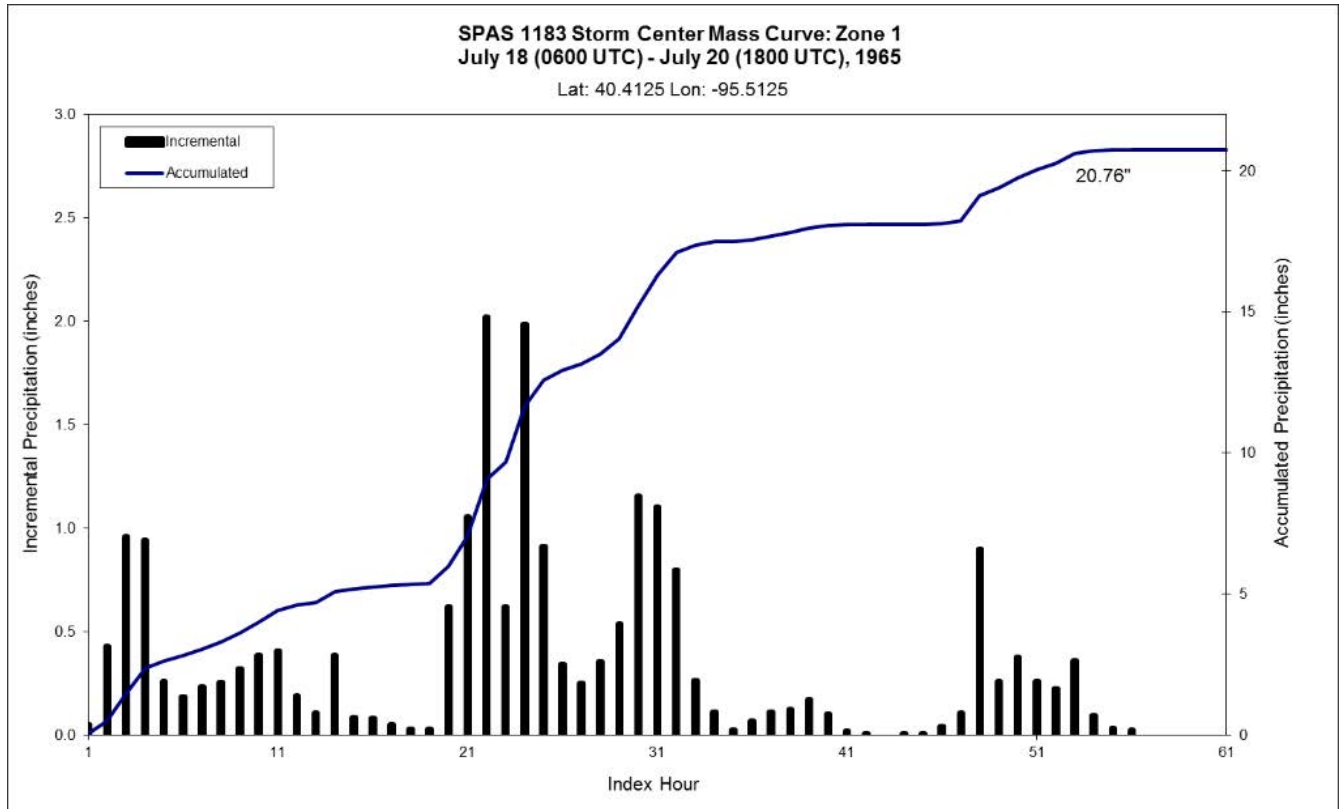
Depth-Area-Duration (DAD) analysis: Yes

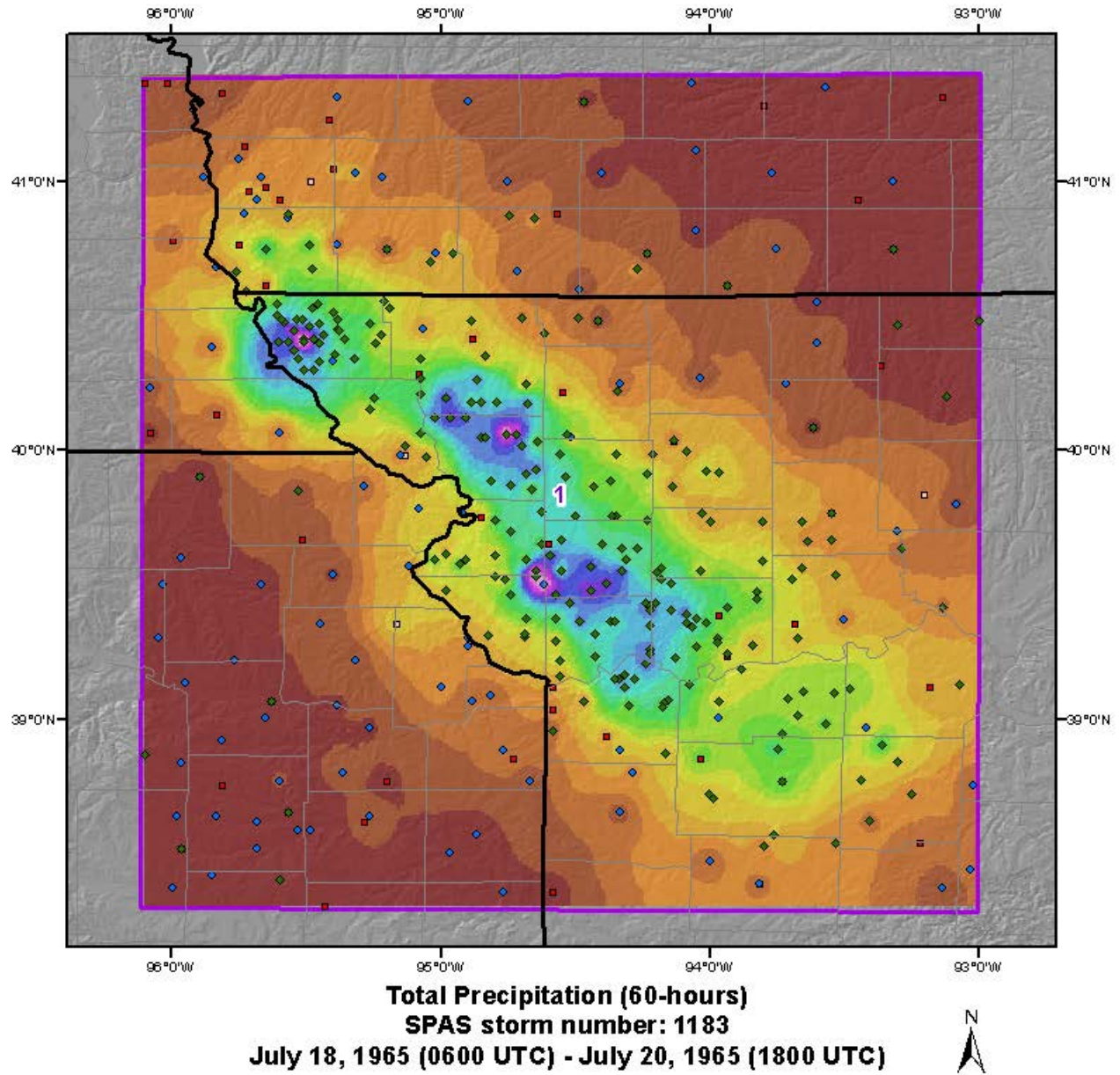
					Storm Rep. Dew Point					Climatological Max. Dew Point						
SPAS Storm ID	LON	LAT	ELEV	ELEV Round	T _d	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	T _d	T _d Round	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	IPMF
1183_1	-95.513	40.413	915	900	76.00	2.99	0.23	74	2.760	80.47	80.5	3.68	0.27	83	3.410	1.236

Storm 1183 - July 18 (0600 UTC) - July 20 (1800 UTC), 1965
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)

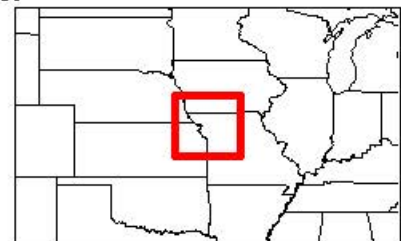
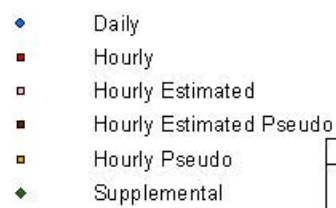
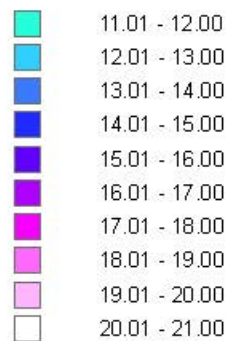
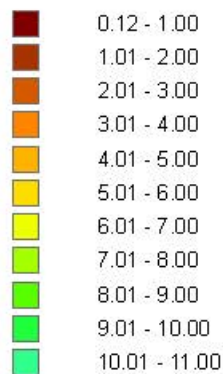
Area (mi ²)	Duration (hours)												
	1	2	3	4	5	6	12	18	24	36	48	60	Total
0.4	3.75	5.61	7.30	9.78	10.92	12.00	17.04	17.70	18.50	19.74	19.79	20.64	20.64
1	3.72	5.55	7.23	9.67	10.82	11.88	16.86	17.51	18.30	19.58	19.64	20.41	20.41
10	3.49	5.22	6.79	9.09	10.15	11.11	15.55	16.48	17.56	18.95	19.11	19.63	19.63
25	3.15	4.71	6.12	8.20	9.14	10.00	14.06	15.33	16.35	18.05	18.33	19.01	19.01
50	2.80	4.18	5.45	7.29	8.12	8.88	12.61	14.04	15.09	17.00	17.44	18.24	18.24
100	2.42	3.62	4.72	6.33	7.02	7.65	10.96	12.38	13.79	15.93	16.40	17.21	17.21
200	2.01	3.02	3.90	5.23	5.79	6.30	9.25	10.59	12.69	14.90	15.38	16.13	16.13
300	1.76	2.62	3.37	4.52	5.01	5.49	8.21	9.56	11.94	14.24	14.75	15.52	15.52
400	1.60	2.36	3.02	4.01	4.47	4.95	7.51	8.81	11.43	13.79	14.33	15.10	15.10
500	1.48	2.18	2.77	3.66	4.09	4.58	7.03	8.34	11.05	13.45	14.00	14.78	14.78
1,000	1.21	1.65	2.15	2.80	3.37	3.82	5.97	7.55	9.92	12.35	13.05	13.83	13.83
2,000	0.97	1.41	1.92	2.51	3.00	3.46	5.17	6.84	8.80	11.13	11.85	12.63	12.63
5,000	0.64	1.10	1.56	2.04	2.38	2.73	4.06	5.59	7.02	8.97	9.64	10.28	10.28
10,000	0.48	0.86	1.24	1.60	1.86	2.10	3.18	4.21	5.38	7.05	7.59	8.07	8.07
20,000	0.30	0.61	0.86	1.03	1.25	1.45	2.23	2.84	3.58	4.98	5.36	5.71	5.71
35,221	0.19	0.37	0.45	0.46	0.43	0.83	1.17	1.78	2.29	2.57	3.46	3.72	3.72



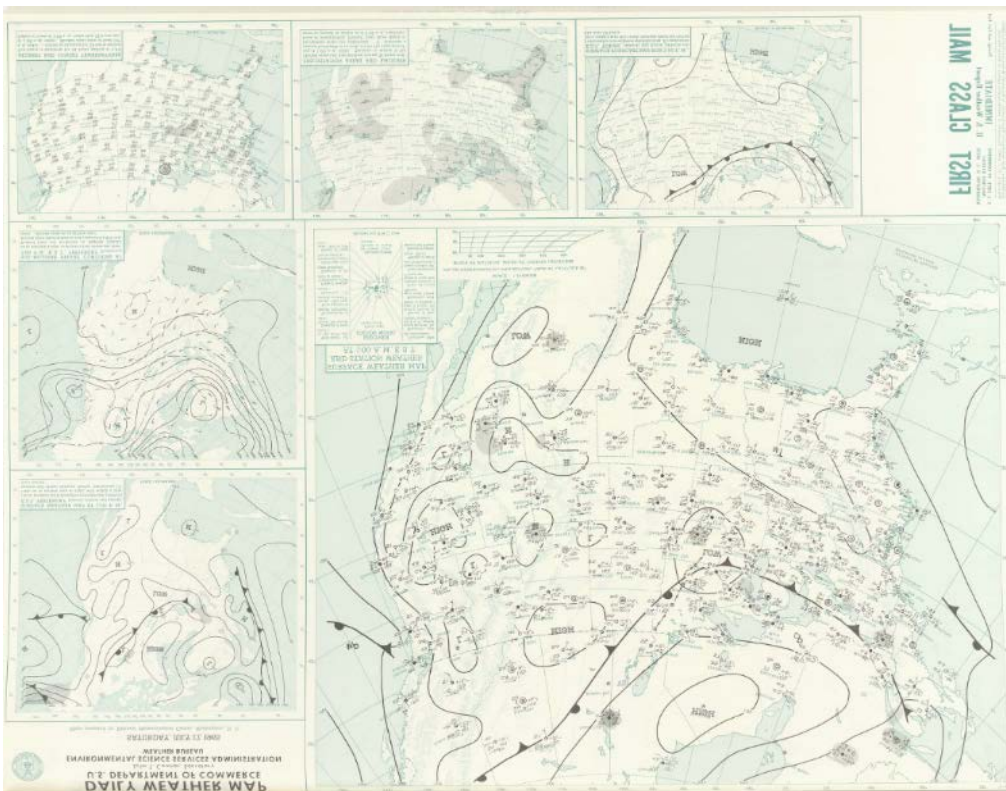
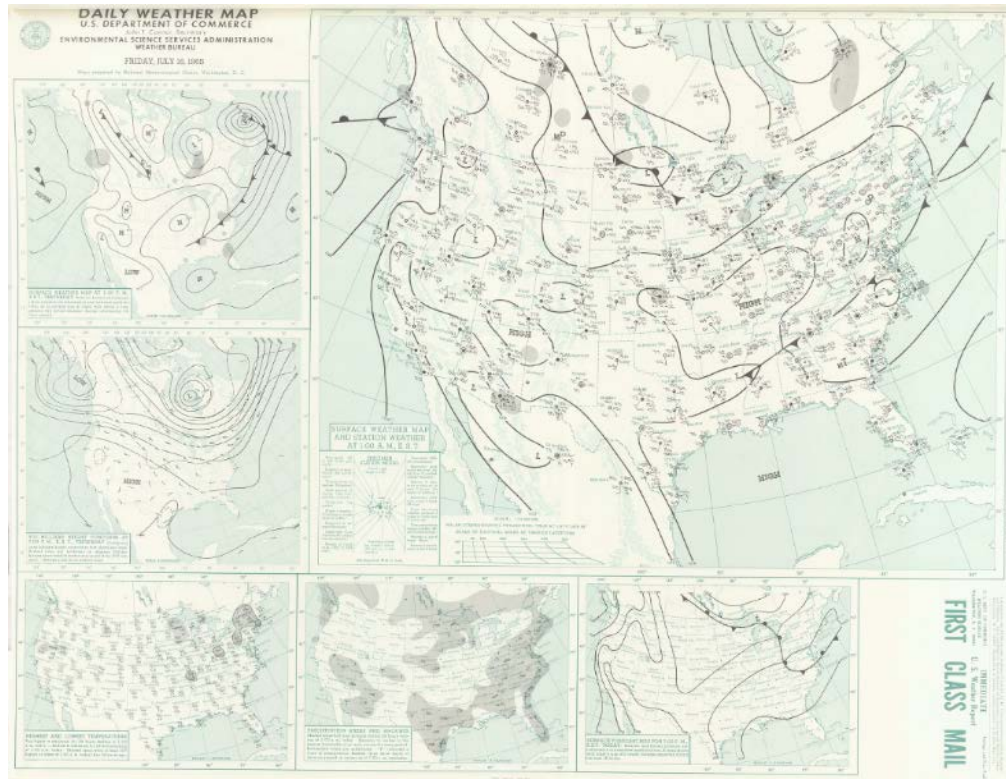


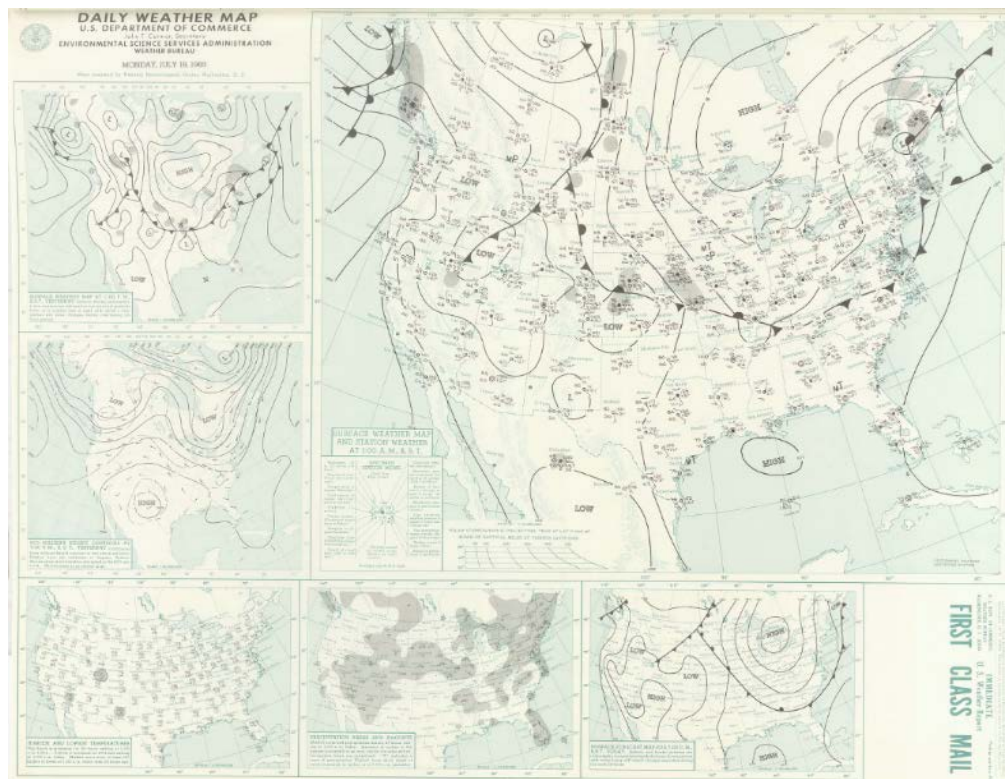
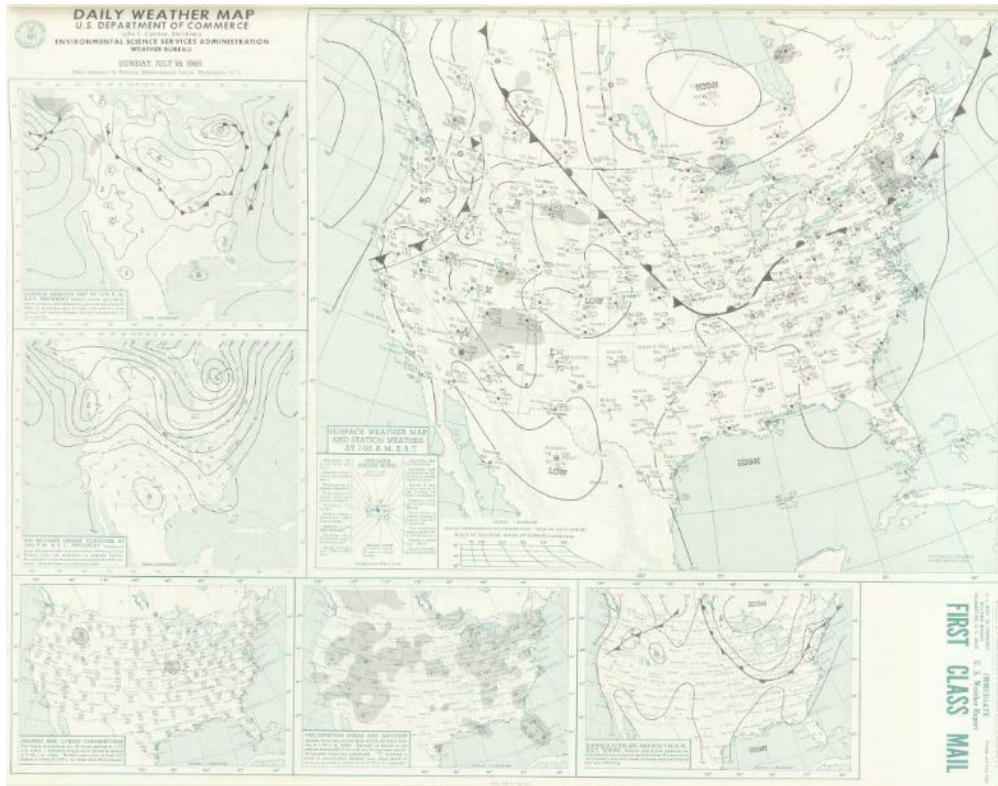


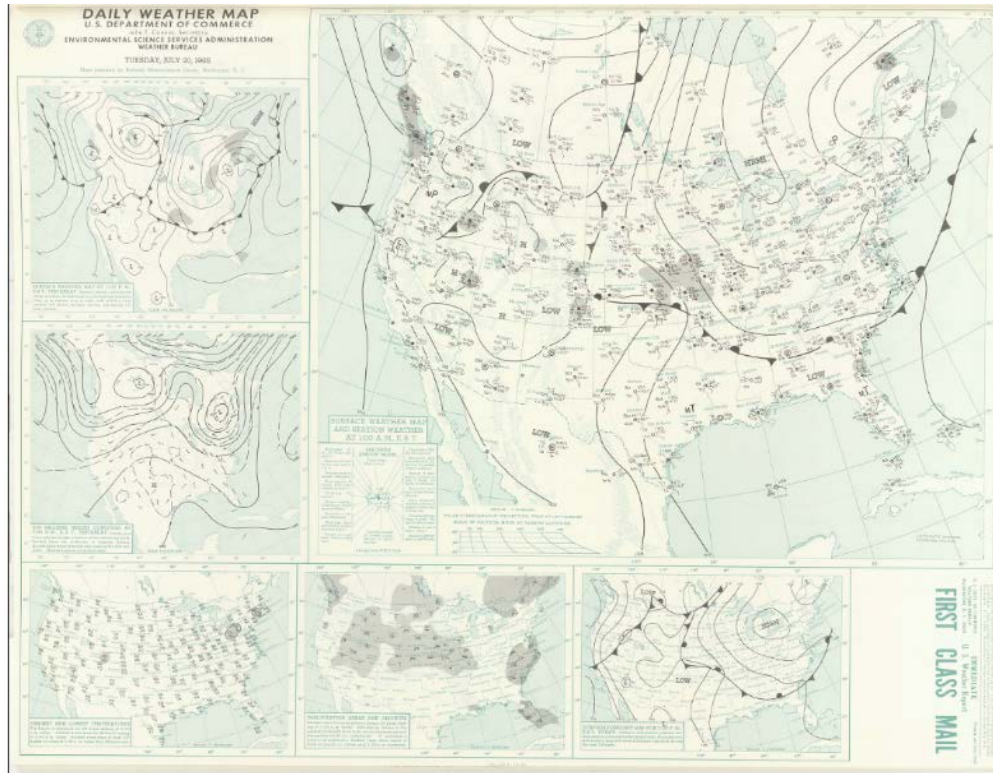
Precipitation (inches)



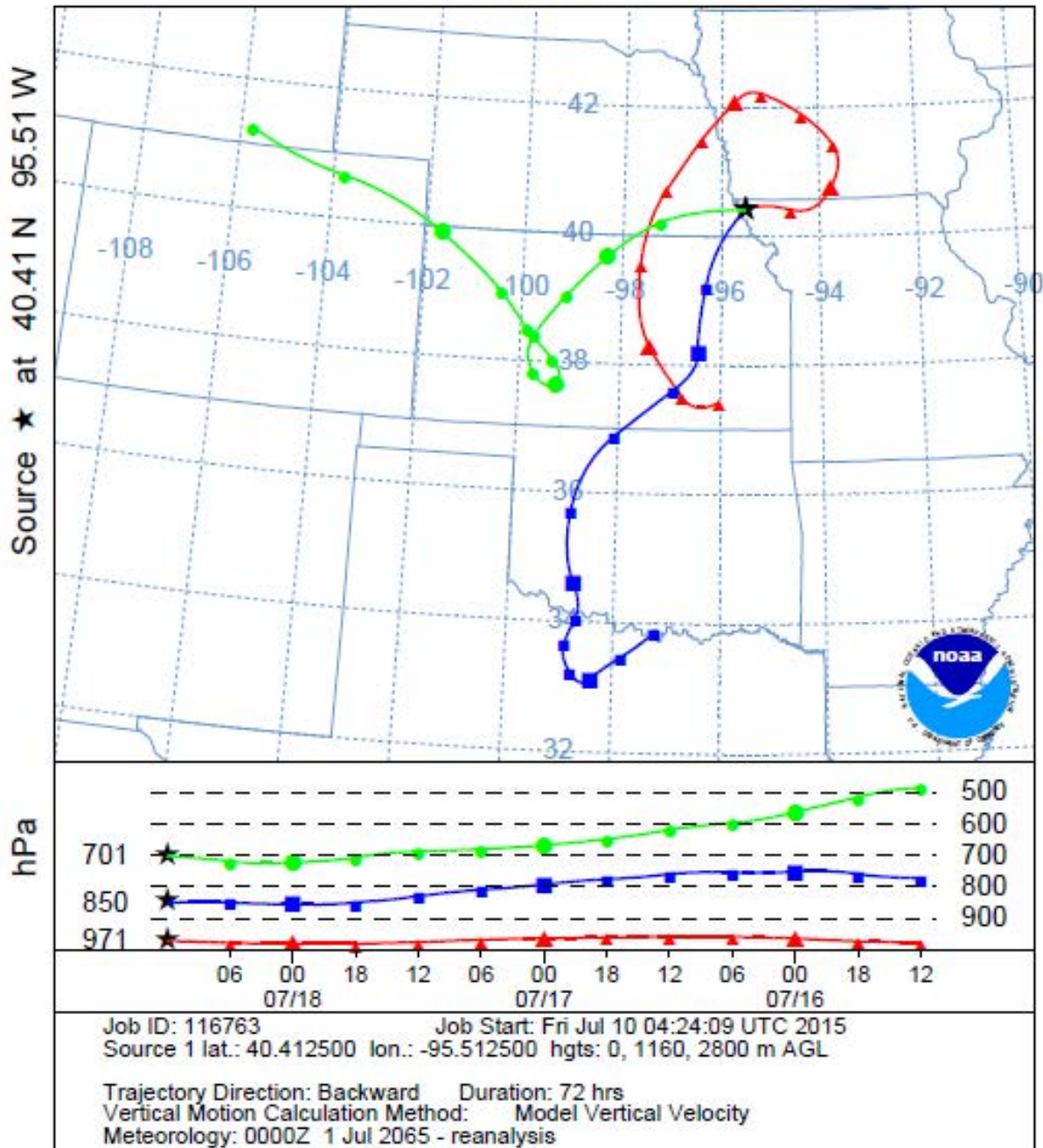
NE S&B FAWA May 20, 2010



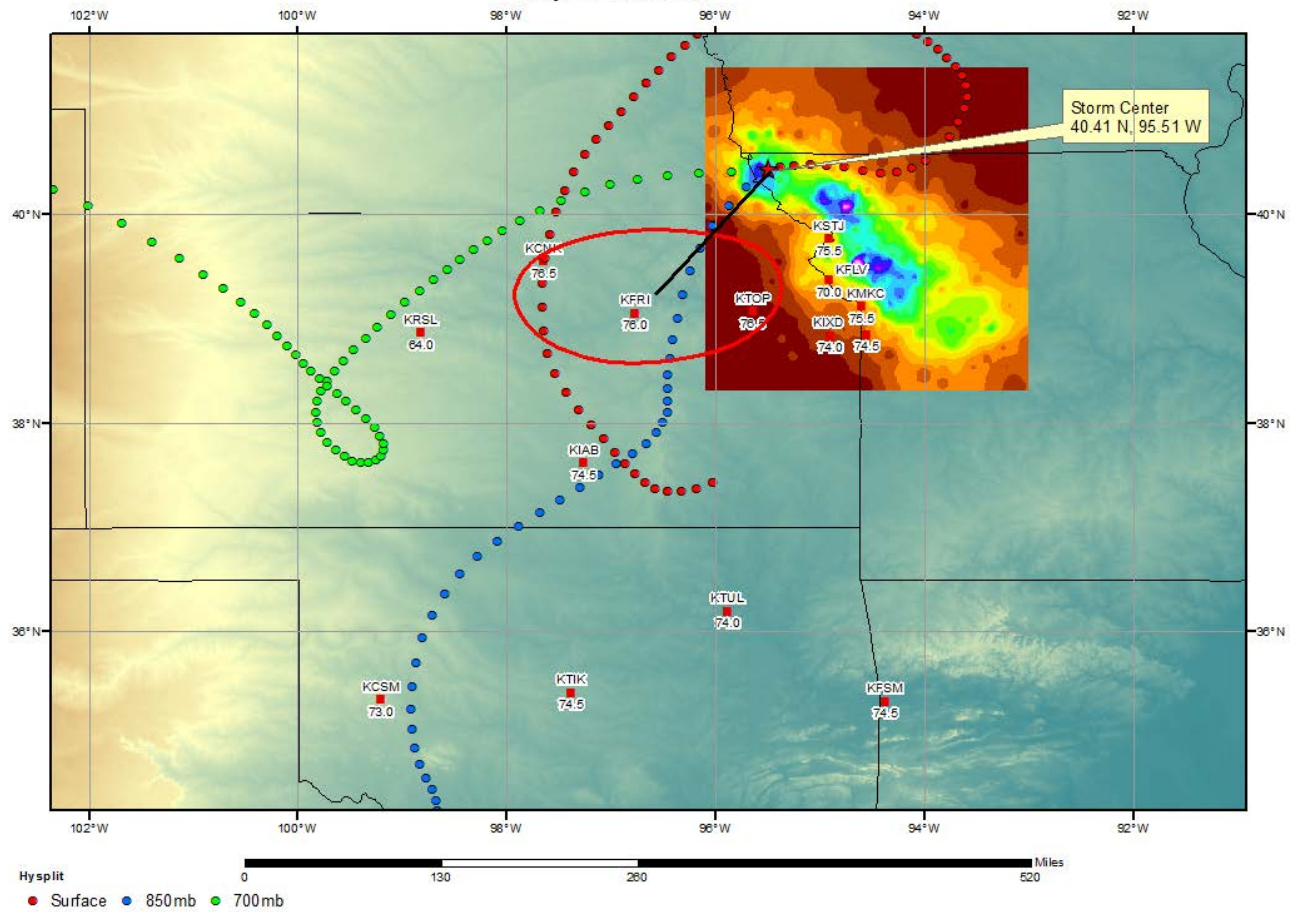




NOAA HYSPLIT MODEL
 Backward trajectories ending at 1200 UTC 18 Jul 65
 CDC1 Meteorological Data



SPAS 1183 Edgerton, MO Storm Analysis July 16-19, 1965



Storm Precipitation Analysis System (SPAS) For Storm #1253_1

General Storm Location: Colorado

Storm Dates: May 3-8, 1969

Event: Synoptic

DAD Zone 1

Latitude: 40.27

Longitude: -105.42

Max. Grid Rainfall Amount: 20.01"

Max. Observed Rainfall Amount: 20.00"

Number of Stations: 332 (182 Daily, 27 Hourly, 7 Hourly Pseudo, 107 Supplemental, and 9 Supplemental Estimated)

SPAS Version: 9.5

Basemap: PRISM May 1969 precipitation

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

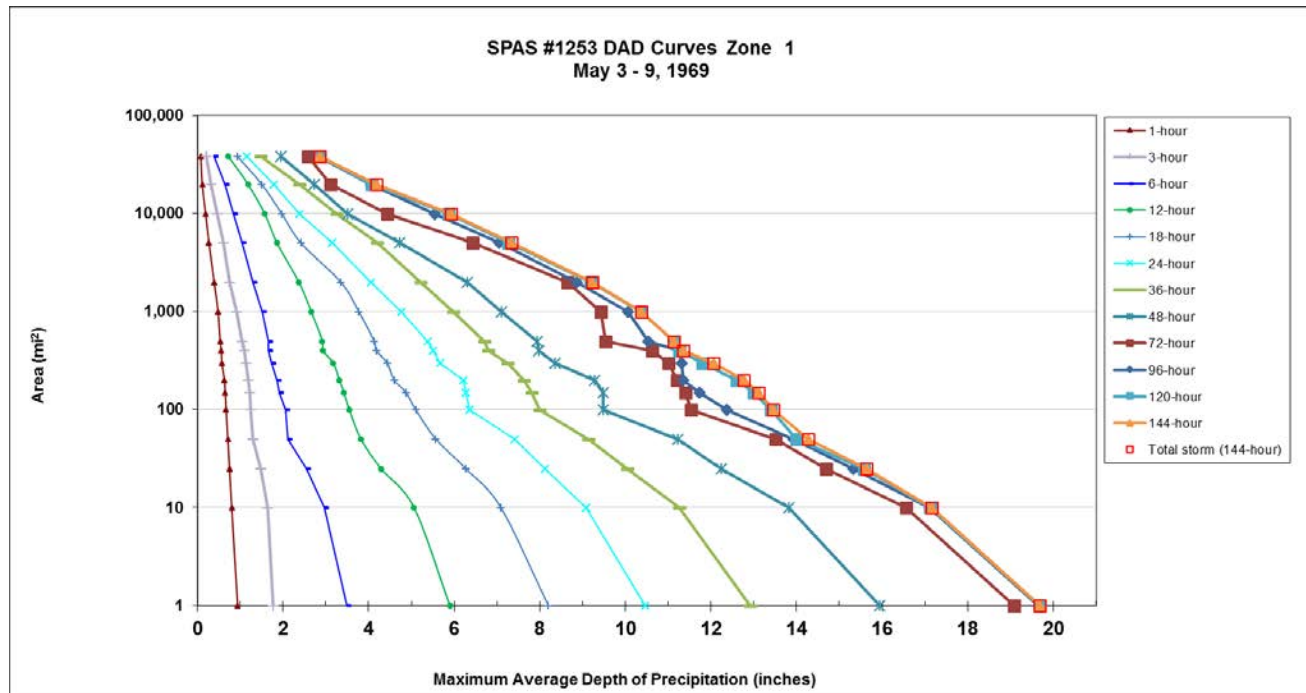
Radar Included: No

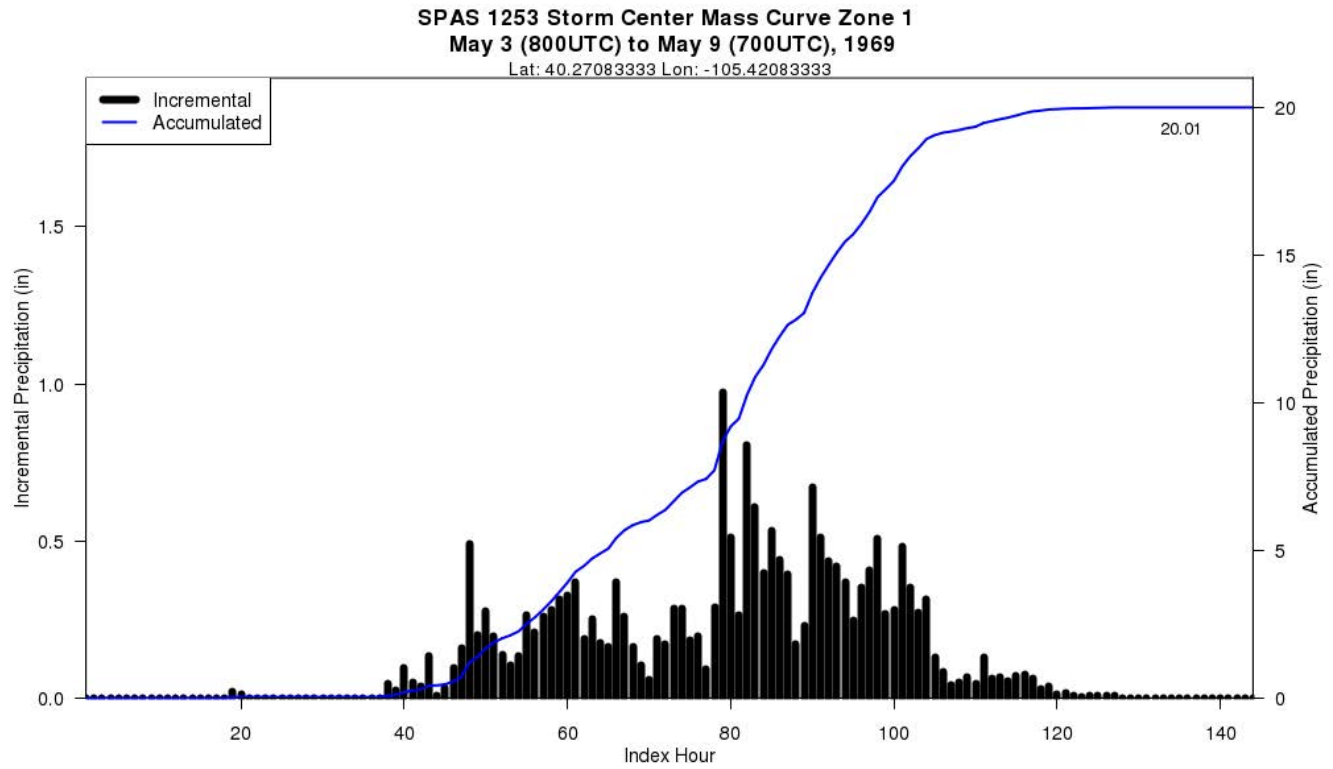
Depth-Area-Duration (DAD) analysis: Yes

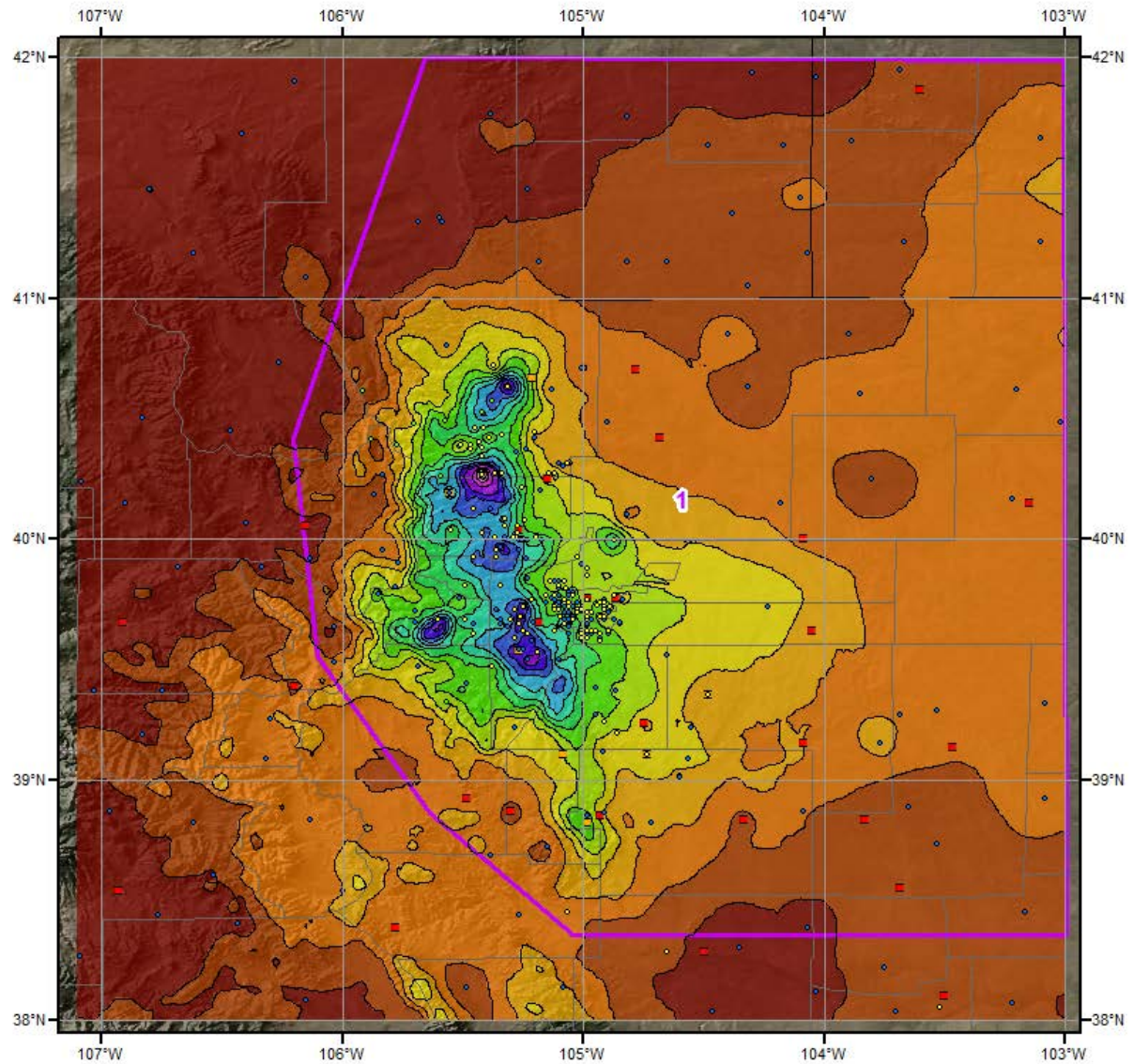
Reliability of results: This analysis was based on hourly data, daily data, supplemental bucket survey data, and previously analyzed isohyetal pattern. We have a high degree of confidence in the station based results, and spatial pattern is dependent on PRISM basemap. The closest hourly station to Big Elk Meadow was Boulder no2, CO. The Big Elk Meadow, CO bucket survey supplemental station recorded 20.00" (bucket survey data from NCDC Colorado Climatological Data May 1969). This value was adjusted to 20.21" in order for SPAS to maintain a 20.00" value at the station grid cell location.

					Storm Rep. Dew Point					Climatological Max. Dew Point						
SPAS Storm ID	LON	LAT	ELEV	ELEV Round	T _d	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	T _d	T _d Round	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	IPMF
1253 1	-105.417	40.267	7,656	7,500	64.00	1.68	1.00	50	0.680	74.33	74.5	2.79	1.48	71	1.315	1.500

SPAS 1253 - May 3 (800 UTC) - May 9 (700 UTC), 1969													
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)													
Area (mi ²)	Duration (hours)												
	1	3	6	12	18	24	36	48	72	96	120	144	Total
0.3	0.97	1.82	3.56	6.00	8.34	10.64	13.13	16.21	19.41	19.97	20.01	20.01	20.01
1	0.94	1.77	3.50	5.90	8.20	10.46	12.92	15.94	19.09	19.65	19.69	19.69	19.69
10	0.80	1.65	2.97	5.06	7.09	9.08	11.26	13.83	16.57	17.10	17.12	17.16	17.16
25	0.75	1.47	2.55	4.29	6.27	8.13	10.04	12.25	14.70	15.32	15.58	15.64	15.64
50	0.71	1.30	2.11	3.82	5.57	7.42	9.14	11.22	13.51	13.93	14.01	14.28	14.28
100	0.67	1.25	2.06	3.55	5.10	6.36	8.00	9.49	11.53	12.37	13.41	13.46	13.46
150	0.65	1.22	1.91	3.42	4.87	6.27	7.81	9.48	11.40	11.73	13.01	13.11	13.11
200	0.63	1.19	1.86	3.32	4.60	6.21	7.63	9.29	11.21	11.36	12.61	12.76	12.76
300	0.57	1.14	1.74	3.17	4.43	5.67	7.25	8.36	11.00	11.32	11.80	12.06	12.06
400	0.56	1.09	1.66	2.93	4.18	5.50	6.80	7.97	10.63	11.26	11.27	11.36	11.36
500	0.53	1.05	1.66	2.92	4.13	5.38	6.70	7.94	9.54	10.54	11.14	11.14	11.14
1,000	0.48	0.91	1.52	2.66	3.77	4.77	5.98	7.11	9.43	10.07	10.38	10.38	10.38
2,000	0.39	0.75	1.29	2.37	3.35	4.06	5.21	6.30	8.65	8.87	9.20	9.23	9.23
5,000	0.27	0.60	1.04	1.86	2.42	3.15	4.20	4.72	6.44	7.05	7.27	7.35	7.35
10,000	0.19	0.47	0.85	1.57	1.97	2.38	3.25	3.52	4.44	5.54	5.87	5.93	5.93
20,000	0.11	0.32	0.65	1.18	1.50	1.79	2.38	2.73	3.12	4.06	4.08	4.18	4.18
38,492	0.08	0.21	0.39	0.72	0.93	1.15	1.47	1.95	2.58	2.82	2.86	2.86	2.86



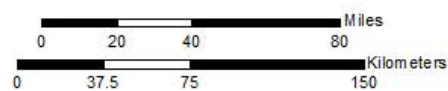




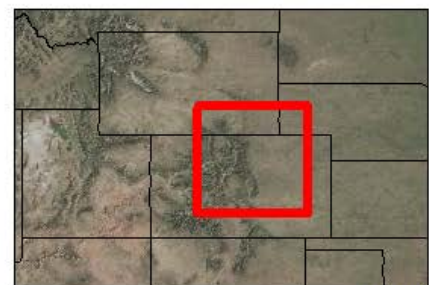
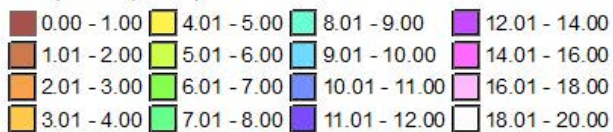
Total Precipitation (144-hours)
SPAS 1253 - Big Elk Meadows, CO
5/3/1969 0800 GMT - 5/9/1969 0700 GMT

Gauges

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

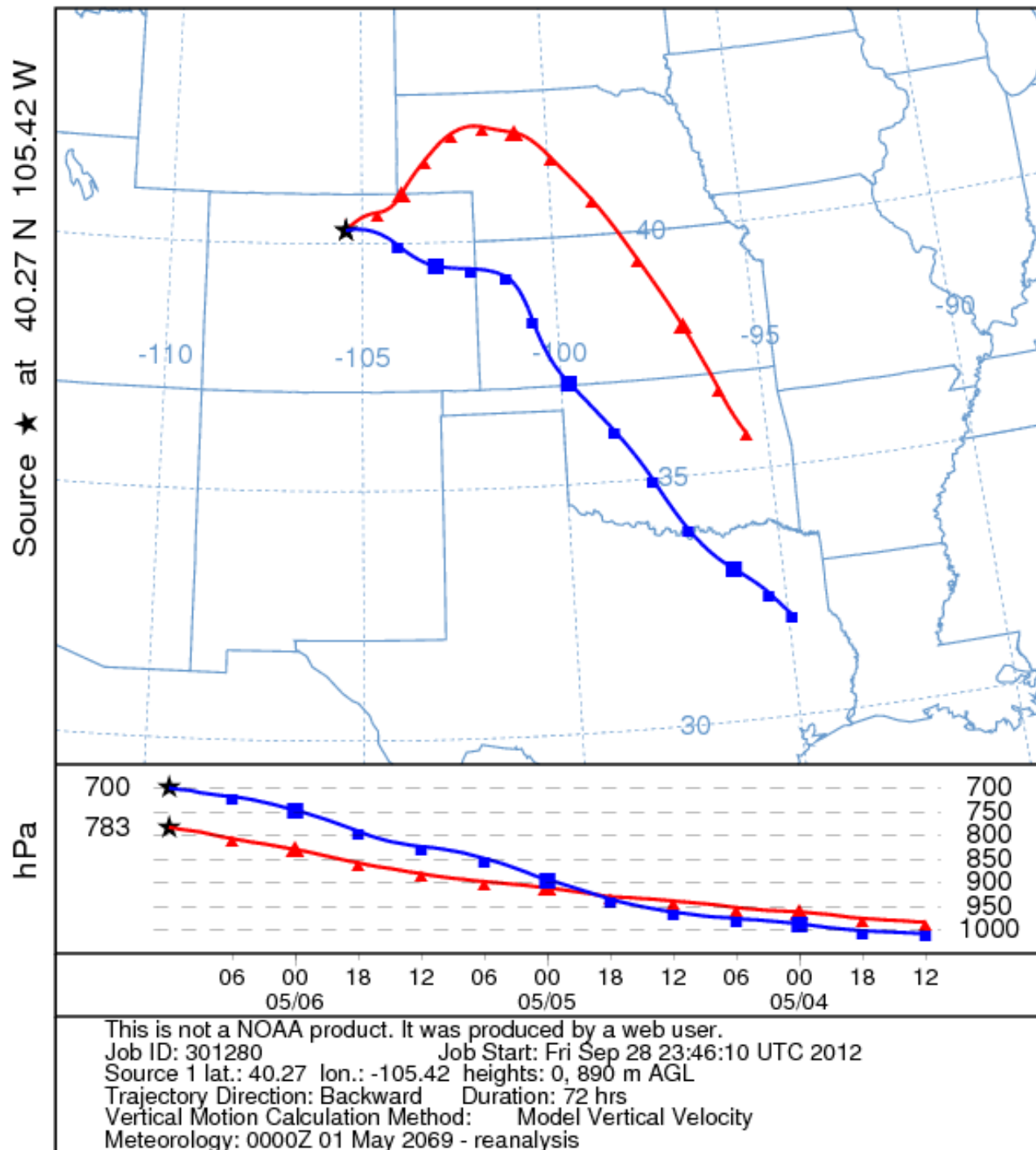


Precipitation (inches)

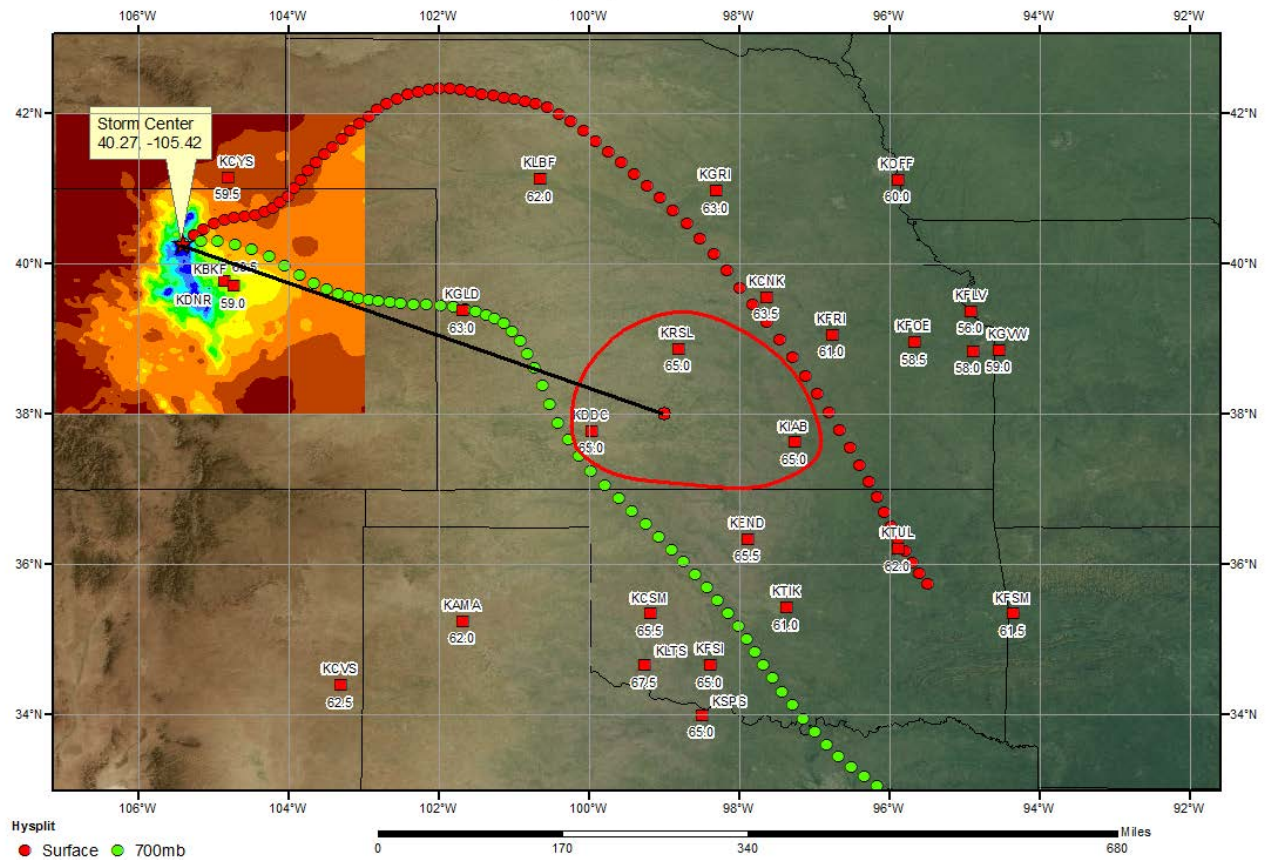


9/26/2012

NOAA HYSPLIT MODEL
Backward trajectories ending at 1200 UTC 06 May 69
CDC1 Meteorological Data



SPAS 1253 Big Elk Meadow, CO Storm Analysis May 2-5, 1969



Storm Precipitation Analysis System (SPAS) For Storm #1219_1

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

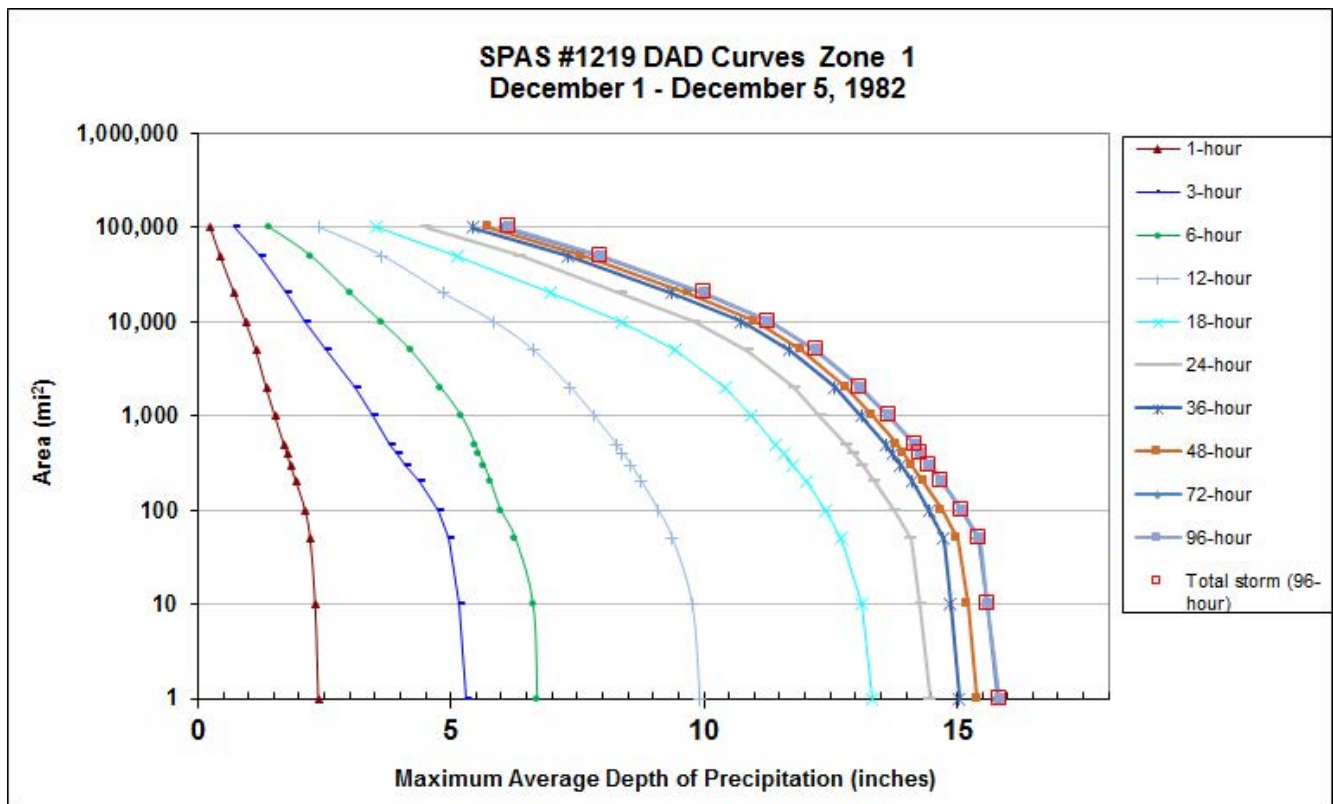
Spatial resolution: 0.30 sq-mi

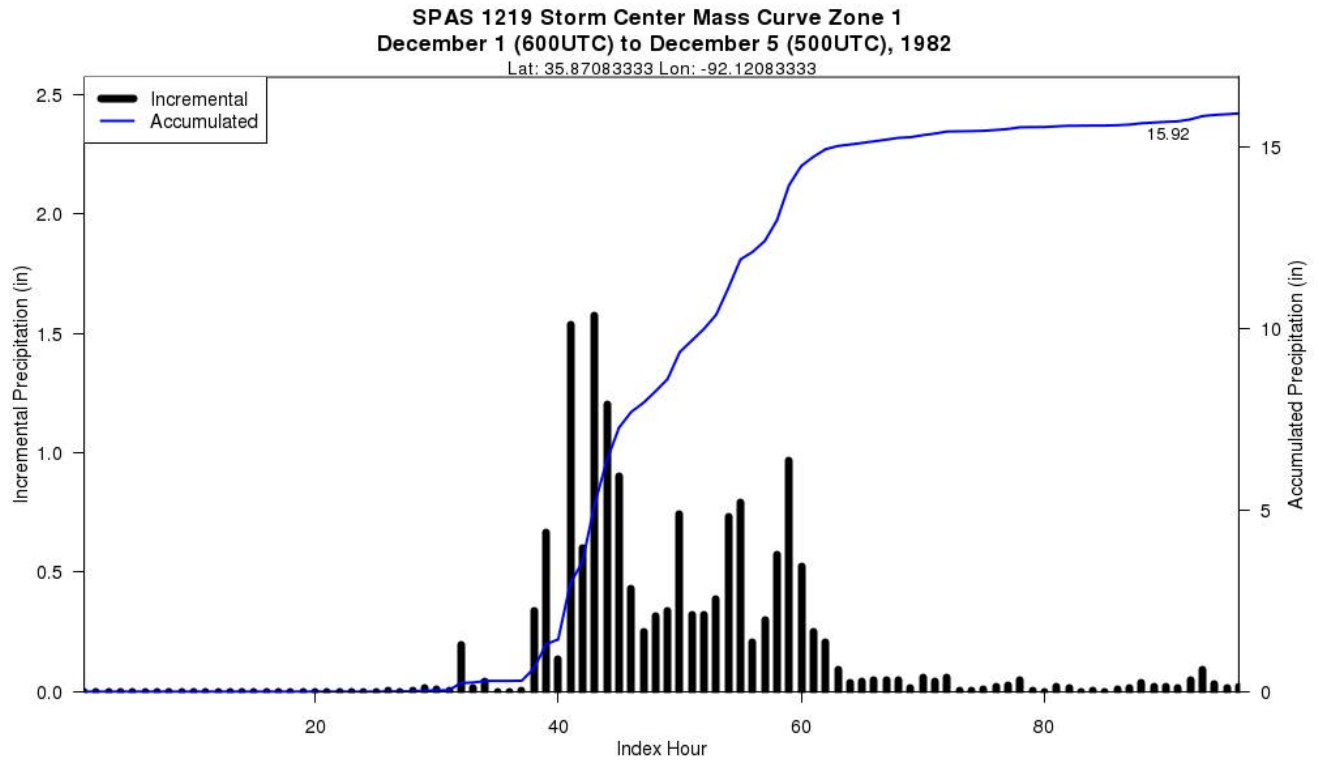
Radar Included: No

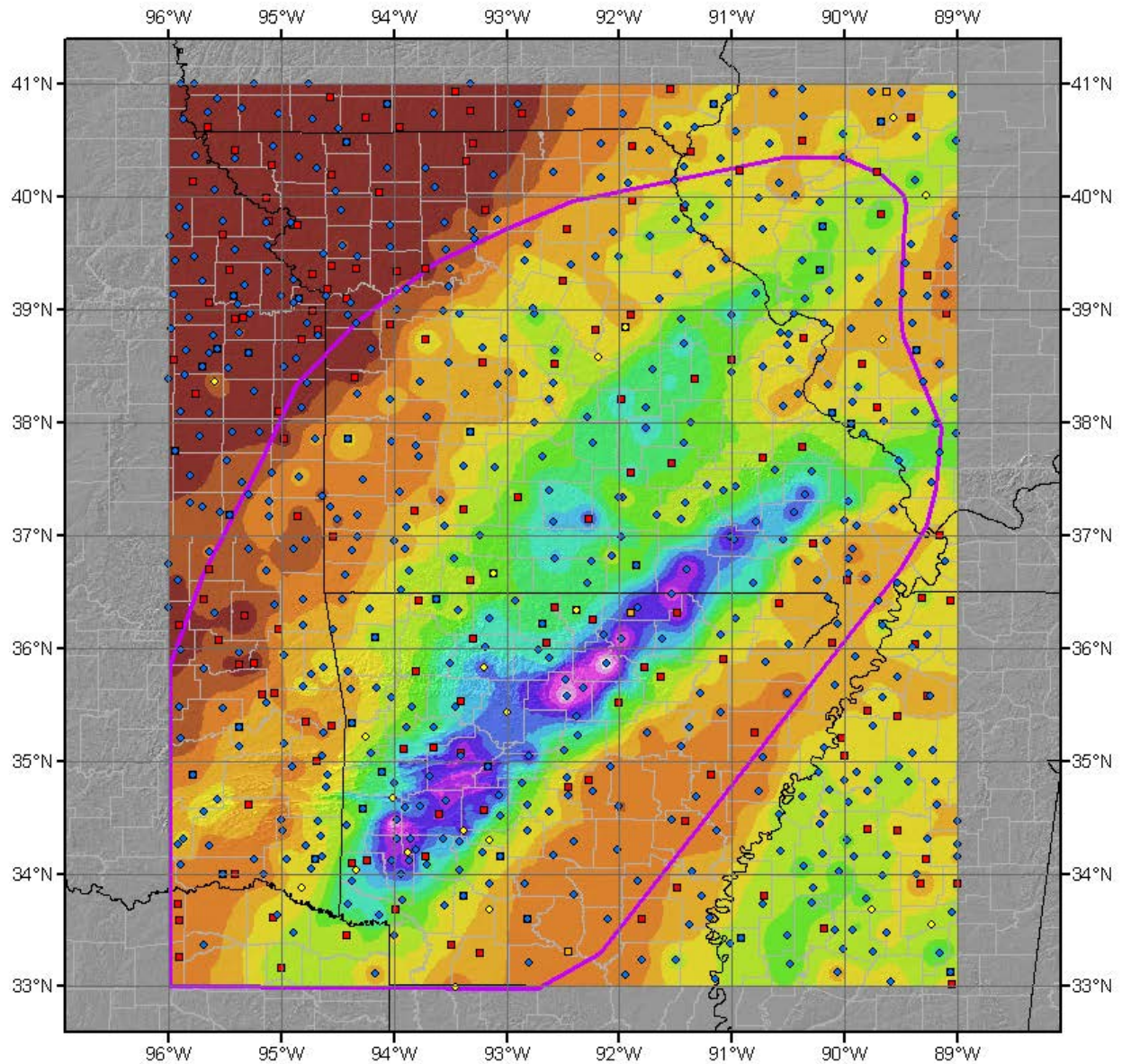
Depth-Area-Duration (DAD) analysis: Yes

SPAS Storm ID	LON	LAT	ELEV	ELEV Round	Storm Rep. Dew Point					Climatological Max. Dew Point						IPMF
					T _d	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	T _d	T _d Round	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	
1219_1	-92.121	35.871	764	800	72.00	2.47	0.18	66	2.290	74.86	75.0	2.85	0.20	72	2.650	1.157

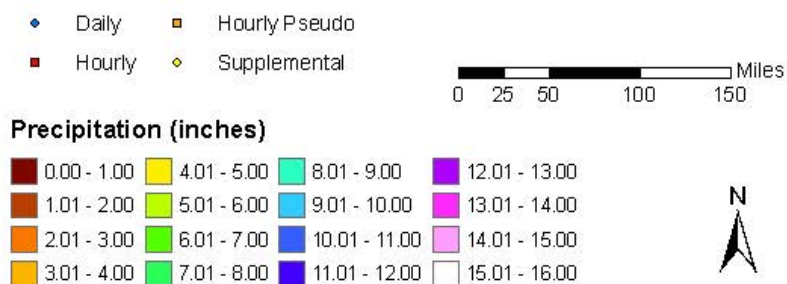
Storm 1219 - December 1 (0600 UTC) - December 5 (0500 UTC), 1982											
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)											
Area (mi ²)	Duration (hours)										
	1	3	6	12	18	24	36	48	72	96	Total
0.4	2.41	5.34	6.73	9.97	13.40	14.55	15.13	15.47	15.88	15.92	15.92
1	2.39	5.29	6.70	9.91	13.32	14.47	15.05	15.40	15.80	15.85	15.85
10	2.33	5.17	6.62	9.76	13.11	14.27	14.87	15.21	15.59	15.61	15.61
50	2.23	4.96	6.27	9.37	12.70	14.09	14.74	15.02	15.43	15.45	15.45
100	2.13	4.74	5.98	9.09	12.39	13.77	14.45	14.70	15.08	15.10	15.10
200	1.95	4.38	5.78	8.76	12.03	13.38	14.13	14.34	14.70	14.71	14.71
300	1.84	4.12	5.65	8.56	11.76	13.14	13.89	14.11	14.45	14.47	14.47
400	1.77	3.94	5.55	8.39	11.57	12.96	13.73	13.95	14.29	14.30	14.30
500	1.71	3.81	5.48	8.26	11.43	12.80	13.60	13.82	14.16	14.17	14.17
1000	1.53	3.45	5.20	7.83	10.94	12.30	13.12	13.34	13.65	13.67	13.67
2,000	1.36	3.12	4.79	7.36	10.43	11.78	12.58	12.81	13.08	13.10	13.10
5,000	1.15	2.53	4.19	6.62	9.44	10.86	11.69	11.93	12.21	12.22	12.22
10,000	0.95	2.12	3.61	5.84	8.39	9.81	10.74	11.01	11.28	11.29	11.29
20,000	0.73	1.73	3.00	4.85	6.99	8.37	9.38	9.70	10.01	10.03	10.03
50,000	0.45	1.23	2.22	3.64	5.13	6.37	7.31	7.60	7.92	7.95	7.95
100,000	0.26	0.73	1.40	2.40	3.51	4.52	5.43	5.75	6.05	6.14	6.14





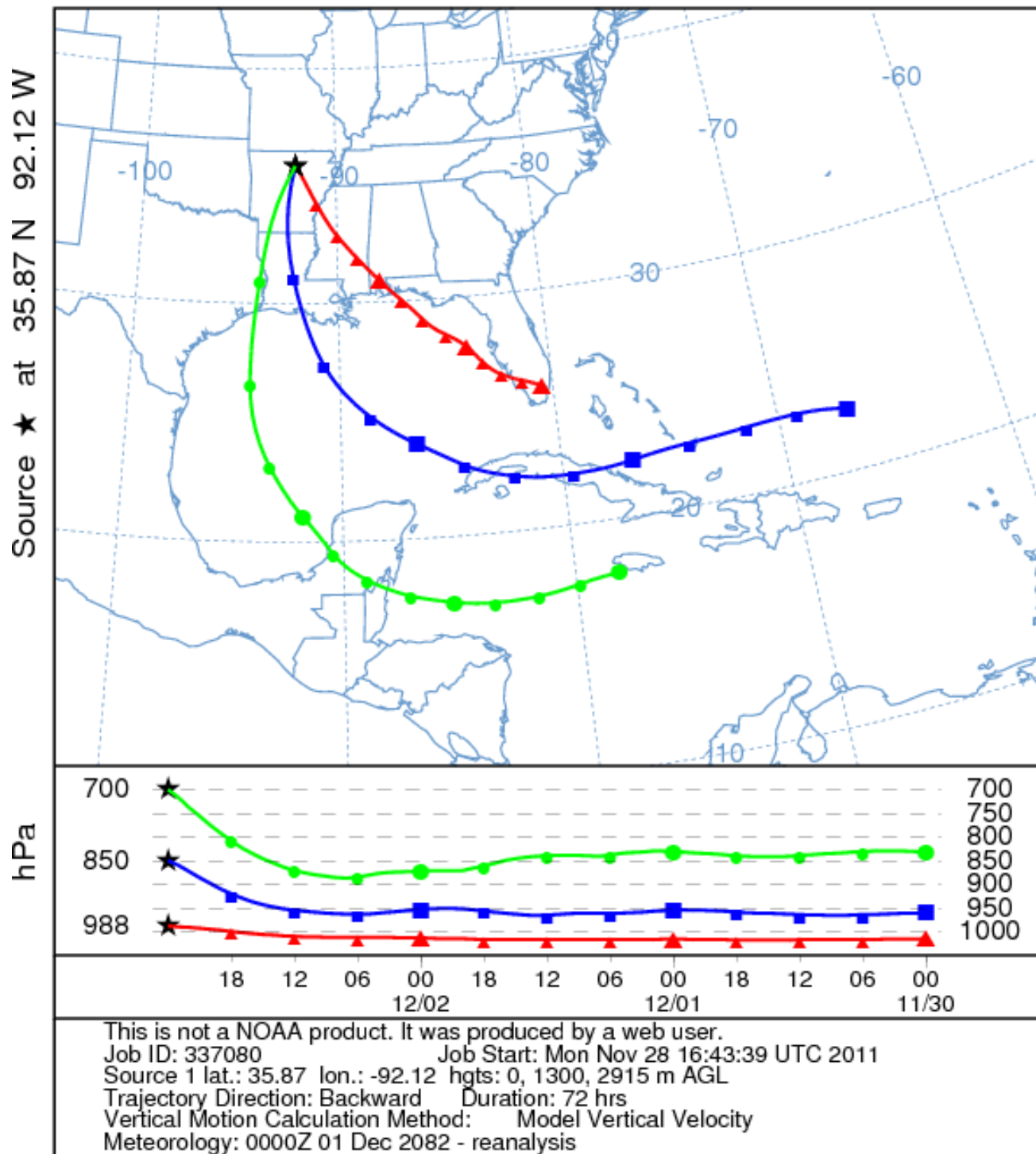


Total Precipitation (96 hours)
SPAS #1219
12/01/1982 0100 UTC - 12/05/1982 0500 UTC

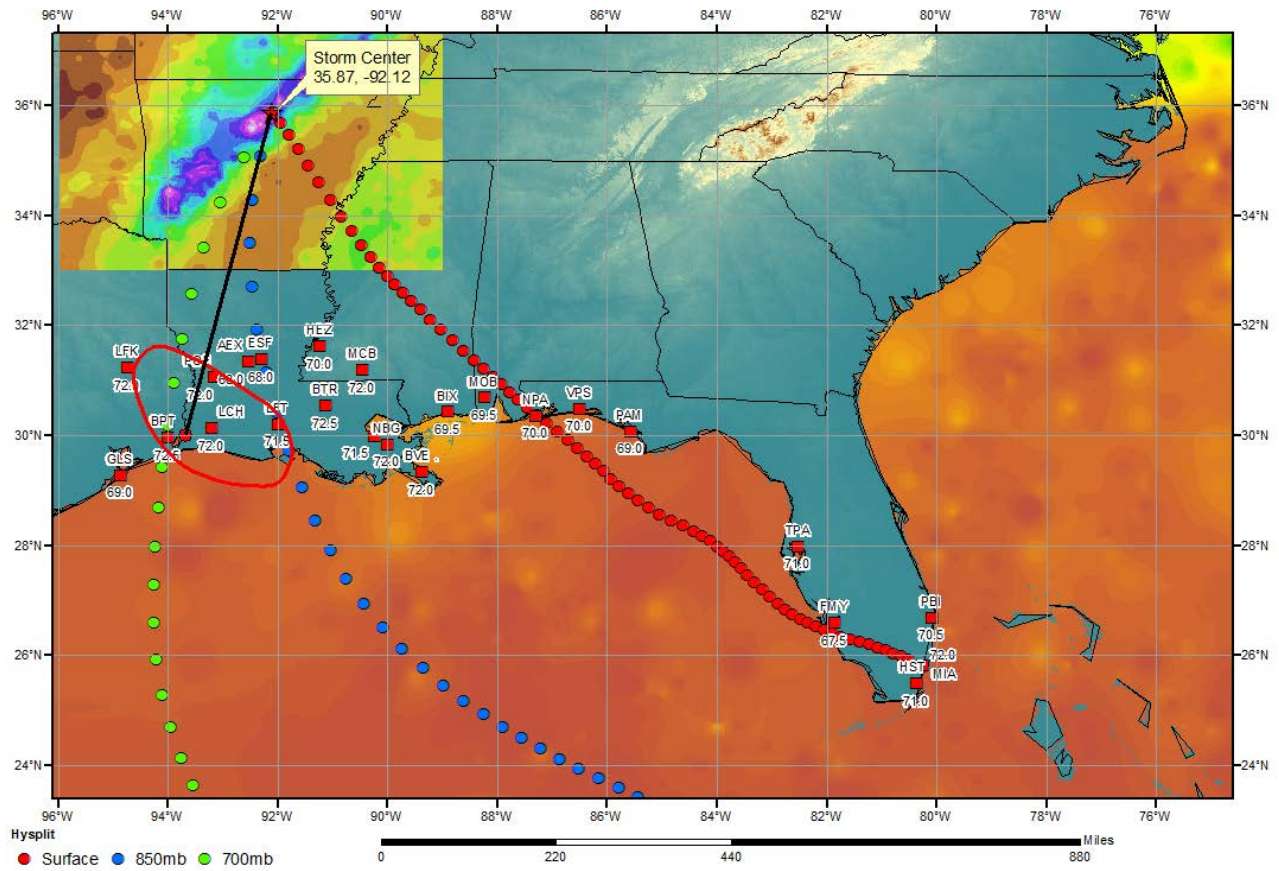


11/21/2011

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



SPAS 1219 - Big Fork, AR Storm Analysis
November 30 - December 4, 1982



Storm Precipitation Analysis System (SPAS) For Storm #1719_1

General Storm Location: Nacaise, MS

Storm Dates: May 8-10, 1995

Event: Synoptic Event

DAD Zone 1

Latitude: 30.5650

Longitude: -89.4950

Max. Grid Rainfall Amount: 28.51"

Max. Observed Rainfall Amount: 27.49"

Number of Stations: 284

SPAS Version: 10.0

Base Map Used: defaultP_Tropical

Radar Included: Yes

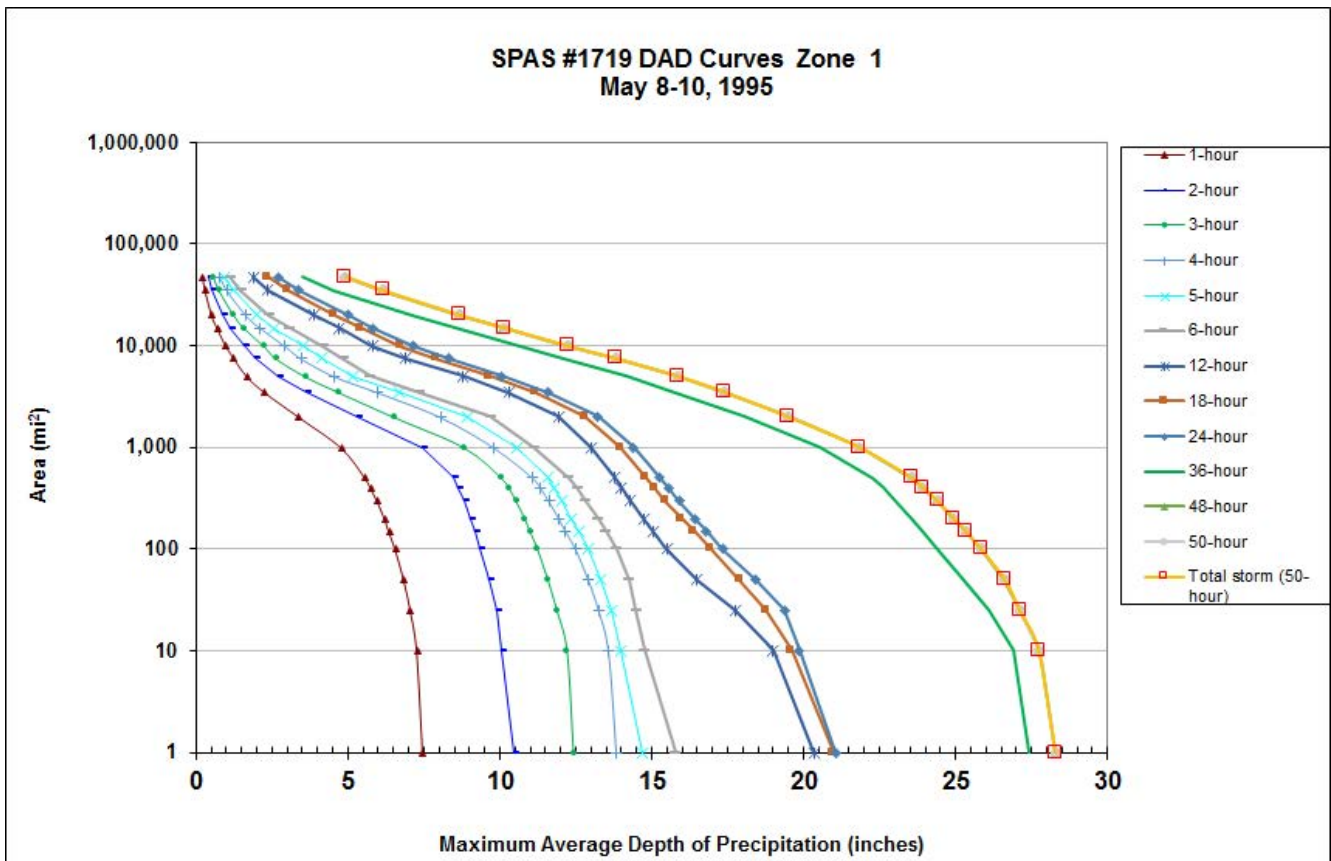
Depth-Area-Duration (DAD) analysis: Yes

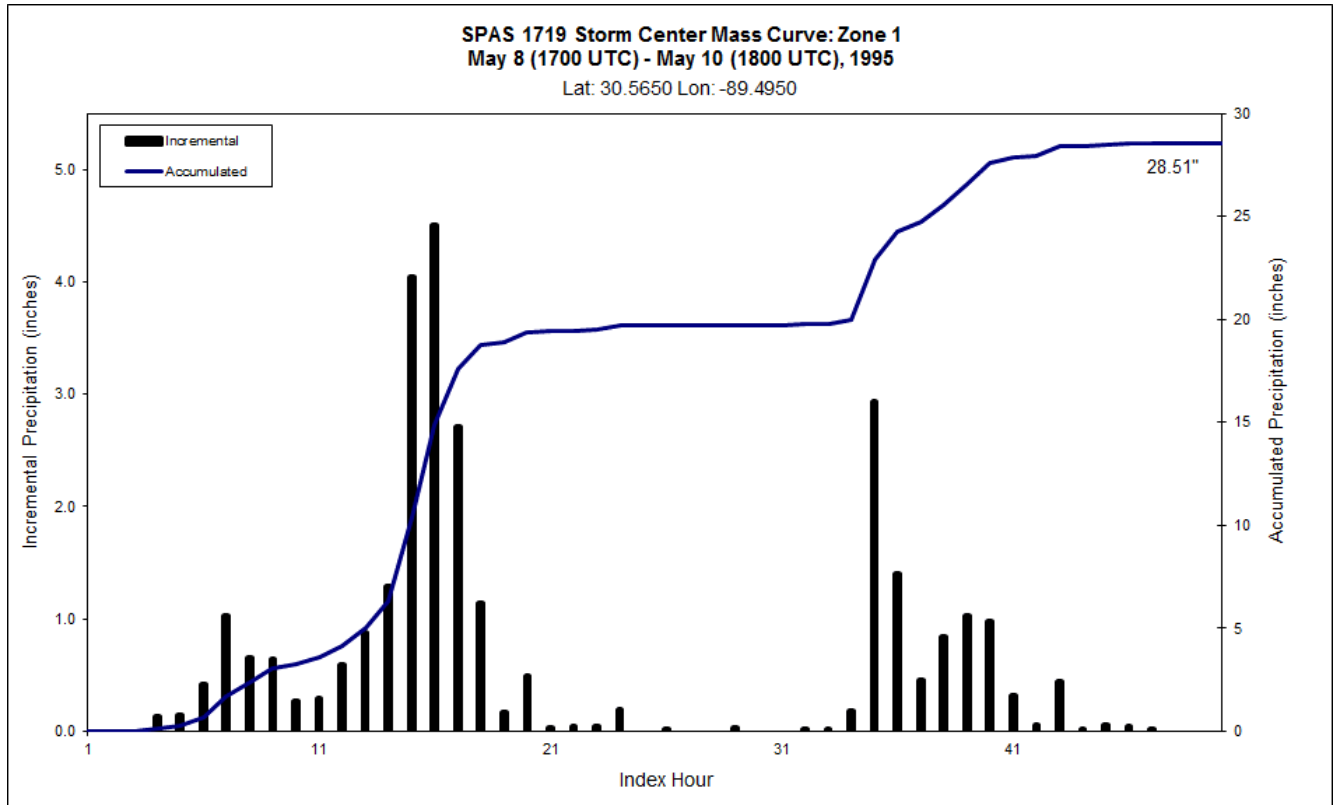
Reliability of Results: This analysis was based on 284 hourly stations, daily data, supplemental station data and NEXRAD Radar. We have a good degree of confidence for the radar/station based storm total results. The spatial pattern is dependent on the radar data and basemap. Timing is based on the hourly and hourly pseudo stations. Several daily stations were moved to supplemental due to timing issues and to ensure data consistency.

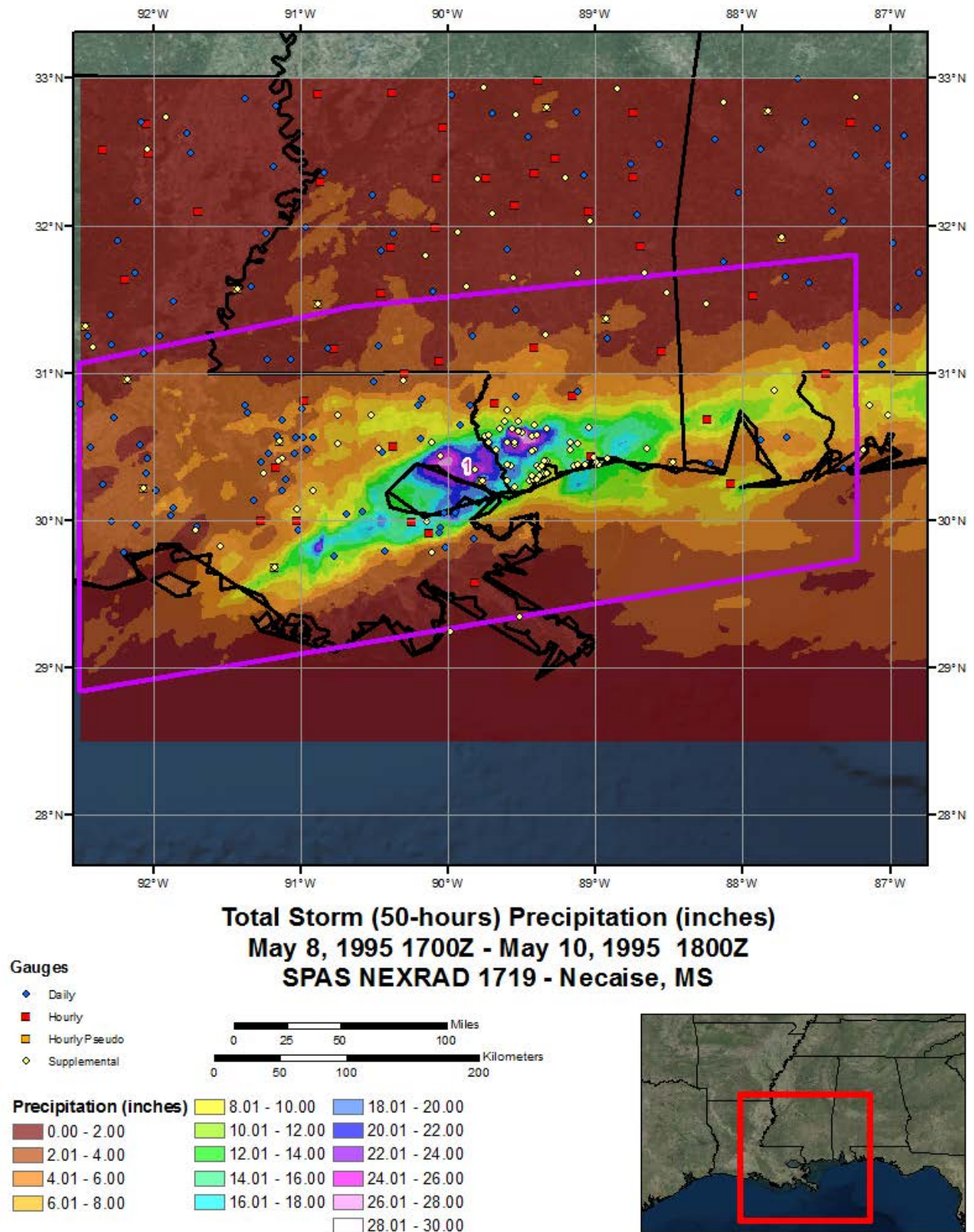
					Storm Rep. Dew Point					Climatological Max. Dew Point						
SPAS Storm ID	LON	LAT	ELEV	ELEV Round	T _d	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	T _d	T _d Round	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	IPMF
1719 1	-89.495	30.565	84	100	79.50	3.52	0.03	81	3.490	82.50	82.5	4.03	0.03	87	4.000	1.146

Storm 1719 - May 8 (1700 UTC) - May 10 (1800 UTC), 1995
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)

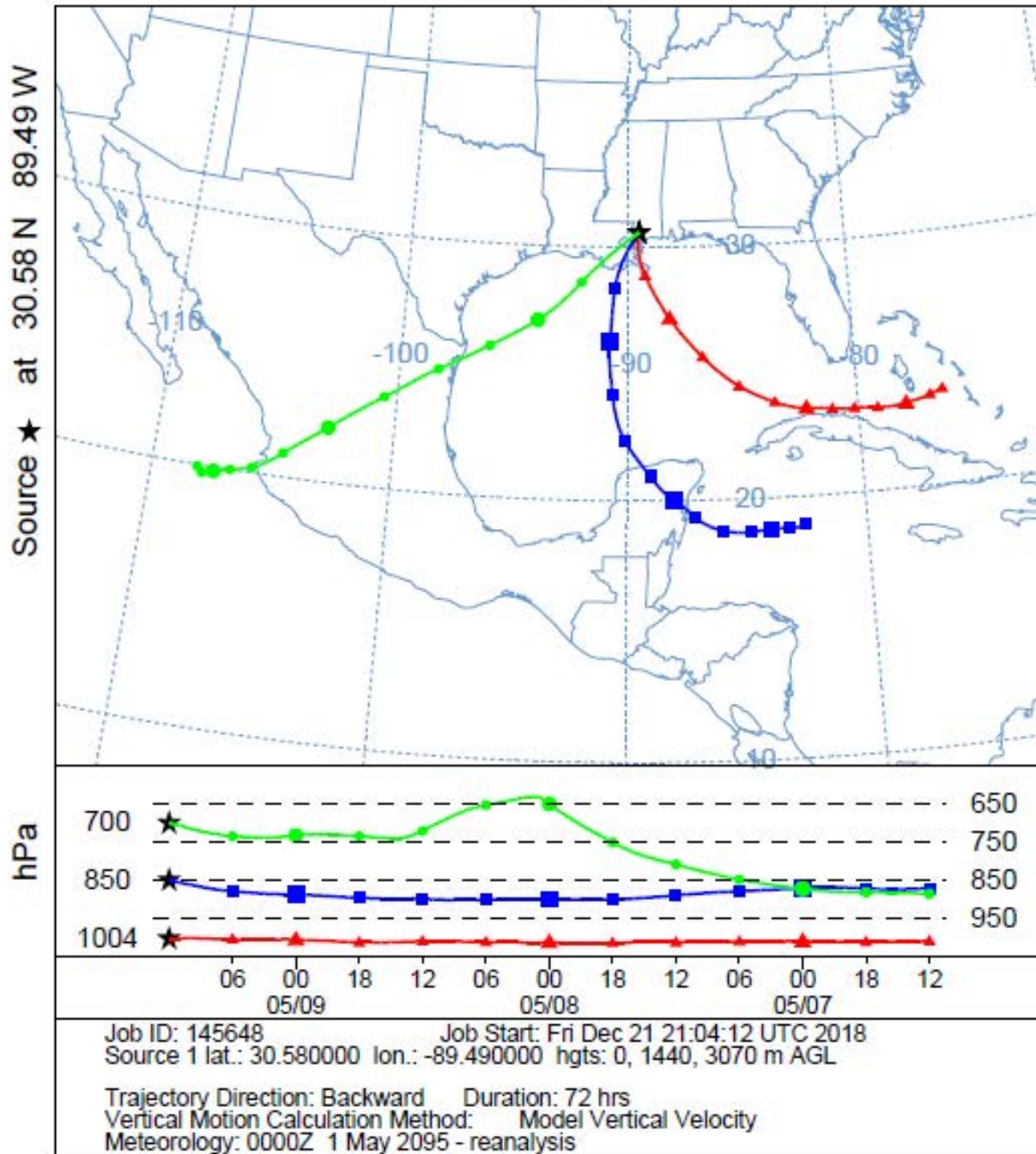
Area (mi ²)	Duration (hours)												
	1	2	3	4	5	6	12	18	24	36	48	50	Total
0.4	7.53	10.63	12.51	13.94	14.98	16.07	20.68	21.34	21.41	27.61	28.51	28.51	28.51
1	7.47	10.46	12.43	13.84	14.69	15.77	20.34	20.98	21.05	27.41	28.30	28.30	28.30
10	7.28	10.06	12.22	13.58	13.97	14.77	18.99	19.61	19.86	26.88	27.75	27.75	27.75
25	7.07	9.89	11.89	13.26	13.65	14.48	17.73	18.77	19.36	26.07	27.11	27.12	27.12
50	6.85	9.63	11.59	12.92	13.30	14.24	16.48	17.90	18.42	25.26	26.62	26.64	26.64
100	6.57	9.35	11.25	12.50	12.89	13.83	15.51	16.95	17.33	24.42	25.84	25.85	25.85
150	6.36	9.18	11.00	12.17	12.58	13.49	15.05	16.38	16.79	23.91	25.33	25.35	25.35
200	6.22	9.06	10.83	11.95	12.35	13.23	14.74	15.99	16.41	23.56	24.94	24.96	24.96
300	5.97	8.82	10.54	11.61	12.02	12.83	14.30	15.45	15.90	23.04	24.39	24.41	24.41
400	5.76	8.63	10.31	11.35	11.77	12.55	14.00	15.08	15.54	22.62	23.92	23.94	23.94
500	5.58	8.45	10.07	11.10	11.57	12.25	13.78	14.80	15.27	22.27	23.55	23.57	23.57
1,000	4.79	7.48	8.84	9.81	10.59	11.12	13.00	13.96	14.40	20.51	21.84	21.85	21.85
2,000	3.40	5.33	6.53	8.05	8.95	9.69	11.92	12.80	13.23	18.04	19.49	19.50	19.50
3,500	2.27	3.64	4.71	5.98	6.70	7.37	10.30	11.18	11.59	15.78	17.40	17.41	17.41
5,000	1.68	2.71	3.61	4.57	5.18	5.73	8.80	9.67	10.06	14.17	15.85	15.86	15.86
7,500	1.26	1.93	2.65	3.47	4.14	4.84	6.90	7.89	8.33	12.14	13.83	13.84	13.84
10,000	0.99	1.59	2.24	2.93	3.52	4.17	5.82	6.74	7.16	10.68	12.23	12.24	12.24
15,000	0.70	1.13	1.59	2.12	2.55	3.08	4.71	5.44	5.81	8.53	10.13	10.15	10.15
20,000	0.52	0.88	1.25	1.65	2.01	2.40	3.90	4.55	5.01	7.10	8.67	8.70	8.70
35,000	0.30	0.54	0.77	1.03	1.24	1.48	2.38	3.02	3.39	4.50	6.12	6.16	6.16
47,766	0.22	0.42	0.58	0.78	0.94	1.13	1.89	2.36	2.71	3.50	4.90	4.93	4.93



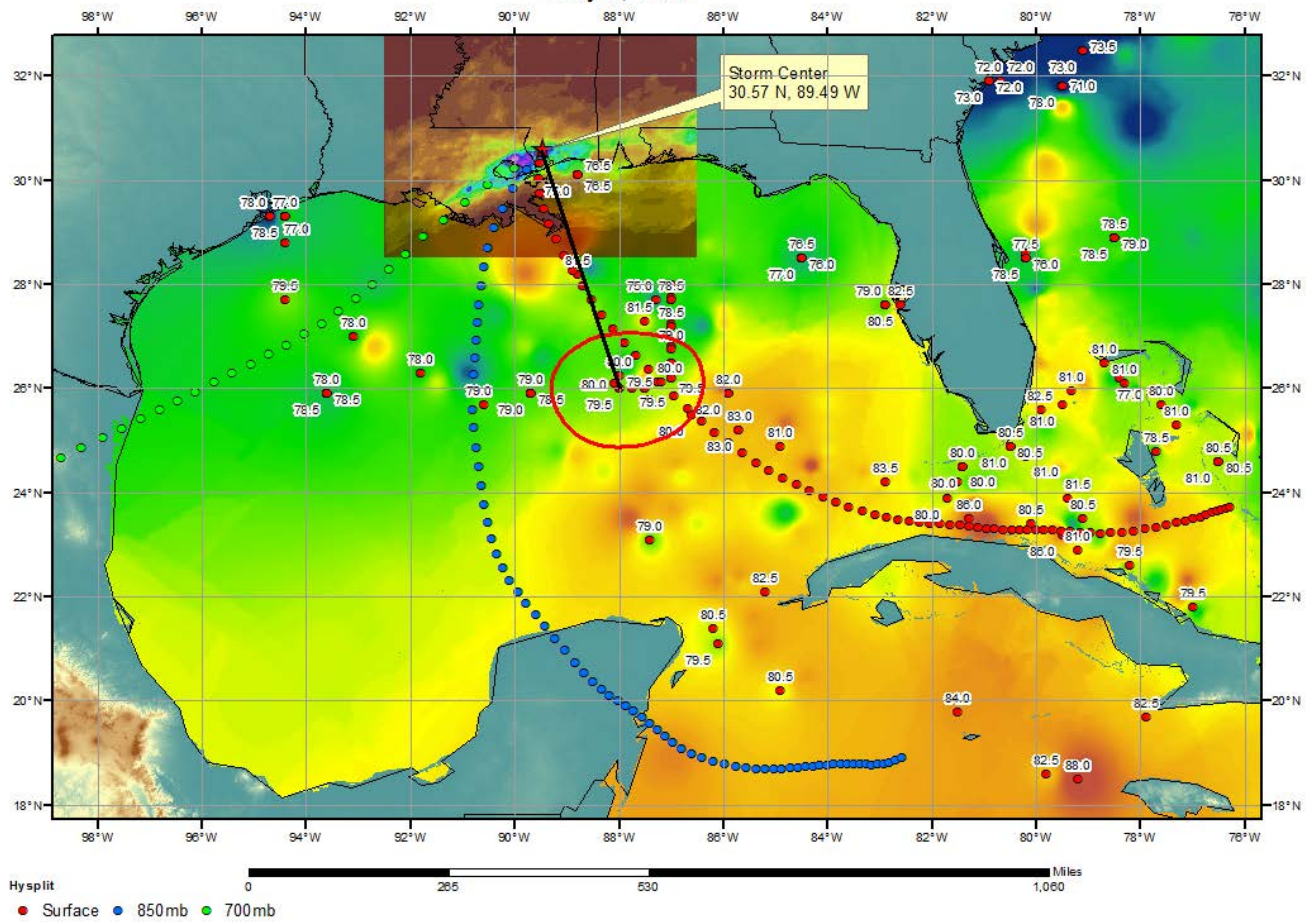




NOAA HYSPLIT MODEL
 Backward trajectories ending at 1200 UTC 09 May 95
 CDC1 Meteorological Data



SPAS 1719 Necaie, MS Sea Surface Temperatures (F)
May 9, 1995



Storm Precipitation Analysis System (SPAS) For Storm #1286_1 (Re-analysis of SPAS #1029)

General Storm Location: Northern Illinois (Aurora College, IL)

Storm Dates: July 17, 1996 0100 UTC – July 19, 1996 0000 UTC (48 hours)

Event: Mesoscale convective complex (MCC)

DAD Zone 1

Latitude: 41.4575

Longitude: -88.0699

Max. Grid Rainfall Amount: 18.13”

Number of Stations: 173

SPAS Version: 10.0

Base Map Used: 1981-2010 Mean July Precipitation (PRISM)

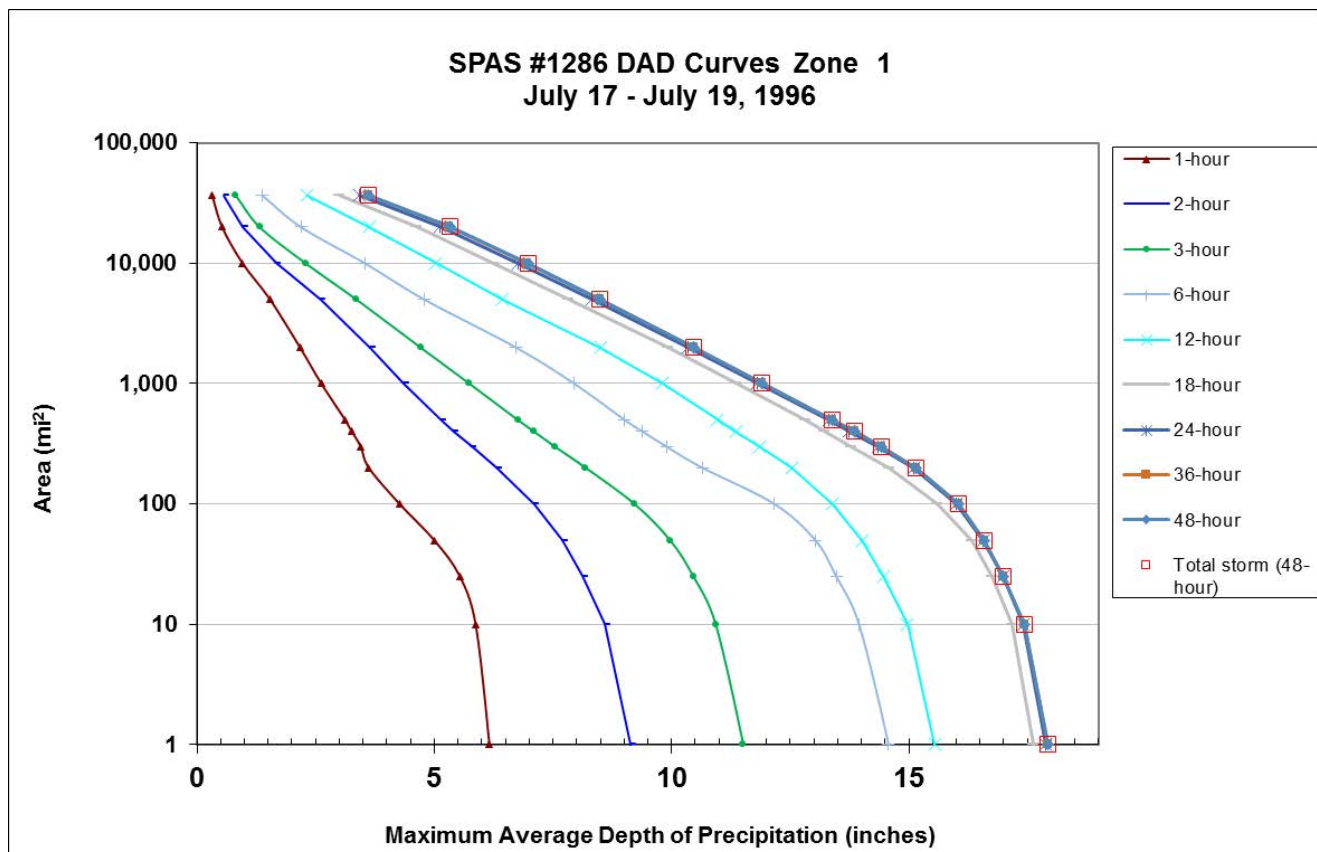
Radar Included: Yes (KMKX, KLOT and KIND)

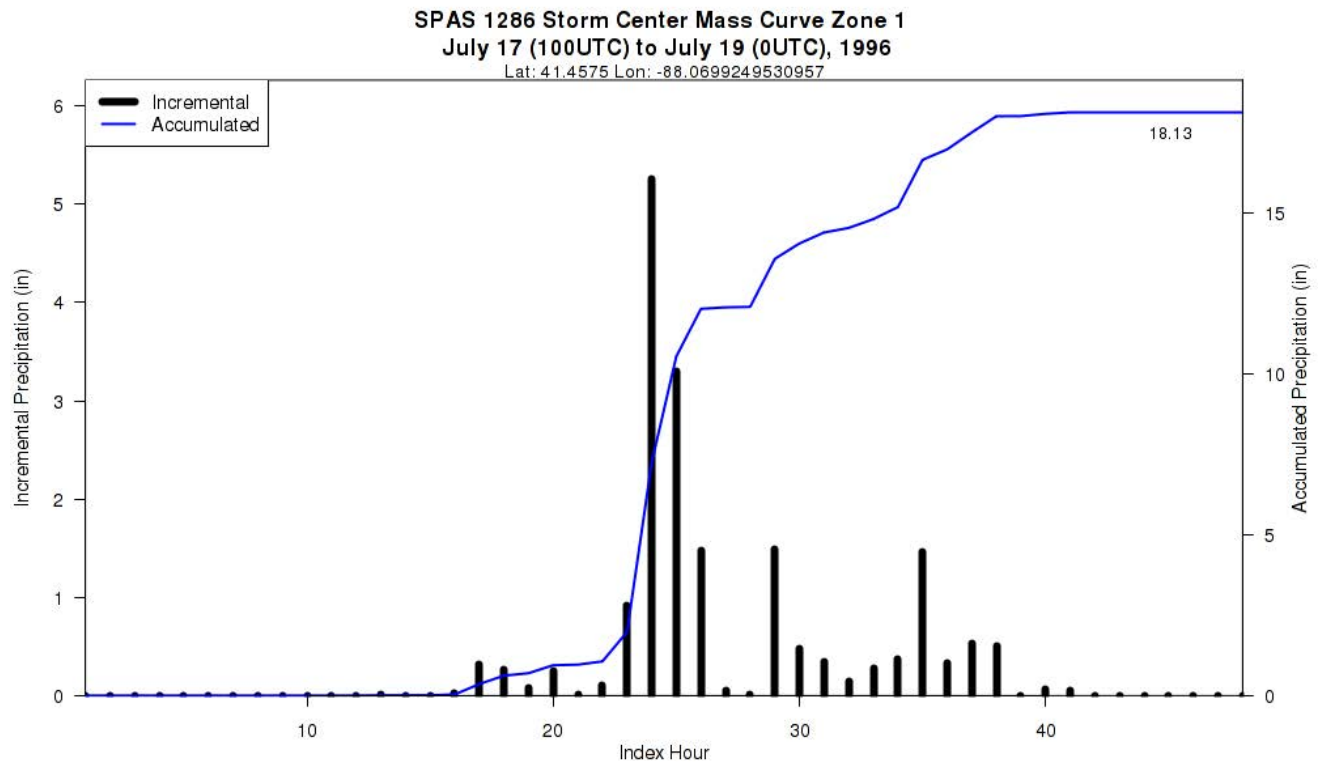
Depth-Area-Duration (DAD) analysis: Yes, 1, 2, 3, 4, 5, 6, 12, 18, 24, 36 and 48 hours

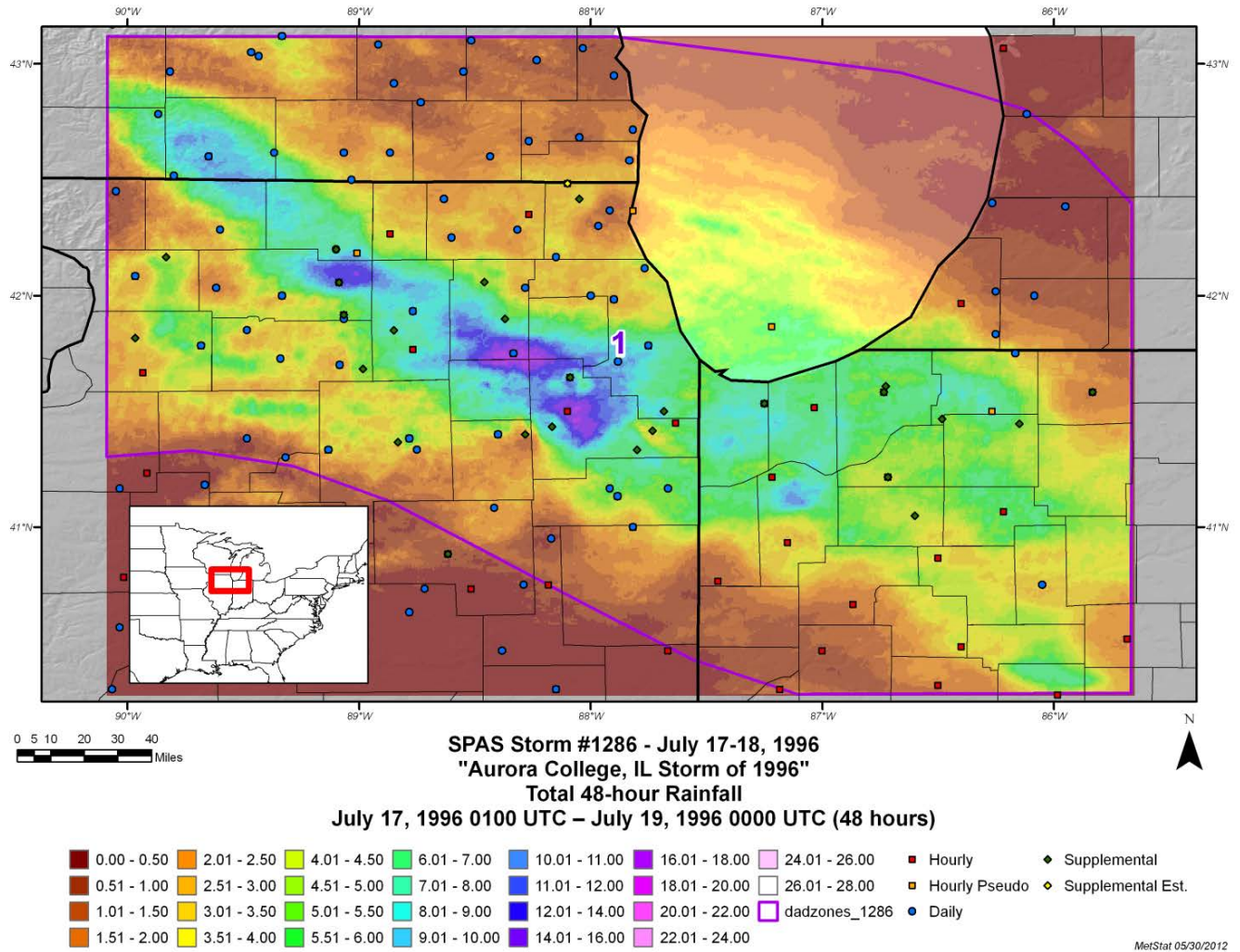
Reliability of Results: With the exception of the Southwestern corner of the analysis domain, we generally have a high degree of confidence in the results. Although there was a good deal of measured daily rainfall amounts in/around the storm center, a lack of hourly data forced us to develop and include several hourly-pseudo stations based on radar data and a default Z-R relationship.

					Storm Rep. Dew Point					Climatological Max. Dew Point						
SPAS Storm ID	LON	LAT	ELEV	ELEV Round	T _d	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	T _d	T _d Round	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	IPMF
1286 1	-88.070	41.458	634	600	74.00	2.73	0.15	70	2.580	80.61	80.5	3.68	0.18	83	3.500	1.357

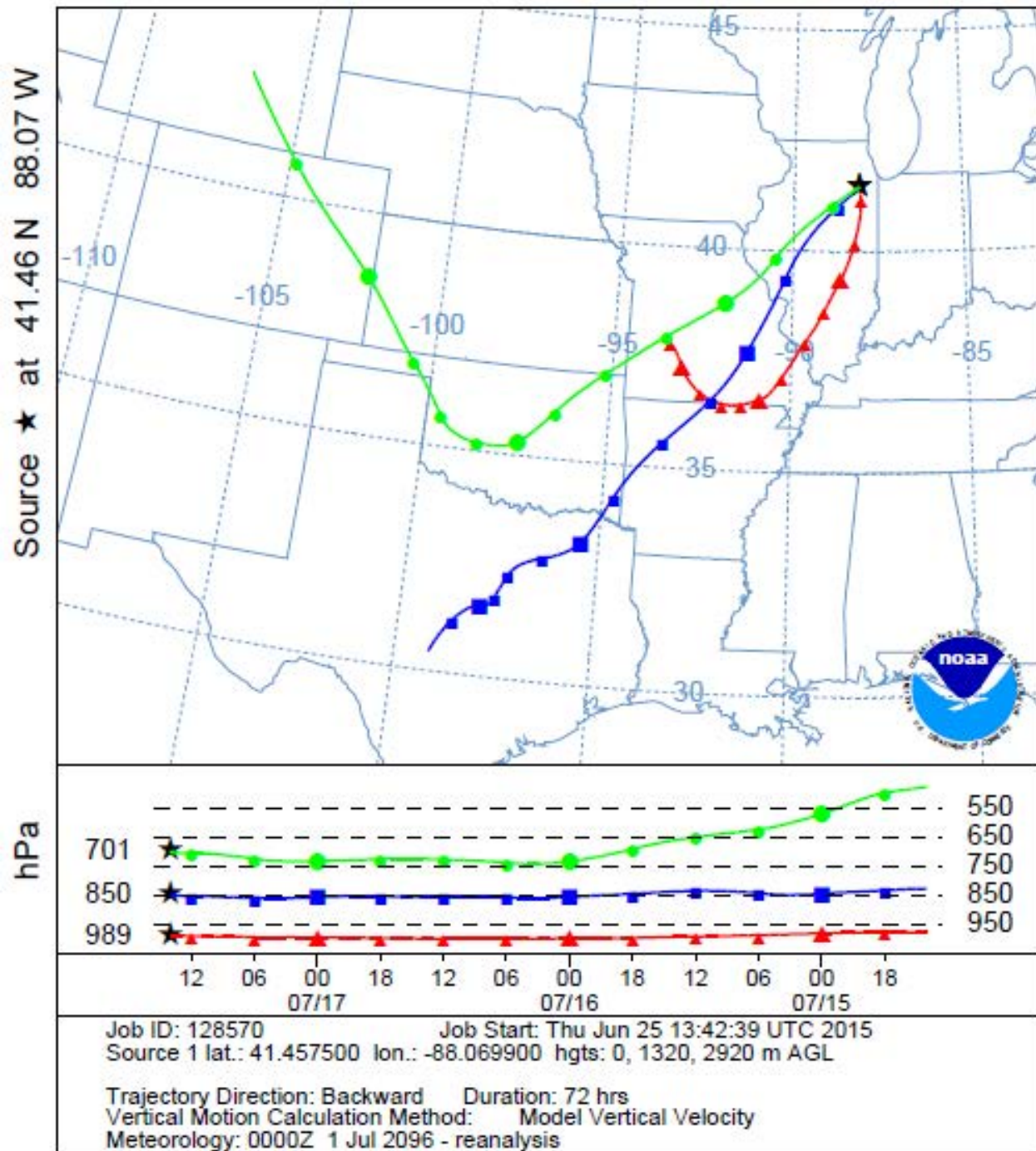
Storm 1286 - July 17 (0100 UTC) - July 19 (0000 UTC), 1996										
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)										
Area (mi ²)	Duration (hours)									
	1	2	3	6	12	18	24	36	48	Total
0.4	6.22	9.20	11.64	14.70	15.68	17.75	18.00	18.06	18.06	18.06
1	6.16	9.14	11.51	14.57	15.55	17.62	17.89	17.92	17.92	17.92
10	5.87	8.60	10.93	13.95	14.97	17.18	17.42	17.43	17.43	17.43
25	5.54	8.13	10.46	13.47	14.46	16.75	16.98	17.00	17.00	17.00
50	5.00	7.70	9.97	13.03	14.02	16.32	16.57	16.59	16.59	16.59
100	4.27	7.11	9.22	12.17	13.39	15.60	16.01	16.04	16.04	16.04
200	3.62	6.32	8.19	10.65	12.53	14.59	15.11	15.16	15.16	15.16
300	3.45	5.79	7.54	9.89	11.85	13.79	14.35	14.42	14.42	14.42
400	3.26	5.41	7.10	9.39	11.36	13.23	13.75	13.86	13.86	13.86
500	3.12	5.14	6.76	9.01	10.97	12.81	13.31	13.39	13.39	13.39
1,000	2.62	4.36	5.74	7.95	9.81	11.37	11.82	11.90	11.90	11.90
2,000	2.17	3.65	4.71	6.72	8.50	9.93	10.36	10.46	10.46	10.46
5,000	1.54	2.61	3.36	4.79	6.45	7.82	8.33	8.49	8.49	8.49
10,000	0.96	1.66	2.29	3.54	5.03	6.25	6.77	6.96	6.97	6.97
20,000	0.53	0.97	1.32	2.19	3.63	4.63	5.11	5.32	5.33	5.33
36,456	0.32	0.57	0.82	1.38	2.33	3.00	3.43	3.61	3.62	3.62



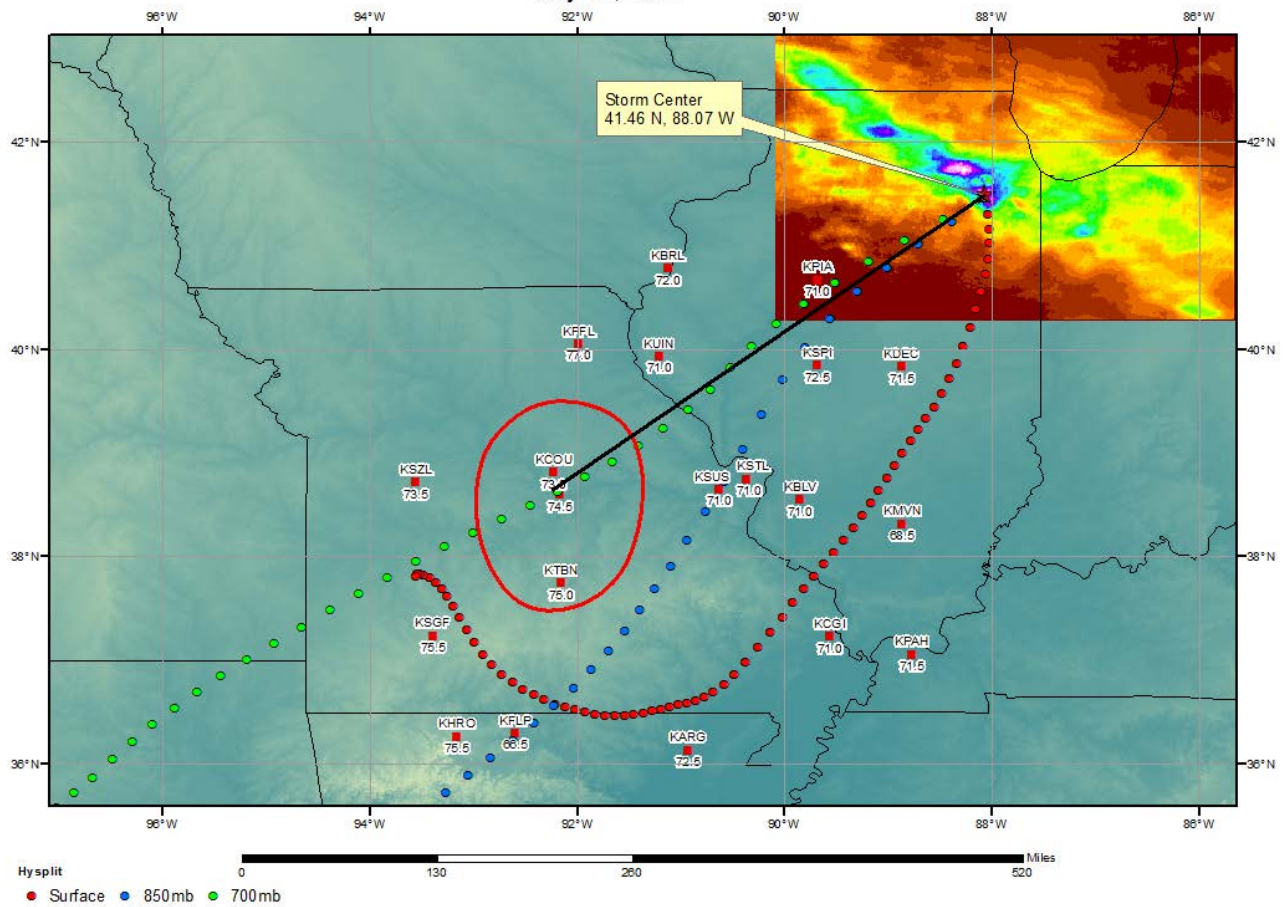




NOAA HYSPLIT MODEL
 Backward trajectories ending at 1400 UTC 17 Jul 96
 CDC1 Meteorological Data



SPAS 1286 Aurora College, IL Storm Analysis July 17, 1996



Storm Precipitation Analysis System (SPAS) For Storm #1242_1

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

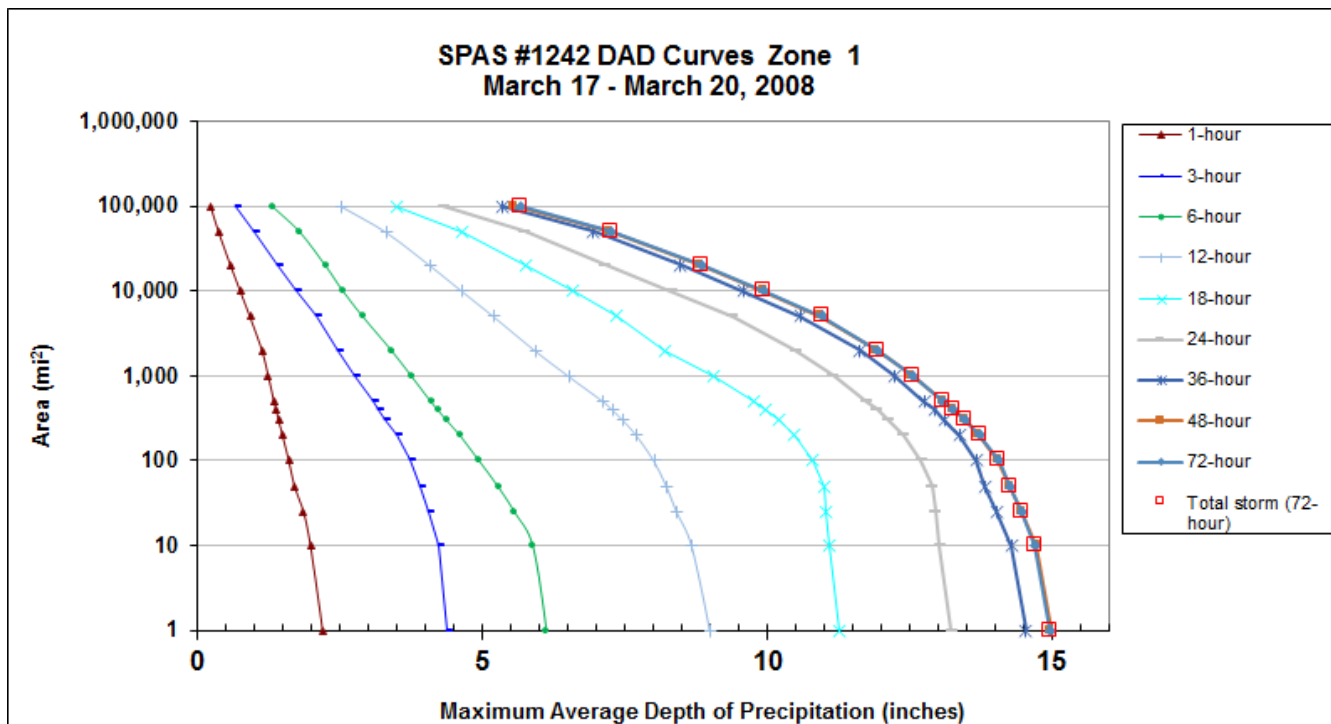
Depth-Area-Duration (DAD) analysis: Yes

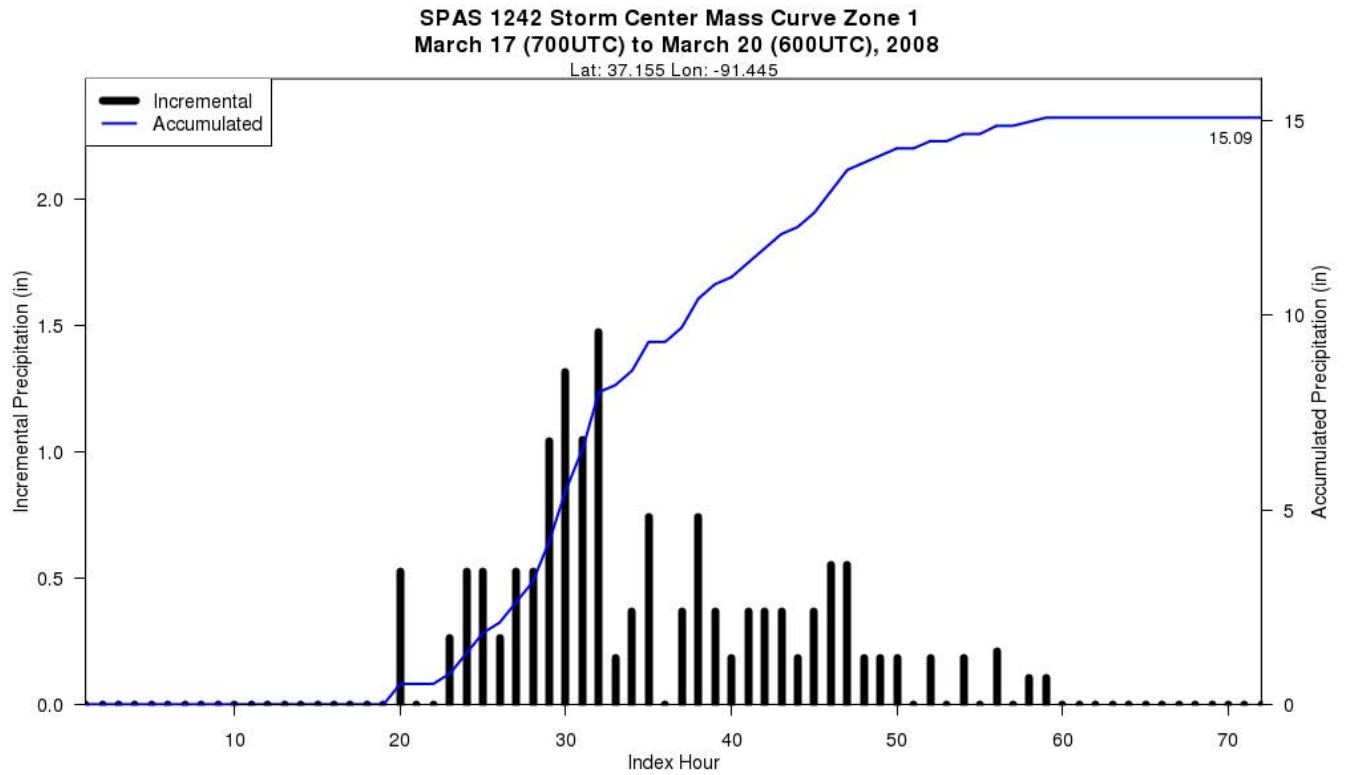
Reliability of results: This analysis was based on WDT NEXRAD data (unblocked) and extensive gauge data, we have a very high degree of confidence in the results. There were a few areas of radar beam blockage in the domain, these areas were adjusted using a beam blockage mask. The radar blocked areas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

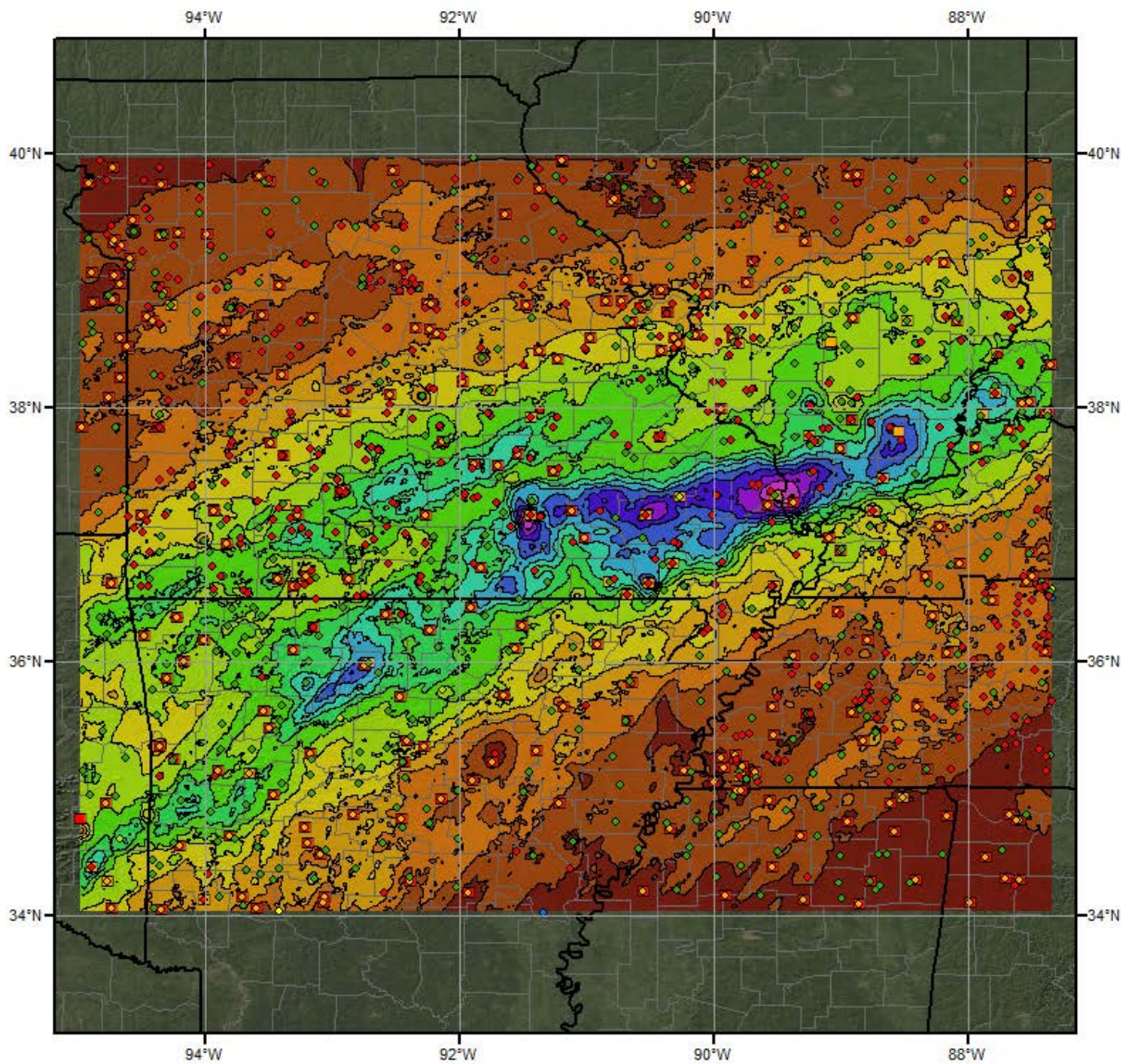
					Storm Rep. Dew Point					Climatological Max. Dew Point						
SPAS Storm ID	LON	LAT	ELEV	ELEV Round	T _d	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	T _d	T _d Round	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	IPMF
1242_1	-91.445	37.115	946	900	66.00	1.86	0.17	54	1.690	71.79	72.0	2.47	0.21	66	2.260	1.337

Storm 1242 - March 17 (0700 UTC) - March 20 (0600 UTC), 2008
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)

Area (mi ²)	Duration (hours)									
	1	3	6	12	18	24	36	48	72	Total
0.4	2.23	4.43	6.18	9.07	11.32	13.32	14.66	15.08	15.08	15.08
1	2.19	4.39	6.13	9.00	11.26	13.24	14.55	14.98	14.97	14.97
10	1.98	4.23	5.89	8.68	11.10	13.03	14.29	14.73	14.70	14.70
25	1.86	4.05	5.57	8.42	11.04	12.96	14.03	14.47	14.47	14.47
50	1.70	3.91	5.28	8.24	10.99	12.90	13.82	14.27	14.27	14.27
100	1.60	3.74	4.95	8.02	10.81	12.71	13.67	14.06	14.07	14.07
200	1.49	3.48	4.61	7.71	10.47	12.39	13.38	13.72	13.73	13.73
300	1.42	3.30	4.38	7.48	10.20	12.13	13.11	13.48	13.49	13.49
400	1.38	3.17	4.22	7.29	9.98	11.92	12.94	13.26	13.27	13.27
500	1.34	3.07	4.10	7.13	9.78	11.75	12.77	13.10	13.10	13.10
1,000	1.24	2.77	3.76	6.52	9.05	11.16	12.24	12.54	12.55	12.55
2,000	1.13	2.47	3.41	5.93	8.20	10.49	11.63	11.92	11.94	11.94
5,000	0.92	2.07	2.91	5.21	7.35	9.39	10.59	10.94	10.96	10.96
10,000	0.75	1.74	2.56	4.65	6.60	8.32	9.59	9.94	9.95	9.95
20,000	0.58	1.40	2.25	4.09	5.77	7.15	8.48	8.81	8.84	8.84
50,000	0.37	0.99	1.80	3.31	4.64	5.74	6.94	7.22	7.26	7.26
100,000	0.23	0.68	1.32	2.53	3.49	4.31	5.34	5.57	5.66	5.66



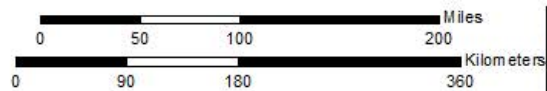




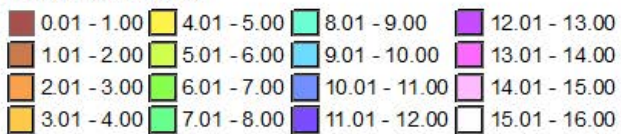
Total Precipitation (72-hrs)
SPAS-NEXRAD: 1242 Alley Spring, MO
3/17/2008 0700 UTC- 3/20/2008 0600 UTC

Gauges

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

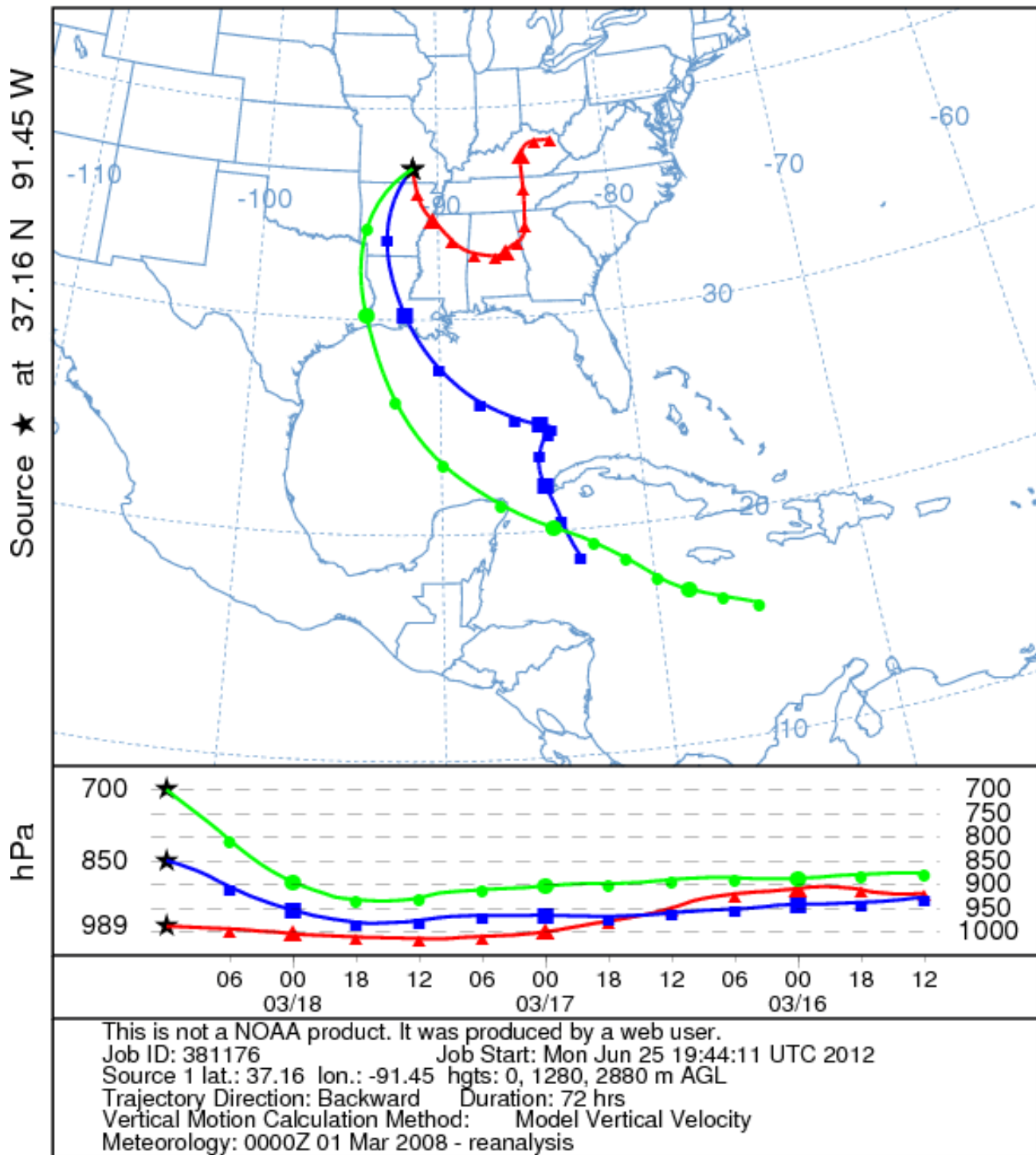


Precipitation (inches)

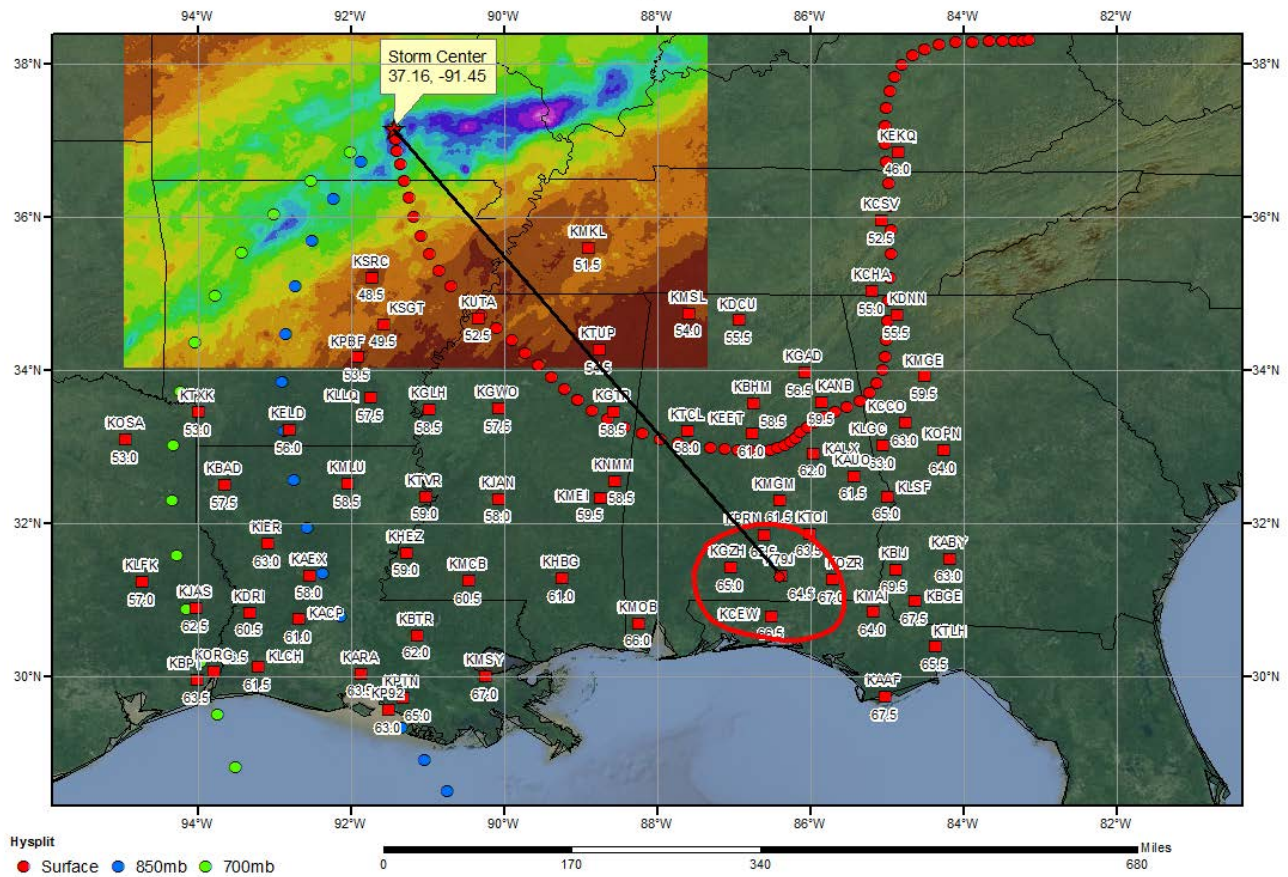


6/27/2012

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



SPAS 1242 Alley Spring, MO Storm Analysis
March 15-18, 2008



Storm Precipitation Analysis System (SPAS) For Storm #1218_1

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)

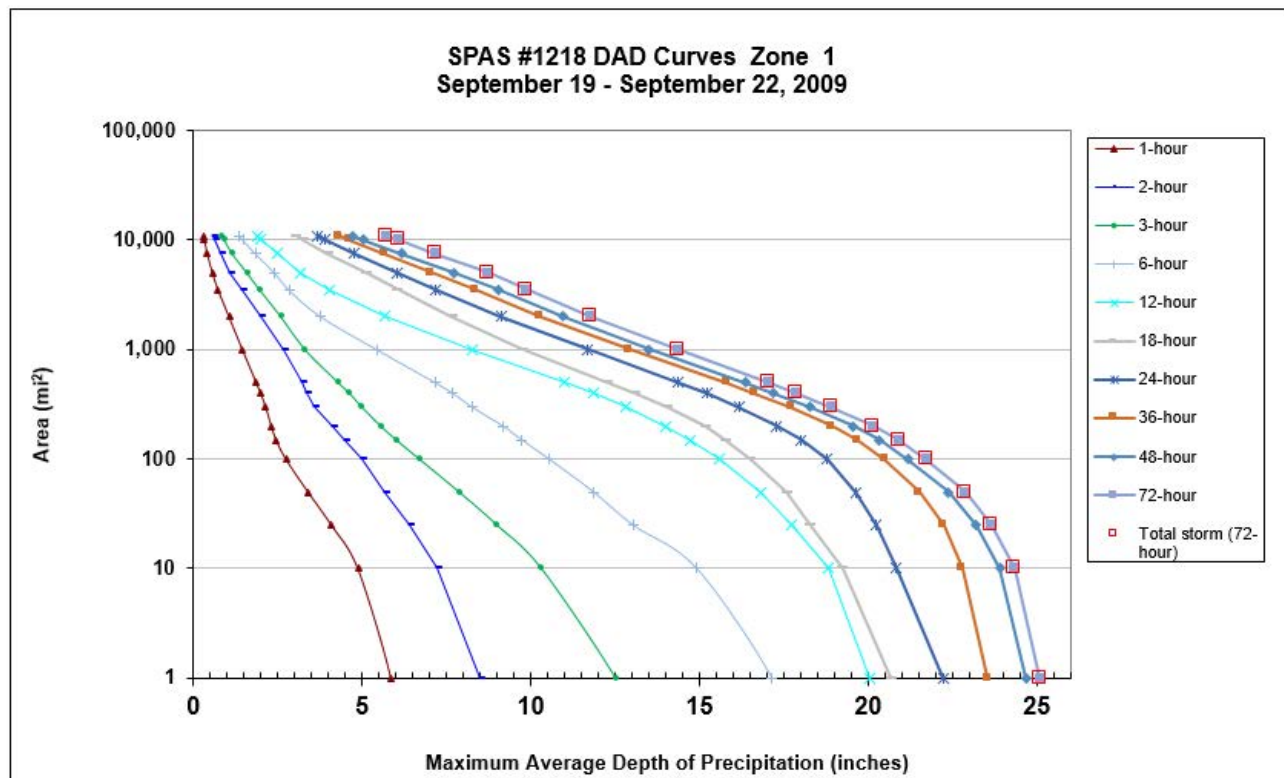
Radar Included: Yes

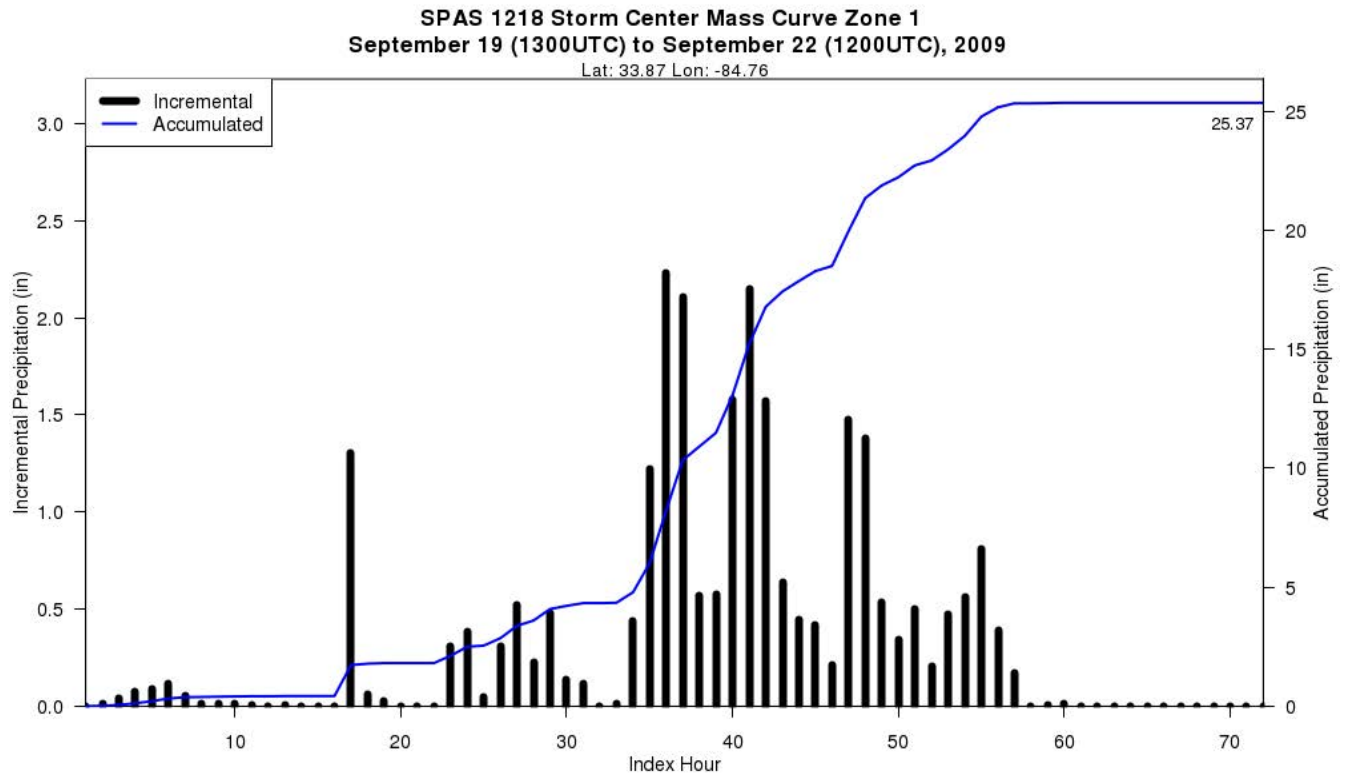
Depth-Area-Duration (DAD) analysis: Yes

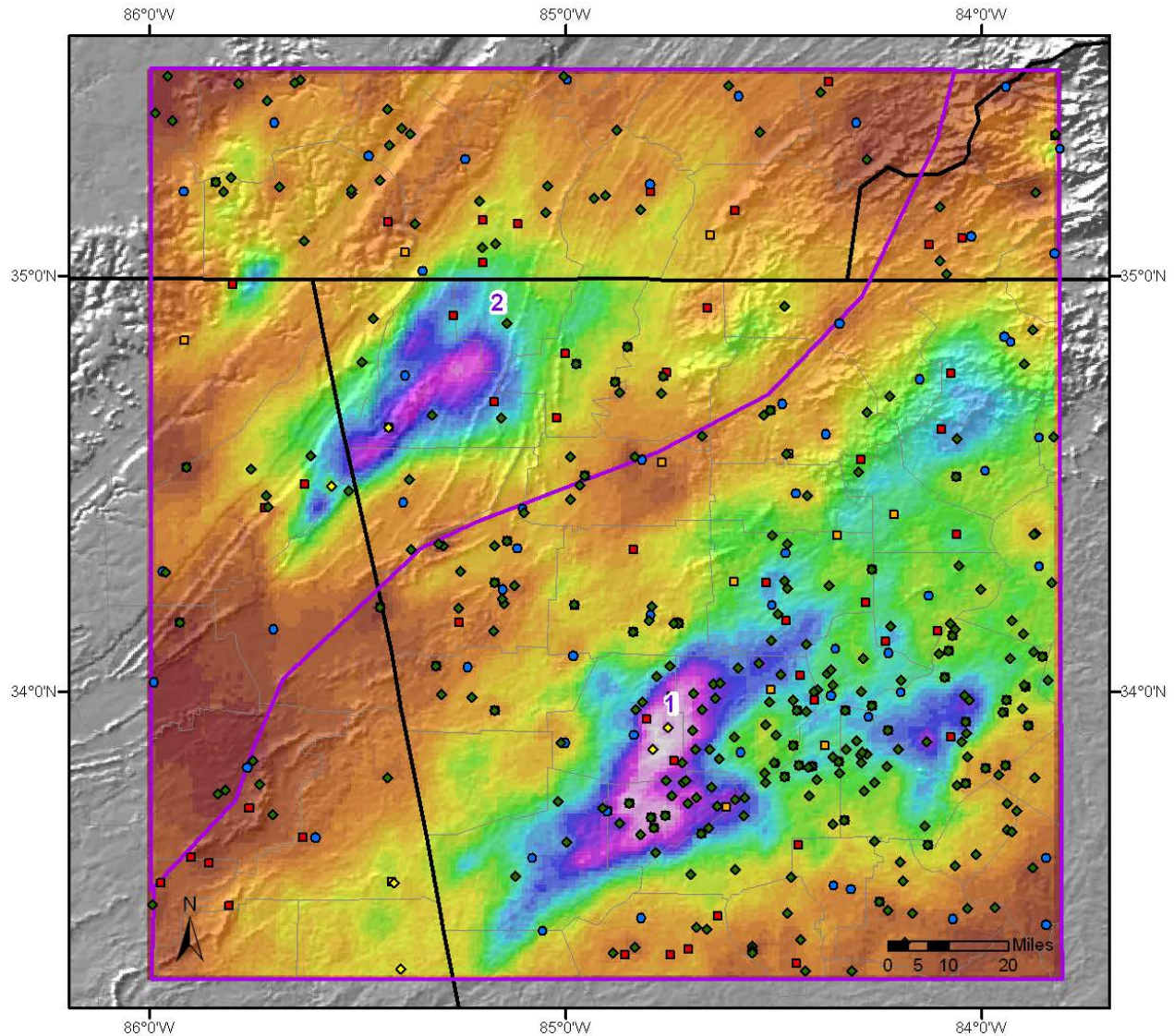
Reliability of results: Given the unblocked, clean and QC'ed radar data coupled with extensive gauge data, we have a very high degree of confidence in the results, particularly in DAD zone 1. We have slightly less confidence in the DAD results for Zone 2 given fewer stations sampled the peak rainfall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

					Storm Rep. Dew Point					Climatological Max. Dew Point						
SPAS Storm ID	LON	LAT	ELEV	ELEV Round	T _d	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	T _d	T _d Round	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	IPMF
1218 1	-84.760	33.870	939	900	76.00	2.99	0.23	74	2.760	78.74	78.5	3.37	0.26	79	3.110	1.127

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

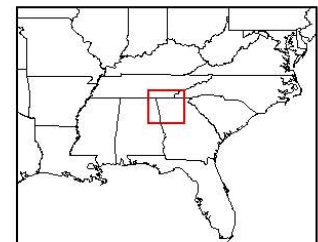




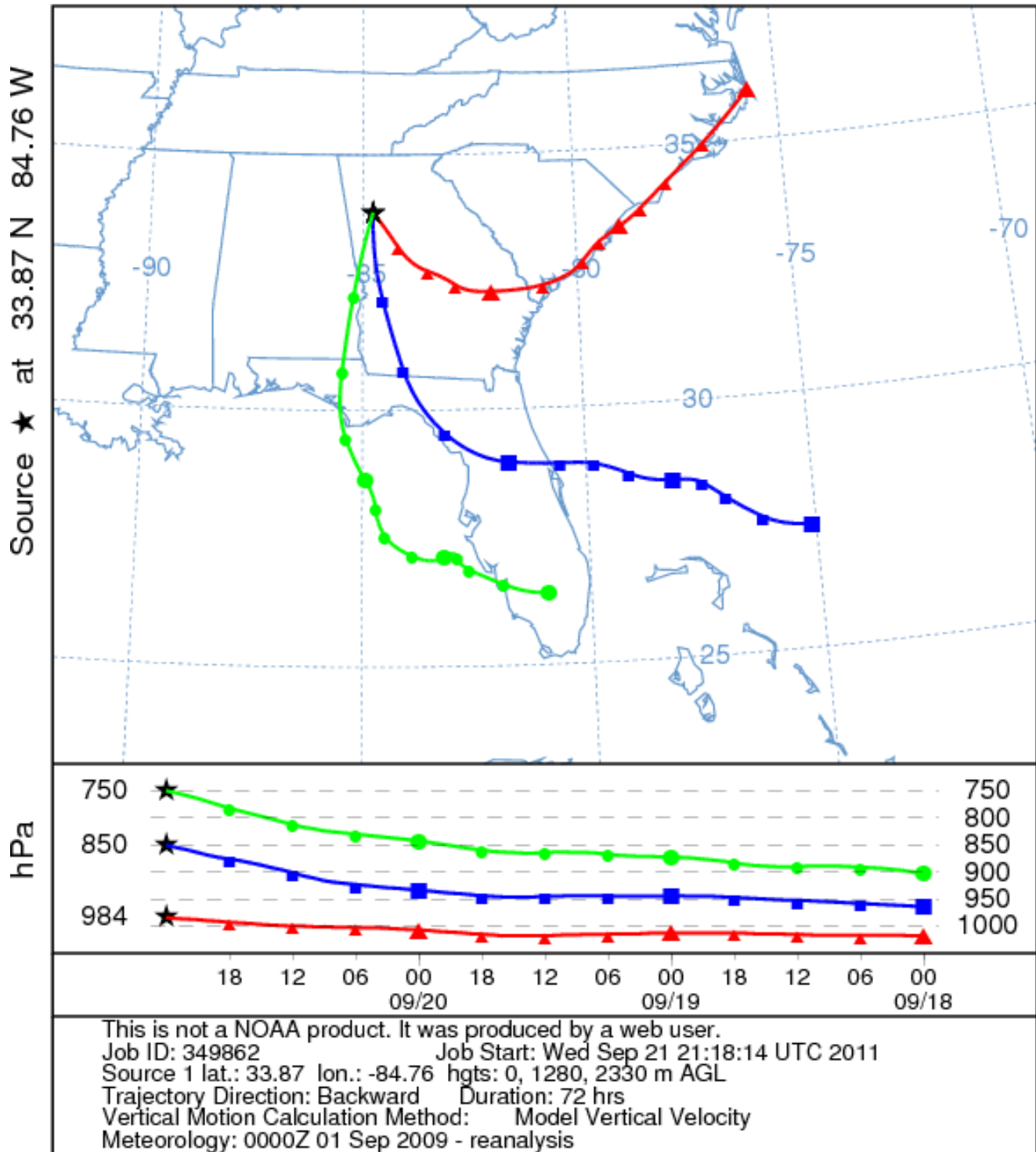


Total 72-hour Rainfall (Inches)
09/19/2009 1300 UTC - 09/22/2009 1300 UTC
SPAS #1218

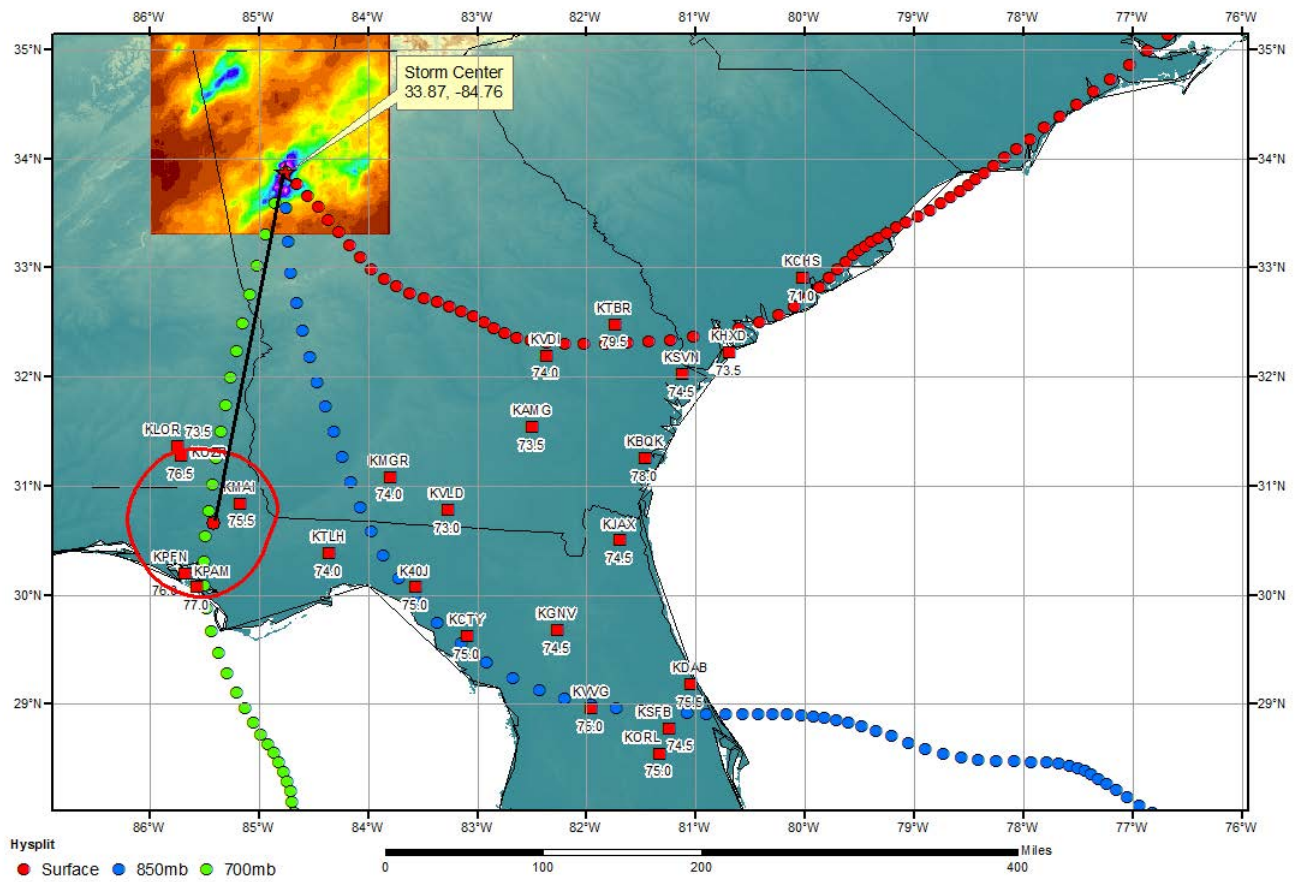
Rainfall in Inches



NOAA HYSPLIT MODEL
Backward trajectories ending at 0000 UTC 21 Sep 09
CDC1 Meteorological Data



SPAS 1218 - Dew Point Temperature (F)
September 18-22, 2009



Storm Precipitation Analysis System (SPAS) For Storm #1208_1

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

SPAS Version: 8.5

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

Spatial resolution: 36 seconds (0.39 sq-mi)

Radar Included: Yes

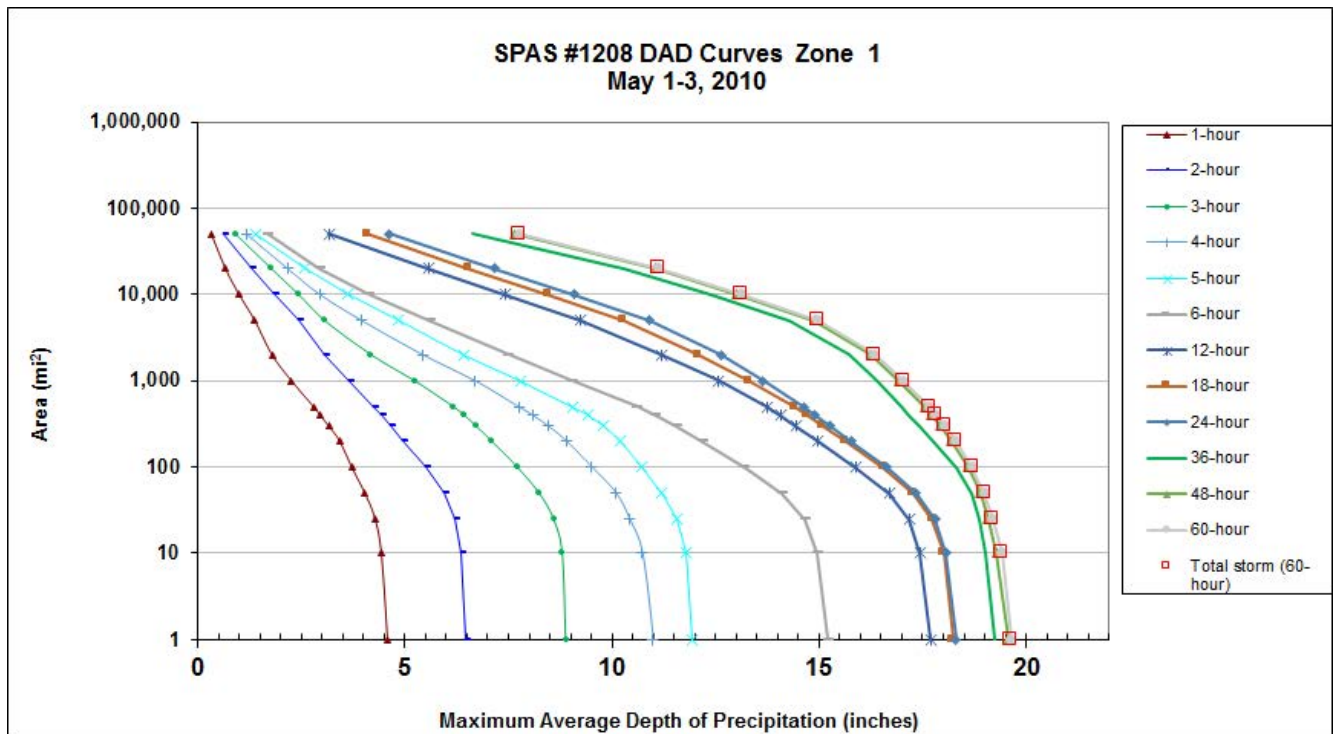
Depth-Area-Duration (DAD) analysis: Yes

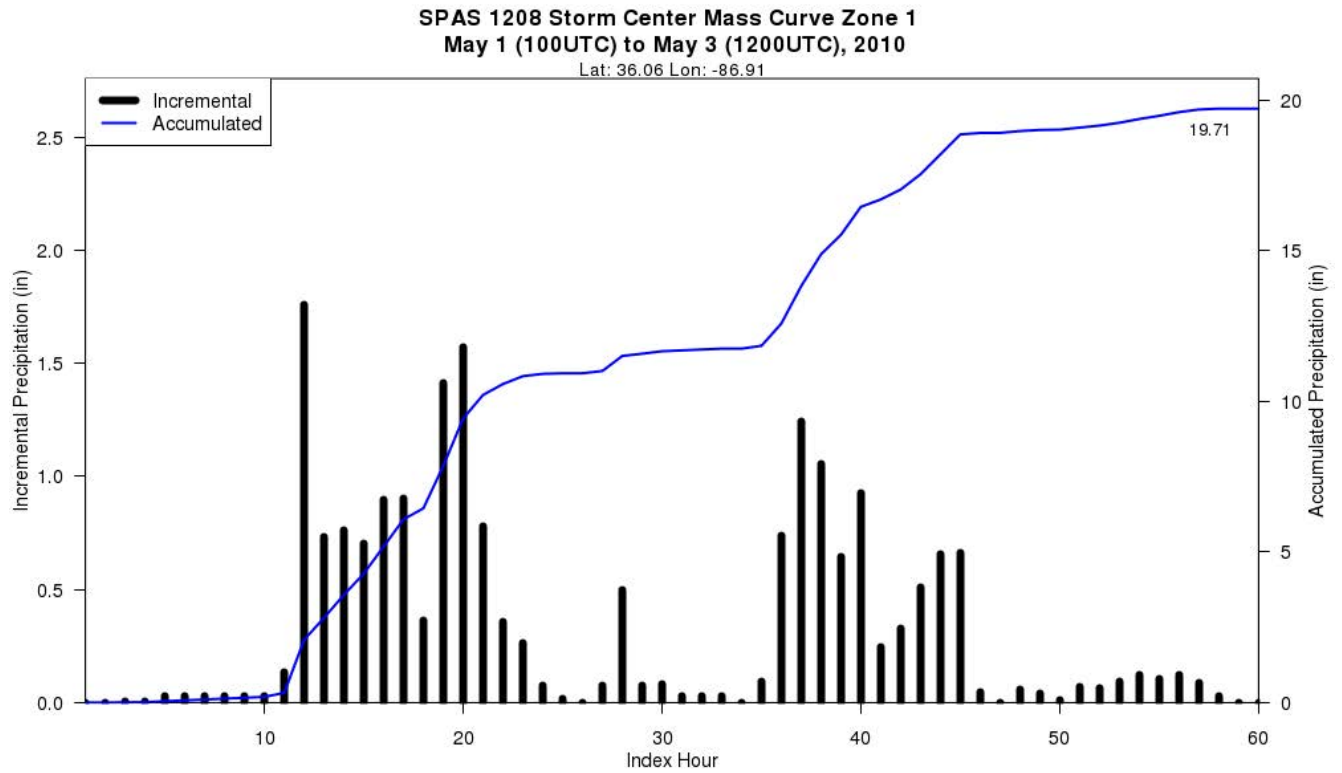
Degree of confidence in results: This was a difficult storm to analyze due to the extreme intensities, strong spatial rainfall gradients, large amount of data, relatively low radar reflectivity values across western Tennessee where among the heaviest rains fell. However, given this analysis was based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

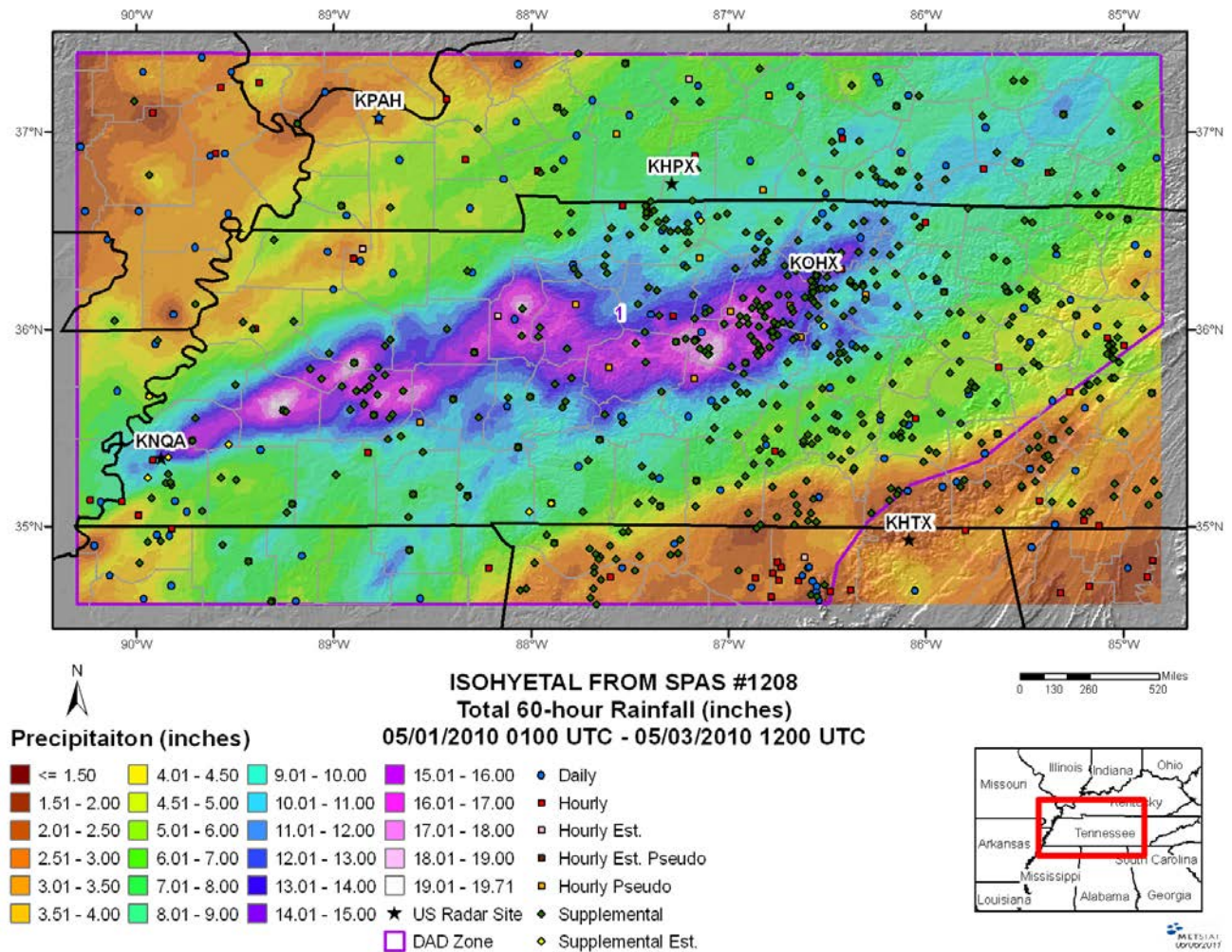
					Storm Rep. Dew Point					Climatological Max. Dew Point						
SPAS Storm ID	LON	LAT	ELEV	ELEV Round	T _d	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	T _d	T _d Round	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	IPMF
1208 1	-86.906	36.061	621	600	75.00	2.85	0.15	72	2.700	77.00	77.0	3.14	0.16	76	2.980	1.104

Storm 1208 - May 1 (0100 UTC) - May 3 (1200 UTC), 2010
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)

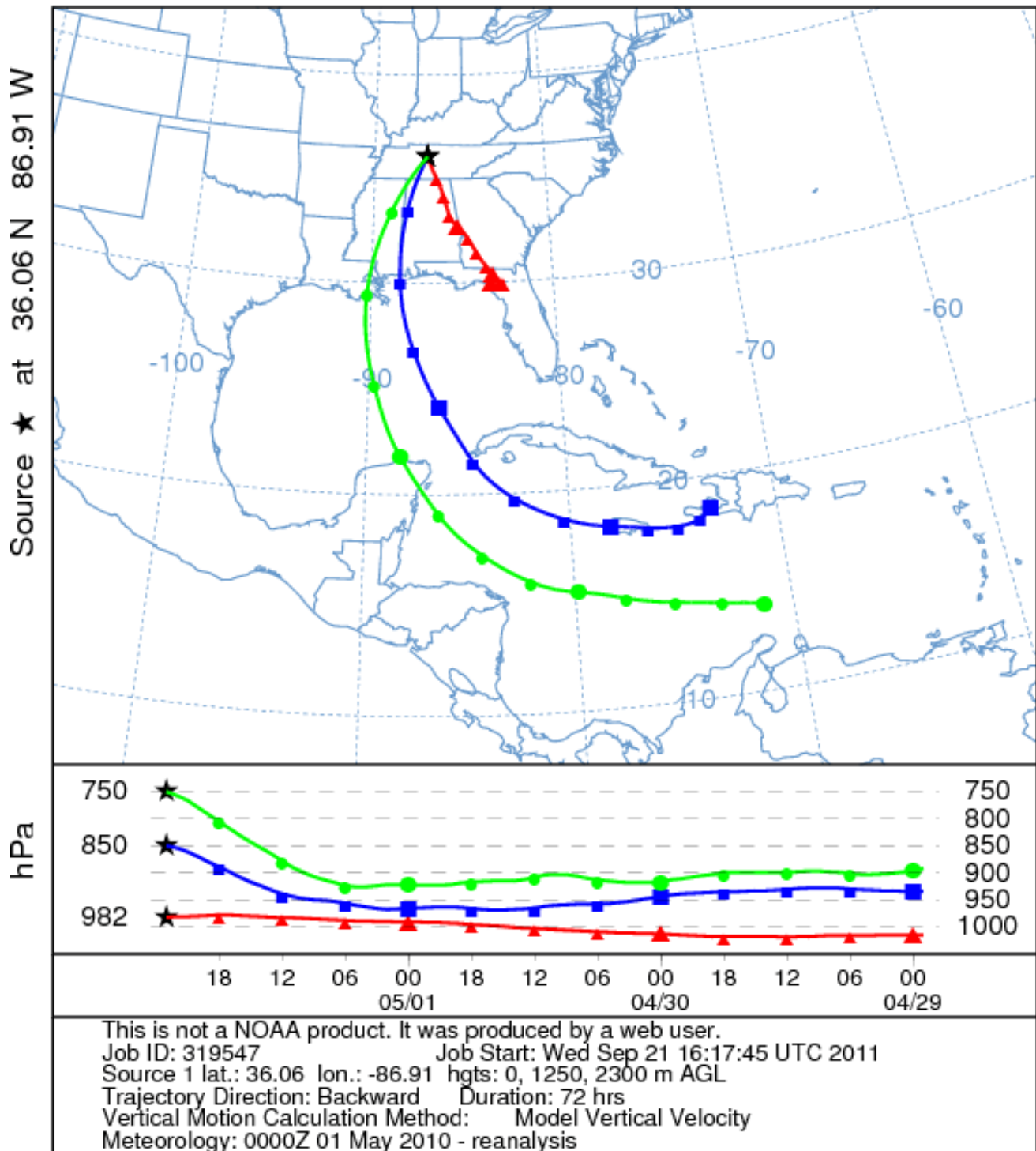
Area (mi ²)	Duration (hours)												
	1	2	3	4	5	6	12	18	24	36	48	60	Total
0.4	4.63	6.50	8.92	11.04	12.01	15.31	17.77	18.33	18.39	19.35	19.66	19.70	19.70
1	4.59	6.48	8.89	10.99	11.95	15.22	17.69	18.24	18.30	19.24	19.57	19.63	19.63
10	4.44	6.36	8.81	10.73	11.77	14.96	17.44	18.01	18.06	19.03	19.28	19.41	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
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
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
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
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
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



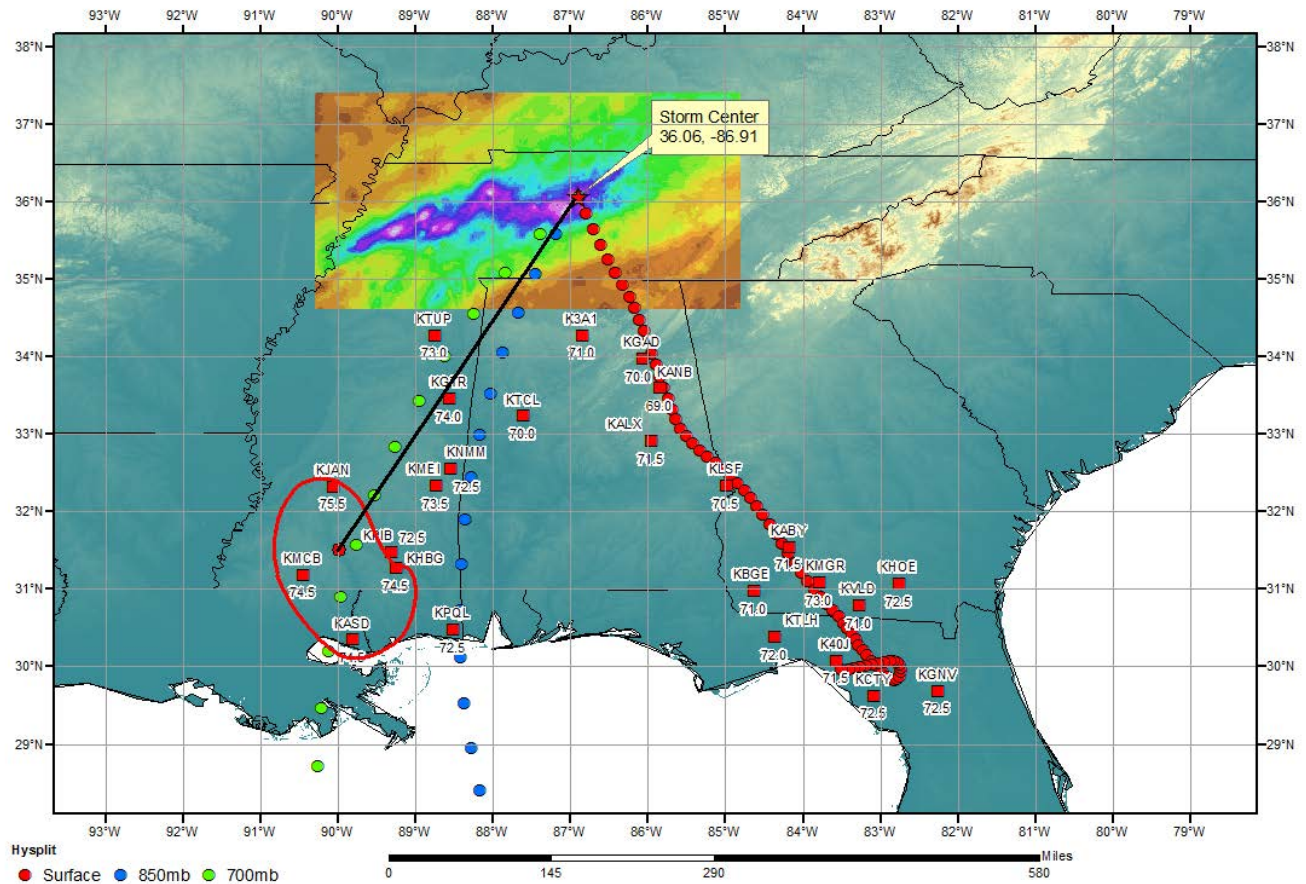




NOAA HYSPLIT MODEL
Backward trajectories ending at 2300 UTC 01 May 10
CDC1 Meteorological Data



SPAS 1208 - Dew Point Temperature (F)
April 29 - May 2, 2010



Storm Precipitation Analysis System (SPAS) For Storm #1530_1

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

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

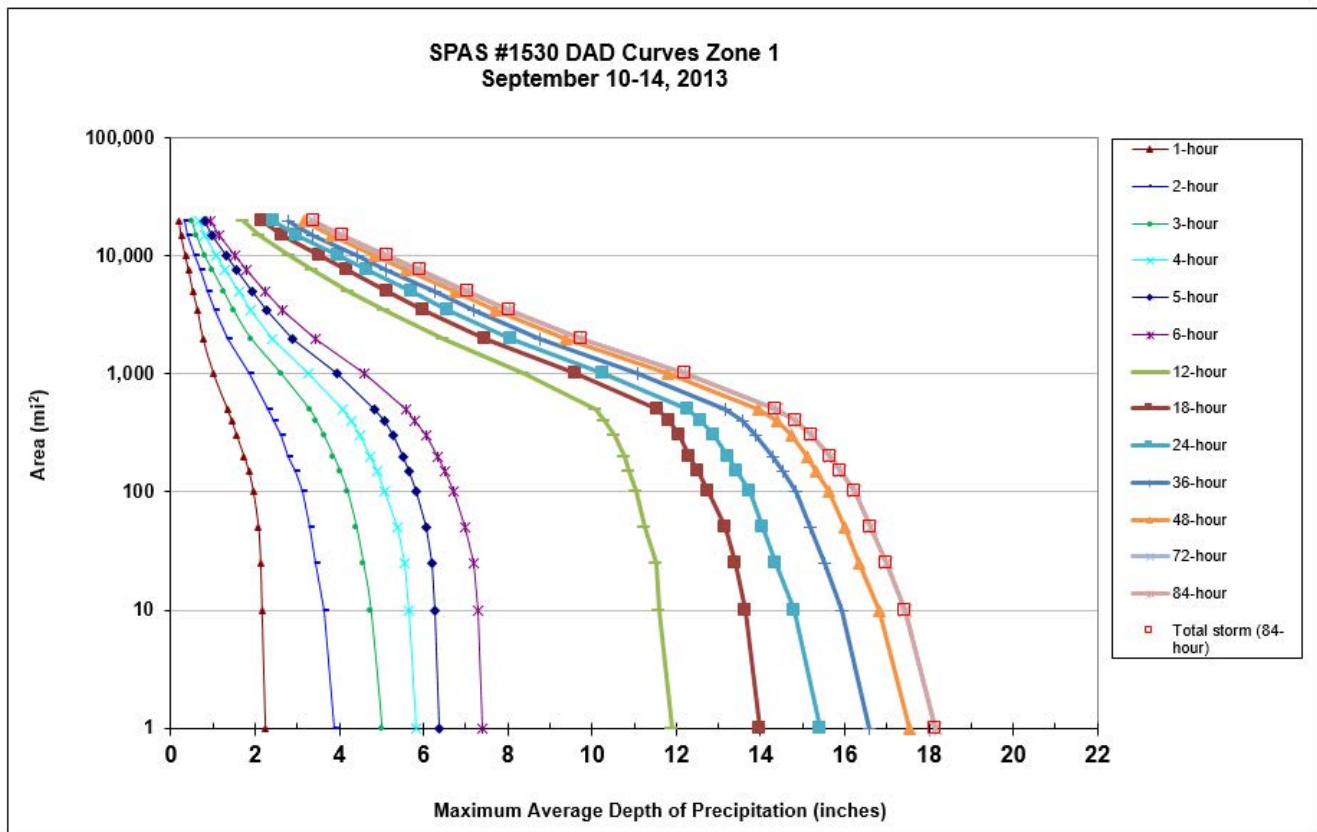
Degree of confidence in results: This analysis was based on an abundance of hourly data, daily data, supplemental station data and one hourly estimated station at the storm center. We have a good degree of confidence for the station based storm total results. The spatial pattern is dependent on the basemap (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.

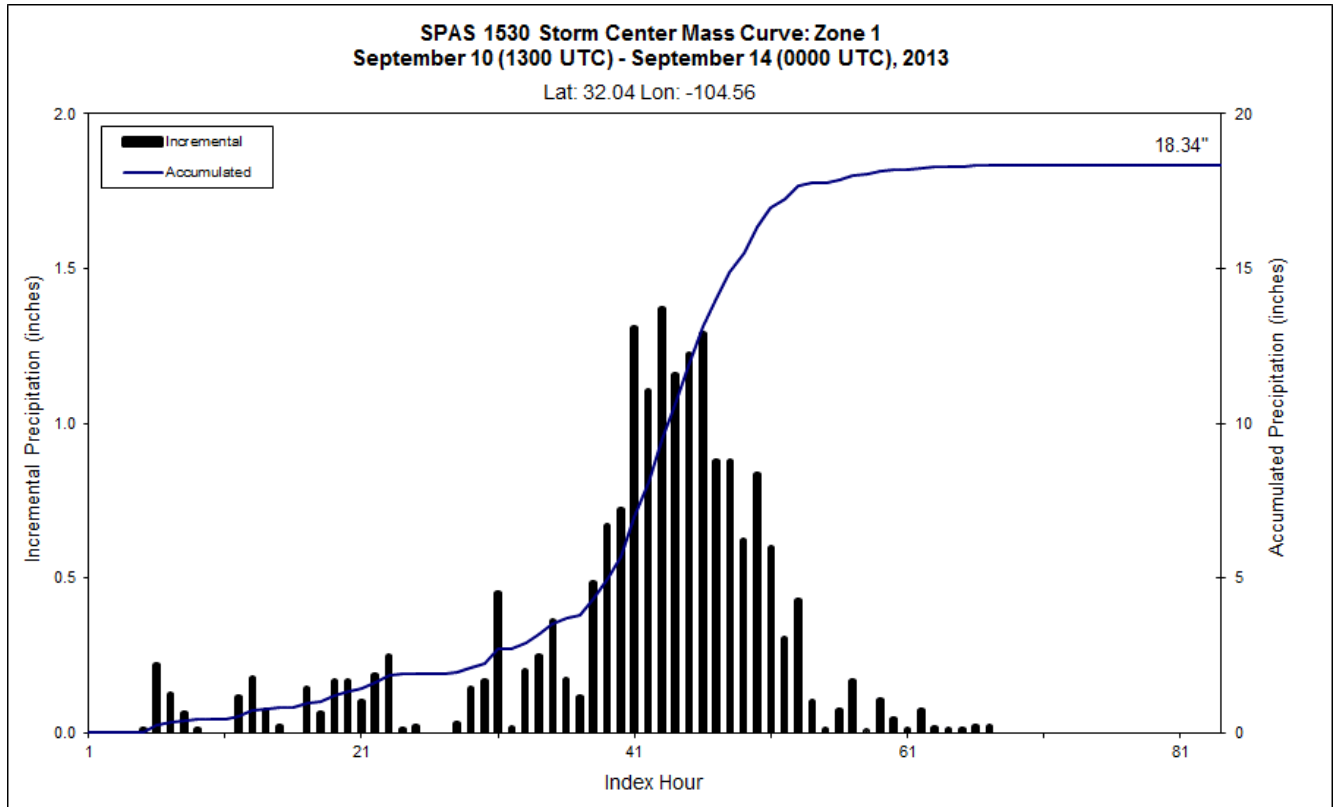
Due to beam blockage issues, some of the hourly precipitation intensities, at the storm center, were likely high. An hourly estimated (HE) station was created at the SPAS storm center from its mass curve with radar index hours 34, 42, 49 and 52 estimated from nearby stations (see below). Also, a supplemental station was created near the original SPAS created storm center in order to control the overall magnitude

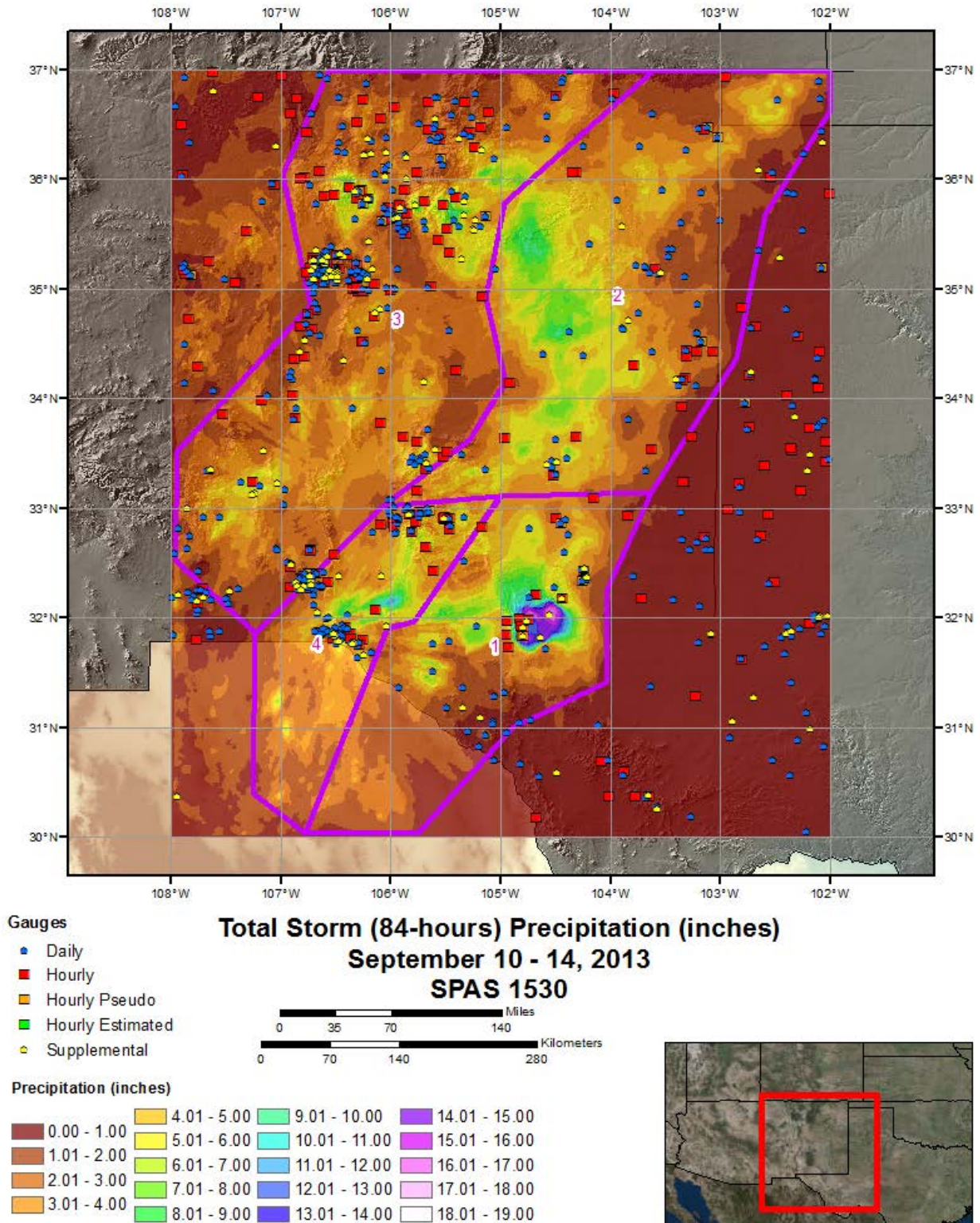
of the storm (highest observation near storm center was 15.76 inches; SPAS without supplemental at storm center was about 20 inches due to beam blockage issues). This SPAS storm center supplemental station was set to 17.50 inches (over the radar period), which was the approximate difference between the 20 inch storm center and 15.76 inch highest observation.

					Storm Rep. Dew Point					Climatological Max. Dew Point						
SPAS Storm ID	LON	LAT	ELEV	ELEV Round	T _d	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	T _d	T _d Round	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	IPMF
1530_1	-104.555	32.035	3,986	4,000	74.00	2.73	0.87	70	1.860	78.80	79.0	3.44	1.03	80	2.410	1.296

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

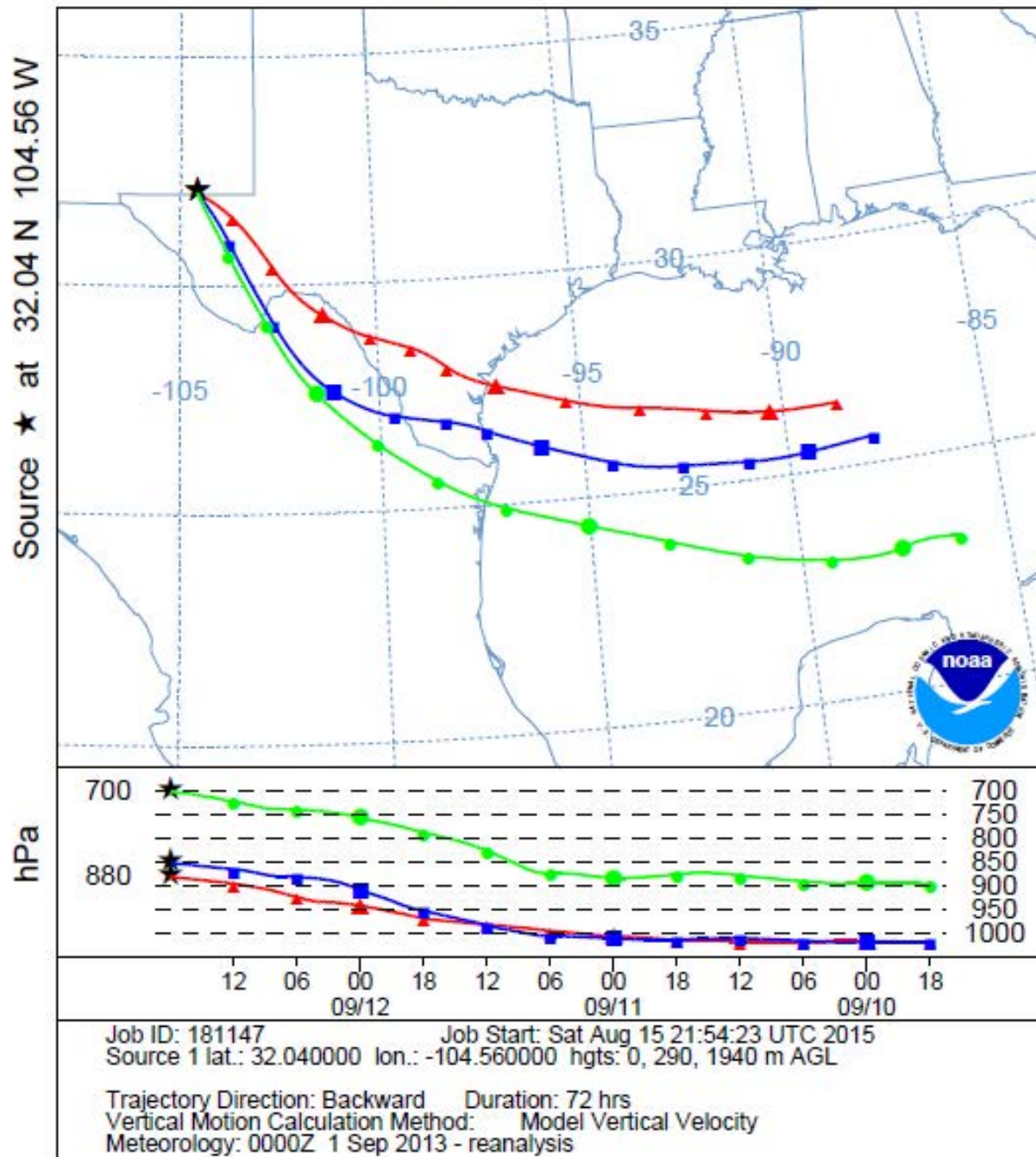






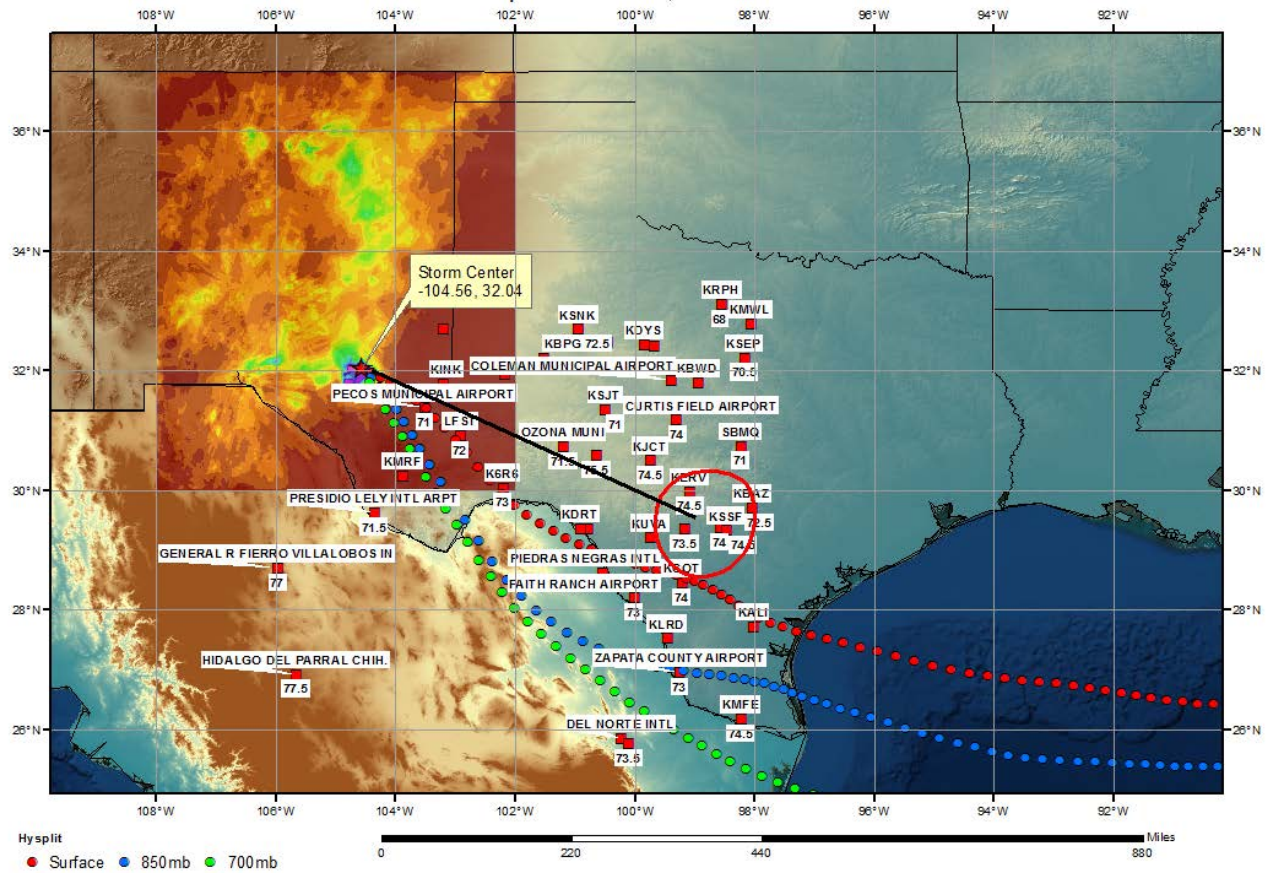
8/13/2015

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



SPAS 1530 Guadalupe Pass, TX Storm Analysis Zone 1

September 11-12, 2013



Local Storms

Storm Precipitation Analysis System (SPAS) For Storm #1426_1

General Storm Location: Cooper, MI

Storm Dates: September 1 – September 2, 1914

Event: Extreme Precipitation Event

DAD Zone 1

Latitude: 42.3708

Longitude: -85.5875

Max. Grid Rainfall Amount: 13.39"

Max. Observed Rainfall Amount: 12.80"

Number of Stations: 30

SPAS Version: 10.0

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

Spatial resolution: 0.2451

Radar Included: No

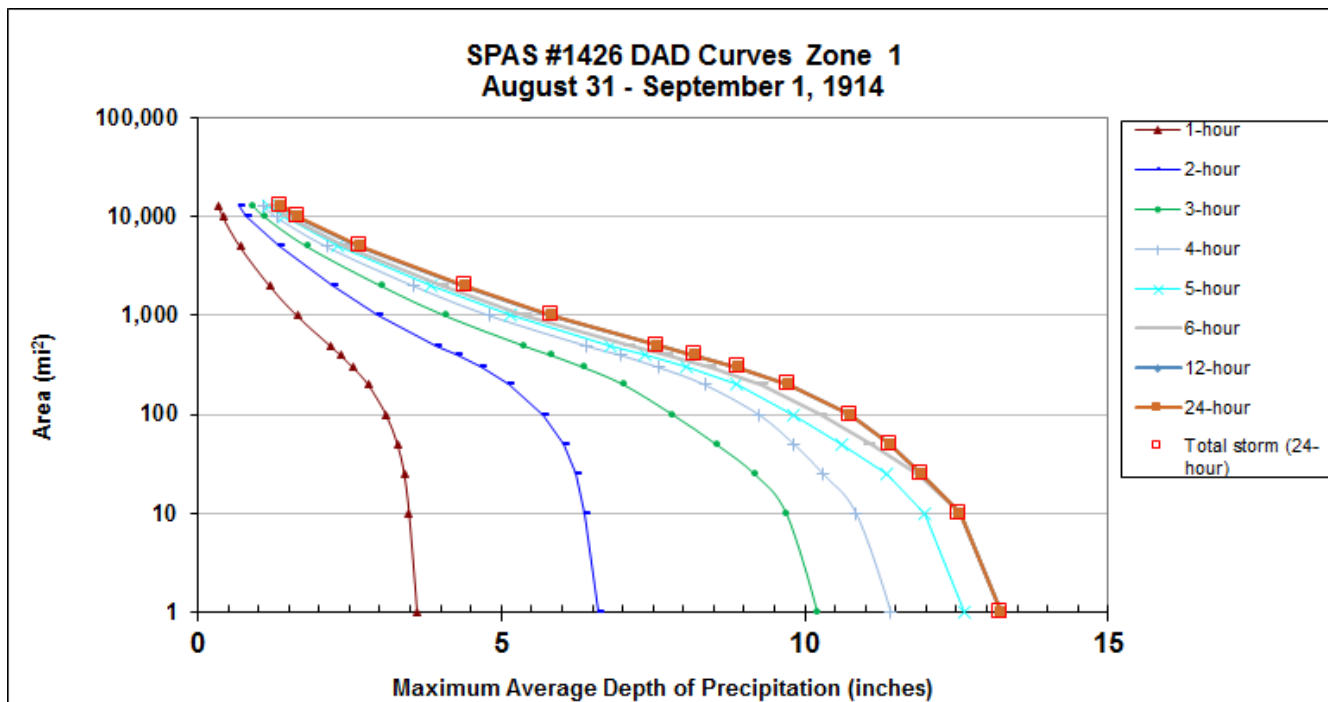
Depth-Area-Duration (DAD) analysis: Yes

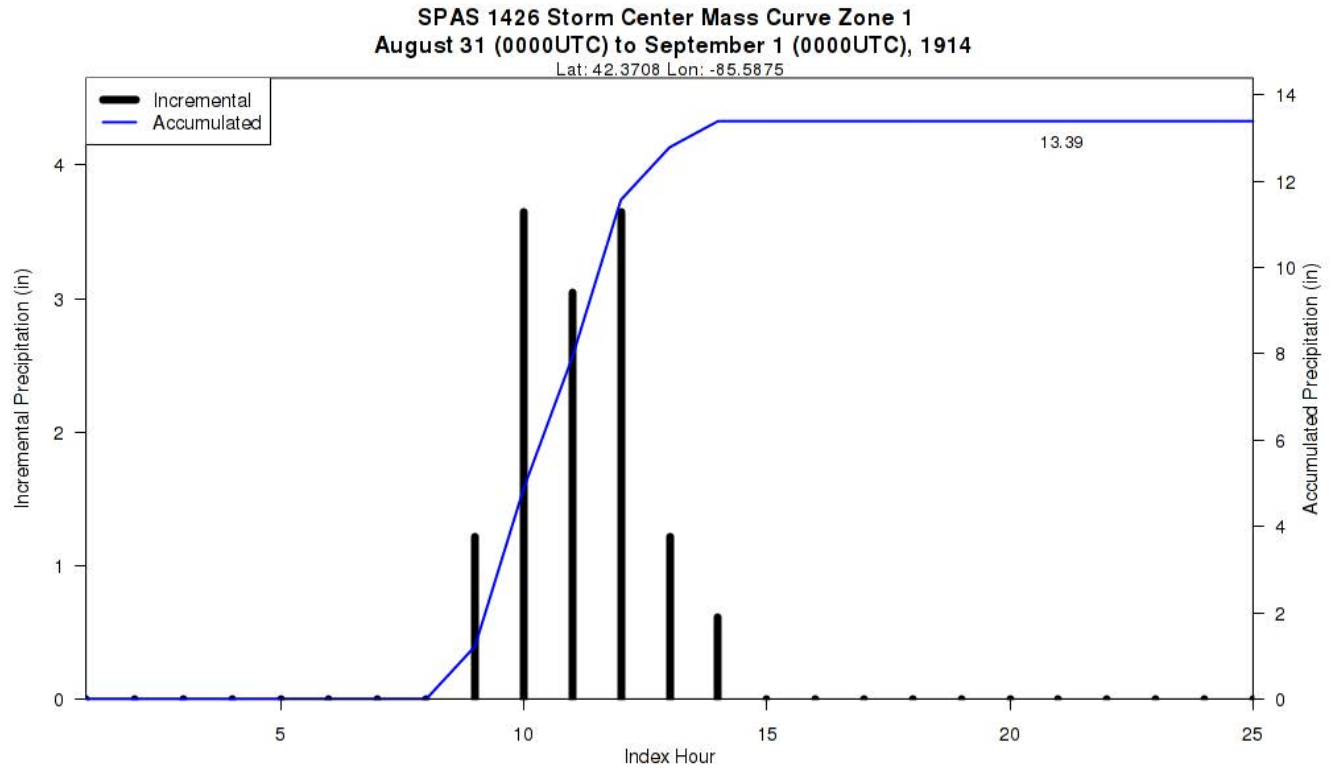
Reliability of results: In addition to the NCDC stations, three hourly stations were digitized from the U.S. Army Corp of Engineers (USACE) Storm Study Pertinent Data Sheet (included below). These stations only provided precipitation timing for the time period beginning on August 31, 1914 at 6pm EST and ending at 6pm the following day. Due to the lack of hourly information, a 25-hour Core Precipitation Period (CPP) was established for this time period. While precipitation did fall outside of the CPP, results are unreliable due to the lack of data. The resulting DAD values are slightly less than those determined by the initial USACE report. Major adjustments were completed in order to simulate USACE results, however the original analysis likely over generalized the storm area and this analysis likely provides a more accurate depiction of the event.

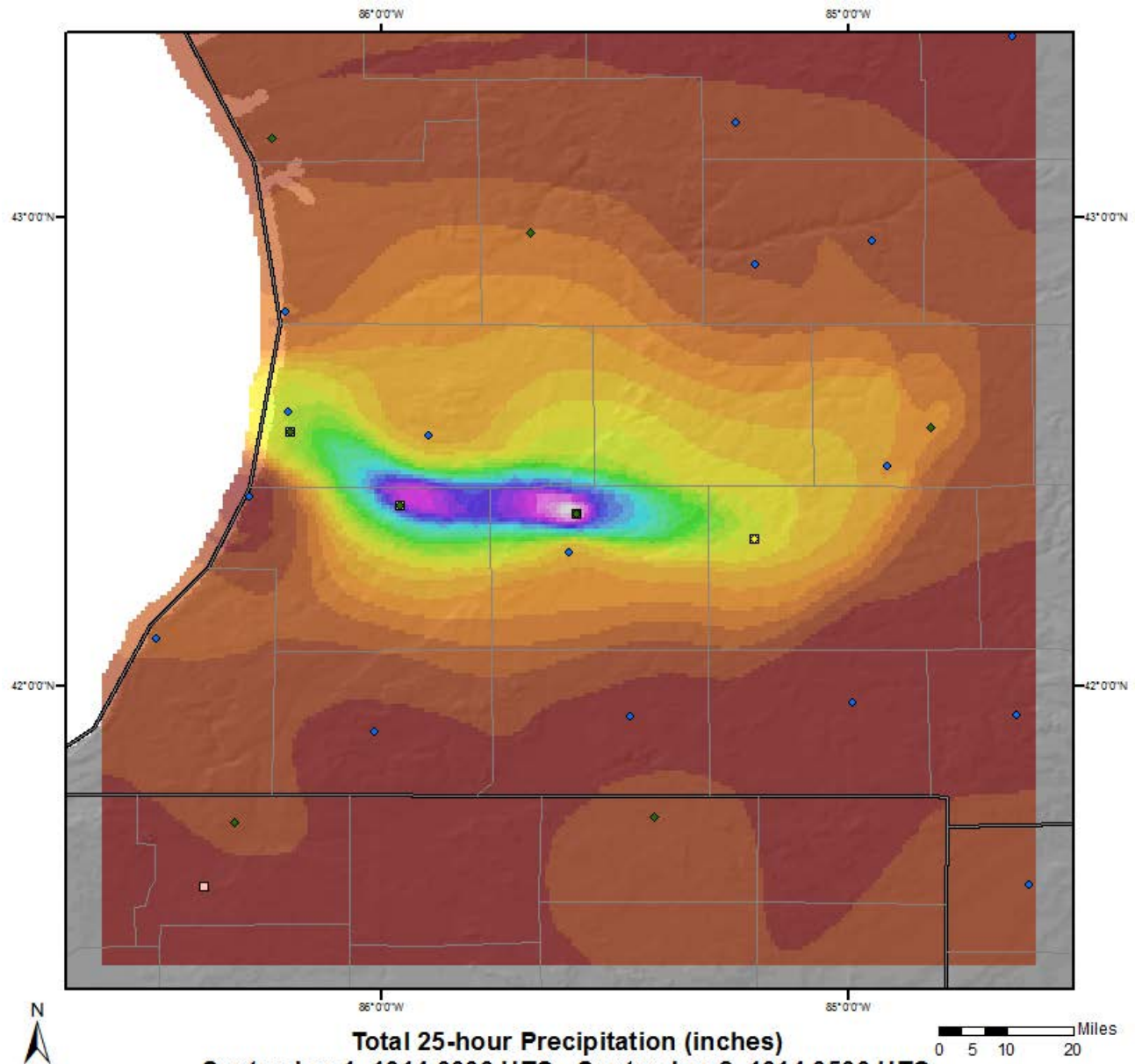
					Storm Rep. Dew Point					Climatological Max. Dew Point						
SPAS Storm ID	LON	LAT	ELEV	ELEV Round	T _d	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	T _d	T _d Round	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	IPMF
1426_1	-85.588	42.371	816	800	75.00	2.85	0.20	72	2.650	80.56	80.5	3.68	0.24	83	3.440	1.298

Storm 1426 - August 31 (0000 UTC) - September 1 (0000 UTC), 1914
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)

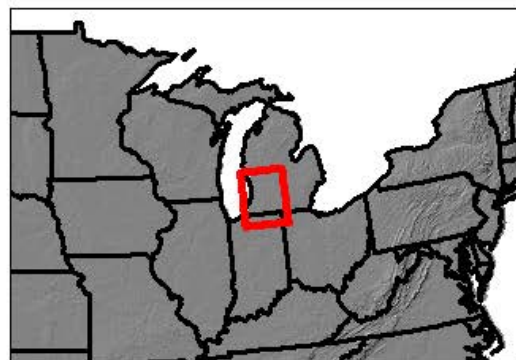
Area (mi ²)	Duration (hours)								
	1	2	3	4	5	6	12	24	Total
0.4	3.64	6.66	10.30	11.51	12.73	13.33	13.33	13.33	13.33
1	3.61	6.61	10.21	11.41	12.62	13.23	13.23	13.23	13.23
10	3.48	6.38	9.70	10.84	11.98	12.55	12.55	12.55	12.55
25	3.40	6.23	9.18	10.30	11.34	11.88	11.93	11.93	11.93
50	3.29	6.02	8.55	9.82	10.61	11.07	11.40	11.40	11.40
100	3.10	5.68	7.83	9.24	9.82	10.26	10.74	10.75	10.75
200	2.81	5.13	7.03	8.36	8.87	9.29	9.74	9.74	9.74
300	2.56	4.67	6.37	7.60	8.06	8.45	8.88	8.89	8.89
400	2.35	4.27	5.82	6.96	7.37	7.74	8.17	8.18	8.18
500	2.18	3.93	5.37	6.39	6.79	7.11	7.58	7.58	7.58
1,000	1.64	2.97	4.09	4.82	5.16	5.40	5.83	5.84	5.84
2,000	1.19	2.23	3.03	3.56	3.83	4.04	4.40	4.41	4.41
5,000	0.70	1.33	1.81	2.13	2.30	2.43	2.67	2.68	2.68
10,000	0.42	0.81	1.11	1.30	1.41	1.49	1.64	1.65	1.65
12,928	0.35	0.68	0.92	1.09	1.18	1.24	1.37	1.37	1.37







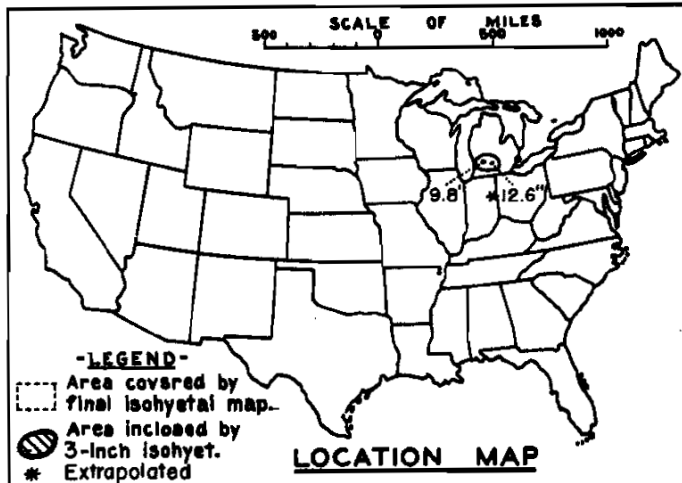
Stations	Precipitation (inches)		
◆ D	0.00 - 0.50	4.51 - 5.00	9.01 - 9.50
□ HE	0.51 - 1.00	5.01 - 5.50	9.51 - 10.00
■ HEP	1.01 - 1.50	5.51 - 6.00	10.01 - 10.50
◆ S	1.51 - 2.00	6.01 - 6.50	10.51 - 11.00
◆ SE	2.01 - 2.50	6.51 - 7.00	11.01 - 11.50
	2.51 - 3.00	7.01 - 7.50	11.51 - 12.00
	3.01 - 3.50	7.51 - 8.00	12.01 - 12.50
	3.51 - 4.00	8.01 - 8.50	12.51 - 13.00
	4.01 - 4.50	8.51 - 9.00	13.01 - 13.50



ADH 10/09/2014

WAR DEPARTMENT

CORPS OF ENGINEERS, U. S. ARMY

STORM STUDIES - PERTINENT DATA SHEET

Storm of 31 Aug.-1 Sept. 1914

Assignment GL 2-16

Location Michigan

Study Prepared by:

Great Lakes Division

Milwaukee District Office and

Hydrometeorological Section of

U. S. Weather Bureau.

Part I Reviewed by H. M. Sec. of

Weather Bureau, 10/26/39

Part II Approved by Office, Chief

of Engineers for Distribution

of Factual Data, 10/26/46

Remarks: Centers near

Cooper and Bloomingdale,
Mich.**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)----- 8

Form 5001-B (24-hour " ")----- 5

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

Misc. precip. records, meteorological data, etc.----- 6

Form 5002 (Mass rainfall curves)----- 4

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)----- -

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

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

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

MAXIMUM AVERAGE DEPTH OF RAINFALL IN INCHES

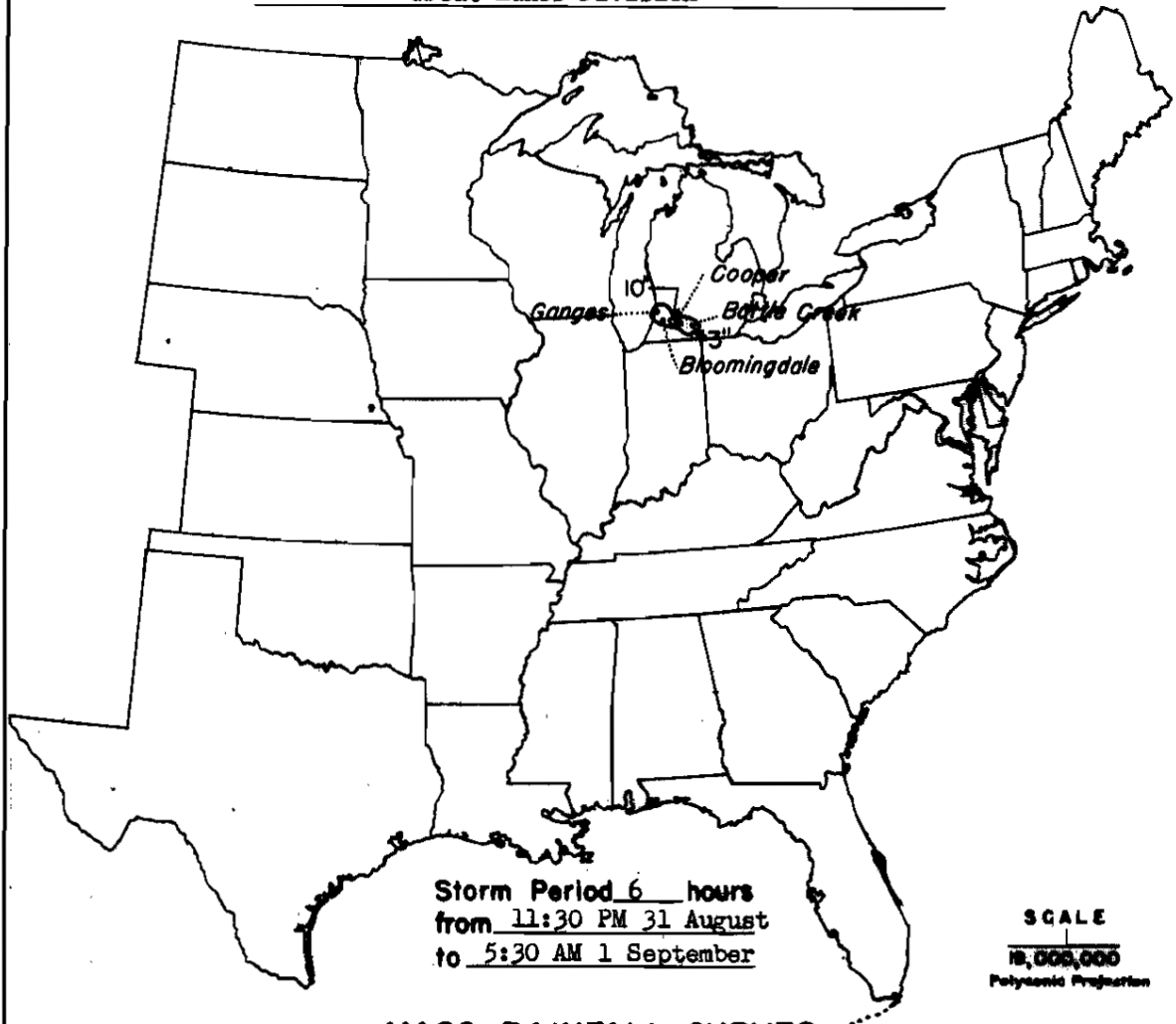
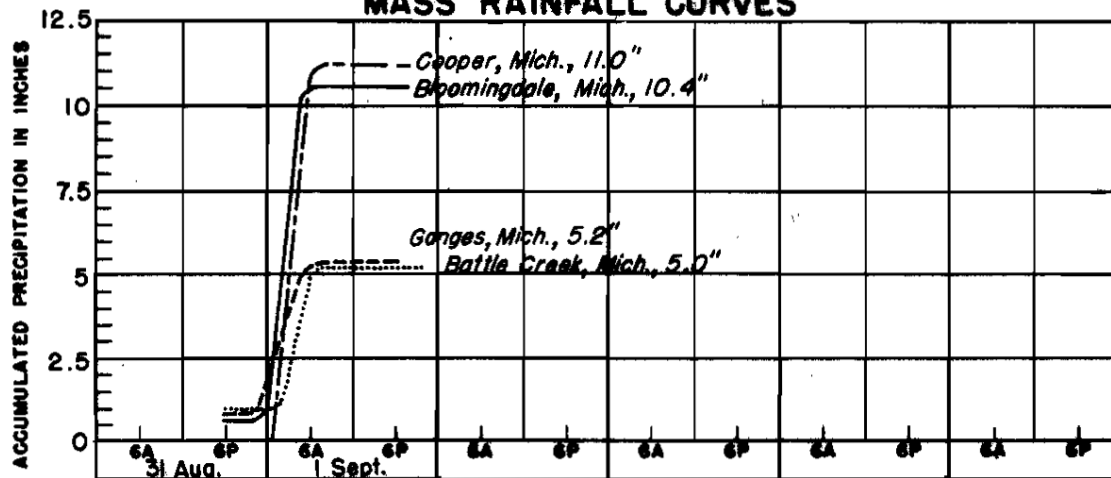
Area in Sq. Mi.	Duration of Rainfall in Hours									
	6									
10	12.6									
50	12.0									
100	11.3									
200	10.0									
500	7.6									
800	6.3									
1,000	5.7									
1,200	5.2									

WAR DEPARTMENT

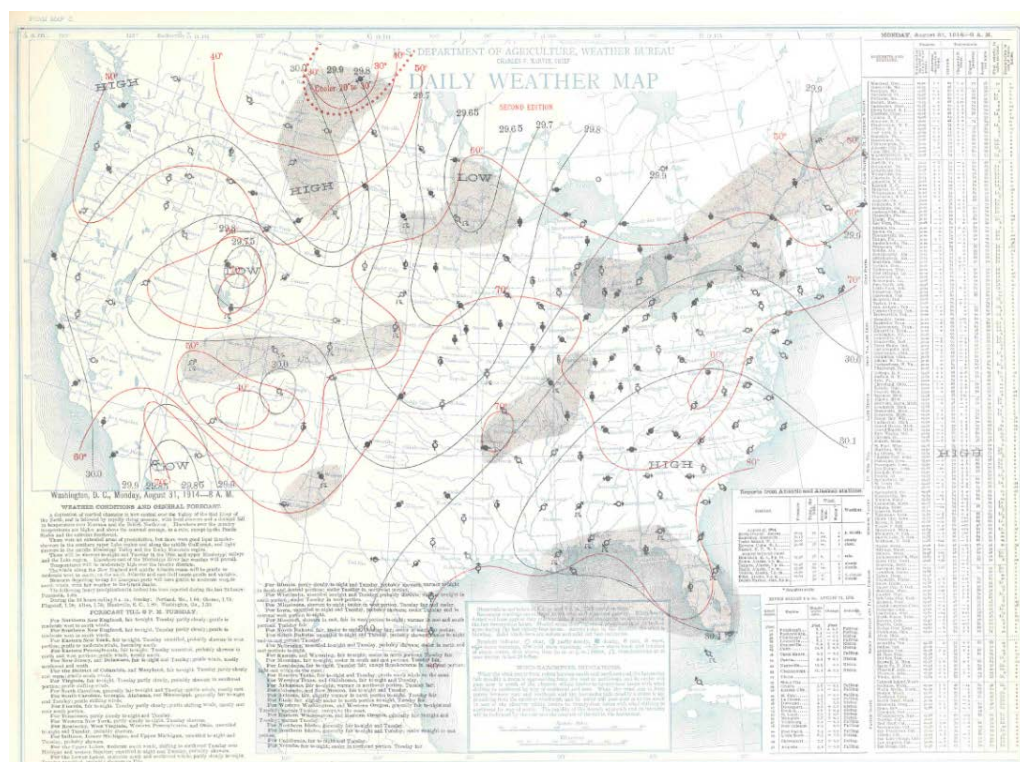
CORPS OF ENGINEERS, U. S. ARMY

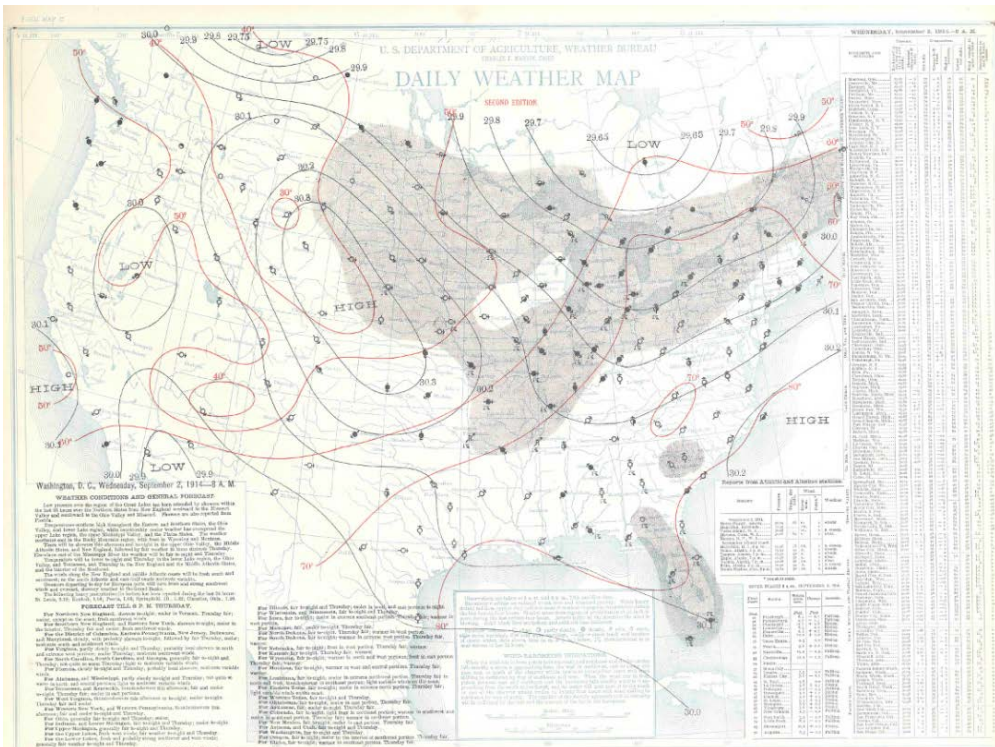
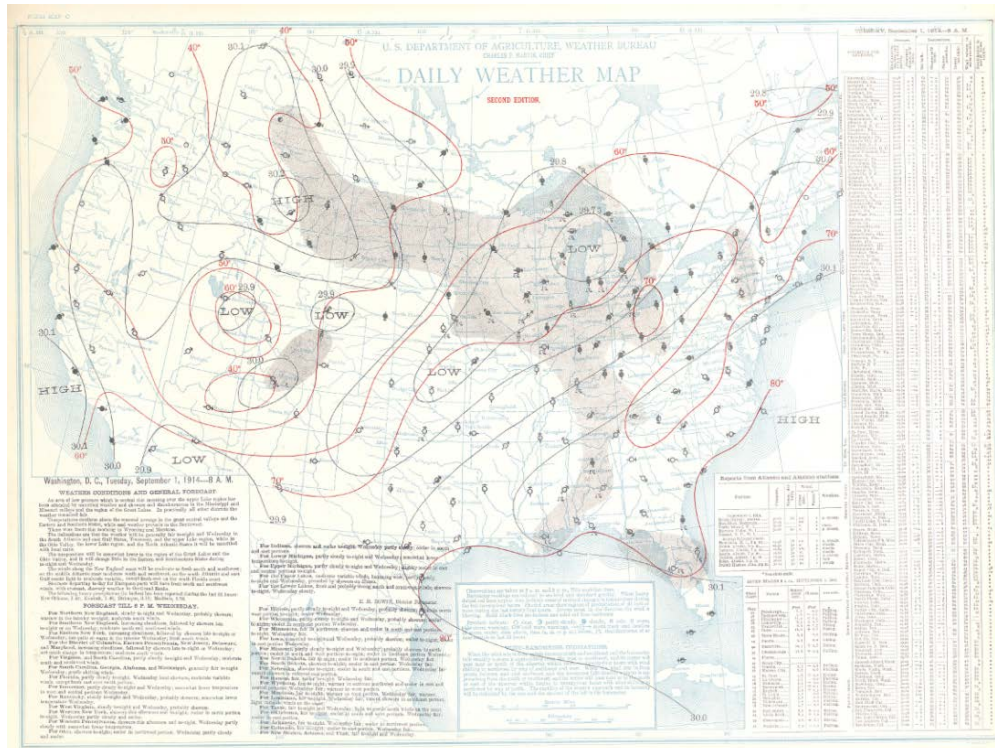
STORM STUDIES - ISOHYETAL MAP

Storm of Aug. 31-Sept. 1, 1914 Assignment GL 2-16
 Study Prepared by: Milwaukee, Wisc. District
Great Lakes Division

**MASS RAINFALL CURVES**

FORM 5-32





GL 2-16..Aug.31-Sept.1, 1914..Cooper, L

12-hr. rTd 68..250 SW..to 77.55%

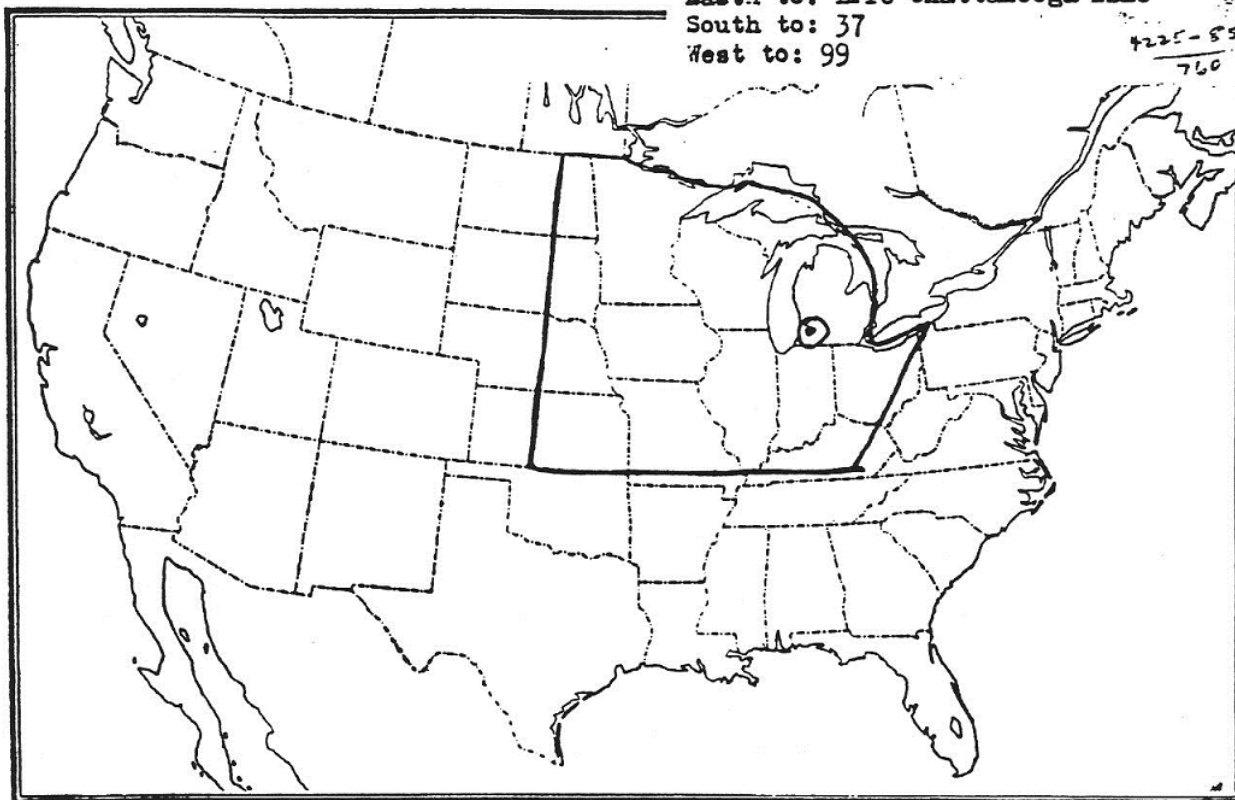
North to: border

East to: Erie-Chattanooga line

South to: 37

West to: 99

425-553
760



Storm Precipitation Analysis System (SPAS) For Storm #1427_1

General Storm Location: Boyden, IA

Storm Dates: September 17 – September 18, 1926

Event: Extreme Precipitation Event

DAD Zone 1

Latitude: 43.1958

Longitude: -95.9958

Max. Grid Rainfall Amount: 24.22”

Max. Observed Rainfall Amount: 24.01”

Number of Stations: 159

SPAS Version: 10.0

Basemap: Manually digitized contours

Spatial resolution: 0.242

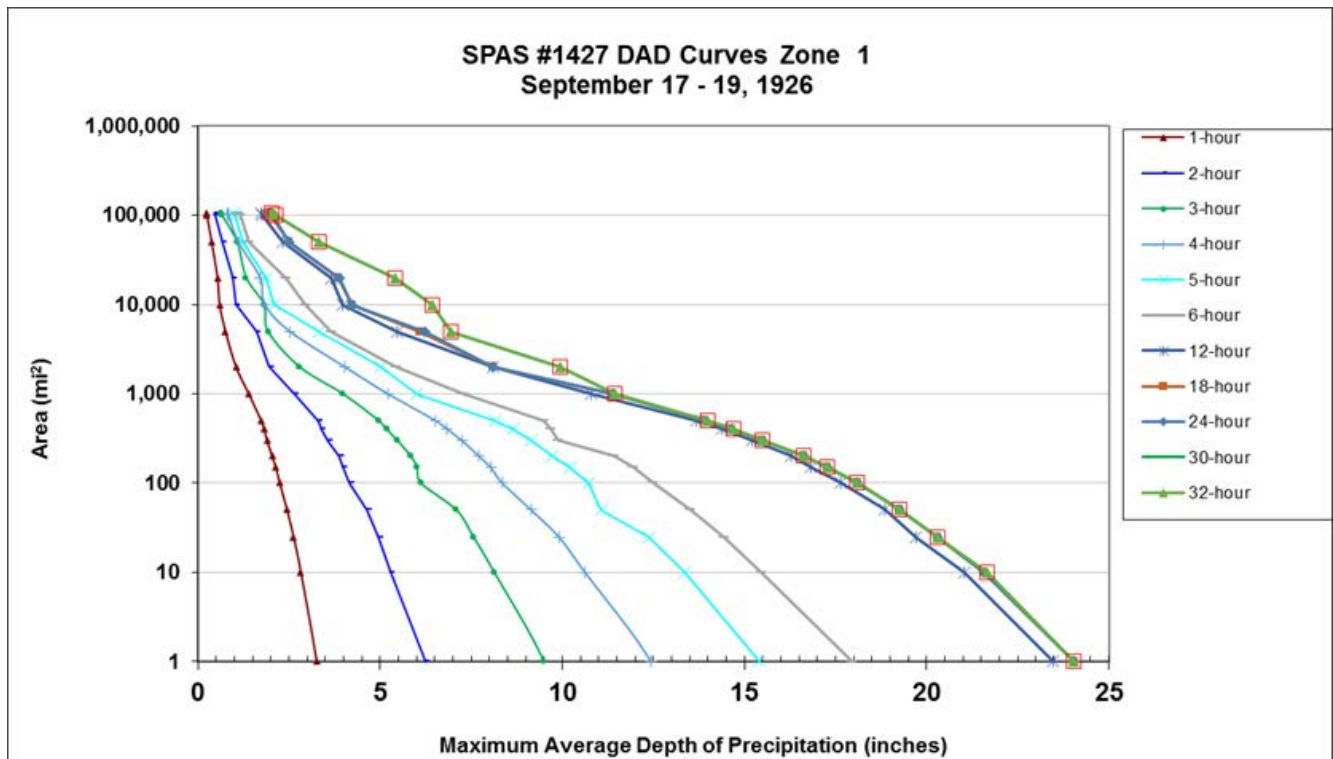
Radar Included: No

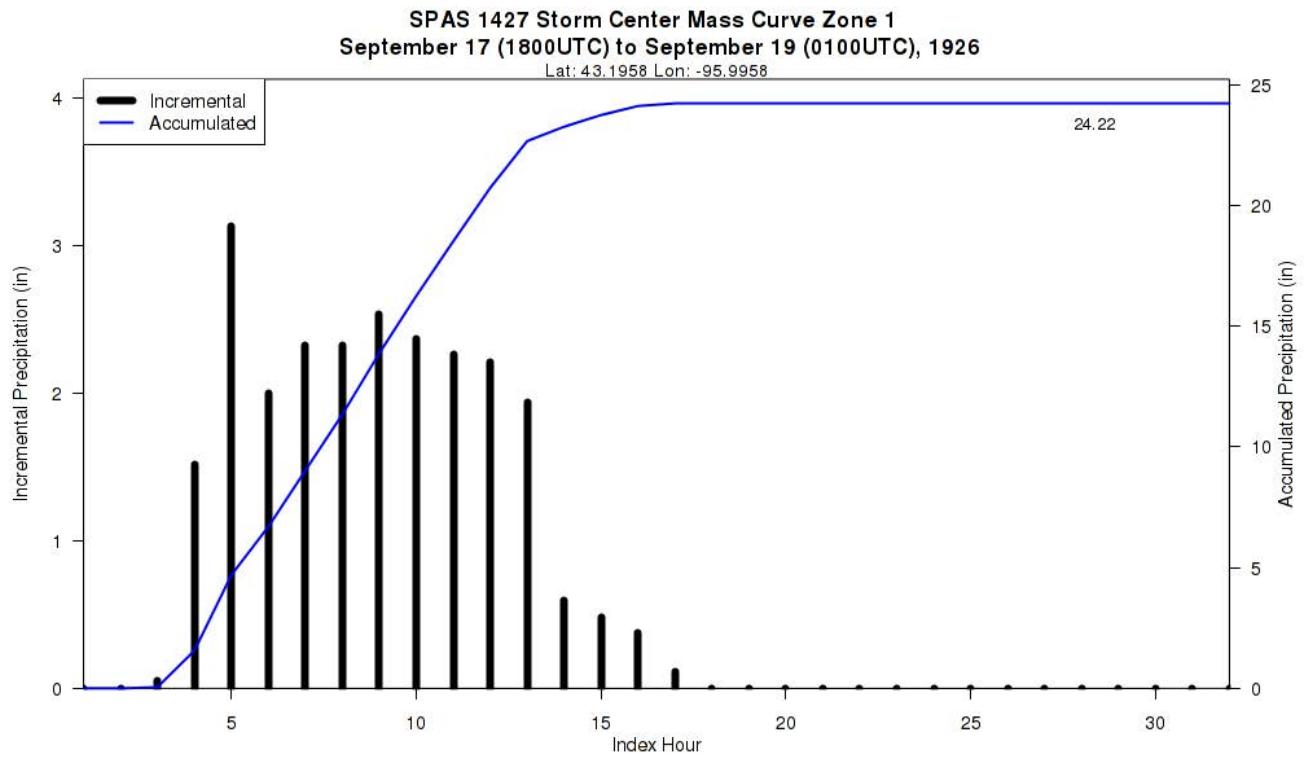
Depth-Area-Duration (DAD) analysis: Yes

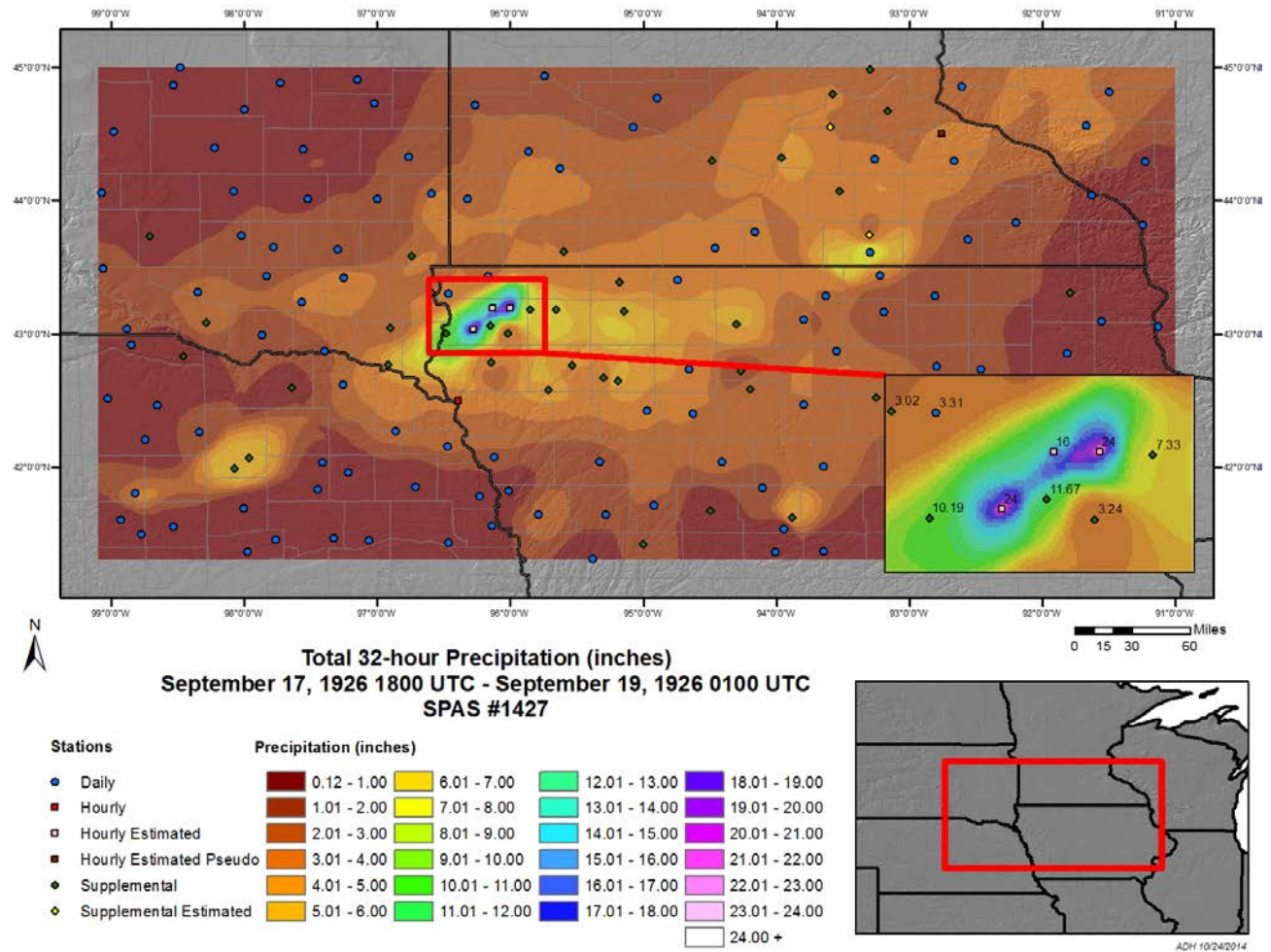
Reliability of results: In addition to the NCDC stations, four hourly stations were digitized from the U.S. Army Corp of Engineers (USACE) Storm Study Pertinent Data Sheet (included below). These stations only provided precipitation timing for the time period beginning on September 17 around 12:00 CST to 18:00 CST on September 18. Data mining also produced an additional supplemental station at Foss Field/Sioux Falls Regional Airport, SD. Due to the lack of hourly information, a 32-hour Core Precipitation Period (CPP) was established for this time period. While precipitation did fall outside of the CPP, results are unreliable due to the lack of data. In addition to the three digitized hourly stations, an additional estimated hourly station with 2.40 inches of accumulated precipitation over the CPP was created in order to represent later timing as the frontal passage moved eastward. The resulting DAD values are about equal to those of the previous analysis. There are slight deviations, both high and low, which are likely due to the original analysis over generalizing the storm area. For this reason, the current analysis is considered more reliable and represents a more accurate depiction of the event.

					Storm Rep. Dew Point					Climatological Max. Dew Point						
SPAS Storm ID	LON	LAT	ELEV	ELEV Round	T _d	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	T _d	T _d Round	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	IPMF
1427 1	-95.996	43.196	1,438	1,400	76.50	3.07	0.37	75	2.700	78.93	79.0	3.44	0.39	80	3.050	1.130

Storm 1427 - September 17 (1800 UTC) - September 19 (0100 UTC), 1926												
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)												
Area (mi ²)	Duration (hours)											
	1	2	3	4	5	6	12	18	24	30	32	Total
0.4	3.37	6.39	9.68	12.72	15.78	18.37	23.60	24.14	24.14	24.14	24.14	24.14
1	3.29	6.23	9.45	12.42	15.41	17.93	23.46	24.01	24.01	24.01	24.01	24.01
10	2.83	5.35	8.15	10.67	13.25	15.45	20.98	21.48	21.48	21.48	21.48	21.48
25	2.62	4.97	7.57	9.91	12.33	14.38	19.73	20.17	20.17	20.17	20.17	20.17
50	2.44	4.62	7.06	9.20	11.48	13.41	18.79	19.18	19.19	19.19	19.19	19.19
100	2.24	4.25	6.47	8.46	10.60	12.43	17.62	18.04	18.04	18.04	18.04	18.04
200	2.03	3.88	5.89	7.71	9.66	11.32	16.17	16.51	16.51	16.51	16.51	16.51
300	1.90	3.63	5.45	7.17	8.98	10.52	15.10	15.41	15.42	15.42	15.42	15.42
400	1.81	3.45	5.16	6.82	8.51	9.94	14.21	14.50	14.51	14.51	14.51	14.51
500	1.73	3.32	4.96	6.55	8.16	9.50	13.49	13.77	13.78	13.78	13.78	13.78
1,000	1.40	2.67	4.00	5.28	6.57	7.68	11.07	11.33	11.35	11.35	11.35	11.35
2,000	1.03	1.98	2.93	3.86	4.83	5.73	8.55	8.94	9.03	9.03	9.03	9.03
5,000	0.79	1.50	2.18	2.73	3.32	3.89	6.20	6.60	6.69	6.69	6.69	6.69
10,000	0.65	1.26	1.80	2.24	2.66	3.09	4.90	5.34	5.43	5.43	5.43	5.43
20,000	0.53	1.02	1.44	1.82	2.15	2.49	3.87	4.33	4.40	4.40	4.40	4.40
50,000	0.38	0.72	1.05	1.31	1.53	1.73	2.66	2.99	3.08	3.08	3.08	3.08
100,000	0.24	0.47	0.66	0.83	1.01	1.16	1.79	2.02	2.06	2.06	2.06	2.06
104,550	0.23	0.45	0.64	0.81	0.96	1.12	1.74	1.97	2.01	2.01	2.01	2.01

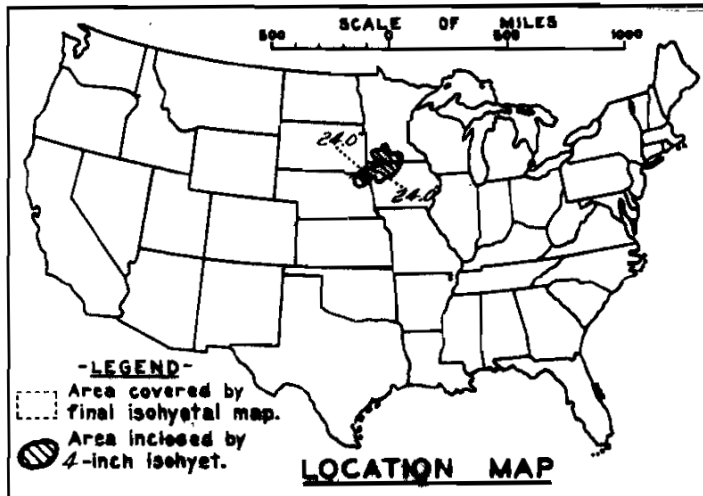






DEPARTMENT OF THE ARMY

CORPS OF ENGINEERS

STORM STUDIES - PERTINENT DATA SHEET

Storm of 17-19 September 1926

Assignment MR 4-24

Location Ia, Minn., Nebr., S.D. & Wisc.

Study Prepared by:

Missouri River Division

Omaha District Office

Part I Reviewed by H. M. Sec. of
Weather Bureau, 8/5/47Part II Approved by Office, Chief
of Engineers for Distribution
of Factual Data, 12/25/47

Remarks: Centers near

Boyden & Maurice, Ia.

Dewpt. 70° - Ref. Pt. 175 SSE

Grid C-15

DATA AND COMPUTATIONS COMPILED**PART I**

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

Precipitation data and mass curves:

(Number of Sheets)

Form 5001-C (Hourly precip. data)-----	8
Form 5001-B (24-hour " ")-----	-
Form 5001-D (" " " ")-----	11
Misc. precip. records, meteorological data, etc.-----	29
Form 5002 (Mass rainfall curves)-----	27

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)-----	3
Form S-11 (Depth-area data from isohyetal map)-----	2
Form S-12 (Maximum depth-duration data)-----	17
Maximum duration-depth-area curves-----	1
Data relating to periods of maximum rainfall-----	7

MAXIMUM AVERAGE DEPTH OF RAINFALL IN INCHES

Area in Sq. Mi.	Duration of Rainfall in Hours								
	6	12	18	24	30	36	48	54	
Max. Station	18.4	23.8	24.0	24.0	24.0	24.0	24.0	24.0	
10	15.1	20.7	21.7	21.7	21.7	21.7	21.7	21.7	
100	12.8	17.1	17.8	17.8	17.8	17.8	17.8	17.8	
200	11.7	15.8	16.6	16.6	16.6	16.6	16.6	16.6	
500	9.4	12.6	13.3	13.3	13.3	13.3	13.3	13.3	
1,000	7.5	10.1	10.4	10.6	10.6	10.6	10.6	10.6	
2,000	5.9	8.0	8.2	8.6	8.6	8.6	8.6	8.6	
5,000	4.1	6.3	6.4	6.6	6.6	6.6	6.6	6.6	
10,000	3.0	5.2	5.4	5.5	5.6	5.6	5.6	5.6	
20,000	2.1	4.1	4.3	4.4	4.6	4.8	4.9	4.9	
50,000	1.4	2.7	2.9	3.0	3.2	3.6	3.8	3.8	
63,000	1.2	2.4	2.6	2.7	2.9	3.3	3.5	3.5	

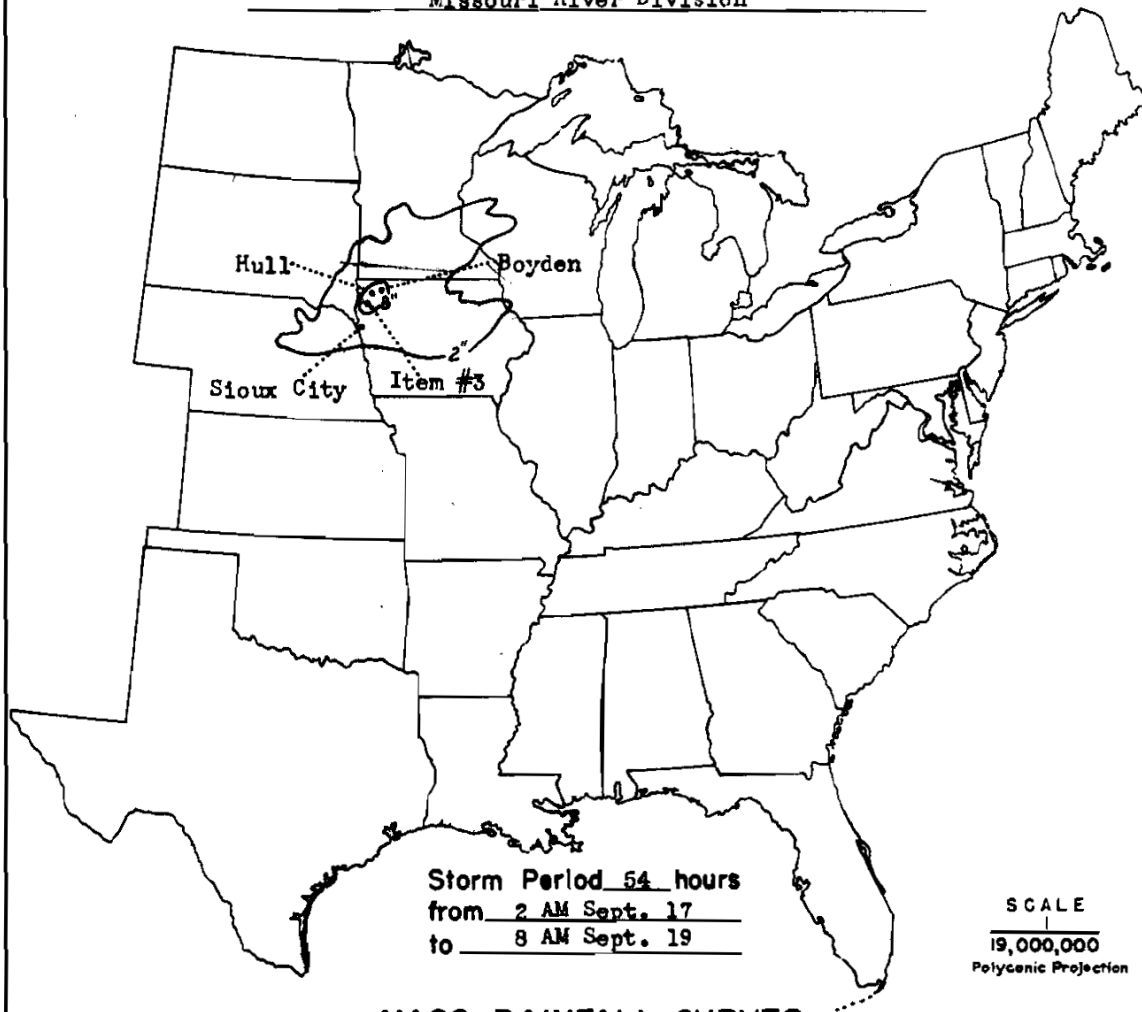
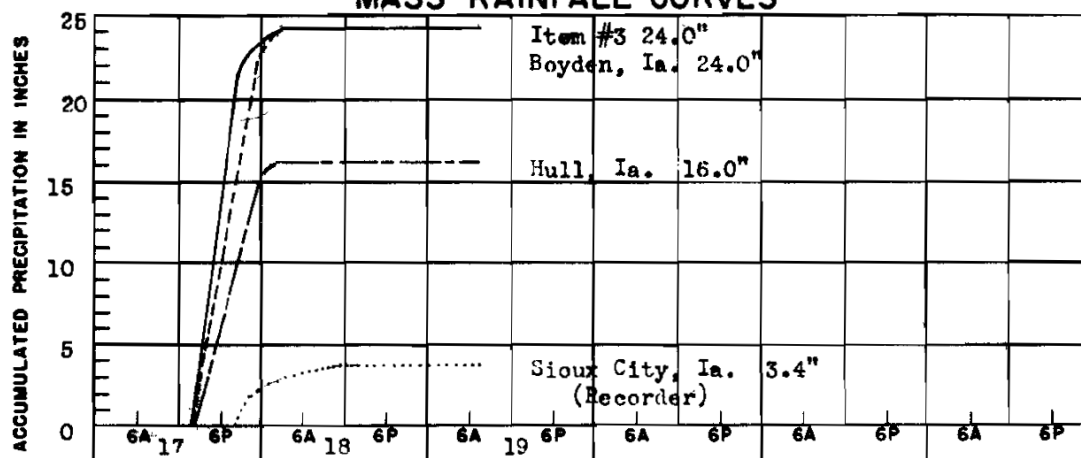
Form S-2

DEPARTMENT OF THE ARMY

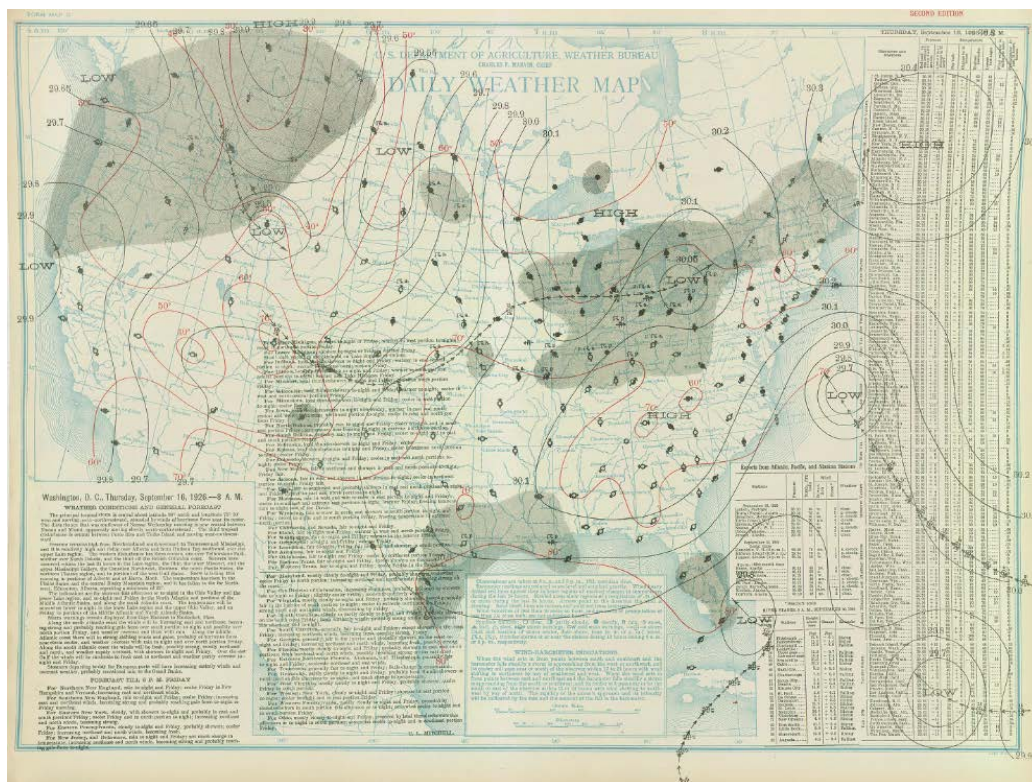
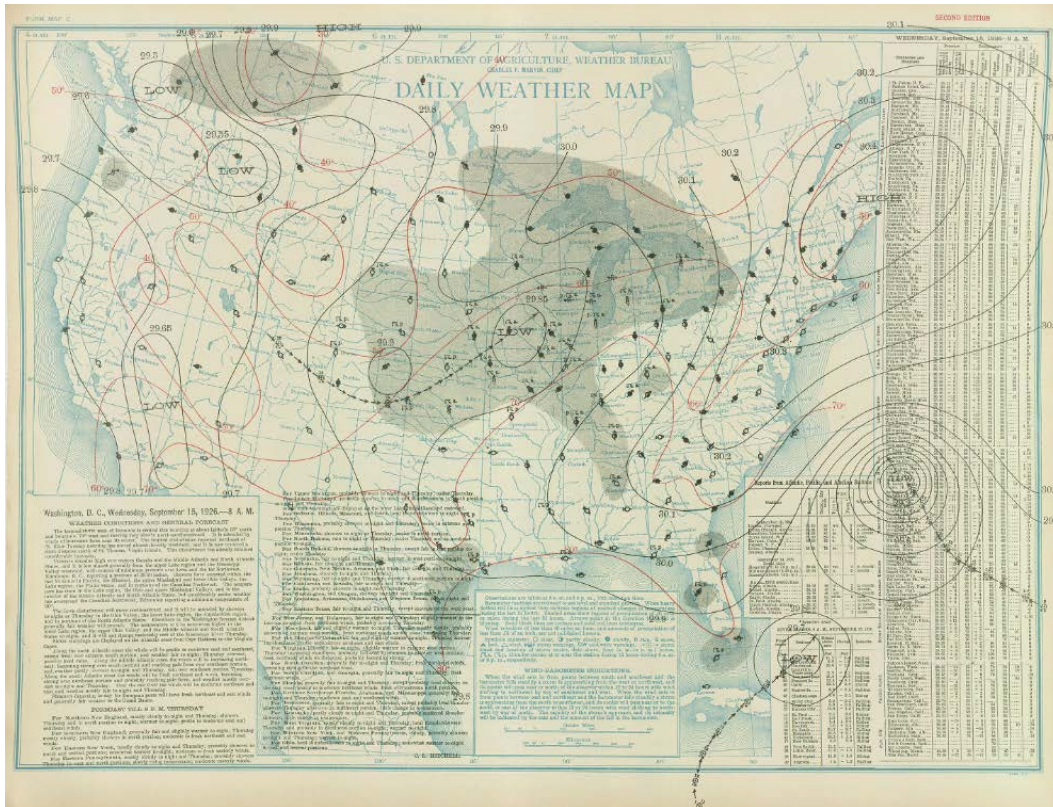
CORPS OF ENGINEERS

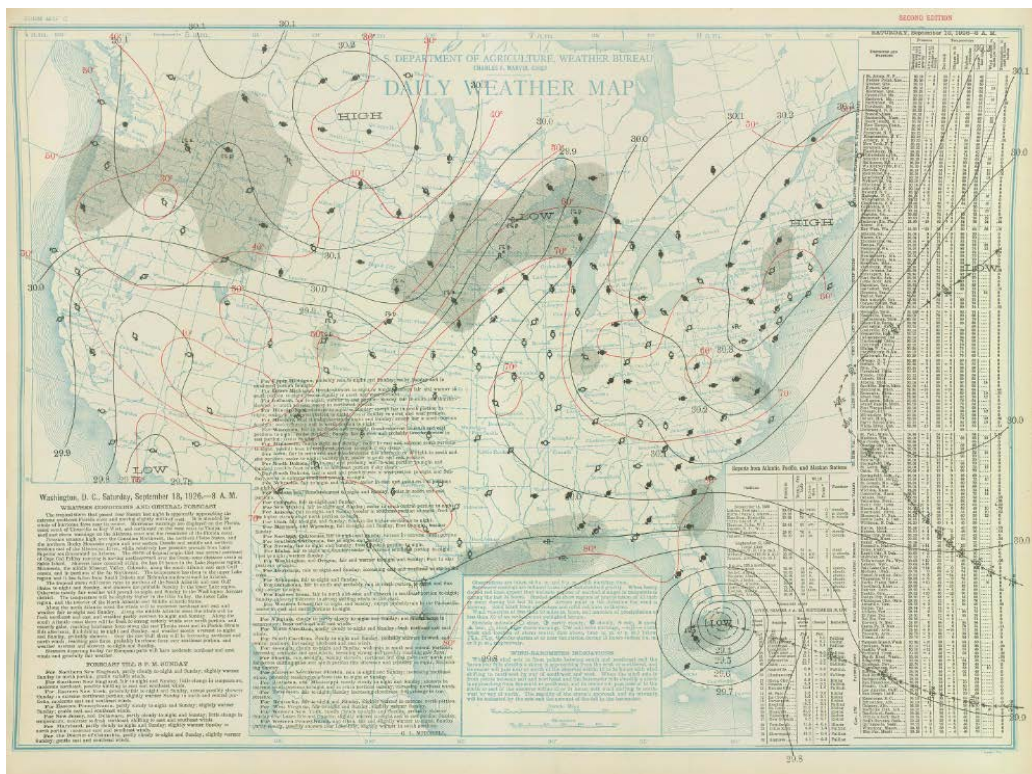
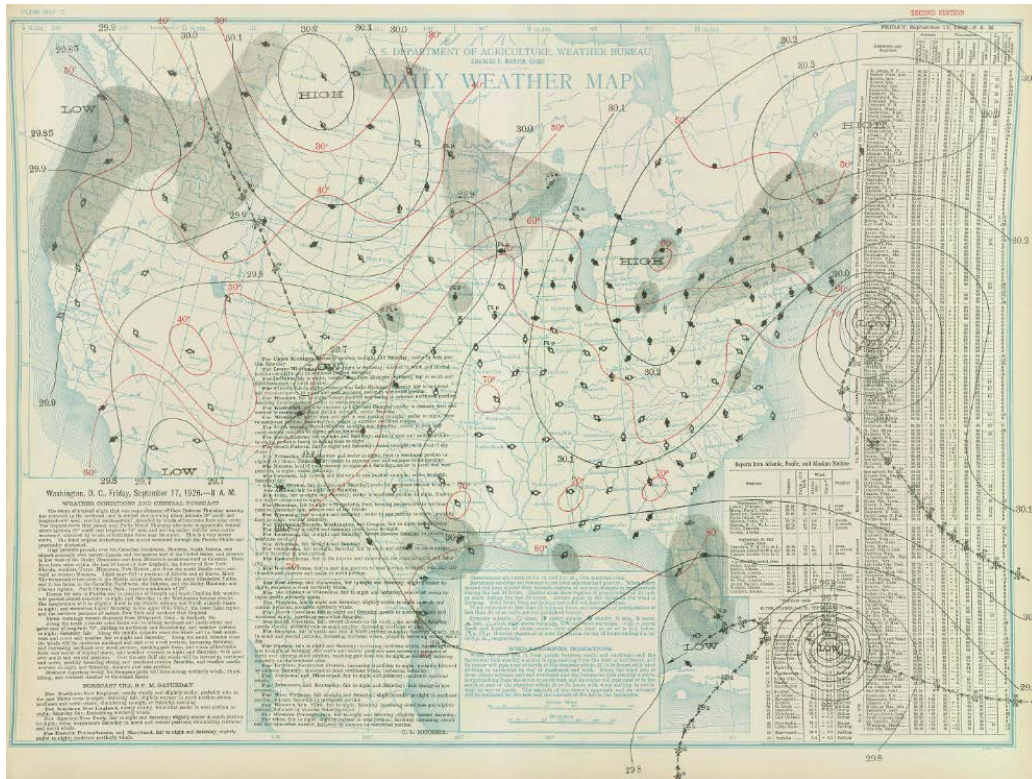
STORM STUDIES - ISOHYETAL MAP

Storm of 17-19 September 1926 Assignment MR 4-24
 Study Prepared by: Omaha, Nebr. District
Missouri River Division

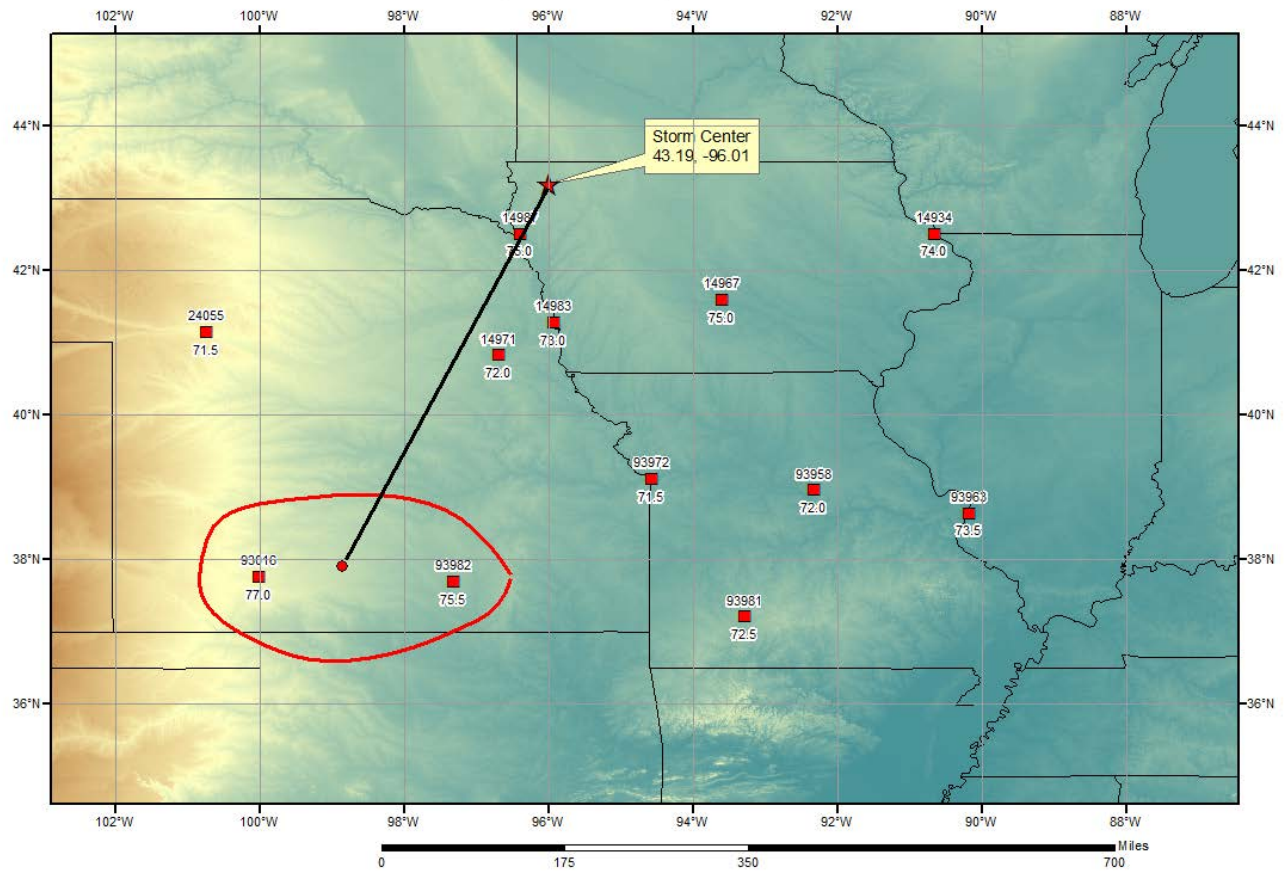
**MASS RAINFALL CURVES**

FORM 8-3E



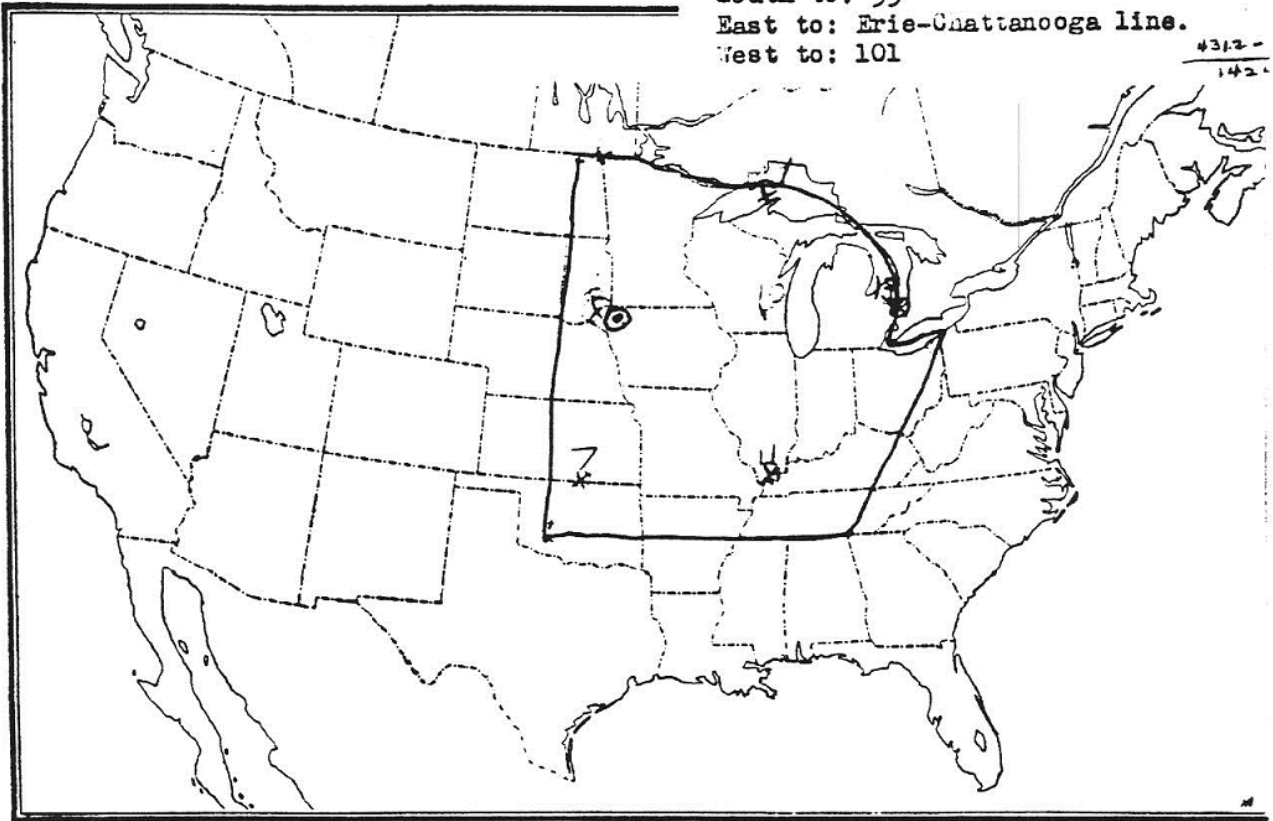


Boyden, IA Storm Analysis September 15-18, 1926



MR 4-24..Sept. 17-19, 1926..Boyden, I
12-hr. rTd 70(18tn)..175 SSE..to 76;
North to: Border
South to: 35
East to: Erie-Chattanooga line.
West to: 101

4312-
142



Storm Precipitation Analysis System (SPAS) For Storm #1494_1

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

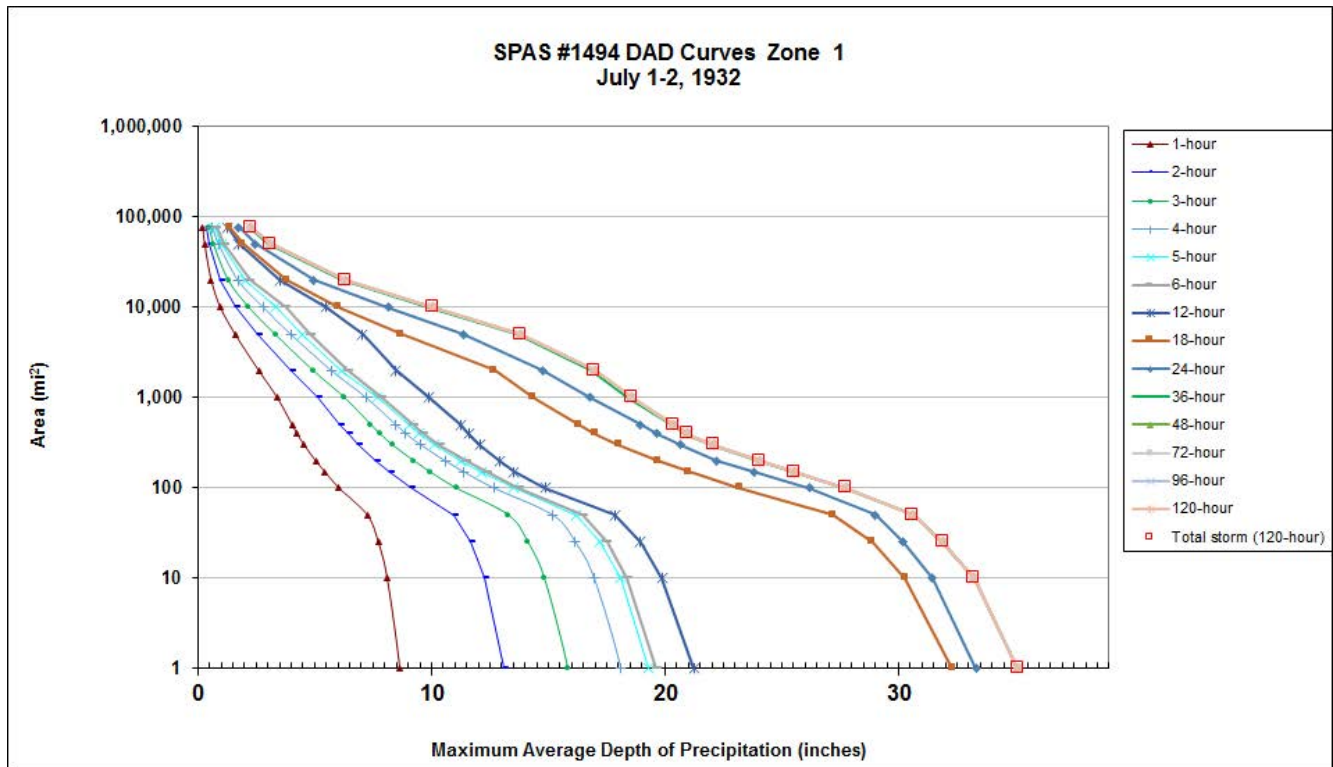
Radar Included: No

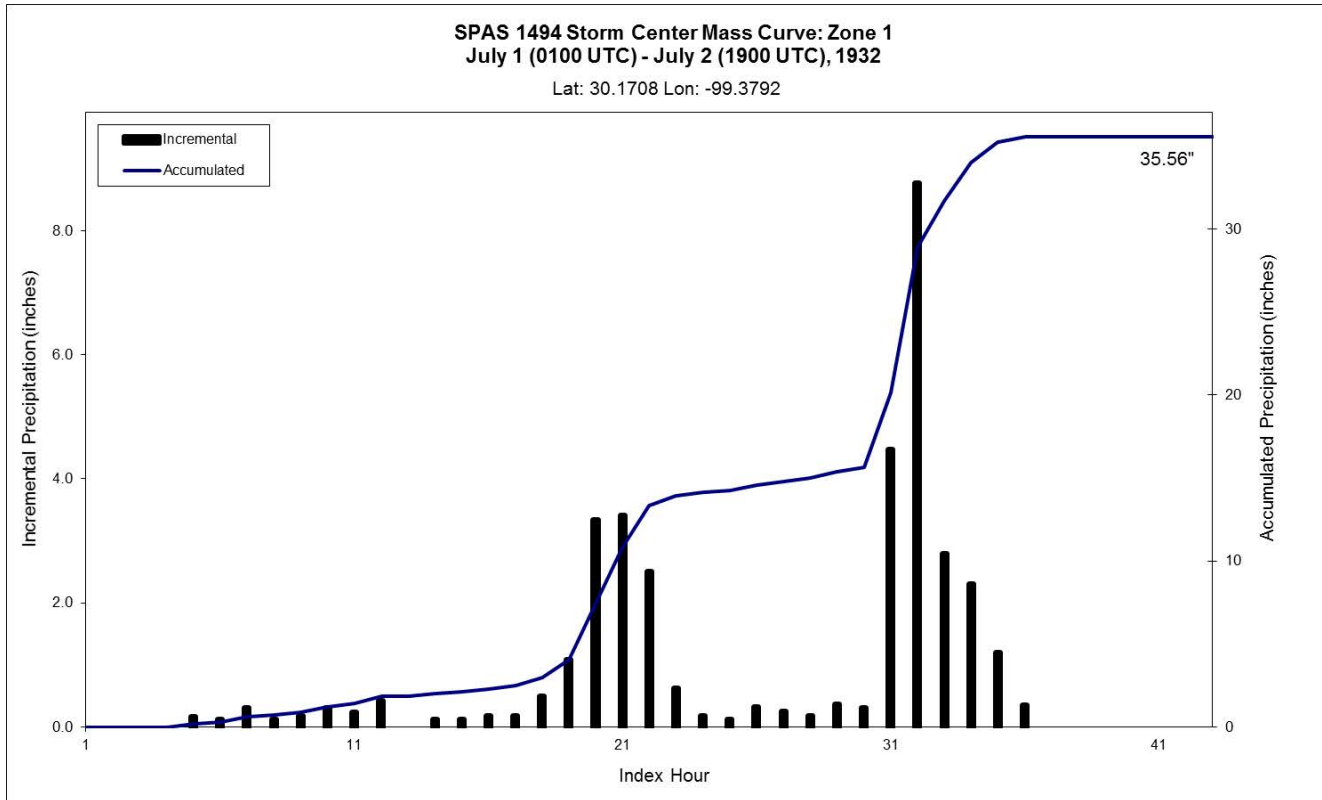
Depth-Area-Duration (DAD) analysis: Yes

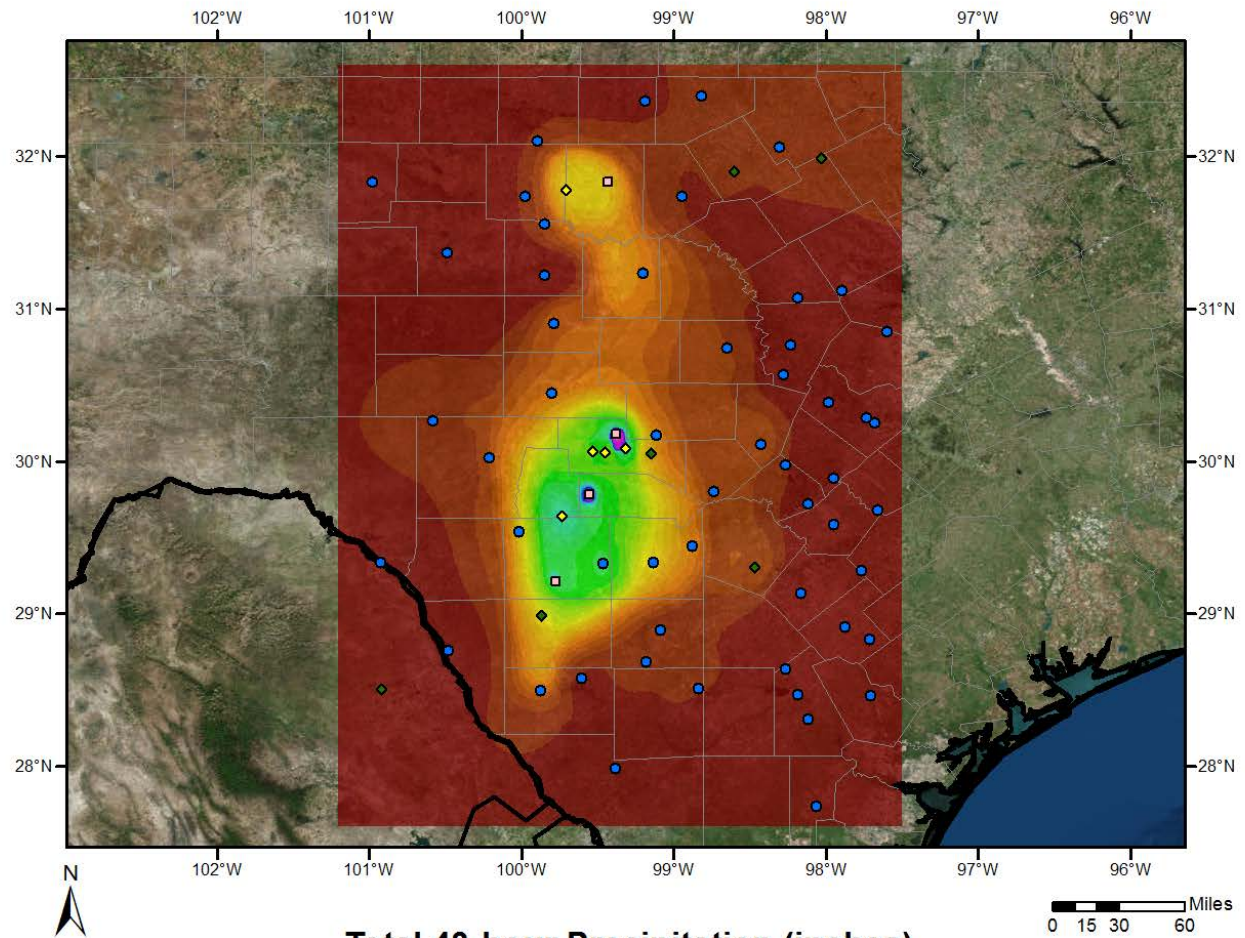
Degree of confidence in results: All of the hourly stations used in this analysis were manually digitized from the Army CORPS of Engineers' pertinent data report. This provided very high accuracy of the hourly data based on previous well-known reports. These hourly stations were essential in the timing 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.

					Storm Rep. Dew Point					Climatological Max. Dew Point						
SPAS Storm ID	LON	LAT	ELEV	ELEV Round	T _d	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	T _d	T _d Round	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	IPMF
1494_1	-99.379	30.171	1,915	1,900	77.00	3.14	0.49	76	2.650	80.61	80.5	3.68	0.55	83	3.130	1.181

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	Total
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	35.43	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	2.26

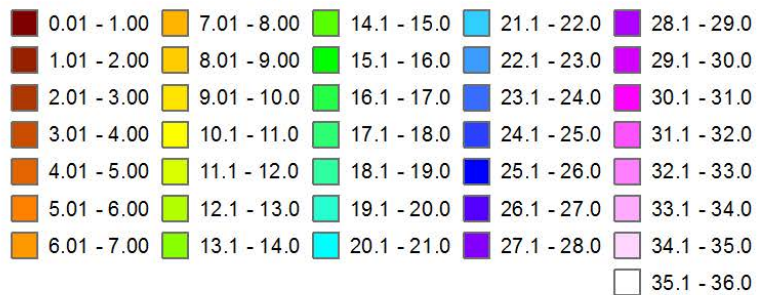






Total 43-hour Precipitation (inches)
July 1, 1932 0100 UTC - July 2, 1932 1900 UTC
SPAS #1494

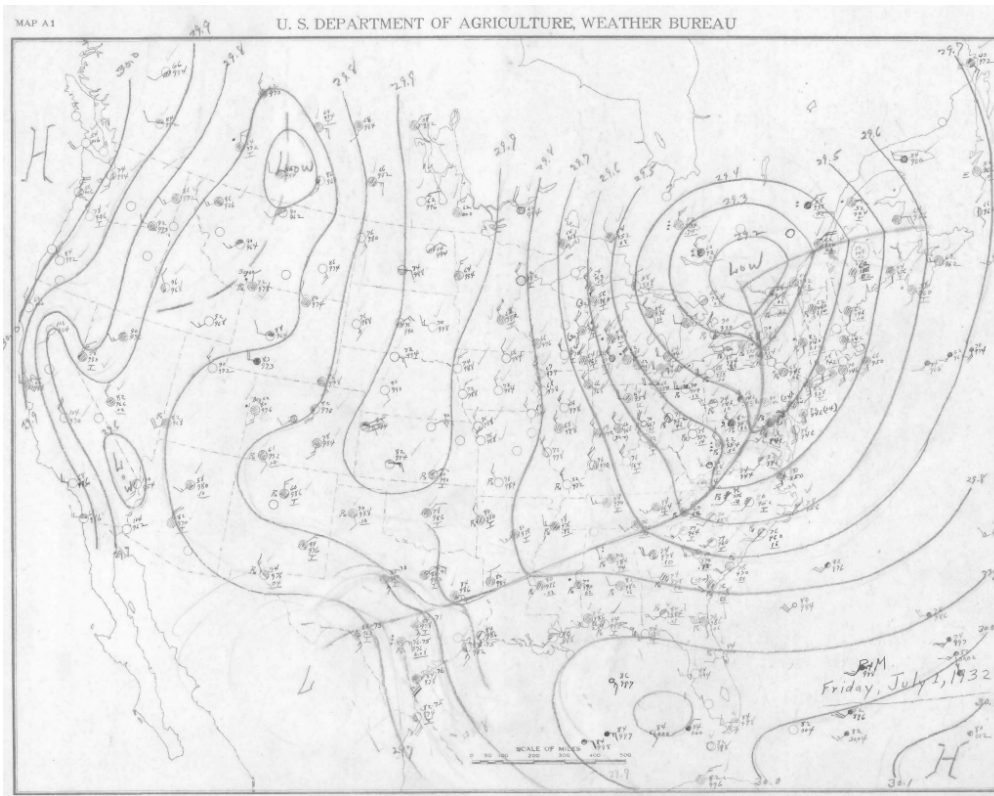
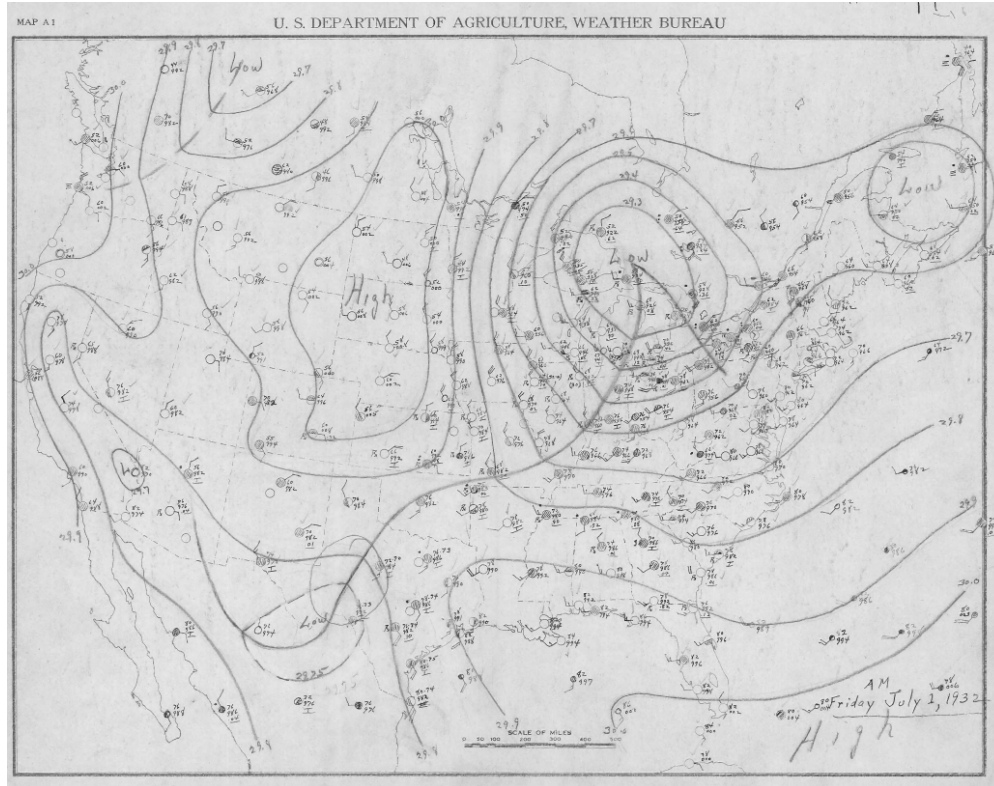
Precipitation (inches)

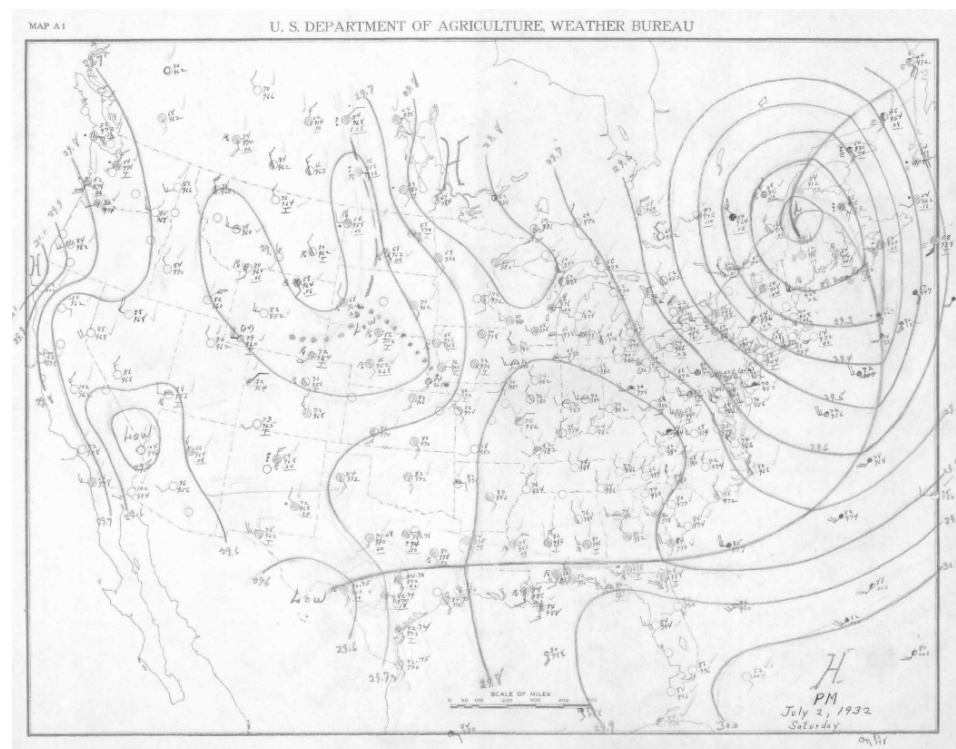
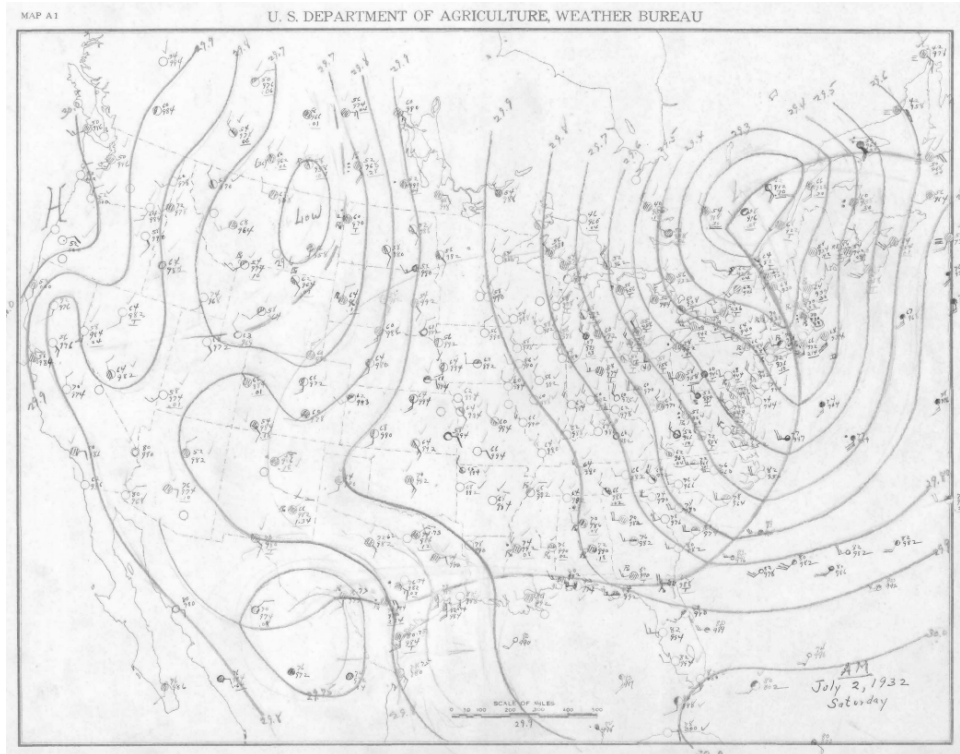


Stations

- Daily
- Hourly Estimated
- ◆ Supplemental
- ◇ Supplemental Estimated







WAR DEPARTMENT

CORPS OF ENGINEERS, U.S. ARMY

STORM STUDIES - PERTINENT DATA SHEET

Storm of June 30 - July 2, 1932

Assignment O M 5 - 1

Location Southwestern Texas

Study Prepared by:

Southwestern Division

Galveston District Office

Part I Reviewed by H. M. Sec. of
Weather Bureau, 6/7/44Part II Approved by Office, Chief
of Engineers for Distribution
of Factual Data, 2/28/45

Remarks: Center at:

State Fish Hatchery, Texas

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).....	9
Form 5001-B (24-hour " " " ").....	16
Form 5001-D (" " " " " ").....	3
Misc. precip. records, meteorological data, etc.....	5
Form 5002 (Mass rainfall curves).....	23

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).....	2
Form S-12 (Maximum depth-duration data).....	9
Maximum duration-depth-area curves.....	1
Data relating to periods of maximum rainfall.....	2

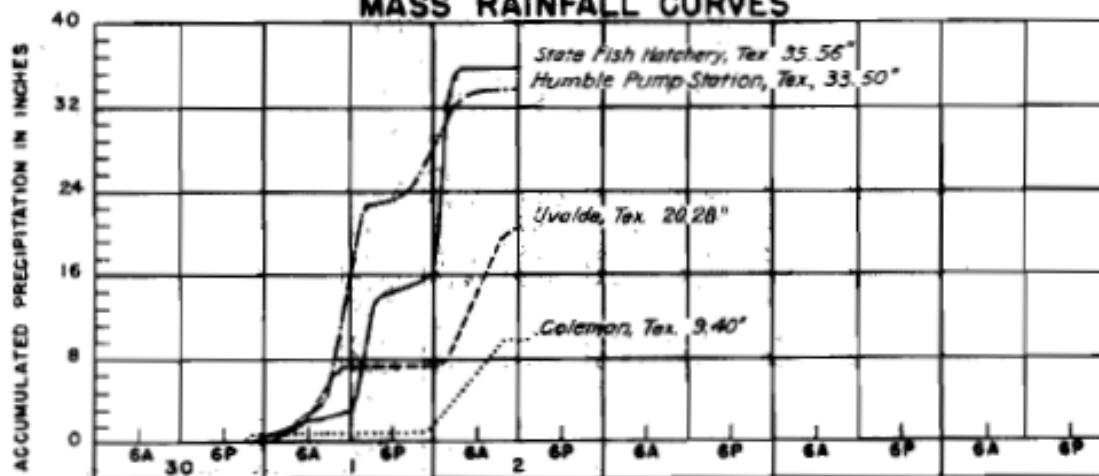
MAXIMUM AVERAGE DEPTH OF RAINFALL IN INCHES

Area in Sq. Mi.	Duration of Rainfall in Hours											
	6	12	18	24	30	36	42					
Max. Station	19.6	21.4	32.4	33.6	34.6	35.6	35.6					
10	13.3	19.5	30.0	31.7	32.9	33.6	33.7					
25	12.9	19.2	29.3	30.8	32.0	32.6	32.8					
100	11.2	15.8	25.7	25.8	26.8	27.5	27.7					
200	10.3	14.3	21.2	23.8	24.9	25.5	25.7					
500	8.8	12.1	17.9	21.1	22.2	22.8	23.0					
1,000	7.7	10.5	15.5	19.0	20.2	20.7	20.9					
2,000	6.5	8.9	13.0	16.9	18.2	18.7	18.9					
5,000	4.8	6.8	9.8	13.5	14.9	15.3	15.6					
10,000	3.6	5.2	7.4	10.3	11.3	11.6	11.8					
20,000	2.4	3.6	4.9	7.0	7.7	7.9	8.1					
30,000	1.6	2.6	3.5	5.0	5.5	5.7	5.9					

Form S-2

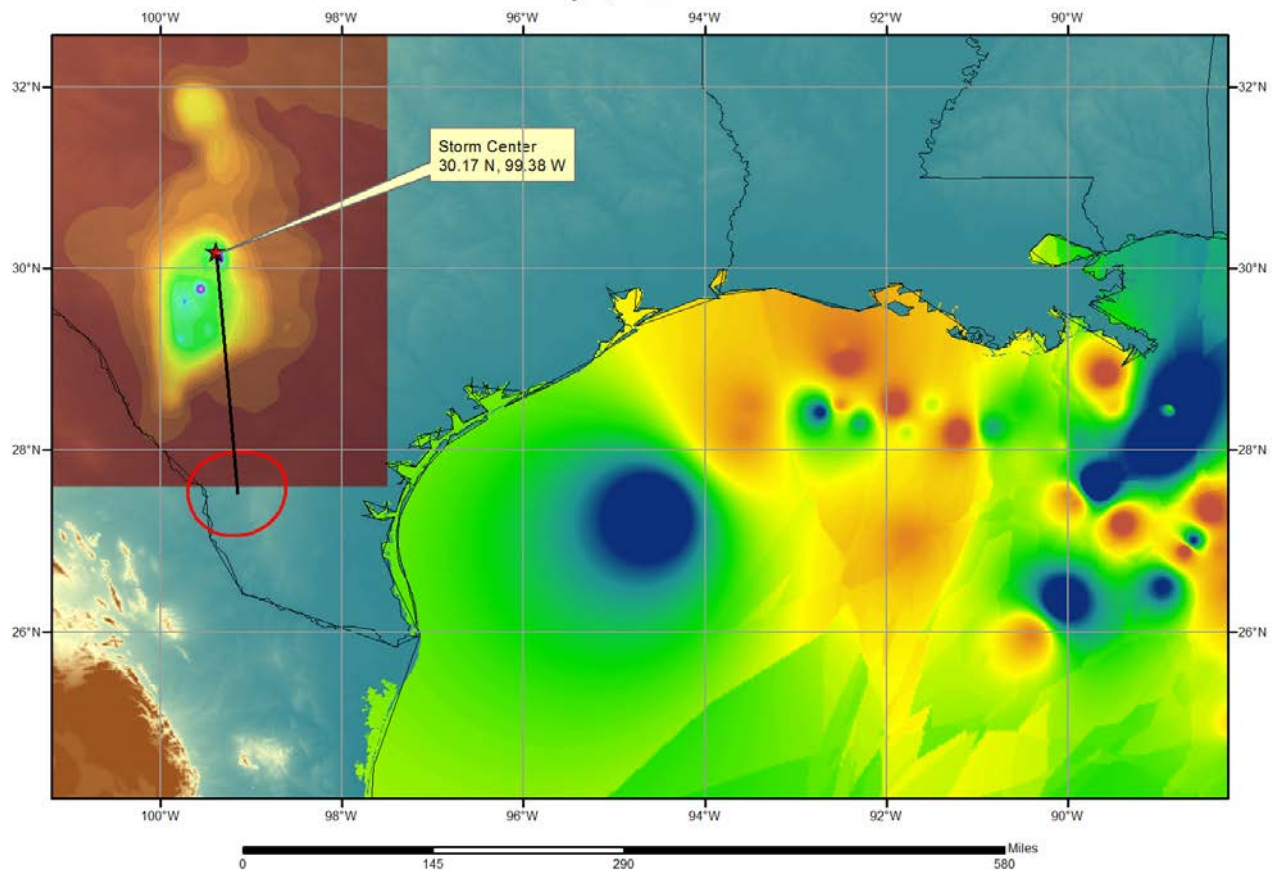
WAR DEPARTMENT

CORPS OF ENGINEERS, U. S. ARMY

STORM STUDIES - ISOHYETAL MAPStorm of June 30 - July 2, 1932 Assignment GM 5-1Study Prepared by: Galveston, Tex. District
Southwestern Division**MASS RAINFALL CURVES**

FORM 8-3W

SPAS 1494 Mountain Home, TX Storm Analysis
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 Lorton, Okla.
May 25-30	GM 4-26	76	190 SSE of Henly, Tex.
May 25-30	MR 4-27	63	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	NA 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.

Storm Precipitation Analysis System (SPAS) For Storm #1495_1

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

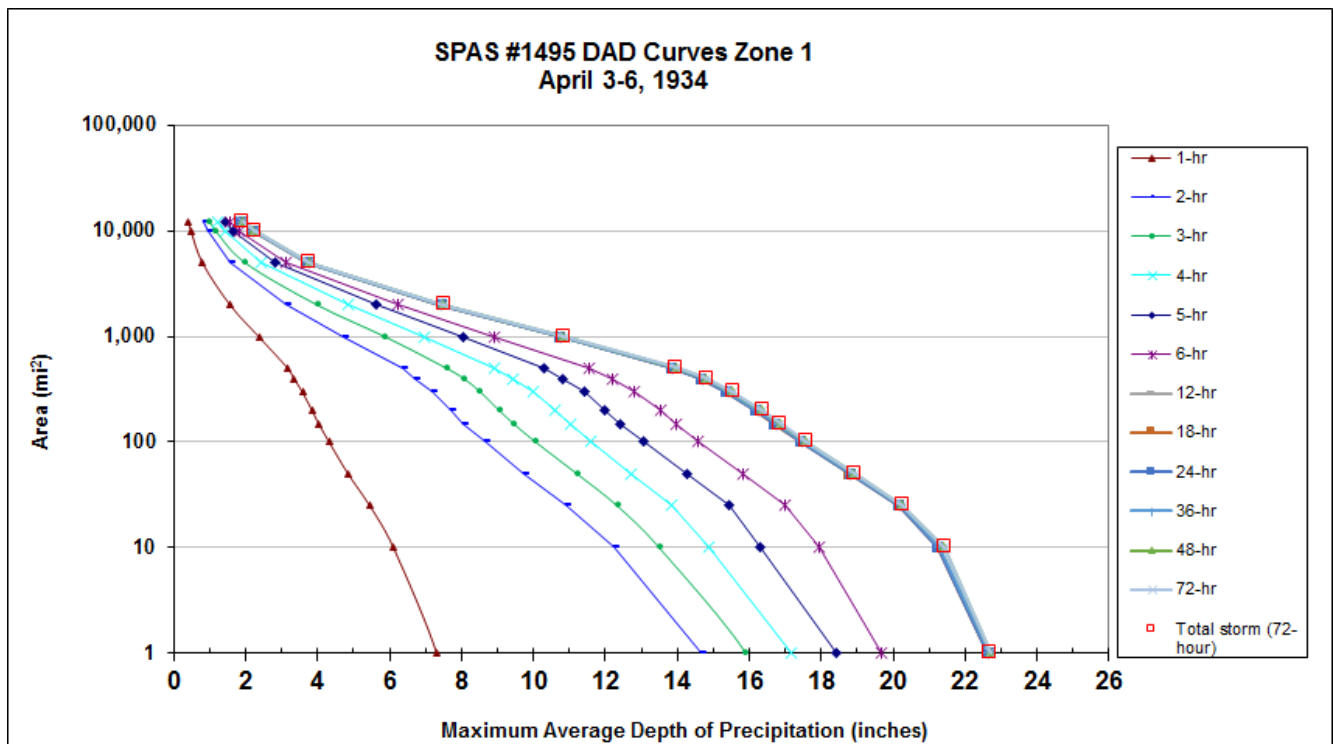
Depth-Area-Duration (DAD) analysis: Yes

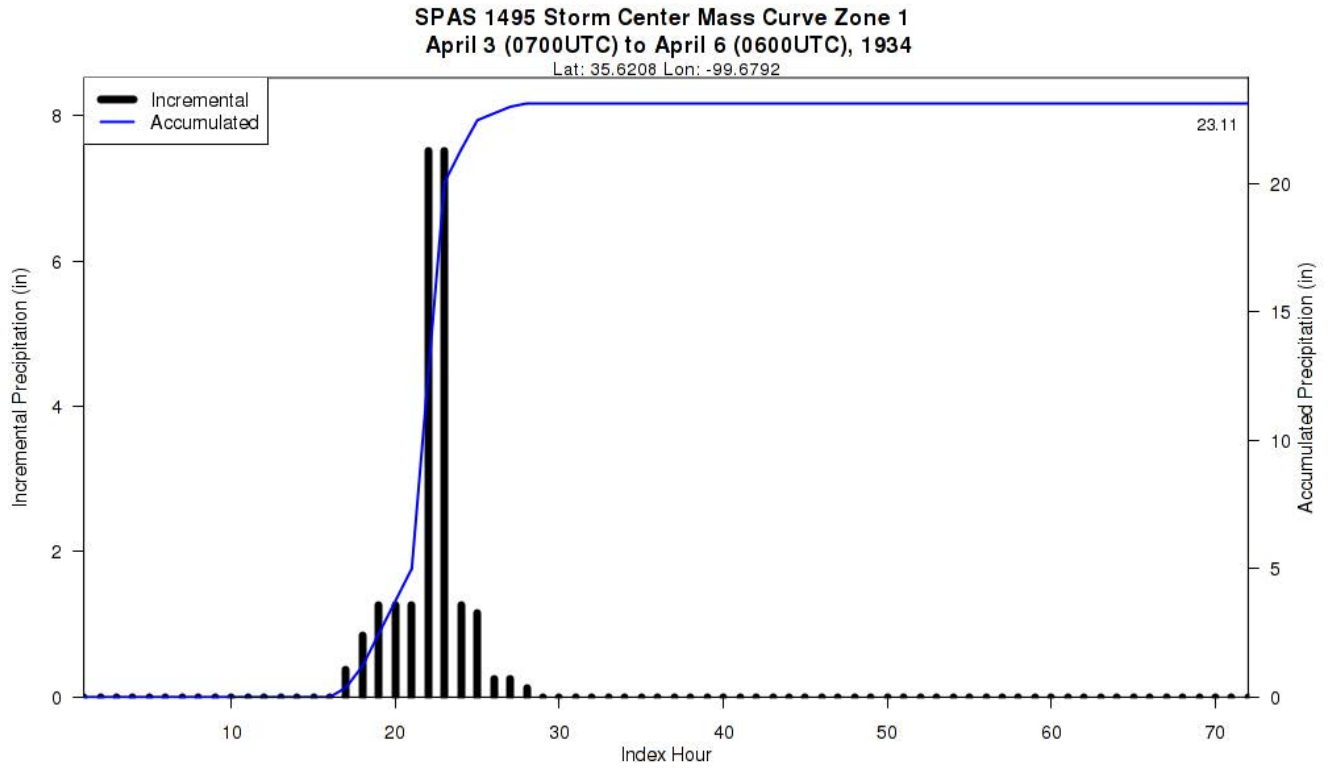
Degree of confidence in results: While no NCDC hourly stations were available for this storm, two recorder stations and three estimated stations were digitized from the U.S. Army Corp of Engineers (USACE) Storm Study and EDADS pertinent data; these three estimated stations contained the storm center 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 min-night, 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.

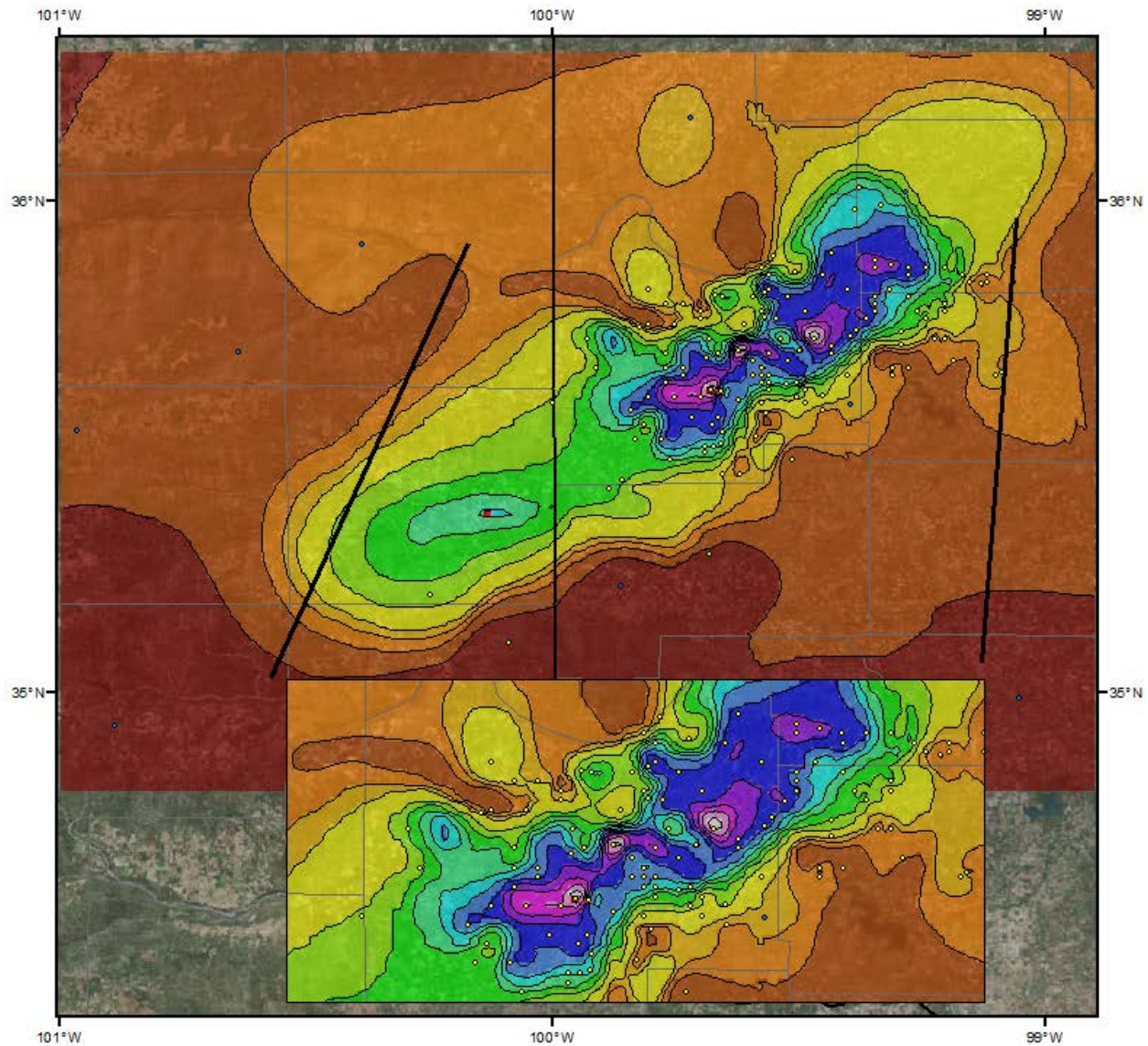
					Storm Rep. Dew Point					Climatological Max. Dew Point						
SPAS Storm ID	LON	LAT	ELEV	ELEV Round	T _d	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	T _d	T _d Round	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	IPMF
1495 1	-99.679	35.621	1,930	1,900	68.00	2.05	0.37	58	1.680	74.28	74.5	2.79	0.45	71	2.338	1.391

Storm 1495 Zone 1 - April 3 (0700 UTC) - April 6 (0600 UTC), 1934
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)

areasqmi	Duration (hours)												
	1-hr	2-hr	3-hr	4-hr	5-hr	6-hr	12-hr	18-hr	24-hr	36-hr	48-hr	72-hr	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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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







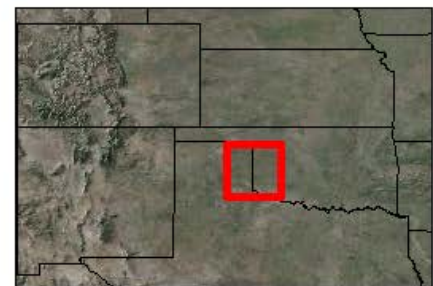
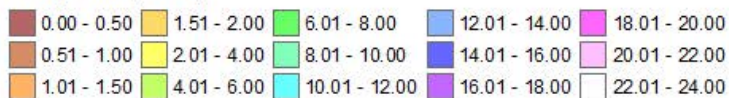
Total 72-hour Precipitation (inches)
April 3, 1934 (0700 UTC) - April 6, 1934 (0600 UTC)
SPAS #1495

Gauges

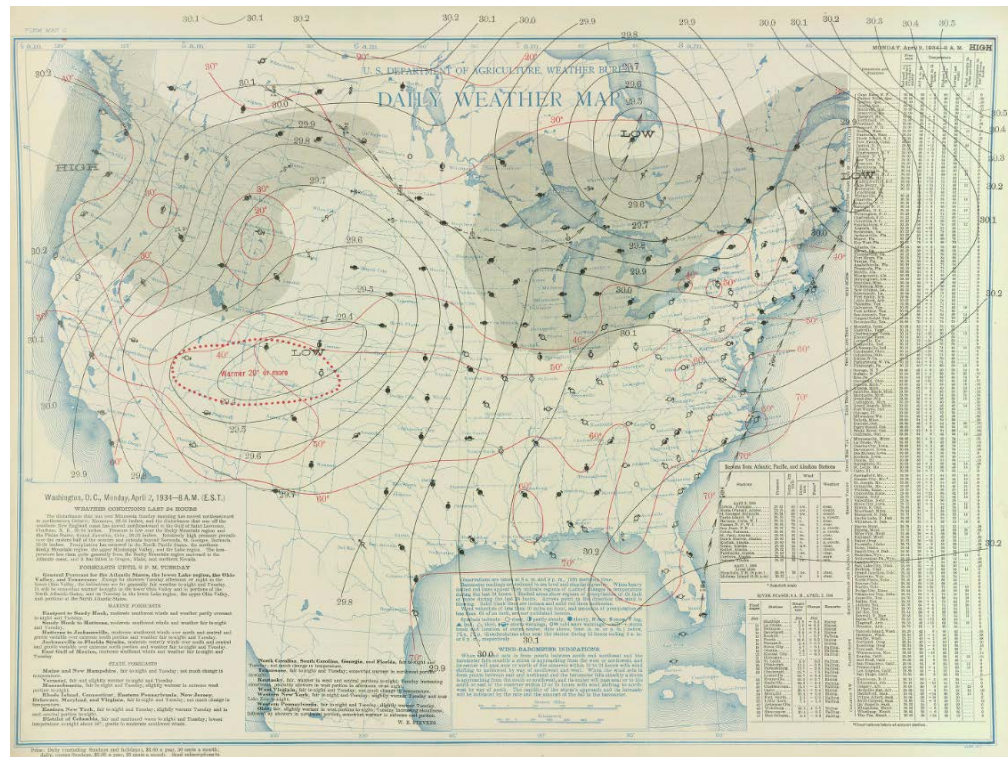
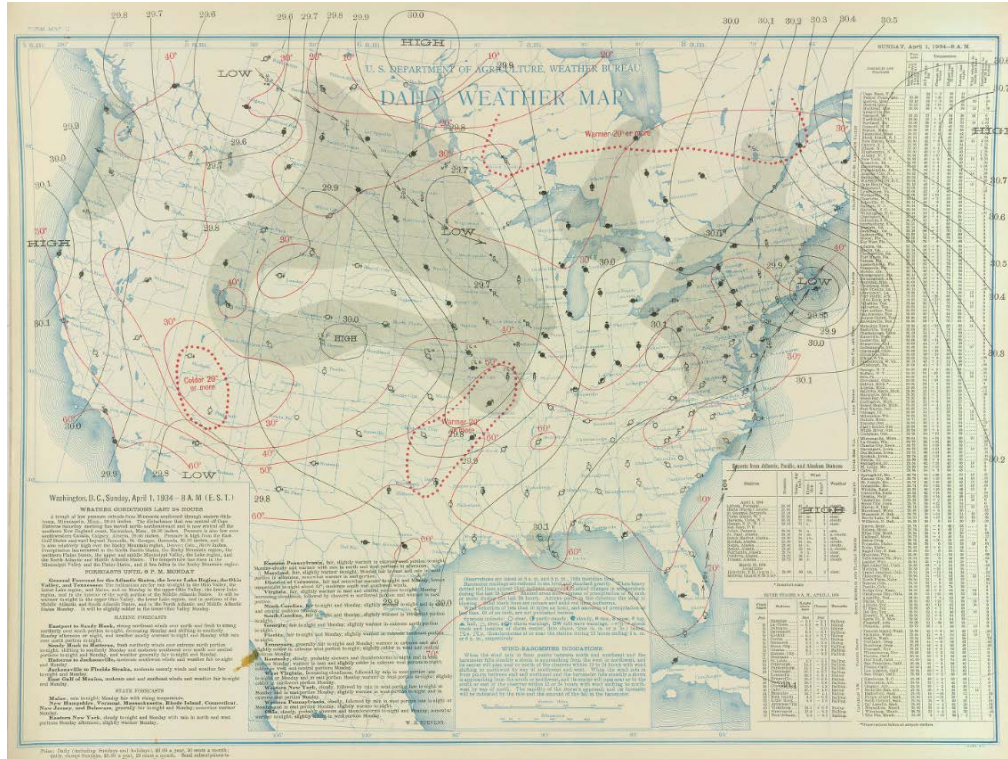
- Daily
- Hourly Estimated
- Hourly Est. Pseudo
- Supplemental
- Supplemental Est.

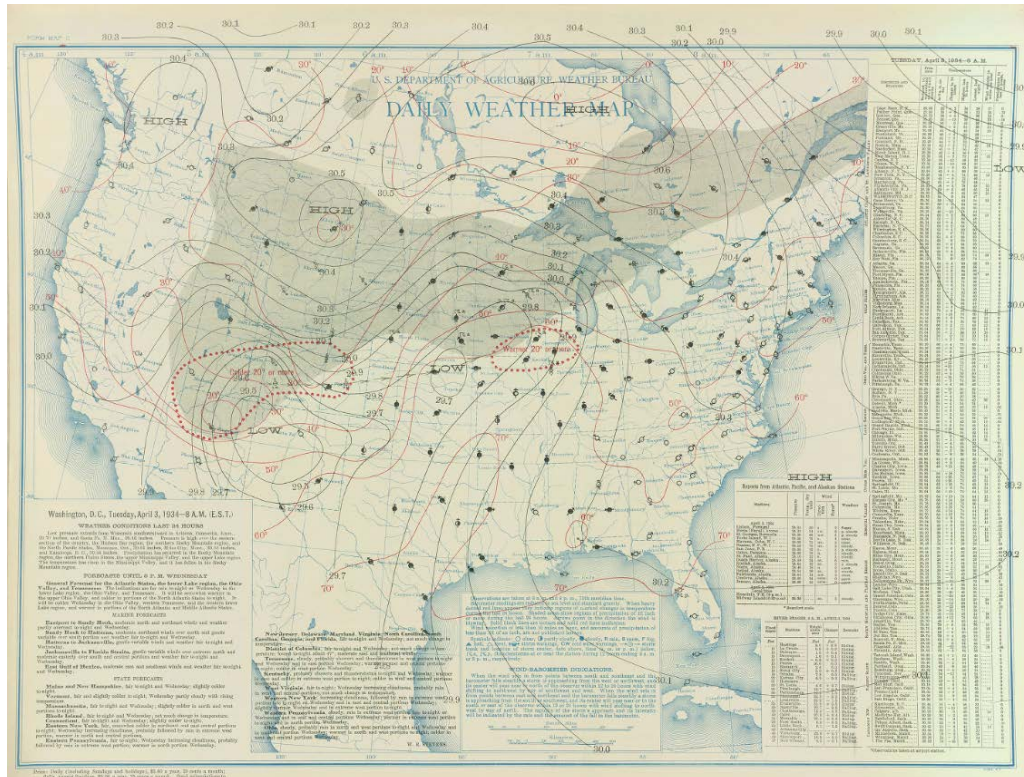


Precipitation (inches)



2/29/2016





DEPARTMENT OF THE ARMY

CORPS OF ENGINEERS

STORM STUDIES - PERTINENT DATA SHEET

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

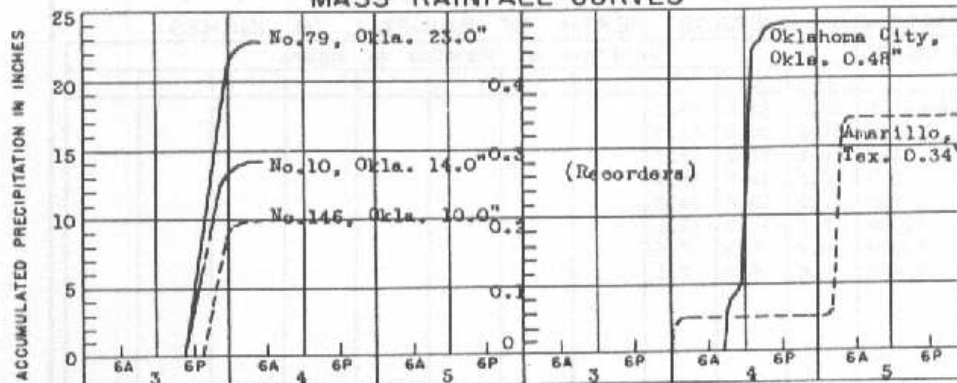
MAXIMUM AVERAGE DEPTH OF RAINFALL IN INCHES

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

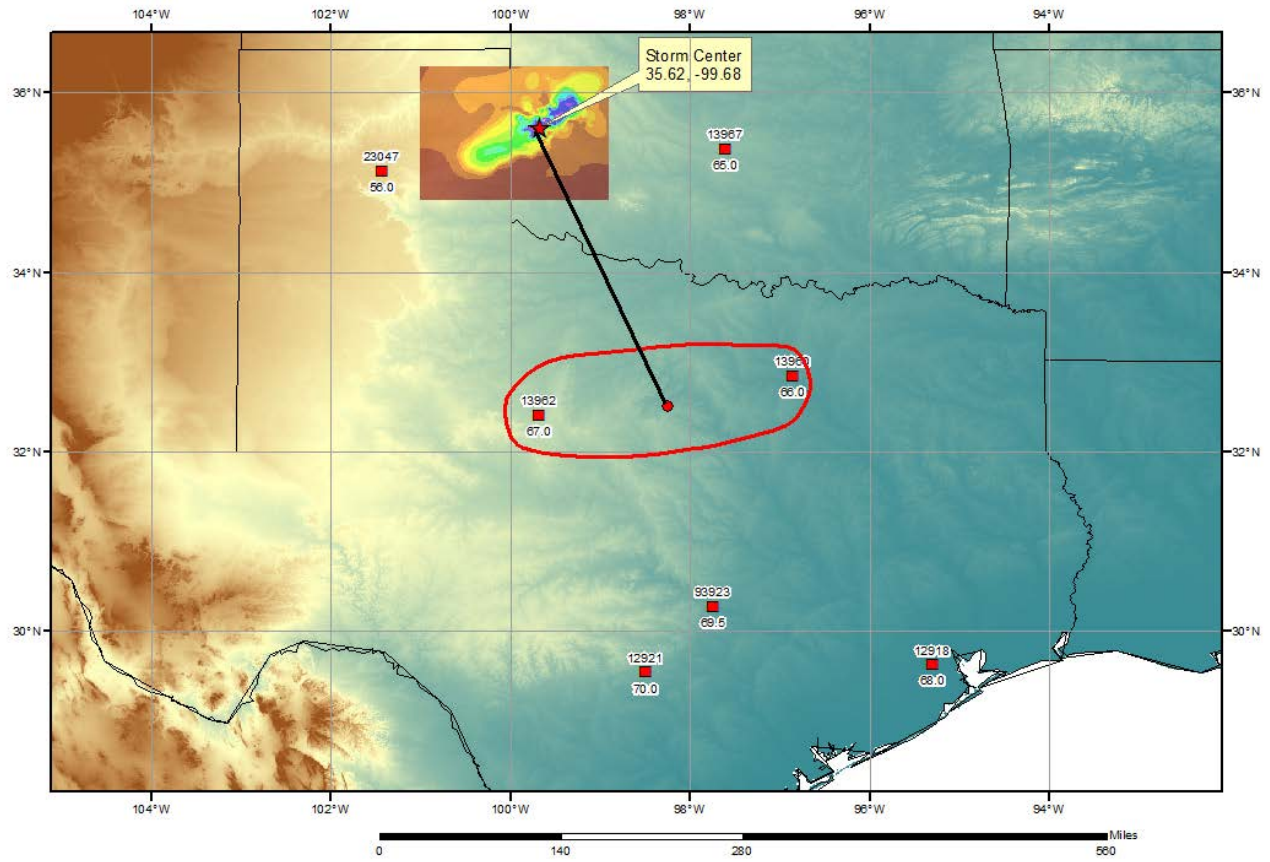
DEPARTMENT OF THE ARMY

CORPS OF ENGINEERS

STORM STUDIES - ISOHYETAL MAPStorm of 3-4 April 1934 Assignment SW 2-11Study Prepared by: Tulsa, Okla. District
Southwestern Division**MASS RAINFALL CURVES**

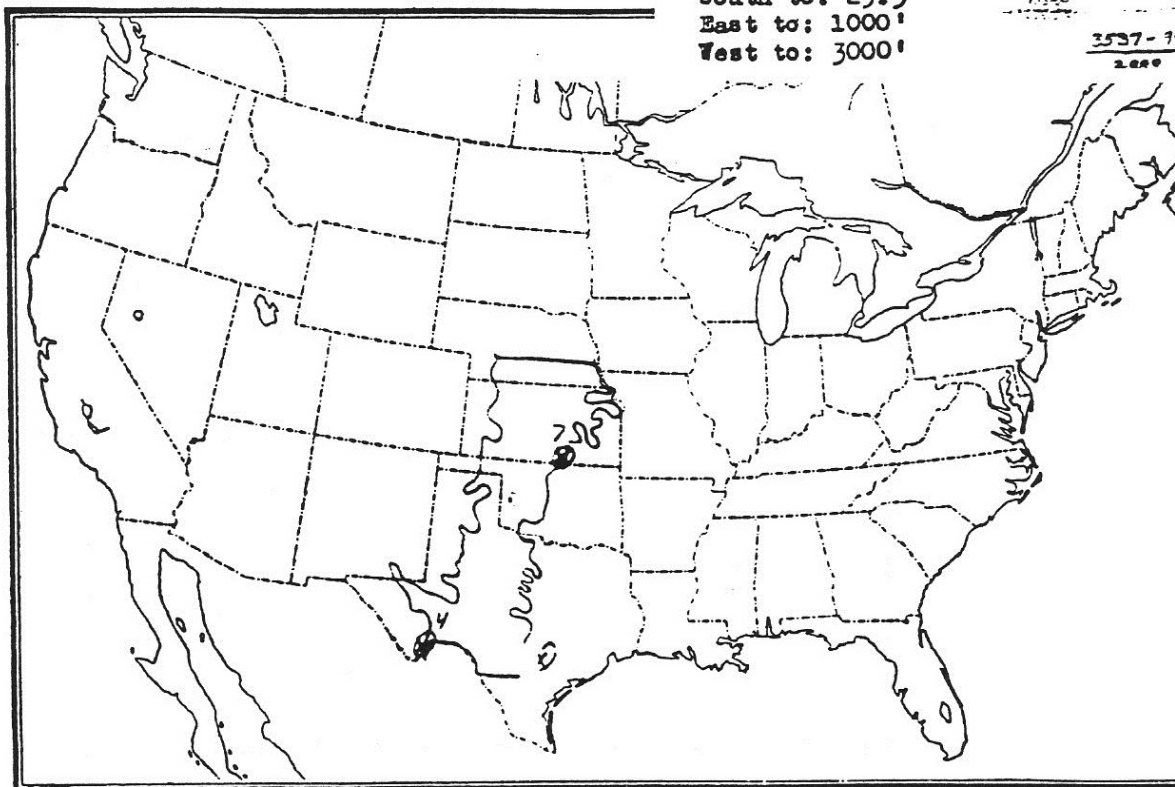
FORM 8-3W

SPAS 1495 - Cheyenne, OK Storm Analysis April 1-3, 1934



SW 2-11..April 3-4, 1934. Cheyenne
12-hr. rTd 64(4th)..250 [redacted] to 70
North to: 41
South to: 29.5
East to: 1000'
West to: 3000'

3537-70
2.000



Storm Precipitation Analysis System (SPAS) For Storm #1295_1 (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)

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

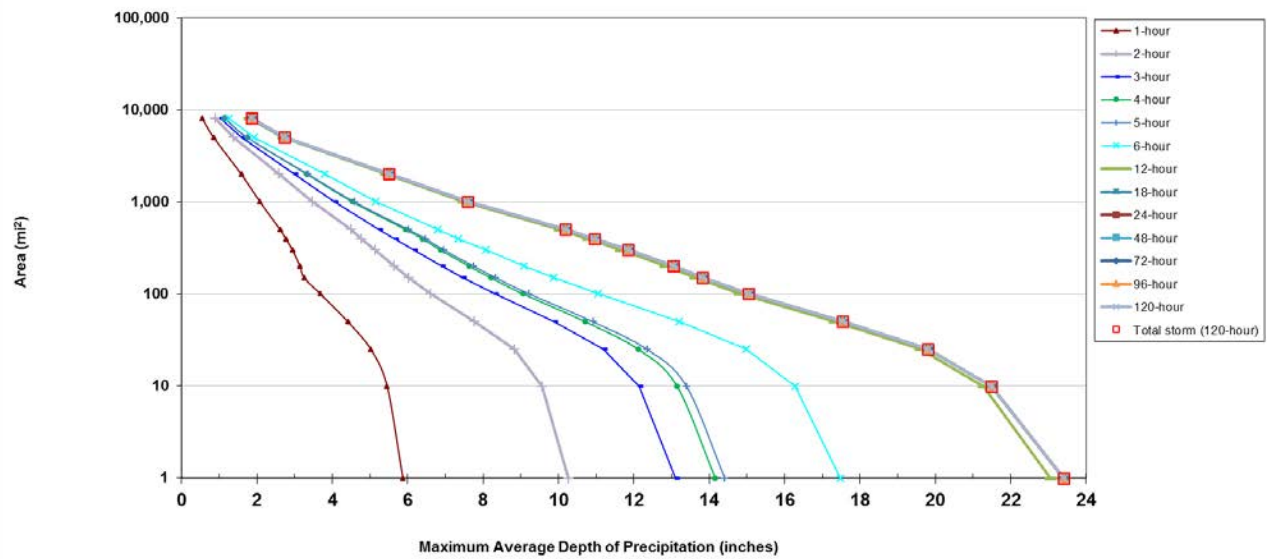
Reliability of results: This was a challenging storm to analyze given the lack of accurate measurements and hourly recording data. The storm analysis is consistent with the numerous other analyses of this storm by the USACE, USACE and NWS. Although we have a moderate degree of confidence in the magnitudes 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.

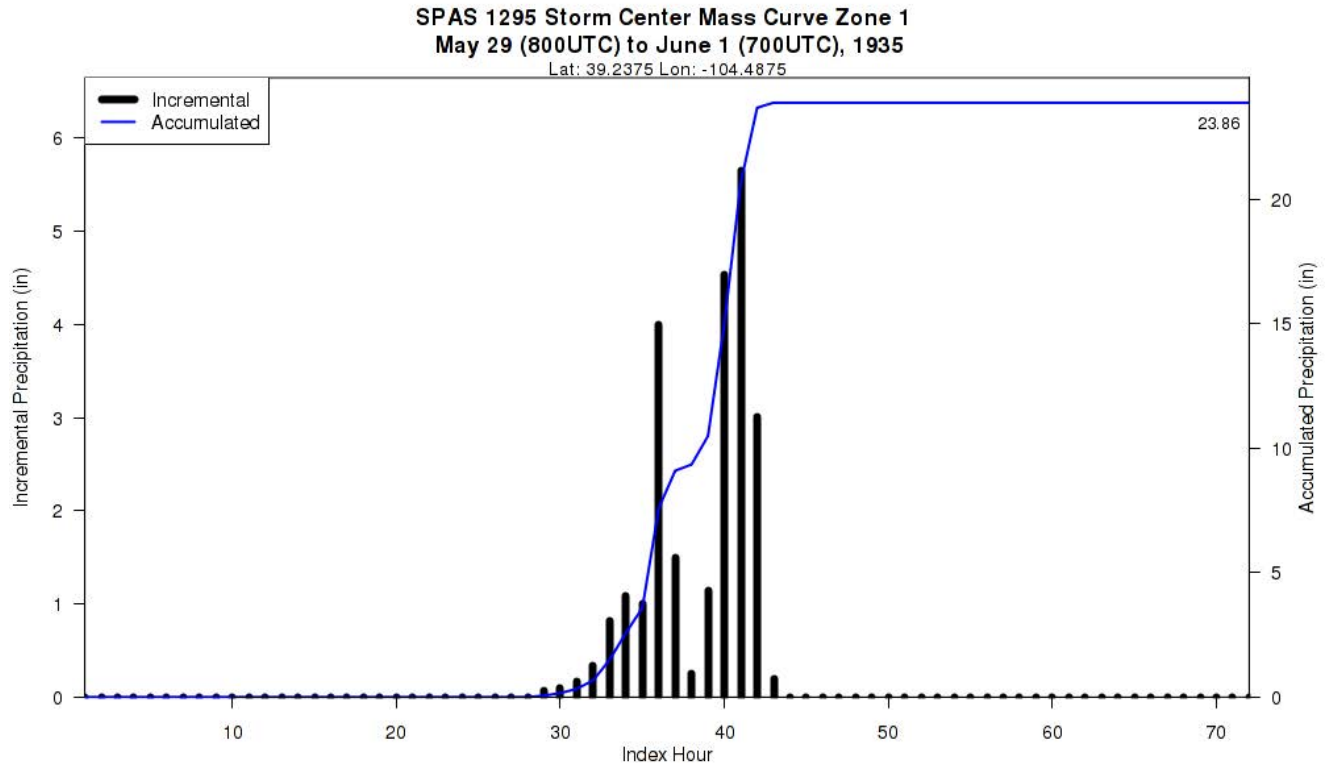
					Storm Rep. Dew Point					Climatological Max. Dew Point						
SPAS Storm ID	LON	LAT	ELEV	ELEV Round	T _d	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	T _d	T _d Round	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	IPMF
1295 1	-104.488	39.238	6.787	7,000	76.50	3.07	1.51	75	1.560	78.71	78.5	3.37	1.62	79	1.750	1.122

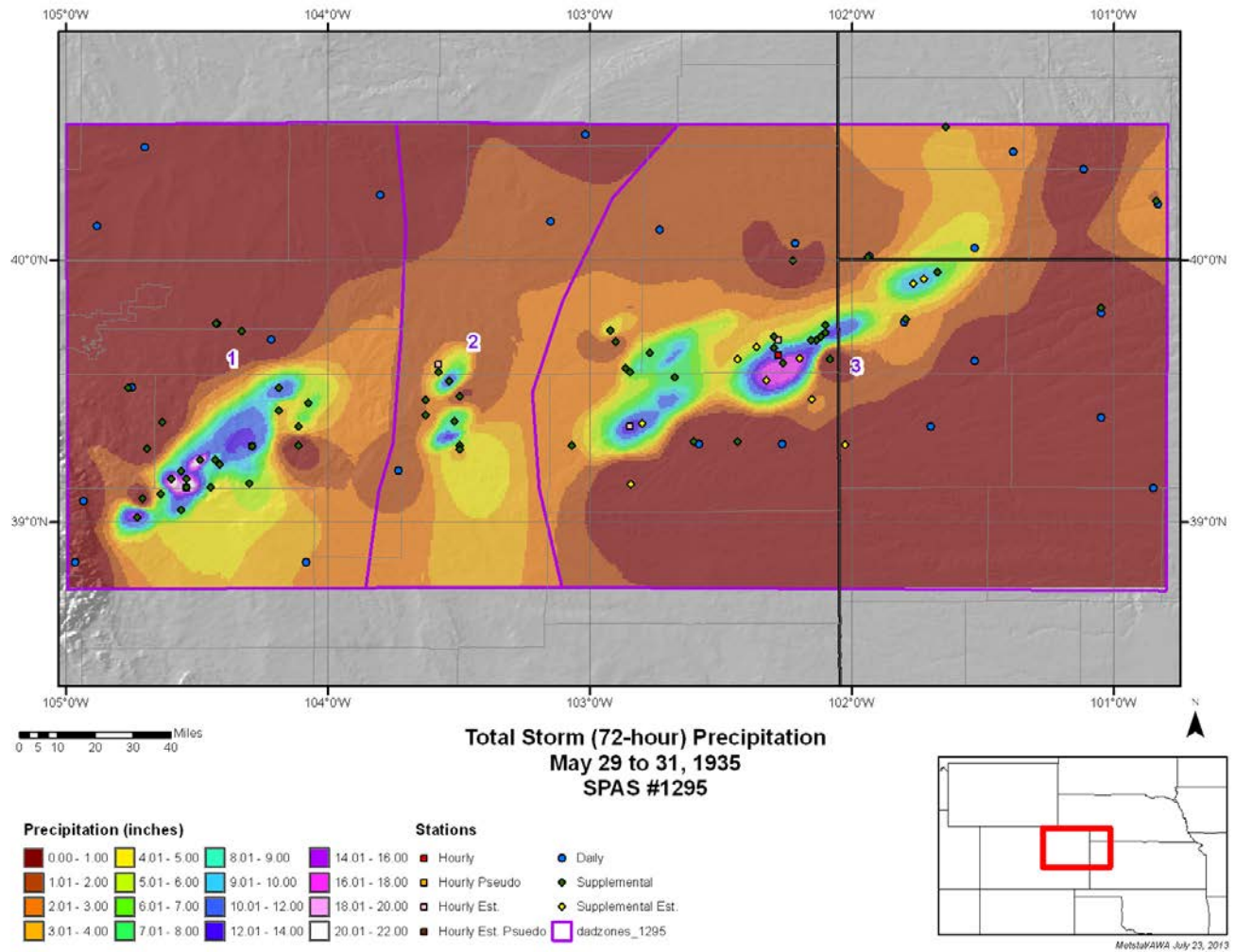
SPAS 1295 - May 29 (800 UTC) - June 1 (700 UTC), 1935
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)

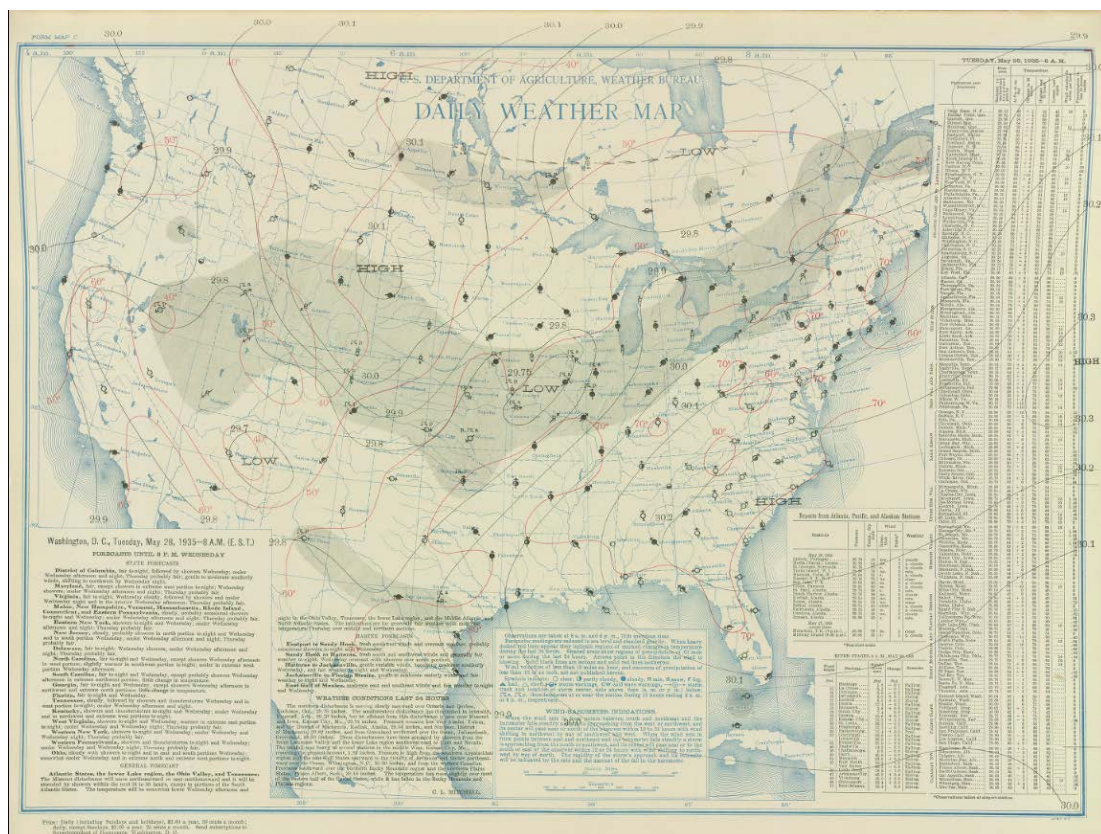
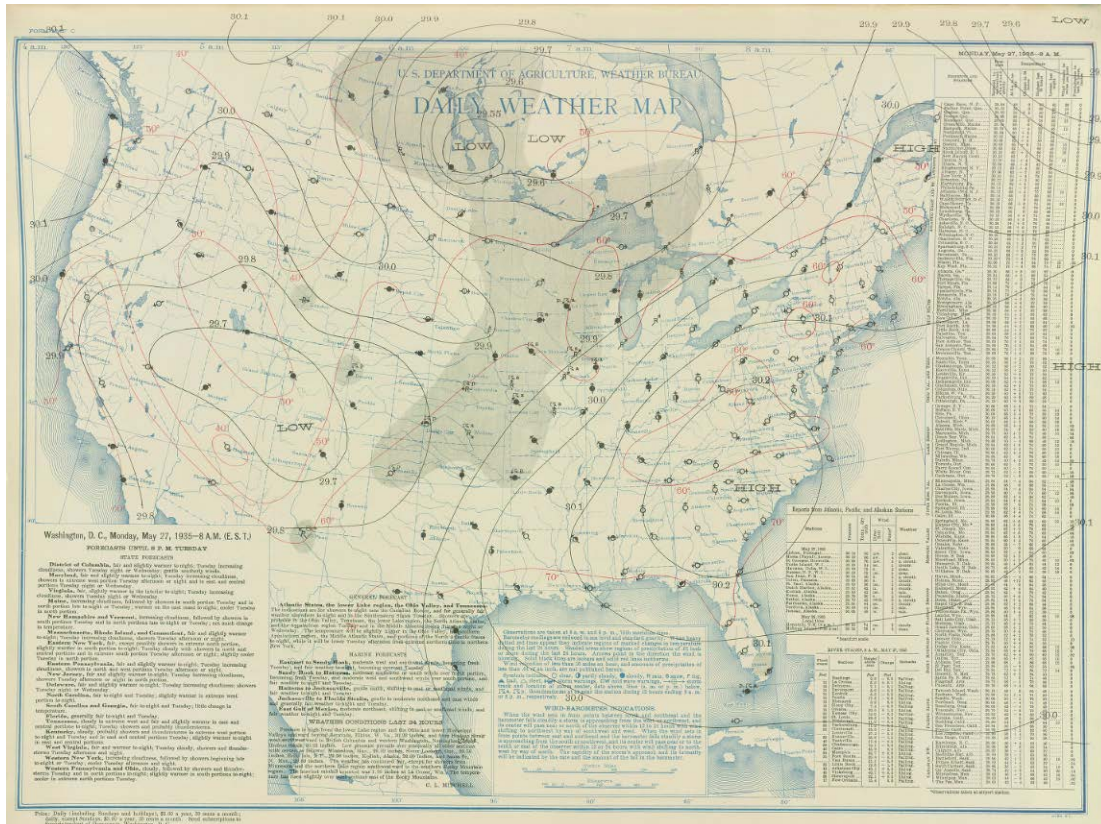
Area (mi ²)	Duration (hours)												
	1	2	3	4	5	6	12	18	24	48	72	96	120
0.3	5.95	10.39	13.26	14.31	14.58	17.72	23.38	23.71	23.71	23.71	23.71	23.71	23.71
1	5.87	10.26	13.11	14.16	14.41	17.49	23.06	23.40	23.40	23.40	23.40	23.40	23.40
10	5.45	9.57	12.13	13.14	13.39	16.28	21.27	21.49	21.49	21.49	21.49	21.49	21.49
25	5.02	8.82	11.19	12.12	12.35	14.99	19.61	19.81	19.81	19.81	19.81	19.81	19.81
50	4.41	7.77	9.88	10.71	10.91	13.20	17.33	17.53	17.53	17.53	17.53	17.53	17.53
100	3.68	6.60	8.31	9.06	9.22	11.06	14.81	15.04	15.04	15.04	15.04	15.04	15.04
150	3.25	6.02	7.46	8.20	8.33	9.88	13.62	13.83	13.83	13.83	13.83	13.83	13.83
200	3.14	5.64	6.89	7.63	7.75	9.08	12.83	13.04	13.04	13.04	13.04	13.04	13.04
300	2.94	5.13	6.15	6.87	6.96	8.07	11.65	11.84	11.84	11.84	11.84	11.84	11.84
400	2.76	4.76	5.65	6.38	6.46	7.34	10.78	10.95	10.95	10.95	10.95	10.95	10.95
500	2.61	4.50	5.22	5.95	6.02	6.80	10.02	10.18	10.19	10.19	10.19	10.19	10.19
1,000	2.08	3.46	4.05	4.53	4.58	5.16	7.47	7.59	7.59	7.59	7.59	7.59	7.59
2,000	1.58	2.58	2.98	3.32	3.35	3.80	5.42	5.49	5.49	5.49	5.49	5.49	5.49
5,000	0.85	1.37	1.59	1.74	1.74	1.92	2.70	2.72	2.73	2.73	2.73	2.73	2.73
8,125	0.54	0.90	1.03	1.13	1.14	1.26	1.81	1.85	1.86	1.86	1.86	1.86	1.86

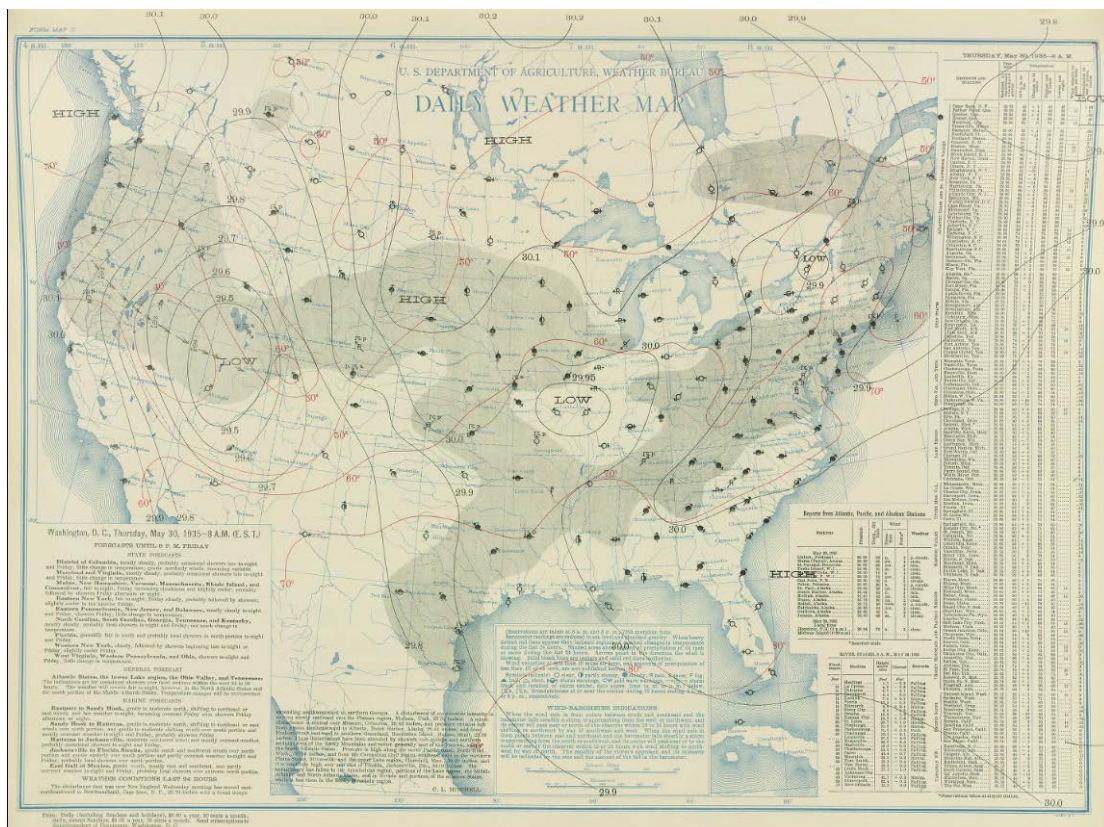
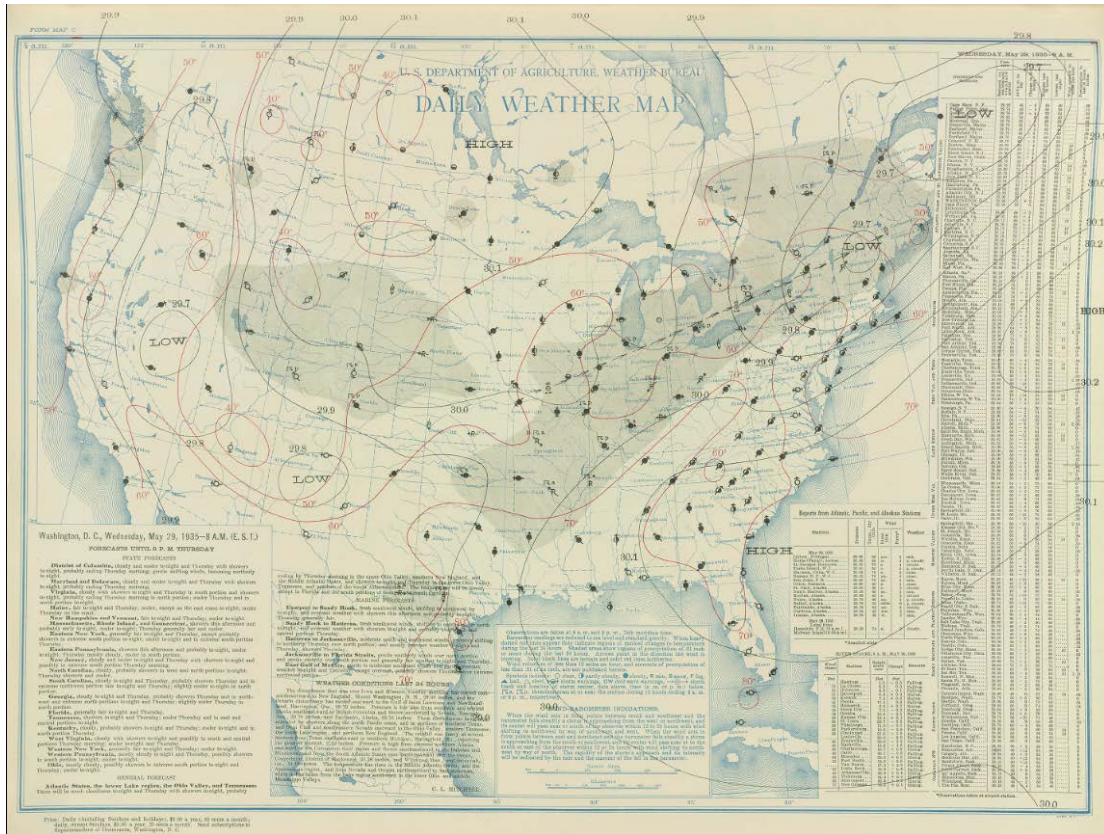
SPAS #1295 DAD Curves Zone 1
May 29-June 1, 1935

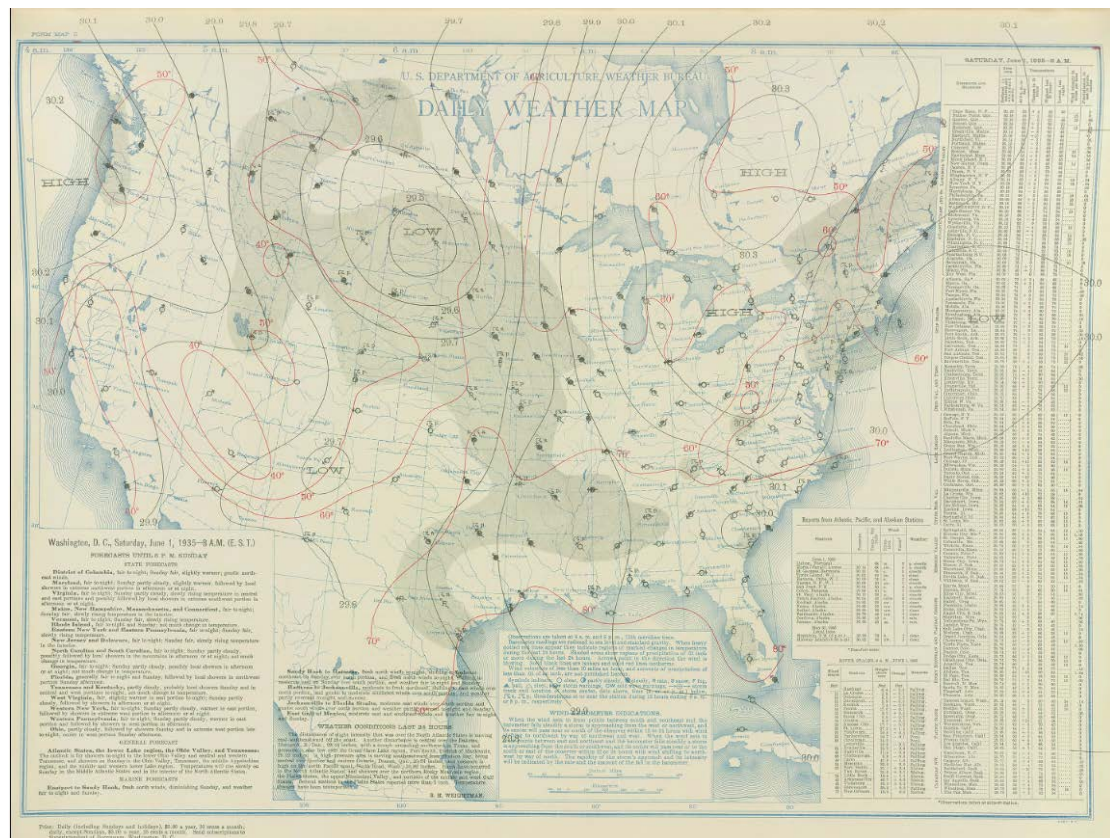
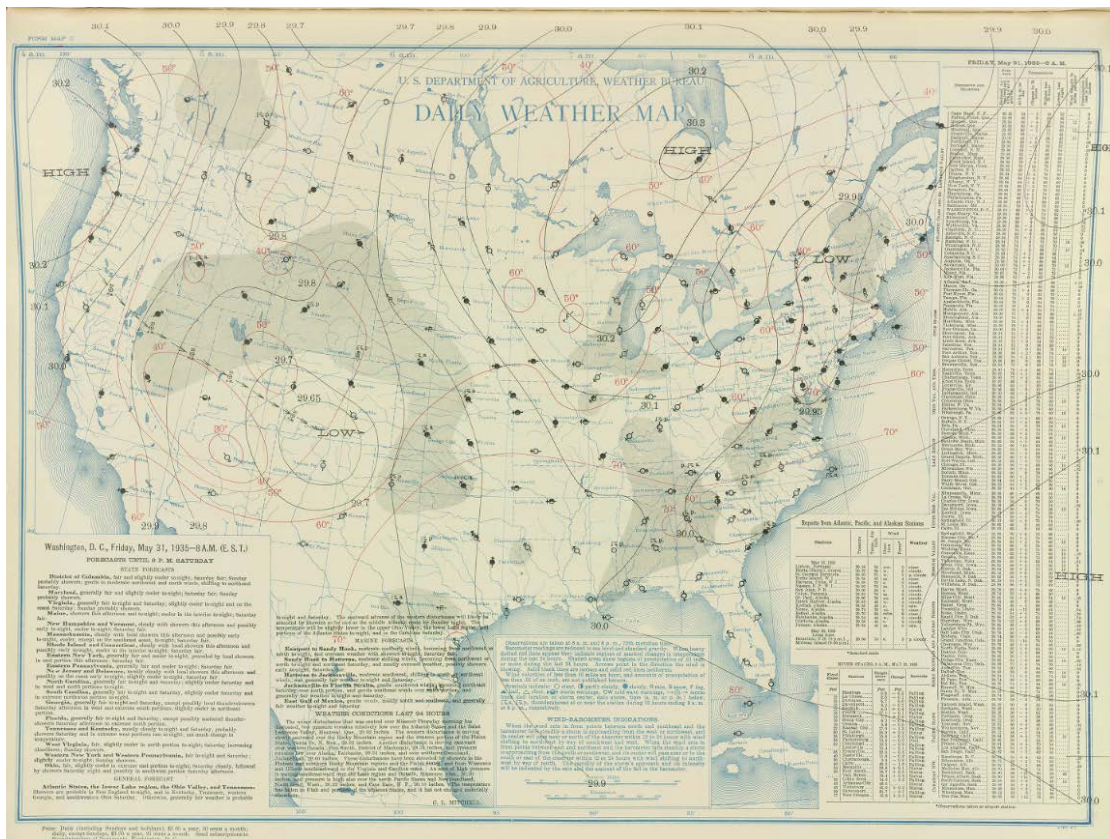




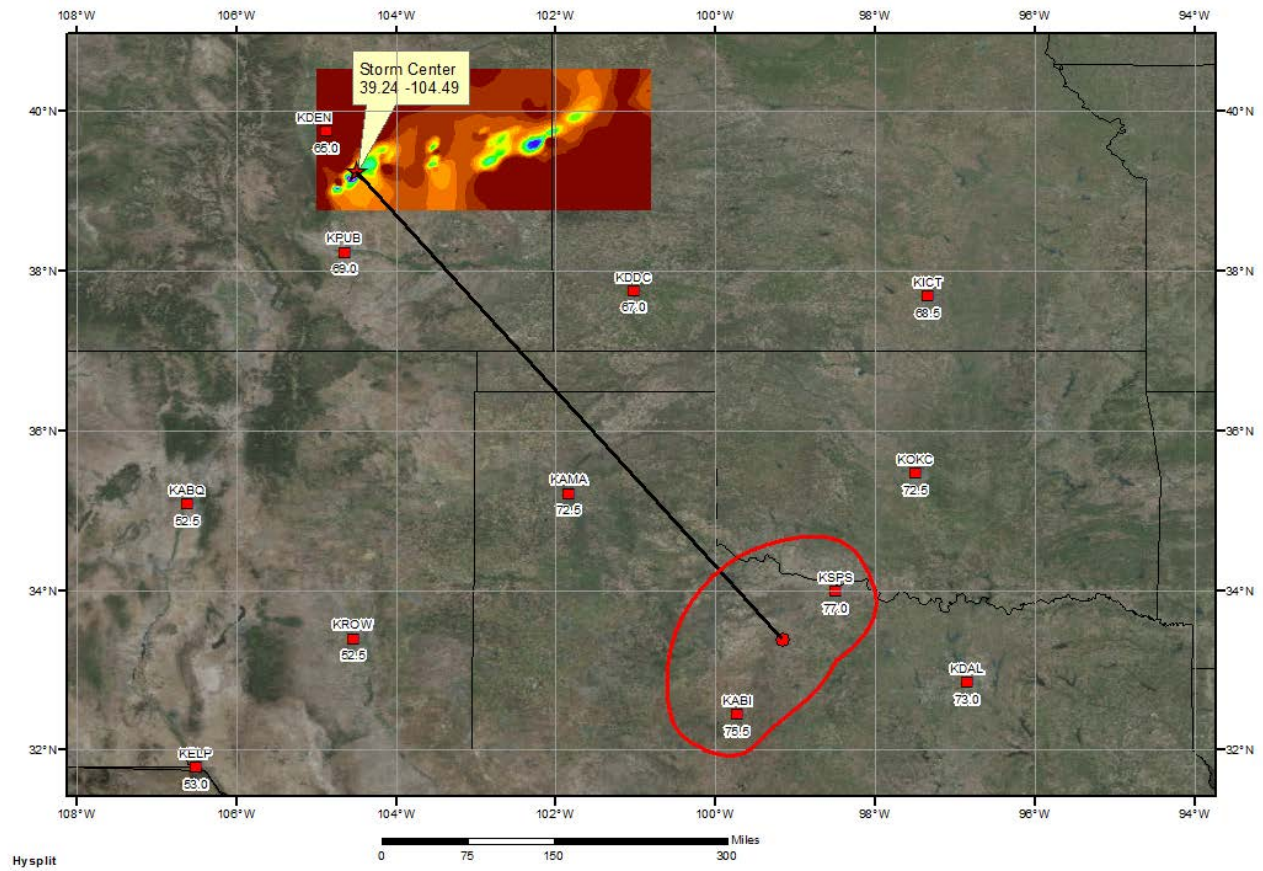








SPAS 1295 Zone 1 Elbert-Cherry Creek, CO Storm Analysis May 29-31, 1935



Storm Precipitation Analysis System (SPAS) For Storm #1295_2 (re-run/expansion of Storm #1039)

Metstat, Inc/AWA

08/12/2013

General Storm Location: Eastern Colorado and southern Colorado Front Range

Storm Dates: May 29-31, 1935

Event: MCCs/Thunderstorms

DAD Zone 2

Latitude: 39.32916

Longitude: -103.5375

Max. Grid Rainfall Amount: 12.65"

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

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

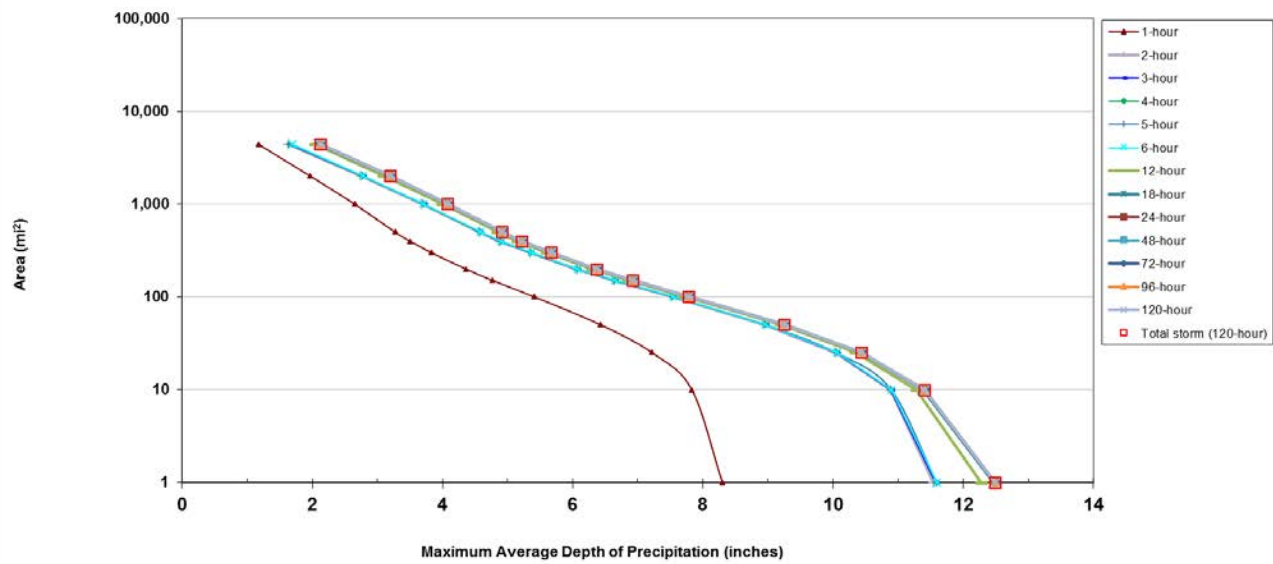
Reliability of results: This was a challenging storm to analyze given the lack of accurate measurements and hourly recording data. The storm analysis is consistent with the numerous other analyses of this storm by the USACE, USACE and NWS. Although we have a moderate degree of confidence in the magnitudes 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.

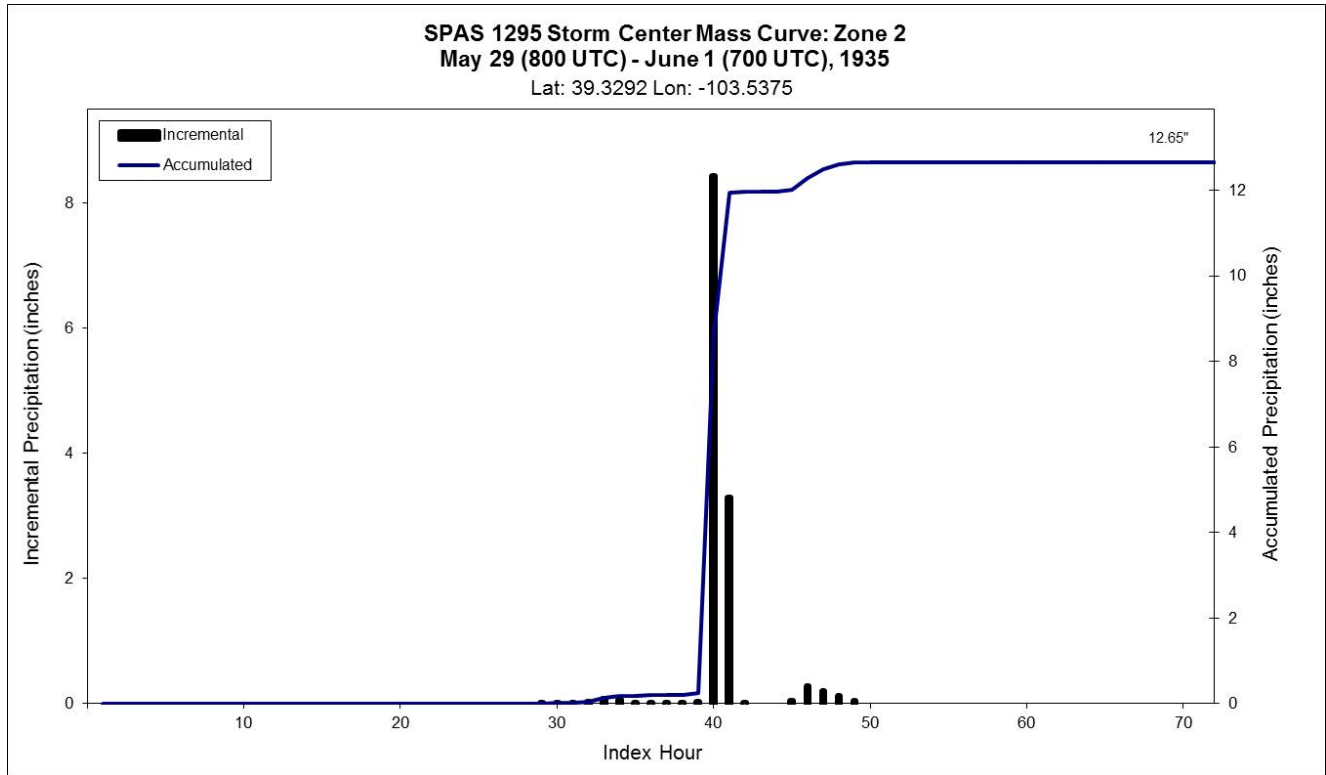
SPAS Storm ID	LON	LAT	ELEV	ELEV Round	Storm Rep. Dew Point					Climatological Max. Dew Point						IPMF
					T _d	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	T _d	T _d Round	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	
1295_2	-103.538	39.329	5,563	5,500	76.50	3.07	1.25	75	1.820	78.71	78.5	3.37	1.33	79	2.035	1.118

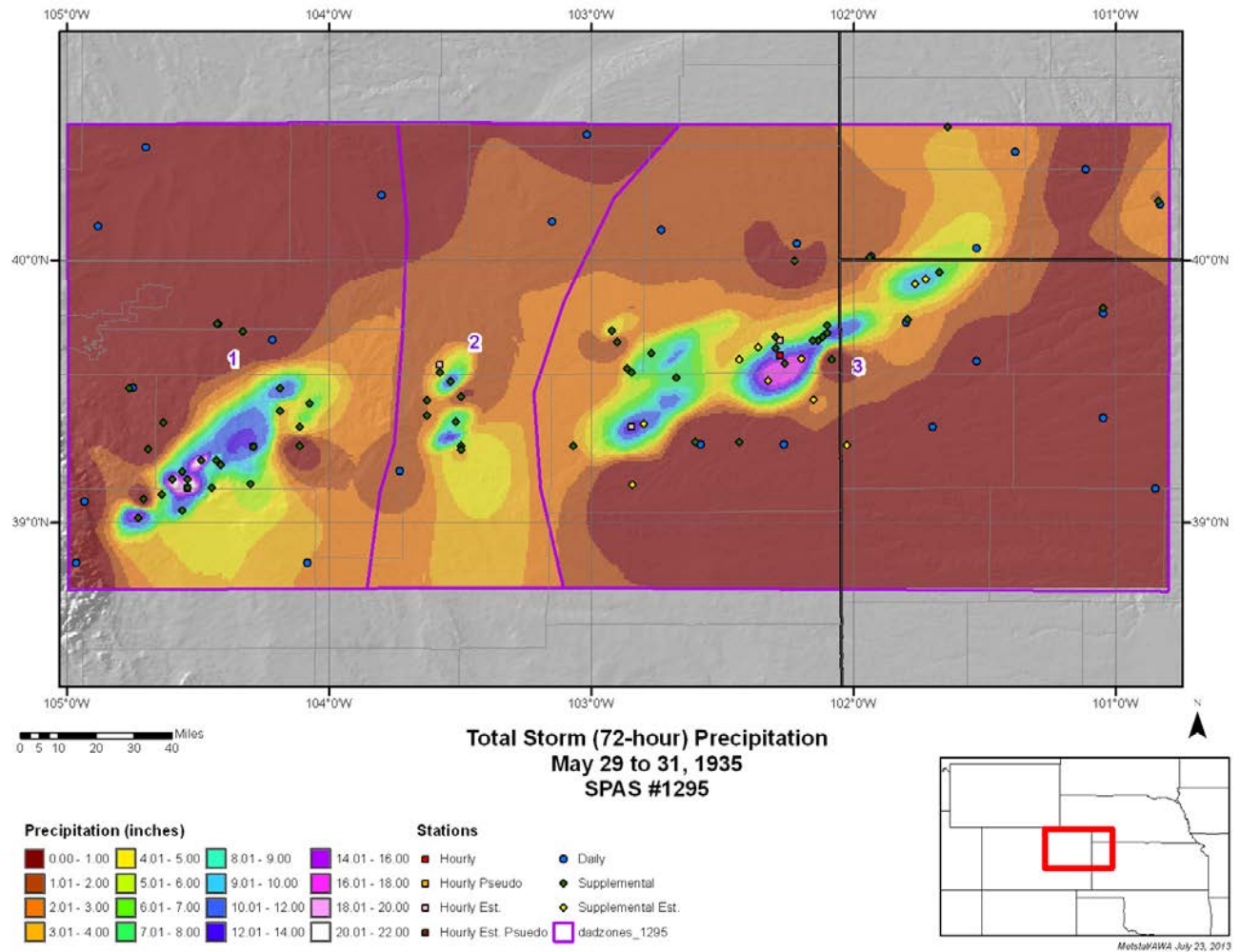
SPAS 1295 - May 29 (800 UTC) - June 1 (700 UTC), 1935
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)

Area (mi ²)	Duration (hours)												
	1	2	3	4	5	6	12	18	24	48	72	96	120
0.3	8.38	11.66	11.69	11.70	11.70	11.71	12.39	12.58	12.60	12.60	12.60	12.60	12.60
1	8.30	11.54	11.57	11.59	11.59	11.60	12.28	12.47	12.49	12.49	12.49	12.49	12.49
10	7.83	10.89	10.89	10.89	10.89	10.90	11.28	11.38	11.40	11.40	11.40	11.40	11.40
25	7.22	10.03	10.05	10.05	10.05	10.06	10.34	10.42	10.43	10.43	10.43	10.43	10.43
50	6.43	8.93	8.96	8.96	8.96	8.96	9.19	9.25	9.25	9.25	9.25	9.25	9.25
100	5.41	7.52	7.53	7.53	7.53	7.54	7.71	7.77	7.78	7.78	7.78	7.78	7.78
150	4.77	6.63	6.64	6.64	6.64	6.65	6.85	6.91	6.92	6.92	6.92	6.92	6.92
200	4.36	6.06	6.06	6.07	6.07	6.08	6.30	6.36	6.37	6.37	6.37	6.37	6.37
300	3.83	5.34	5.34	5.35	5.35	5.36	5.60	5.66	5.67	5.67	5.67	5.67	5.67
400	3.50	4.88	4.88	4.89	4.89	4.90	5.15	5.22	5.22	5.22	5.22	5.22	5.22
500	3.27	4.56	4.56	4.57	4.57	4.58	4.84	4.90	4.91	4.91	4.91	4.91	4.91
1,000	2.65	3.68	3.70	3.70	3.71	3.71	4.00	4.07	4.08	4.08	4.08	4.08	4.08
2,000	1.97	2.74	2.77	2.77	2.77	2.78	3.09	3.18	3.20	3.20	3.20	3.20	3.20
4,425	1.17	1.63	1.64	1.65	1.65	1.69	2.04	2.10	2.12	2.12	2.12	2.12	2.12

SPAS #1295 DAD Curves Zone 2
May 29-June 1, 1935







WAR DEPARTMENT

CORPS OF ENGINEERS, U.S. ARMY

STORM STUDIES - PERTINENT DATA SHEET

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, 11/16/42Part 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						

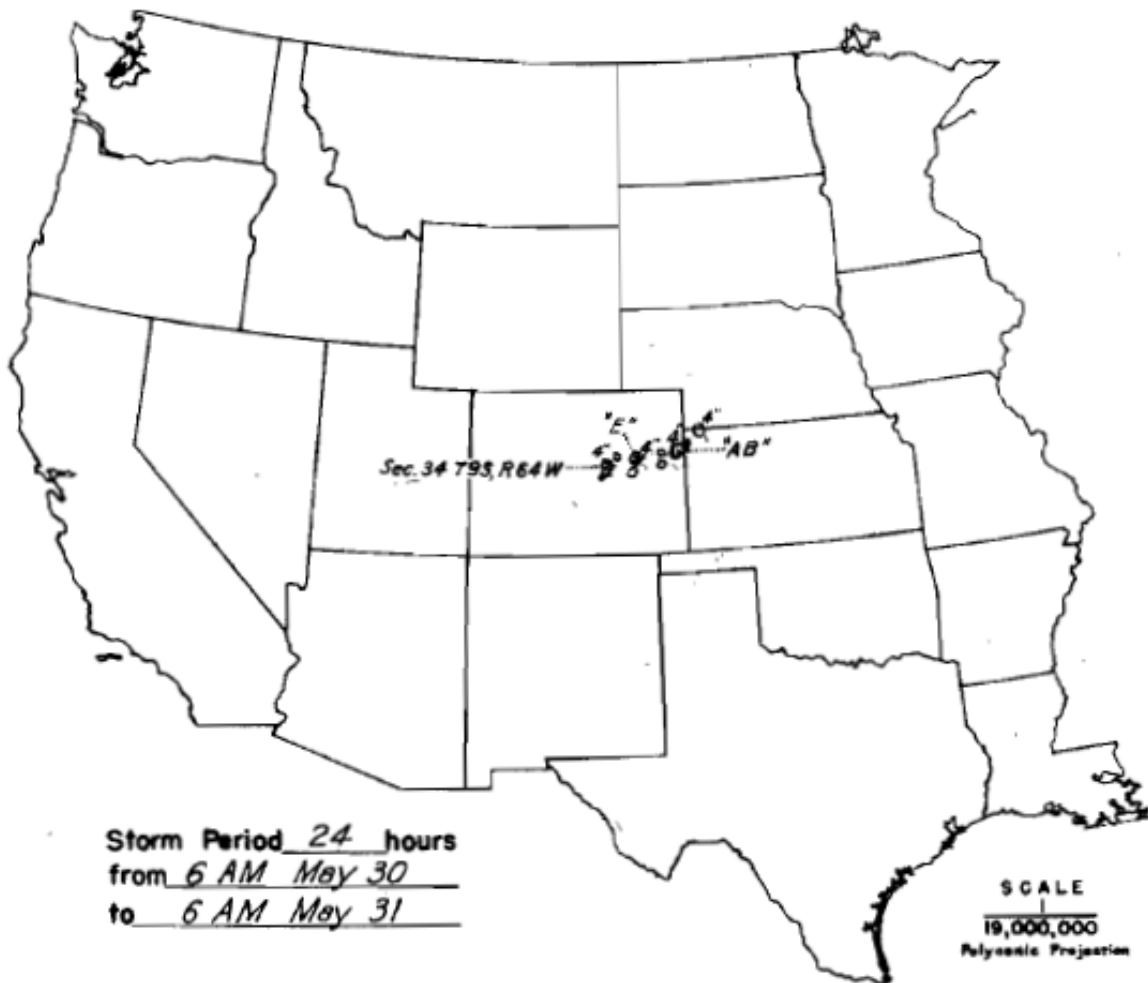
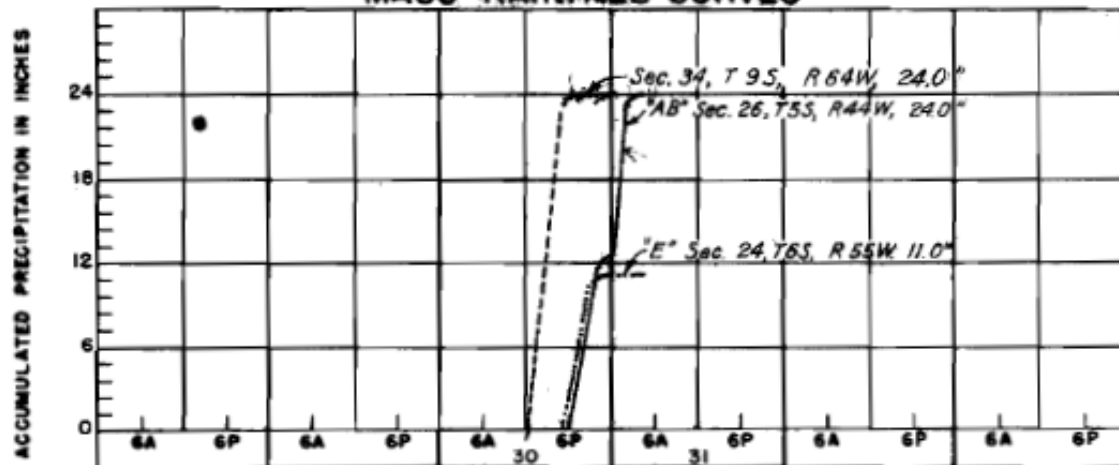
Form S-2

WAR DEPARTMENT

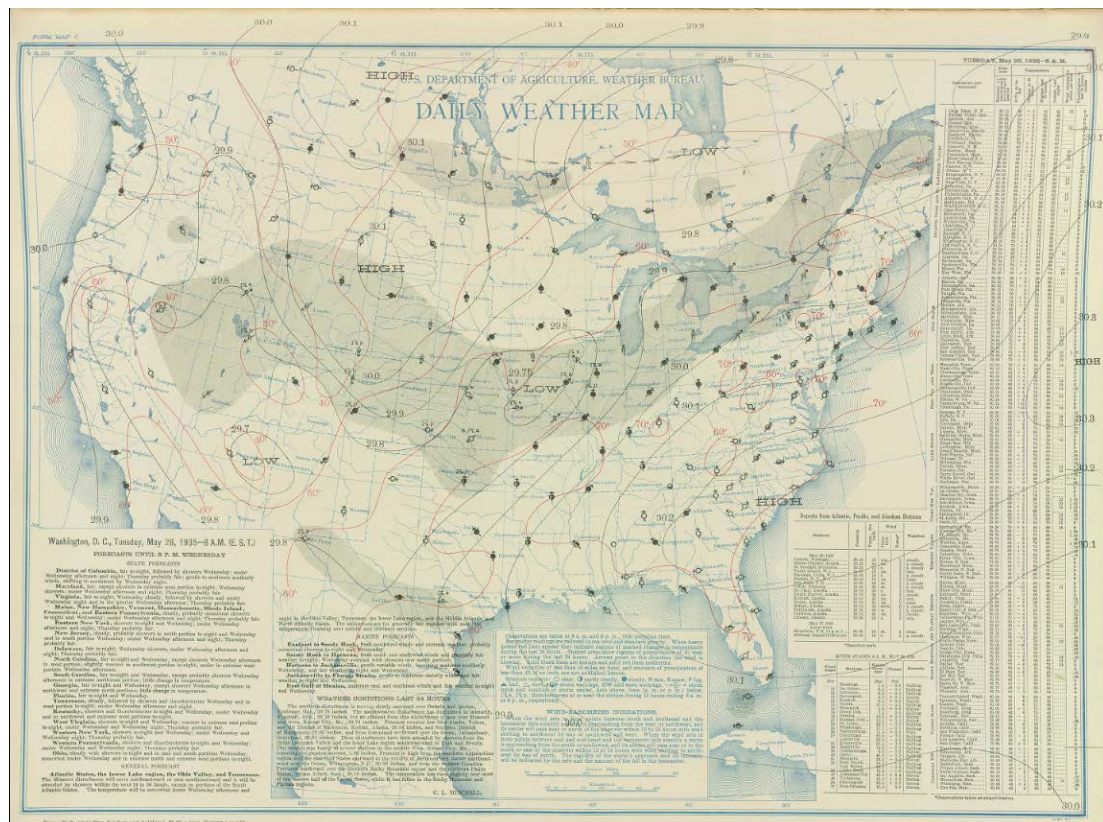
CORPS OF ENGINEERS, U. S. ARMY

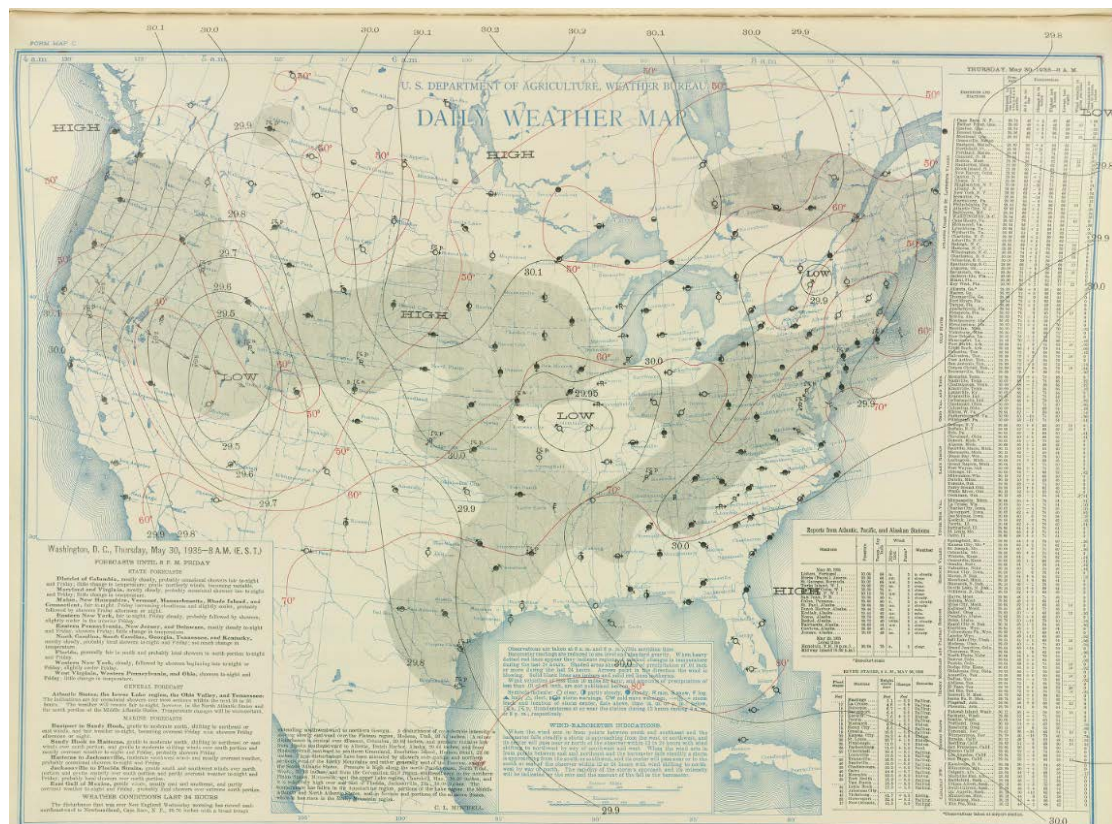
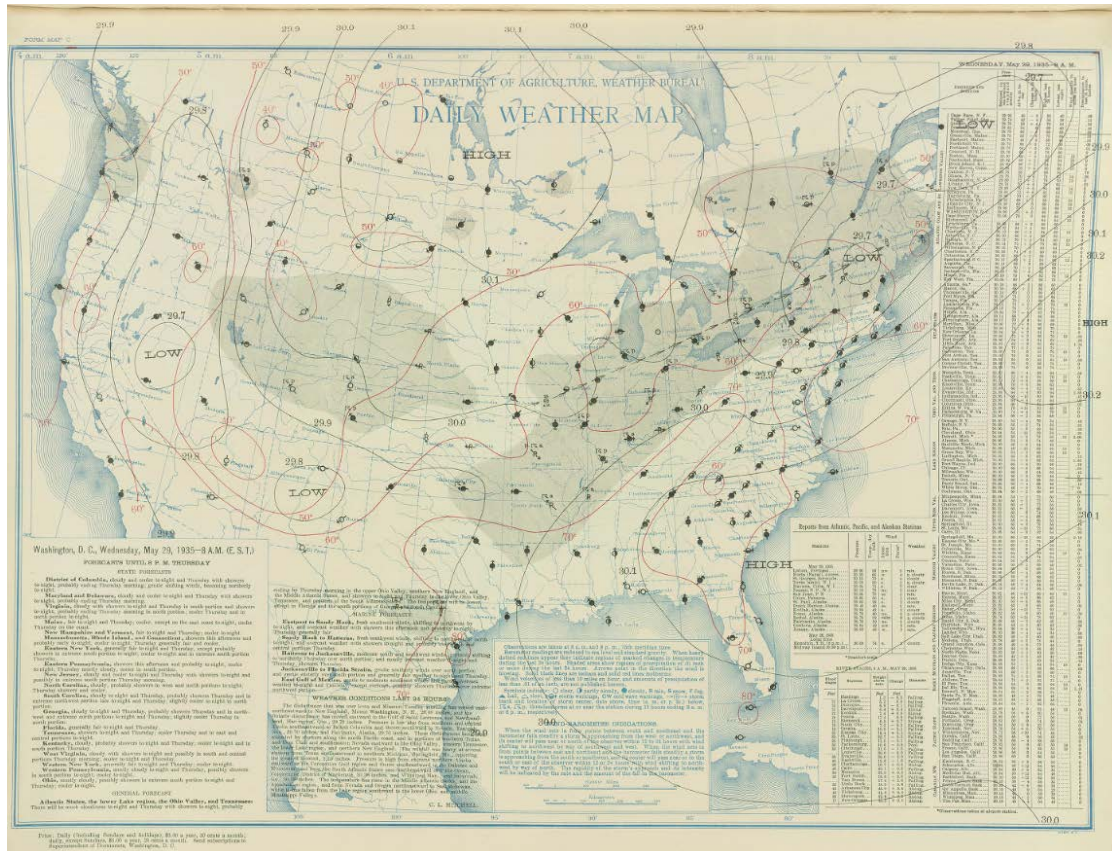
STORM STUDIES - ISOHYETAL MAP

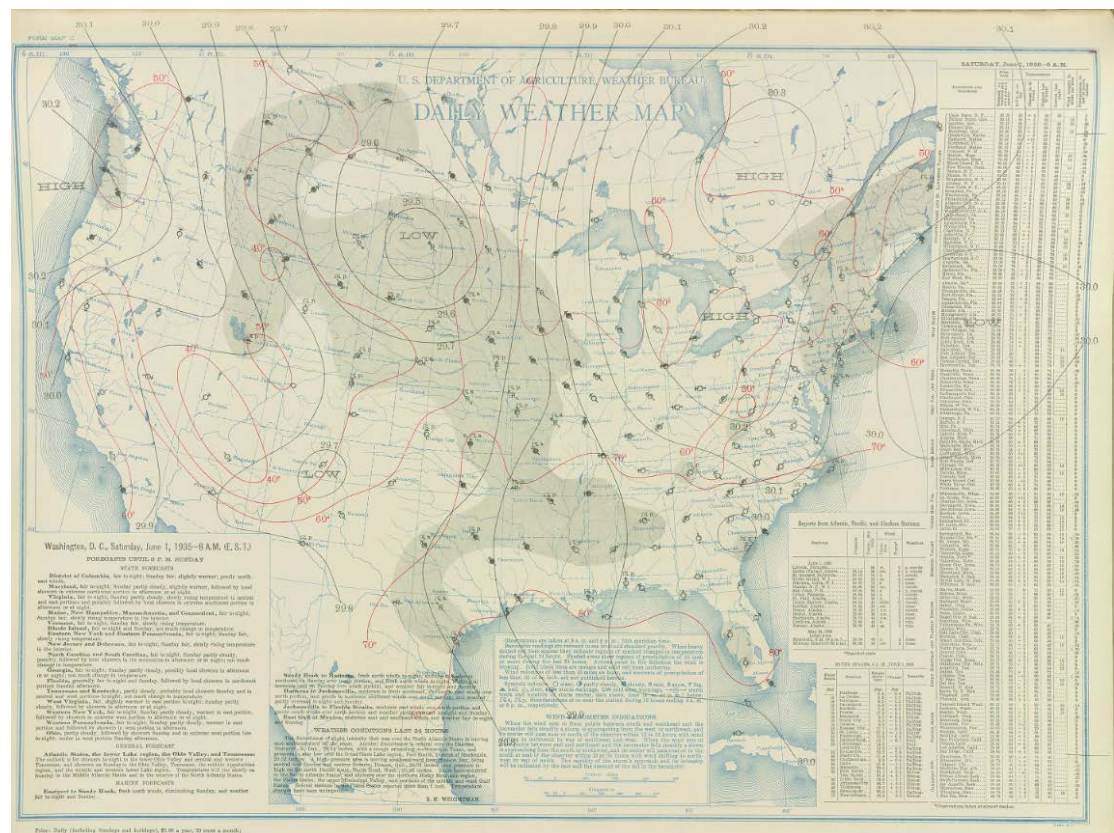
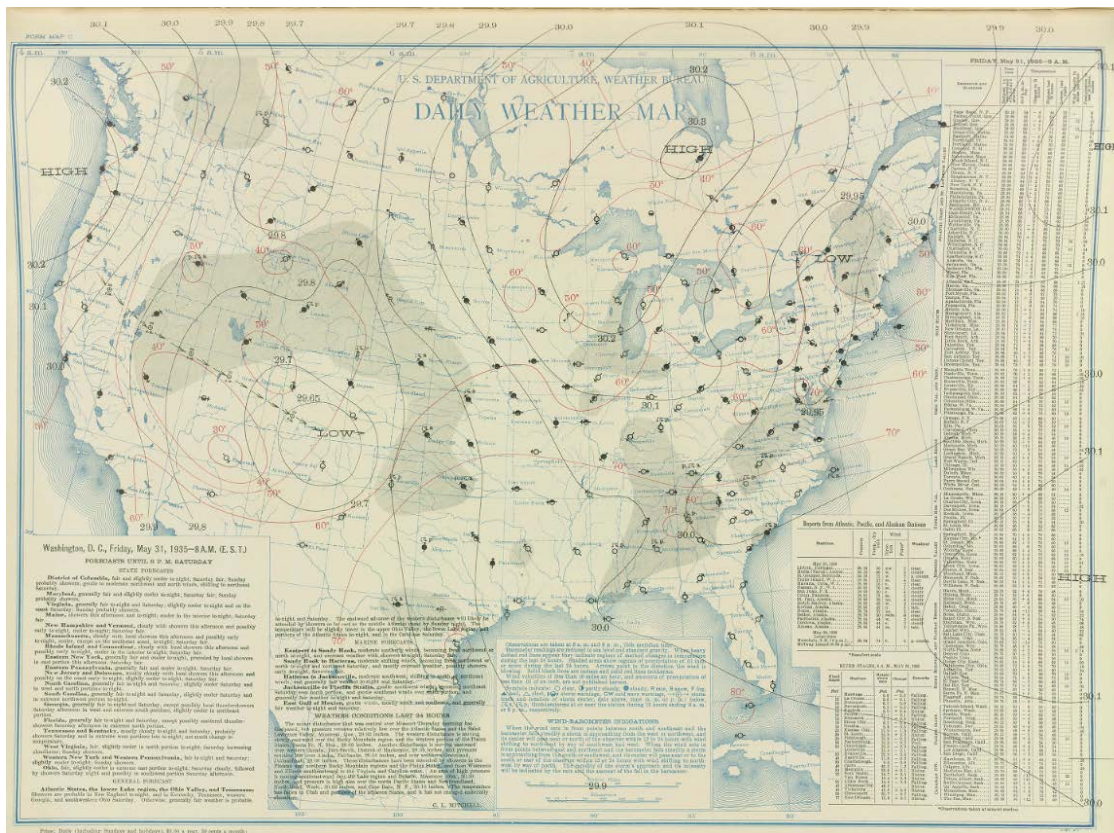
Storm of May 30-31, 1935 Assignment MR-3-28(A)
 Study Prepared by: Kansas City, Mo. District
Missouri River Division

**MASS RAINFALL CURVES**

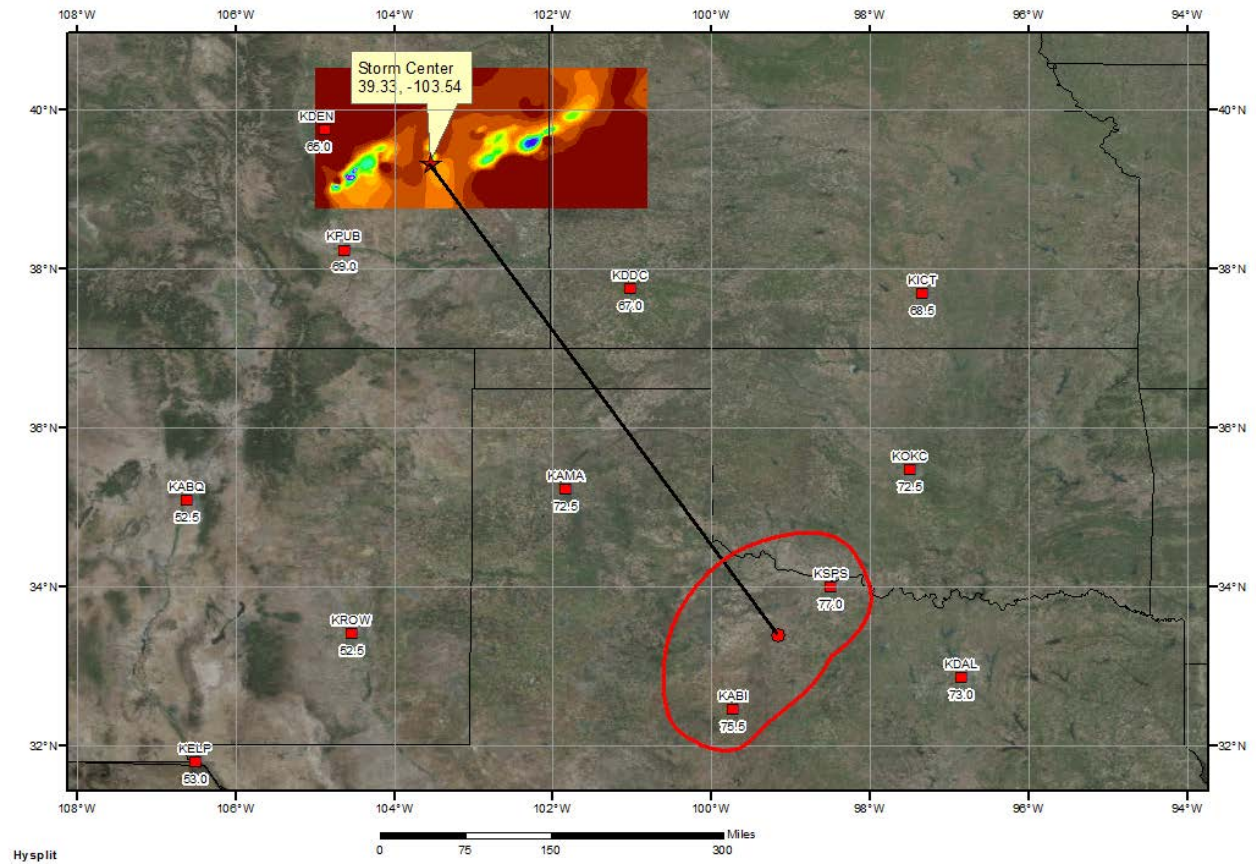
FORM 8-3W







SPAS 1295 Zone 2 Genoa, CO Storm Analysis May 29-31, 1935



Storm Precipitation Analysis System (SPAS) For Storm #1295_3 (re-run/expansion of Storm #1039)

Metstat, Inc/AWA

08/12/2013

General Storm Location: Eastern Colorado and southern Colorado Front Range

Storm Dates: May 29-31, 1935

Event: MCCs/Thunderstorms

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

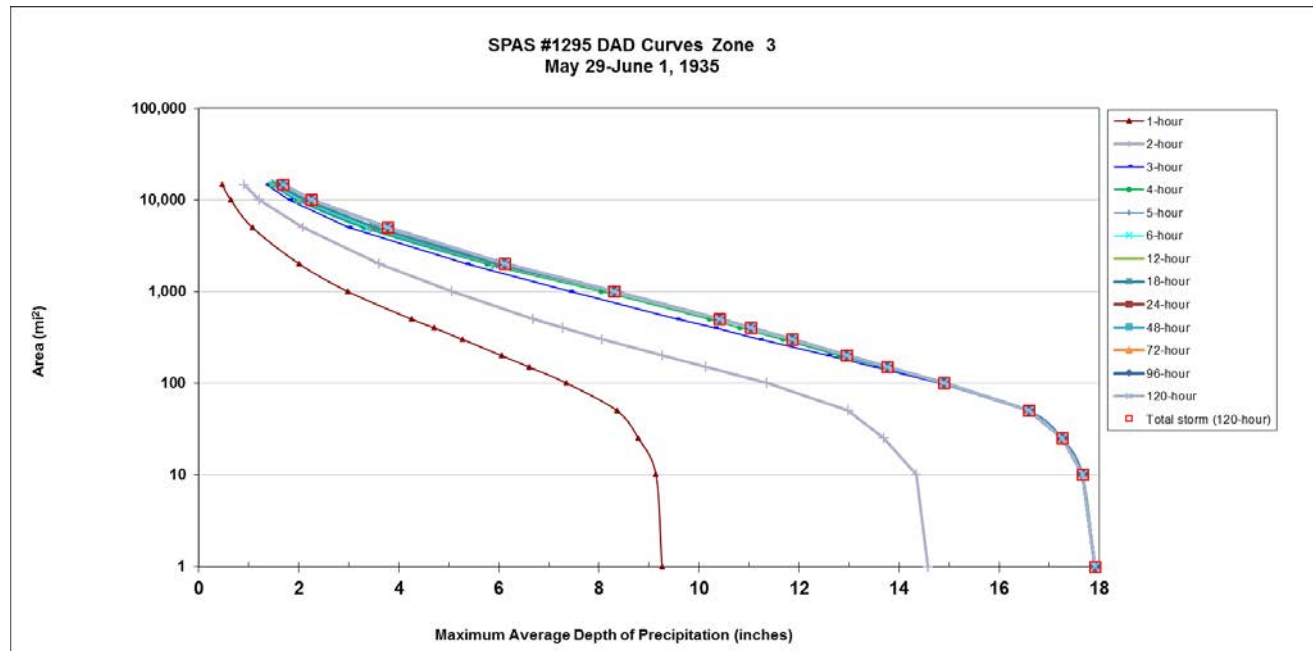
Radar Included: No

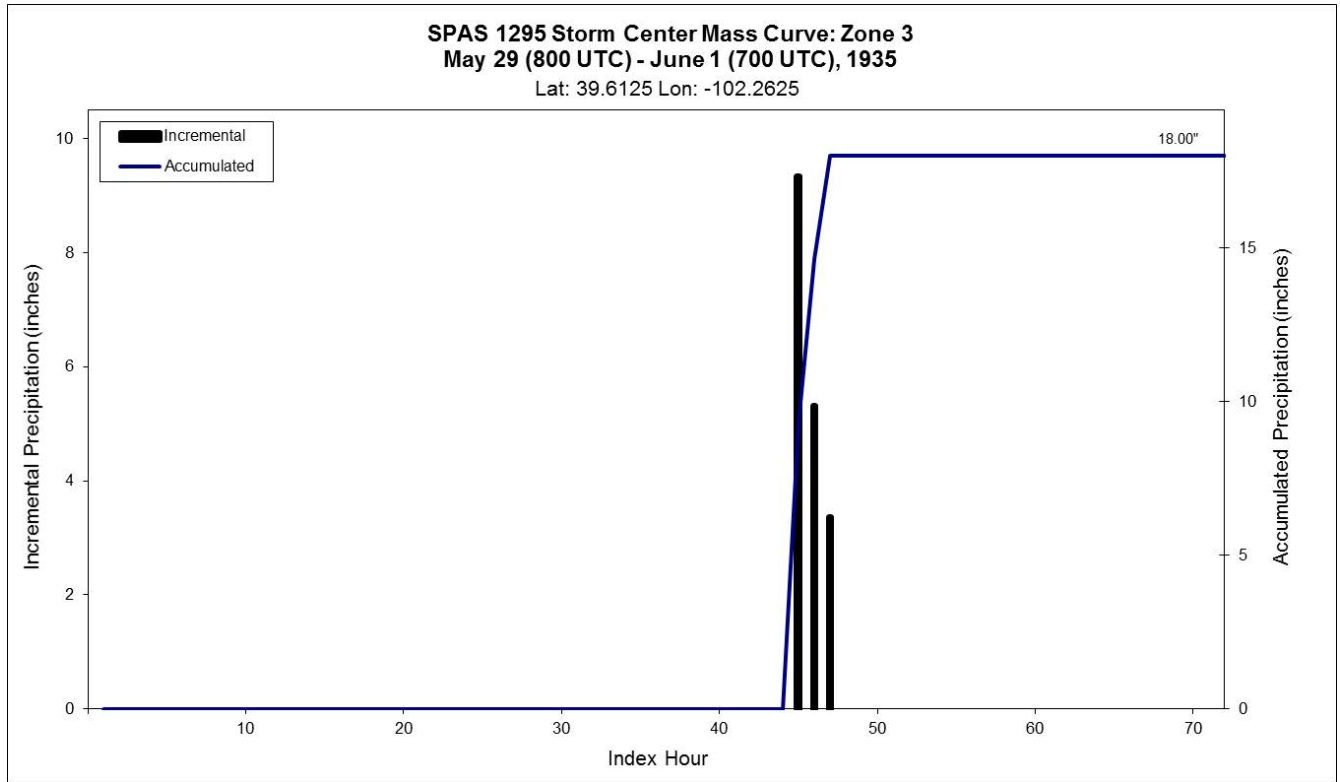
Depth-Area-Duration (DAD) analysis: Yes

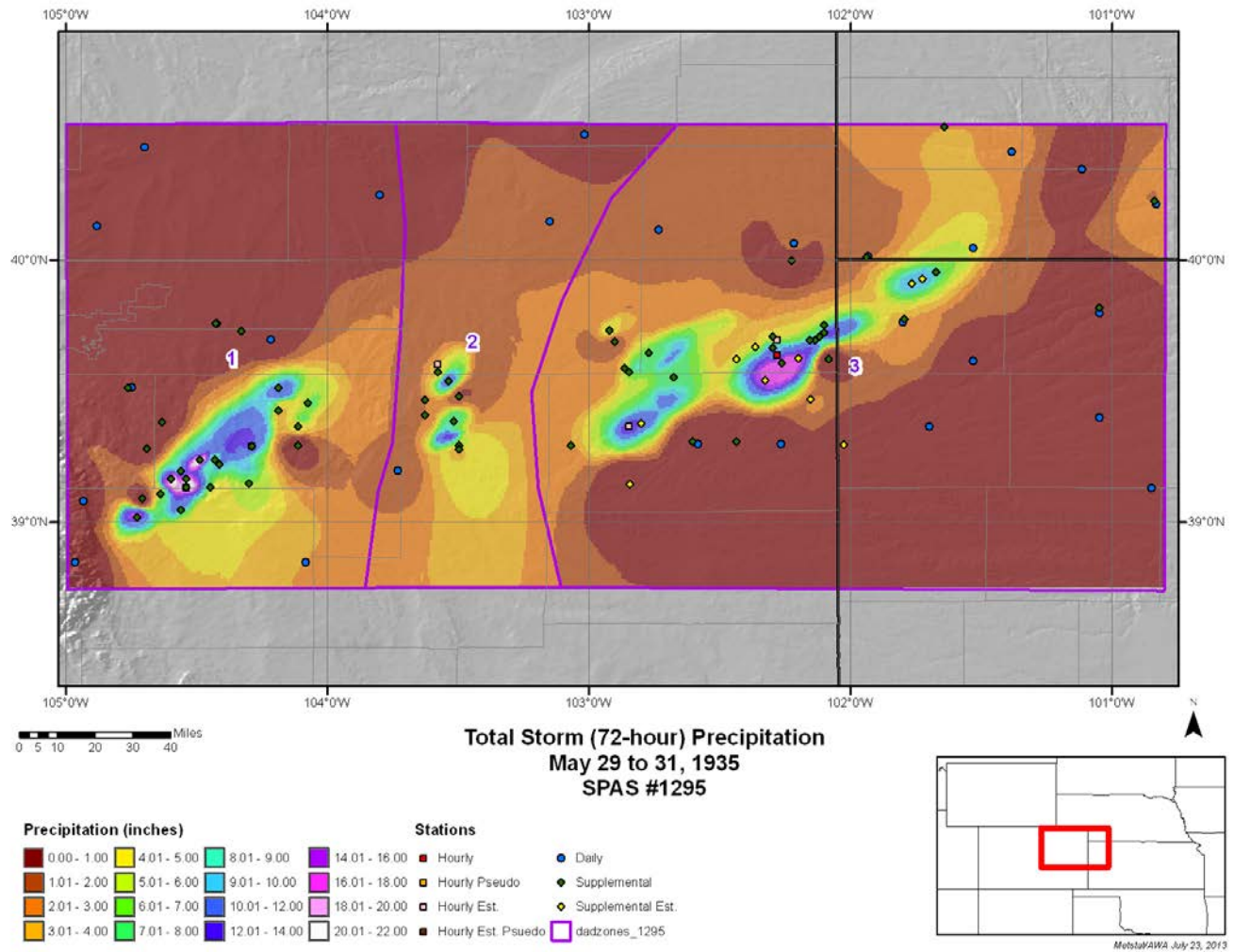
Reliability of results: This was a challenging storm to analyze given the lack of accurate measurements and hourly recording data. The storm analysis is consistent with the numerous other analyses of this storm by the USACE, USACE and NWS. Although we have a moderate degree of confidence in the magnitudes 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	LON	LAT	ELEV	ELEV Round	Storm Rep. Dew Point					Climatological Max. Dew Point						IPMF
					T _d	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	T _d	T _d Round	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	
1295_3	-102.263	39.613	3,699	3,700	76.50	3.07	0.89	75	2.175	78.71	78.5	3.37	0.96	79	2.410	1.108

SPAS 1295 - May 29 (800 UTC) - June 1 (700 UTC), 1935														
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)														
Area (mi ²)	Duration (hours)													
	1	2	3	4	5	6	12	18	24	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
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
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
25	8.79	13.69	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
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
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
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
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
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
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
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
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
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
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
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







WAR DEPARTMENT

CORPS OF ENGINEERS, U.S. ARMY

STORM STUDIES - PERTINENT DATA SHEET

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
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MAXIMUM AVERAGE DEPTH OF RAINFALL IN INCHES

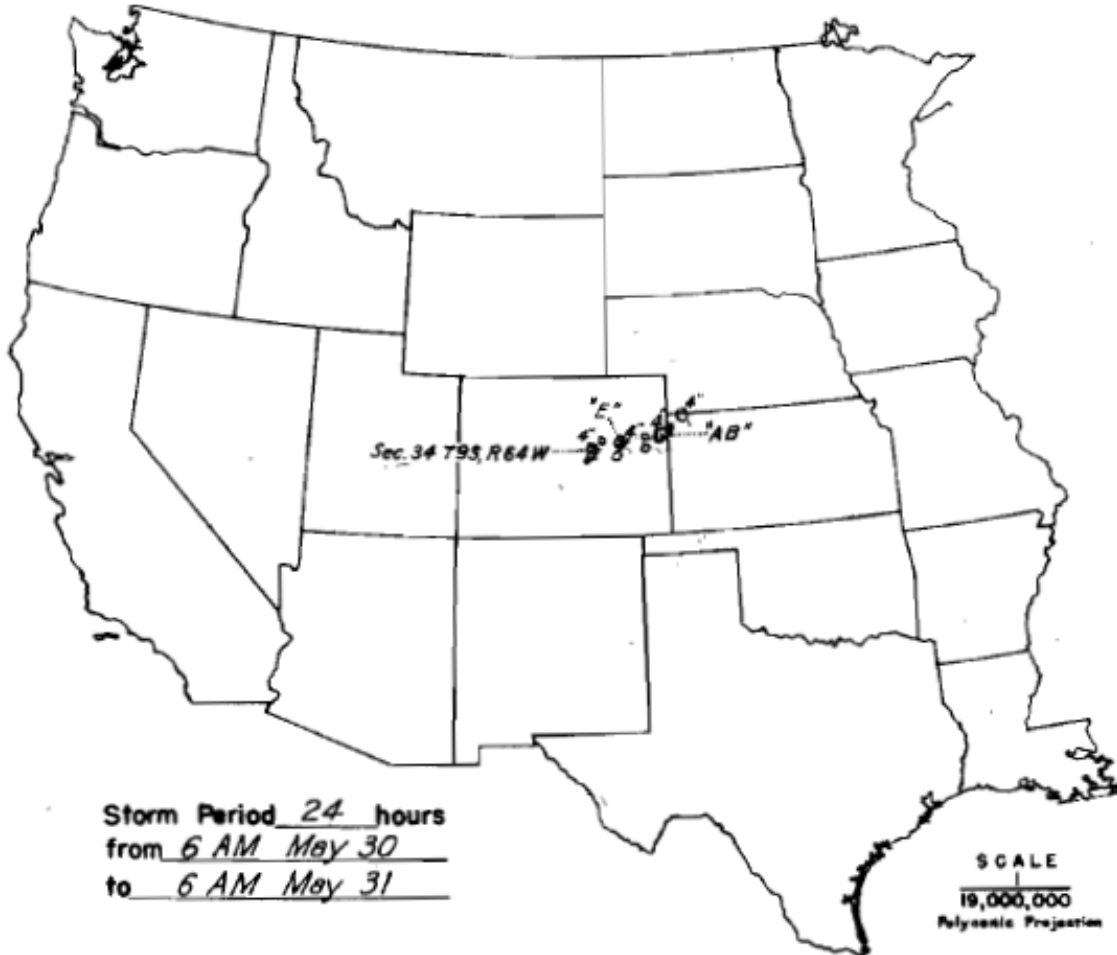
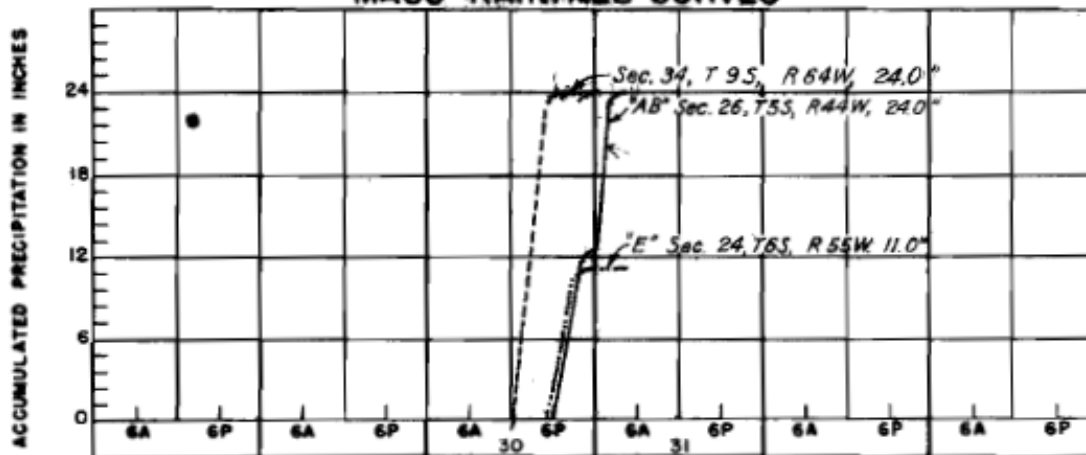
Area in Sq. Mi.	Duration of Rainfall in Hours							
	6	12	18	24				
Max. Station	24.0	24.0	24.0	24.0				
5	22.1	23.3	23.3	23.3				
10	20.6	22.2	22.2	22.2				
20	18.8	20.7	20.7	20.7				
50	16.0	18.0	18.0	18.0				
100	13.7	15.4	15.4	15.4				
200	11.2	12.6	12.6	12.6				
500	7.8	9.3	9.3	9.3				
1,000	5.8	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				

WAR DEPARTMENT

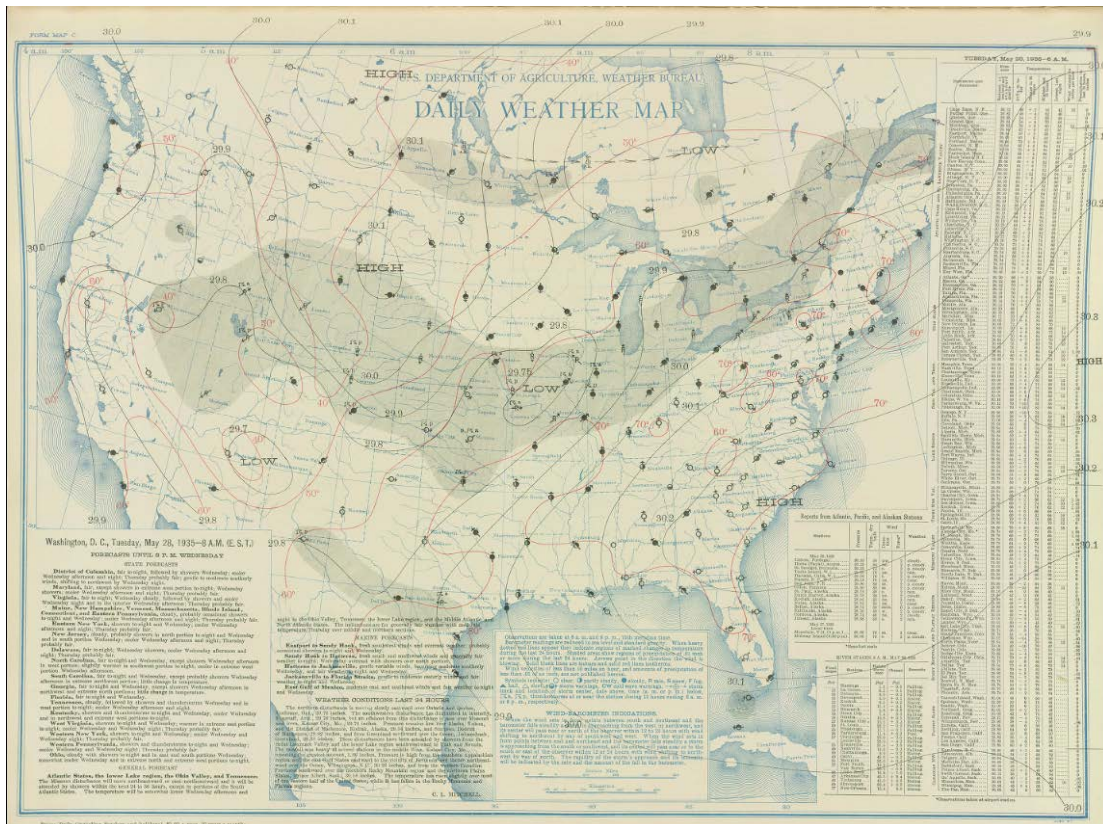
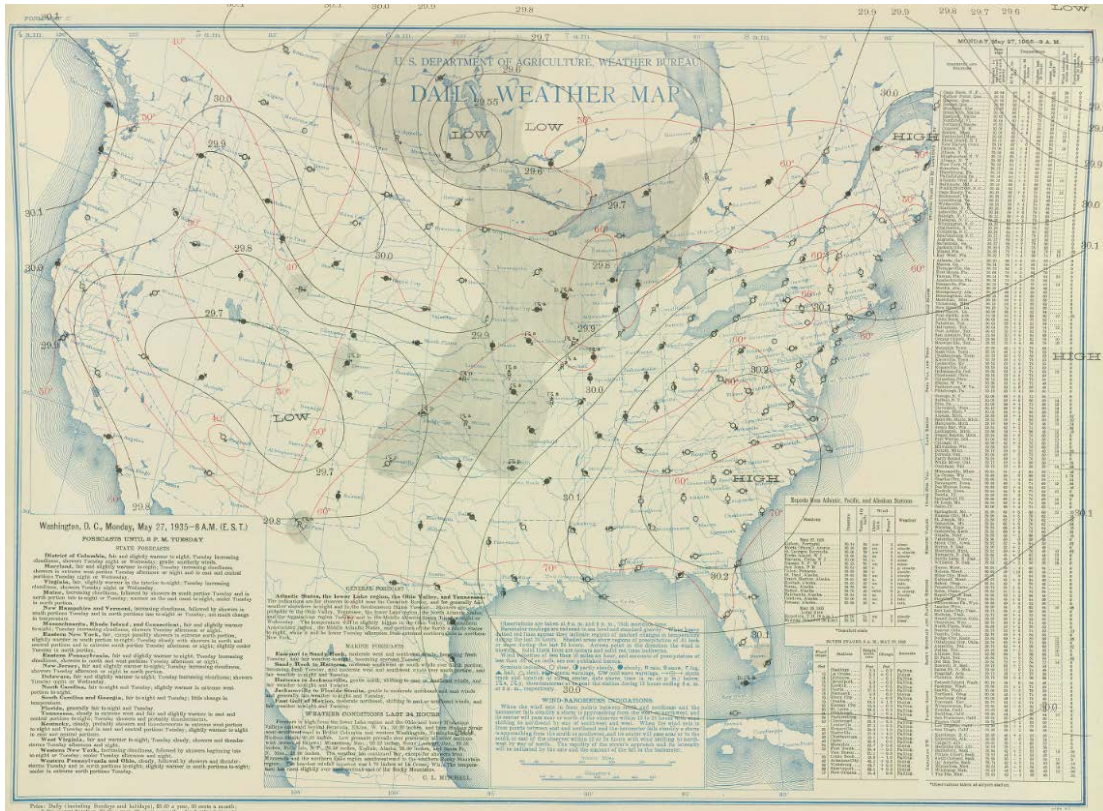
CORPS OF ENGINEERS, U. S. ARMY

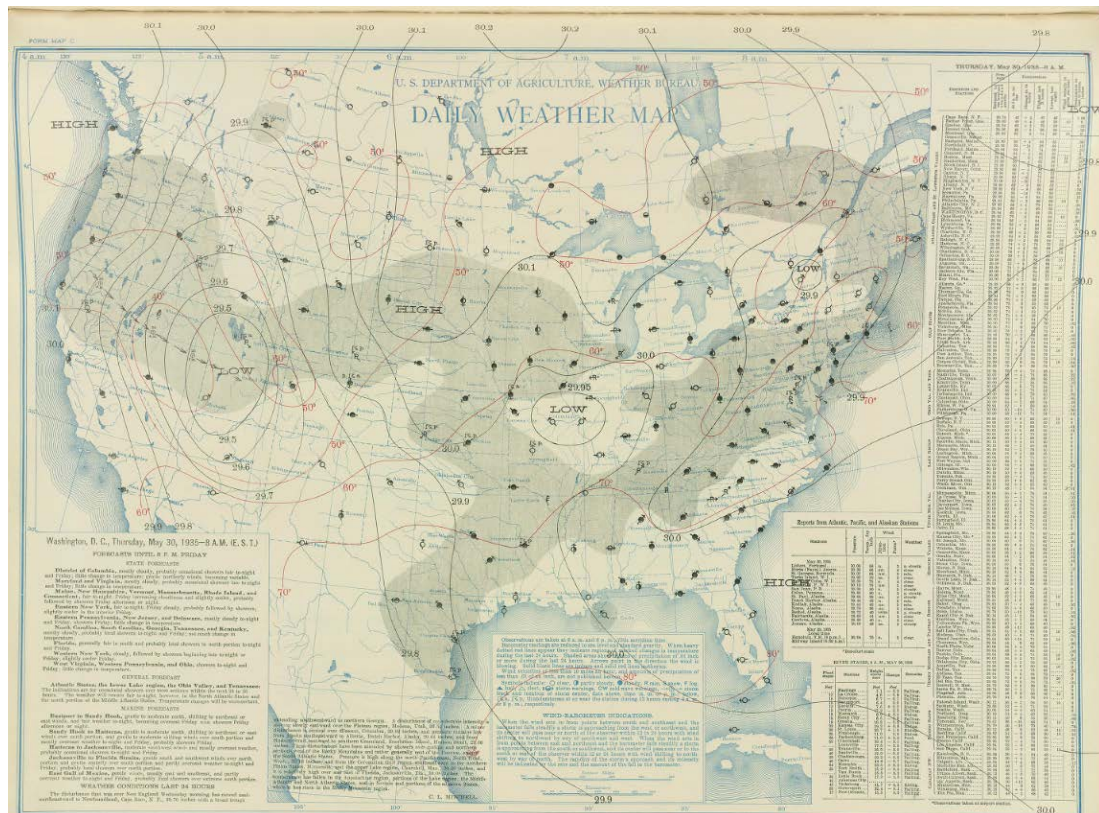
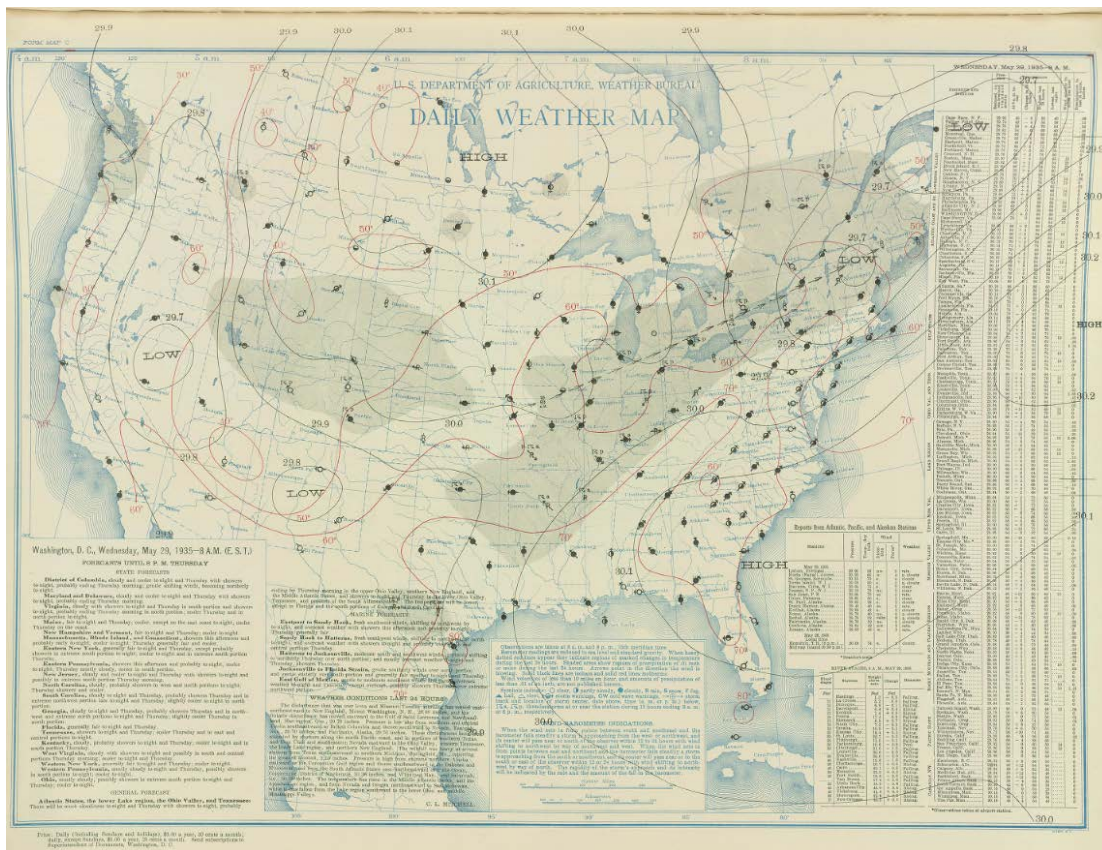
STORM STUDIES - ISOHYETAL MAP

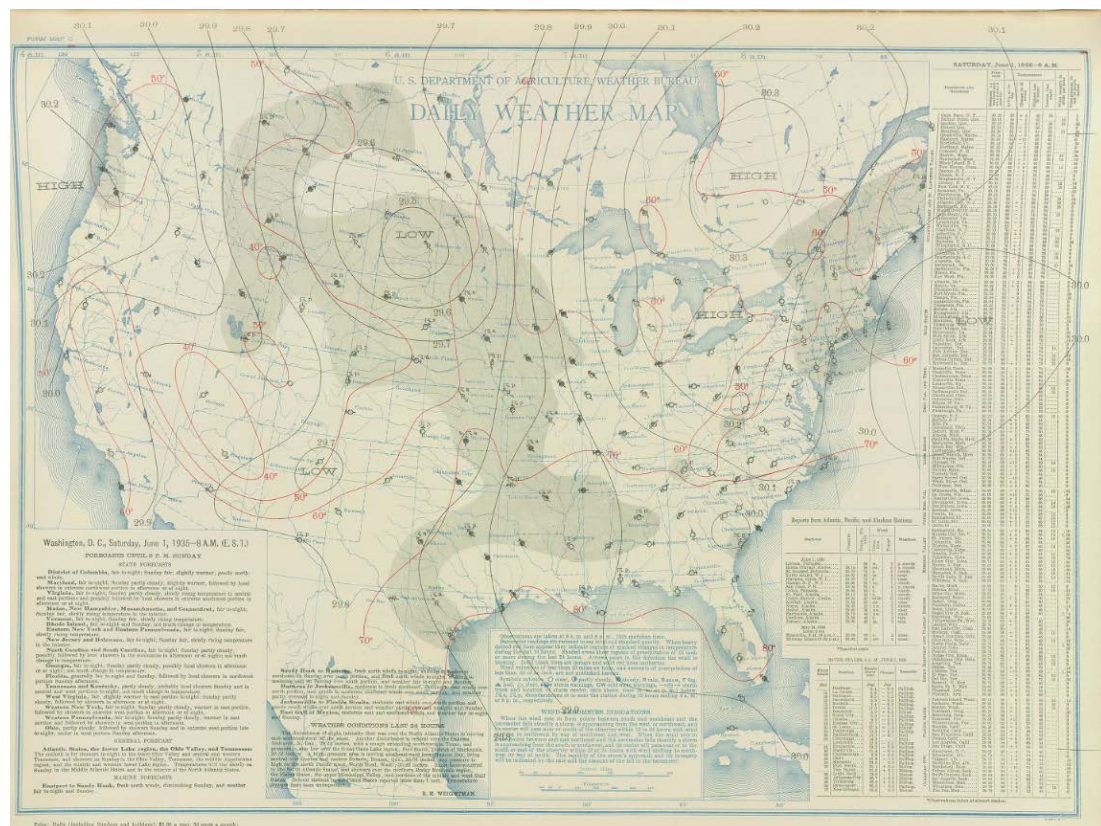
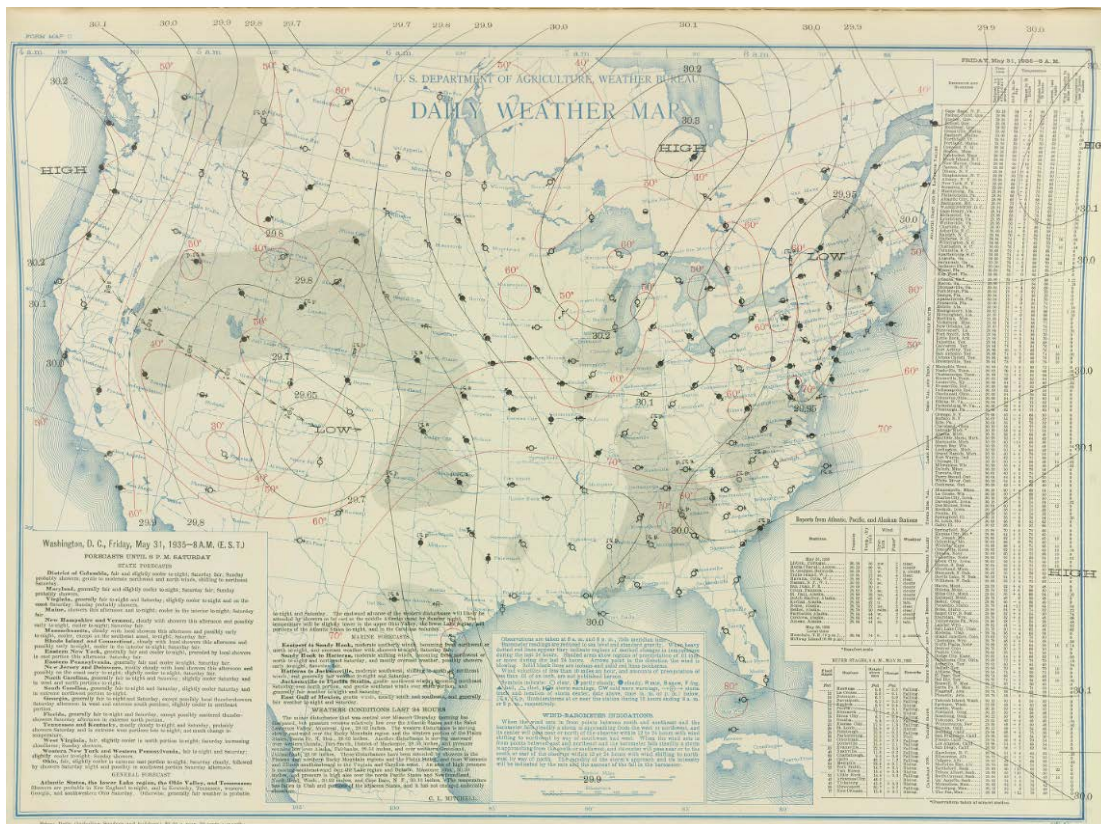
Storm of May 30-31, 1935 Assignment MR-3-28(A)
 Study Prepared by: Kansas City, Mo. District
Missouri River Division

**MASS RAINFALL CURVES**

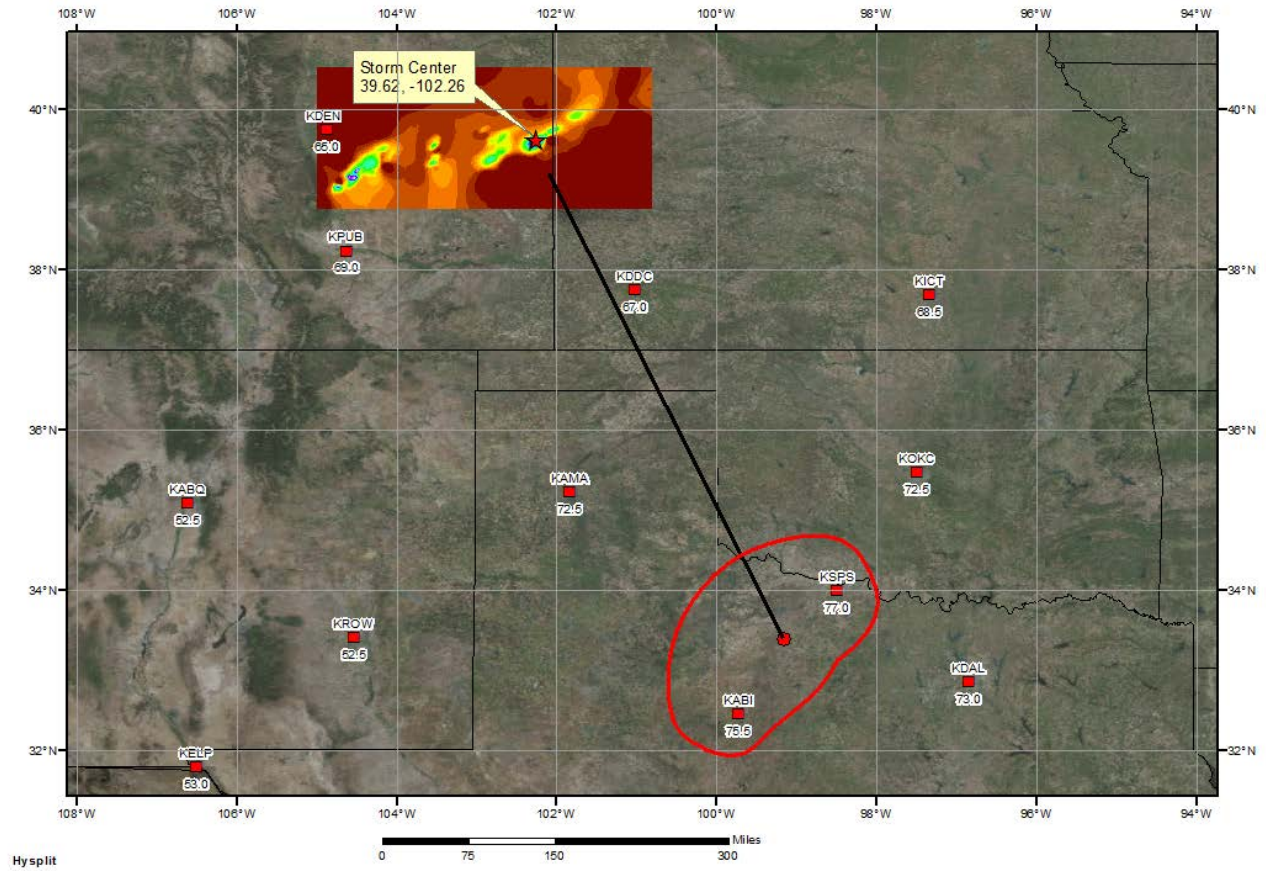
FORM 8-3W







SPAS 1295 Zone 3 Hale, CO Storm Analysis May 29-31, 1935



Storm Precipitation Analysis System (SPAS) For Storm #1485_1

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

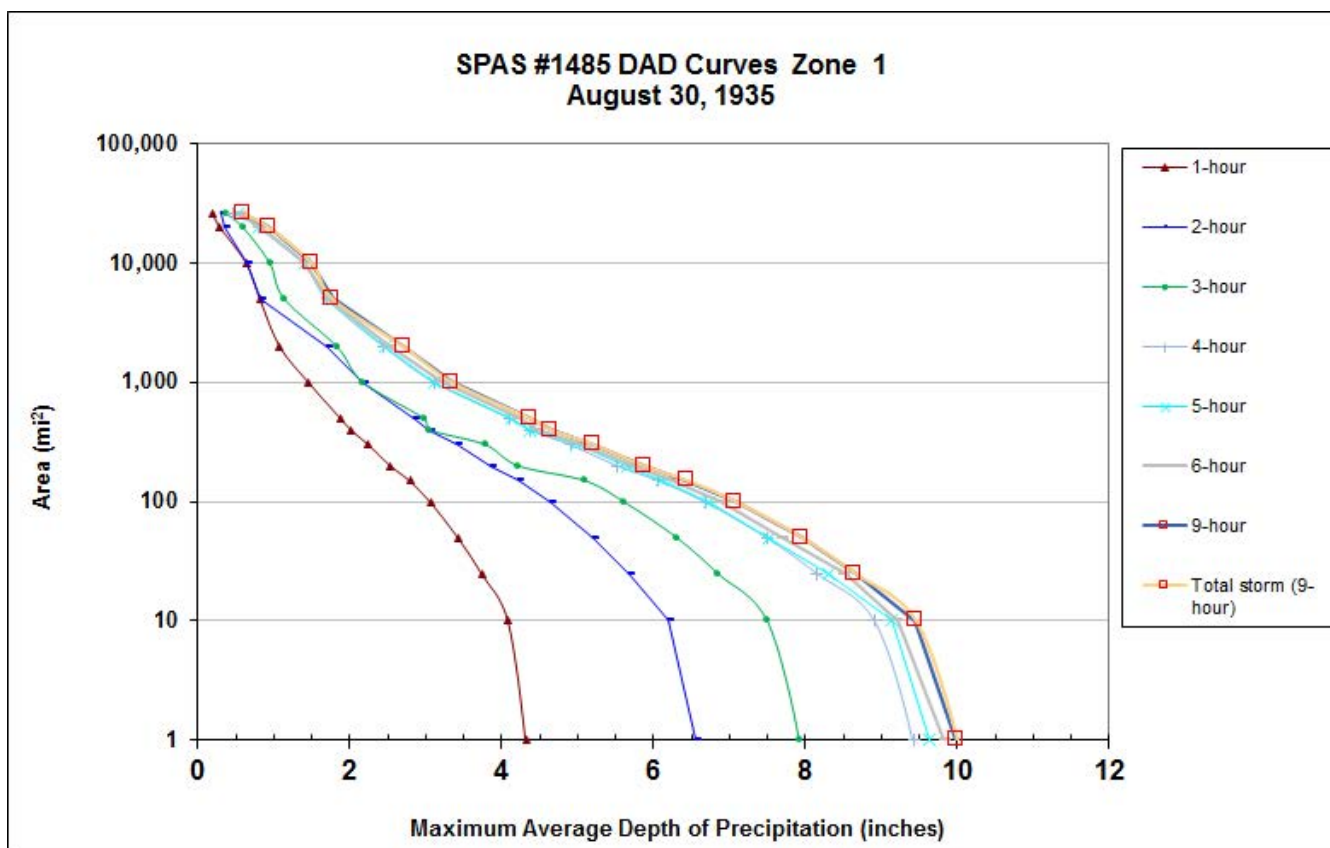
Radar Included: No

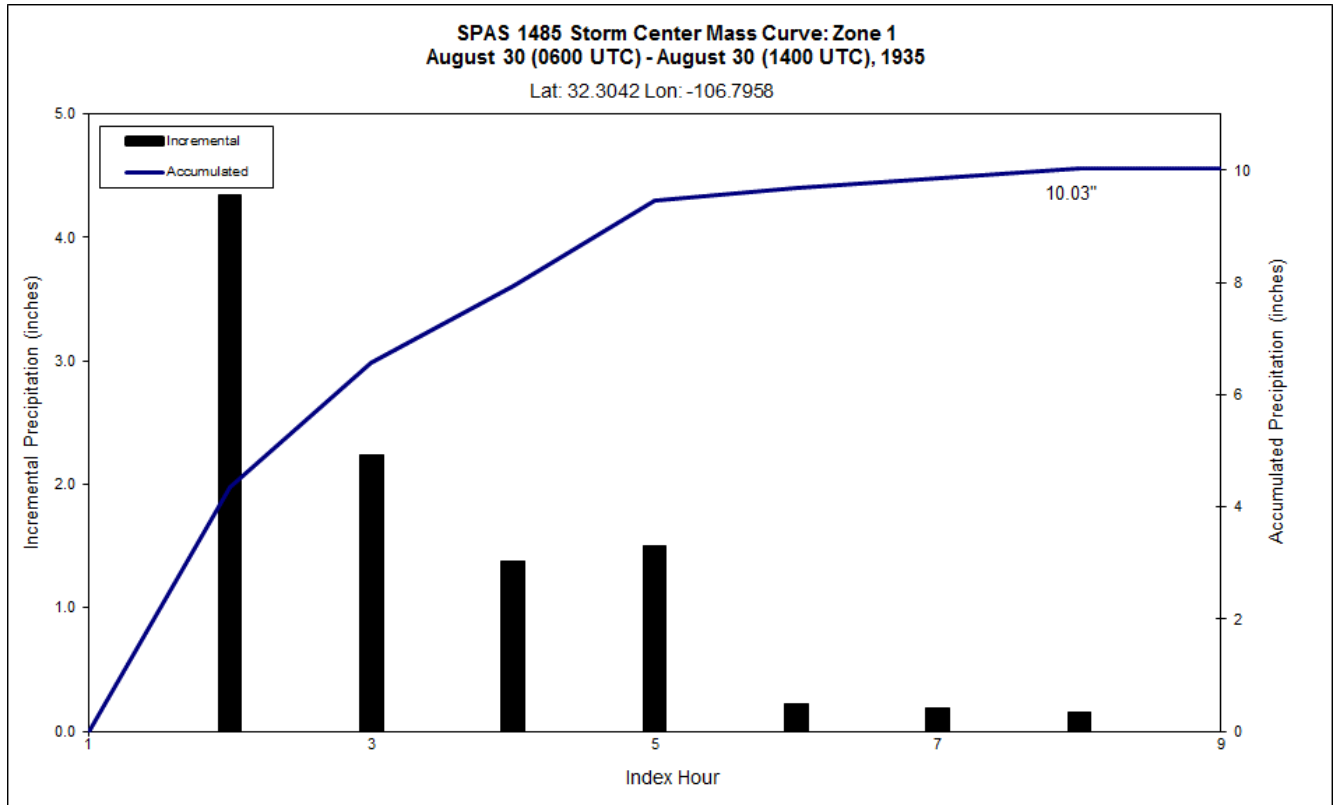
Depth-Area-Duration (DAD) analysis: Yes

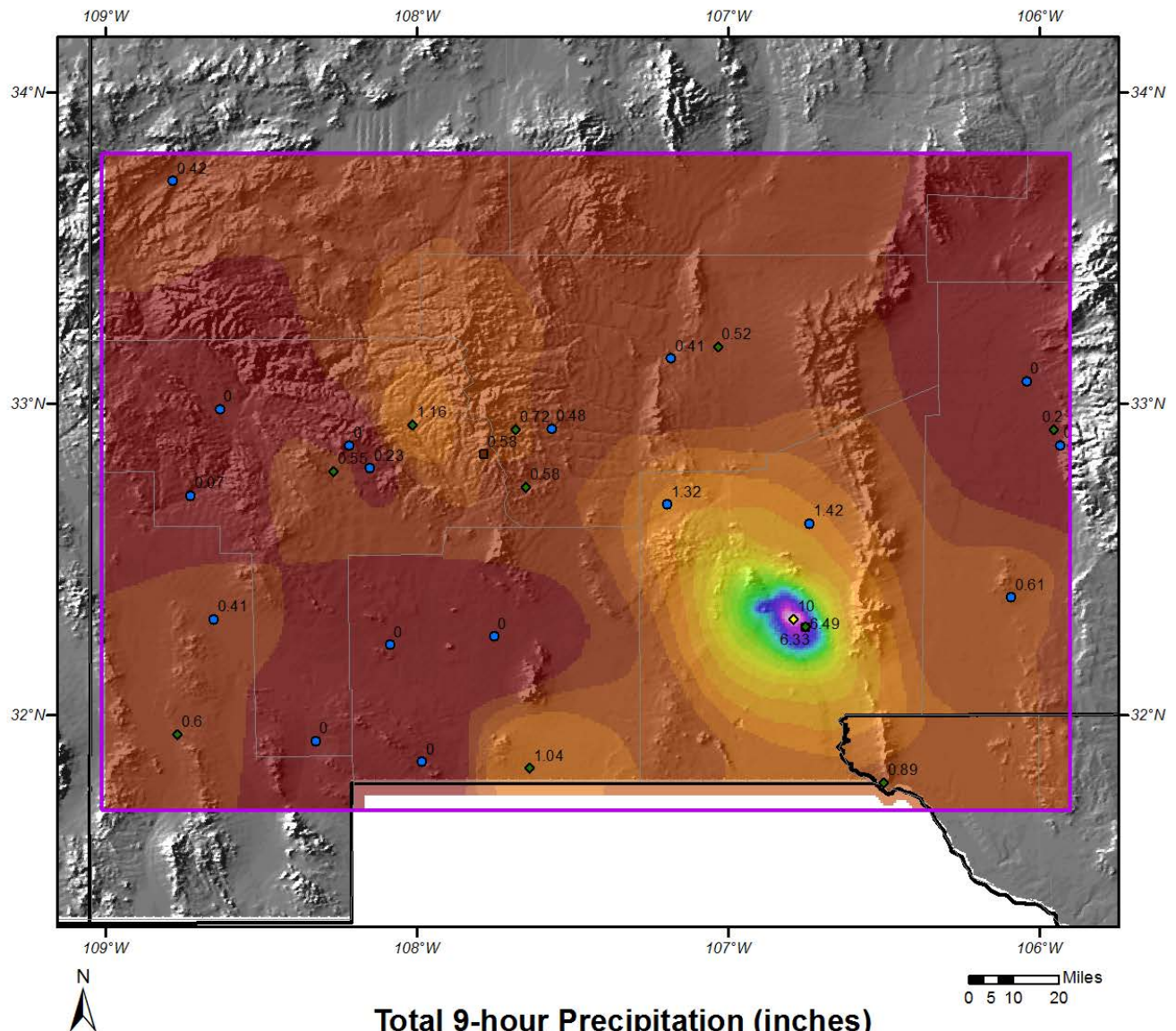
Degree of confidence in results: One of the two hourly stations used in this analysis was manually digitized from the L.B. Leopold report of the storm. The other hourly station was estimated based on timing provided by nearby daily cooperative reports. While not many hourly stations were used, the area 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.

					Storm Rep. Dew Point					Climatological Max. Dew Point						
SPAS Storm ID	LON	LAT	ELEV	ELEV Round	T _d	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	T _d	T _d Round	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	IPMF
1485 1	-106.796	32.304	3,890	3,900	78.00	3.29	0.98	78	2.310	81.02	81.0	3.77	1.07	84	2.700	1.169

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	9	Total
0.3	4.34	6.57	7.95	9.45	9.68	9.87	10.03	10.03
1	4.32	6.55	7.92	9.42	9.64	9.83	9.99	9.99
10	4.09	6.20	7.50	8.92	9.13	9.21	9.45	9.45
25	3.74	5.67	6.85	8.16	8.31	8.51	8.65	8.65
50	3.43	5.21	6.31	7.50	7.52	7.69	7.95	7.95
100	3.06	4.64	5.61	6.68	6.73	6.88	7.08	7.08
150	2.79	4.22	5.10	6.07	6.11	6.25	6.44	6.44
200	2.54	3.85	4.22	5.53	5.66	5.73	5.87	5.87
300	2.25	3.41	3.79	4.91	4.97	5.07	5.21	5.21
400	2.02	3.04	3.05	4.37	4.37	4.48	4.65	4.65
500	1.88	2.85	2.98	4.11	4.12	4.22	4.37	4.37
1,000	1.46	2.17	2.18	3.12	3.12	3.21	3.35	3.35
2,000	1.08	1.69	1.83	2.45	2.46	2.51	2.70	2.70
5,000	0.82	0.82	1.14	1.70	1.70	1.70	1.77	1.77
10,000	0.64	0.64	0.95	1.40	1.40	1.40	1.49	1.49
20,000	0.29	0.35	0.59	0.81	0.81	0.81	0.93	0.93
25,835	0.20	0.30	0.38	0.47	0.54	0.56	0.60	0.60







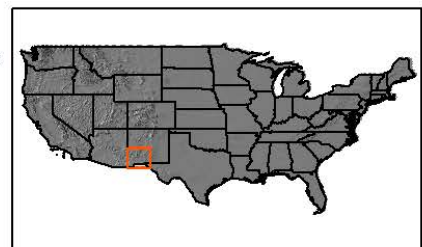
Total 9-hour Precipitation (inches)
August 30, 1935 0600 UTC - August 30, 1935 1400 UTC
SPAS #1485

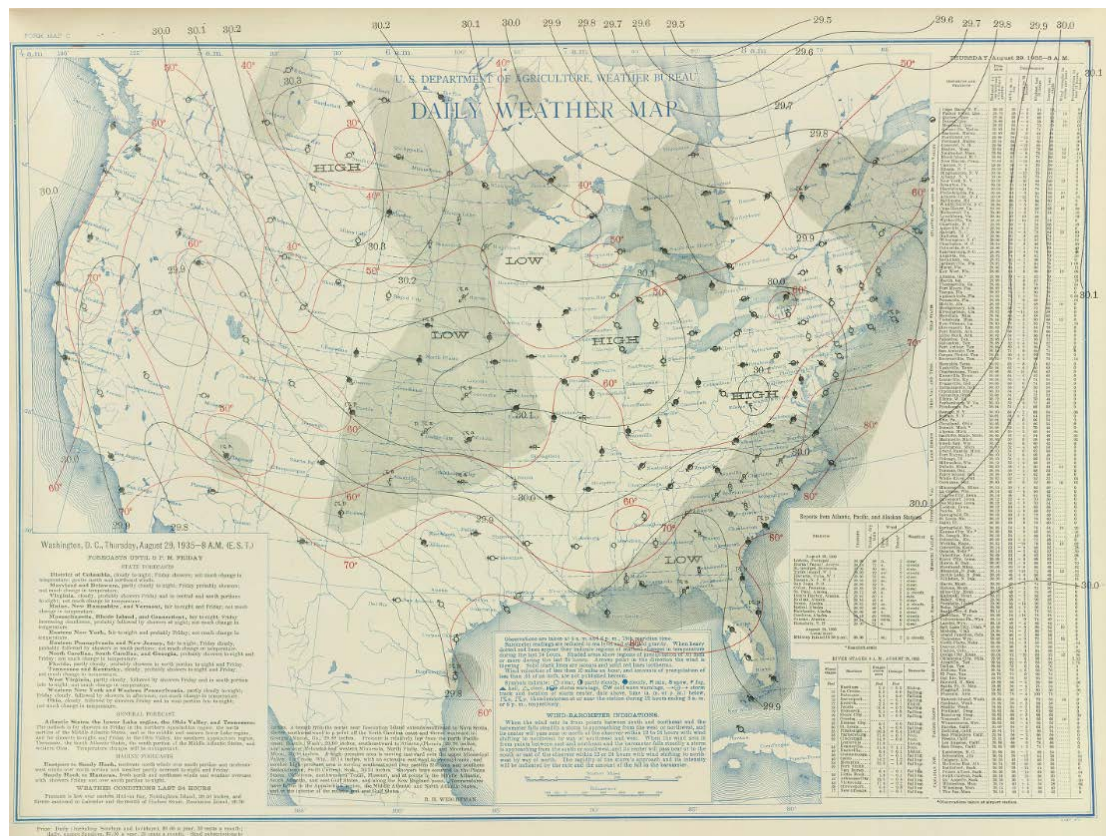
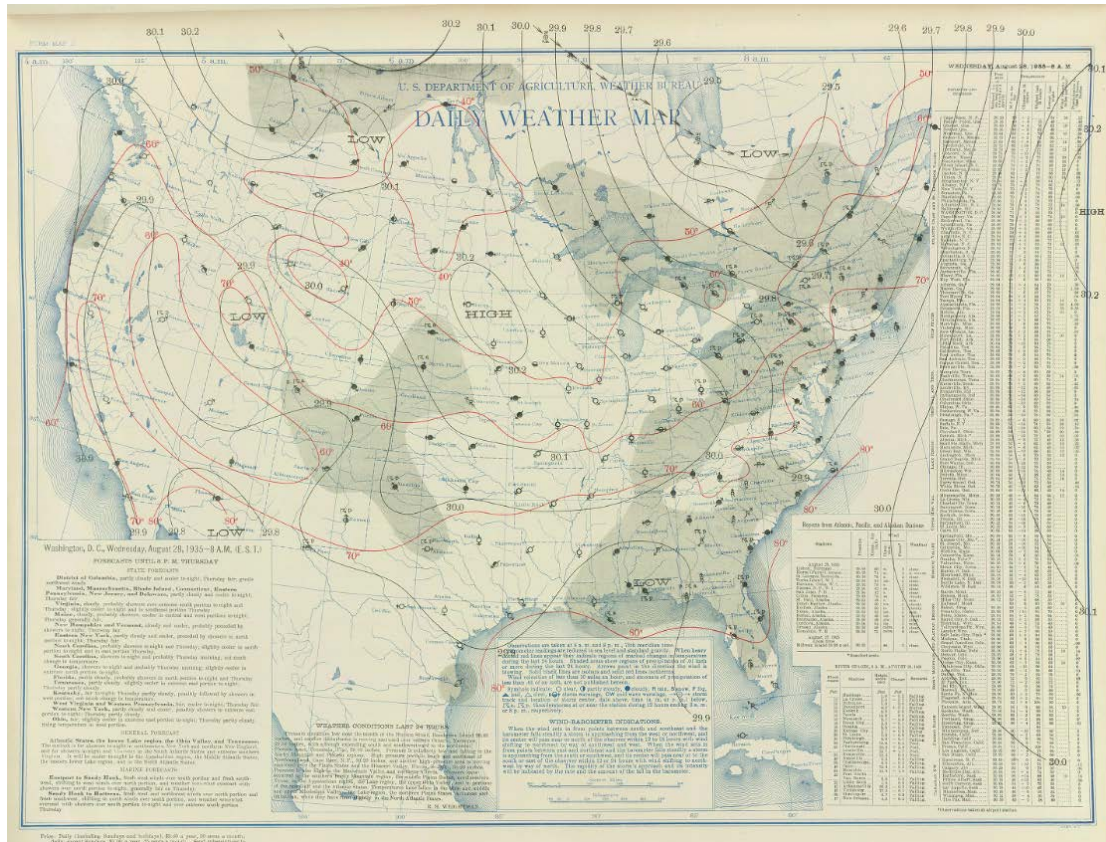
Precipitation (inches)

0.00 - 0.30	2.11 - 2.40	4.21 - 4.50	6.31 - 6.60
0.31 - 0.60	2.41 - 2.70	4.51 - 4.80	6.61 - 6.90
0.61 - 0.90	2.71 - 3.00	4.81 - 5.10	6.91 - 7.20
0.91 - 1.20	3.01 - 3.30	5.11 - 5.40	7.21 - 7.50
1.21 - 1.50	3.31 - 3.60	5.41 - 5.70	7.51 - 7.80
1.51 - 1.80	3.61 - 3.90	5.71 - 6.00	7.81 - 8.10
1.81 - 2.10	3.91 - 4.20	6.01 - 6.30	8.11 - 8.40

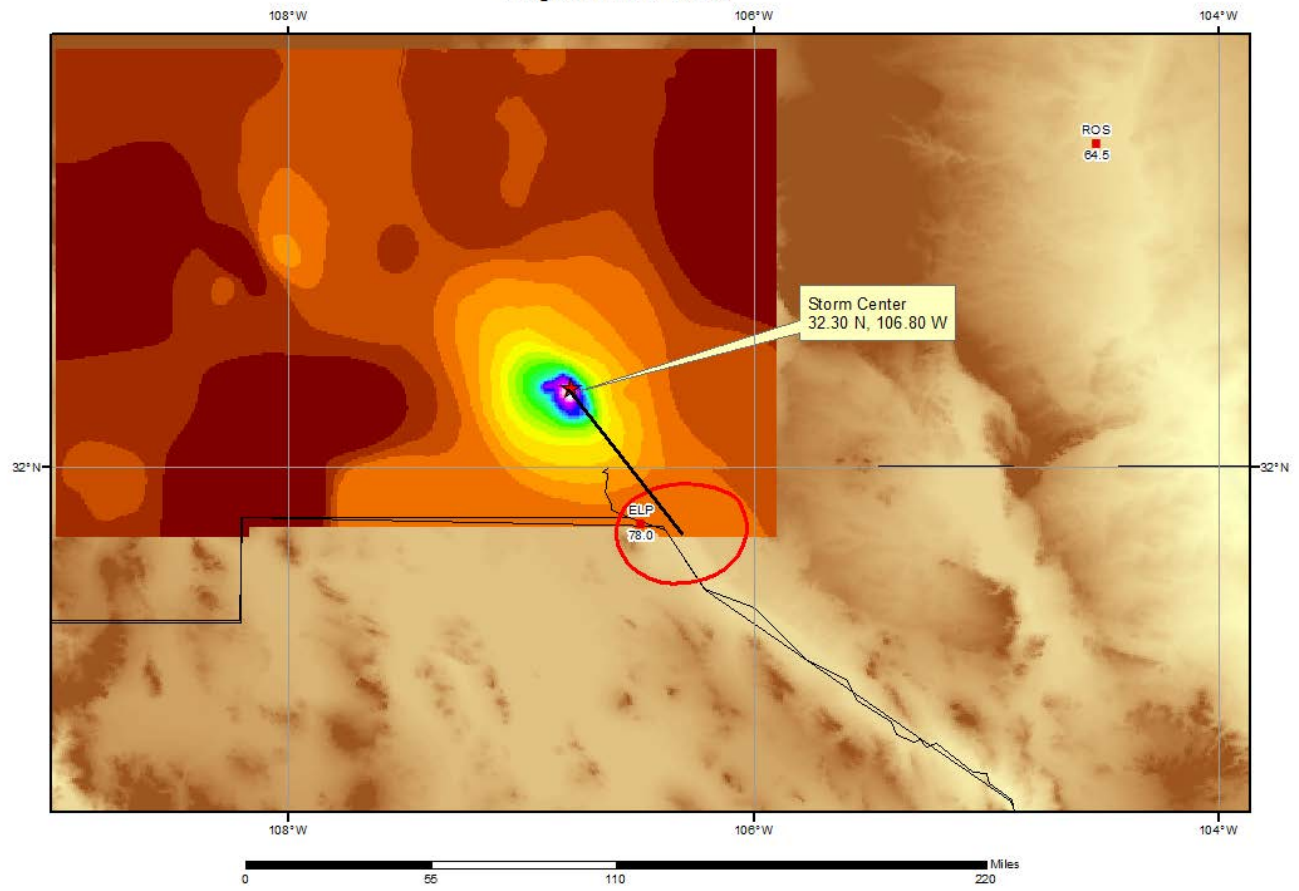
Stations

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





SPAS 1485 Las Cruces, NM Storm Analysis
August 29-30, 1935



Storm Precipitation Analysis System (SPAS) For Storm #1496_1

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

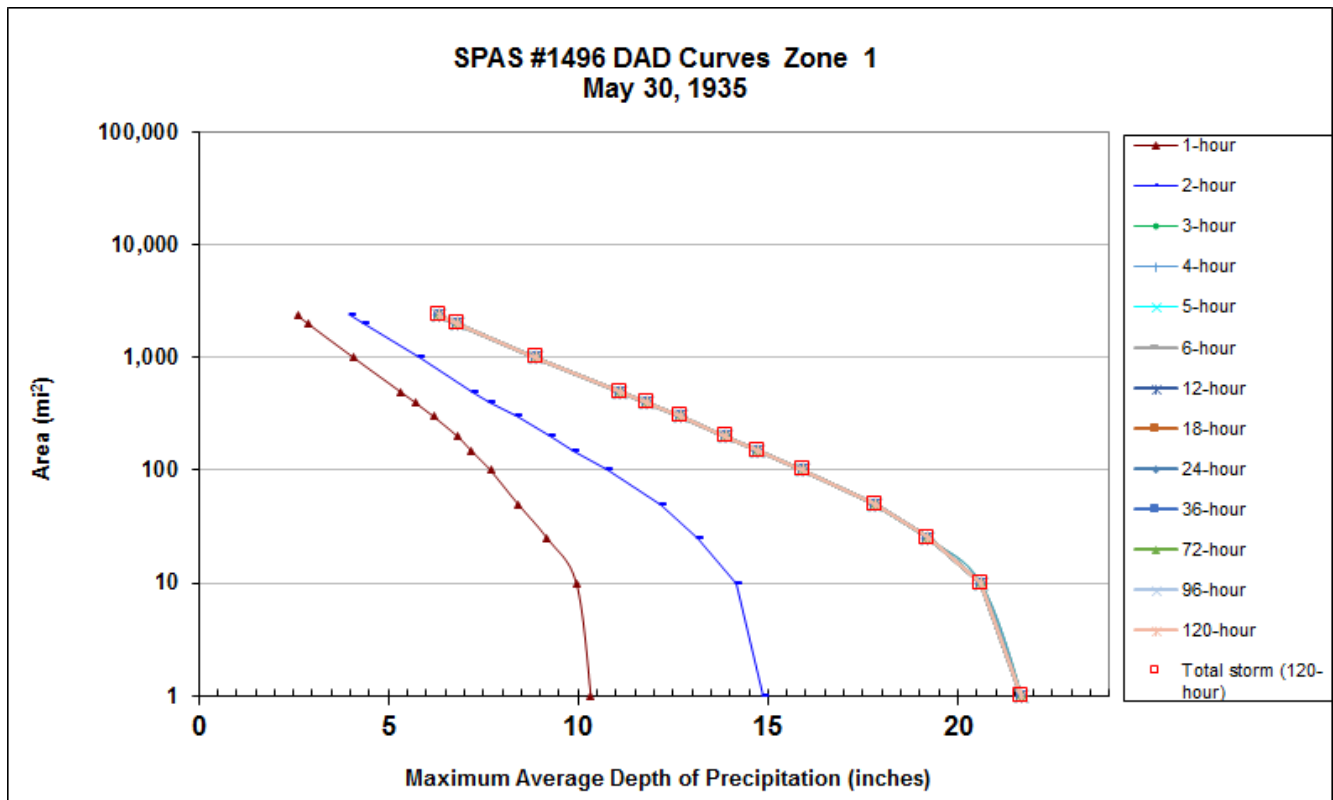
Radar Included: No

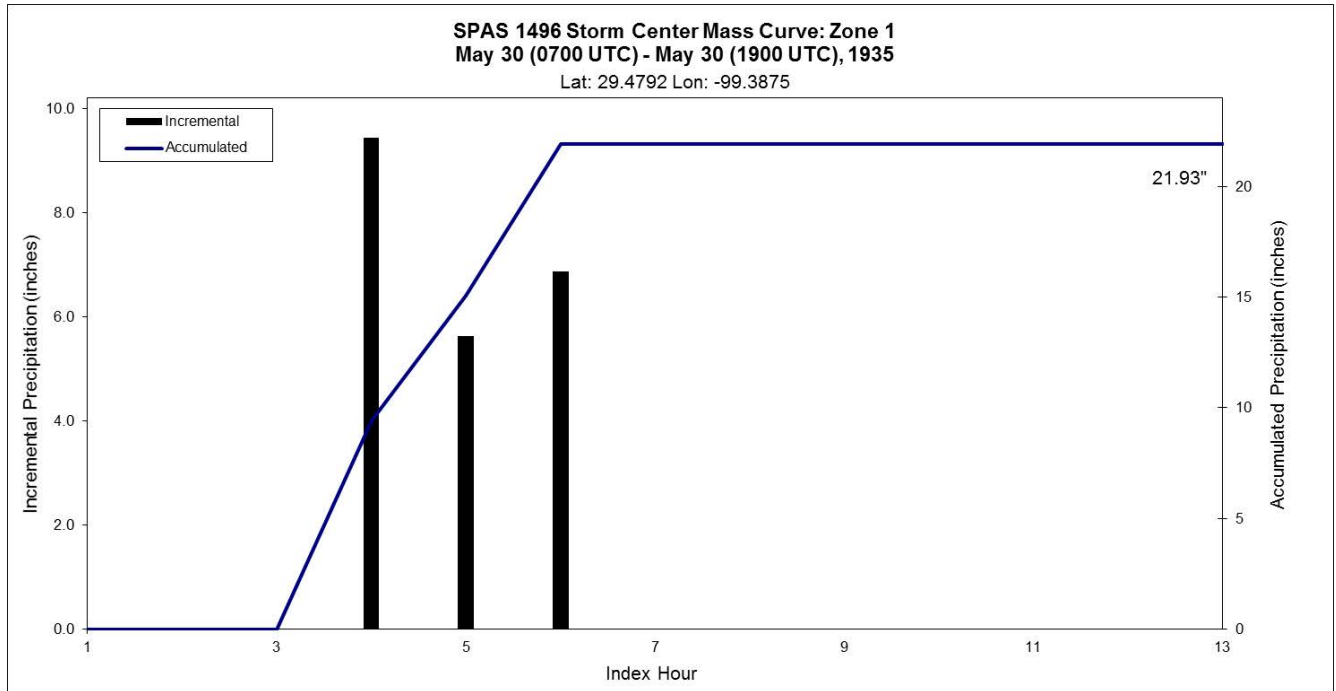
Depth-Area-Duration (DAD) analysis: Yes

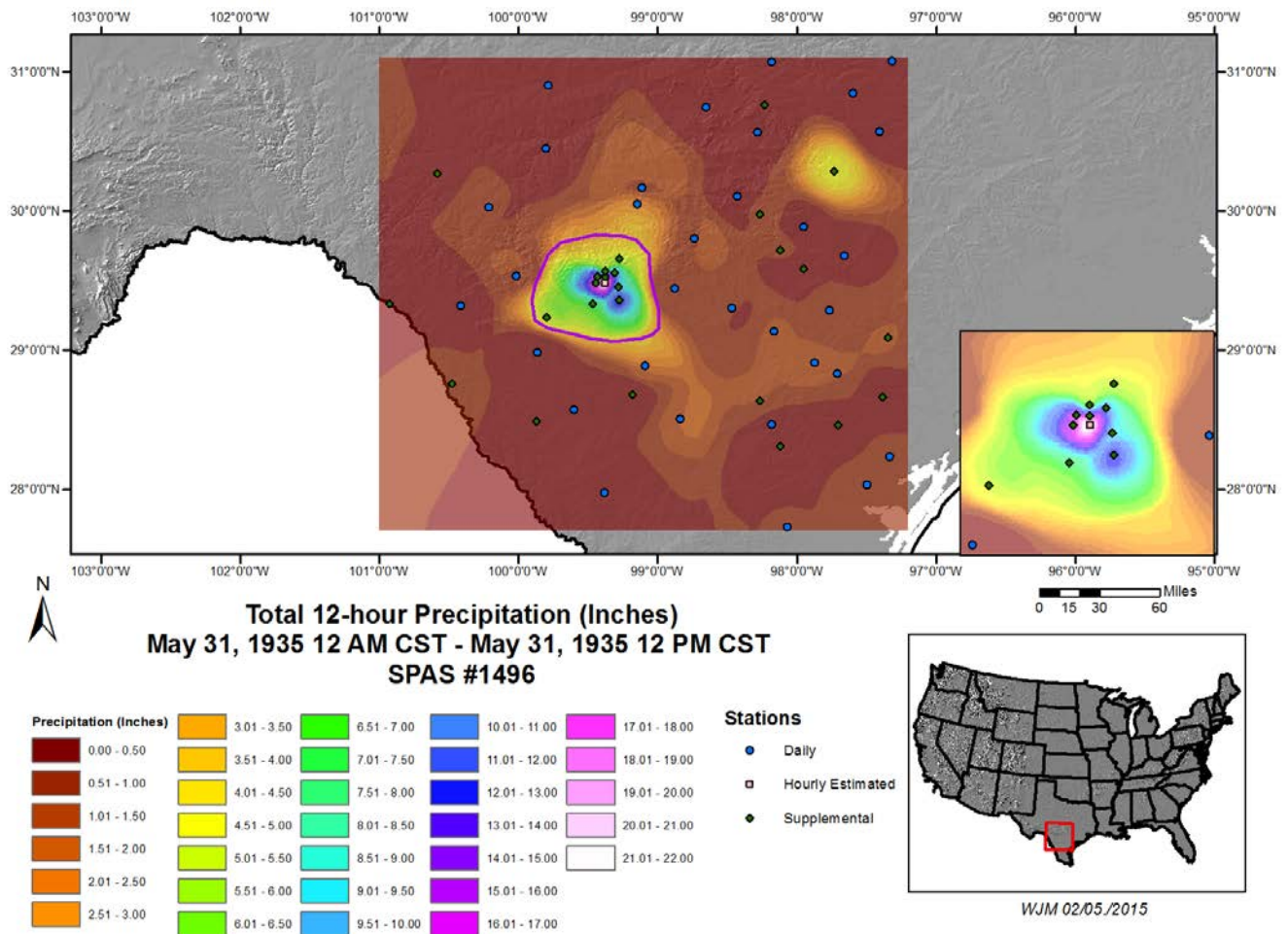
Degree of confidence in results: In addition to the NCDC stations, twenty-five supplemental stations were added to ensure data consistency. Due to the amount and integrity of the U.S. Army Corps of Engineers (USACE), one hourly station was digitized based on the mass rainfall curves from the USACE report. 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.

					Storm Rep. Dew Point					Climatological Max. Dew Point						
SPAS Storm ID	LON	LAT	ELEV	ELEV Round	T _d	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	T _d	T _d Round	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	IPMF
1496 1	-99.388	29.479	1,175	1,200	77.00	3.14	0.32	76	2.820	81.22	81.0	3.77	0.36	84	3.410	1.209

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







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, 5/8/44

Part 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						

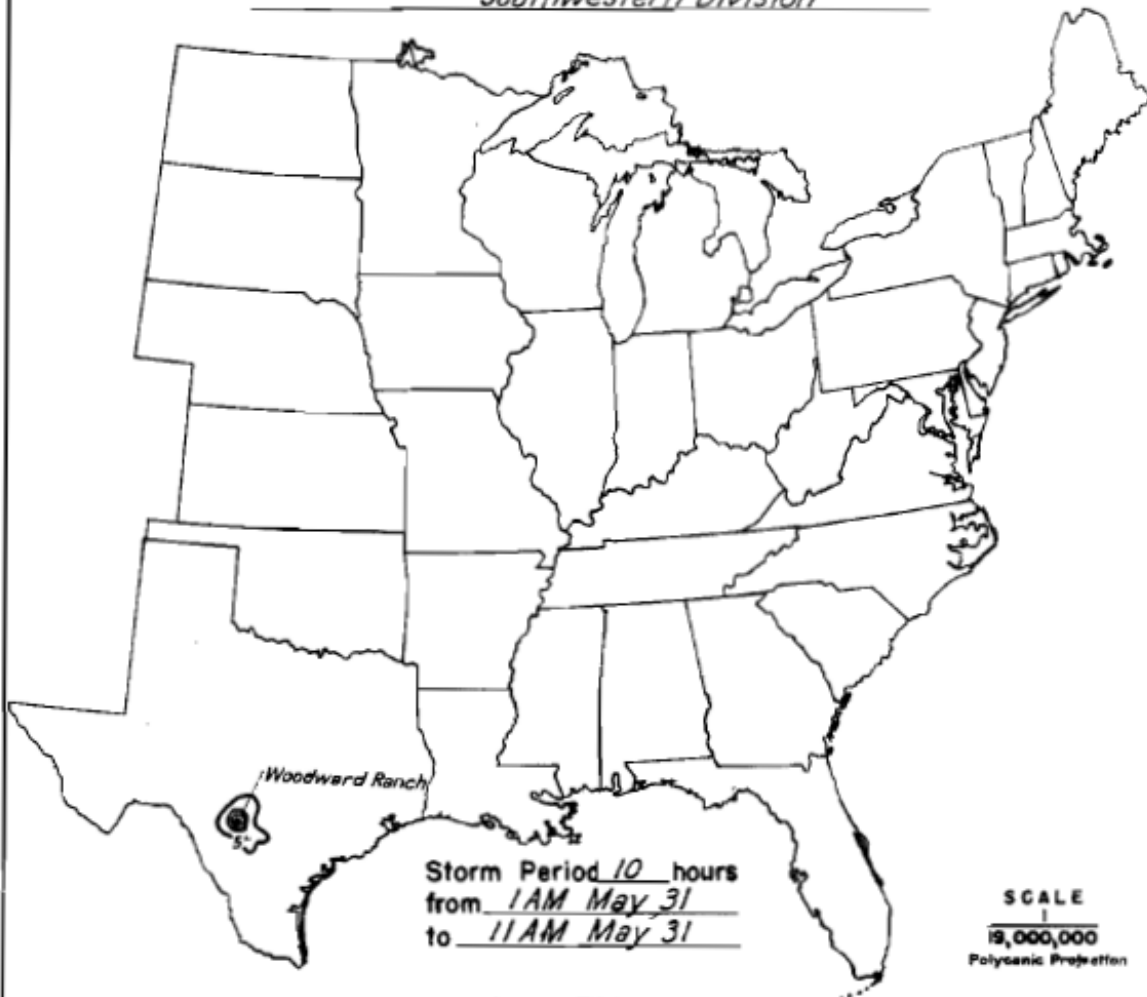
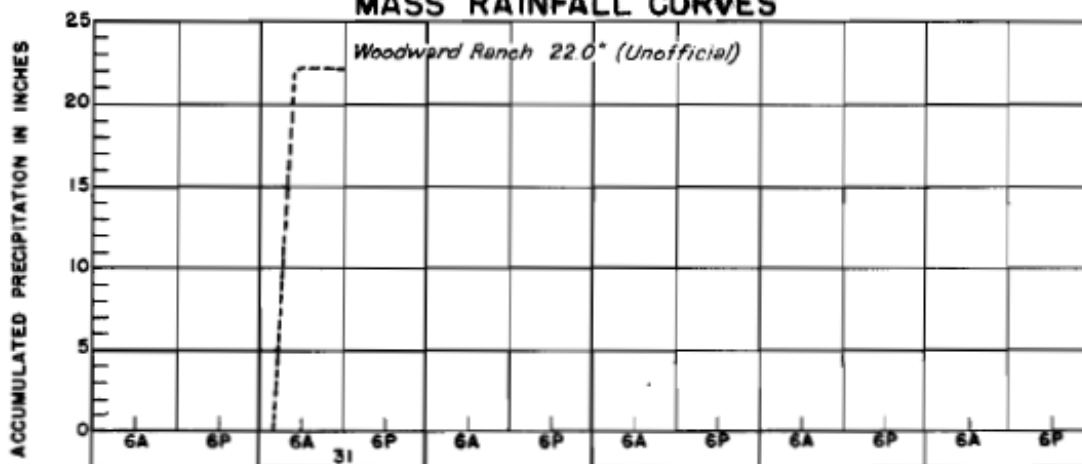
Form S-2

WAR DEPARTMENT

CORPS OF ENGINEERS, U. S. ARMY

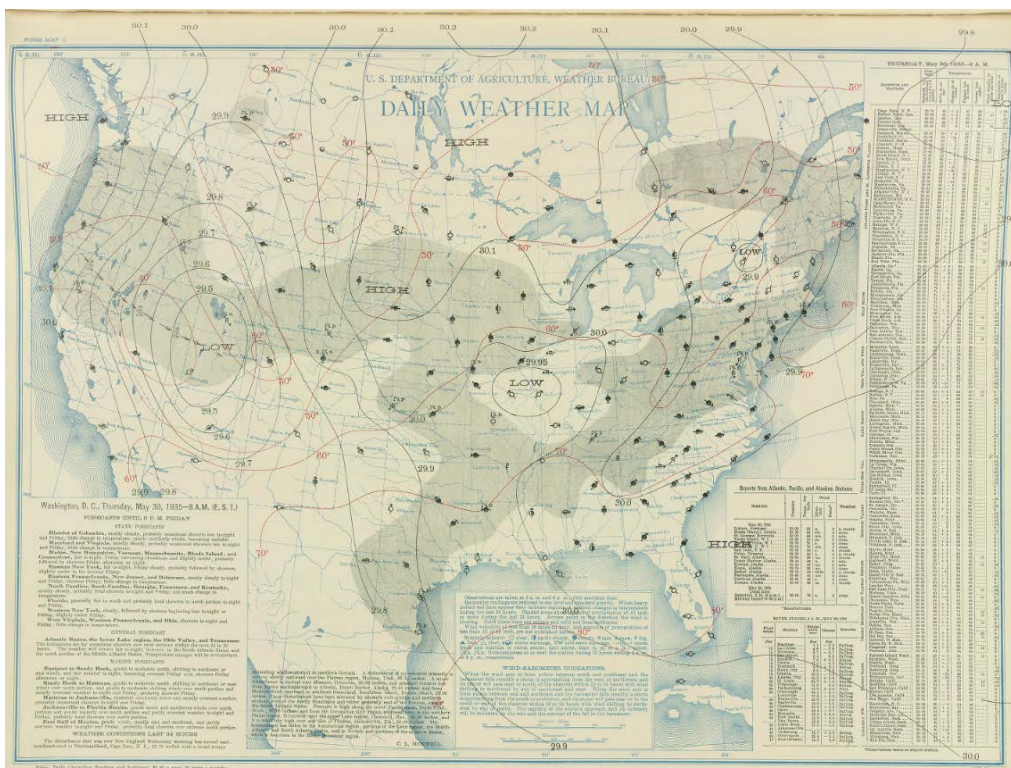
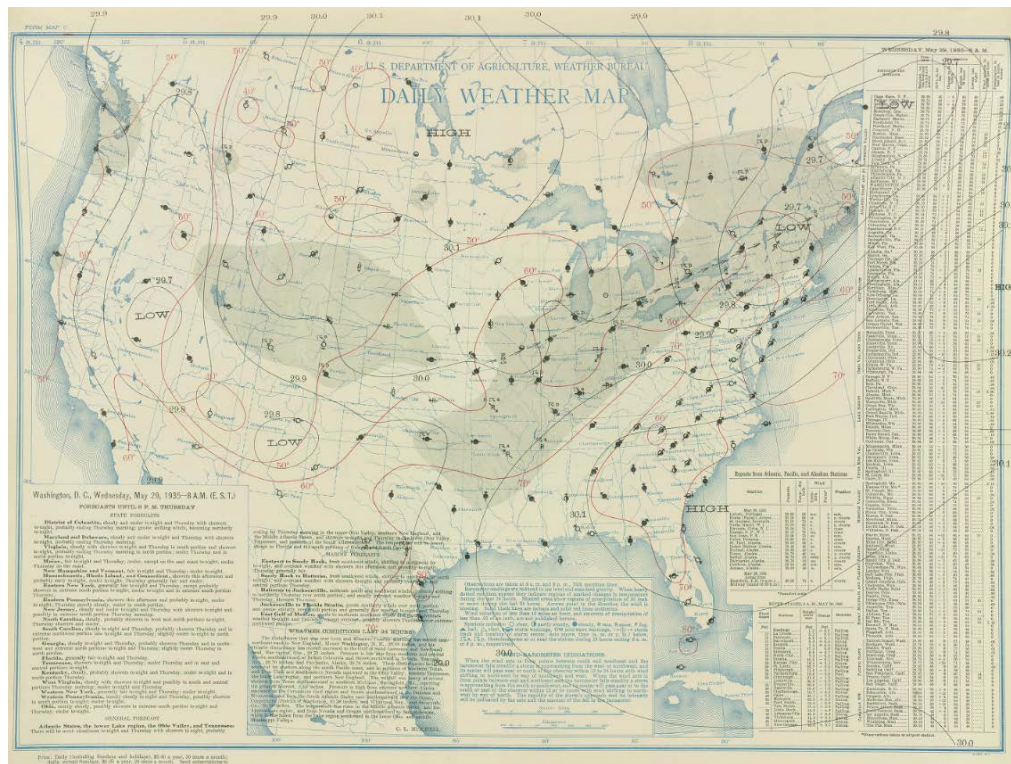
STORM STUDIES - ISOHYETAL MAP

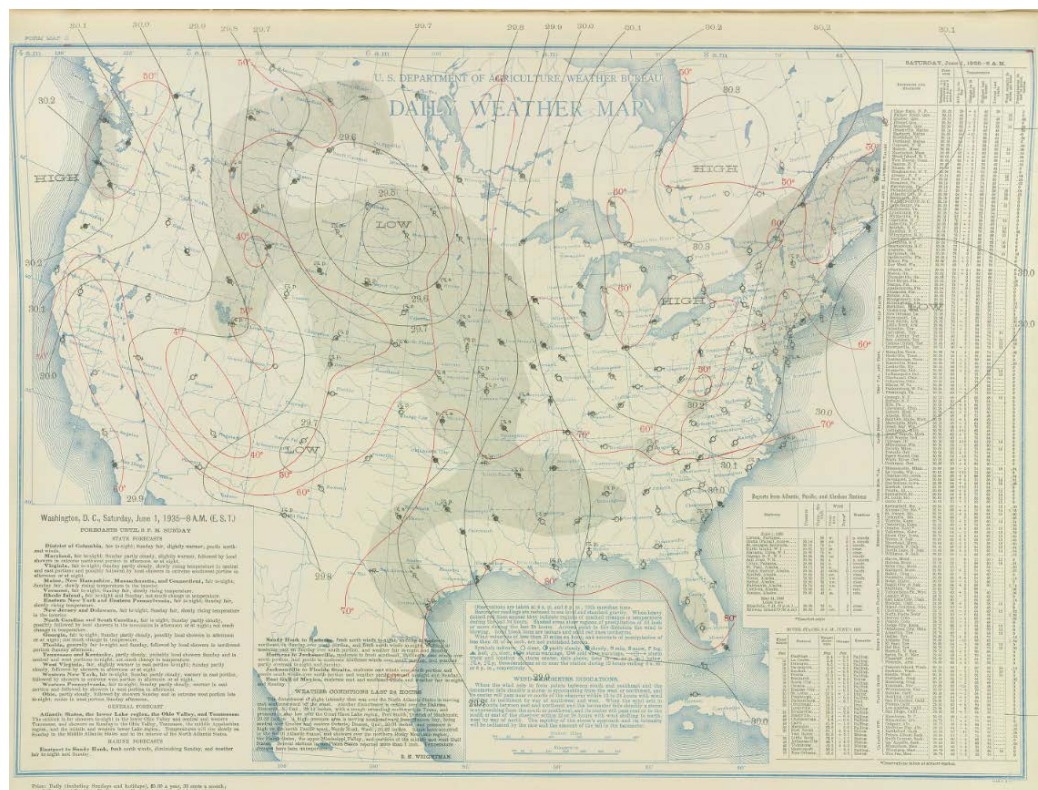
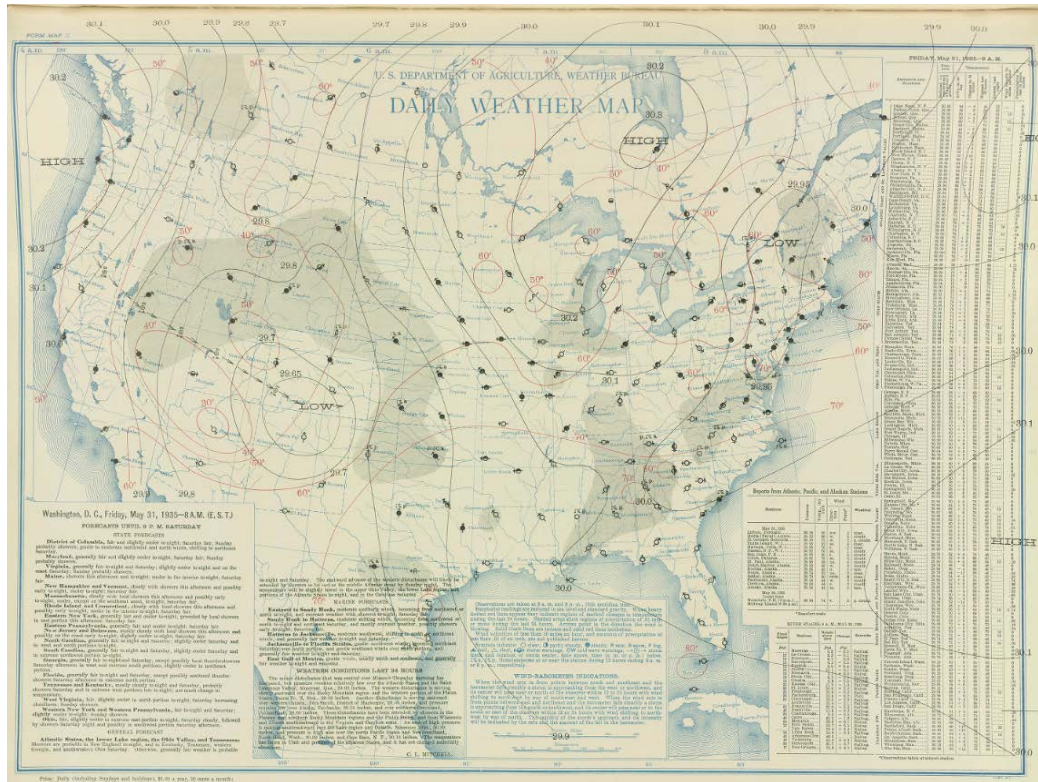
Storm of May 31, 1935 Assignment GM 5-20
 Study Prepared by: Galveston, Tex. District
Southwestern Division

**MASS RAINFALL CURVES**

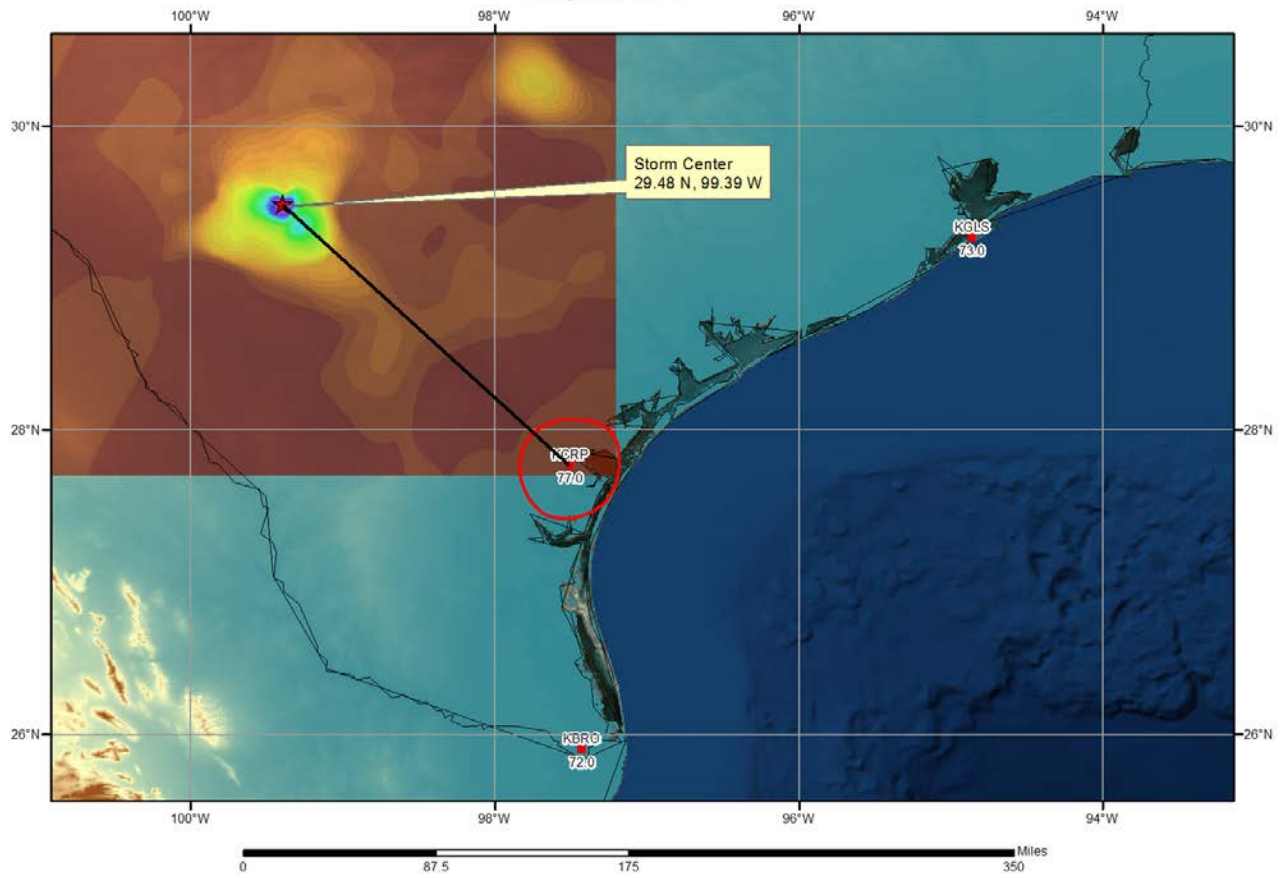
FORM 8-3E

U. S. GOVERNMENT PRINTING OFFICE 0-1845





SPAS 1496 Woodward Ranch, TX Storm Analysis May 30, 1935



1/.

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 Wetumpka, Miss.
Dec 21-24	SW 2-9	64	250 SE of Sulphur, Okla.
<u>1933</u>			
Apr 11-14	NA 1-23	61	660 SW of Durham, N. H.
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 Sinnesport, 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 Segovia, 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 SSE 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 Satsuma, Tex.

Storm Precipitation Analysis System (SPAS) For Storm #1429_2

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 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

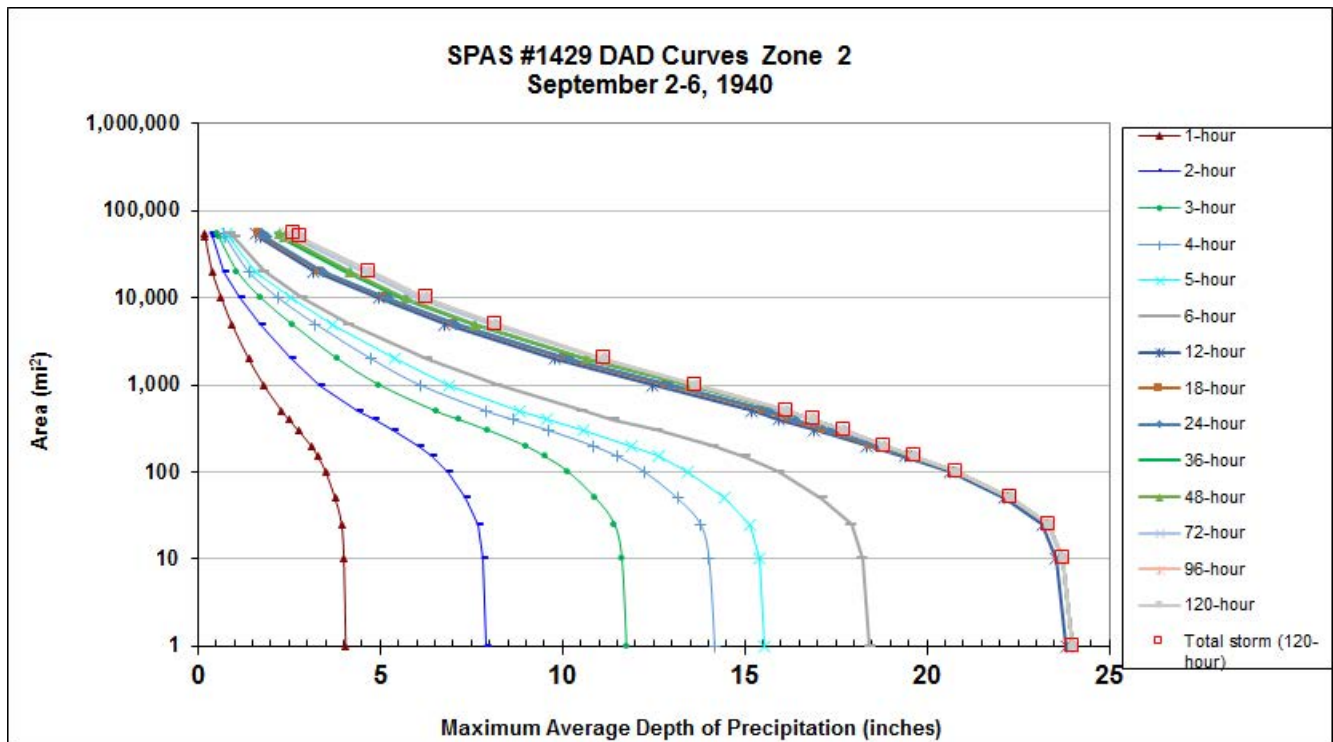
Radar Included: No

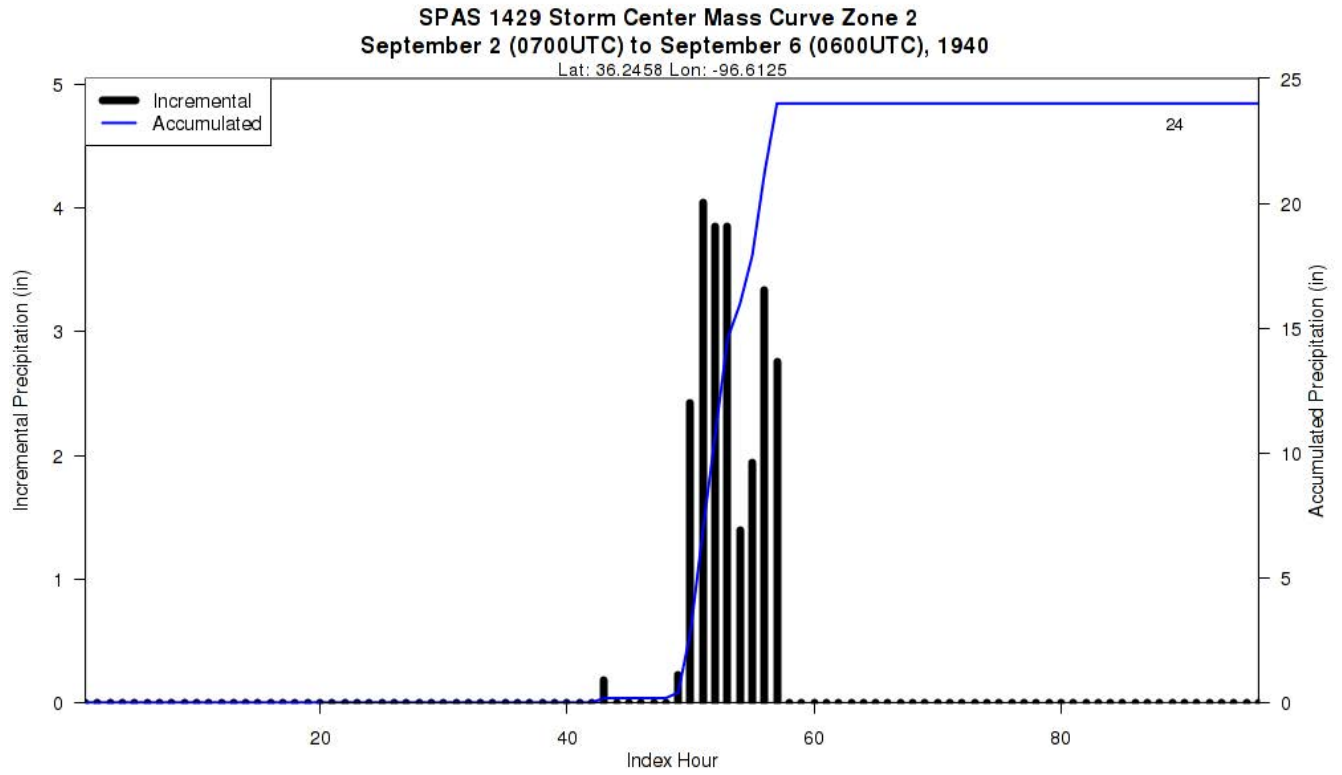
Depth-Area-Duration (DAD) analysis: Yes

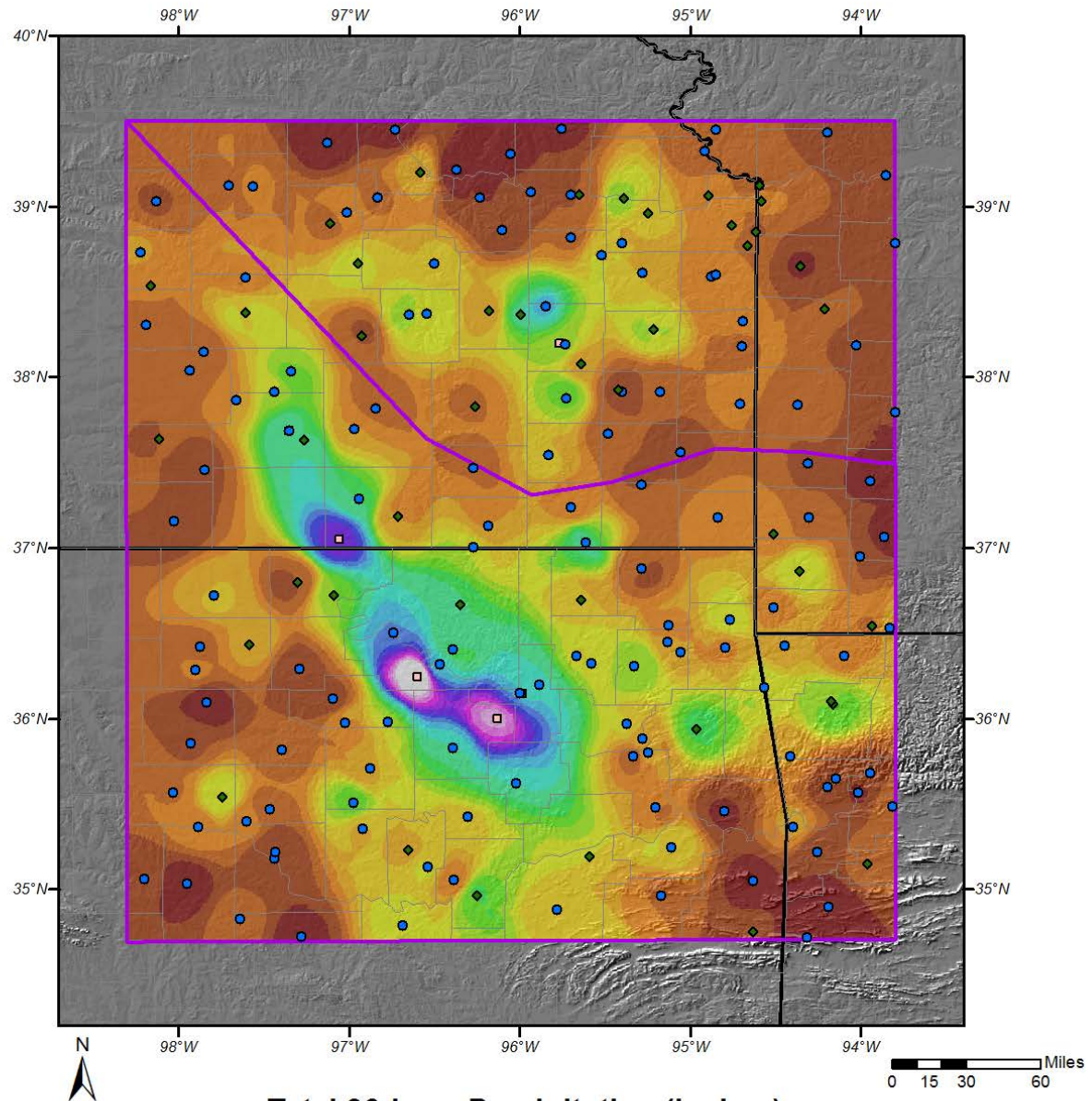
Reliability of results: All seven of the hourly stations were digitized from either the Army CORPS of Engineers’ pertinent data report or from a NCDC local climatology report of the storm. This provided very high accuracy of the hourly data, which is essential in the timing of the daily and supplemental 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.

					Storm Rep. Dew Point					Climatological Max. Dew Point						
SPAS Storm ID	LON	LAT	ELEV	ELEV Round	T _d	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	T _d	T _d Round	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	IPMF
1429 2	-96.613	36.246	871	900	77.50	3.22	0.25	77	2.970	80.97	81.0	3.77	0.27	84	3.500	1.178

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

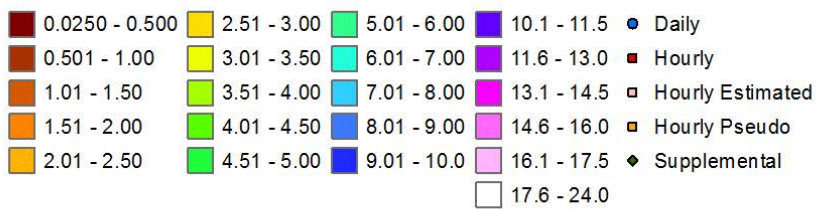




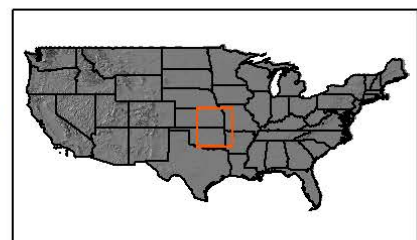


Total 96-hour Precipitation (inches)
September 2, 1940 0700 UTC - September 6, 1940 0600 UTC
SPAS #1429

Precipitation (inches)

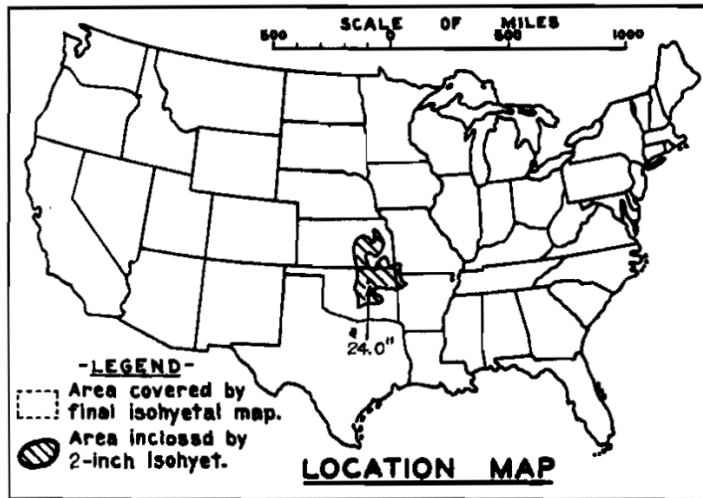


Stations



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)----- 19

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

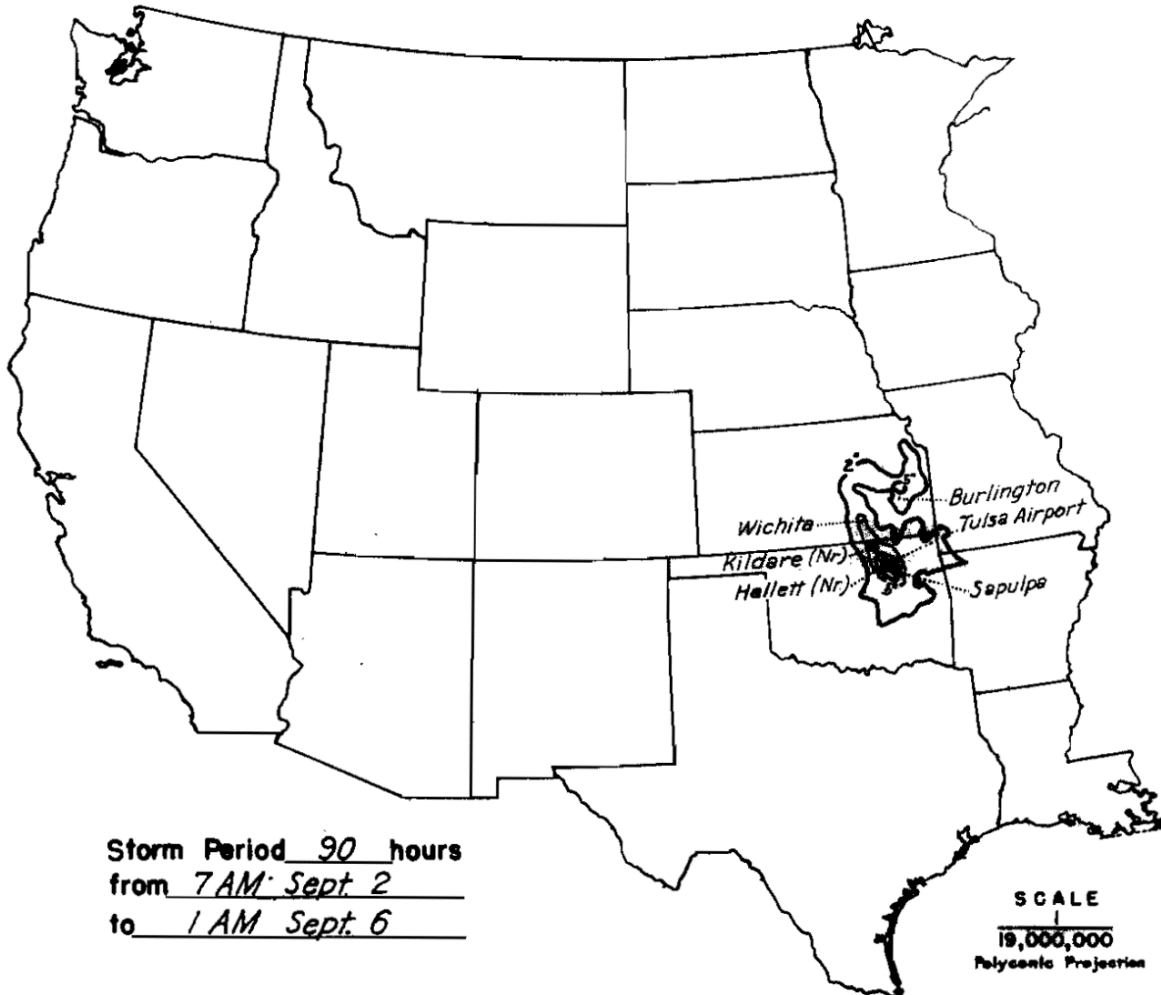
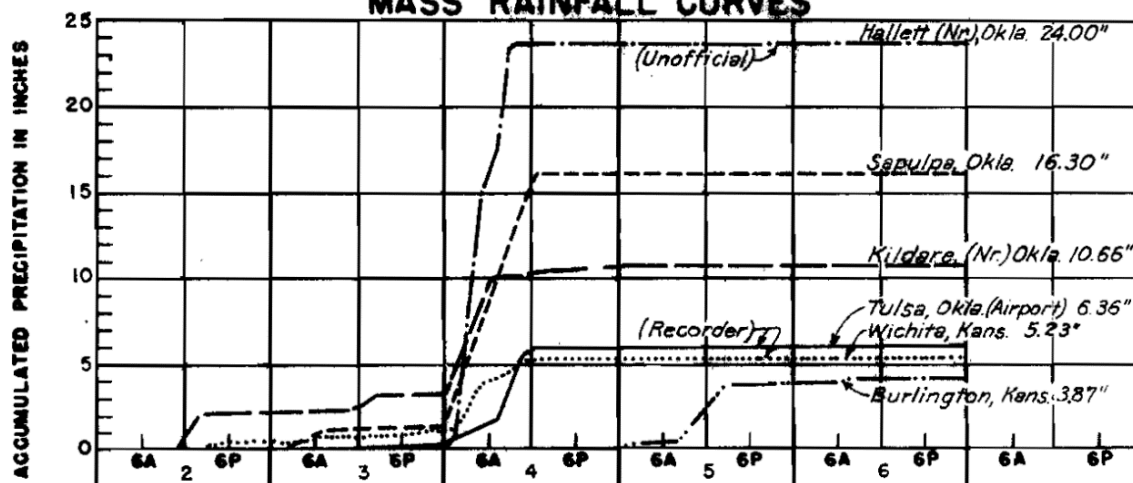
Data relating to periods of maximum rainfall----- 2

MAXIMUM AVERAGE DEPTH OF RAINFALL IN INCHES.

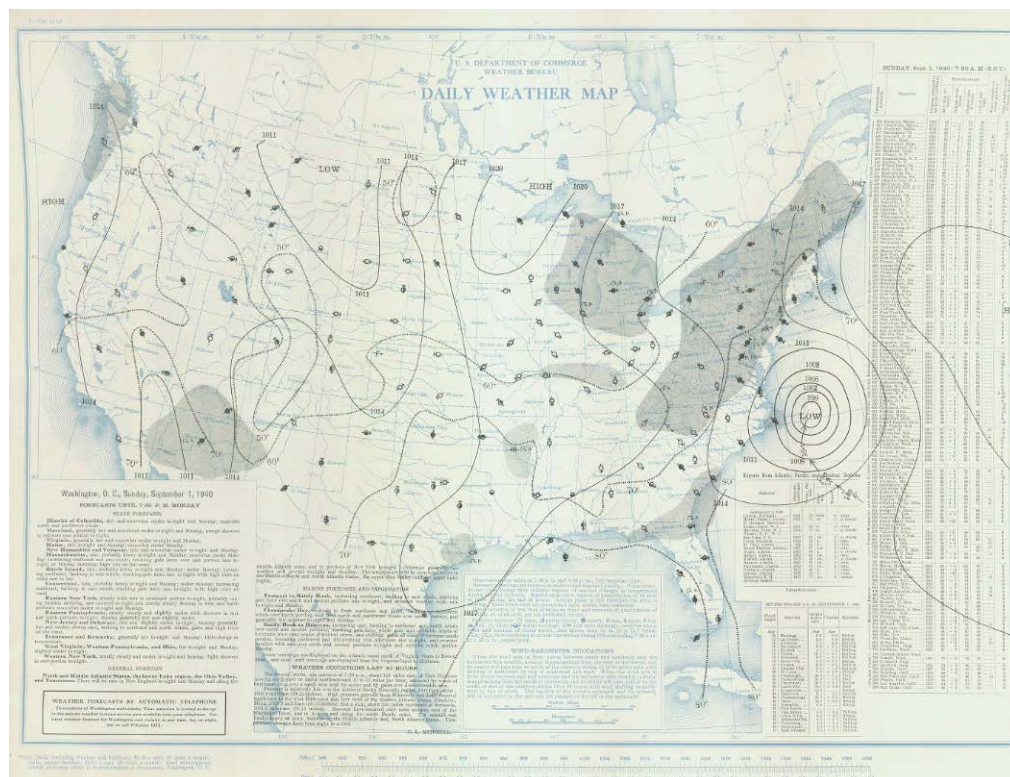
Area in Sq. Mi.	Duration of Rainfall in Hours									
	6	12	18	24	30	36	48	54	90	
Max. Station	18.9	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	
10	18.4	23.4	23.6	23.6	23.6	23.6	23.6	23.6	23.6	
100	14.7	19.2	19.4	19.6	19.7	19.8	19.8	19.8	19.8	
200	12.5	17.6	17.8	18.0	18.1	18.2	18.3	18.3	18.3	
500	9.7	15.4	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	

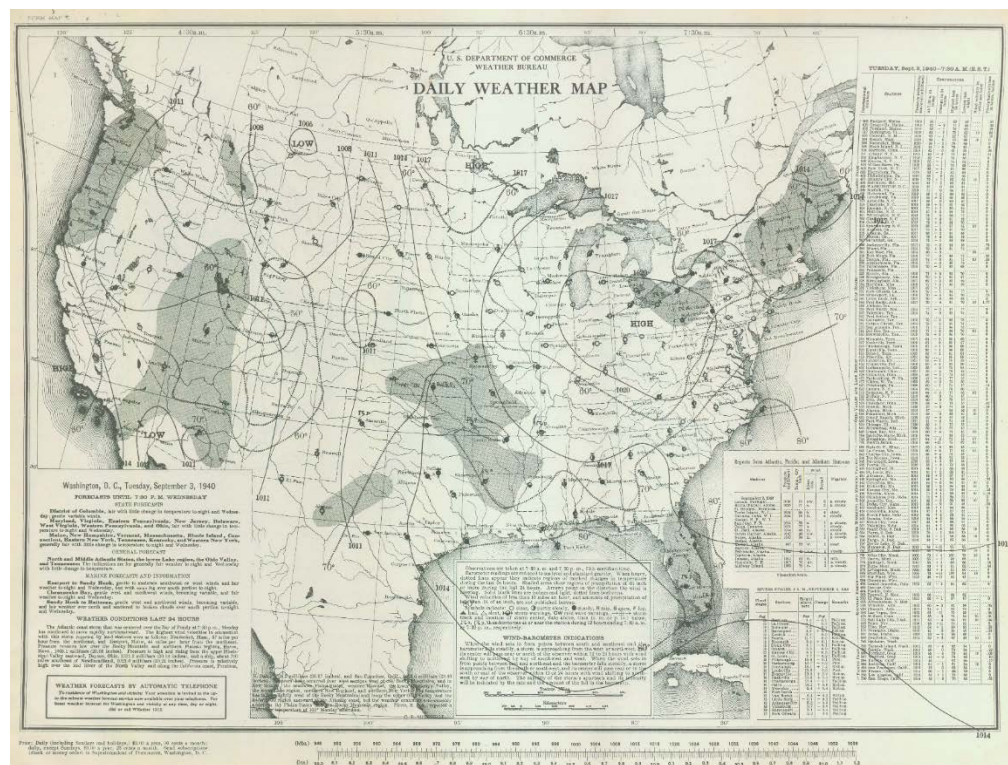
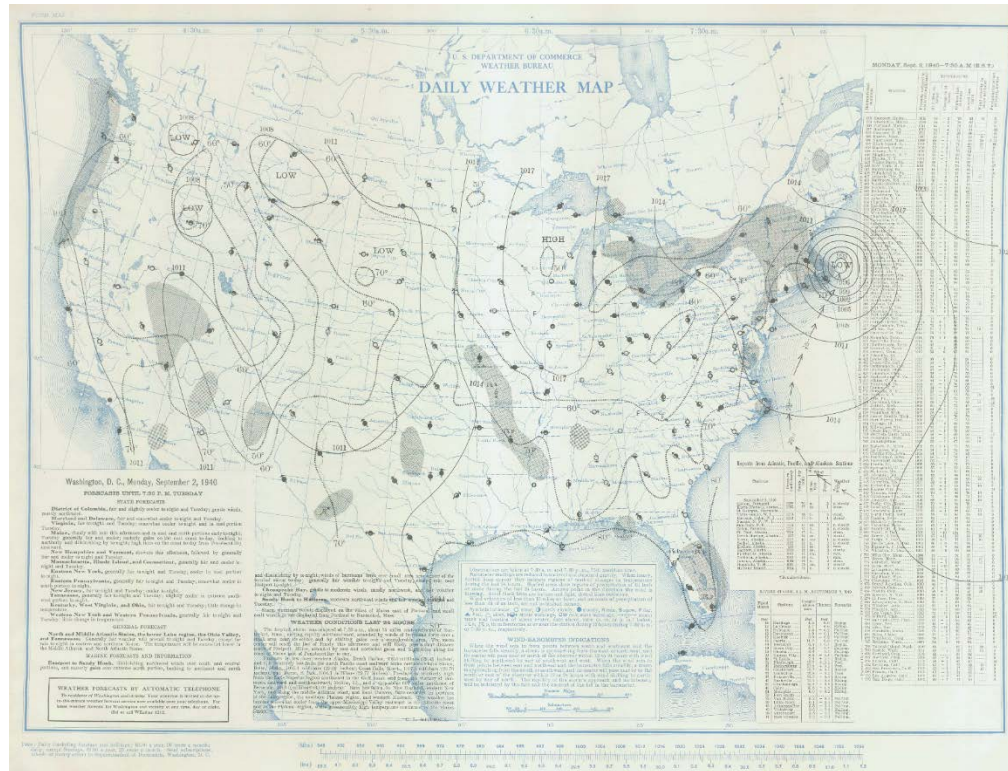
WAR DEPARTMENT

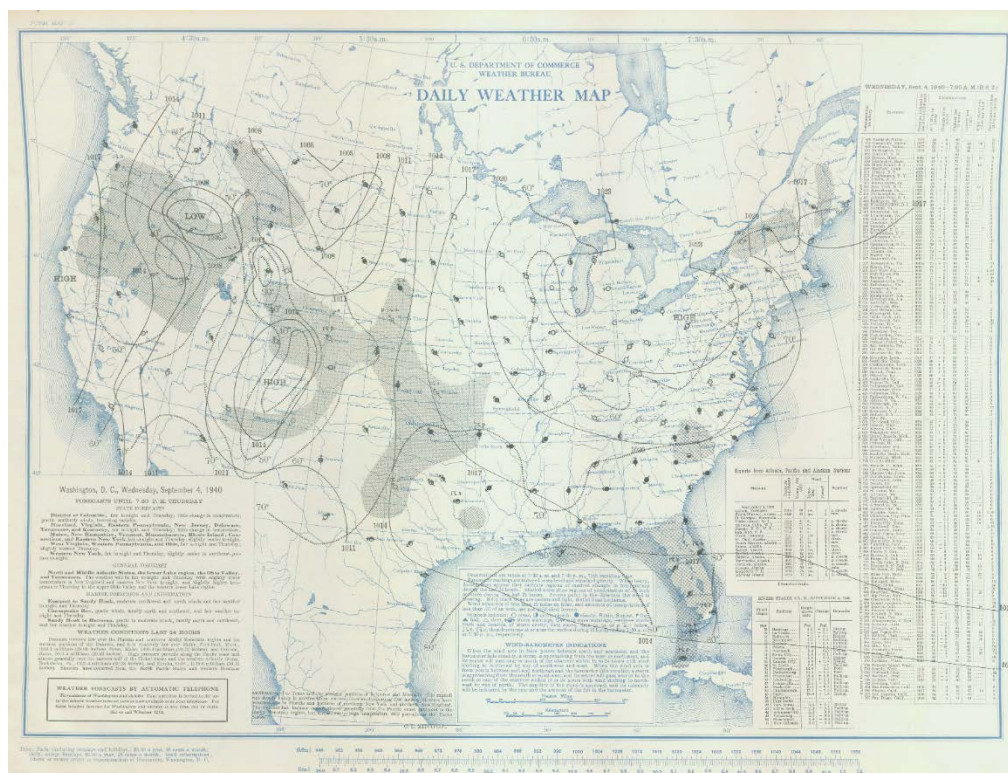
CORPS OF ENGINEERS, U. S. ARMY

STORM STUDIES - ISOHYETAL MAPStorm of September 2-6, 1940 Assignment SW 2-18Study Prepared by: Tulsa, Okla. District
Southwestern Division**MASS RAINFALL CURVES**

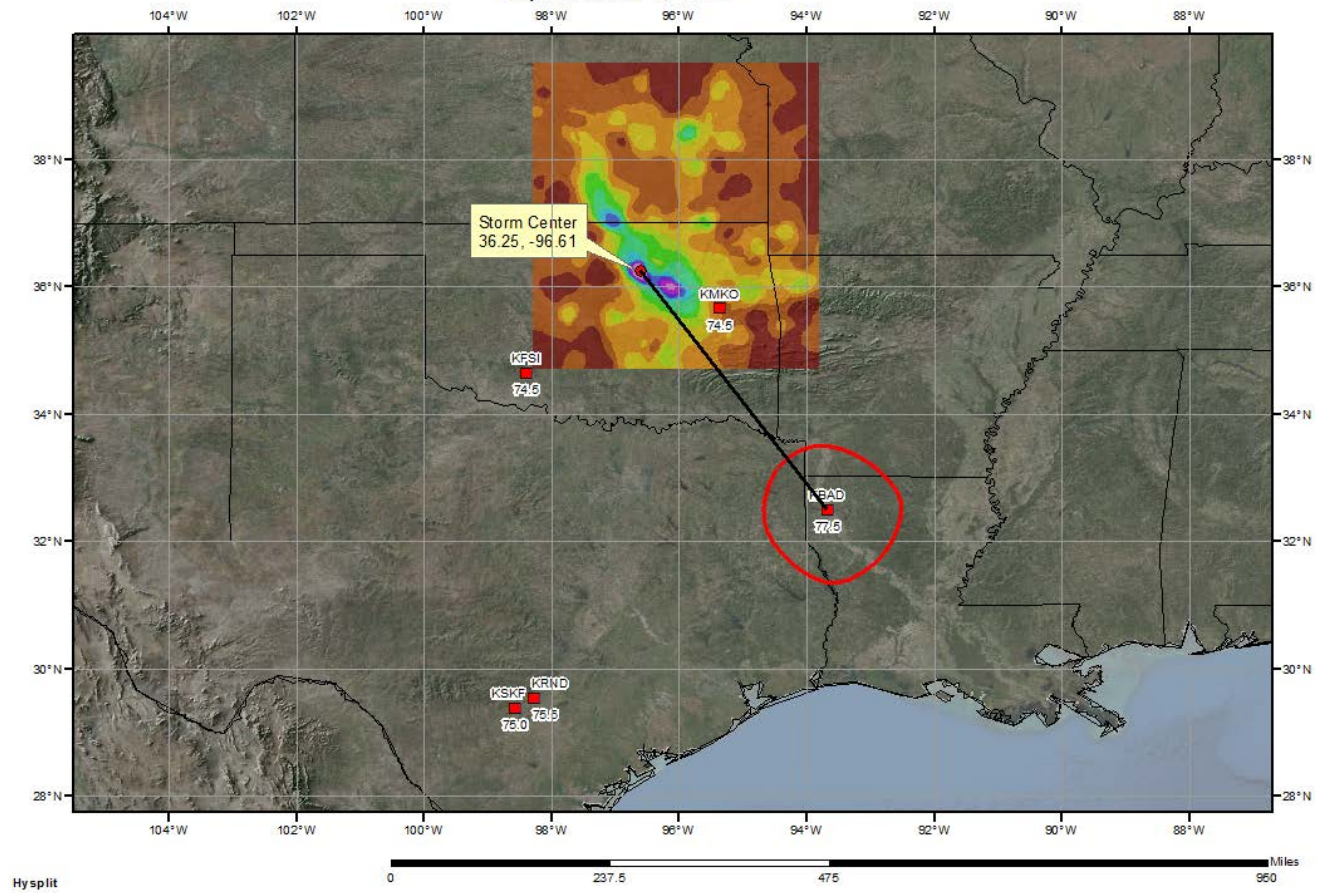
FORM 8-3W

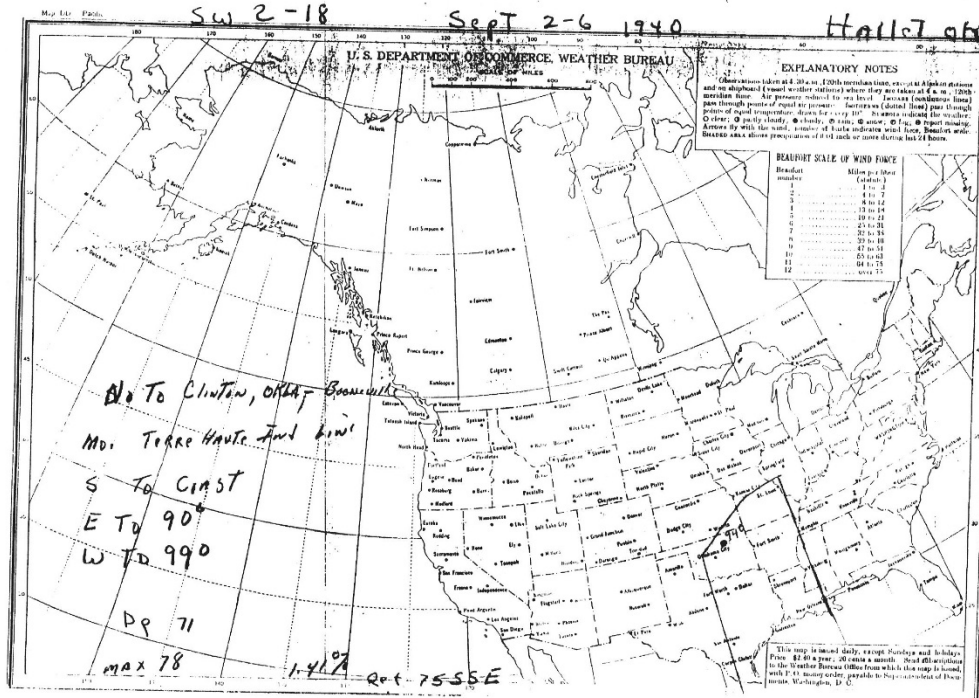






SPAS 1429 Hallett, OK Storm Analysis September 2-4, 1940





Storm Precipitation Analysis System (SPAS) For Storm #1432_1

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

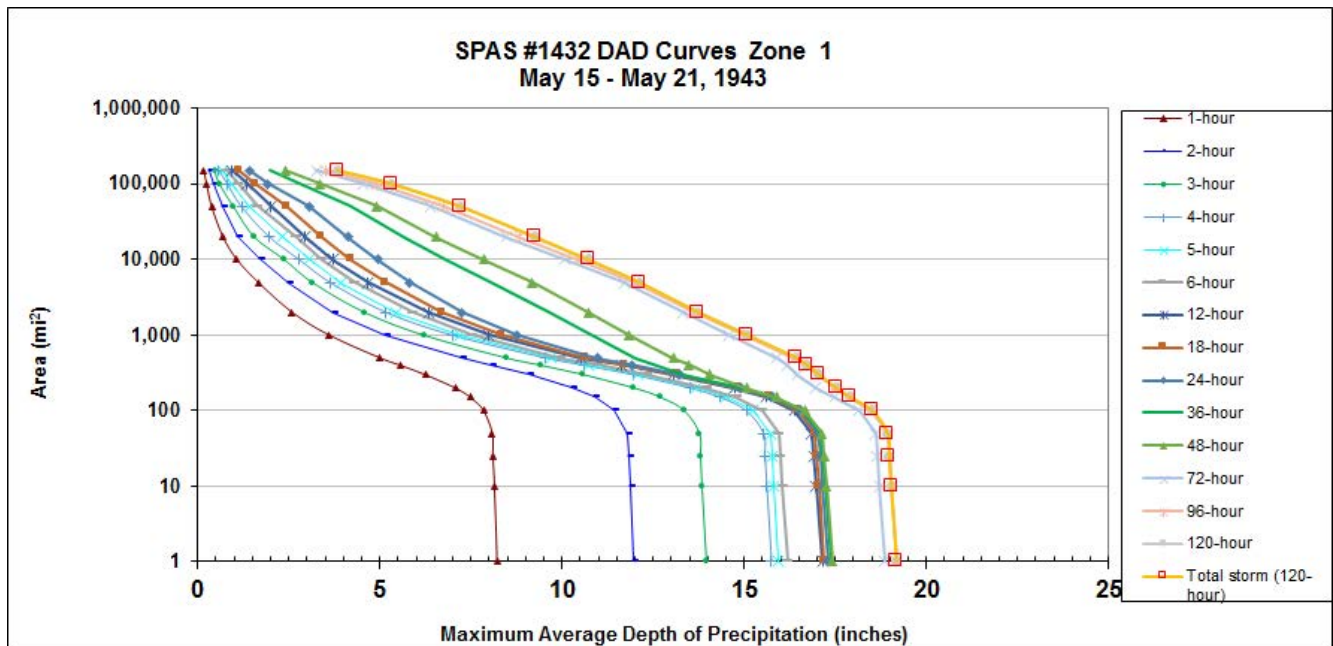
Radar Included: No

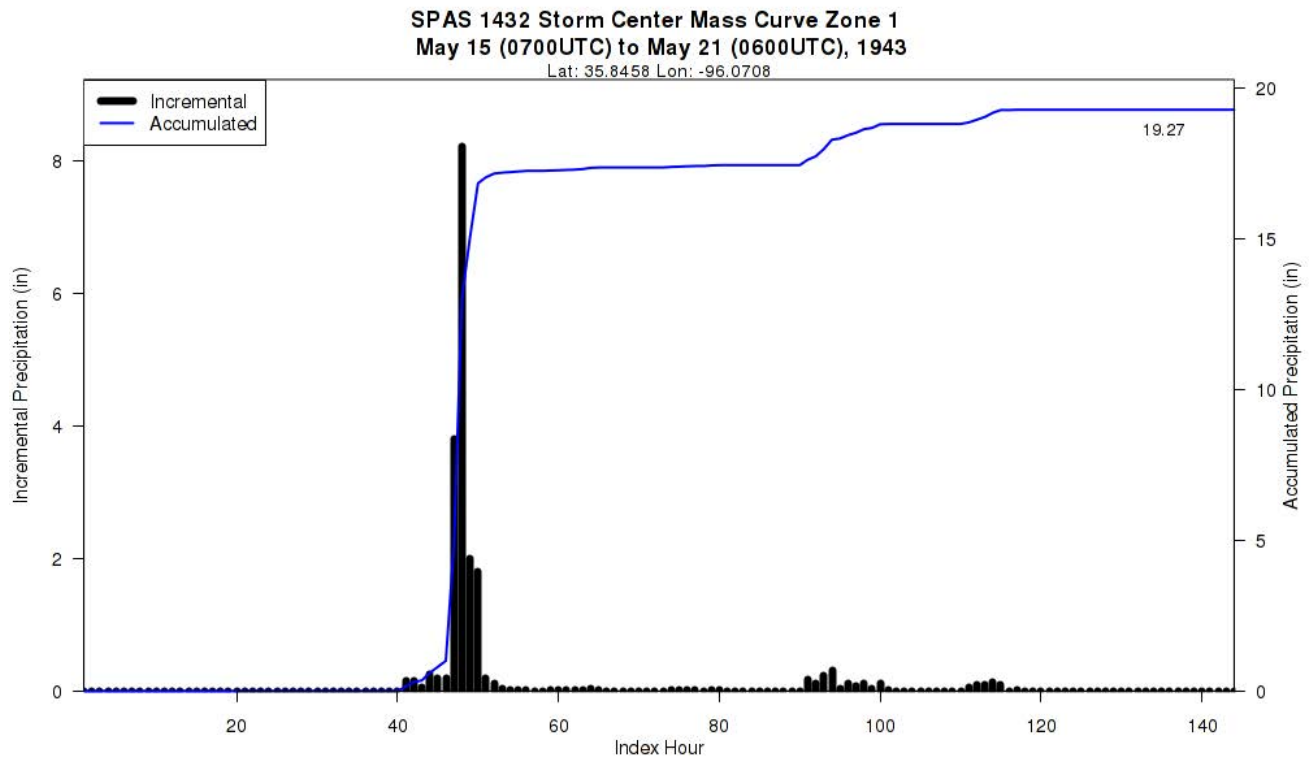
Depth-Area-Duration (DAD) analysis: Yes

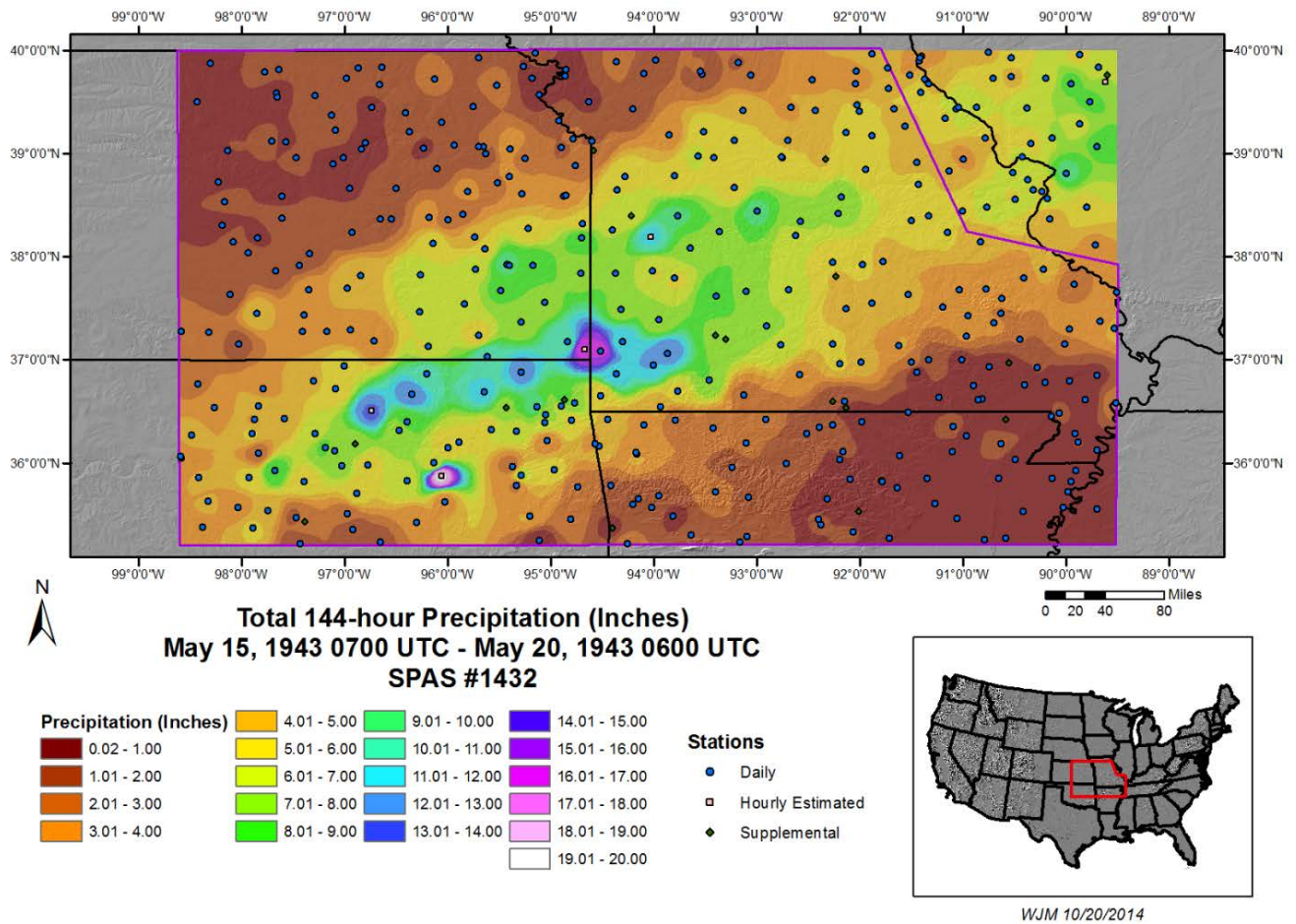
Reliability of results: In addition to the NCDC stations, seventeen supplemental stations were added to ensure data consistency. Due to the amount and integrity of the U.S. Army Corps of Engineers (USACE), five hourly stations were digitized based on the mass rainfall curves. With the density of stations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

					Storm Rep. Dew Point					Climatological Max. Dew Point						
SPAS Storm ID	LON	LAT	ELEV	ELEV Round	T _d	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	T _d	T _d Round	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	IPMF
1432_1	-96.071	35.846	766	800	73.00	2.60	0.19	68	2.410	79.55	79.5	3.52	0.24	81	3.285	1.363

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	144	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	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	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	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	19.14
50	8.10	11.83	13.80	15.57	15.77	15.99	16.90	16.98	17.06	17.06	17.15	17.15	18.50	18.61	19.00	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	18.53
150	7.48	10.90	12.71	14.35	14.53	14.76	15.62	15.68	15.71	15.71	15.78	15.85	17.19	17.41	17.73	17.92	17.96	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	17.36	17.56	17.57	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	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	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	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	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	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	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	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	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	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	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	3.88

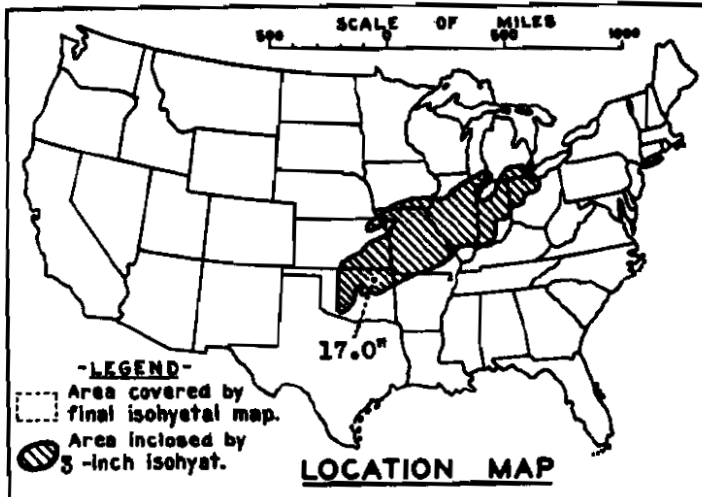






DEPARTMENT OF THE ARMY

CORPS OF ENGINEERS

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
 Misc. precip. records, meteorological data, etc. ----- 10
 Form 5002 (Mass rainfall curves) ----- 251

PART II

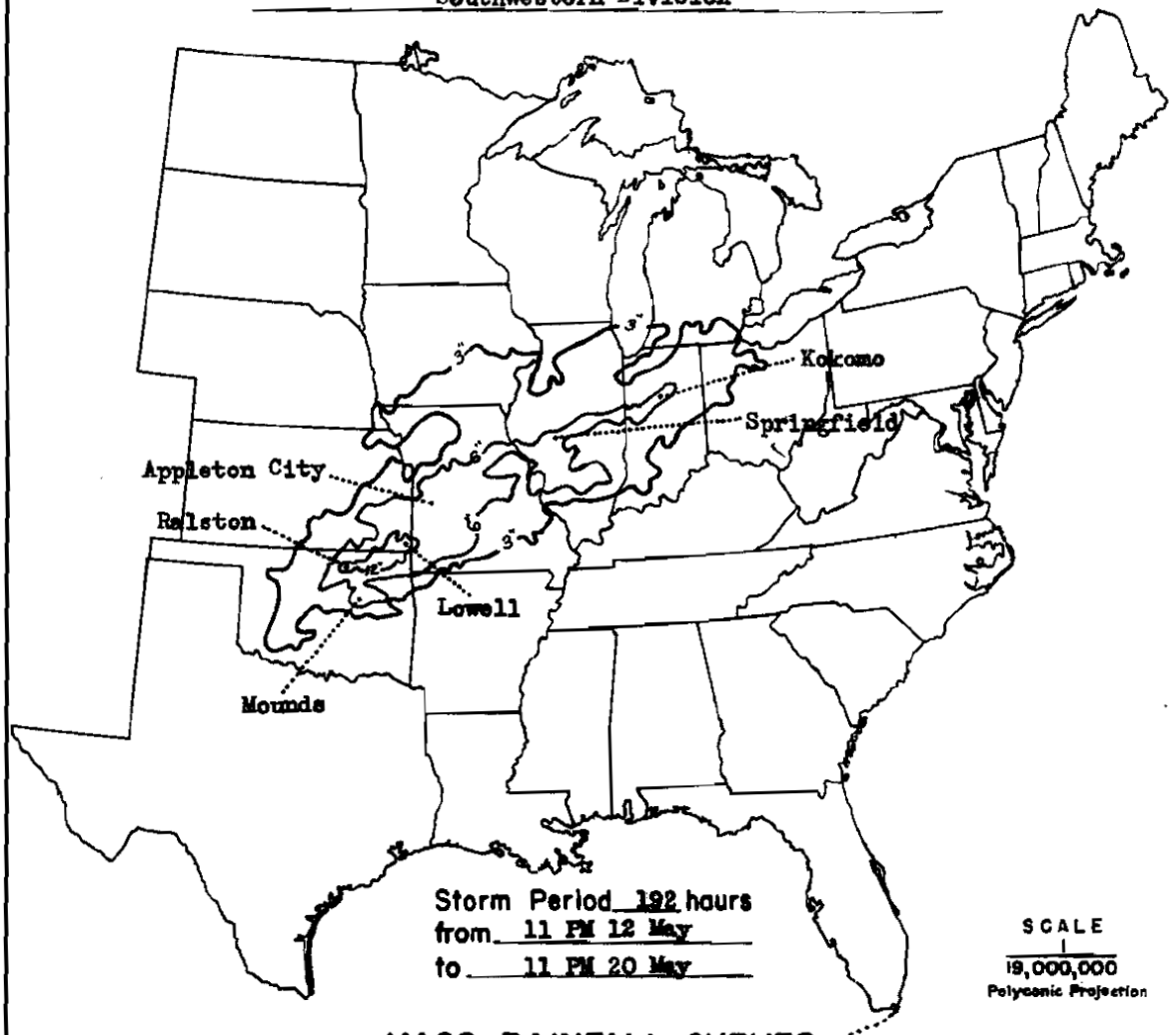
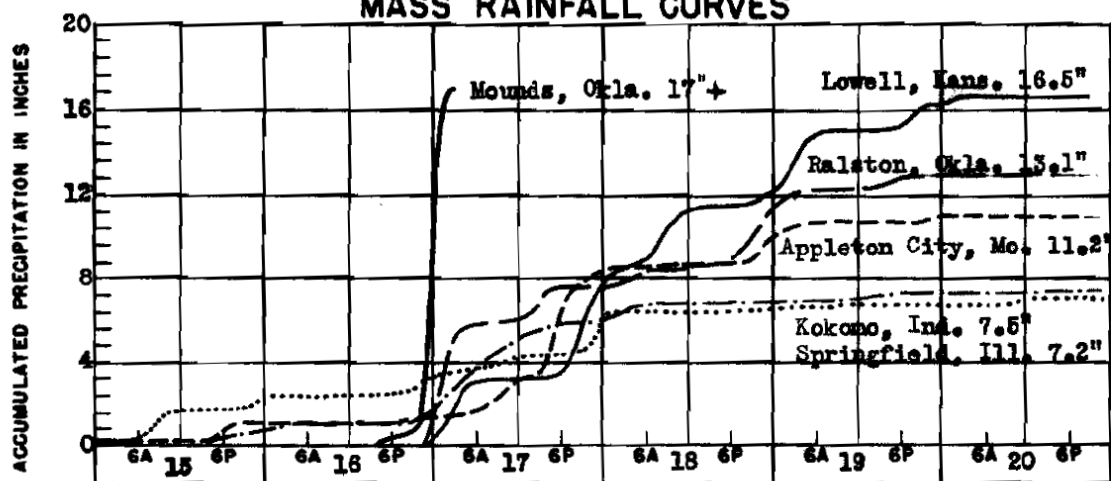
Final isohyetal maps, in 1 sheet, scale 1: 1,000,000
 Data and computation sheets:
 Form S-10 (Data from mass rainfall curves) ----- 42
 Form S-11 (Depth-area data from isohyetal map) ----- 8
 Form S-12 (Maximum depth-duration data) ----- 12
 Maximum duration-depth-area curves ----- 1
 Data relating to periods of maximum rainfall ----- 1

MAXIMUM AVERAGE DEPTH OF RAINFALL IN INCHES

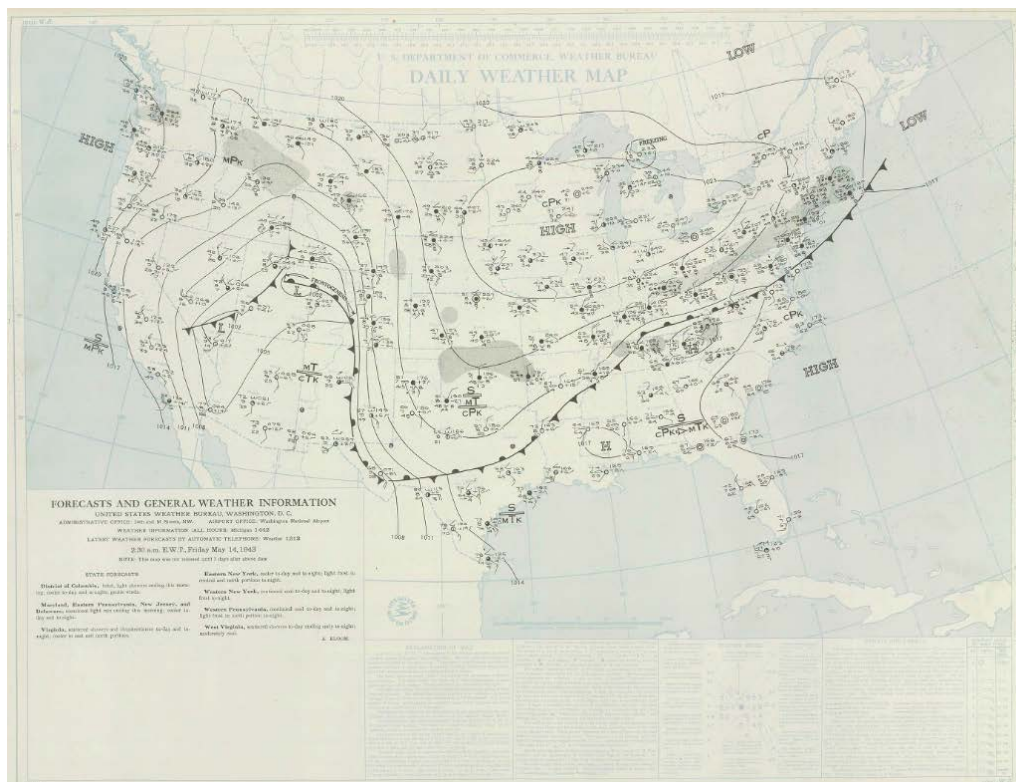
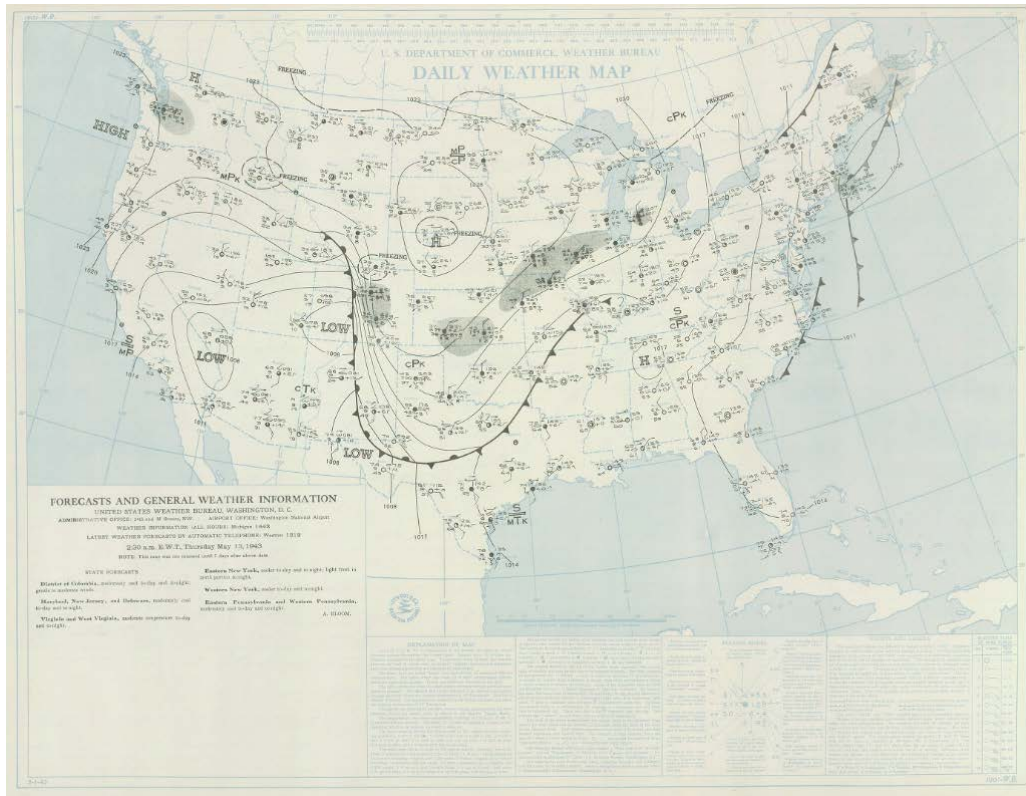
Area in Sq. Mi.	Duration of Rainfall in Hours										144
	6	12	18	24	36	48	60	72	96	120	192
Max. Station	16.2	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0
10	15.9	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.8	16.9	16.9
100	14.2	14.8	14.9	14.9	14.9	14.9	15.0	15.4	15.6	15.9	15.9
200	13.0	13.5	13.9	13.9	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

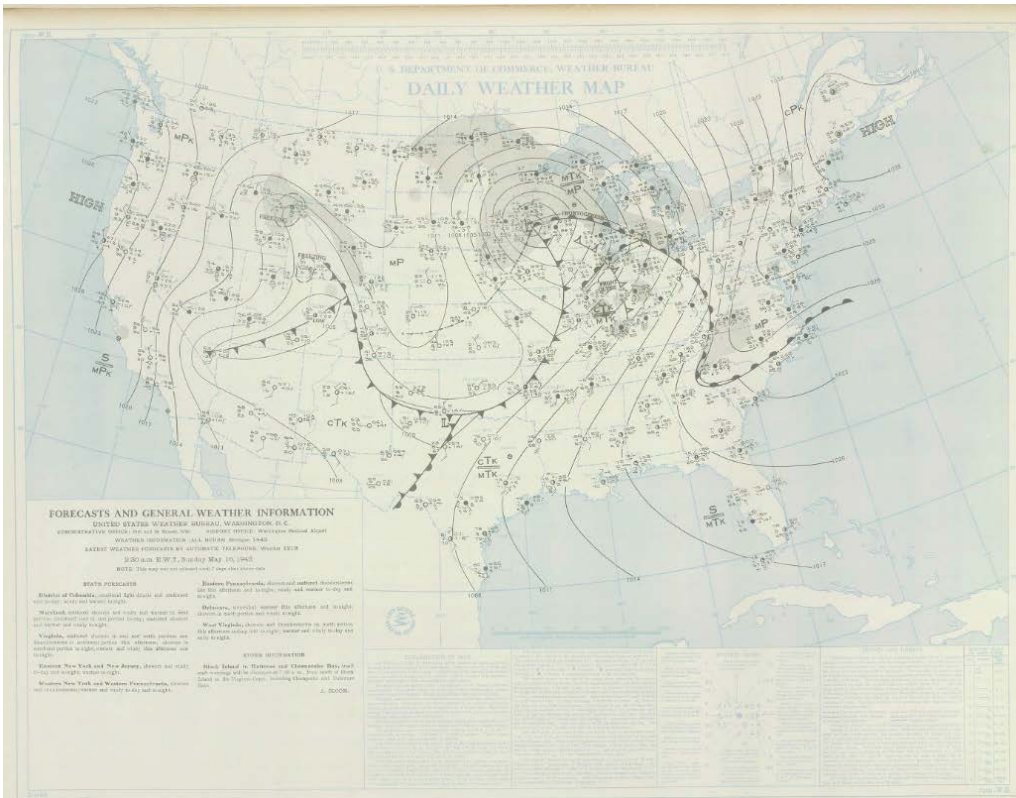
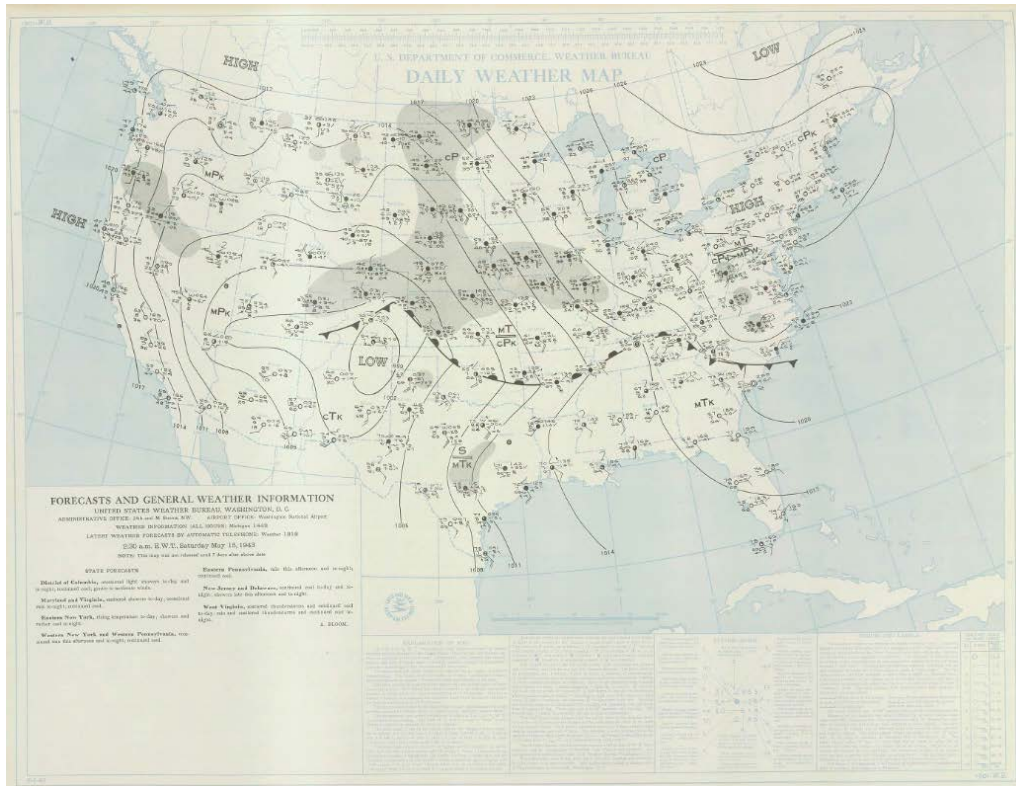
DEPARTMENT OF THE ARMY

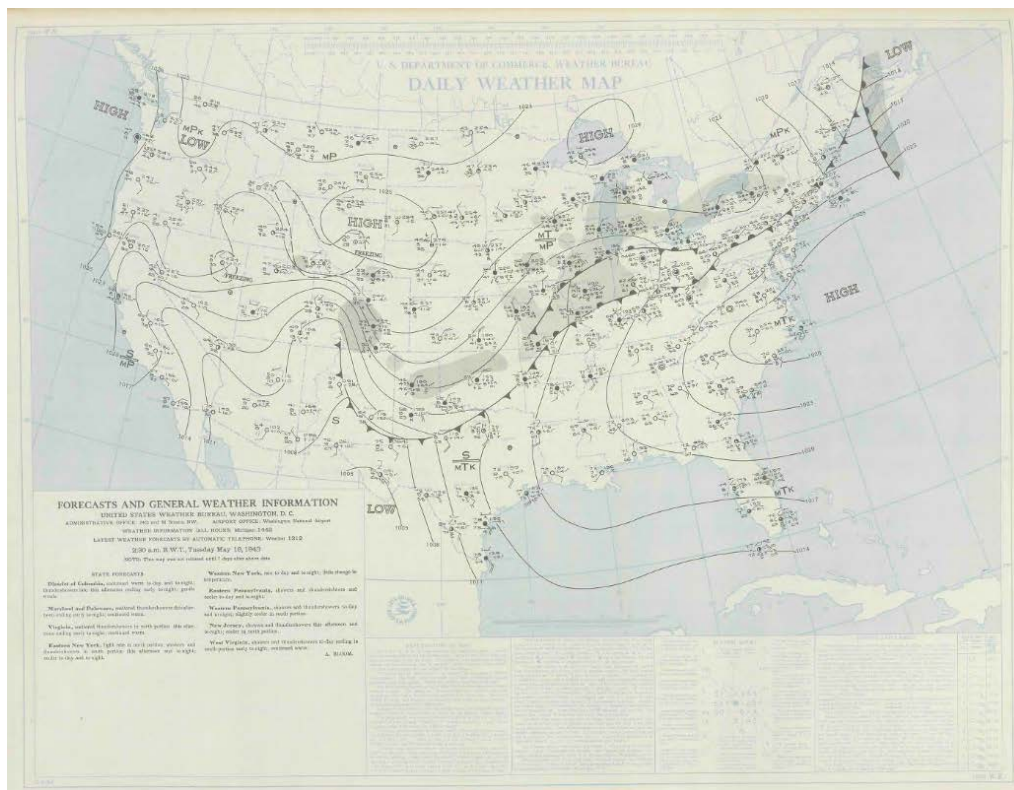
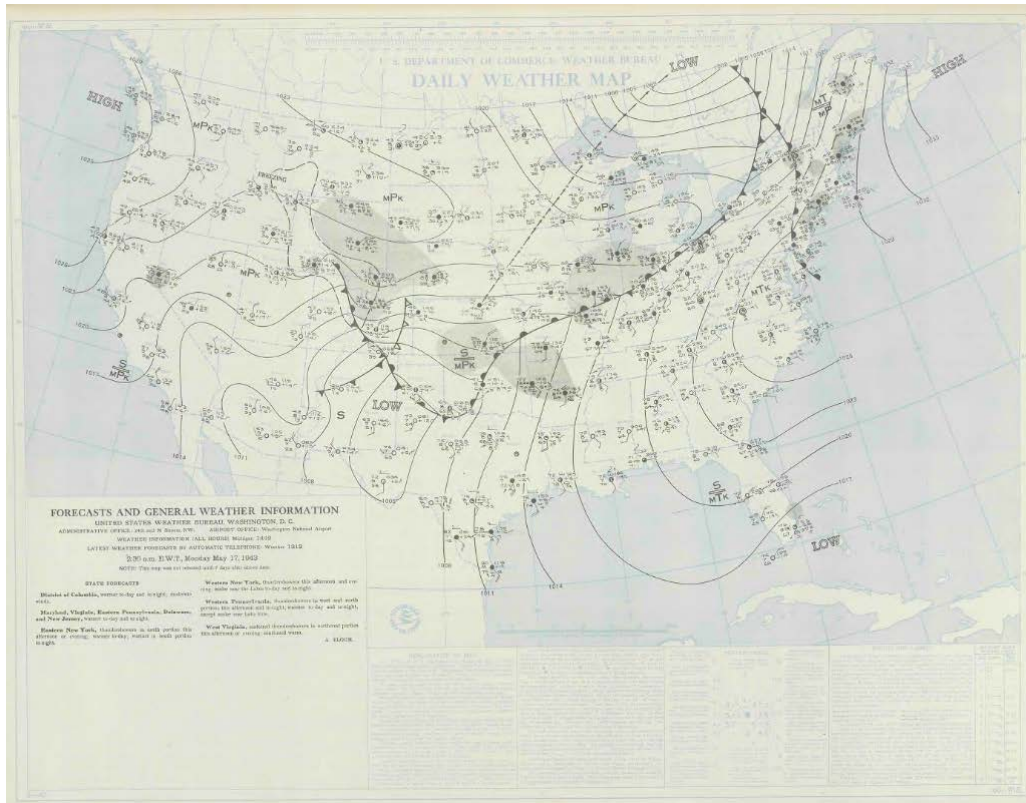
CORPS OF ENGINEERS

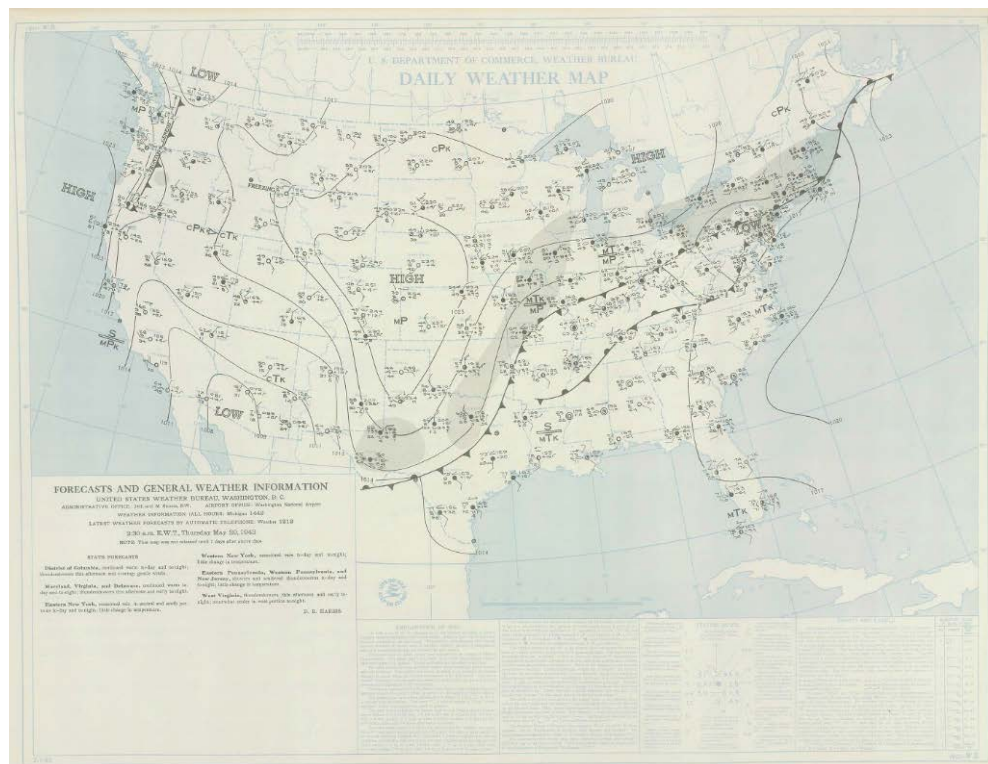
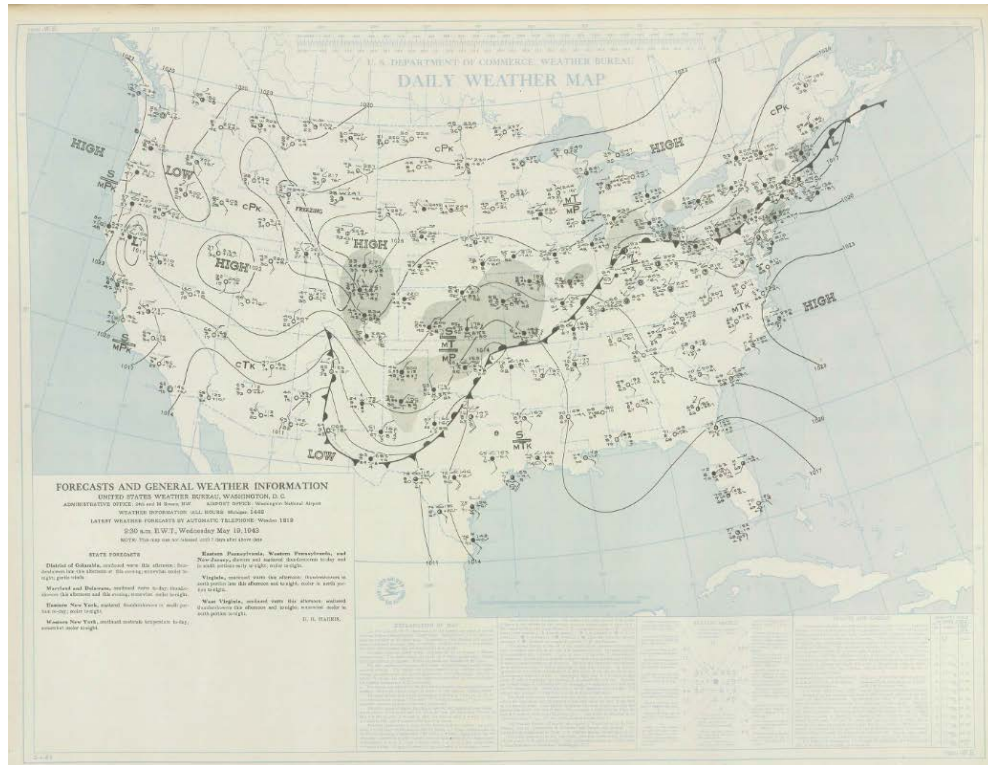
STORM STUDIES - ISOHYETAL MAPStorm of 12-20 May 1943Assignment SW 2-21Study Prepared by: Tulsa, Okla. DistrictSouthwestern Division**MASS RAINFALL CURVES**

FORM 8-3E

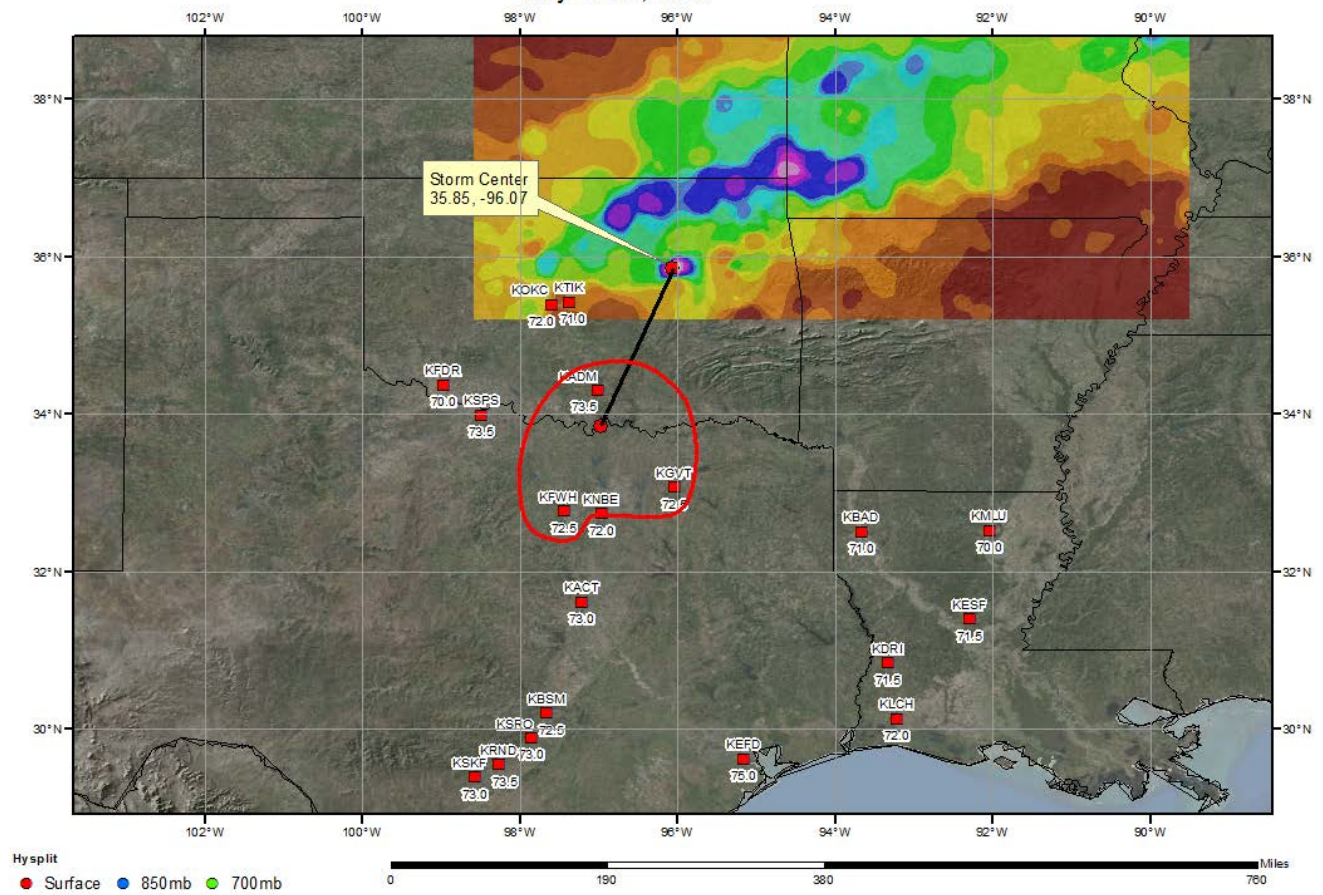






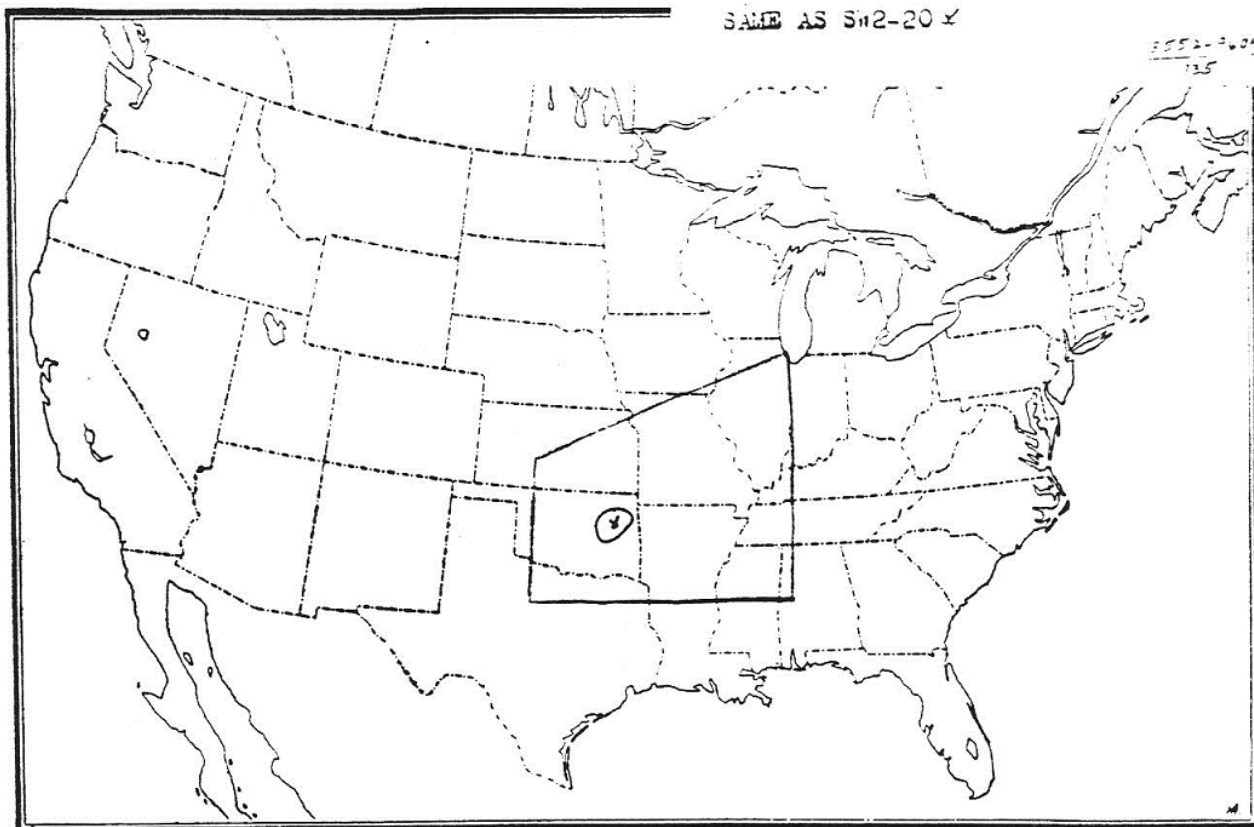


SPAS 1432 Mounds, OK Storm Analysis
May 15-20, 1943



Sw 2-21..May 13-20, 1943..Mounds, Okl
12-hr. rTd 71(16tn)..to 76, 285.60

SAME AS Sw2-20 x



Storm Precipitation Analysis System (SPAS) For Storm #1434_1

General Storm Location: Holt, Missouri

Storm Dates: June 18 – June 23, 1947

Event: CORPS of Engineers, US Army Assignment MR 8 – 20

DAD Zone 1

Latitude: 39.4542

Longitude: -94.3292

Max. Grid Rainfall Amount: 17.62”

Max. Observed Rainfall Amount: 17.62”

Number of Stations: 162

SPAS Version: 10.0

Basemap: Manually digitized contours using Army CORPS of Engineers isohyetal map.

Spatial resolution: 0.2548

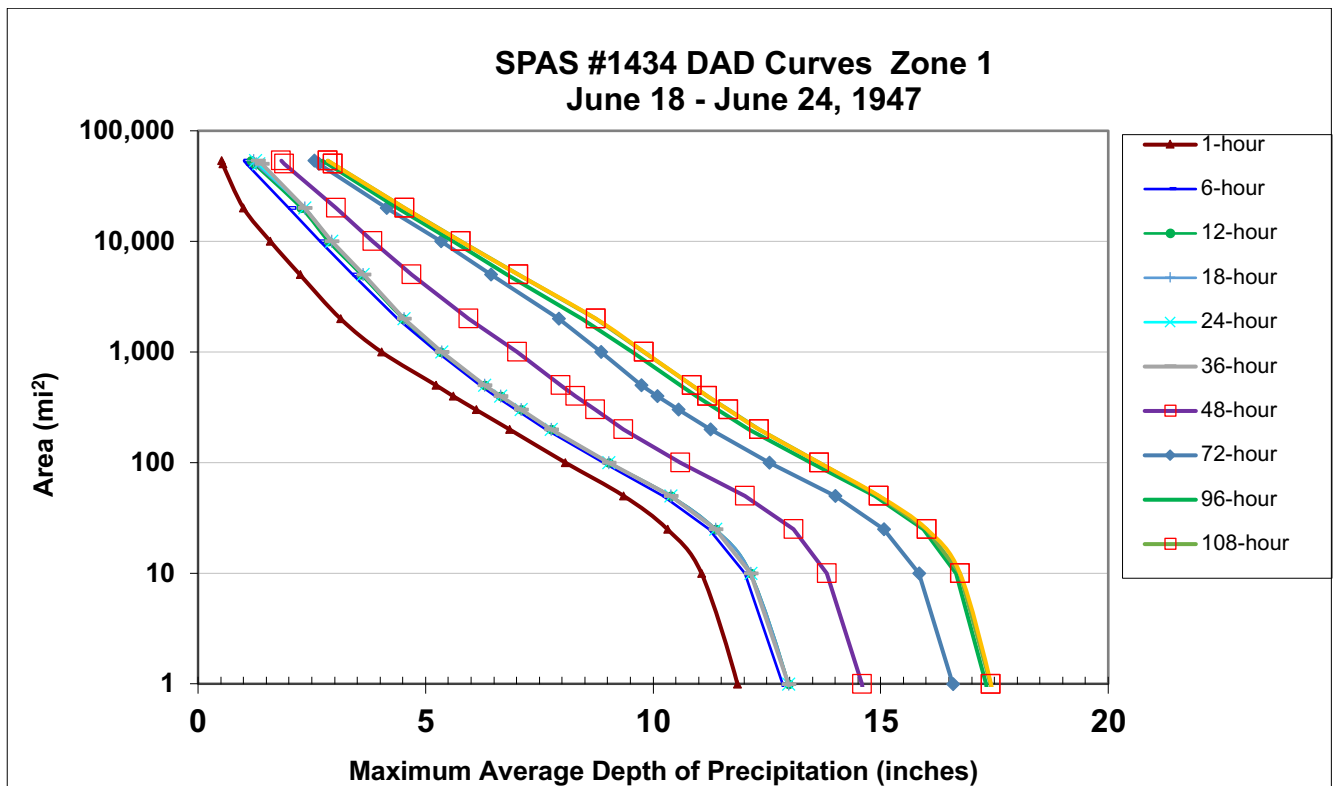
Radar Included: No

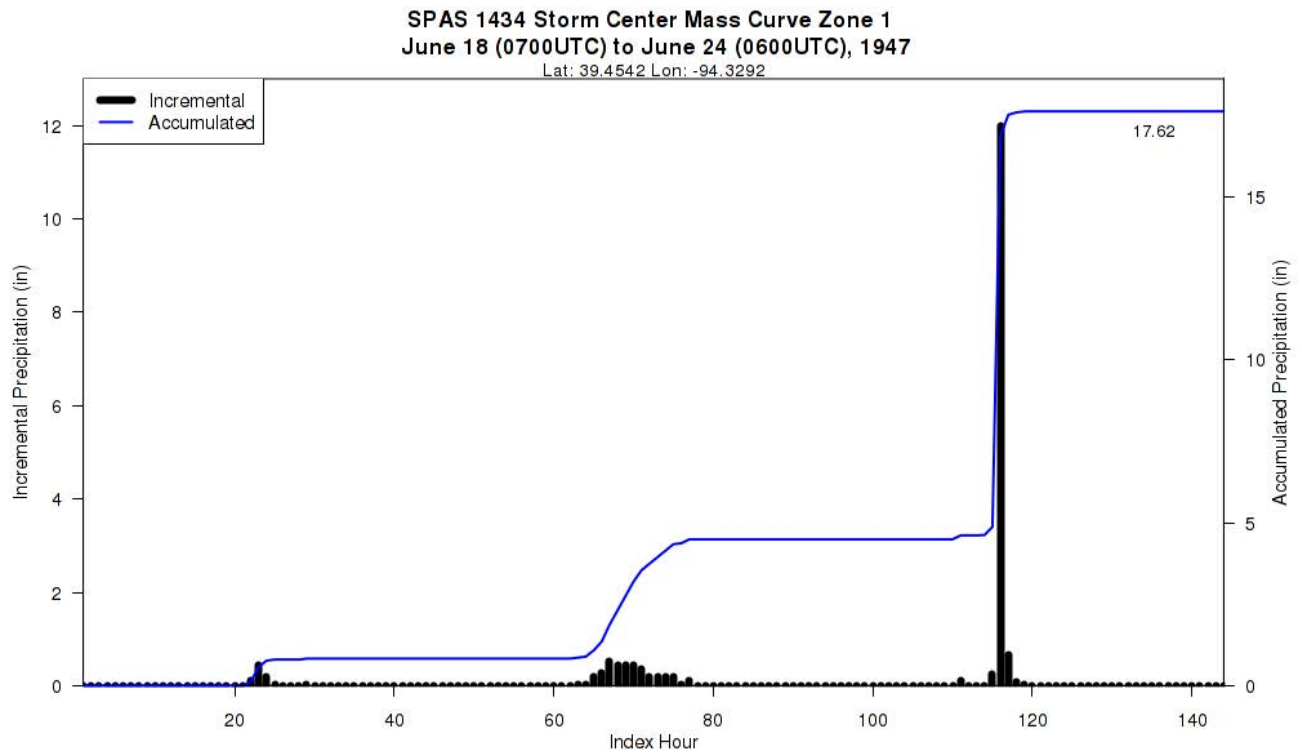
Depth-Area-Duration (DAD) analysis: Yes

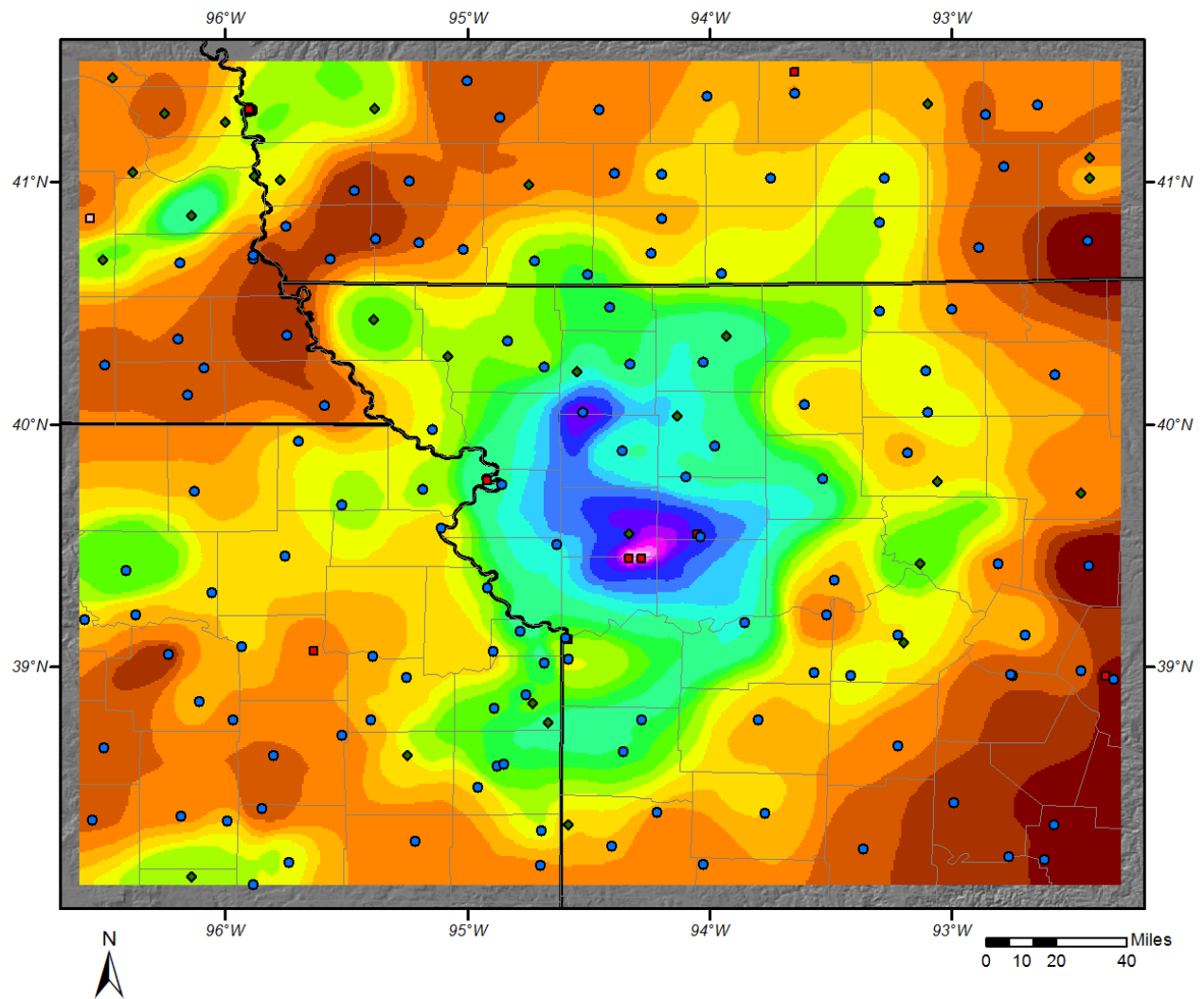
Reliability of results: Ten of the eleven hourly stations used in this analysis were manually digitized from either the Army CORPS of Engineers’ pertinent data report or from local climatological data. The last hourly station was estimated from the spas precipitation grid due to daily and supplemental stations nearby needing more accurate timing. This provided very high accuracy of the hourly data, which is essential in the timing of the daily and supplemental stations. Of the 28 supplemental stations, 8 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. An additional 8 stations found in the CORPS report were added to the supplemental file as well. 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 Rep. Dew Point					Climatological Max. Dew Point						
SPAS Storm ID	LON	LAT	ELEV	ELEV Round	T _d	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	T _d	T _d Round	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	IPMF
1434_1	-94.329	39.454	957	1,000	79.00	3.44	0.28	80	3.160	81.63	81.5	3.86	0.30	85	3.560	1.127

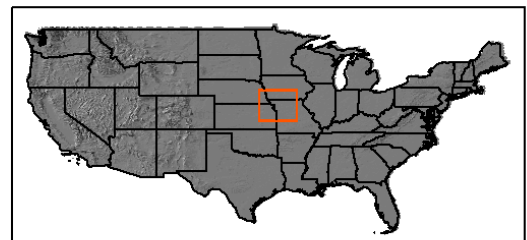
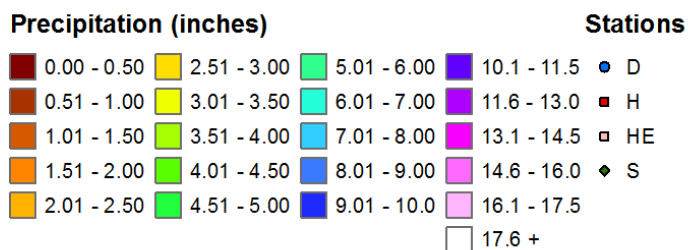
Storm 1434 - June 18 (0700 UTC) - June 24 (0600 UTC), 1947											
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)											
Area (mi ²)	Duration (hours)										
	1	6	12	18	24	36	48	72	96	108	Total
0.4	11.95	12.96	13.08	13.08	13.08	13.08	14.71	16.72	17.45	17.55	17.55
1	11.85	12.85	12.97	12.97	12.97	12.97	14.59	16.58	17.31	17.42	17.42
10	11.06	12.01	12.14	12.14	12.14	12.14	13.81	15.84	16.66	16.74	16.74
25	10.31	11.23	11.37	11.37	11.37	11.37	13.08	15.07	15.94	16.01	16.01
50	9.35	10.22	10.38	10.38	10.38	10.38	12.01	14.00	14.87	14.96	14.96
100	8.07	8.91	9.02	9.02	9.02	9.02	10.60	12.55	13.46	13.64	13.64
200	6.84	7.65	7.75	7.75	7.75	7.75	9.35	11.25	12.10	12.32	12.32
300	6.11	6.99	7.09	7.09	7.09	7.09	8.72	10.55	11.41	11.65	11.65
400	5.60	6.54	6.64	6.64	6.64	6.64	8.29	10.09	10.95	11.19	11.19
500	5.23	6.20	6.29	6.30	6.30	6.30	7.97	9.74	10.60	10.85	10.85
1,000	4.03	5.25	5.33	5.35	5.35	5.35	7.01	8.85	9.54	9.80	9.80
2,000	3.13	4.39	4.50	4.53	4.53	4.53	5.95	7.92	8.43	8.74	8.74
5,000	2.24	3.40	3.58	3.63	3.63	3.64	4.69	6.44	6.79	7.04	7.04
10,000	1.59	2.68	2.86	2.93	2.93	2.93	3.84	5.34	5.60	5.77	5.77
20,000	1.00	2.00	2.26	2.34	2.34	2.34	3.03	4.15	4.39	4.54	4.54
50,000	0.54	1.06	1.23	1.28	1.34	1.40	1.90	2.66	2.85	2.97	2.97
53,668	0.52	1.01	1.17	1.22	1.27	1.32	1.83	2.55	2.73	2.85	2.85





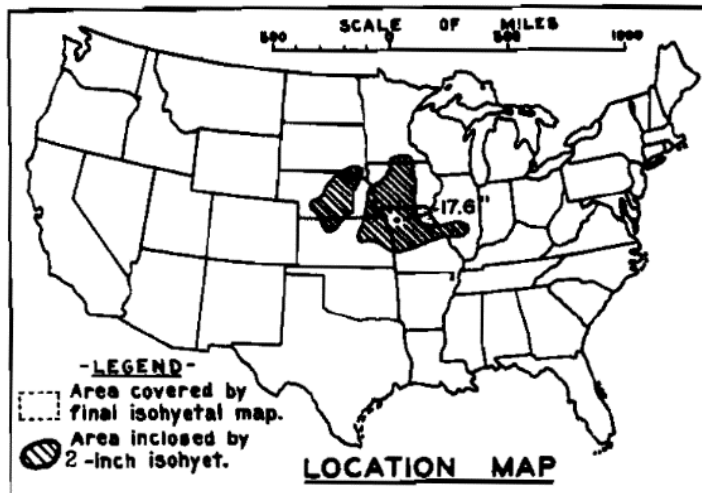


Total 108-hour Precipitation (inches)
June 19, 1947 0000 UTC - June 23, 1947 1200 UTC
SPAS #1434



DEPARTMENT OF THE ARMY

CORPS OF ENGINEERS

STORM STUDIES - PERTINENT DATA SHEET

Storm of 18-23 June 1947
 Assignment MR 8-20
 Location Ill., Ia., Kans., Minn.
 Mo., Nebr., & S. Dak.
 Study Prepared by:
 Missouri River Division
 Omaha District Office

Part I Reviewed by H. M. Sec. of
 Weather Bureau, 12/17/52
 Part II Approved by Office, Chief
 of Engineers for Distribution
 of Factual Data, 9/10/54
 Remarks:

Center near Holt, Mo.
 Dewpoint 75°, Ref. Pt. 140 S

DATA AND COMPUTATIONS COMPILED

Grid E-14

PART I

Preliminary Isohyetal map, in sheet, scale

Precipitation data and mass curves:

(Number of Sheets)

Form 5001-C (Hourly precip. data) -- NOTE: This study was computed
 Form 5001-B (24-hour " ") by the Regional Method
 Form 5001-D (" " ") which does not employ the
 Misc. precip. records, meteorological data, etc. Part I and Part II phases
 Form 5002 (Mass rainfall curves) in their entirety.

PART II

Final isohyetal maps, in 1 sheet, scale 1:100,000

Data and computation sheets:

Form S-10 (Data from mass rainfall curves) 9
 Form S-11 (Depth-area data from isohyetal map) 4
 Form S-12 (Maximum depth-duration data) 7
 Maximum duration-depth-area curves 1
 Data relating to periods of maximum rainfall

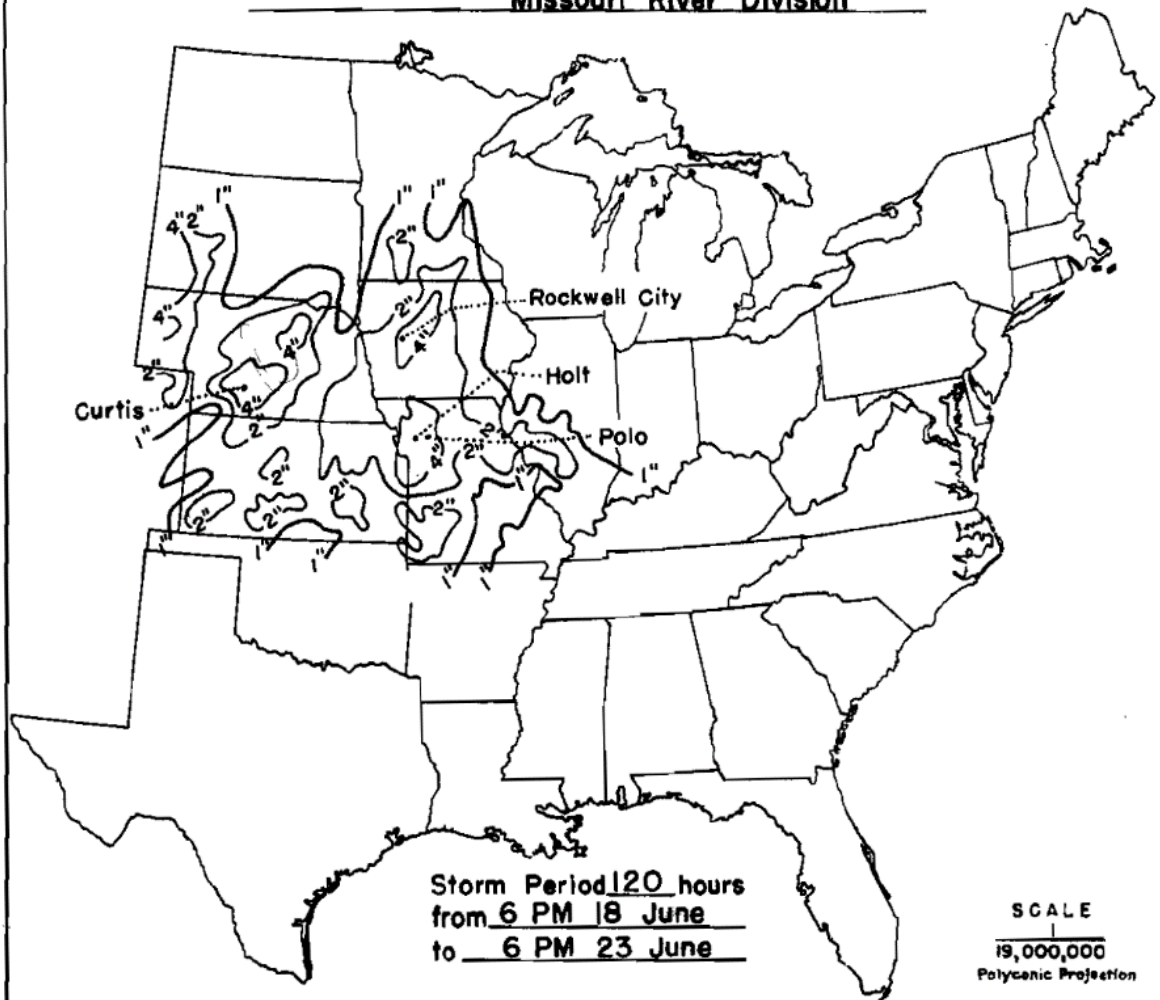
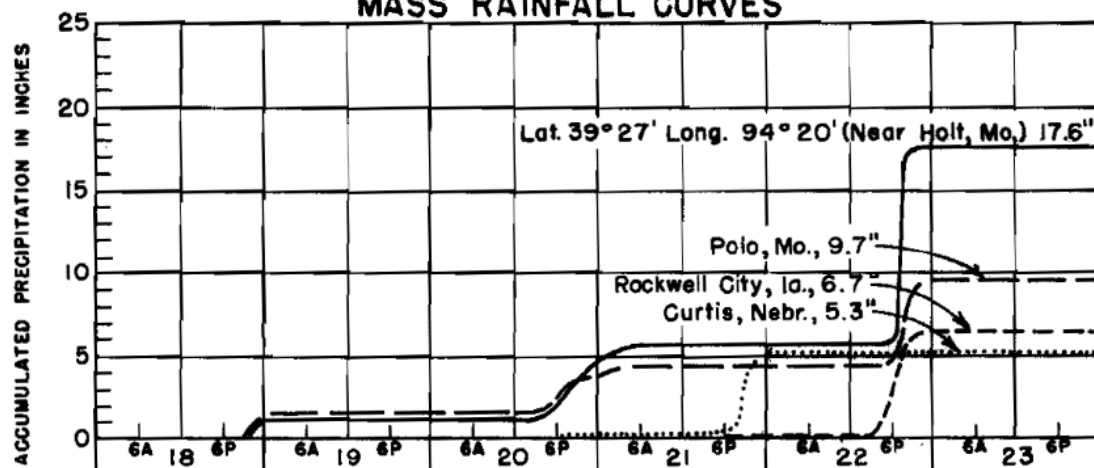
MAXIMUM AVERAGE DEPTH OF RAINFALL IN INCHES

Area in Sq. Mi.	Duration of Rainfall in Hours									
	6	12	18	24	36	48	72	96	120	
Max. Station	12.0	12.0	12.0	12.0	12.0	14.4	16.6	18.9	17.6	
10	11.5	11.5	11.5	11.5	11.5	12.6	15.9	15.8	14.9	
100	7.9	7.9	7.9	7.9	7.9	9.3	12.9	12.9	14.1	
200	7.1	7.1	7.1	7.1	7.1	8.4	11.9	11.9	13.0	
500	6.3	6.3	6.3	6.3	6.3	7.4	10.6	10.6	11.6	
1000	5.6	5.6	5.6	5.6	5.6	6.6	9.6	9.6	10.5	
2000	4.9	4.9	4.9	4.9	4.9	5.7	8.4	8.4	9.3	
5000	3.5	3.7	3.7	3.7	3.7	4.6	6.7	6.7	7.3	
10000	2.6	2.9	3.0	3.0	3.0	3.7	5.4	5.4	5.9	
20000	1.8	2.1	2.2	2.2	2.2	3.1	4.4	4.6	4.9	
50000	1.2	1.4	1.5	1.6	1.8	2.5	3.2	3.5	3.8	
100000	0.8	1.0	1.1	1.4	1.6	2.1	2.7	2.9	3.0	
200000	0.6	0.7	0.8	1.1	1.4	1.7	2.1	2.2	2.3	
306000	0.5	0.6	0.8	0.7	0.9	1.2	1.6	1.8	1.8	

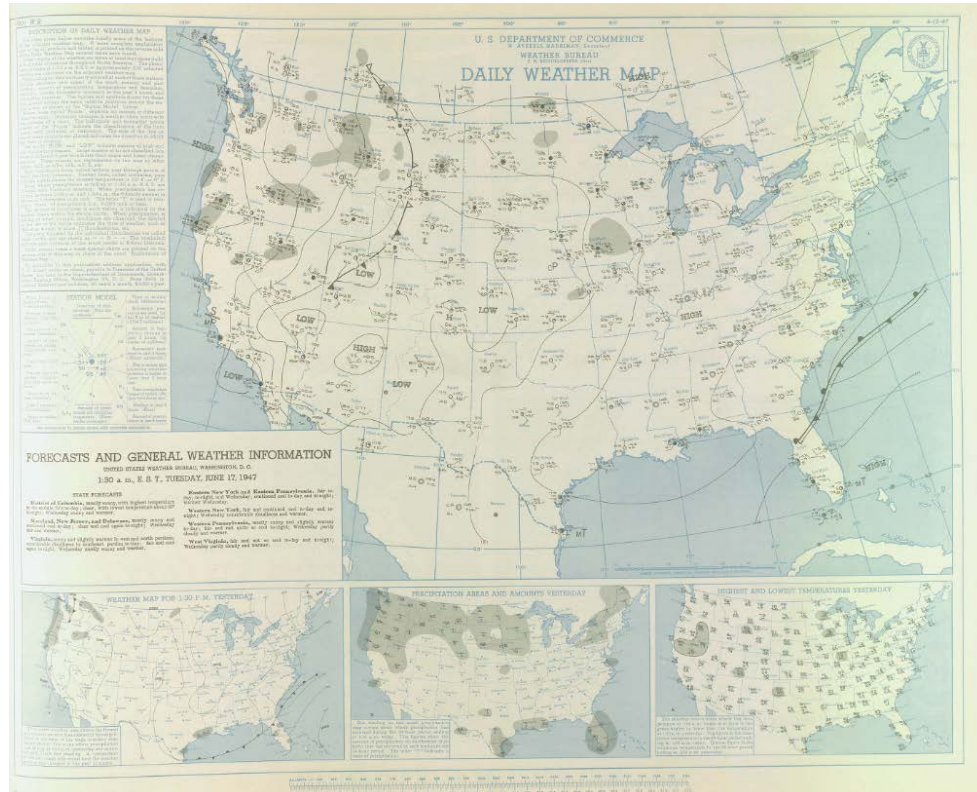
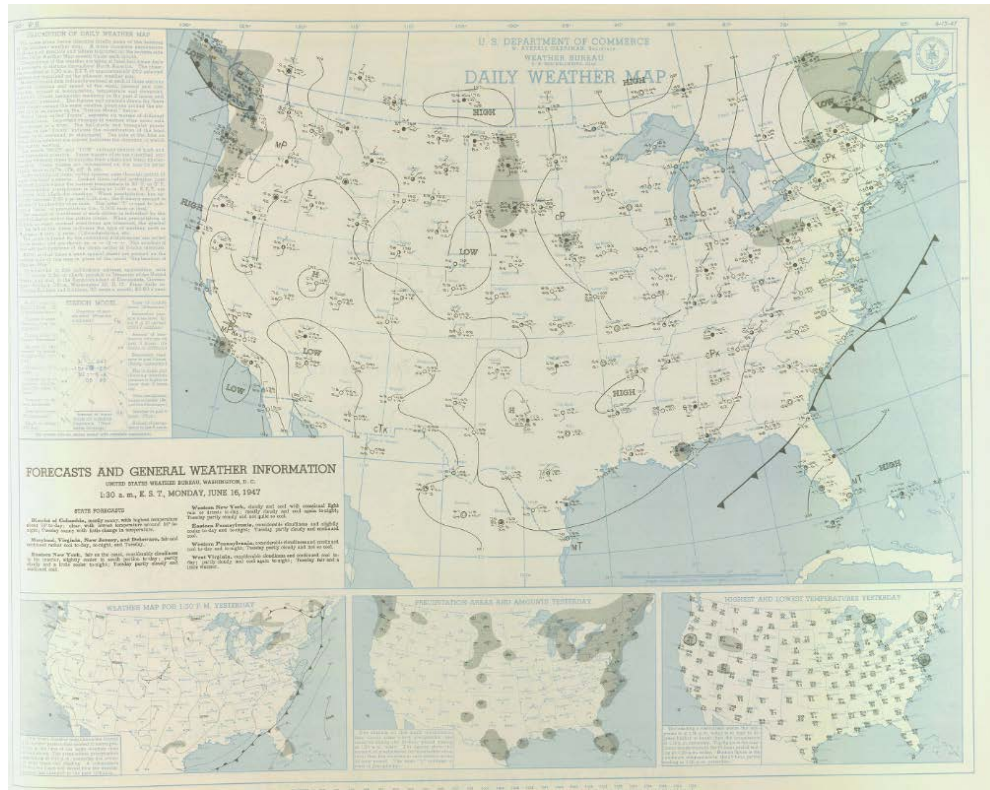
Form S-2

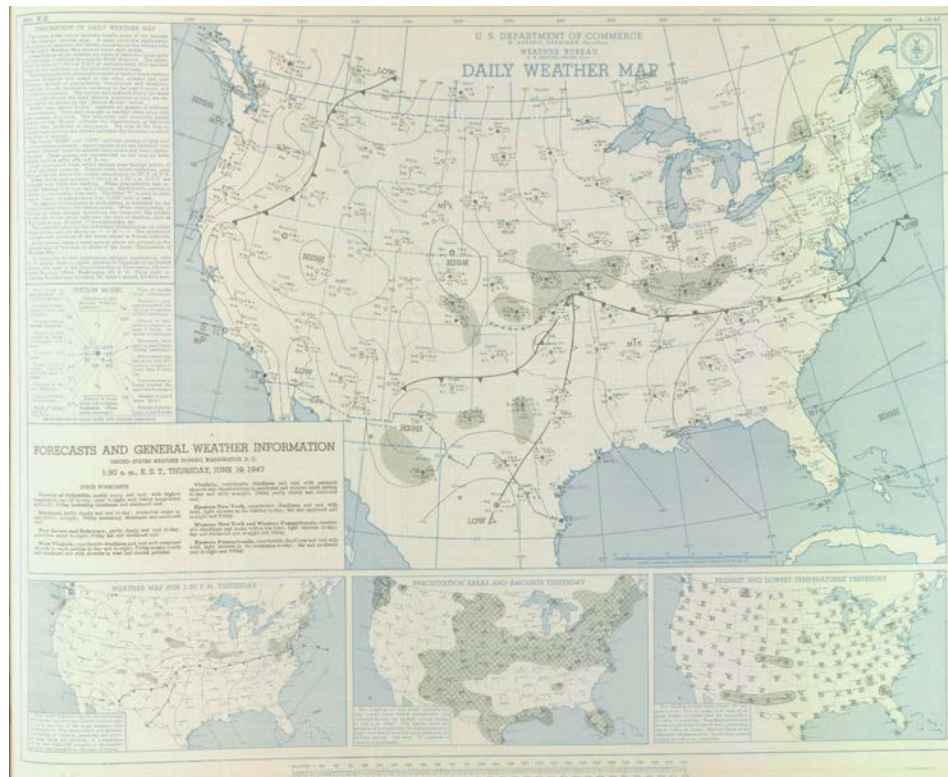
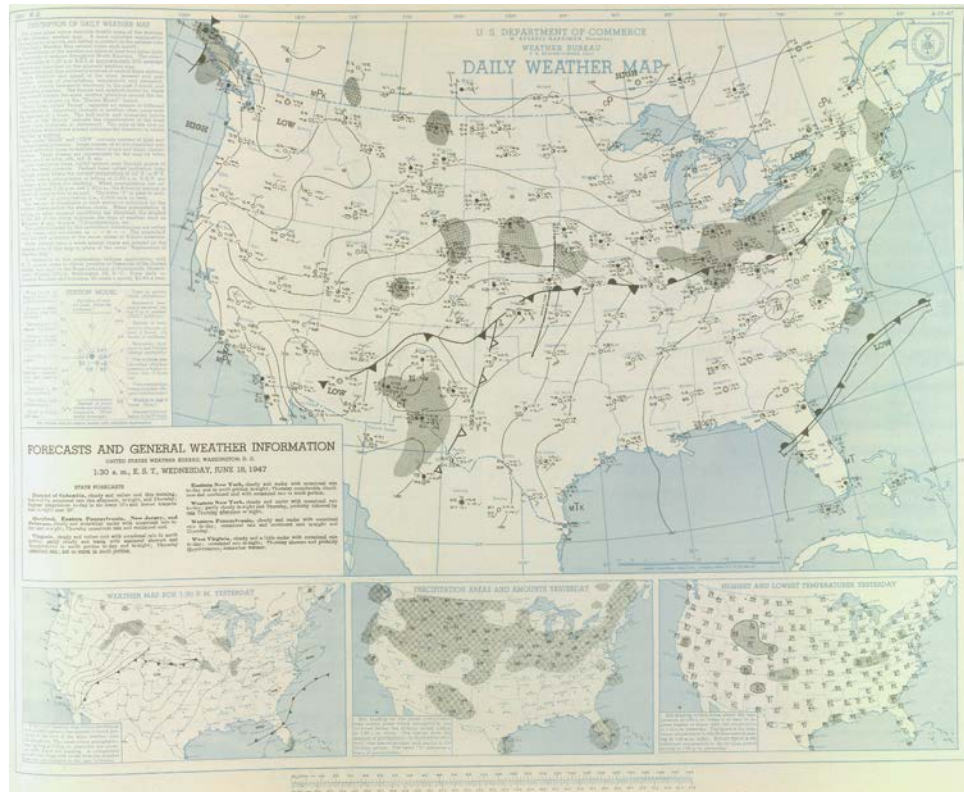
DEPARTMENT OF THE ARMY

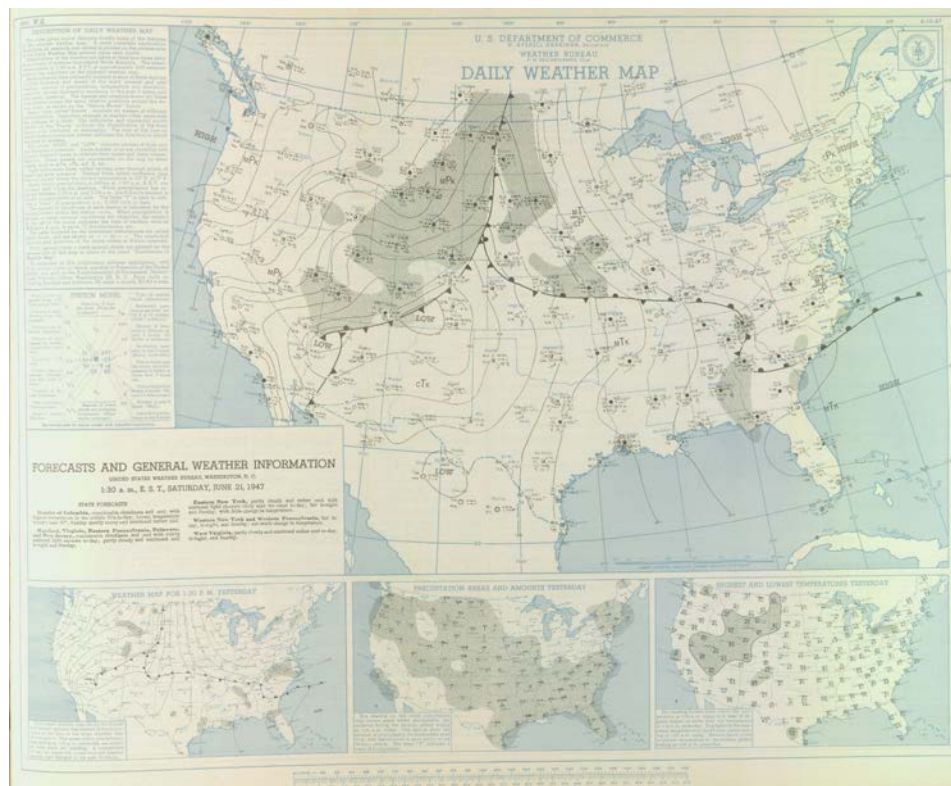
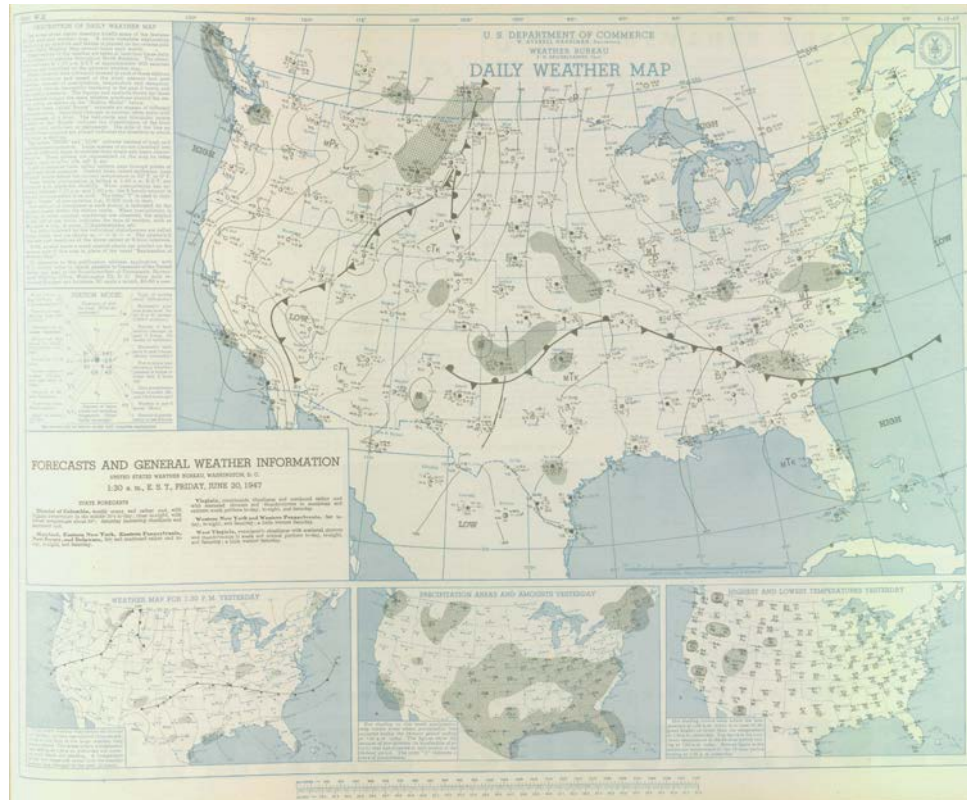
CORPS OF ENGINEERS

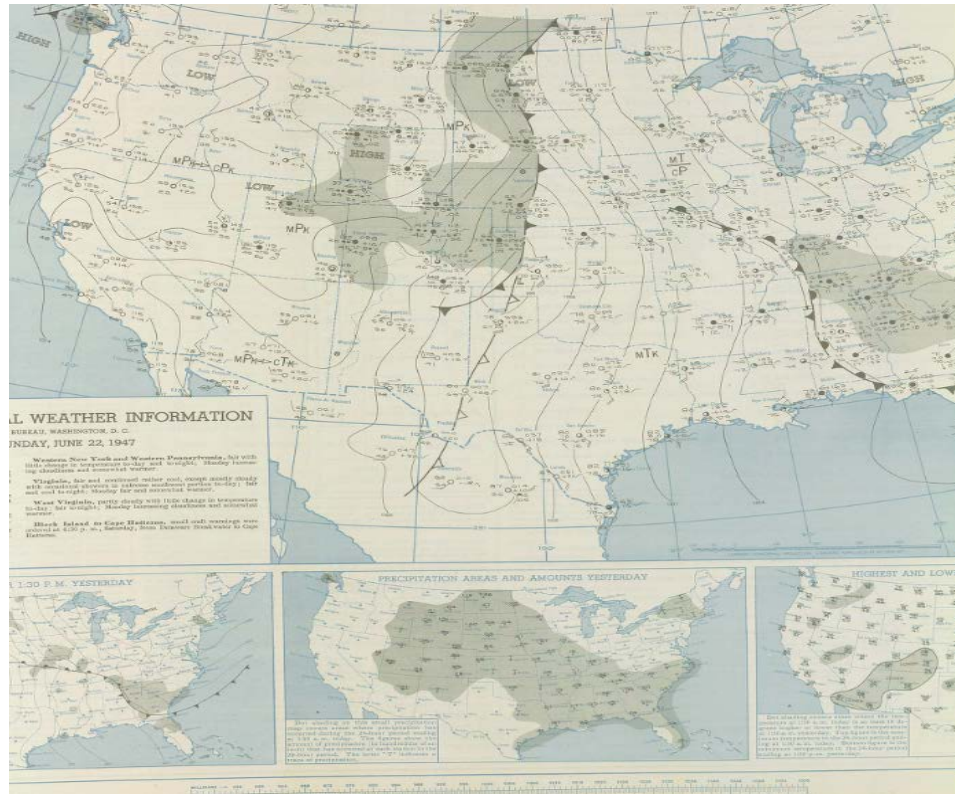
STORM STUDIES - ISOHYETAL MAPStorm of 18-23 June 1947Assignment MR 8-20Study Prepared by: Omaha, Nebr., District
Missouri River Division**MASS RAINFALL CURVES**

FORM 8-3E

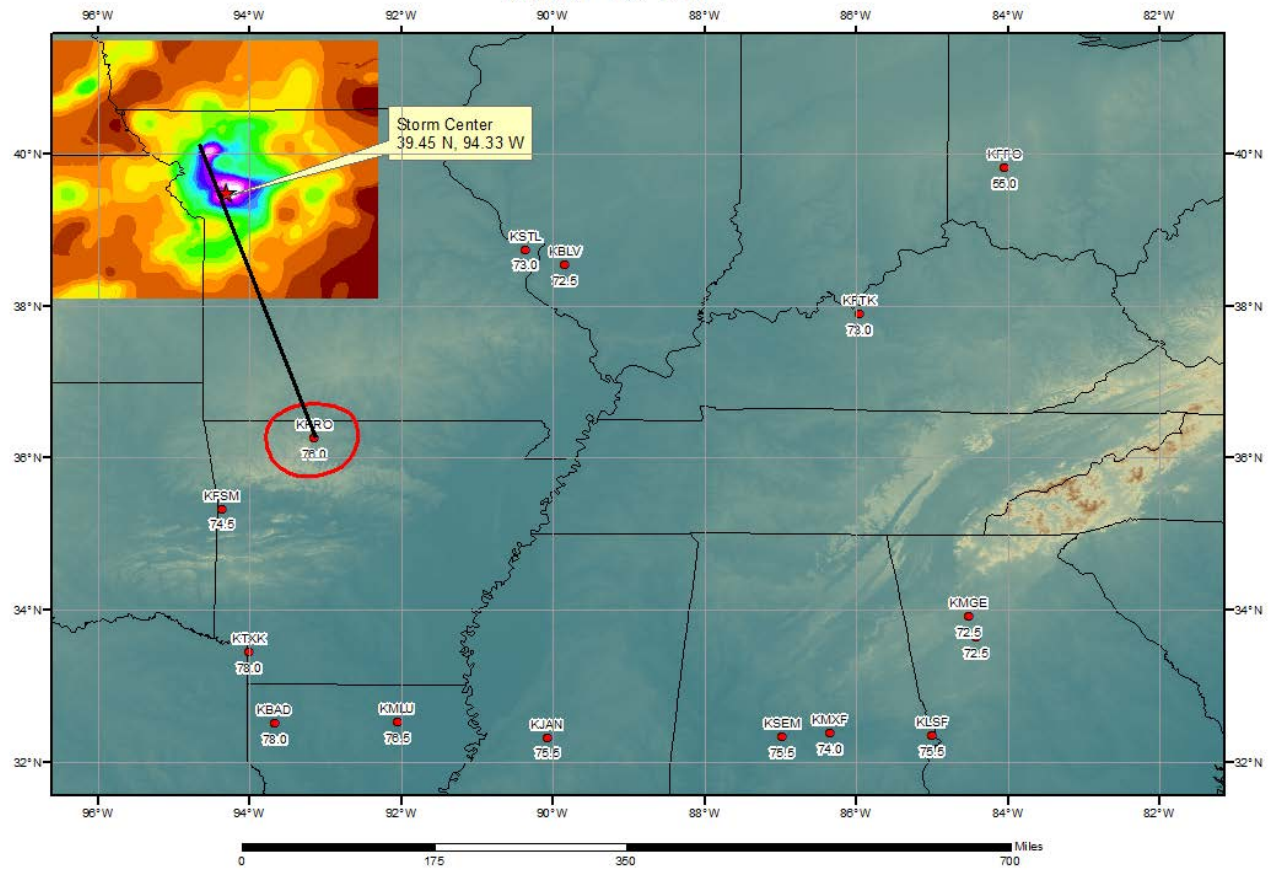








SPAS 1434 Holt, MO Storm Analysis
June 20 - 23, 1947



Storm Precipitation Analysis System (SPAS) For Storm #1613_1

General Storm Location: Northern Colorado

Storm Dates: June 6-8, 1948

Event: Local

DAD Zone 1

Latitude: 39.7875

Longitude: -105.2875

Max. Grid Rainfall Amount: 6.00"

Max. Observed Rainfall Amount: 6.00" (Golden, CO)

Number of Stations: 17

SPAS Version: 10.0

Basemap: USACE Isohyetal Map

Spatial resolution: 0.2549

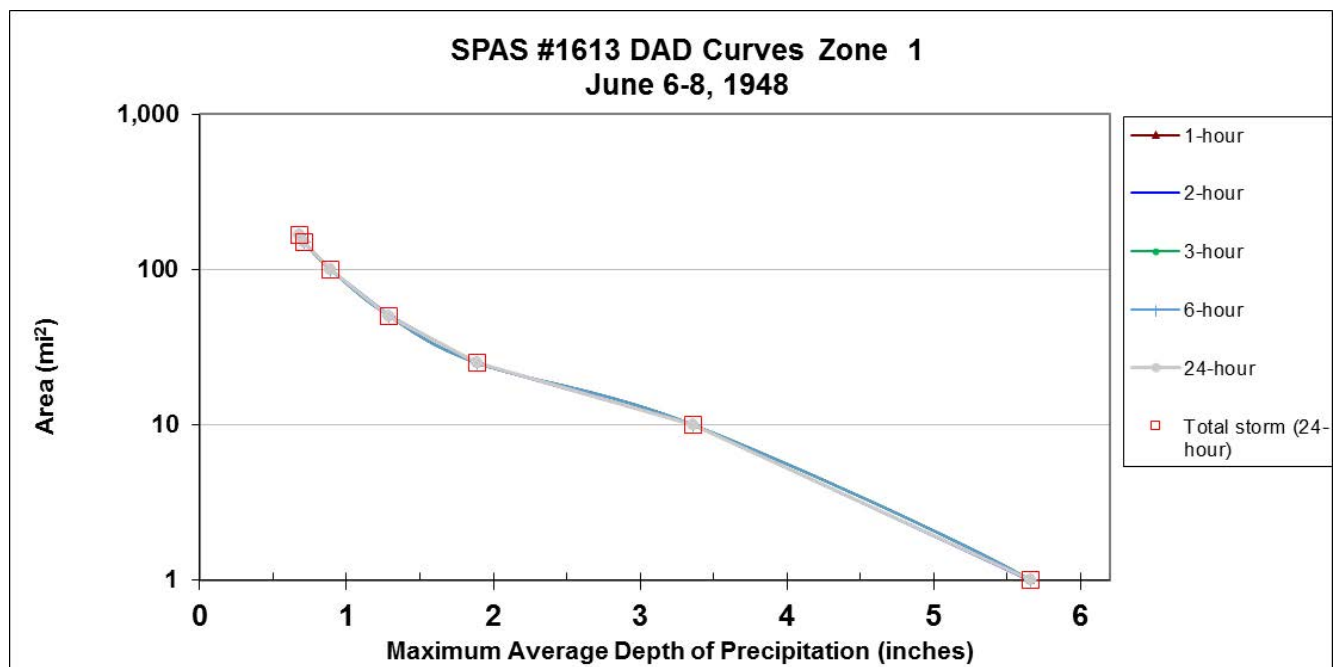
Radar Included: No

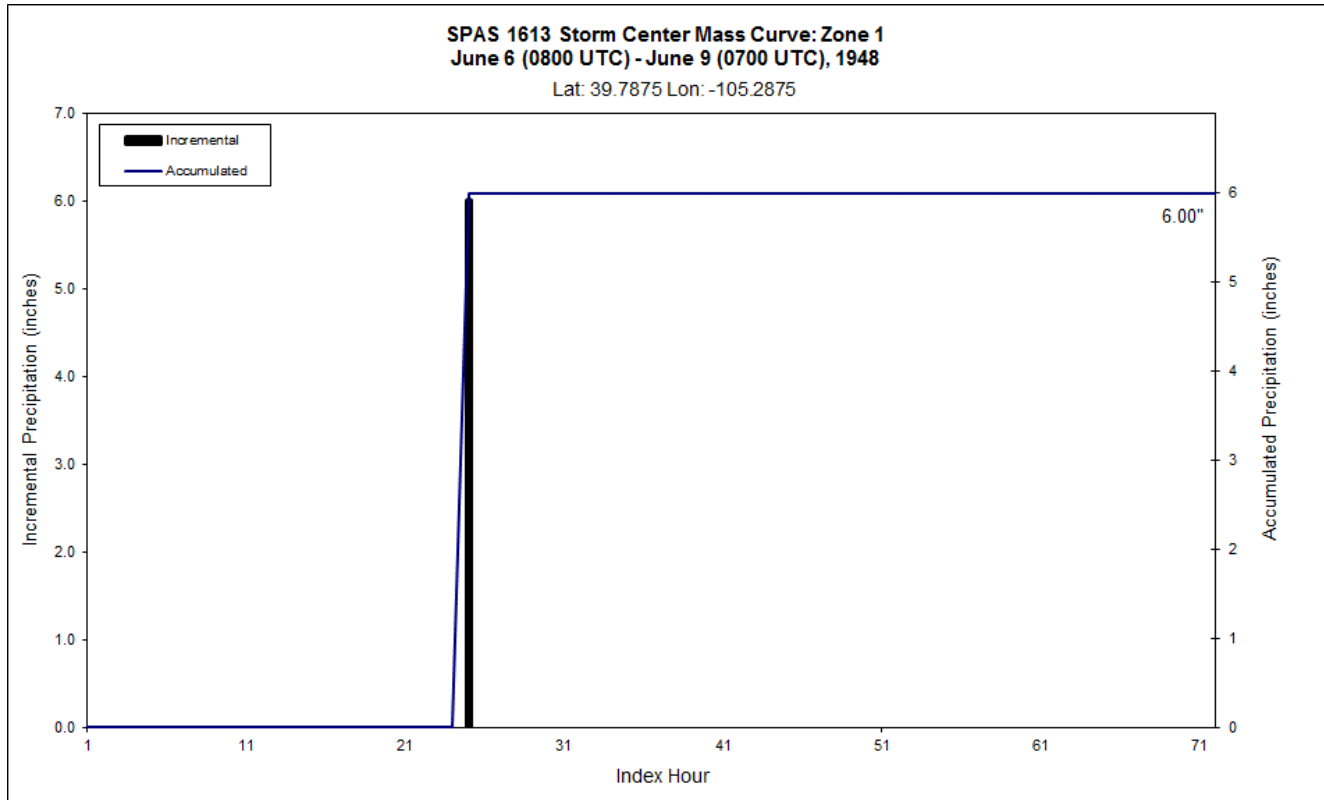
Depth-Area-Duration (DAD) analysis: Yes

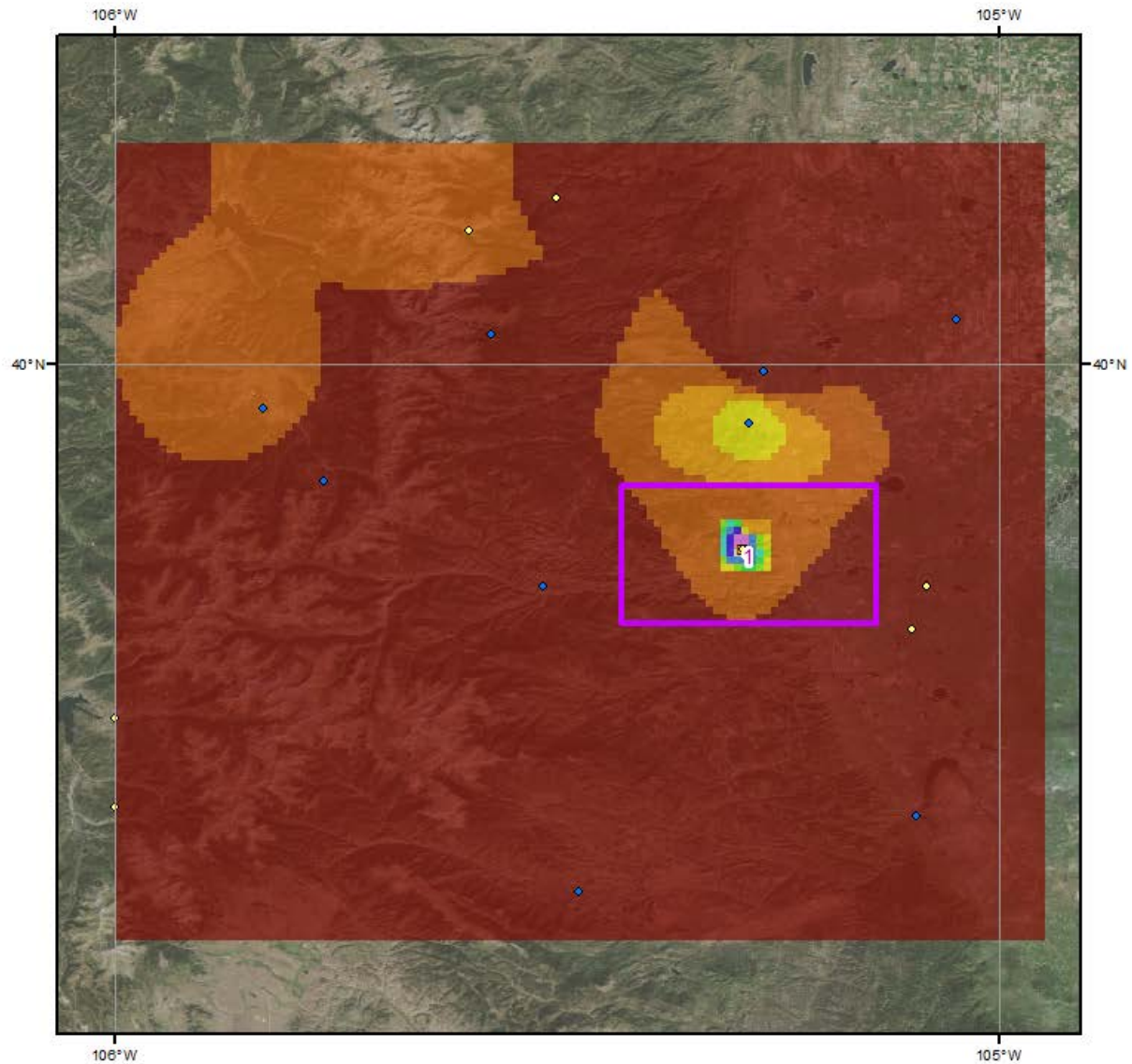
Reliability of results: This analysis was based on 17 hourly stations, daily data, and supplemental station data. We have a good degree of confidence for the station based storm total results. The spatial pattern is dependent heavily on the basemap created from the USGS Isohyetal image. Timing is based on the hourly pseudo station near the storm center. Several daily stations were moved to supplemental stations due to timing issues and to ensure data consistency.

					Storm Rep. Dew Point					Climatological Max. Dew Point						
SPAS Storm ID	LON	LAT	ELEV	ELEV Round	T _d	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	T _d	T _d Round	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	IPMF
1613_1	-105.288	39.788	7,154	7,000	74.00	2.73	1.38	70	1.350	79.94	80.0	3.60	1.70	82	1.900	1.407

Storm 1613 - June 6 (0800 UTC) - June 9 (0700 UTC), 1948						
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)						
Area (mi²)	Duration (hours)					
	1	2	3	6	24	Total
0.4	5.89	5.89	5.89	5.89	5.89	5.89
1	5.66	5.66	5.66	5.66	5.66	5.66
10	3.36	3.36	3.36	3.36	3.36	3.36
25	1.89	1.89	1.89	1.89	1.89	1.89
50	1.29	1.29	1.29	1.29	1.29	1.29
100	0.89	0.89	0.89	0.89	0.89	0.89
150	0.71	0.71	0.71	0.71	0.71	0.71
165	0.68	0.68	0.68	0.68	0.68	0.68







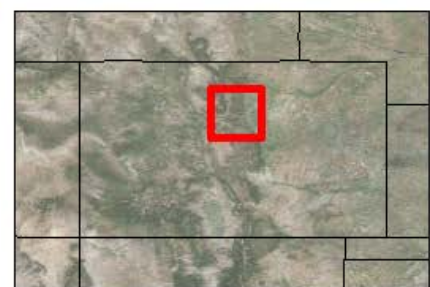
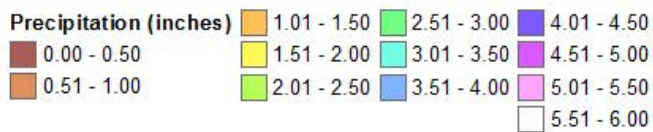
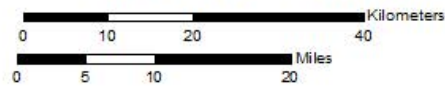
Total Storm (72-hours) Precipitation (inches)

June 6-8, 1948

SPAS 1613 - Golden, CO

Gauges

- ◆ Daily
- Hourly
- Hourly/Pseudo
- ◆ Supplemental



7/21/2016

STORM STUDIES - PERTINENT DATA SHEET

Storm of 7 June 1948
Assignment MR 7-19
Location Colorado
Study Prepared by:
Missouri River Division
Omaha District Office

Part I Reviewed by H. M. Sec. of
Weather Bureau, 10/1/52
Part II Approved by Office, Chief
of Engineers for Distribution
of Factual Data. 4/30/57

Remarks:

Center Near Golden, Colo.
Dewpoint 65° Ref. Pt.
310 SE

DATA AND COMPUTATIONS COMPILED

Grid E-20

PART I

Preliminary isohyetal map, in 1 sheet, scale 1" = 2 Miles

Precipitation data and mass curves:

(Number of Sheets)

Form 5001-C (Hourly precip. data).....	0
Form 5001-B (24-hour " " " ").....	0
Form 5001-D (" " " " " ").....	1
Misc. precip. records, meteorological data, etc.....	21
Form 5002 (Mass rainfall curves).....	3

PART II

Final isohyetal maps, in 1 sheet, scale 1" = 2 Miles

Data and computation sheets:

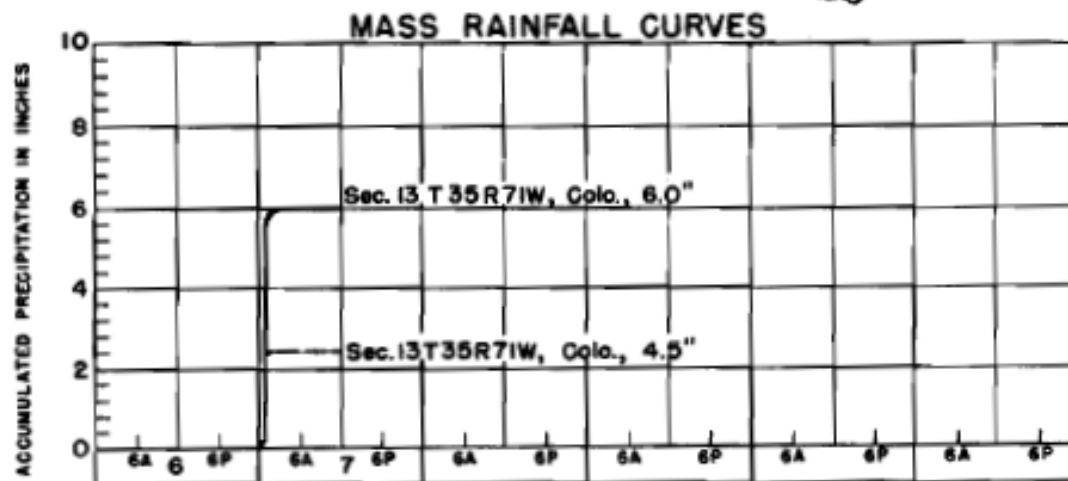
Form S-10 (Data from mass rainfall curves)-----	1
Form S-11 (Depth-area data from isohyetal map)-----	1
Form S-12 (Maximum depth-duration data)-----	2
Maximum duration-depth-area curves-----	1
Data relating to periods of maximum rainfall-----	3

MAXIMUM AVERAGE DEPTH OF RAINFALL IN INCHES

Area in Sq. Mi.	Duration of Rainfall in Hours									
	1	2								
Max. Station	6.0	6.0								
1	5.5	5.5								
2	4.9	4.9								
5	3.9	4.0								
8	3.5	3.5								

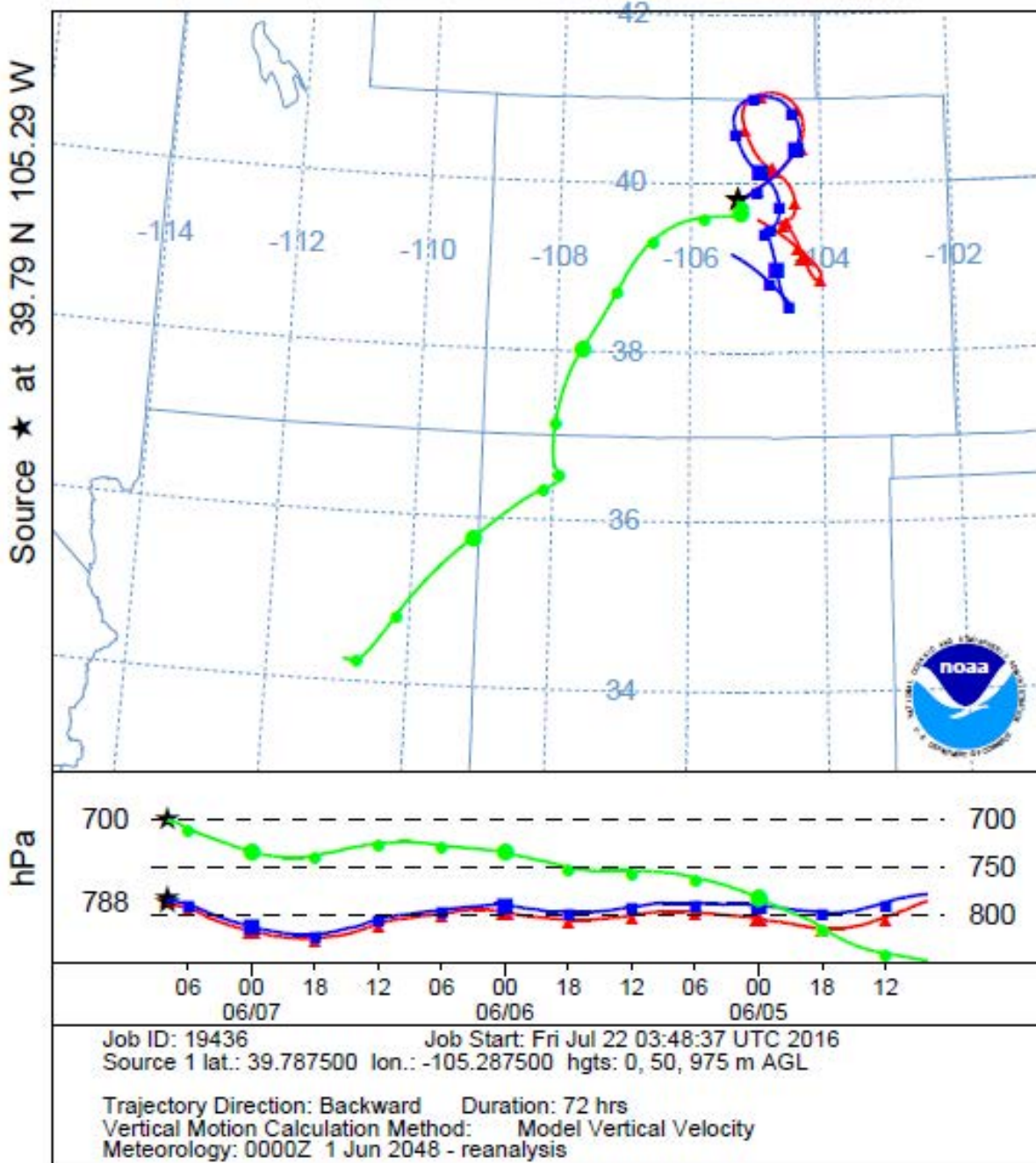
DEPARTMENT OF THE ARMY

CORPS OF ENGINEERS

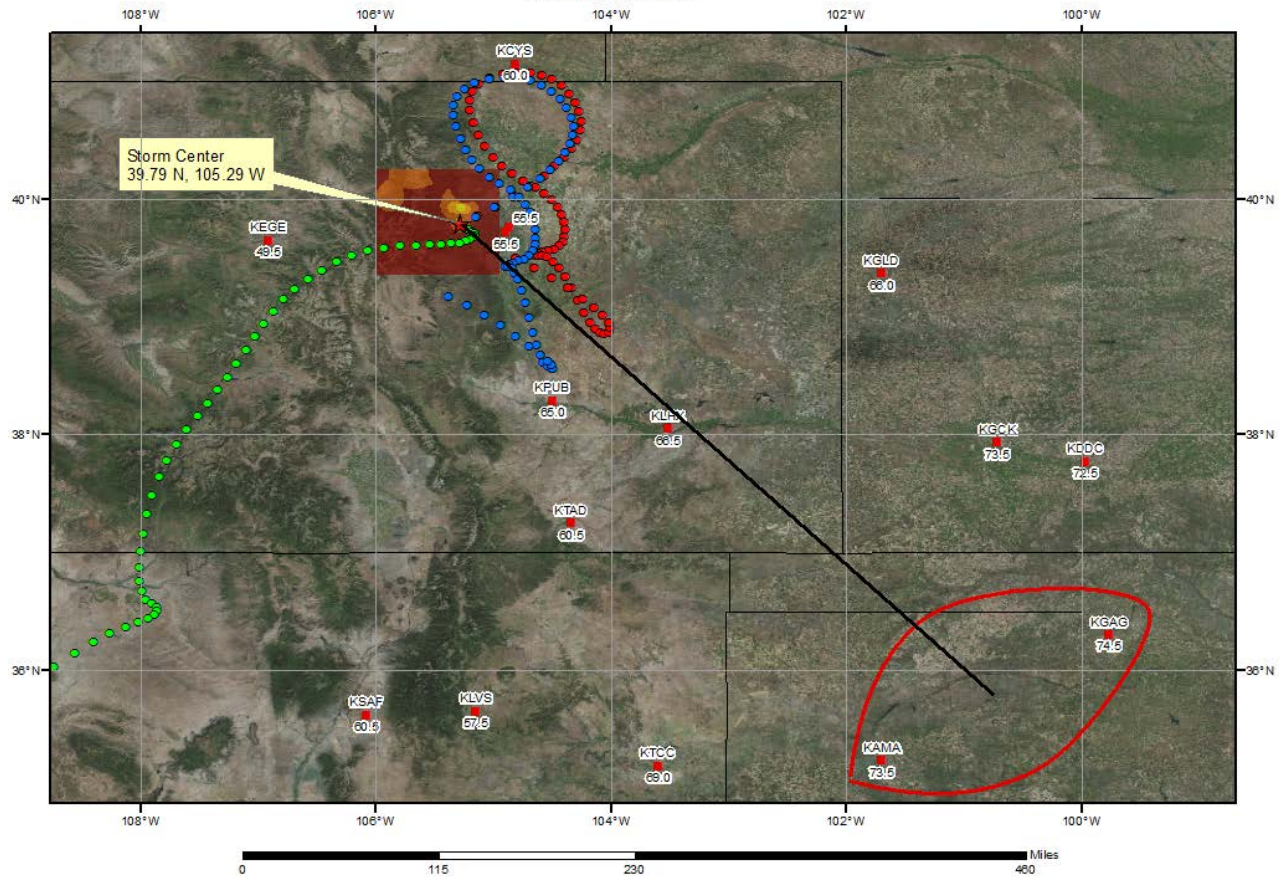
STORM STUDIES - ISOHYETAL MAPStorm of 7 June 1948Assignment MR 7-19Study Prepared by: Missouri River Division
Omaha, Nebr. District

FORM 8-3W

NOAA HYSPLIT MODEL
Backward trajectories ending at 0800 UTC 07 Jun 48
CDC1 Meteorological Data



SPAS 1613 Golden, CO Storm Analysis June 6-7, 1948



Storm Precipitation Analysis System (SPAS) For Storm #1602_1

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

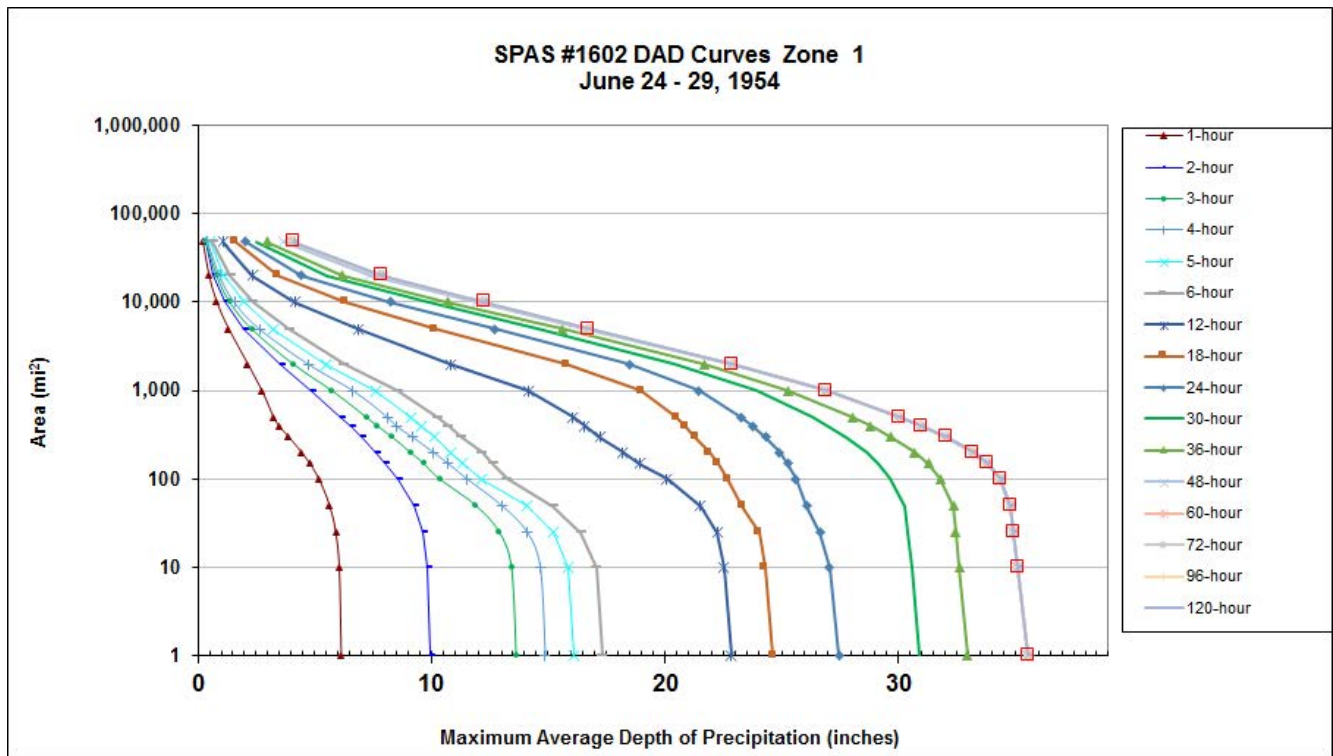
Depth-Area-Duration (DAD) analysis: Yes

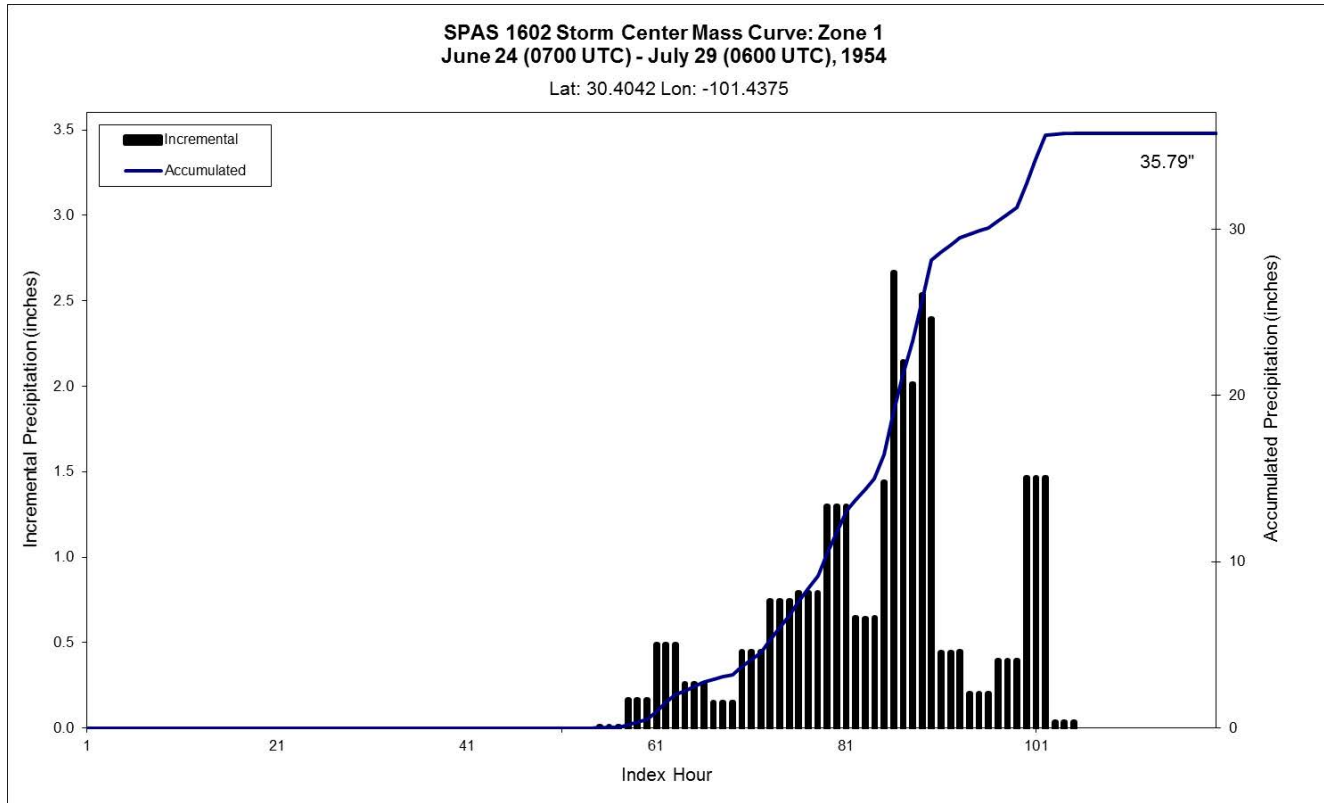
Reliability of results: This analysis was based on 279 hourly stations, daily data, and supplemental station data. We have a good degree of confidence for the station based storm total results. The spatial pattern is dependent heavily on the basemap created from the USGS Isohyetal image. Timing is based 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.

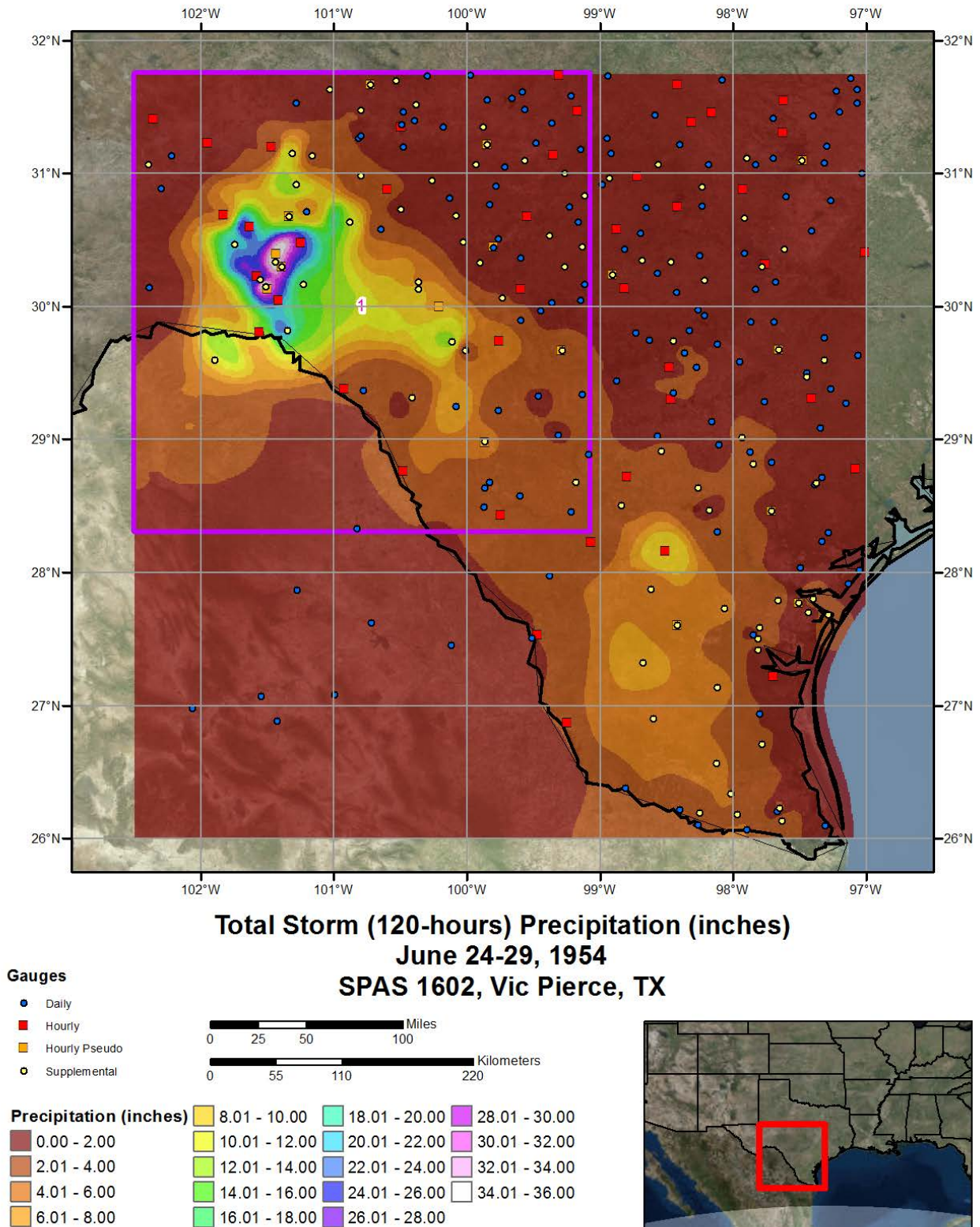
					Storm Rep. Dew Point					Climatological Max. Dew Point						
SPAS Storm ID	LON	LAT	ELEV	ELEV Round	T _d	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	T _d	T _d Round	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	IPMF
1602_1	-101.438	30.404	2,287	2,300	76.50	3.07	0.58	75	2.485	79.60	79.5	3.52	0.64	81	2.880	1.159

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	30	36	48	60	72	96	120	Total
0.4	6.18	10.03	13.73	14.96	16.20	17.43	22.97	24.78	27.63	31.07	33.10	35.70	35.72	35.72	35.72	35.72	35.72
1	6.14	9.97	13.64	14.87	16.10	17.33	22.84	24.64	27.46	30.92	32.96	35.52	35.55	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	30.56	32.60	35.09	35.11	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	30.41	32.46	34.91	34.94	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	30.30	32.35	34.79	34.81	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	29.66	31.78	34.33	34.36	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	29.12	31.28	33.81	33.84	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	28.62	30.70	33.19	33.22	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	27.73	29.70	32.05	32.08	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	26.97	28.81	30.97	30.99	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	26.30	28.03	30.03	30.05	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	23.92	25.26	26.93	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	20.43	21.69	22.83	22.86	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	14.56	15.61	16.51	16.69	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	9.91	10.70	11.97	12.18	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	5.53	6.19	7.40	7.77	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	2.50	2.97	3.67	3.98	4.04	4.07	4.08	4.08







STORM STUDIES - PERTINENT DATA SHEET

Storm of 23-28 June 1954

Assignment SW 3-22

Location Texas & Mexico

Study Prepared by:

Southwestern Division
Albuquerque District

Part I Reviewed by H. M. Sec. of
Weather Bureau, 3/1/55

Part II Approved by Office, Chief
of Engineers for Distribution
of Factual Data, 4/25/56

Remarks: Center at Vic. Pierce
Texas. Dewpoint 75° - Ref. Pt.
250 SE Grid J-18

DATA AND COMPUTATIONS COMPILED

PART I

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

Precipitation data and mass curves:

(Number of Sheets)

Form 5001-C (Hourly precip. data)----- 21

Form 5001-B (24-hour " ")-----0

Form 5001-D (" " " ") _____ 27

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

Form 5002 (Mass rainfall curves)..... 56

PART II

Final isohyetal maps, in 1 sheet, scale 1:500,000

Data and computation sheets:

Form S-10 (Data from mass rainfall curves)----- 6

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

Form S-12 (Maximum depth-duration data)----- 10

Maximum duration-depth-area curves 1

Maximum duration of dry spell (days).....	2
Data relating to periods of maximum rainfall.....	2

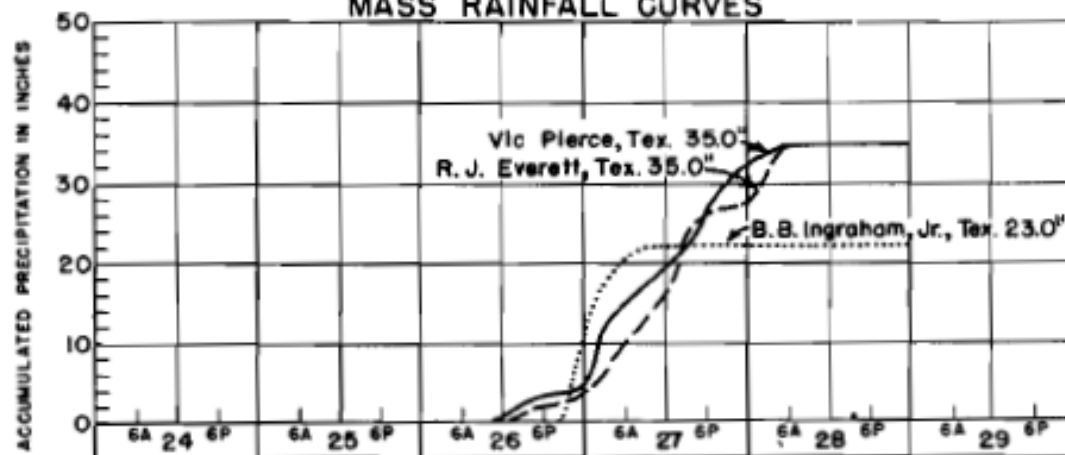
MAXIMUM AVERAGE DEPTH OF RAINFALL IN INCHES

Area in Sq. Mi.	Duration of Rainfall in Hours										
	6	12	18	24	30	36	48	60	72	96	120
Max Station	17.5	22.2	23.8	29.2	30.8	32.0	35.0	35.0	35.0	35.0	35.0
10	16.0	20.1	22.5	26.7	30.7	32.0	34.6	34.6	34.6	34.6	34.6
100	12.6	16.5	19.7	23.6	27.6	29.2	31.5	31.5	31.5	31.5	31.5
200	10.9	14.9	18.6	22.5	25.9	27.5	29.5	29.5	29.5	29.5	29.5
500	8.4	12.0	16.6	20.5	23.0	24.5	26.3	26.3	26.3	26.3	26.3
1,000	6.6	9.7	14.6	18.4	20.1	21.5	23.0	23.0	23.0	23.0	23.0
2,000	4.8	7.5	11.8	14.7	16.1	17.6	19.4	19.4	19.4	19.4	19.4
5,000	2.8	4.9	7.4	8.9	10.4	11.9	13.7	14.3	14.3	14.3	14.3
10,000	1.7	3.2	4.7	5.7	7.1	8.0	9.8	10.4	10.5	10.5	10.5
20,000	1.2	2.0	2.8	3.6	4.5	5.2	6.5	7.0	7.2	7.2	7.2
27,900	1.0	1.6	2.3	2.9	3.6	4.1	5.2	5.7	5.8	5.8	5.8

Form S-2

DEPARTMENT OF THE ARMY

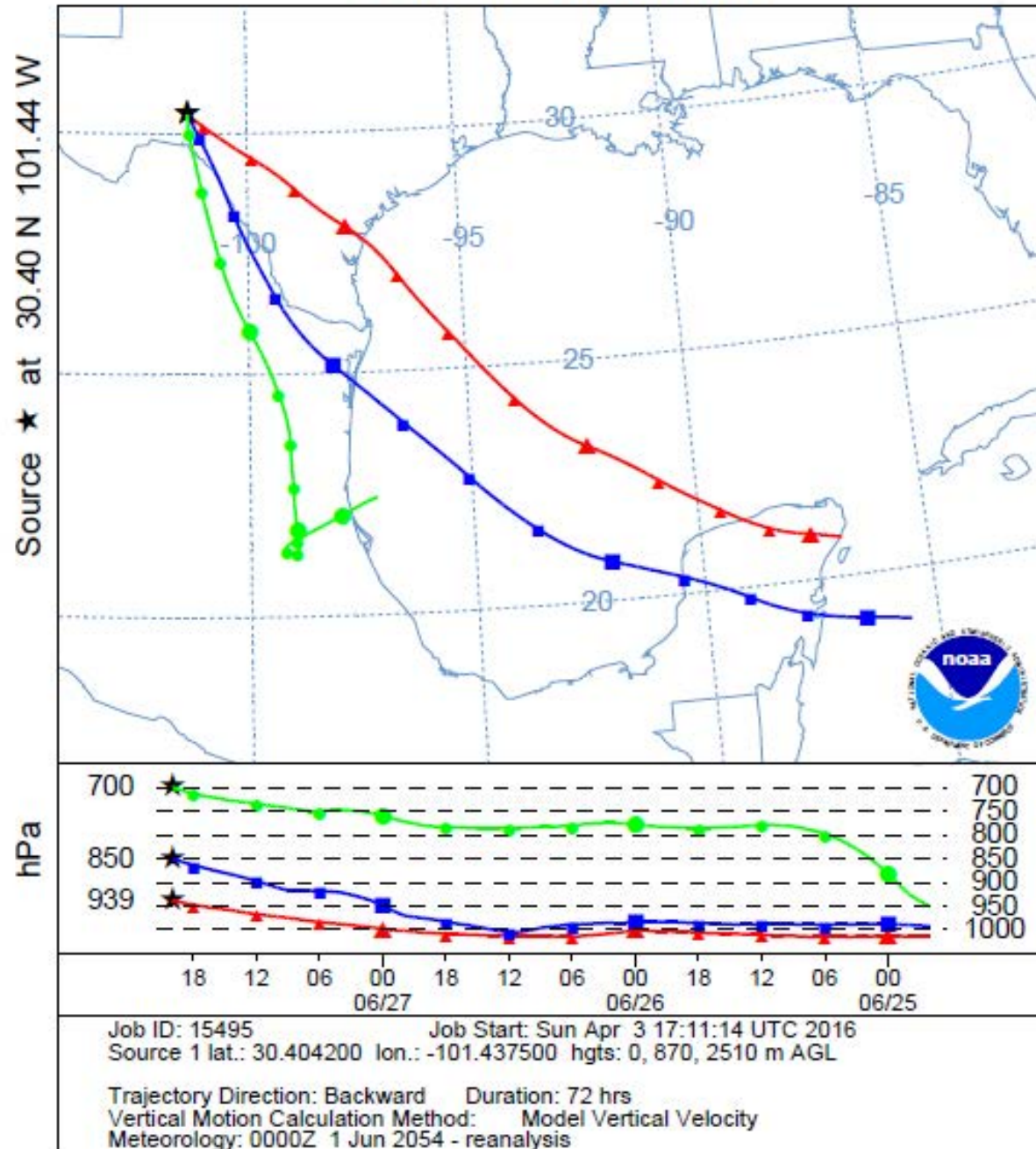
CORPS OF ENGINEERS

STORM STUDIES - ISOHYETAL MAPStorm of 23-28 June 1954Assignment SW 3-22Study Prepared by: Albuquerque, N.Mex. District
Southwestern Division**MASS RAINFALL CURVES**

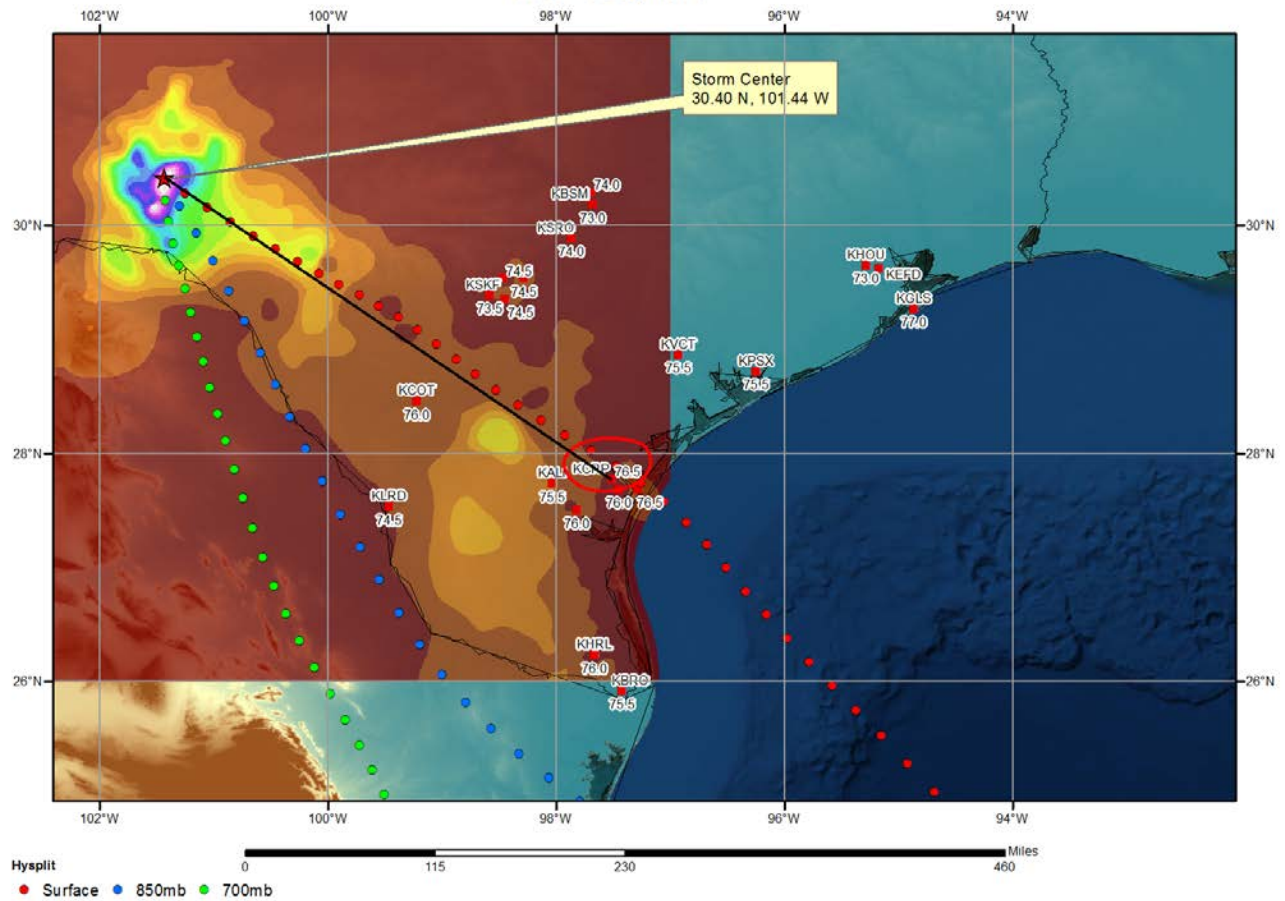
FORM 8-3W

U. S. GOVERNMENT PRINTING OFFICE : 1958 O - 454230

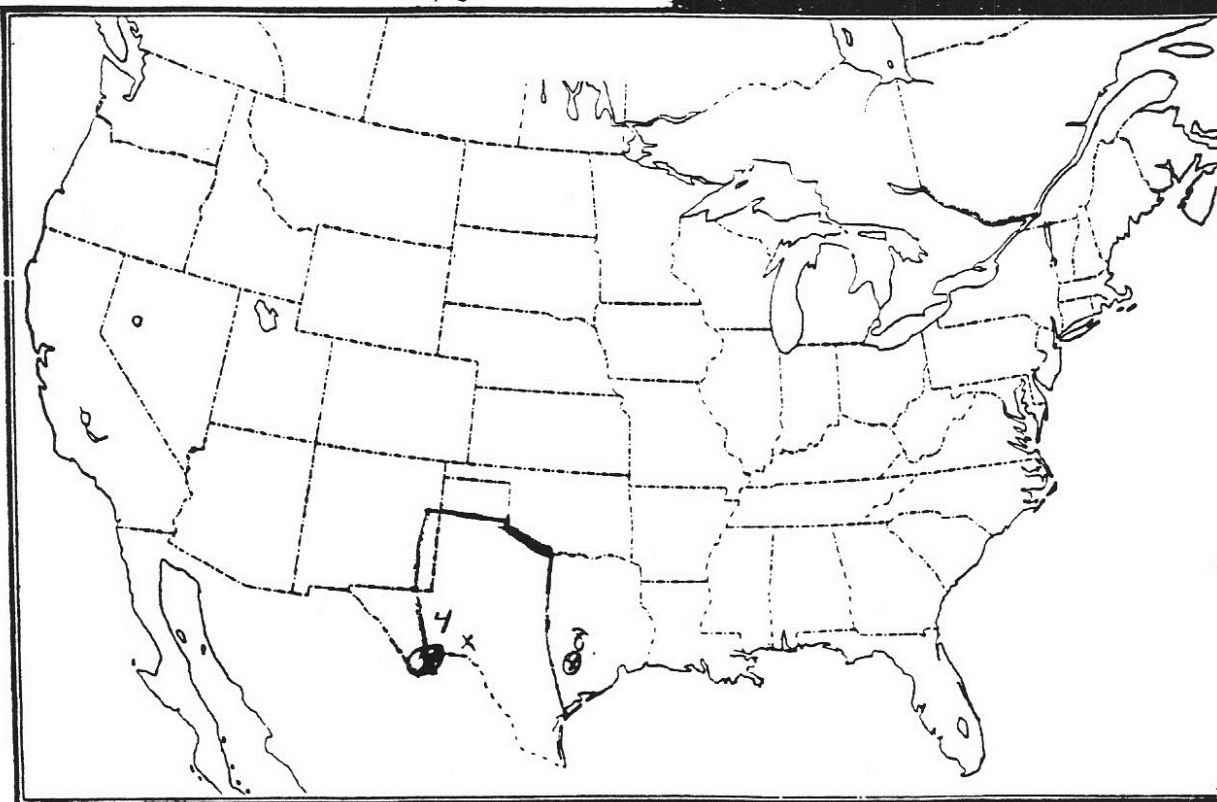
NOAA HYSPLIT MODEL
Backward trajectories ending at 2000 UTC 27 Jun 54
CDC1 Meteorological Data



SPAS 1602 Vic Pierce, TX Storm Analysis June 25-28, 1954



SW 3-22 June 23-28, 1954
 Vic Pierce, Texas 30°22' 101°23"
 12hr Td = 75°F, 2508E, 78°F 116%



Storm Precipitation Analysis System (SPAS) For Storm #1226_1

General Storm Location: College Hill, OH

Storm Dates: June 4 (0600) - June 5 (0600), 1963

Event: Convective

DAD Zone 1

Latitude: 40.0854

Longitude: -81.6479

Max. Grid/Radar Rainfall Amount: 19.39"

Max. Observed Rainfall Amount: 19.37"

Number of Stations: 132 (53 Daily, 15 Hourly, 6 Hourly Pseudo, 1 Hourly Estimated, 57 Supplemental)

SPAS Version: 9.0

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

Spatial resolution: 15 seconds*

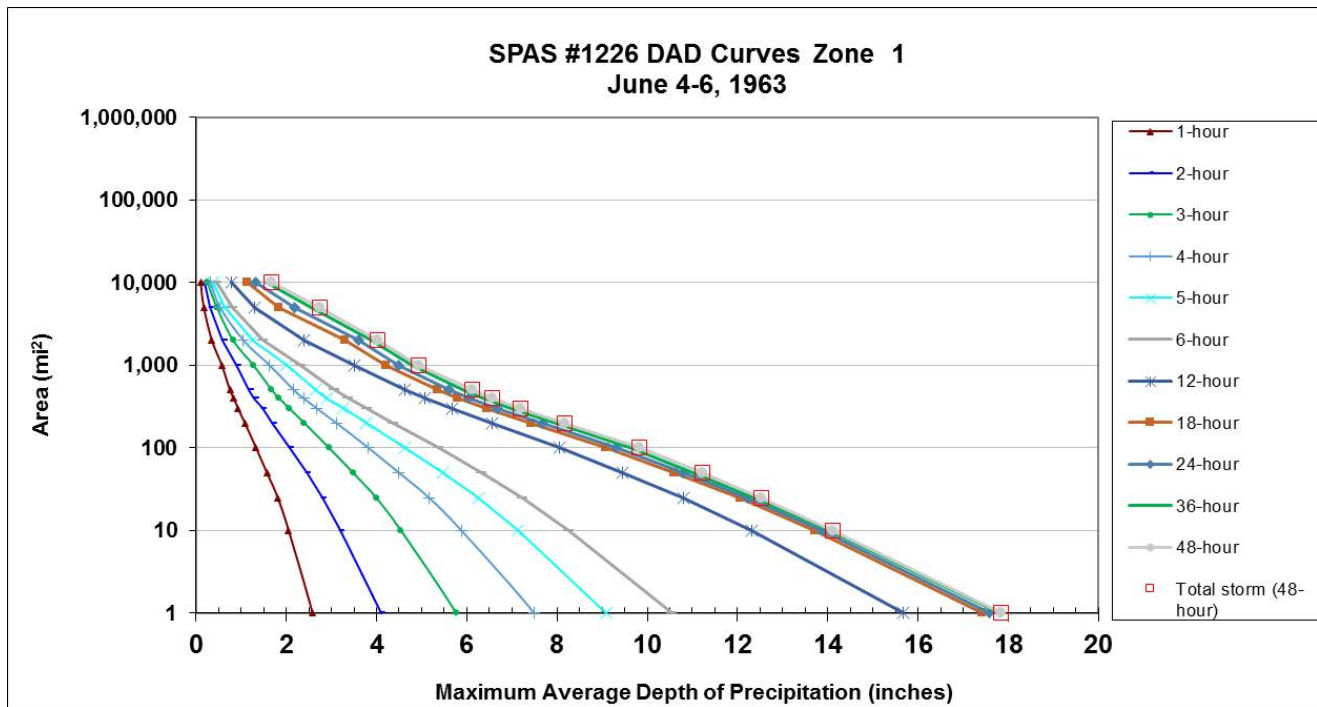
Radar Included: No

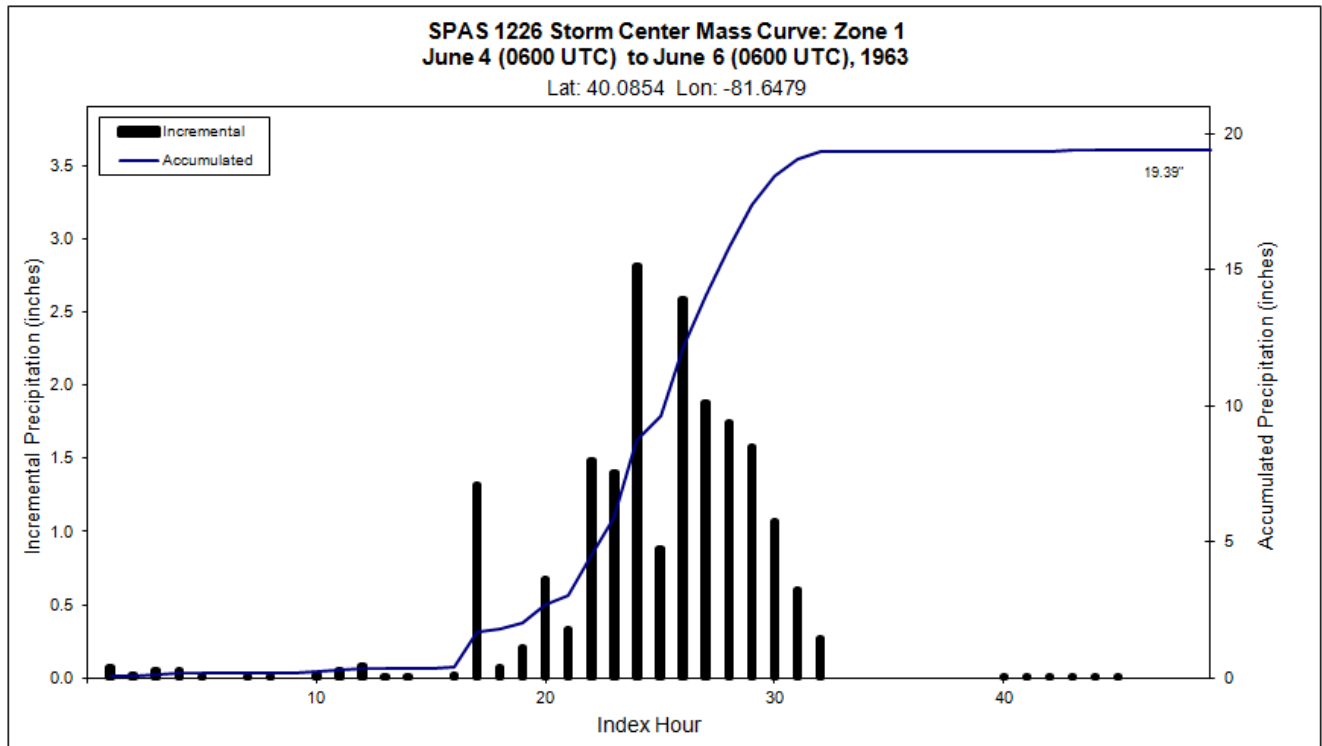
Depth-Area-Duration (DAD) analysis: Yes

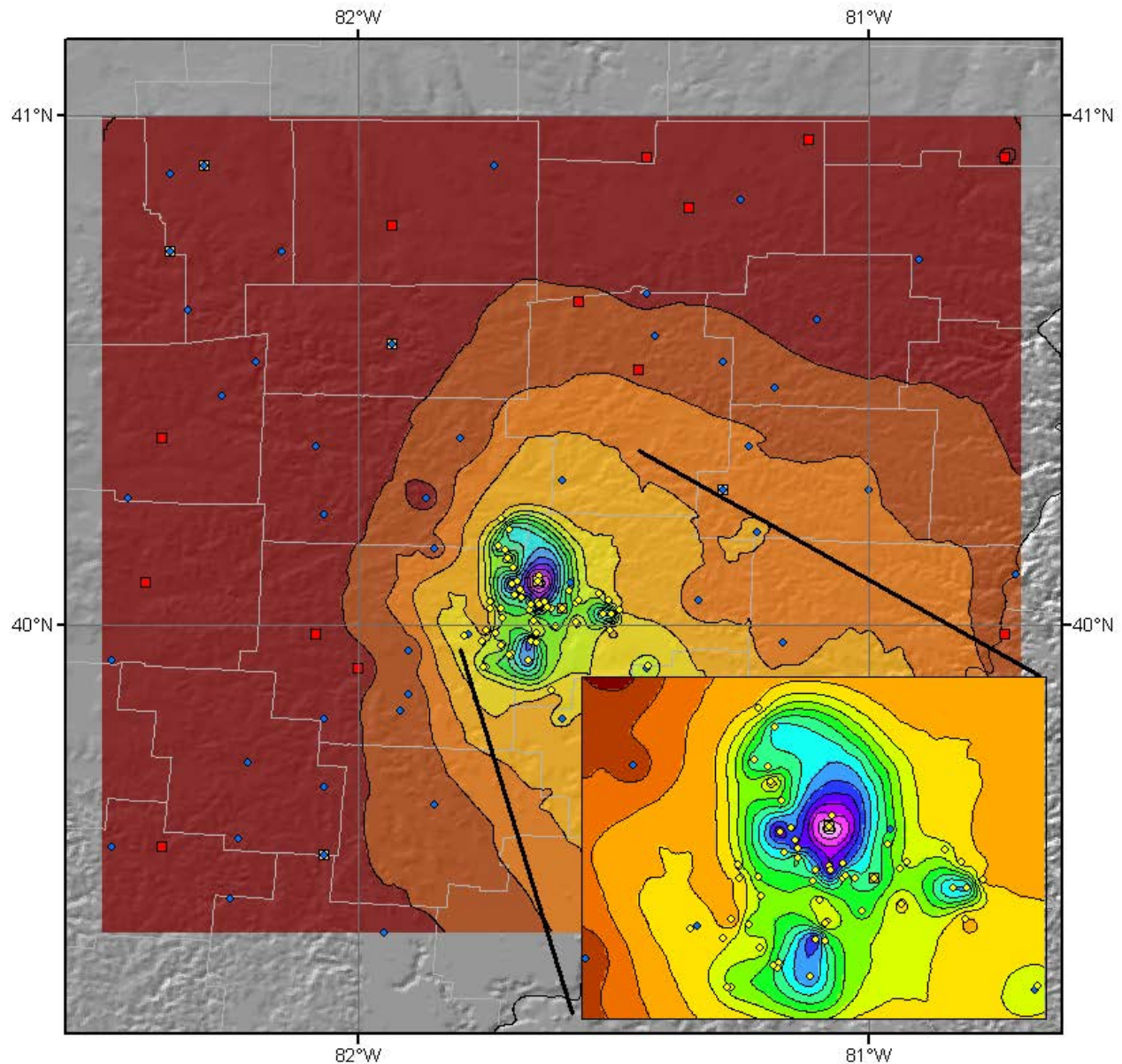
*A higher spatial resolution (15-sec vs. 30-sec) was used in this analysis to better capture the spatial details.

					Storm Rep. Dew Point					Climatological Max. Dew Point						
SPAS Storm ID	LON	LAT	ELEV	ELEV Round	T _d	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	T _d	T _d Round	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	IPMF
1226_1	-81.648	40.085	974	1,000	68.50	2.10	0.21	59	1.890	77.18	77.0	3.14	0.27	76	2.870	1.500

Storm 1226 - June 4 (0600 UTC) - June 6 (0600 UTC), 1963												
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)												
Area (mi ²)	Duration (hours)											
	1	2	3	4	5	6	12	18	24	36	48	Total
0.4	2.71	4.30	6.02	7.86	9.51	11.06	16.37	18.20	18.38	18.58	18.63	18.63
1	2.58	4.10	5.76	7.49	9.10	10.54	15.67	17.43	17.59	17.79	17.83	17.83
10	2.05	3.19	4.54	5.88	7.13	8.26	12.32	13.72	13.87	14.04	14.12	14.12
25	1.81	2.79	3.99	5.16	6.25	7.24	10.81	12.06	12.22	12.39	12.53	12.53
50	1.57	2.44	3.48	4.50	5.46	6.33	9.46	10.59	10.80	11.02	11.22	11.22
100	1.33	2.07	2.95	3.82	4.64	5.38	8.05	9.07	9.31	9.62	9.83	9.83
200	1.08	1.69	2.40	3.11	3.77	4.38	6.56	7.43	7.69	7.99	8.18	8.18
300	0.93	1.46	2.07	2.68	3.26	3.79	5.68	6.44	6.68	6.99	7.20	7.20
400	0.83	1.29	1.84	2.38	2.90	3.37	5.07	5.80	6.04	6.36	6.57	6.57
500	0.75	1.18	1.68	2.17	2.65	3.07	4.63	5.36	5.61	5.92	6.13	6.13
1,000	0.57	0.89	1.27	1.63	2.00	2.32	3.51	4.20	4.49	4.78	4.94	4.94
2,000	0.35	0.59	0.82	1.05	1.26	1.49	2.39	3.29	3.60	3.88	4.02	4.02
5,000	0.17	0.30	0.46	0.53	0.64	0.80	1.30	1.83	2.18	2.55	2.73	2.73
10,000	0.10	0.18	0.25	0.32	0.38	0.45	0.78	1.13	1.31	1.56	1.66	1.66







Total Precipitation (48 hours)

SPAS #1226

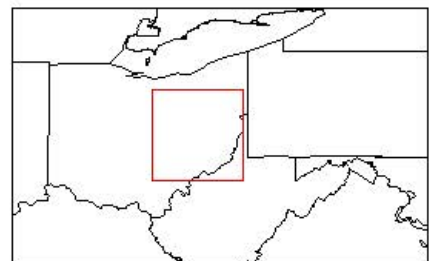
6/04/1963 0600 UTC - 6/06/1963 0600 UTC

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

0 5 10 20 30 Miles

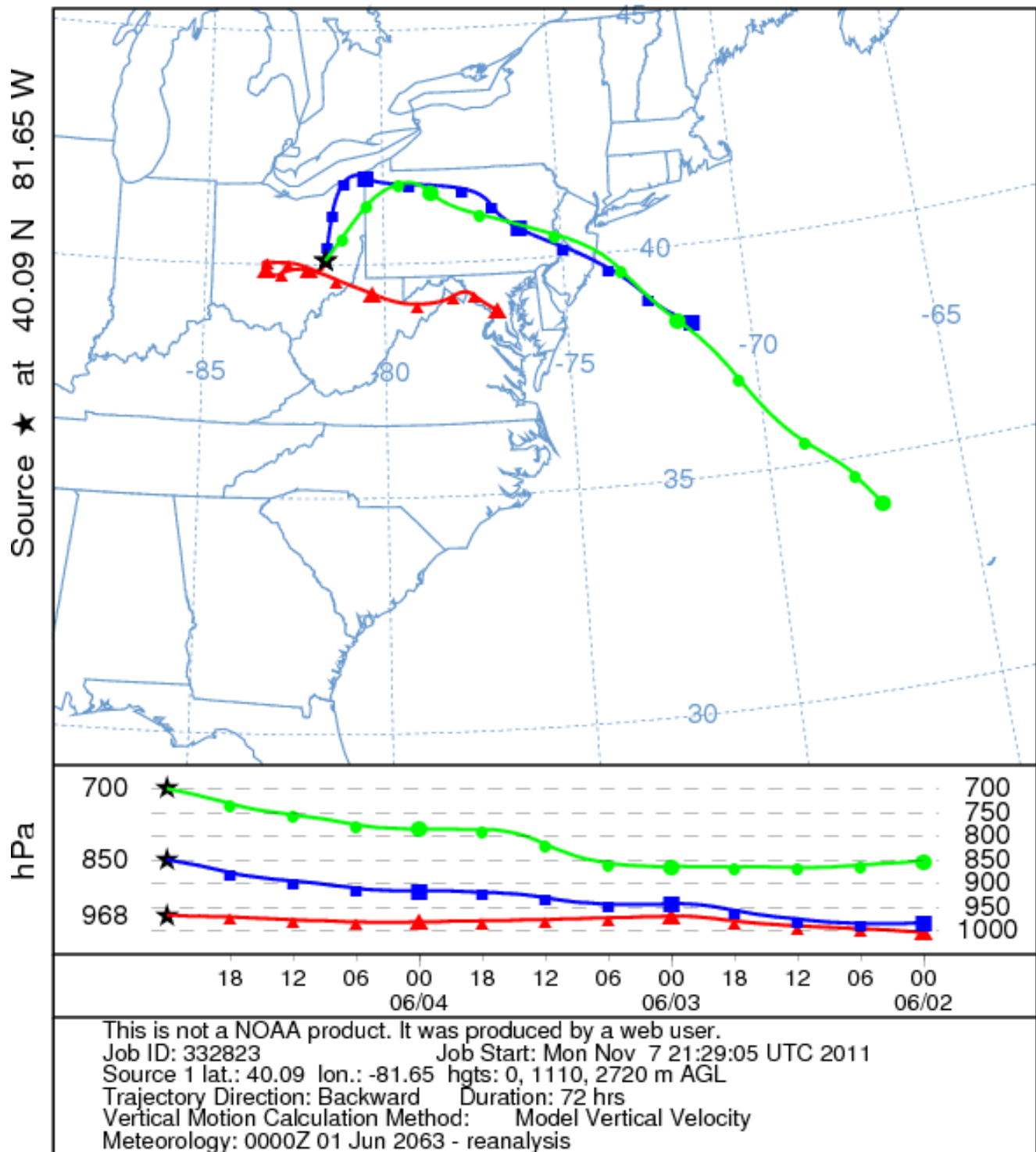
Precipitation (inches)

- | | | | | |
|-------------|-------------|---------------|---------------|---------------|
| 0.00 - 1.00 | 4.01 - 5.00 | 8.01 - 9.00 | 12.01 - 13.00 | 18.01 - 20.00 |
| 1.01 - 2.00 | 5.01 - 6.00 | 9.01 - 10.00 | 13.01 - 14.00 | |
| 2.01 - 3.00 | 6.01 - 7.00 | 10.01 - 11.00 | 14.01 - 16.00 | |
| 3.01 - 4.00 | 7.01 - 8.00 | 11.01 - 12.00 | 16.01 - 18.00 | |

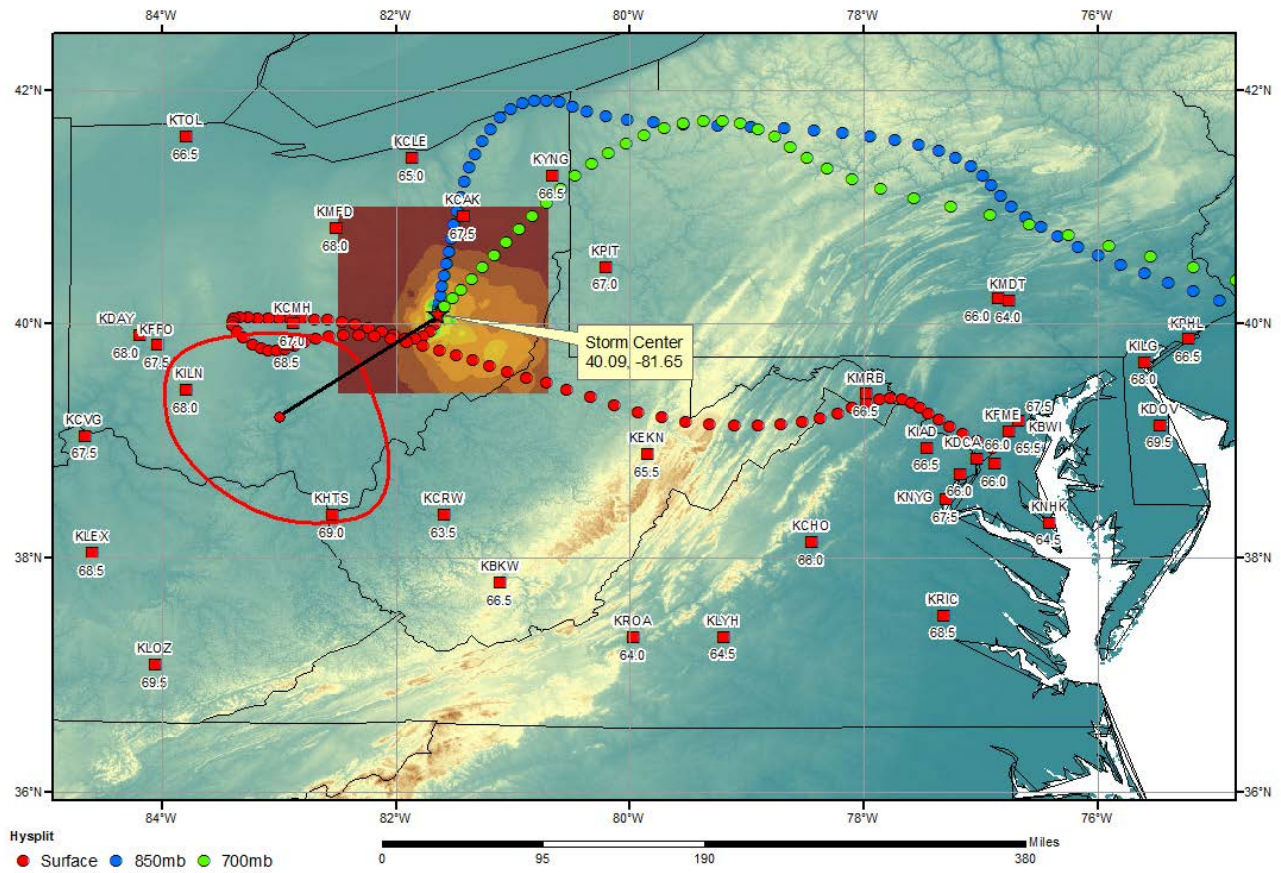


11/25/2011

NOAA HYSPLIT MODEL
Backward trajectories ending at 0000 UTC 05 Jun 63
CDC1 Meteorological Data



College Hill, OH Storm Analysis June 1-5, 1963



Storm Precipitation Analysis System (SPAS) For Storm #1030_1

General Storm Location: Wahoo, NE

Storm Dates: June 22-24, 1963

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

DAD Zone 1

Latitude: 41.2132

Longitude: -97.0710

Rainfall Amount: 15.98 inches

Number of Stations: 222

SPAS Version: 2.0

Base Map Used: No

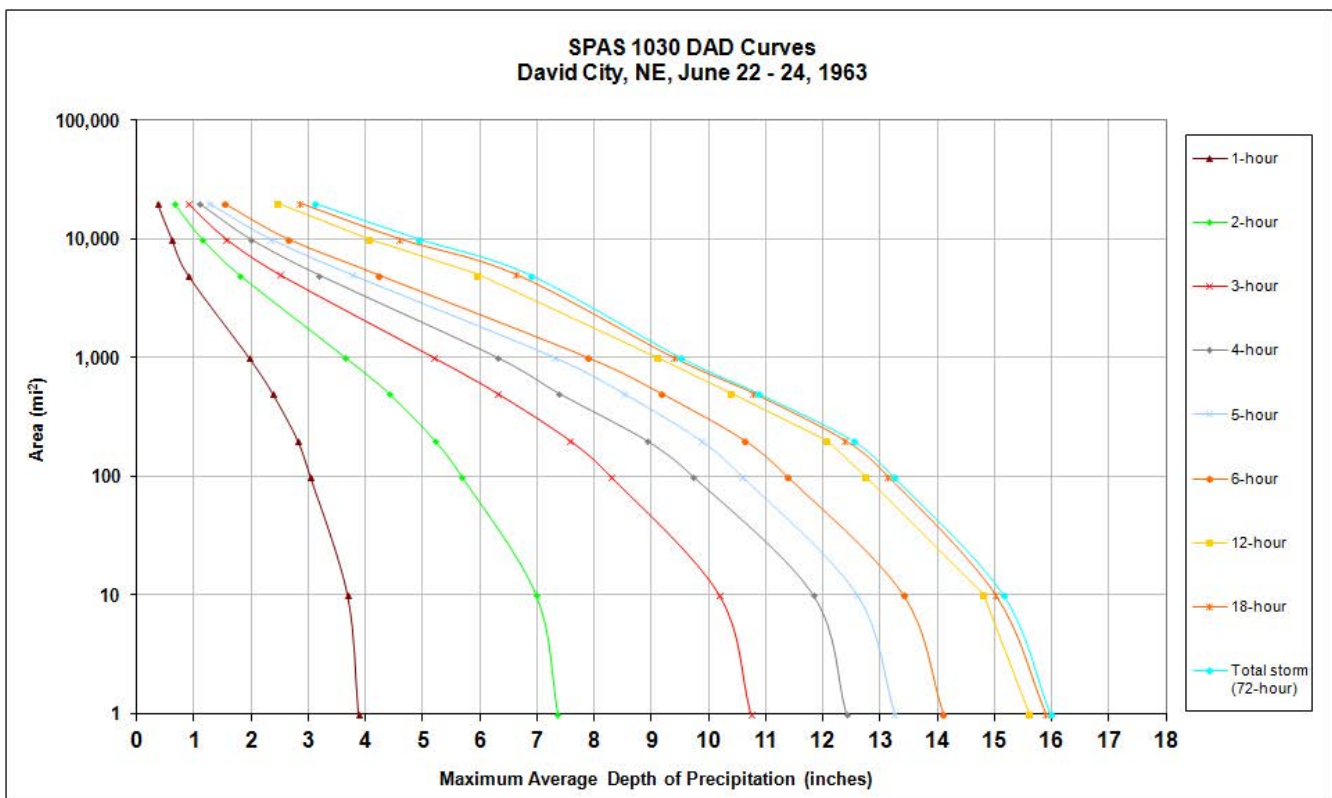
Radar Included: No

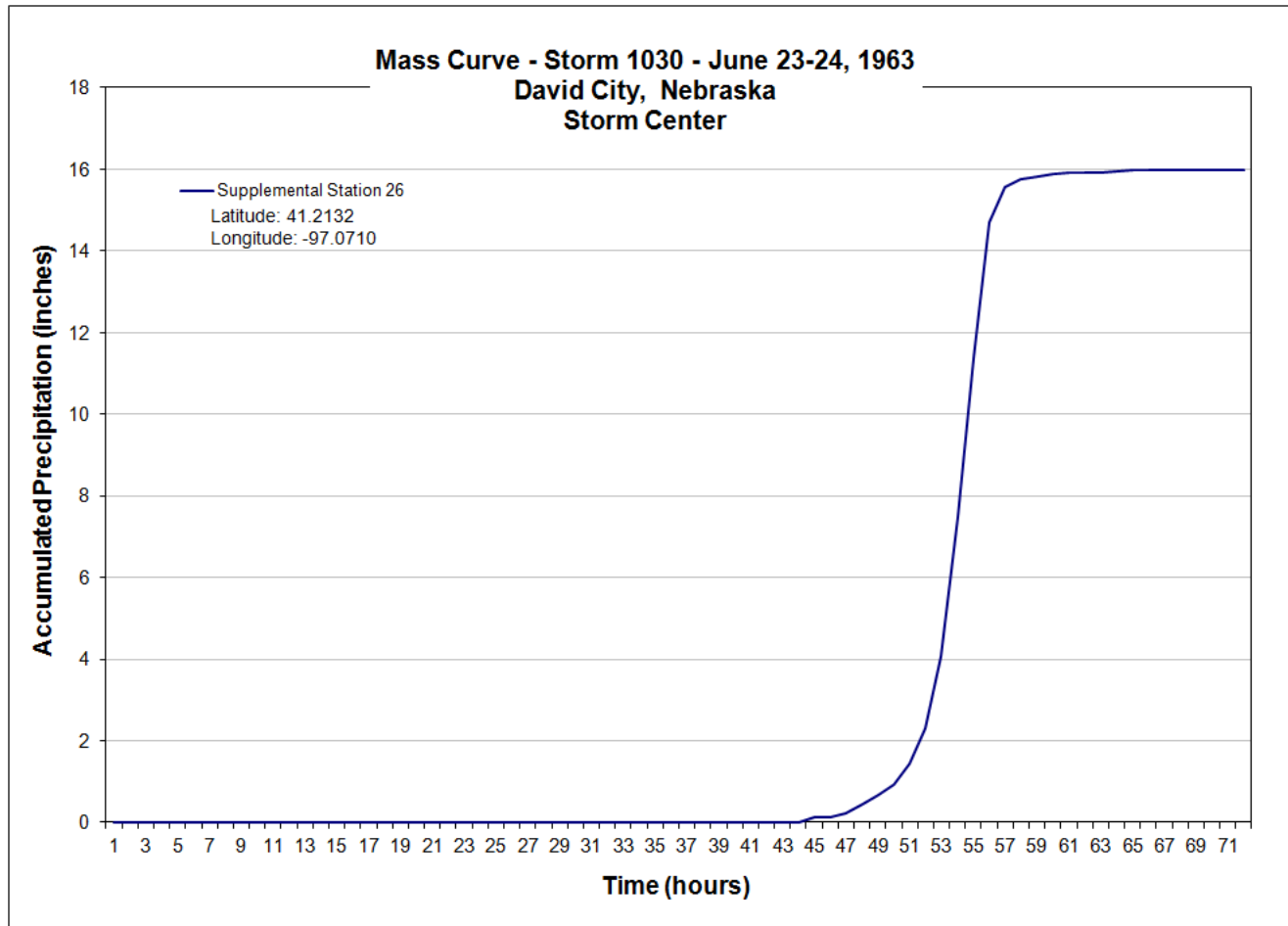
Depth-Area-Duration (DAD) analysis: Yes, 1, 2, 3, 4, 5, 6, 12, 18, 24, 36, 48, and 72 hours

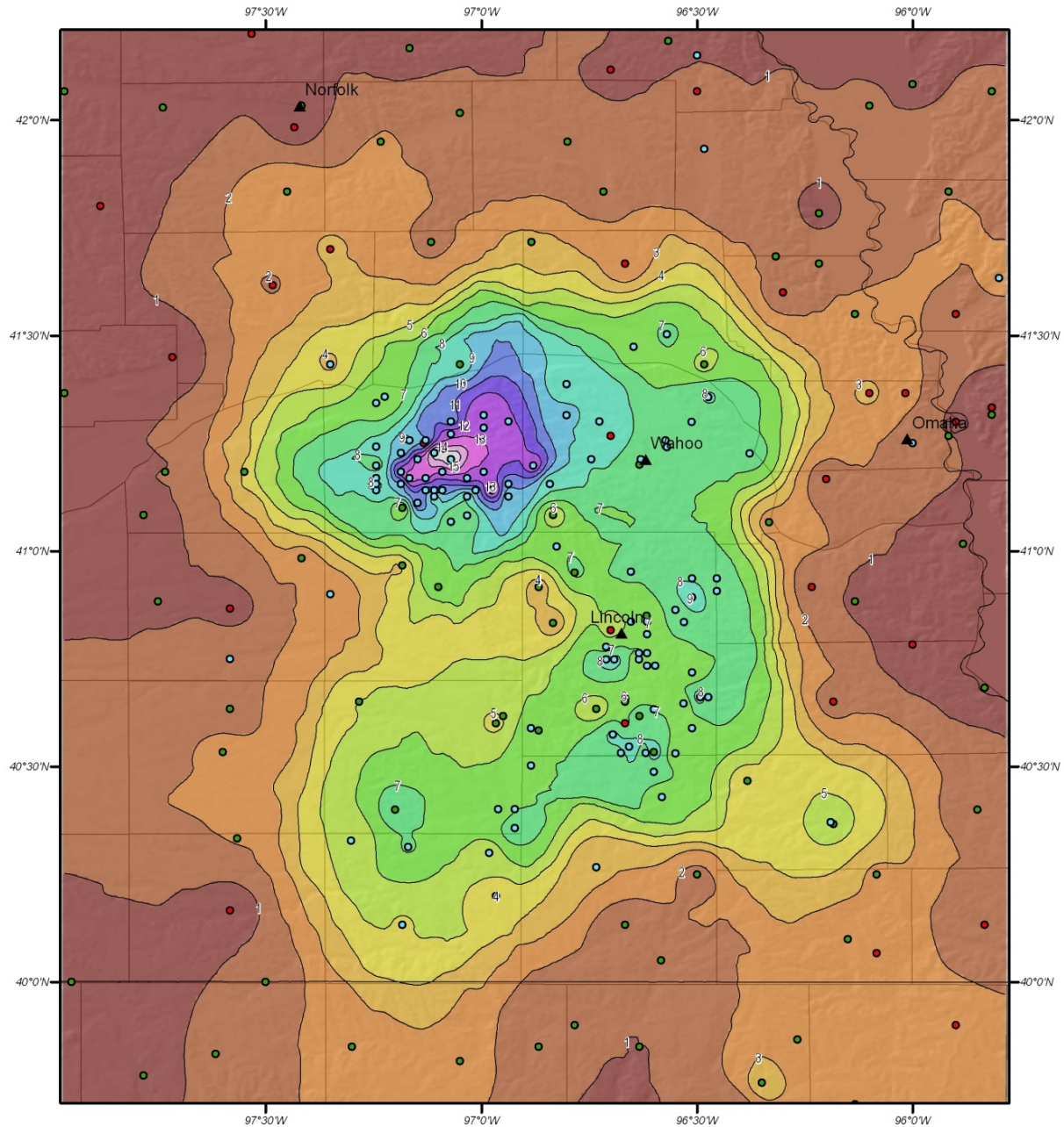
					Storm Rep. Dew Point					Climatological Max. Dew Point						
SPAS Storm ID	LON	LAT	ELEV	ELEV Round	T _d	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	T _d	T _d Round	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	IPMF
1030_1	-97.071	41.213	1,626	1,600	73.50	2.67	0.38	69	2.290	82.00	82.0	3.95	0.48	86	3.470	1.500

SPAS Storm 1030 - David City, NE, June 22 - 24, 1963
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)

Area (mi ²)	Duration (hours)											
	1	2	3	4	5	6	12	18	24	36	48	72
1	3.87	7.36	10.73	12.40	13.26	14.10	15.61	15.90	15.98	15.98	15.98	15.98
10	3.68	6.98	10.18	11.82	12.60	13.40	14.80	15.02	15.15	15.13	15.13	15.16
100	3.03	5.68	8.28	9.72	10.59	11.37	12.75	13.14	13.23	13.23	13.23	13.23
200	2.81	5.21	7.57	8.91	9.87	10.63	12.07	12.39	12.49	12.49	12.50	12.52
500	2.37	4.41	6.30	7.38	8.52	9.17	10.39	10.79	10.82	10.84	10.86	10.87
1,000	1.96	3.65	5.19	6.31	7.32	7.89	9.10	9.39	9.45	9.47	9.48	9.51
5,000	0.89	1.80	2.50	3.18	3.77	4.22	5.96	6.64	6.80	6.83	6.87	6.87
10,000	0.61	1.15	1.56	1.99	2.35	2.65	4.07	4.60	4.84	4.91	4.92	4.93
20,000	0.36	0.66	0.89	1.09	1.27	1.53	2.46	2.85	3.04	3.09	3.10	3.10

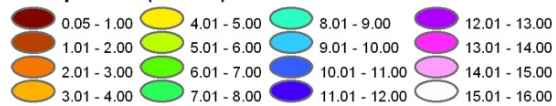




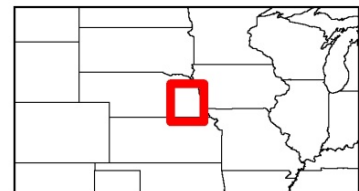
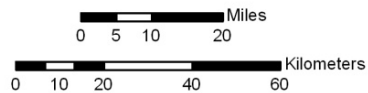


SPAS Storm #1030 - June 22 to 24, 1963
Total Rainfall (72-hours) - Wahoo, Nebraska

Precipitation (inches)

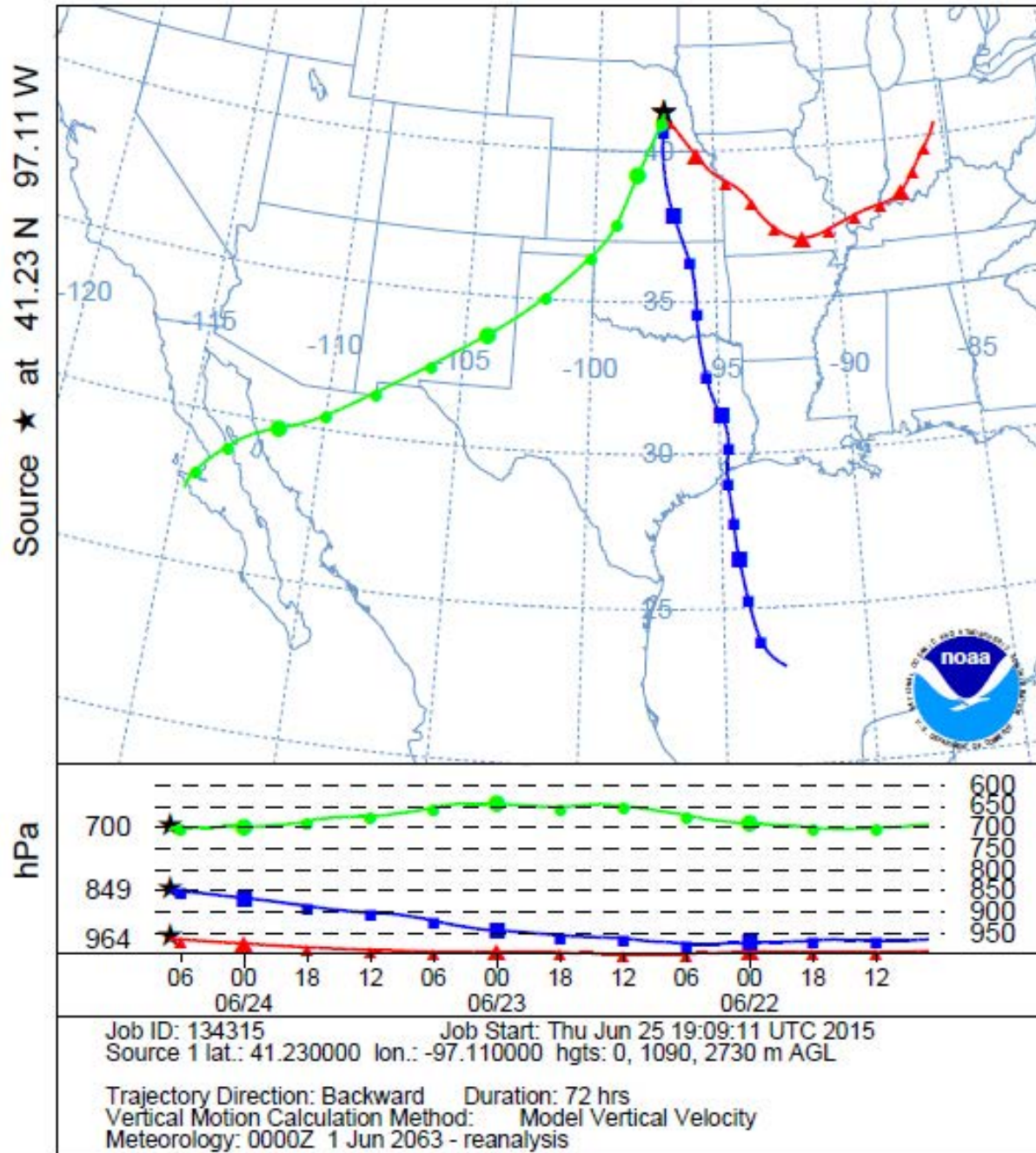


Gauging Stations

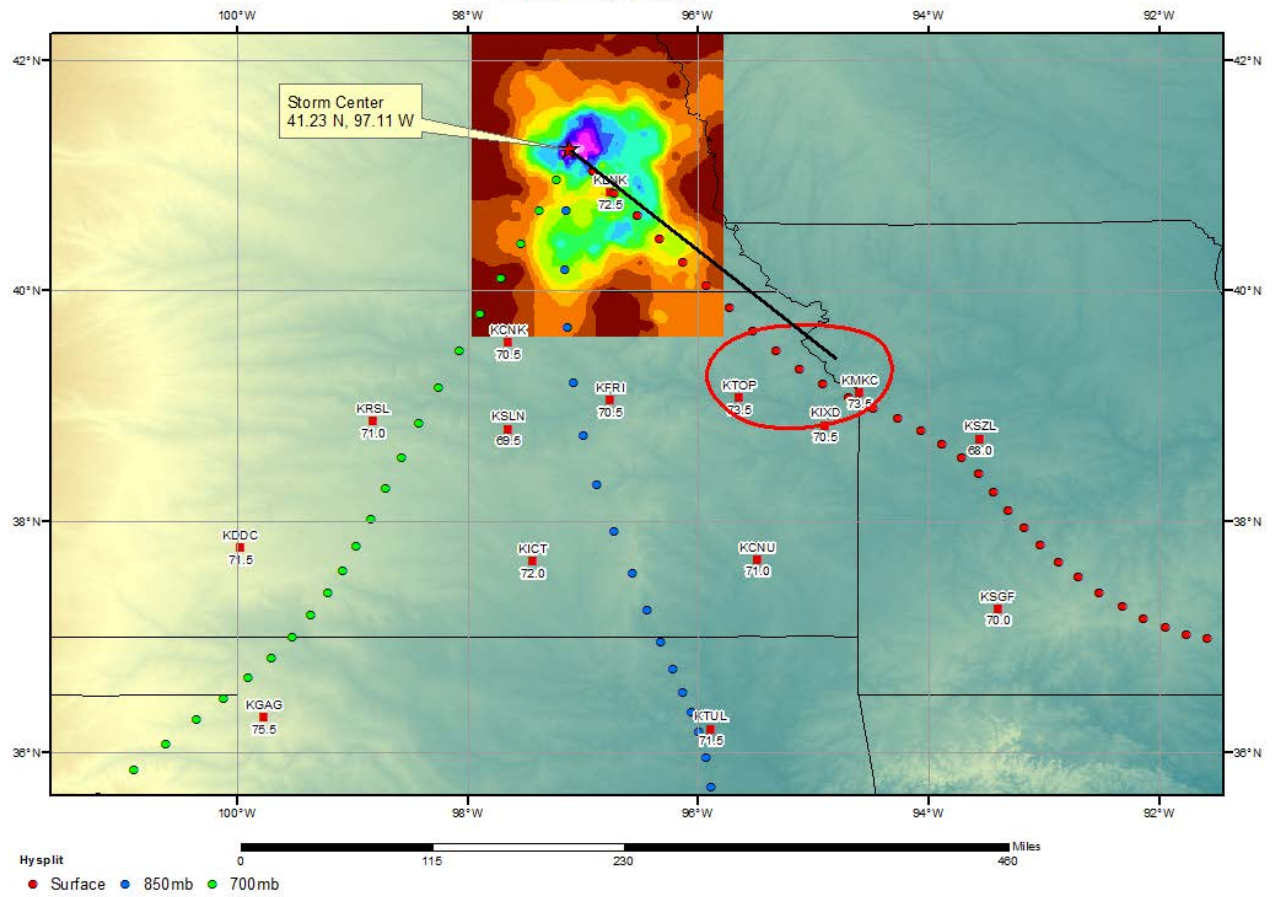


Coordinate system: GCS North American 1983
 Scale: 1:44,522,173 Metstat/AWA March 1, 2007

NOAA HYSPLIT MODEL
 Backward trajectories ending at 0700 UTC 24 Jun 63
 CDC1 Meteorological Data



SPAS 1030 David City, NE Storm Analysis
June 21-24, 1963



Storm Precipitation Analysis System (SPAS) For Storm #1293_1 (Re-Run of SPAS #1009)

General Storm Location: Southeastern Colorado, extreme northeastern New Mexico and extreme eastern 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.

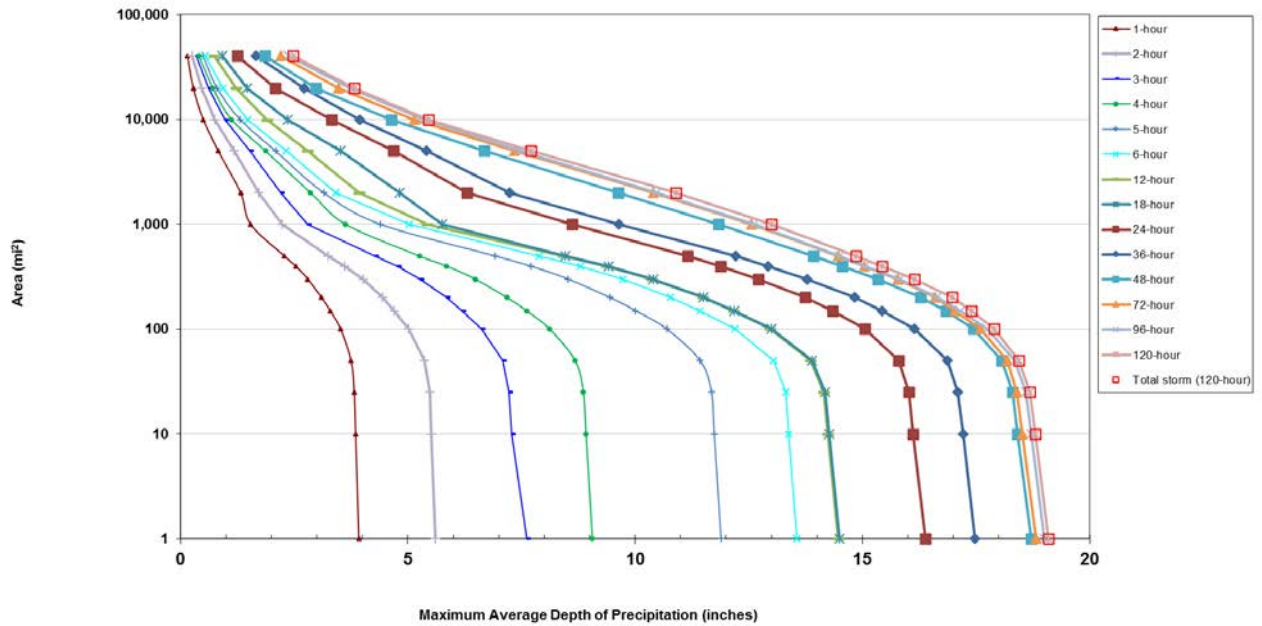
Unlike SPAS #1009 where the storm center was near Holly, SPAS #1293 has the storm center about 30 miles southwest of Holly (or 28 miles south –southeast of Lamar, CO). The USGS report stated intense rains began on June 16th in this area and dropped 15.5” of rain. Coupled with other rain showers during 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.

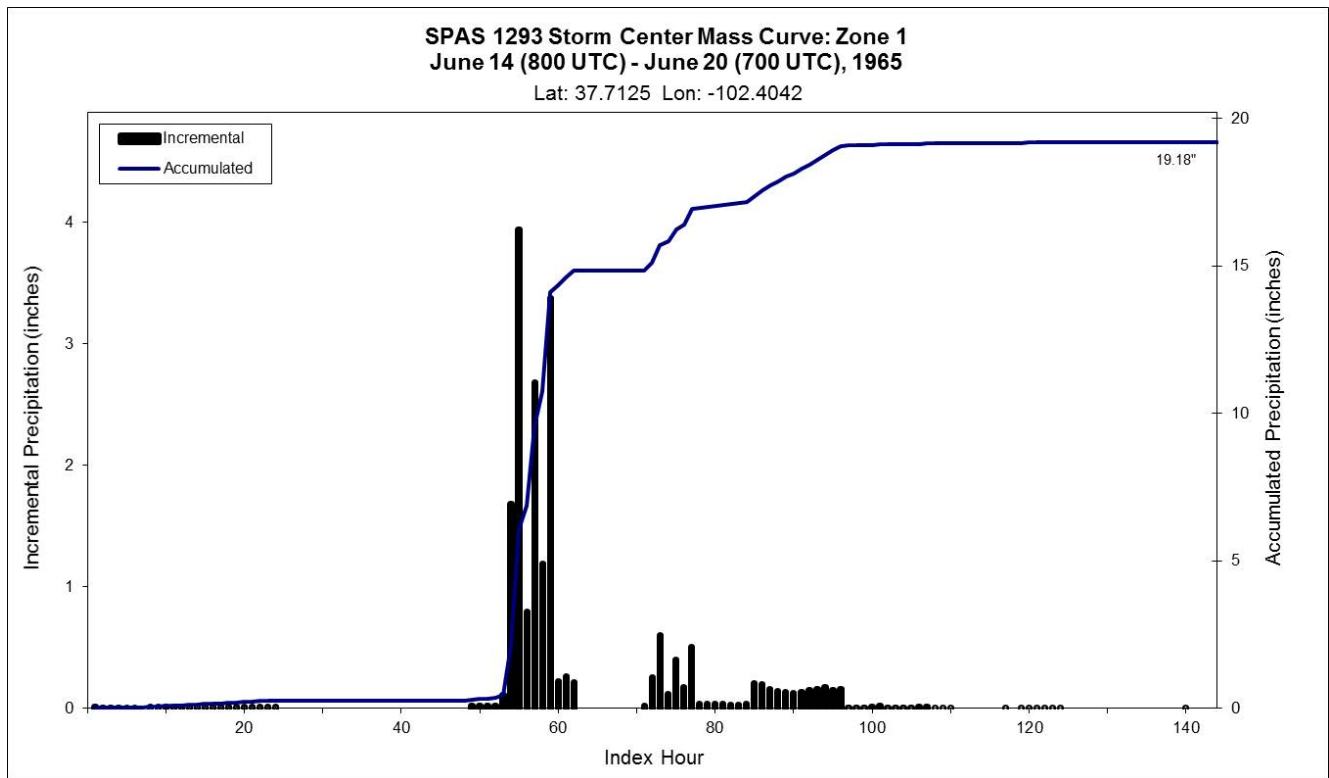
					Storm Rep. Dew Point					Climatological Max. Dew Point						
SPAS Storm ID	LON	LAT	ELEV	ELEV Round	T _d	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	T _d	T _d Round	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	IPMF
1293_1	-102.404	37.713	4,098	4,100	77.00	3.14	0.99	76	2.150	80.95	81.0	3.77	1.12	84	2.650	1.233

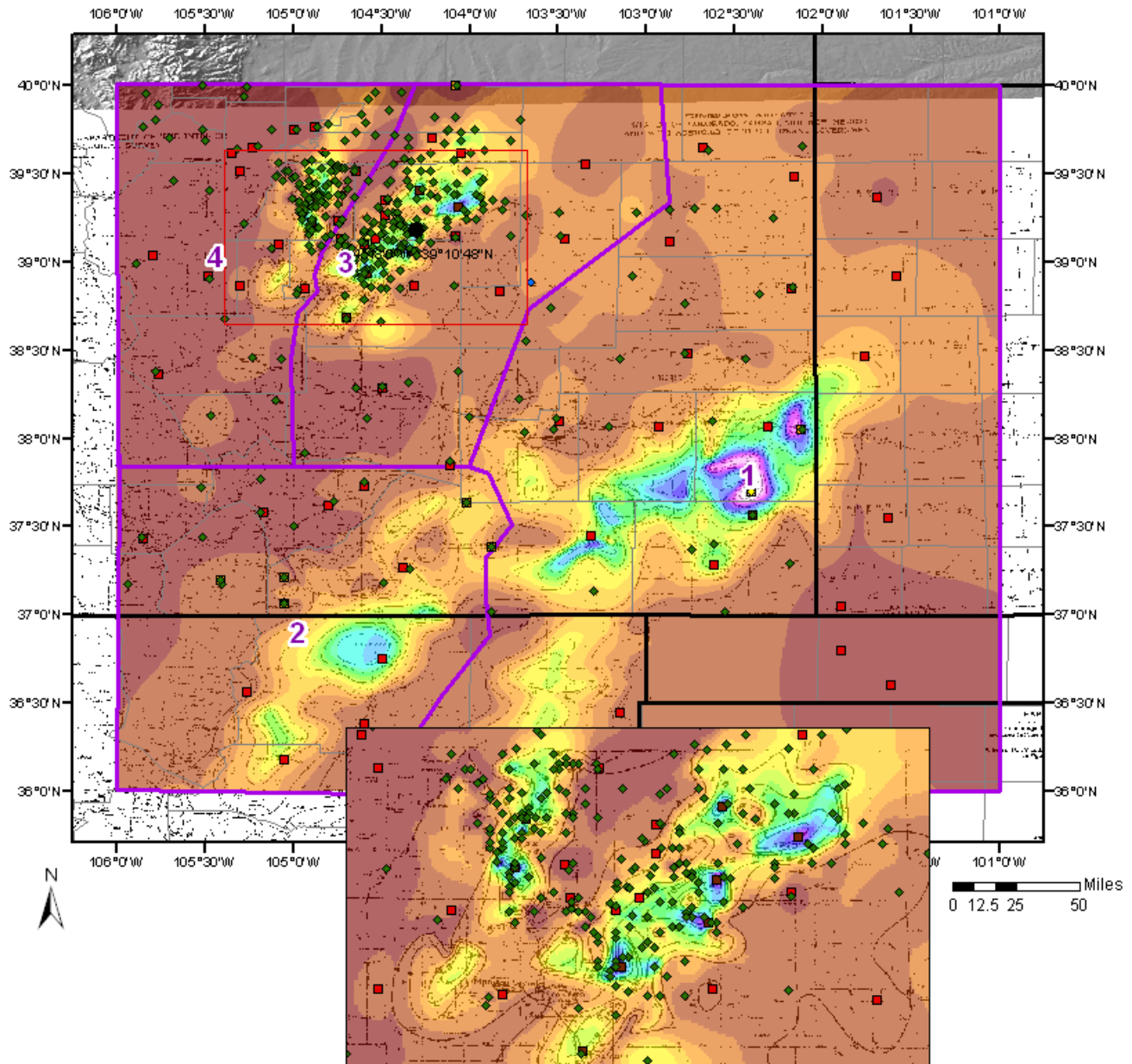
SPAS 1293 - June 14 (800 UTC) - June 20 (700 UTC), 1965
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)

Area (mi ²)	Duration (hours)													
	1	2	3	4	5	6	12	18	24	36	48	72	96	120
Total	19.18	19.09	18.82	18.71	18.69	18.67	18.44	18.35	18.30	18.25	18.20	18.15	18.10	18.05
0.4	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

SPAS #1293 DAD Curves Zone 1
June 14-20, 1965







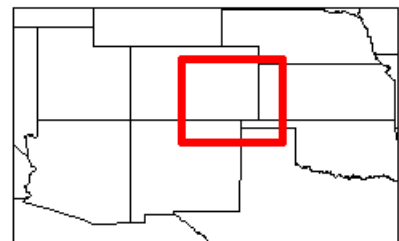
Total 144-hour Precipitation (inches)
06/14/1965 08 UTC - 06/20/1965 07 UTC
SPAS #1293

Precipitation (inches)

0.00 - 1.00	7.01 - 8.00	14.01 - 15.00
1.01 - 2.00	8.01 - 9.00	15.01 - 16.00
2.01 - 3.00	9.01 - 10.00	16.01 - 17.00
3.01 - 4.00	10.01 - 11.00	17.01 - 18.00
4.01 - 5.00	11.01 - 12.00	18.01 - 19.00
5.01 - 6.00	12.01 - 13.00	
6.01 - 7.00	13.01 - 14.00	

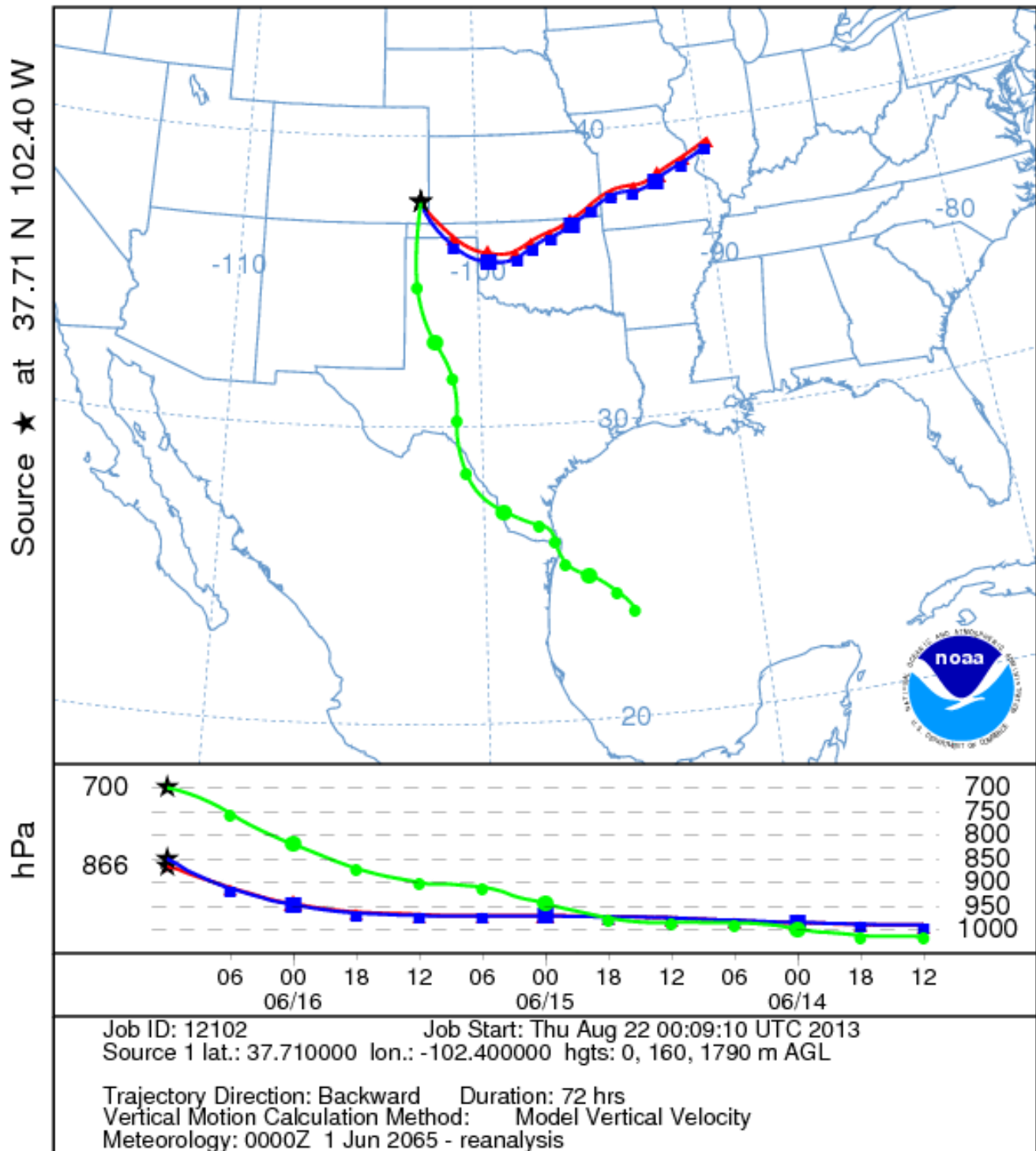
Stations

Hourly
Hourly Estimated
Hourly Est. Pseudo
Hourly Pseudo
Daily
Supplemental
Supplemental Est.

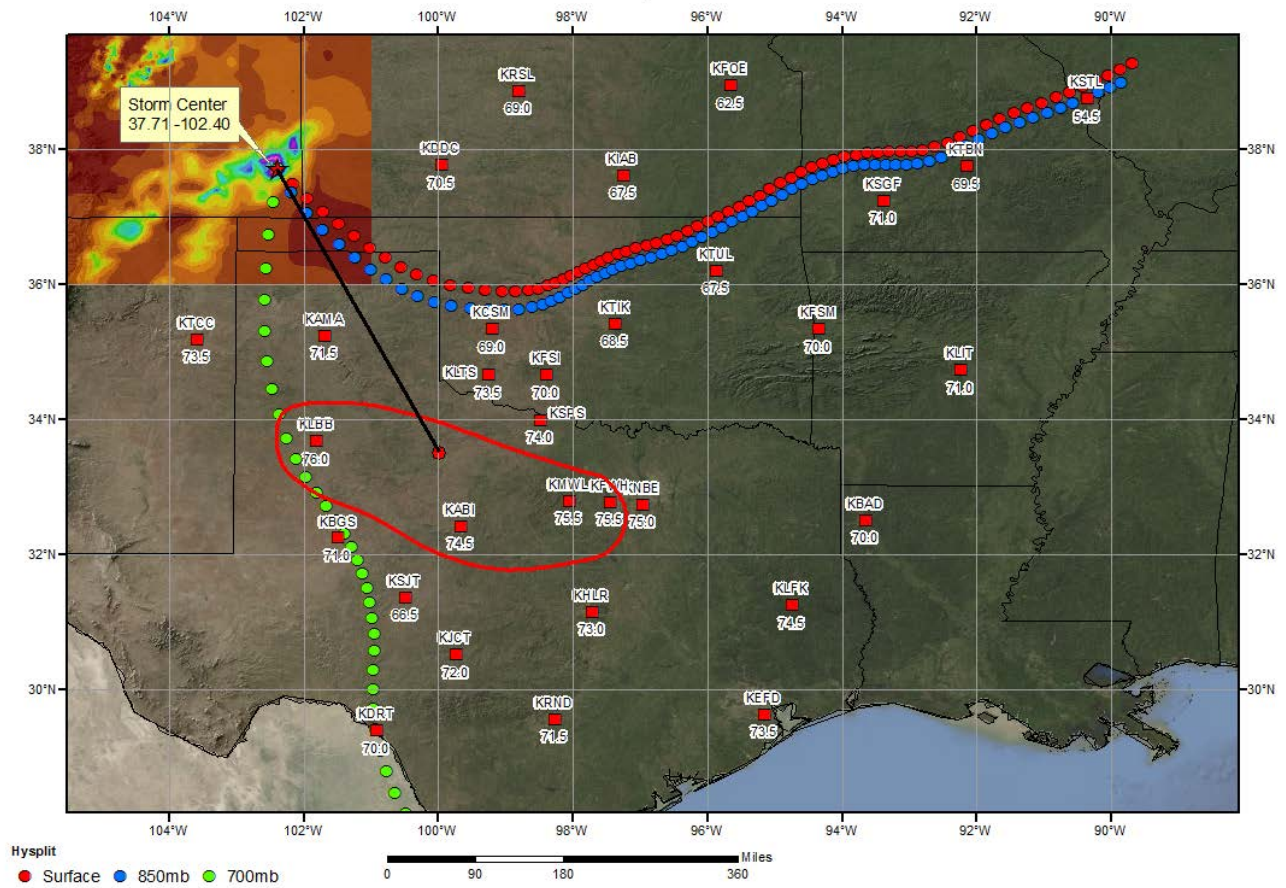


06/20/2013 (updated 12/9/13)

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



SPAS 1293 Holly, CO Storm Analysis
June 13-16, 1965



Storm Precipitation Analysis System (SPAS) For Storm #1034_1

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)

DAD Zone 1

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

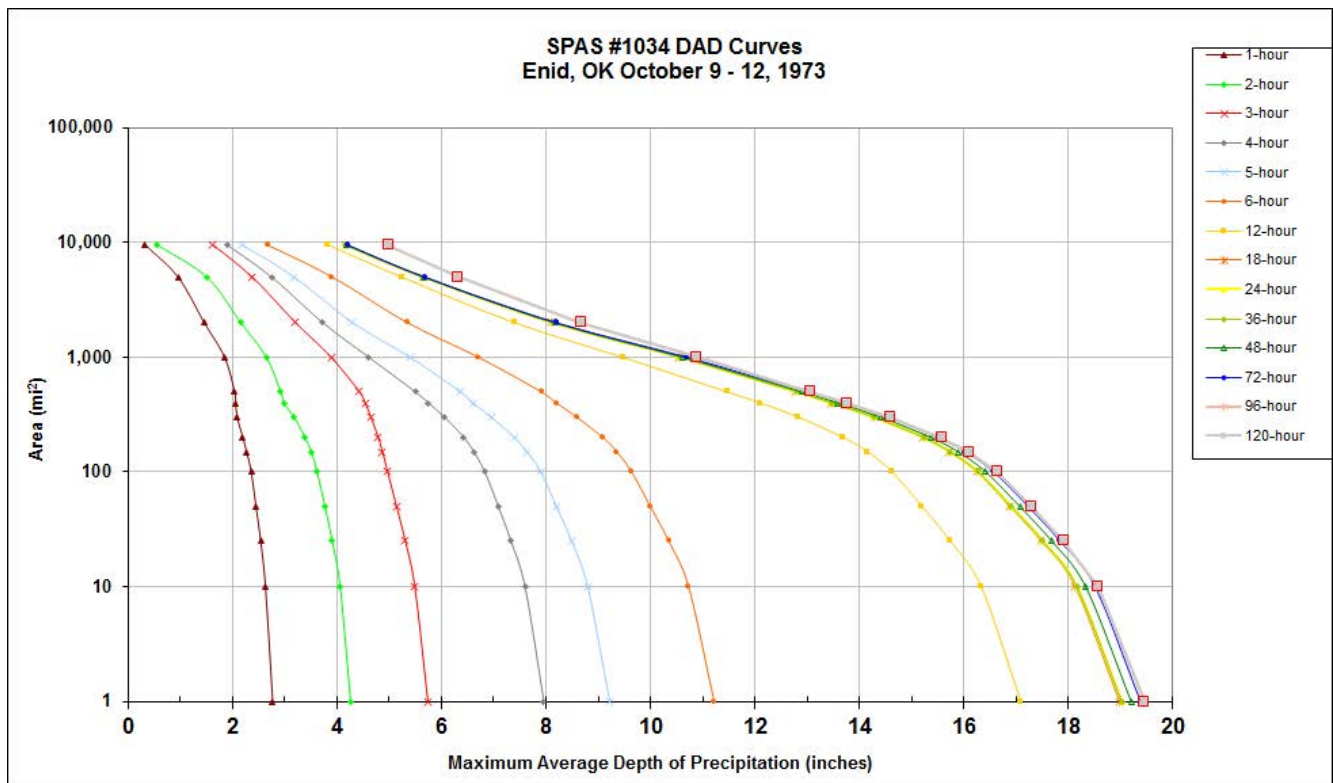
Base Map Used: No

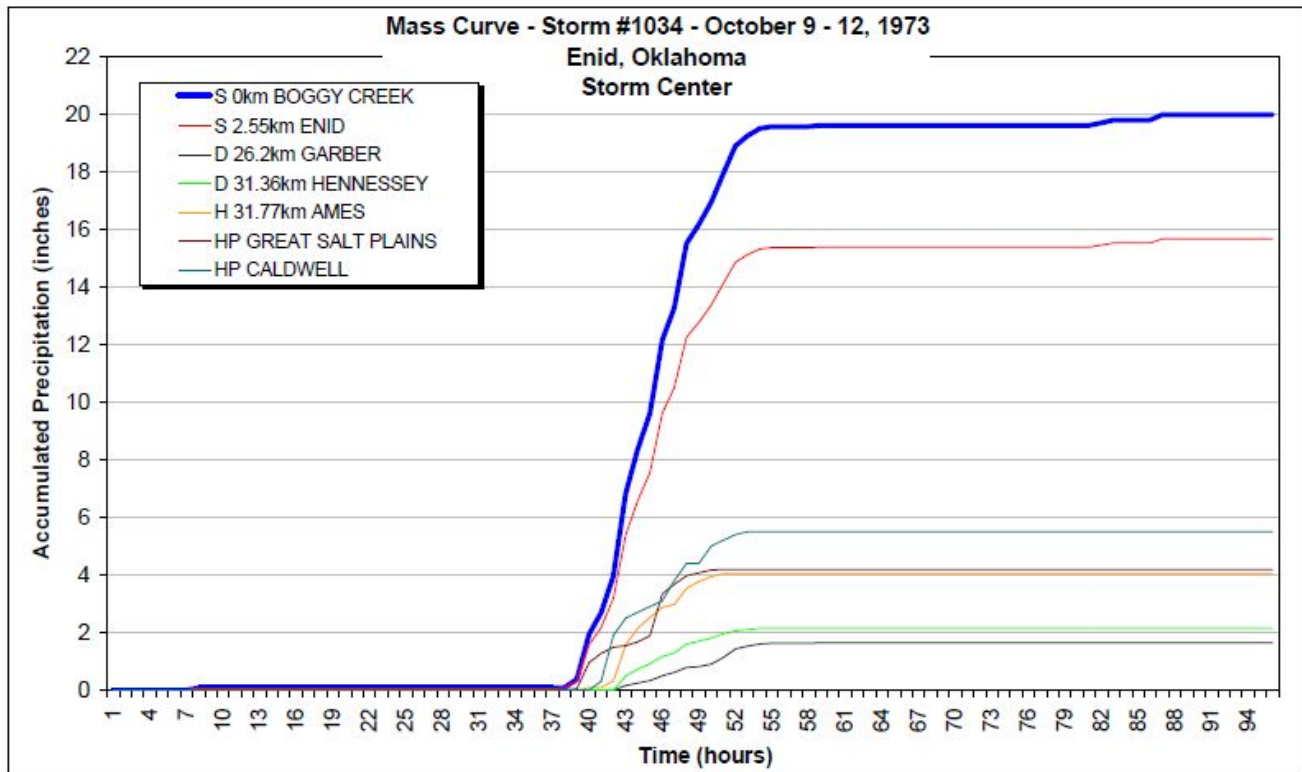
Radar Included: No

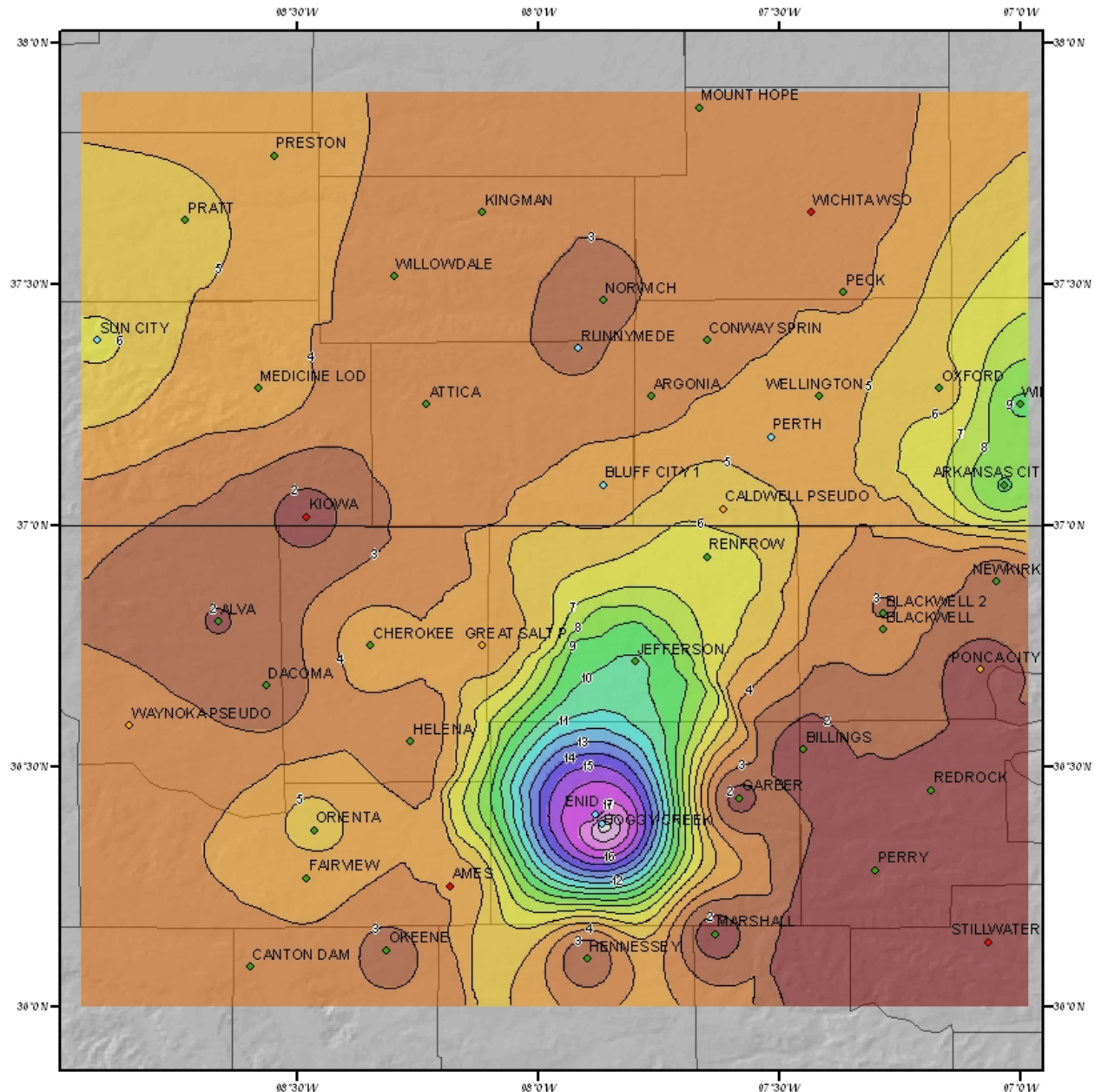
Depth-Area-Duration (DAD) analysis: Yes, 1, 2, 3, 4, 5, 6, 12, 18, 24, 36, 48, 72, and 96 hours

					Storm Rep. Dew Point					Climatological Max. Dew Point						
SPAS Storm ID	LON	LAT	ELEV	ELEV Round	T _d	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	T _d	T _d Round	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	IPMF
1034_1	-97.868	36.381	1,206	1,200	75.00	2.85	0.30	72	2.550	77.95	78.0	3.29	0.33	78	2.960	1.161

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	7.96	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

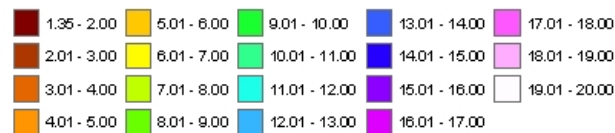




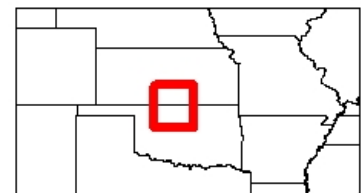
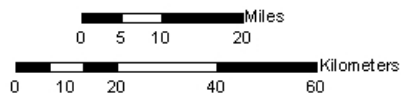


SPAS Storm #1034 - October 9 to 12, 1973
Total Rainfall (96-hours) - Enid, Oklahoma

Precipitation (inches)

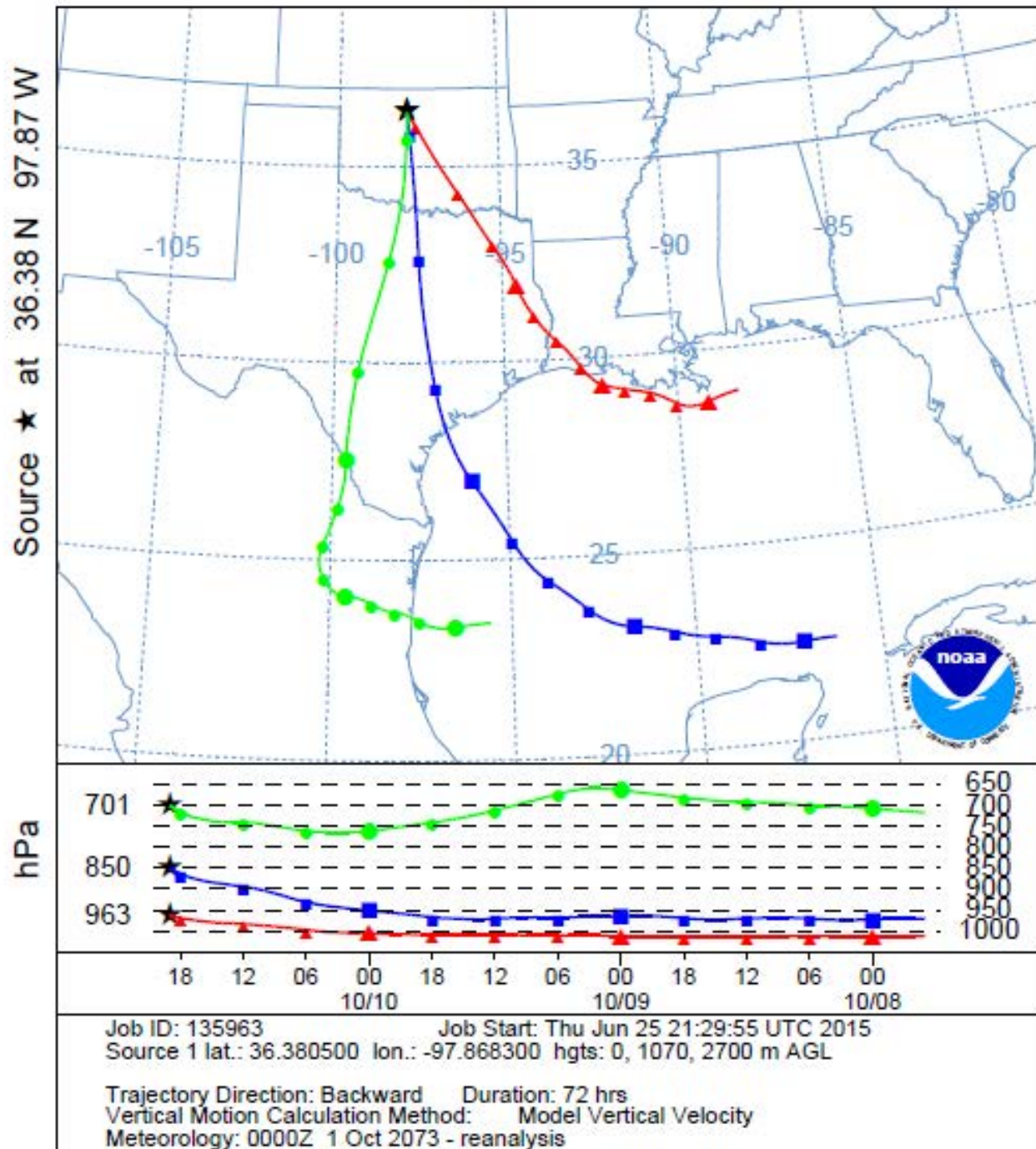


Gauging Stations

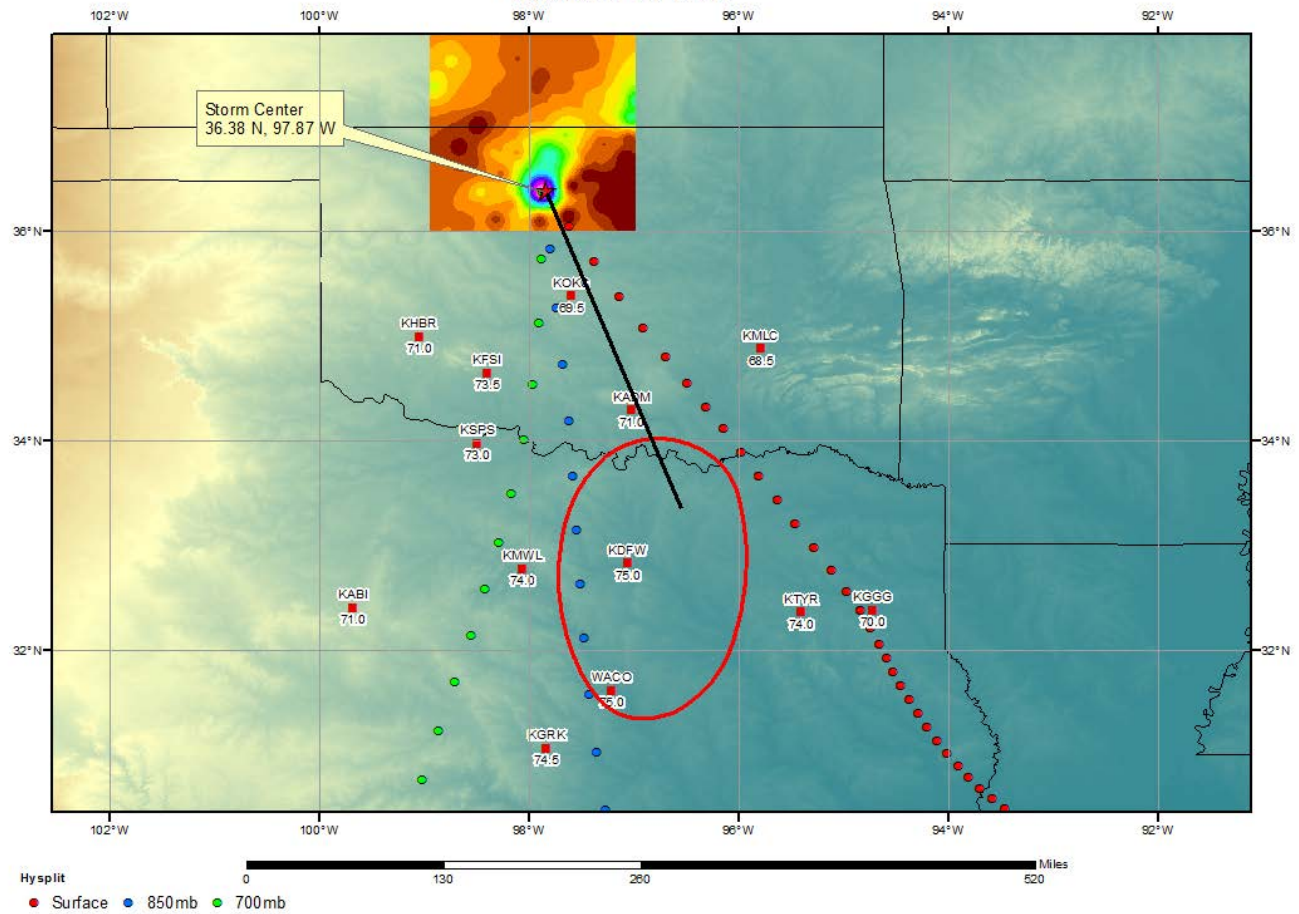


Coordinate system: GCS North American 1983
 Scale: 1:1,210,722
 Map data: FAIR April 9, 2007

NOAA HYSPLIT MODEL
 Backward trajectories ending at 1900 UTC 10 Oct 73
 CDC1 Meteorological Data

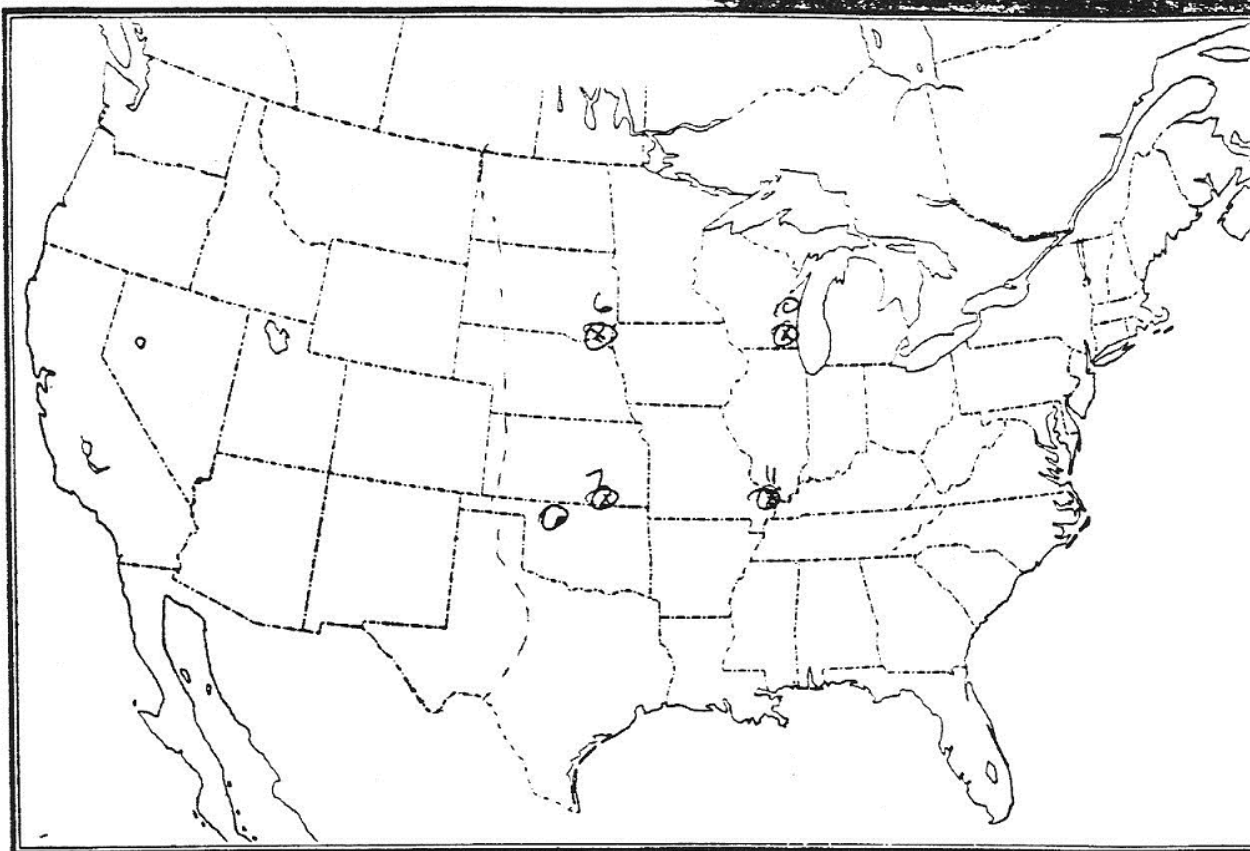


SPAS 1034, Enid, OK Storm Analysis
October 9-10, 1973



133 Hygrotherm Oct 11, 1973
~~Enid OK Ia~~ (1245 hr)
 Td = 74°F, 2255 26°25'975-

733 Hygrotherm Oct 21, 1973



Storm Precipitation Analysis System (SPAS) For Storm #1247_1

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

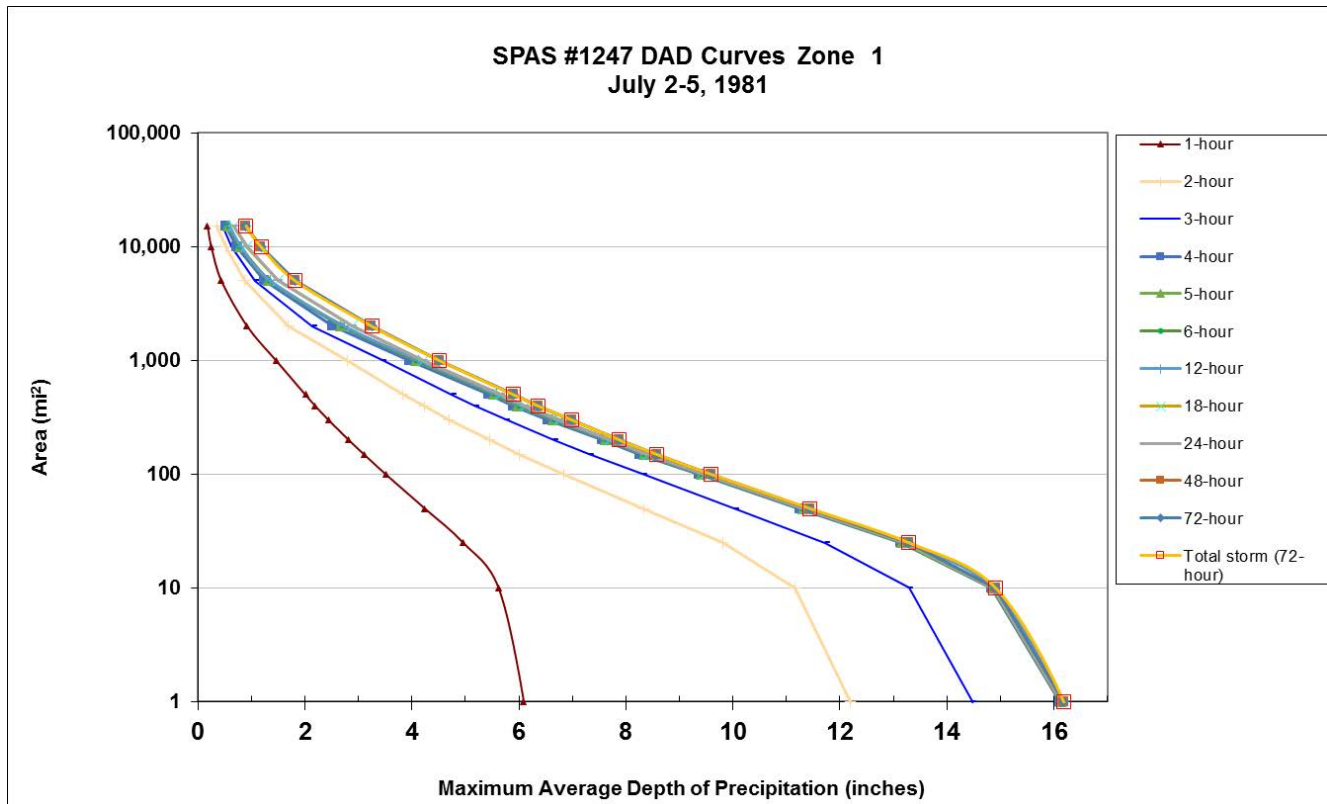
Spatial resolution: 00:00:30 (~ 0.30 mi²)

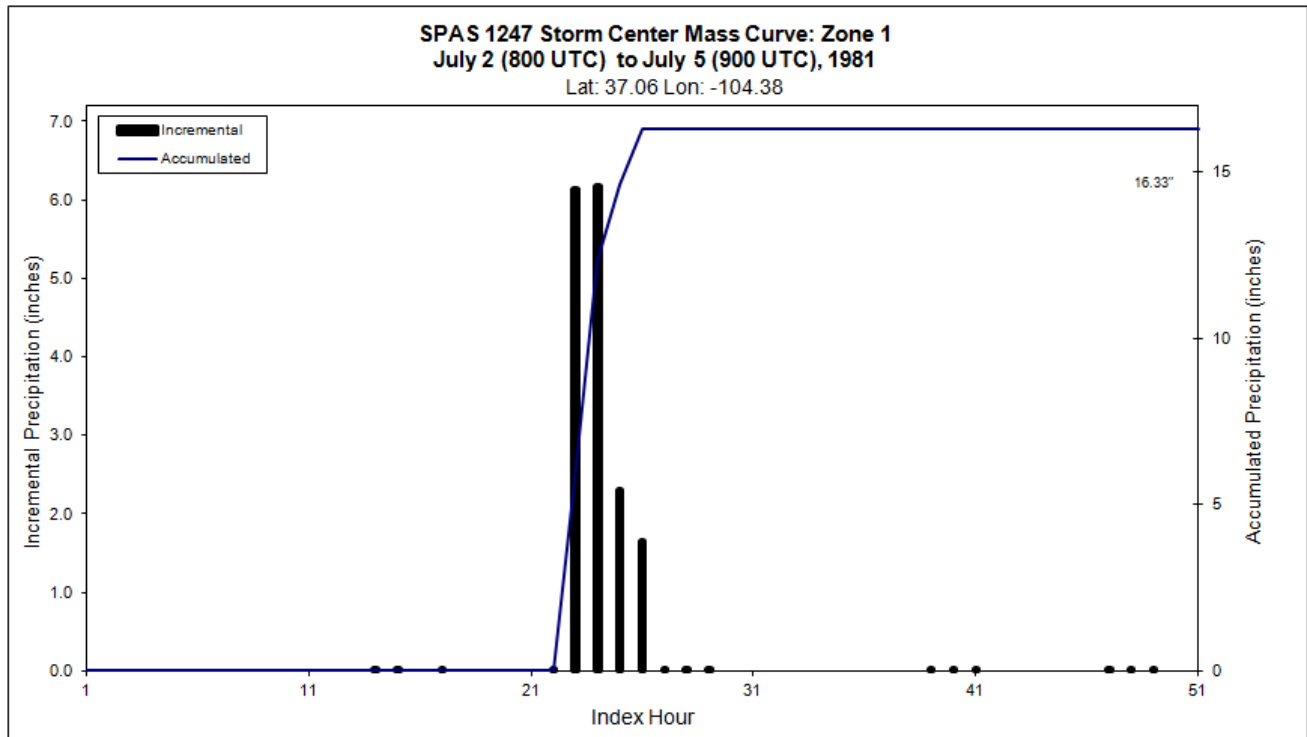
Radar Included: No

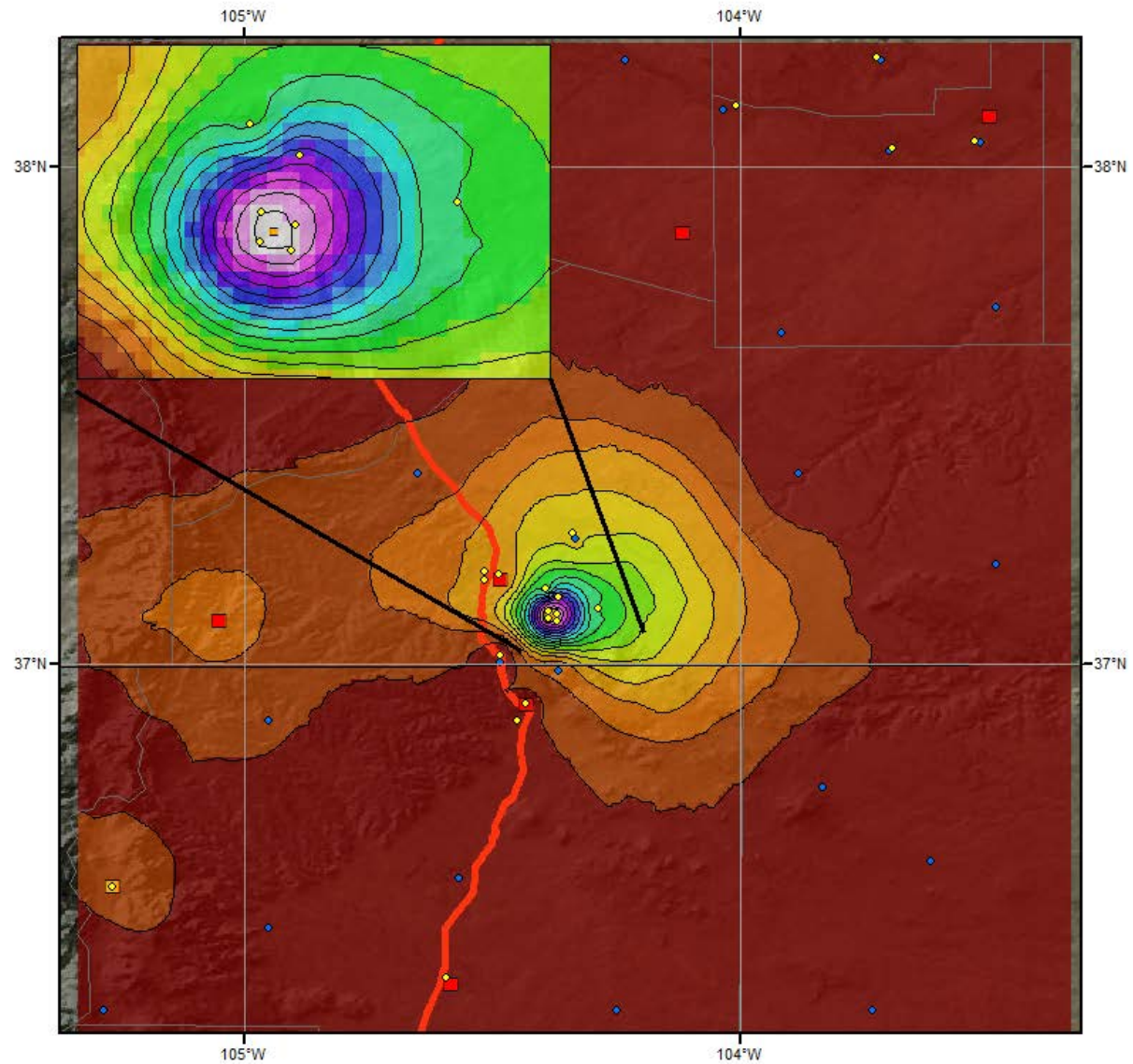
Depth-Area-Duration (DAD) analysis: Yes

					Storm Rep. Dew Point					Climatological Max. Dew Point						
SPAS Storm ID	LON	LAT	ELEV	ELEV Round	T _d	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	T _d	T _d Round	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	IPMF
1247 1	-104.379	37.096	6,534	6,500	77.00	3.14	1.45	76	1.690	79.82	80.0	3.60	1.60	82	2.000	1.183

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	48	72	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
1	6.09	12.19	14.47	16.11	16.12	16.12	16.13	16.14	16.14	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
25	4.96	9.82	11.73	13.13	13.16	13.17	13.18	13.22	13.22	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	11.44	11.44	11.44
100	3.51	6.84	8.31	9.37	9.41	9.42	9.44	9.48	9.48	9.59	9.59	9.59
150	3.10	6.00	7.31	8.27	8.33	8.35	8.37	8.41	8.41	8.57	8.57	8.57
200	2.82	5.45	6.66	7.55	7.62	7.63	7.66	7.71	7.71	7.88	7.88	7.88
300	2.44	4.70	5.75	6.55	6.64	6.66	6.70	6.76	6.76	6.99	6.99	6.99
400	2.19	4.23	5.17	5.89	5.98	6.01	6.05	6.11	6.11	6.35	6.35	6.35
500	2.01	3.83	4.75	5.43	5.52	5.54	5.59	5.66	5.66	5.90	5.90	5.90
1,000	1.46	2.79	3.45	3.96	4.06	4.08	4.13	4.21	4.21	4.51	4.51	4.51
2,000	0.92	1.69	2.14	2.52	2.66	2.70	2.74	2.88	2.88	3.23	3.25	3.25
5,000	0.44	0.87	1.07	1.25	1.32	1.34	1.36	1.50	1.50	1.82	1.82	1.82
10,000	0.25	0.52	0.63	0.73	0.78	0.79	0.81	0.92	0.93	1.17	1.18	1.18
15,206	0.18	0.35	0.46	0.53	0.56	0.57	0.59	0.67	0.67	0.90	0.90	0.90



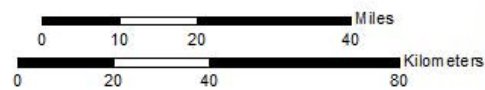




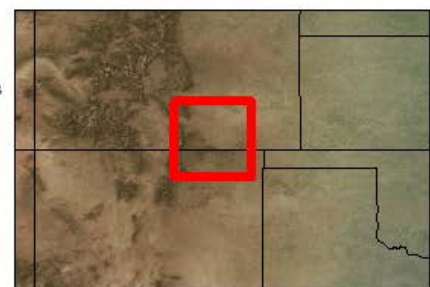
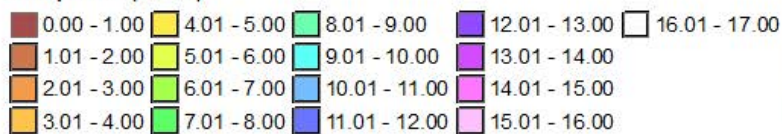
Total Precipitation (72-hours)
SPAS-Lite 1247 - Frijole Creek, CO
7/02/1981 0800 GMT - 7/05/1981 0700 GMT

Gauges

- ◆ Daily
- Hourly
- Hourly Pseudo
- ◇ Supplemental

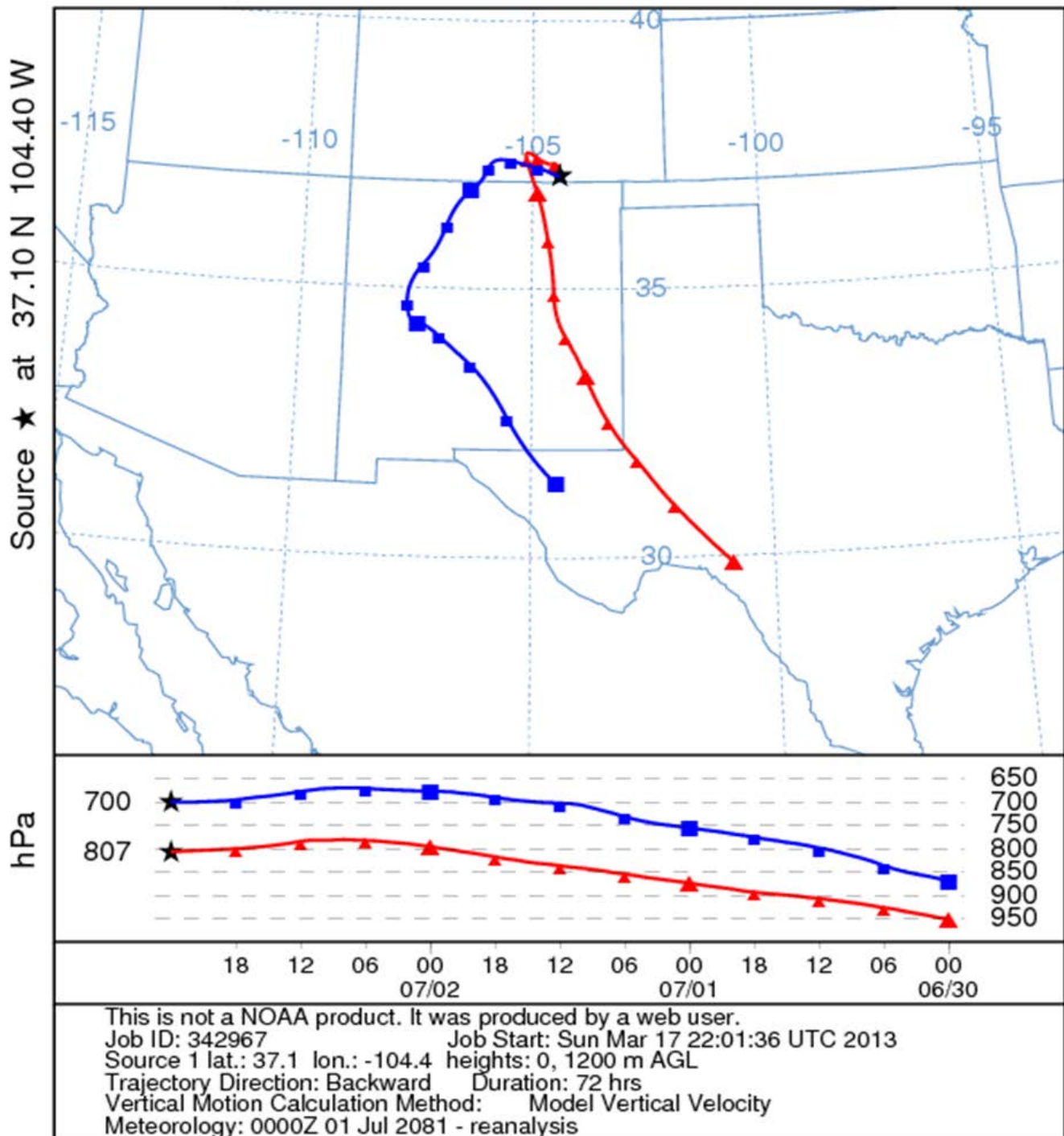


Precipitation (inches)

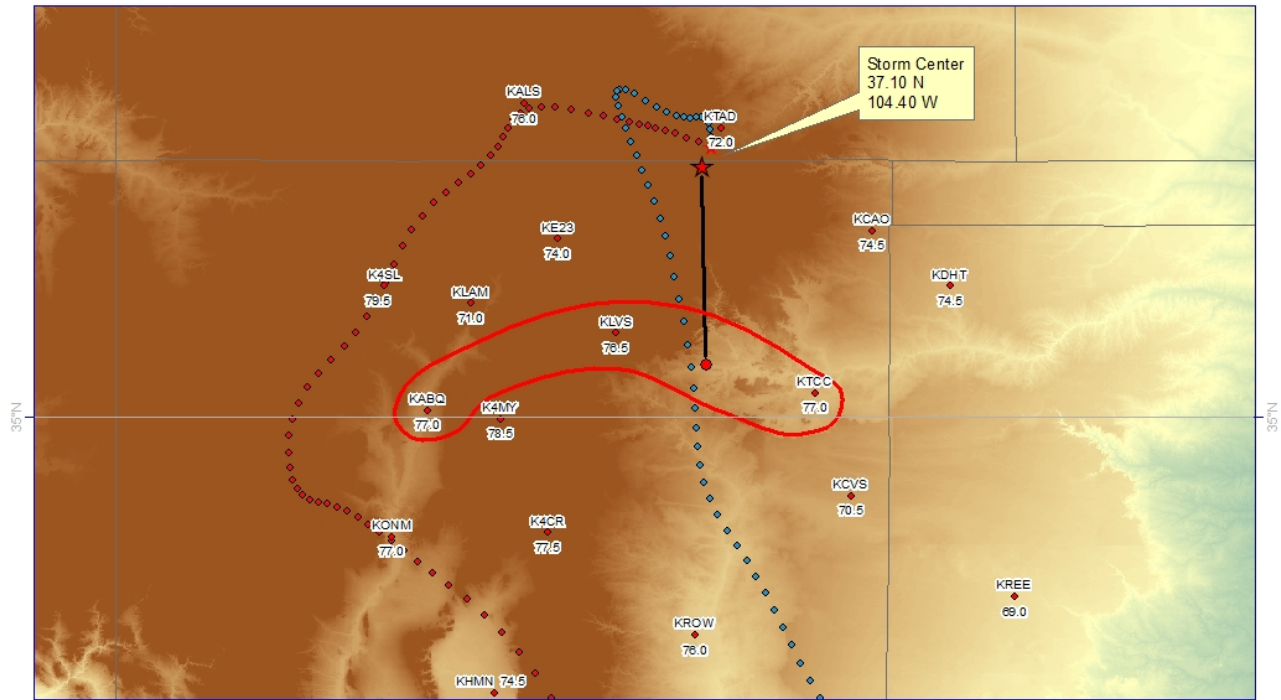


8/20/2012

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



SPAS 1247
July 2-5, 1981



Hysplit

◆ Surface ◆ 700 mb

0 30 60 120 180 240 Miles

Storm Precipitation Analysis System (SPAS) For Storm #1185_1

General Storm Location: Corrigan, TX

Storm Dates: October 15-18, 1994

Event: Tropical moisture & stationary front

DAD 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

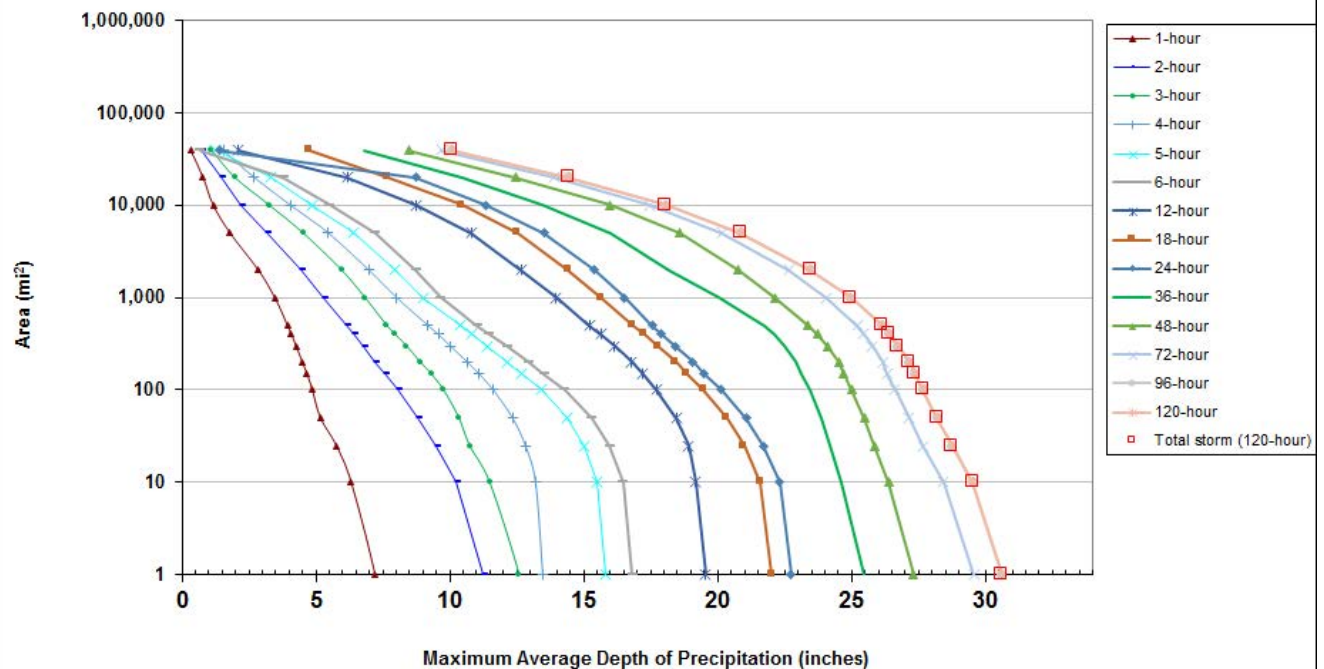
Depth-Area-Duration (DAD) analysis: Yes

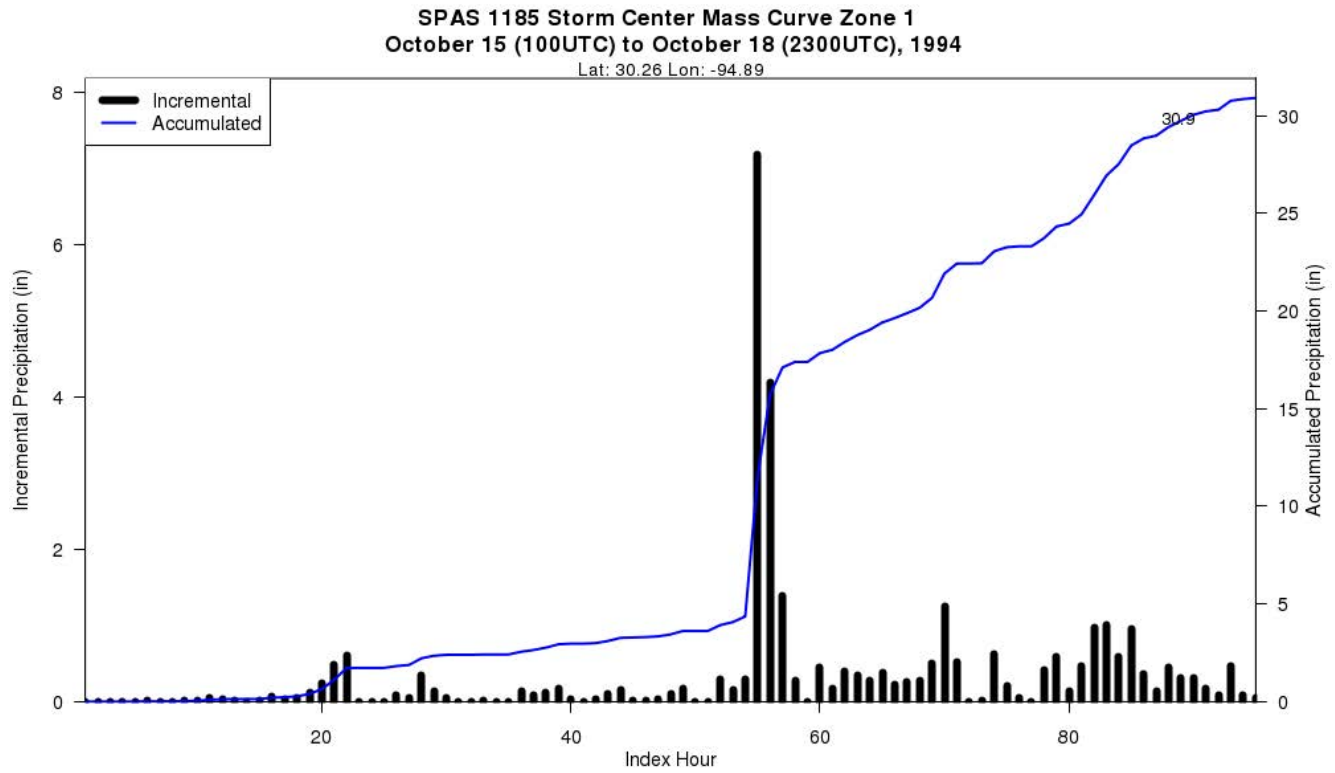
					Storm Rep. Dew Point					Climatological Max. Dew Point						
SPAS Storm ID	LON	LAT	ELEV	ELEV Round	T _d	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	T _d	T _d Round	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	IPMF
1185 1	-94.890	30.260	125	100	82.00	3.95	0.03	86	3.920	84.20	84.0	4.30	0.04	90	4,260	1.087

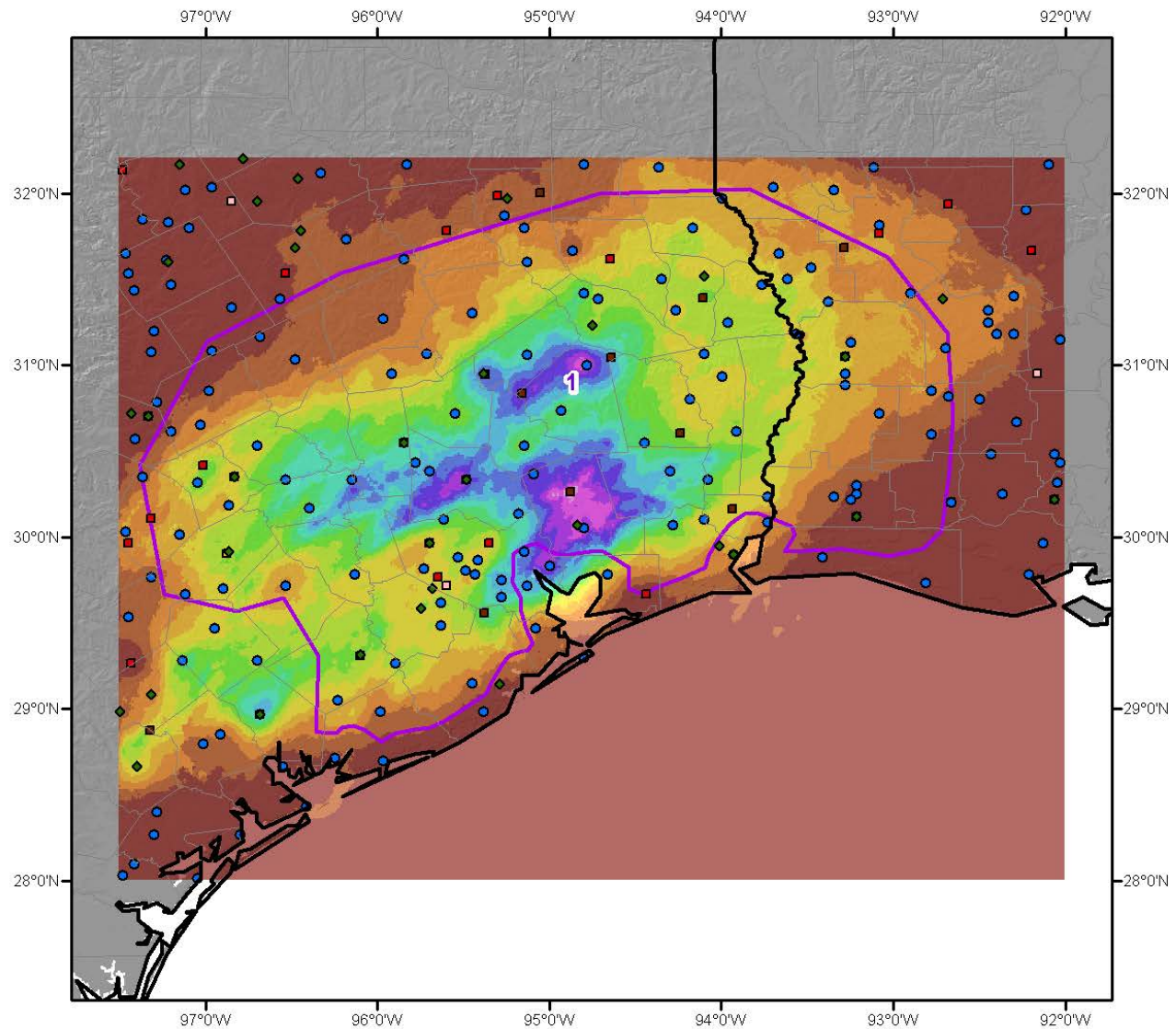
Storm 1185- October 15 (0100 UTC) - October 18 (2300 UTC), 1994**MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)**

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

SPAS #1185 DAD Curves Zone 1
October 15-18, 1994

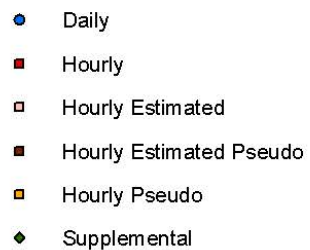




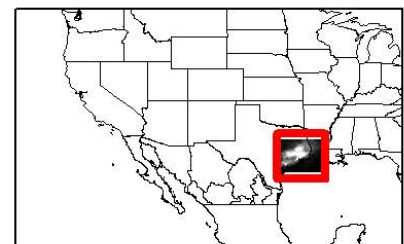


Total Precipitation (95-hours)
SPAS storm number: 1185
October 15, 1994 (0100 UTC) - October 18, 1994 (2300 UTC)

Precipitation (inches)

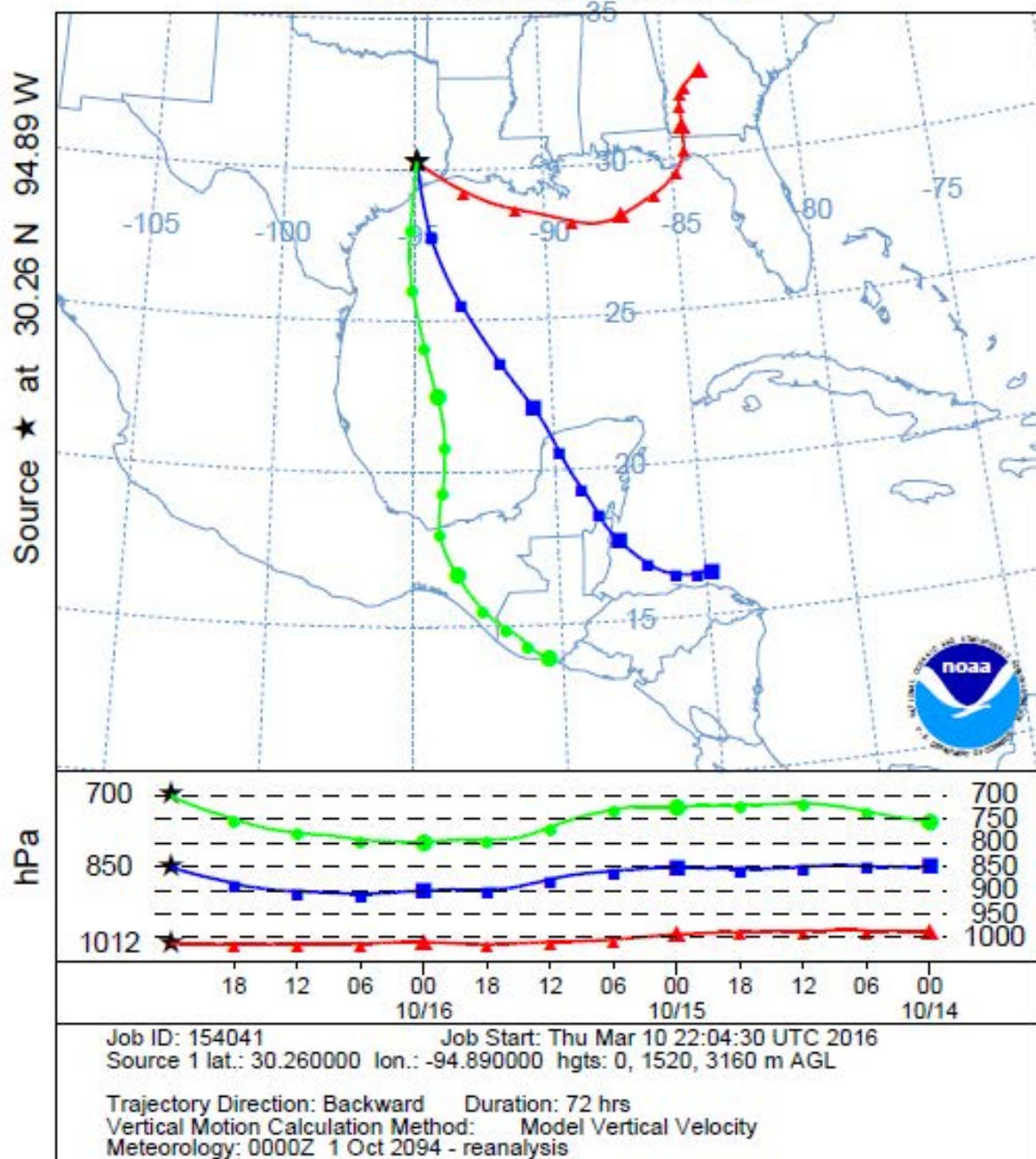


Miles
0 20 40 80

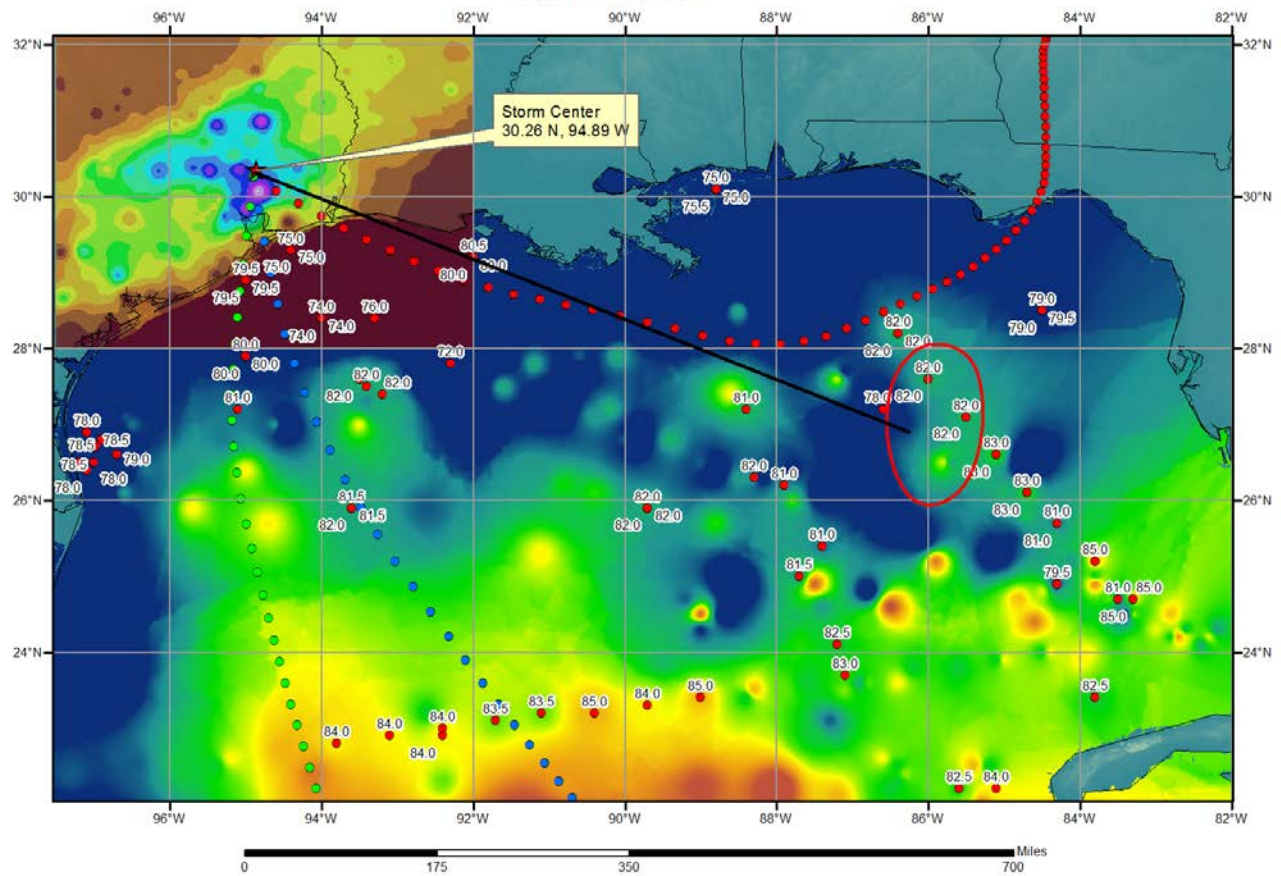


Metstat/AWA July 18, 2010

NOAA HYSPLIT MODEL
 Backward trajectories ending at 0000 UTC 17 Oct 94
 CDC1 Meteorological Data



SPAS 1185 Corrigan, TX Sea Surface Temperatures (F)
October 16, 1994



Storm Precipitation Analysis System (SPAS) For Storm #1036_1

General Storm Location: Pawnee Creek, CO

Storm Dates: July 29 (2000 Z) – 30 (1300 Z), 1997

Event: Convective Thunderstorm

DAD Zone 1

Latitude: 40.7752

Longitude: -103.6253

Rainfall Amount: 13.58" (Grid/Pixel Point) in 12hours (but the total analysis window was 17hrs)

Number of Stations: 96 (15-hourly, 1-hourly pseudo, 24-daily, and 56-supplemental) gauging stations within the define search domain. 77 (6-hourly, 0-hourly pseudo, 15-daily, and 56-supplemental) stations within radar domain.

SPAS Version: 2.0

Base Map Used: No

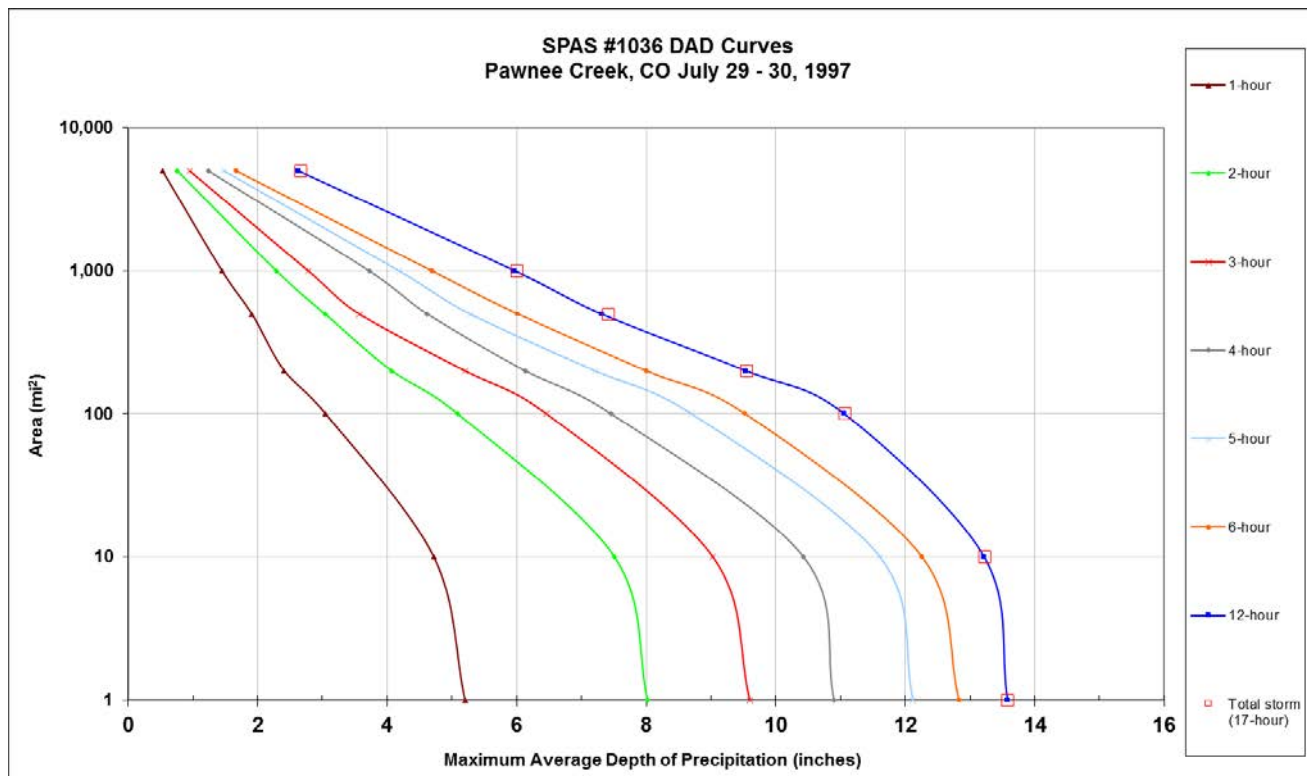
Radar Included: Yes

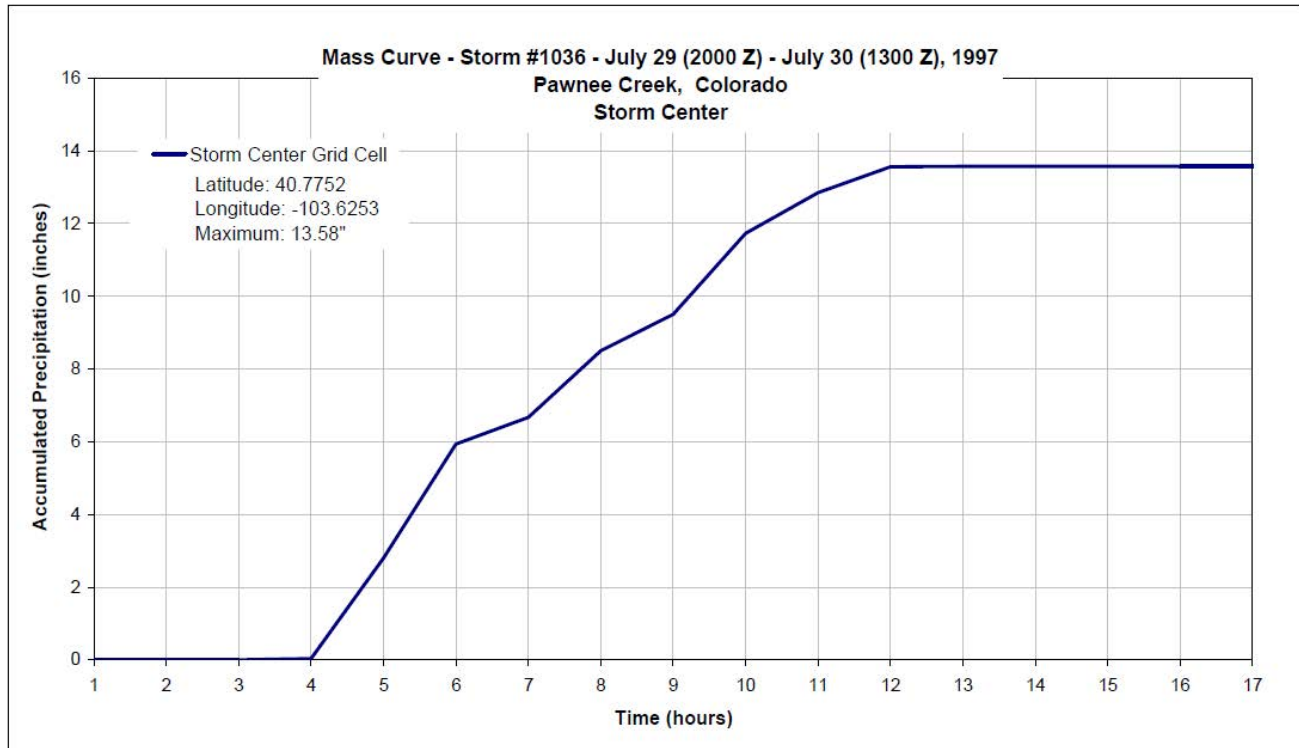
Depth-Area-Duration (DAD) analysis: Yes, 1, 2, 3, 4, 5, 6, 12, and 17 hours.

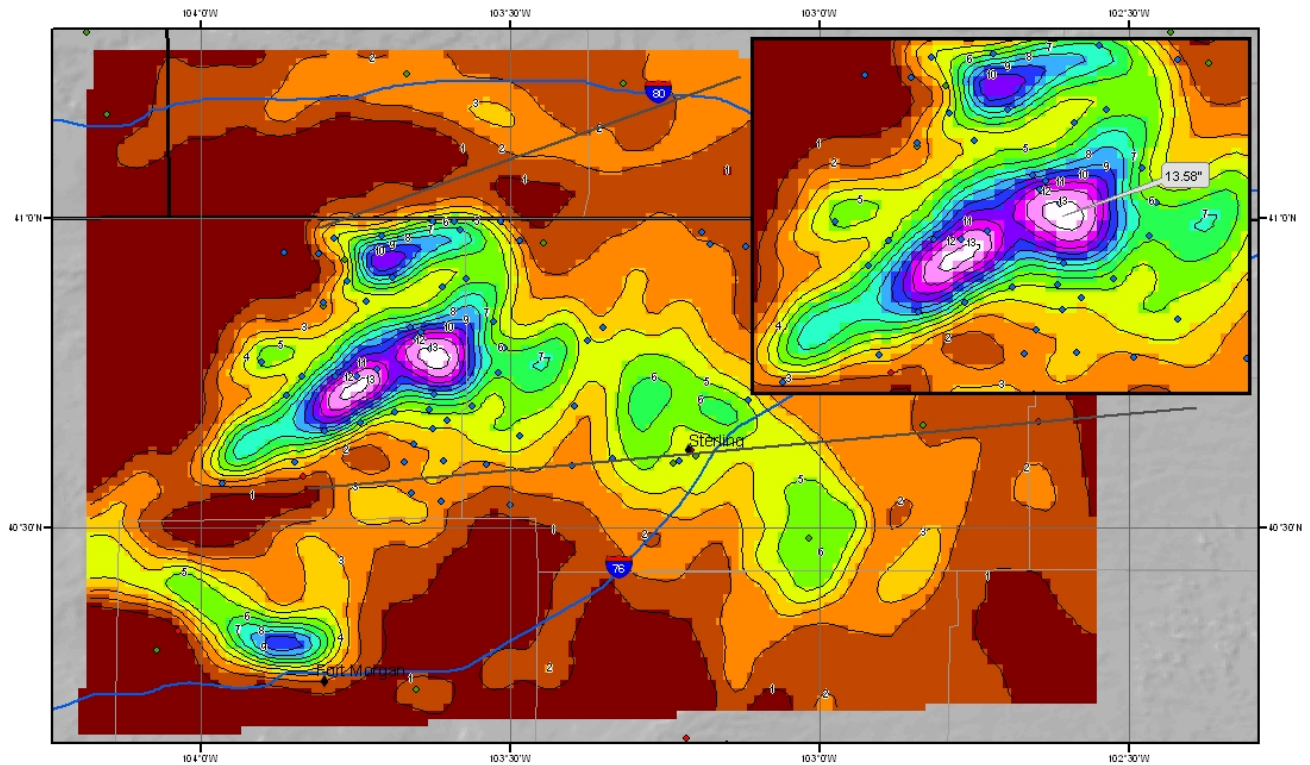
					Storm Rep. Dew Point					Climatological Max. Dew Point						
SPAS Storm ID	LON	LAT	ELEV	ELEV Round	T _d	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	T _d	T _d Round	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	IPMF
1036 1	-103.625	40.775	4,497	4,500	75.50	2.92	1.02	73	1.900	81.70	81.5	3.86	1.24	85	2.620	1.379

Storm 1036 - Pawnee Creek, CO July 29 - 30, 1997
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)

Area (mi ²)	Duration (hours)								
	1	2	3	4	5	6	12	17	total
1	5.20	8.02	9.60	10.90	12.12	12.83	13.58	13.58	13.58
10	4.72	7.51	9.03	10.43	11.61	12.26	13.22	13.23	13.23
100	3.05	5.09	6.46	7.46	8.70	9.53	11.06	11.07	11.07
200	2.41	4.07	5.20	6.13	7.21	8.00	9.54	9.55	9.55
500	1.91	3.04	3.57	4.62	5.28	6.02	7.31	7.42	7.42
1,000	1.45	2.29	2.78	3.72	4.18	4.69	5.97	6.01	6.01
5,000	0.53	0.76	0.95	1.24	1.48	1.67	2.63	2.67	2.67







SPAS Storm #1036 - July 29-30, 1997
Total Rainfall (17-hours) - Pawnee Creek, Colorado

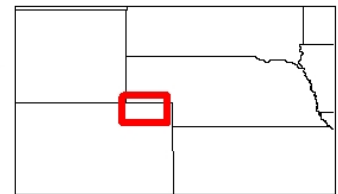
Gauging Stations

◆ Daily ◆ Hourly ◆ Hourly Pseudo ◆ Supplemental

Precipitation (inches)

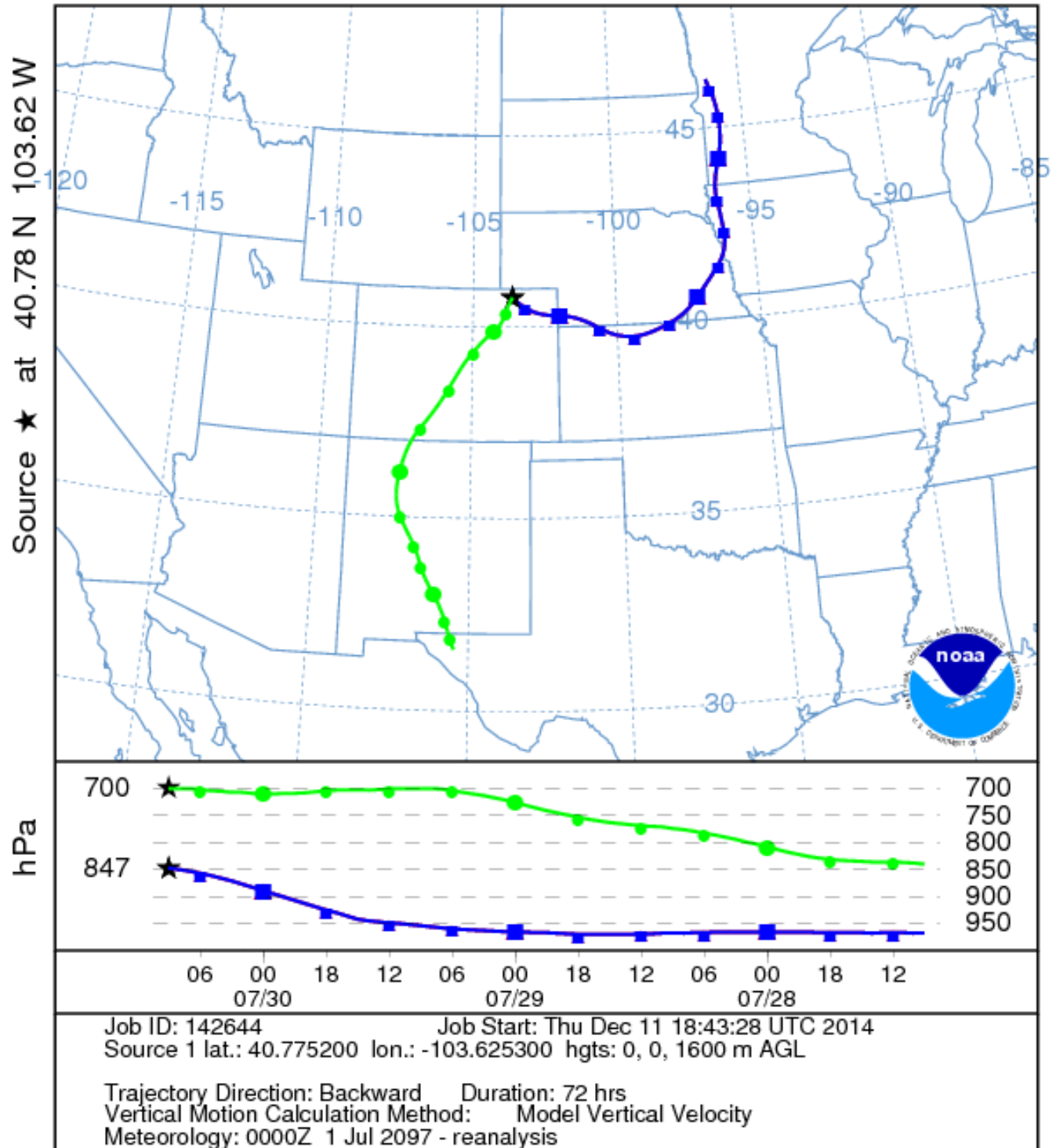
0.00 - 1.00	4.01 - 5.00	8.01 - 9.00	12.01 - 13.00
1.01 - 2.00	5.01 - 6.00	9.01 - 10.00	13.01 - 14.00
2.01 - 3.00	6.01 - 7.00	10.01 - 11.00	
3.01 - 4.00	7.01 - 8.00	11.01 - 12.00	

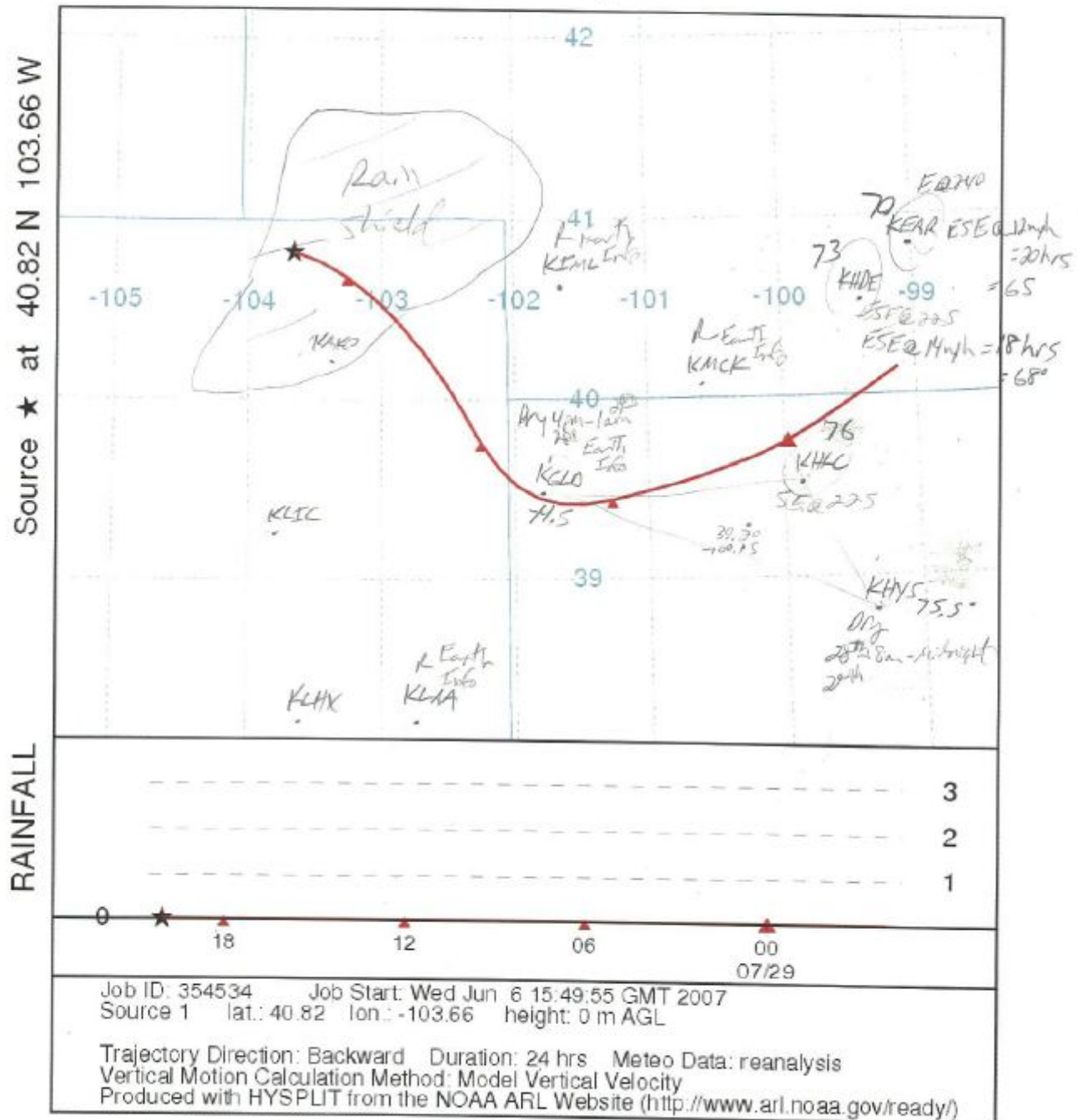
0 5 10 20 Miles
 0 5 10 20 30 40 Kilometers



Coordinate system: GCS North American 1983
 Scale: 1:841,717
 MESS:PAWA June 5, 2007

NOAA HYSPLIT MODEL
Backward trajectories ending at 0900 UTC 30 Jul 97
CDC1 Meteorological Data





Storm Precipitation Analysis System (SPAS) For Storm #1662_1

General Storm Location: Saguache, CO

Storm Dates: July 25-26, 1999

Event: Local

DAD Zone 1

Latitude: 38.2150

Longitude: -106.2950

Max. Grid/Radar Rainfall Amount: 6.68"

Max. Observed Rainfall Amount: 5.00"

Number of Stations: 47

SPAS Version: 10.0

Base Map Used: "defaultP" (created from ippt_allsites_1662_sum_in)

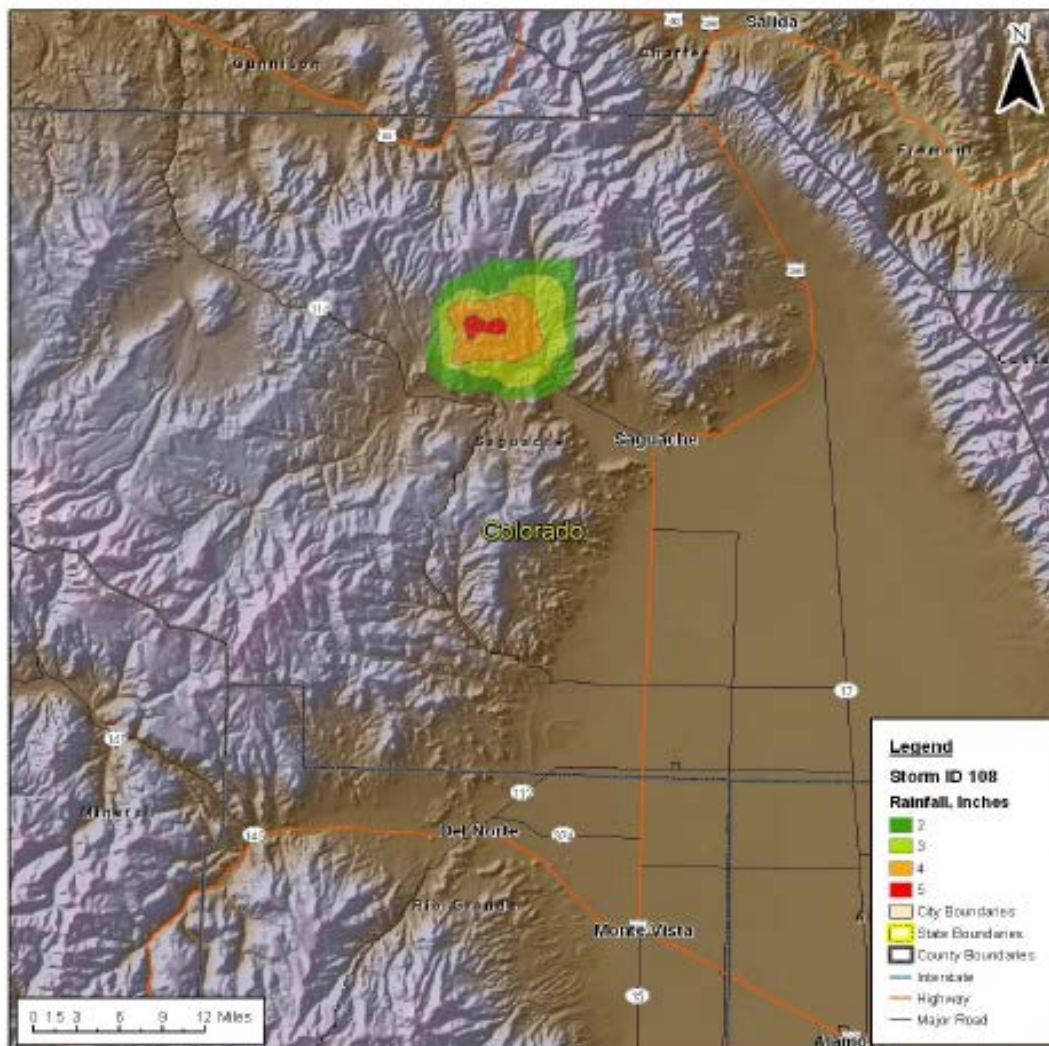
Spatial resolution: 0.3752

Radar Included: Yes

Depth-Area-Duration (DAD) analysis: Yes

Reliability of Results: This analysis was based on 47 hourly stations, daily data, and supplemental station data and NEXRAD Radar. We have a good degree of confidence for the radar/station based storm total results. The spatial pattern is dependent on the radar data and basemap. Timing is based on the hourly and hourly pseudo stations, specifically HRLY 1 created from the information given in the NM EPAT report for storm ID 108. Several daily stations were moved to supplemental due to timing issues and to ensure data consistency.

SPAS Storm ID	LON	LAT	ELEV	ELEV Round	Storm Rep. Dew Point					Climatological Max. Dew Point						IPMF
					T _d	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	T _d	T _d Round	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	
1662_1	-106.295	38.215	8,900	9,000	76.00	2.99	1.78	74	1.210	79.56	79.5	3.52	2.02	81	1.505	1.244

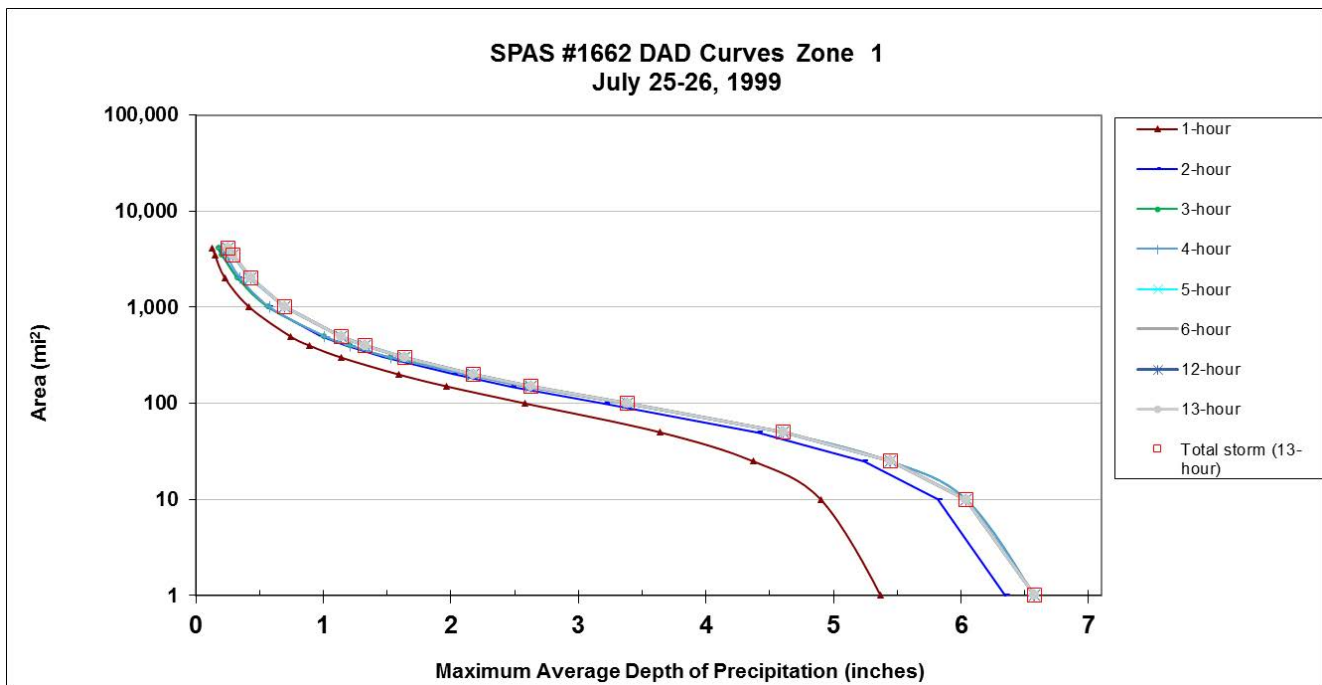


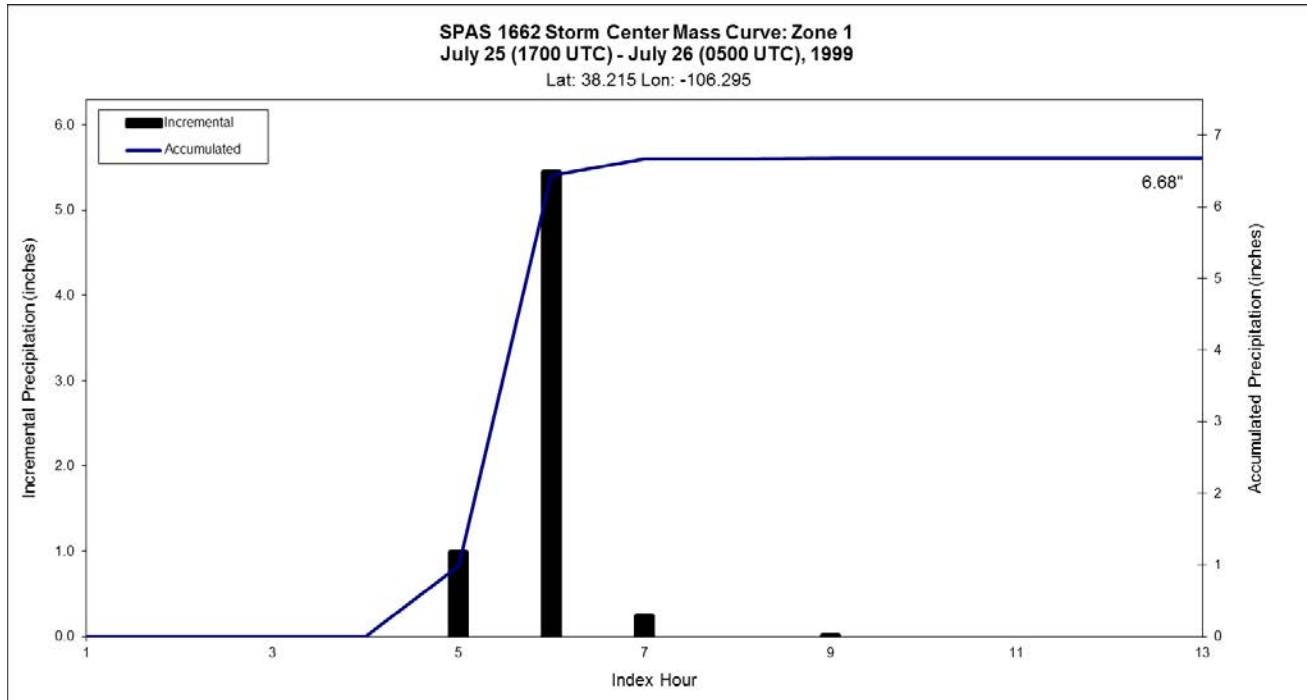
Storm Synopsis and Climate Zone Classification:

Storm ID 108 Climate Zone – Zones 1, 3, 9, 10: Storm event driven during monsoonal period and given location along south-facing terrain just north of flat reach of San Luis Valley. Given this storm location storm allowed in Zones 1, 3, 9 and 10.

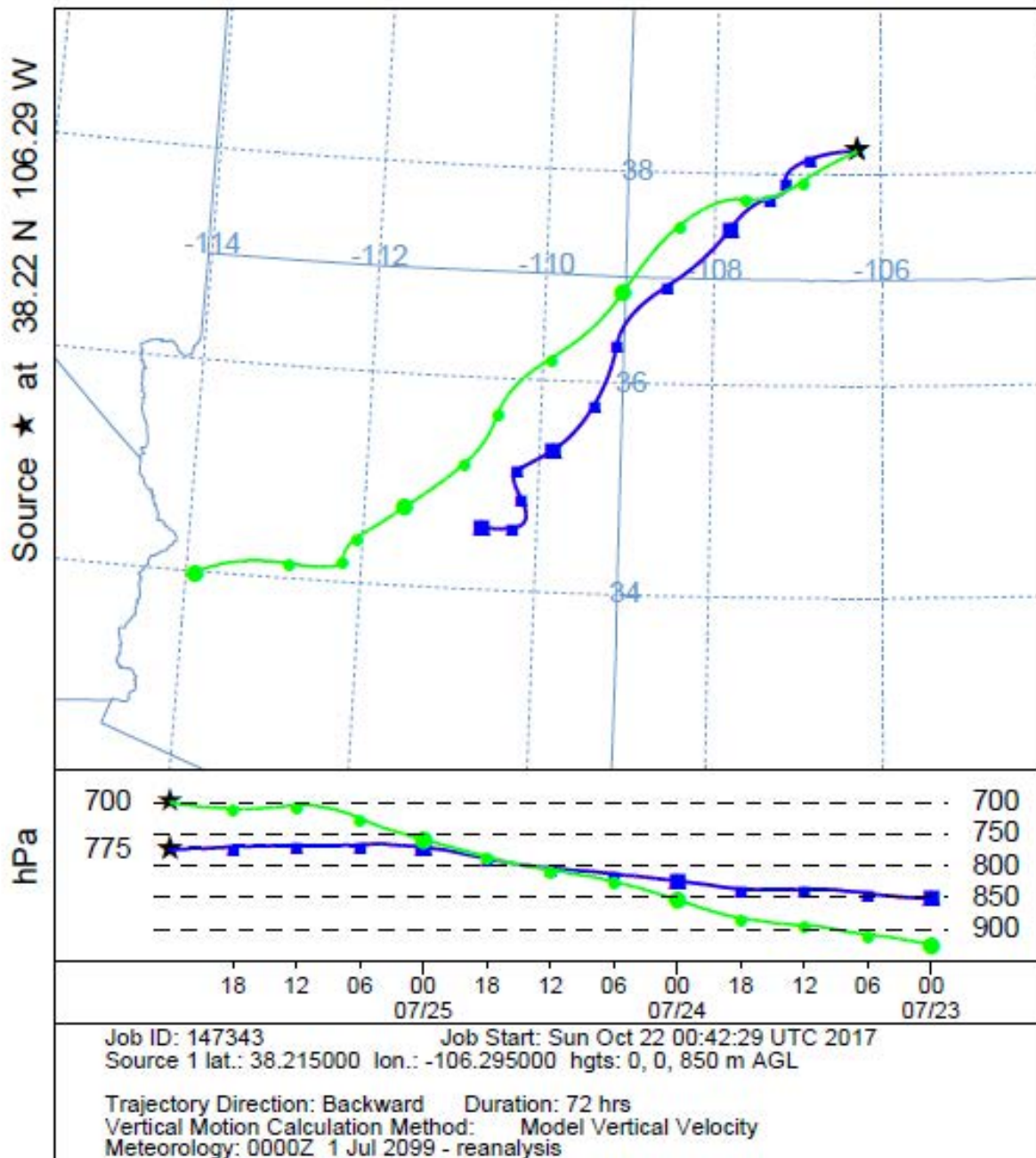
Start Date/End Date	July 25, 1999
Storm Name/Status	Saguache - STORM ID 108 / Active
Storm Type	Local Storm – Convective Simple
State/Climate Zone	Colorado / Climate Zones 1, 3, 9, 10
Duration/Max Precipitation	2 hours / 5"
Originator	Henz
Low Level Wind	140 degrees
Upper Level Wind	220 degrees
PW / 1000mb Dewpoint	3.03" / 76.3F
Storm Source	EPAT
Temporal	Radar observed

Storm 1662 - July 25 (1700 UTC) - July 26 (0500 UTC), 1999									
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)									
Area (mi ²)	Duration (hours)								
	1	2	3	4	5	6	12	13	Total
0.4	5.44	6.43	6.66	6.66	6.67	6.67	6.67	6.67	6.67
1	5.37	6.35	6.57	6.57	6.58	6.58	6.58	6.58	6.58
10	4.90	5.82	6.04	6.04	6.04	6.04	6.04	6.04	6.04
25	4.37	5.24	5.44	5.44	5.45	5.45	5.45	5.45	5.45
50	3.64	4.41	4.59	4.59	4.61	4.61	4.61	4.61	4.61
100	2.58	3.21	3.36	3.36	3.38	3.38	3.38	3.38	3.38
150	1.97	2.48	2.59	2.59	2.63	2.63	2.63	2.63	2.63
200	1.59	2.02	2.13	2.13	2.18	2.18	2.18	2.18	2.18
300	1.14	1.47	1.53	1.53	1.63	1.64	1.64	1.64	1.64
400	0.89	1.17	1.21	1.21	1.33	1.33	1.33	1.33	1.33
500	0.74	0.98	1.01	1.01	1.14	1.14	1.14	1.14	1.14
1,000	0.42	0.57	0.57	0.58	0.70	0.70	0.70	0.70	0.70
2,000	0.23	0.33	0.33	0.35	0.42	0.43	0.43	0.43	0.43
3,500	0.15	0.20	0.21	0.24	0.29	0.29	0.29	0.29	0.29
4,137	0.13	0.17	0.18	0.21	0.25	0.25	0.25	0.25	0.25

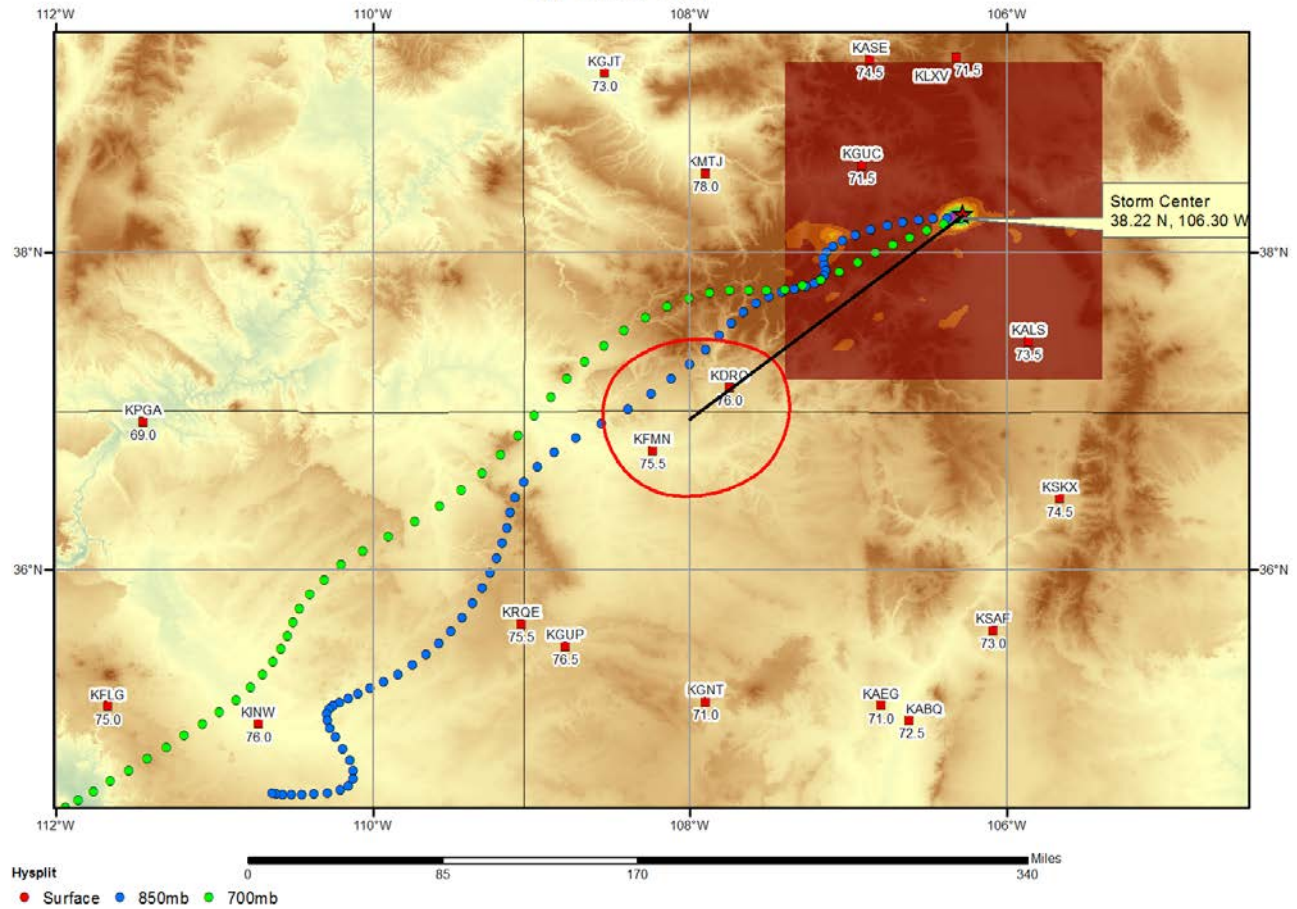




NOAA HYSPLIT MODEL
Backward trajectories ending at 0000 UTC 26 Jul 99
CDC1 Meteorological Data



SPAS 1662 Sagauche, CO Storm Analysis
July 24-25, 1999



Storm Precipitation Analysis System (SPAS) For Storm #1220_1

General Storm Location: Eastern Iowa, Southwestern Wisconsin and Northwestern Illinois

Storm Dates: July 27, 2011 2100 UTC - July 28, 2011 2000 UTC

Event: Mesoscale Convective System (MCS) along a stalled front

DAD Zone 1

Latitude: 42.44

Longitude: -90.75

Max. Grid Rainfall Amount: 15.14"

Max. Observed Rainfall Amount: 15.10" (2 miles SE of Julien, IA)

Number of Stations: 157 (25 Daily, 42 Hourly, 0 Hourly Estimated, 0 Hourly Estimated Pseudo, 14 Hourly Pseudo, 76 Supplemental, and 0 Supplemental Estimated)

SPAS Version: 9.0

Basemap: PRISM Mean (1971-2000) July precipitation

Spatial resolution: 36 seconds (~0.35 mi²)

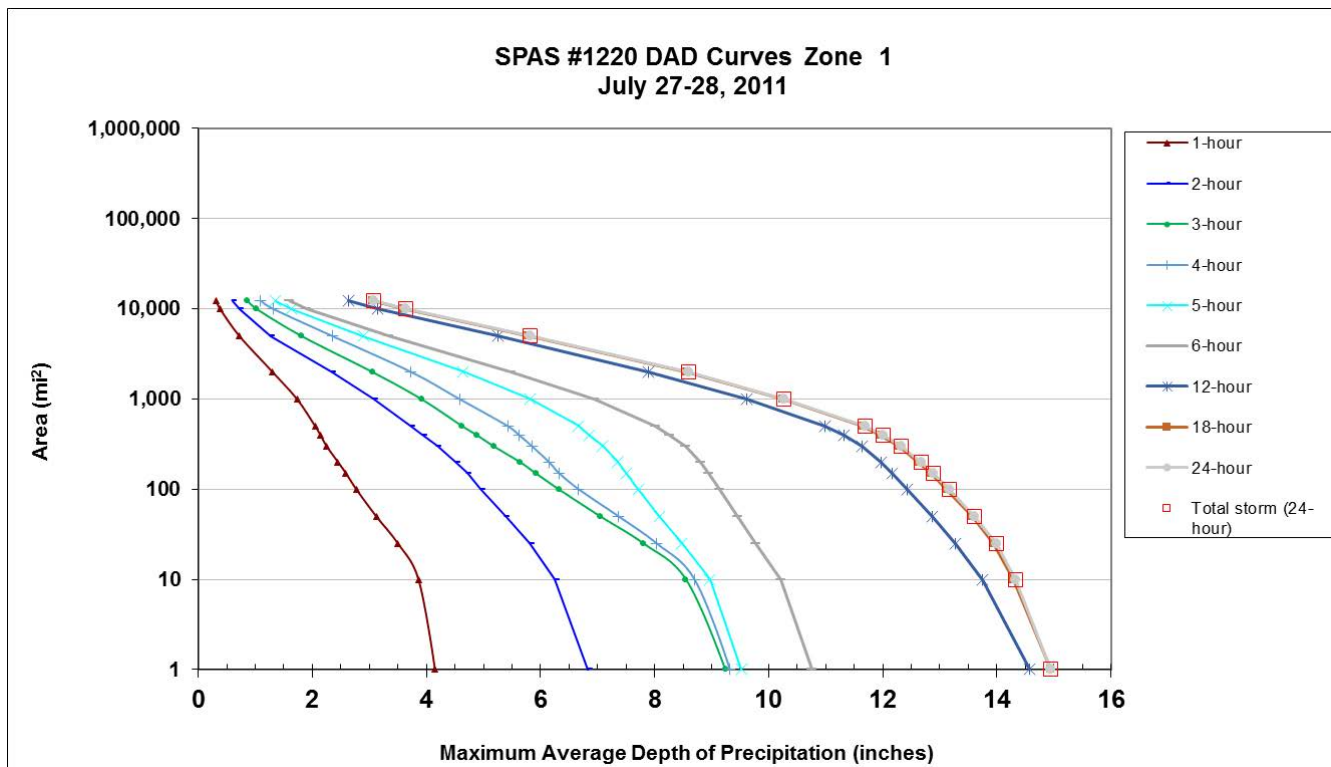
Radar Included: Yes

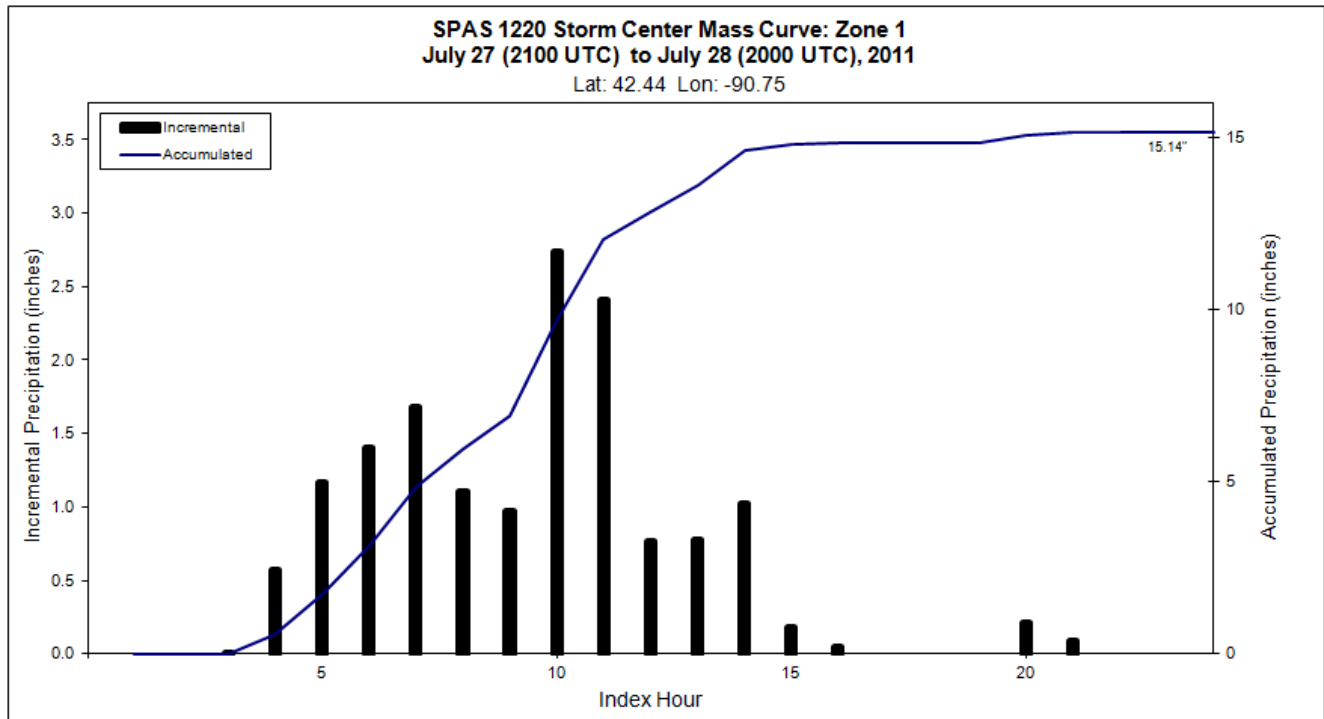
Depth-Area-Duration (DAD) analysis: Yes

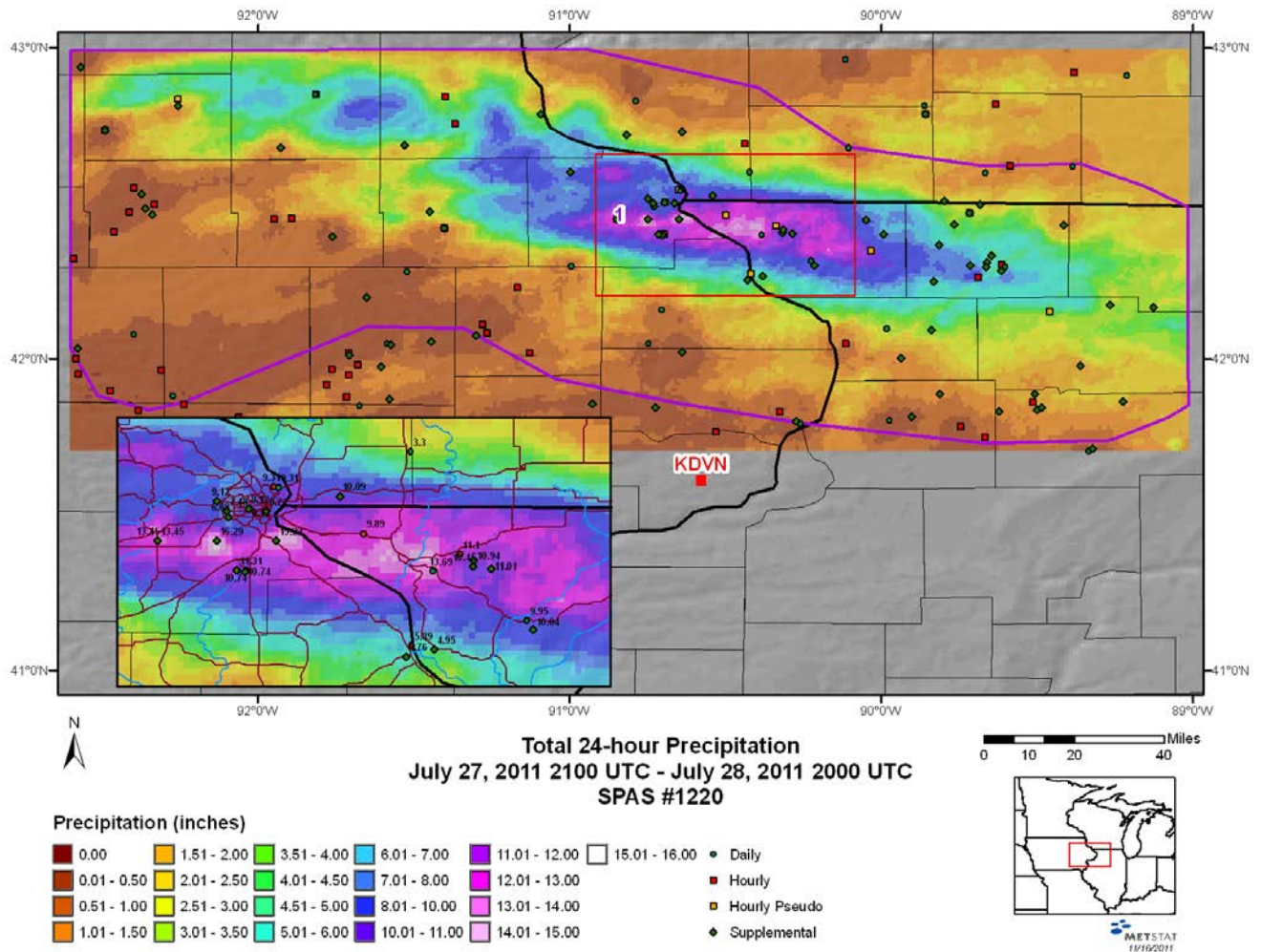
Reliability of results: Given the unblocked, clean and QC'ed radar data coupled with relatively extensive gauge data, we have a very high degree of confidence in the results. No supplemental estimated stations were warranted in this analysis.

					Storm Rep. Dew Point					Climatological Max. Dew Point						
SPAS Storm ID	LON	LAT	ELEV	ELEV Round	T _d	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	T _d	T _d Round	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	IPMF
1220 1	-90.750	42.440	906	900	79.00	3.44	0.26	80	3.180	82.21	82.0	3.95	0.27	86	3.680	1.157

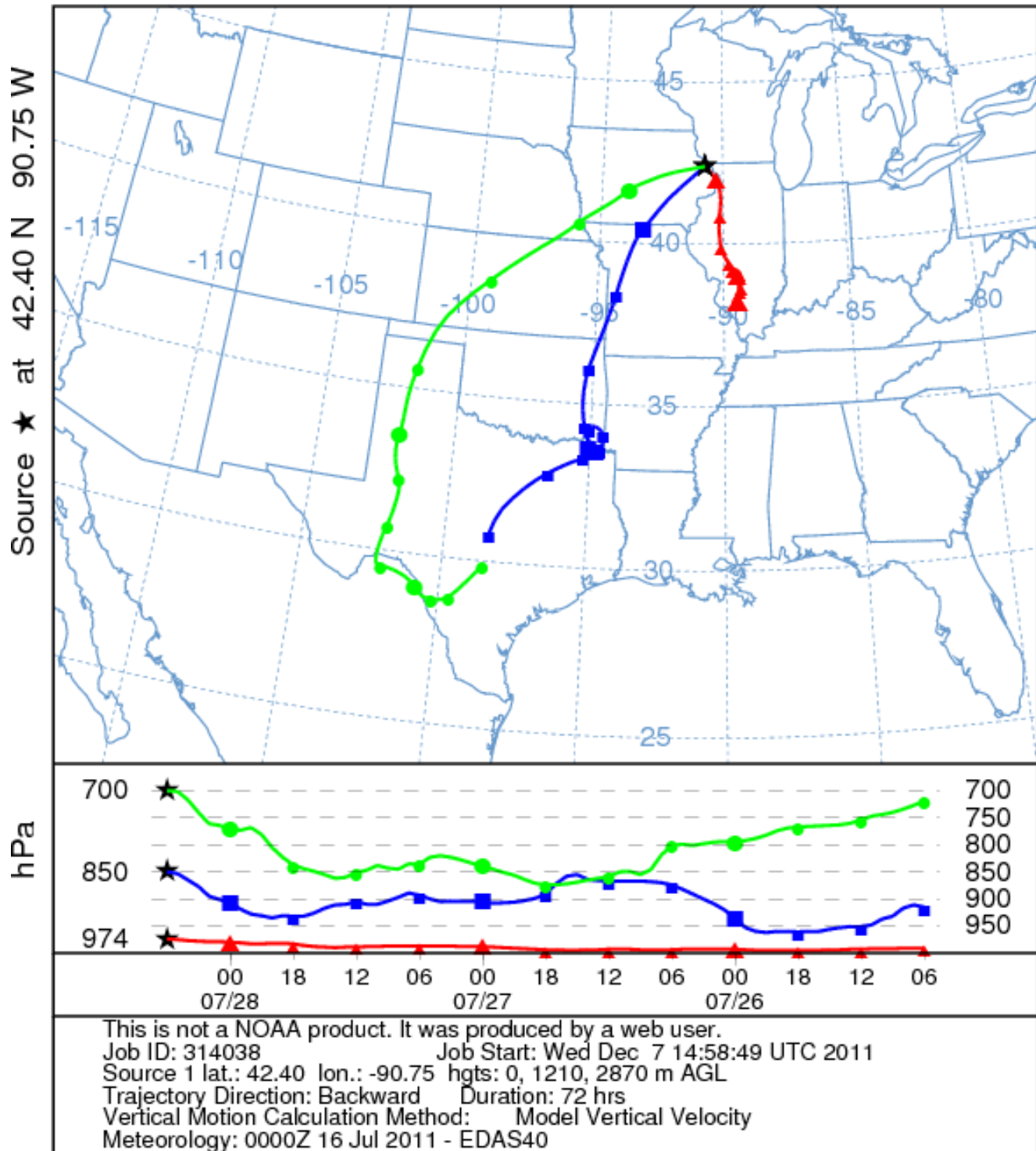
Storm 1220 - July 27 (2100 UTC) - July 28 (2000 UTC), 2011										
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)										
Area (mi ²)	Duration (hours)									
	1	2	3	4	5	6	12	18	24	Total
0.4	4.19	6.91	9.36	9.40	9.63	10.88	14.77	15.11	15.12	15.12
1	4.15	6.83	9.24	9.32	9.52	10.75	14.58	14.94	14.95	14.95
10	3.86	6.25	8.55	8.70	8.97	10.22	13.75	14.30	14.32	14.32
25	3.50	5.81	7.81	8.04	8.48	9.77	13.27	13.94	13.99	13.99
50	3.12	5.38	7.05	7.37	8.08	9.45	12.86	13.57	13.60	13.60
100	2.77	4.95	6.32	6.67	7.71	9.14	12.43	13.12	13.16	13.16
150	2.59	4.71	5.92	6.33	7.50	8.95	12.16	12.85	12.89	12.89
200	2.45	4.51	5.64	6.15	7.35	8.81	11.97	12.63	12.67	12.67
300	2.25	4.19	5.18	5.85	7.09	8.55	11.64	12.29	12.33	12.33
400	2.14	3.93	4.88	5.62	6.85	8.26	11.32	11.96	12.00	12.00
500	2.05	3.72	4.63	5.43	6.67	8.02	10.99	11.66	11.69	11.69
1,000	1.73	3.07	3.91	4.58	5.81	6.95	9.62	10.24	10.27	10.27
2,000	1.30	2.33	3.05	3.73	4.64	5.49	7.89	8.56	8.59	8.59
5,000	0.72	1.27	1.81	2.35	2.89	3.33	5.25	5.79	5.81	5.81
10,000	0.38	0.72	1.02	1.31	1.64	1.89	3.14	3.61	3.63	3.63
12,296	0.31	0.60	0.86	1.09	1.36	1.59	2.63	3.06	3.07	3.07



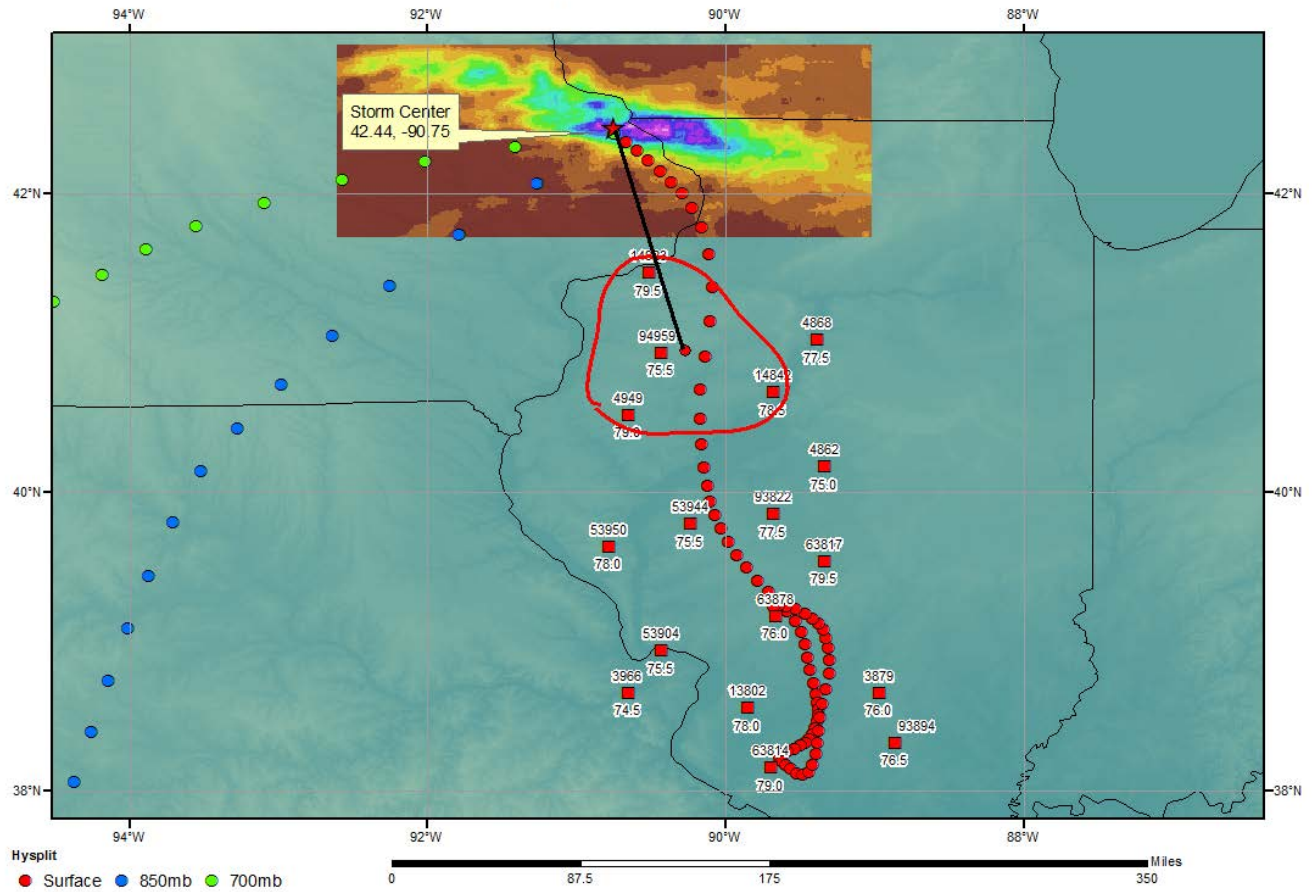




NOAA HYSPLIT MODEL
Backward trajectories ending at 0600 UTC 28 Jul 11
EDAS Meteorological Data



SPAS 1220 - Dubuque, IA Storm Analysis July 25-28, 2011



Storm Precipitation Analysis System (SPAS) For Storm #1590_1

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

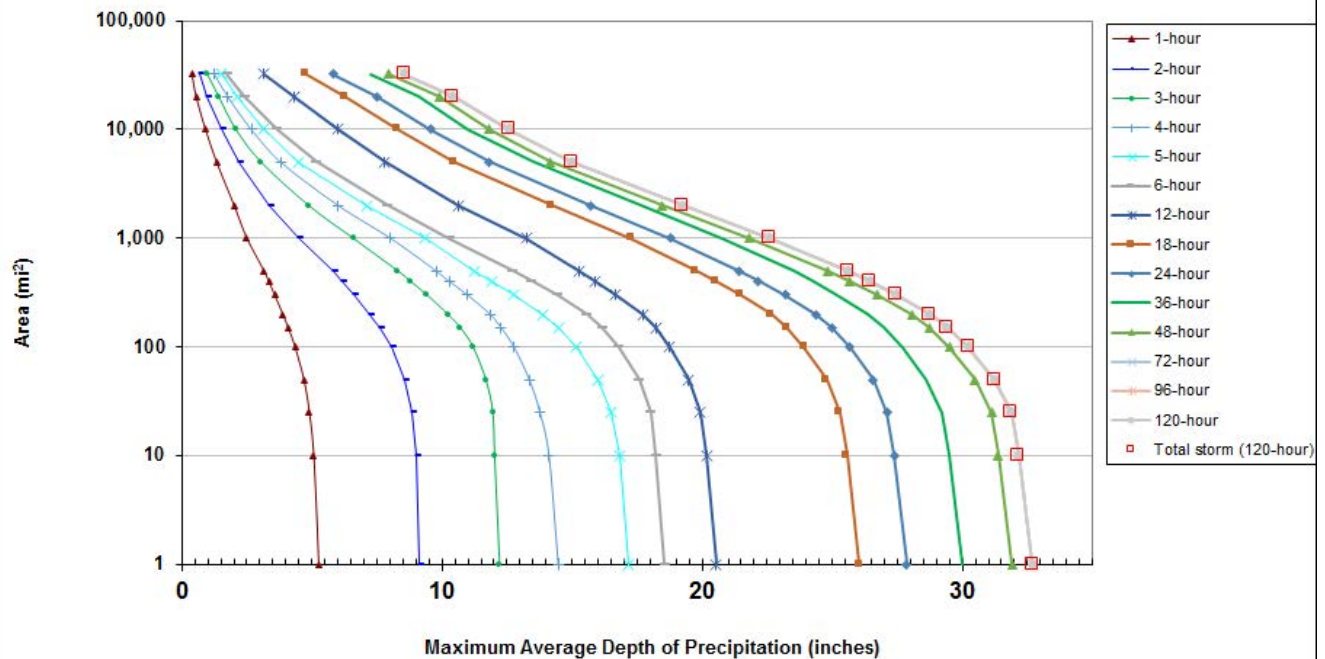
Reliability of results: This analysis was based on 458 hourly stations, daily data, supplemental station data (Dawson Treatment Plant), and radar data. We have a good degree of confidence for the station based storm total results. The spatial pattern is dependent on the radar data, gauge data, and basemap. 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.

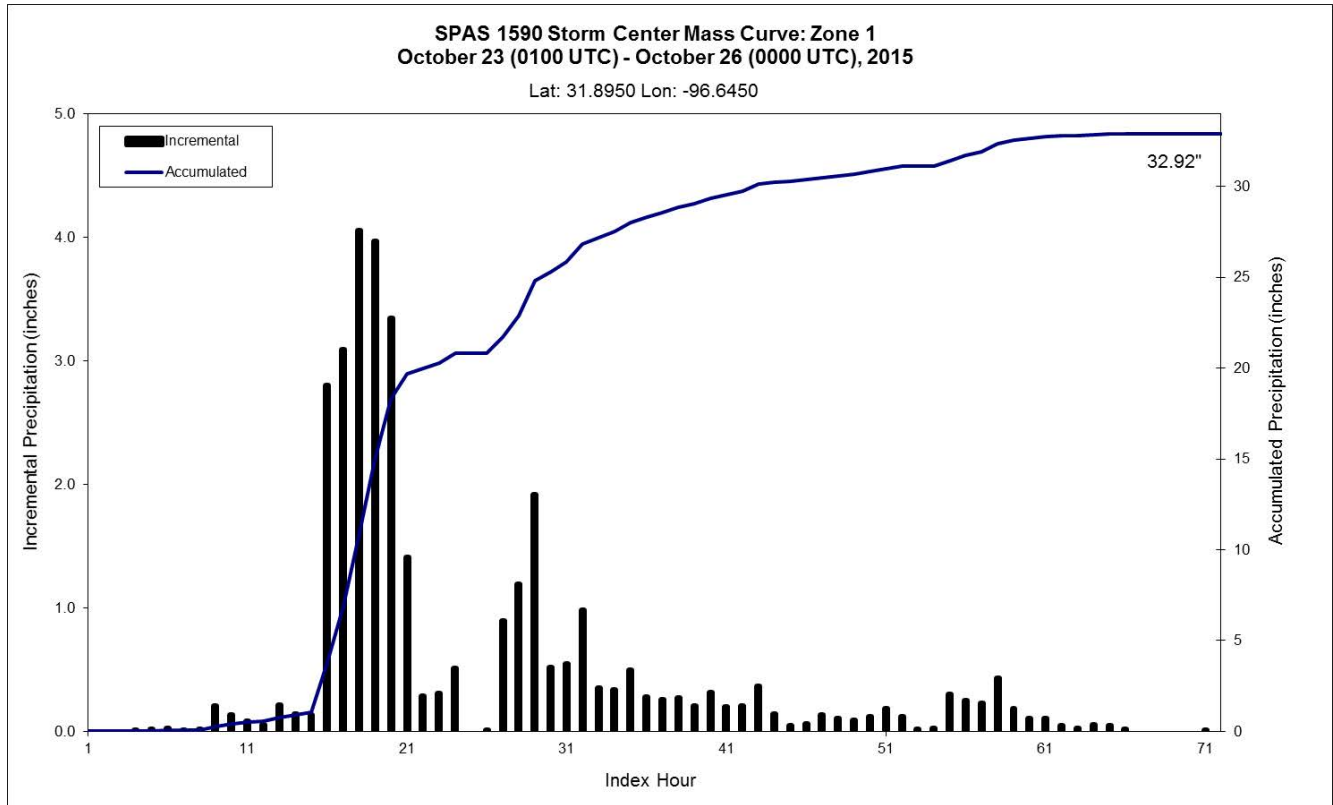
					Storm Rep. Dew Point					Climatological Max. Dew Point						
SPAS Storm ID	LON	LAT	ELEV	ELEV Round	T _d	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	T _d	T _d Round	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	IPMF
1590 1	-96.645	31.895	450	500	76.00	2.99	0.13	74	2.860	77.97	78.0	3.29	0.14	78	3.150	1.101

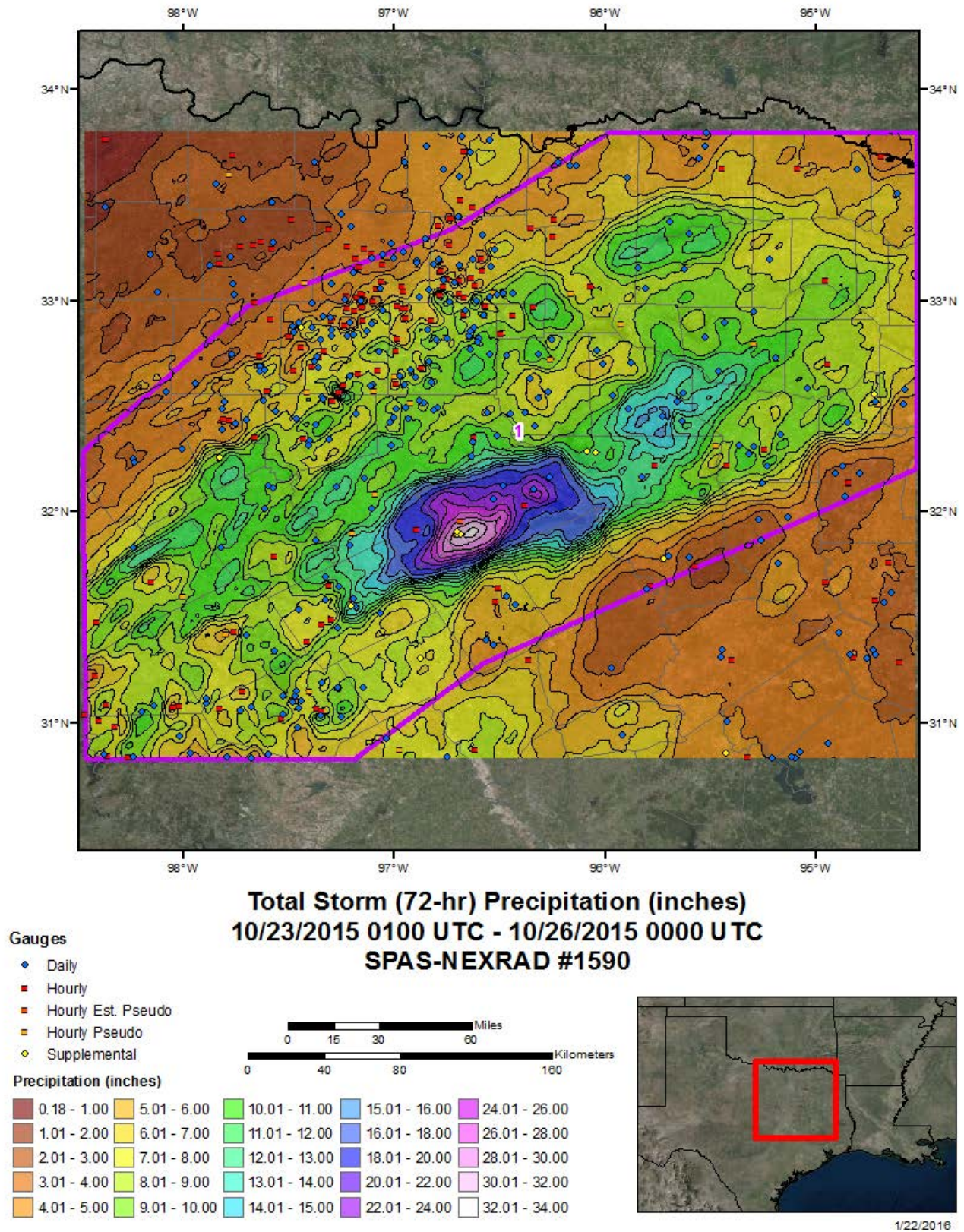
Storm 1590 - October 23 (0100 UTC) - October 26 (0000 UTC), 2015**MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)**

Area (mi ²)	Duration (hours)														
	1	2	3	4	5	6	12	18	24	36	48	72	96	120	Total
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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	8.55

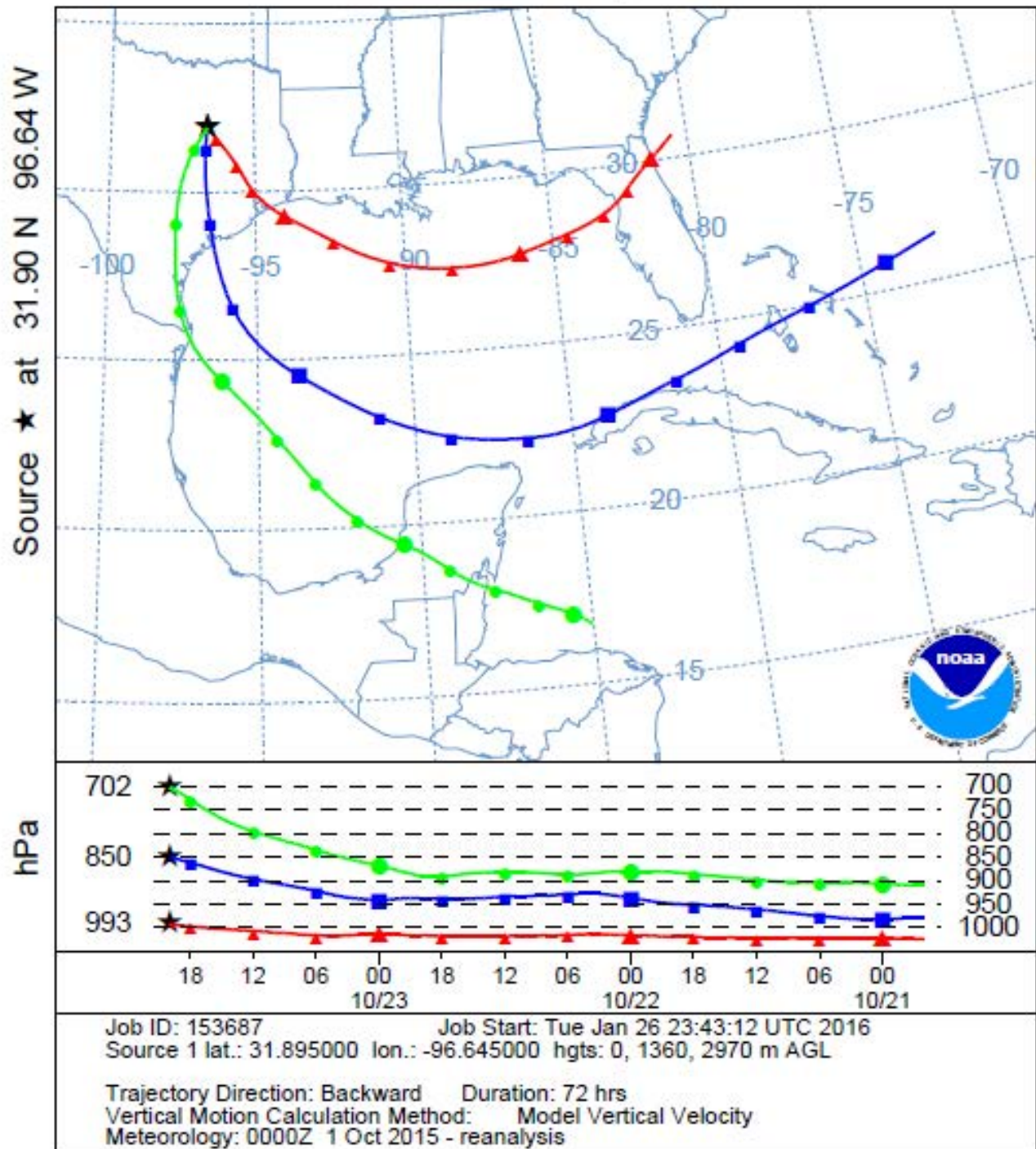
SPAS #1590 DAD Curves Zone 1
October 23 - 26, 2015



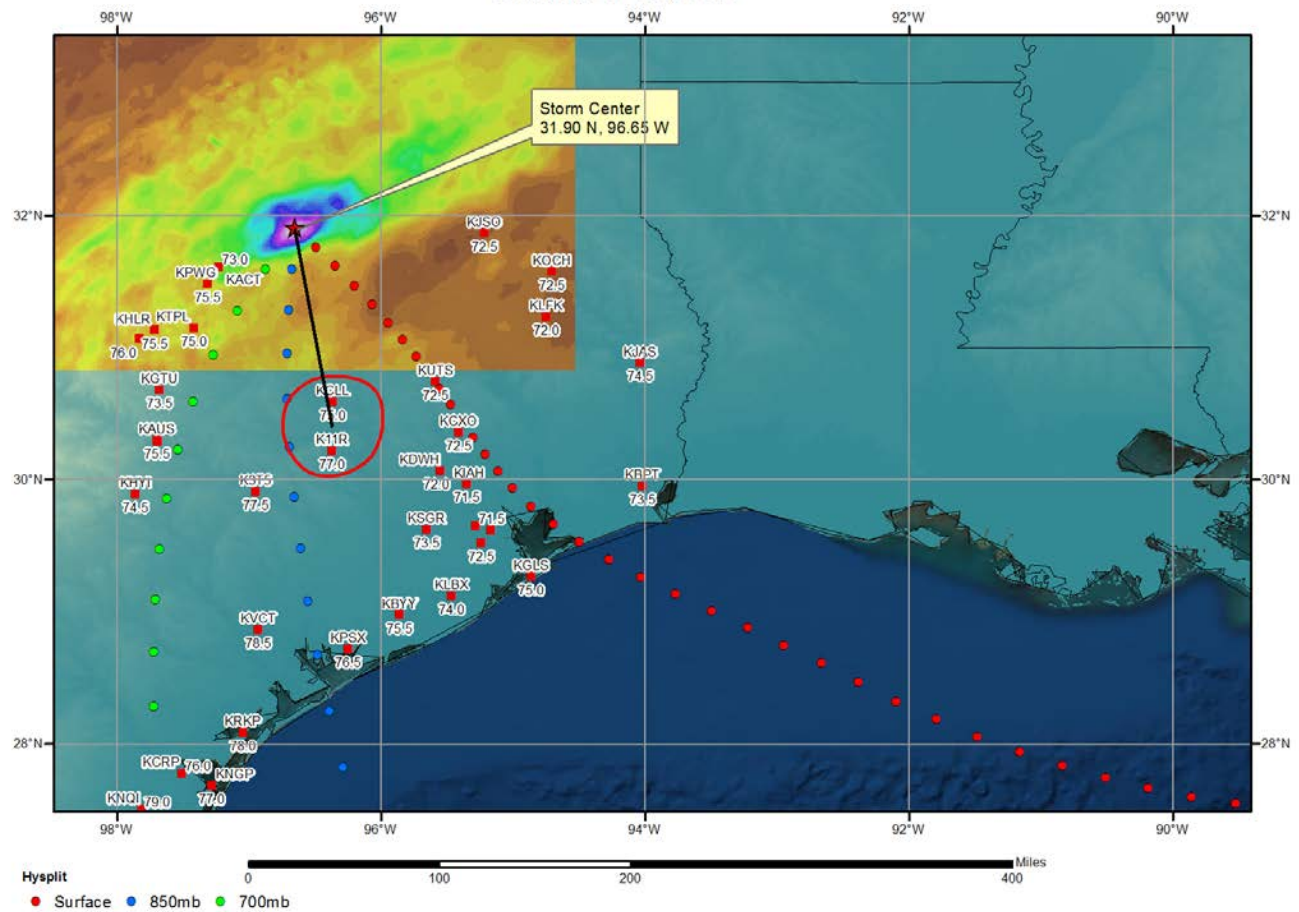




NOAA HYSPLIT MODEL
Backward trajectories ending at 2000 UTC 23 Oct 15
CDC1 Meteorological Data



SPAS 1590 Dawson, TX Storm Analysis
October 21 - 24, 2015



Tropical Storms

Storm Precipitation Analysis System (SPAS) For Storm #1591_1

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

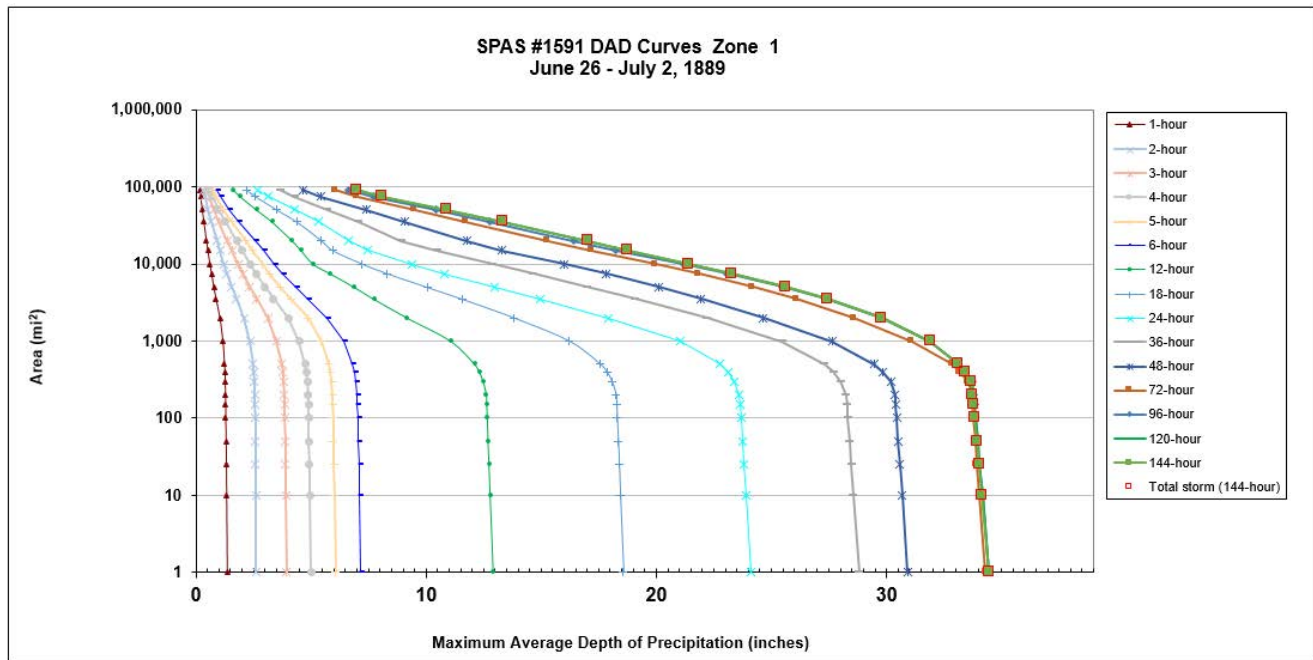
Radar Included: No

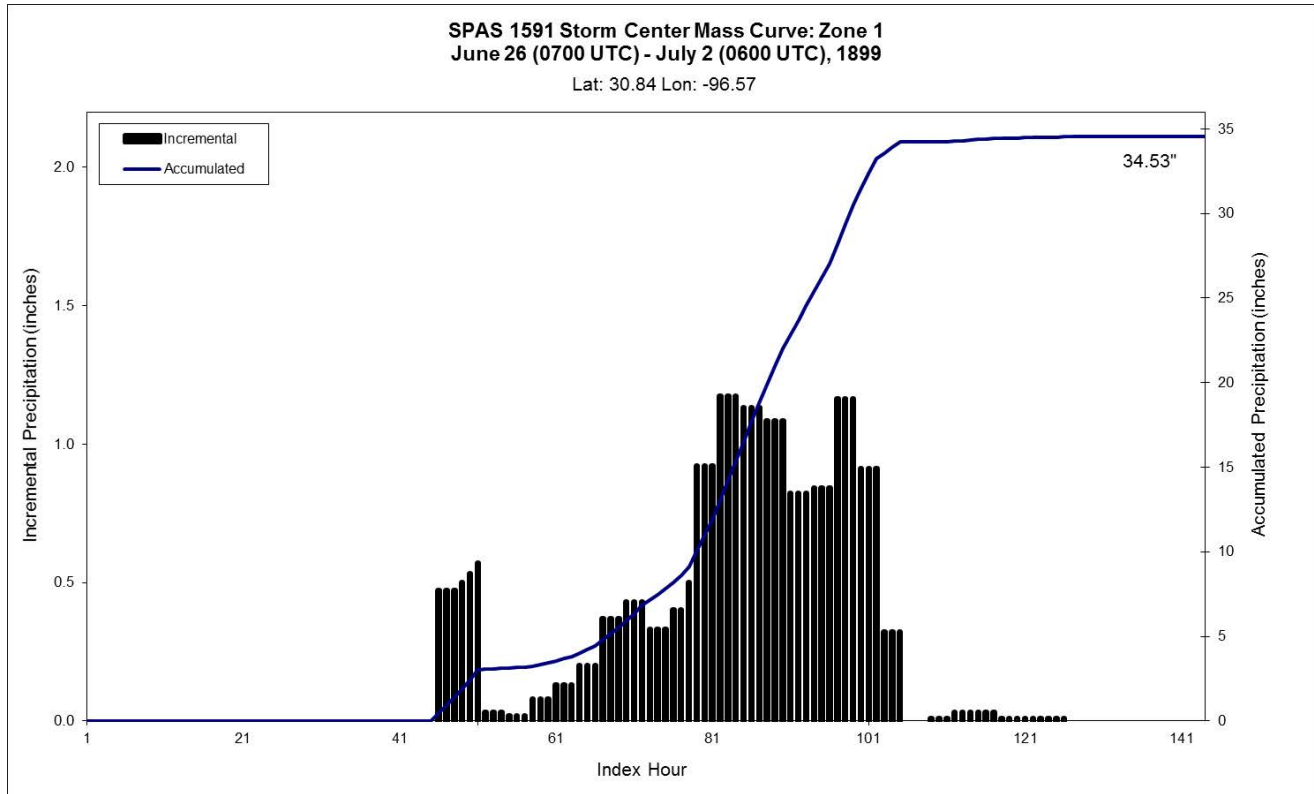
Depth-Area-Duration (DAD) analysis: Yes

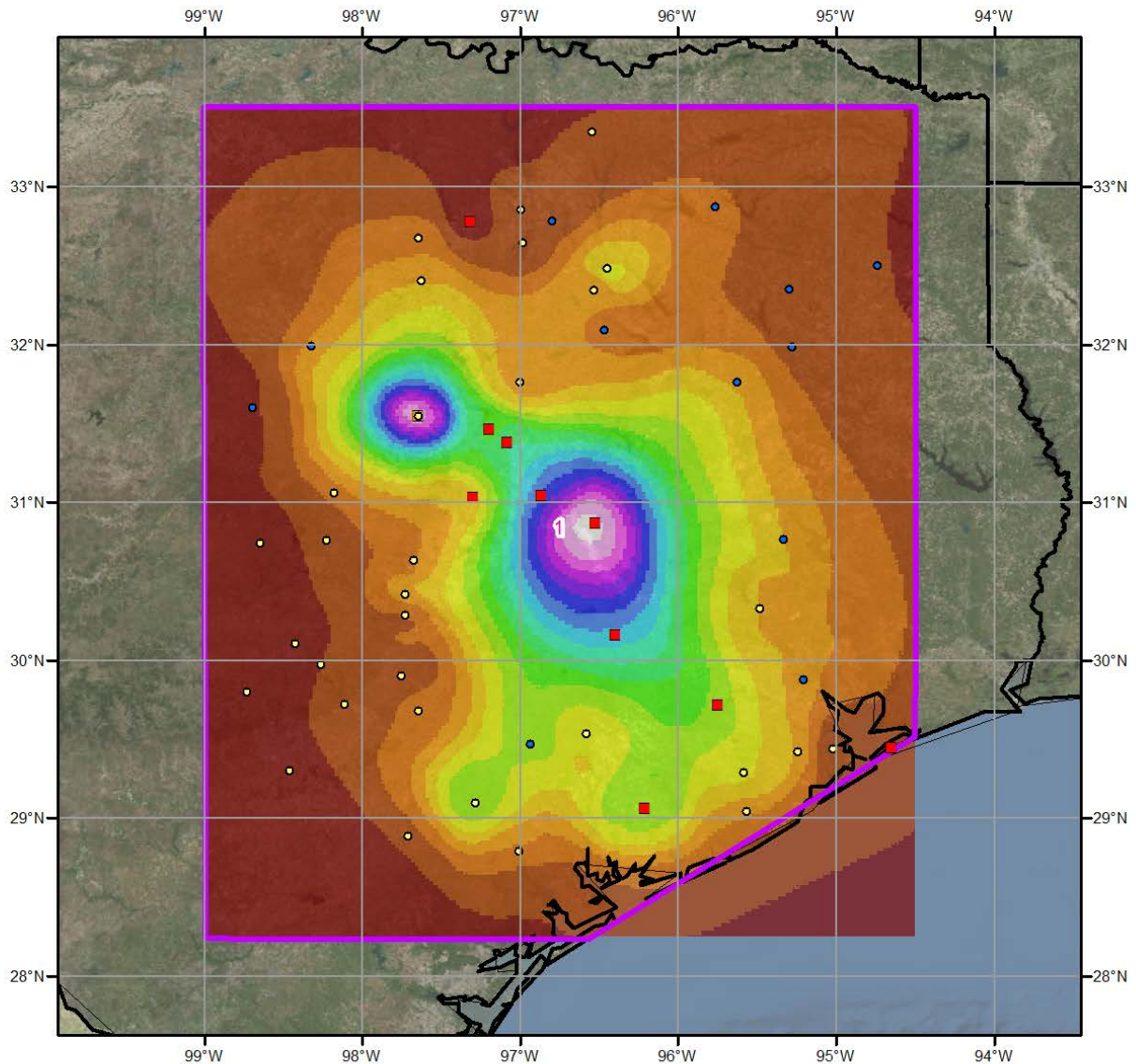
Reliability of Results: This analysis was based on hourly data, daily data, and supplemental station data. We have a high degree of confidence in the station based storm total results. The spatial pattern is dependent on the USDA Isohyetal basemap, and the timing is based on hourly and hourly pseudo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

					Storm Rep. Dew Point					Climatological Max. Dew Point						
SPAS Storm ID	LON	LAT	ELEV	ELEV Round	T _d	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	T _d	T _d Round	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	IPMF
1591_1	-96.570	30.840	276	300	83.50	4.21	0.10	89	4.110	86.13	86.0	4.67	0.11	94	4.560	1.109

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







Total Storm (144-hours) Precipitation (inches)

June 26 - July 1, 1899

SPAS 1591 - Hearne, TX

0 25 50 100 Miles

0 55 110 220 Kilometers

Gauges

- Daily
- Hourly
- Hourly Pseudo
- Supplemental

Precipitation(inches)

0.00 - 2.00	14.01 - 16.00	30.01 - 32.00
2.01 - 4.00	16.01 - 18.00	32.01 - 34.00
4.01 - 6.00	18.01 - 20.00	34.01 - 36.00
6.01 - 8.00	20.01 - 22.00	
8.01 - 10.00	22.01 - 24.00	
10.01 - 12.00	24.01 - 26.00	
12.01 - 14.00	26.01 - 28.00	
	28.01 - 30.00	



4/3/2015

WAR DEPARTMENT

CORPS OF ENGINEERS, U.S. ARMY

STORM STUDIES - PERTINENT DATA SHEET

Storm of 27 June-1 July 1899

Assignment GI 3-4

Location Texas

Study Prepared by:

Southwestern Division

Galveston District Office

Part I Reviewed by H. M. Sec. of
Weather Bureau, 10/1/46Part II Approved by Office, Chief
of Engineers for Distribution
of Factual Data, 5/12/47Remarks: 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

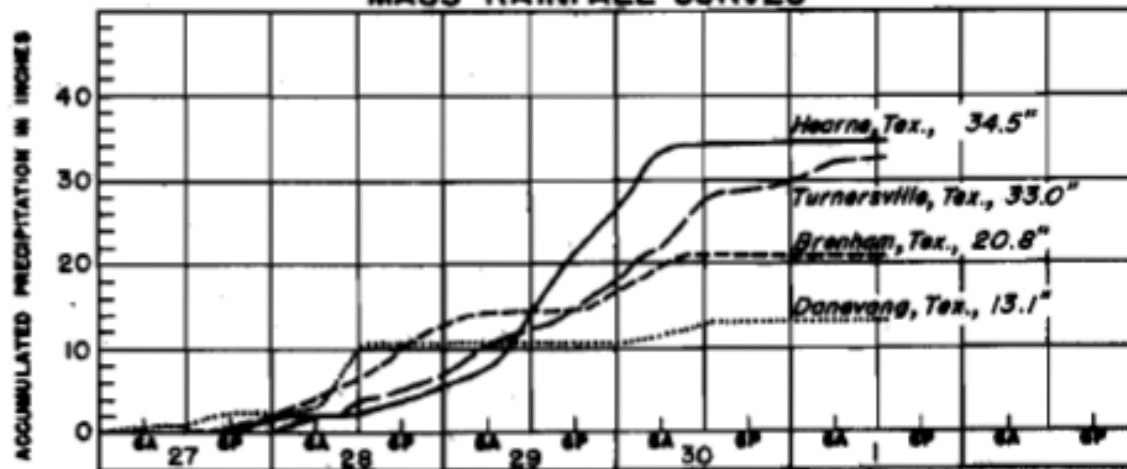
MAXIMUM AVERAGE DEPTH OF RAINFALL IN INCHES

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	7.8	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

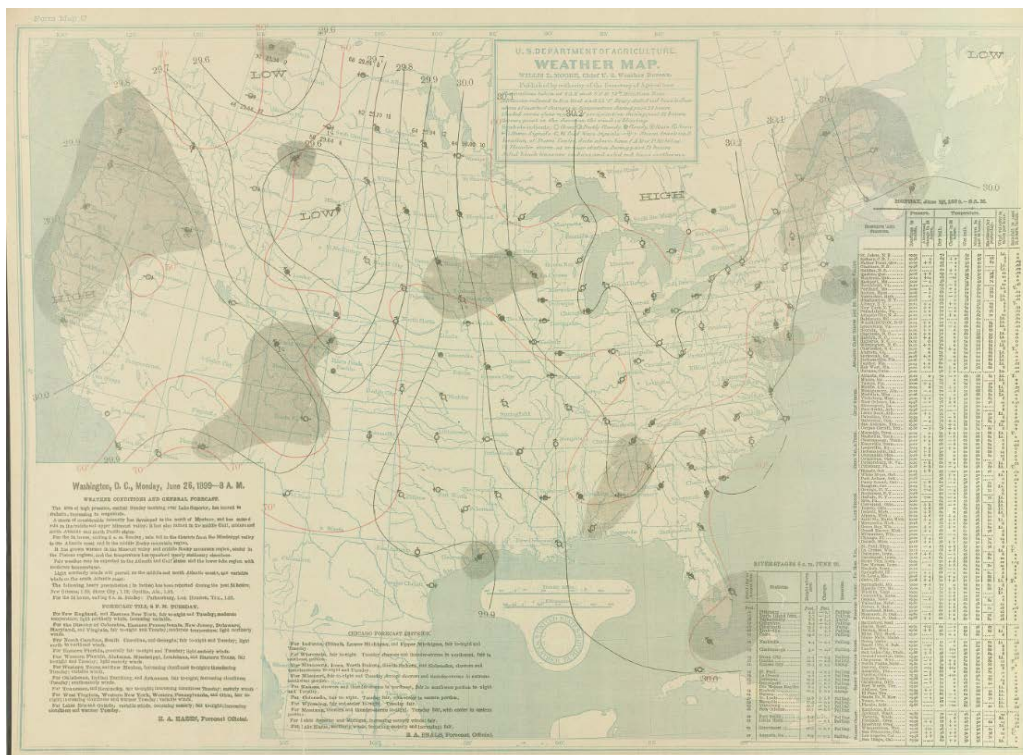
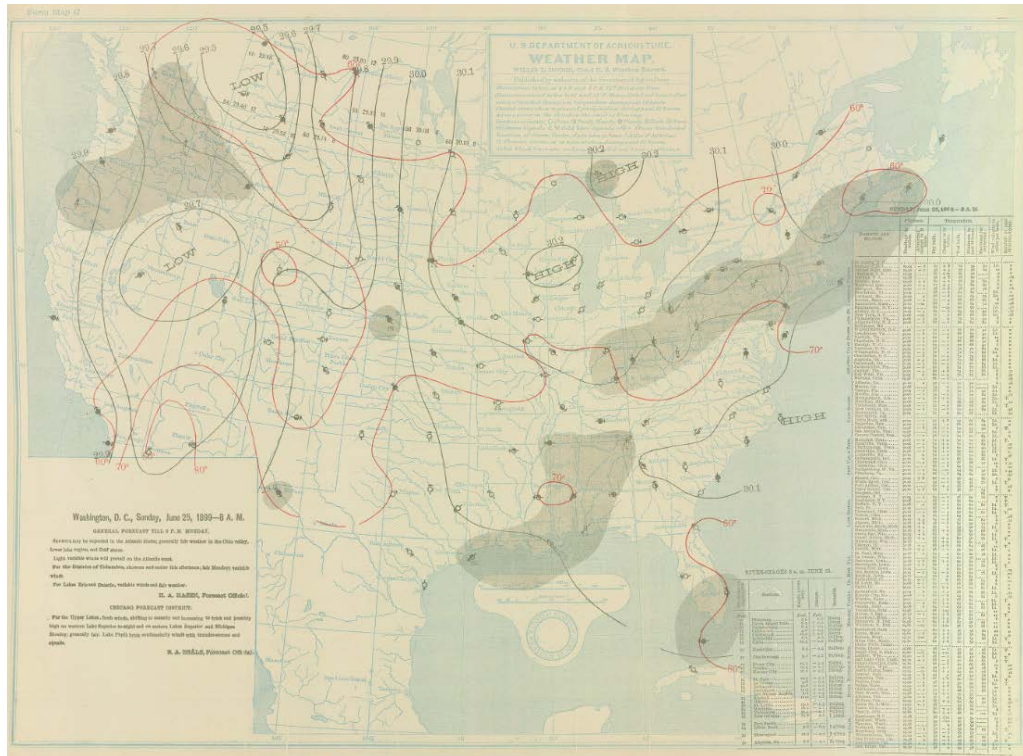
Form S-2

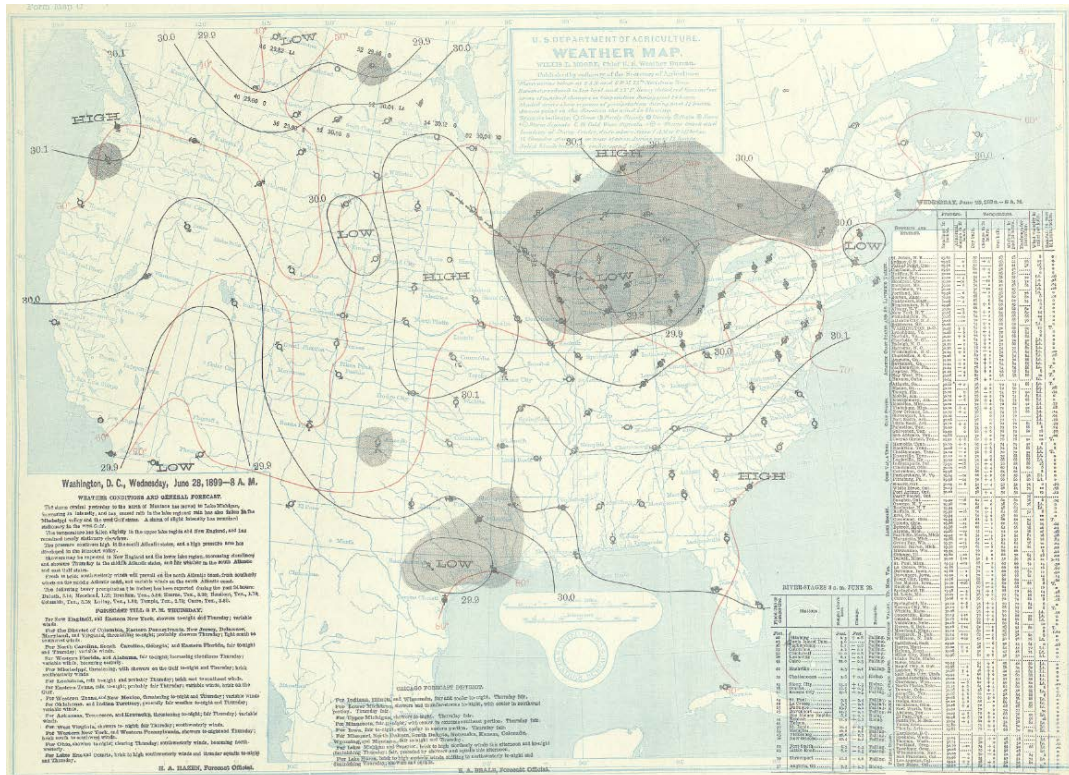
WAR DEPARTMENT

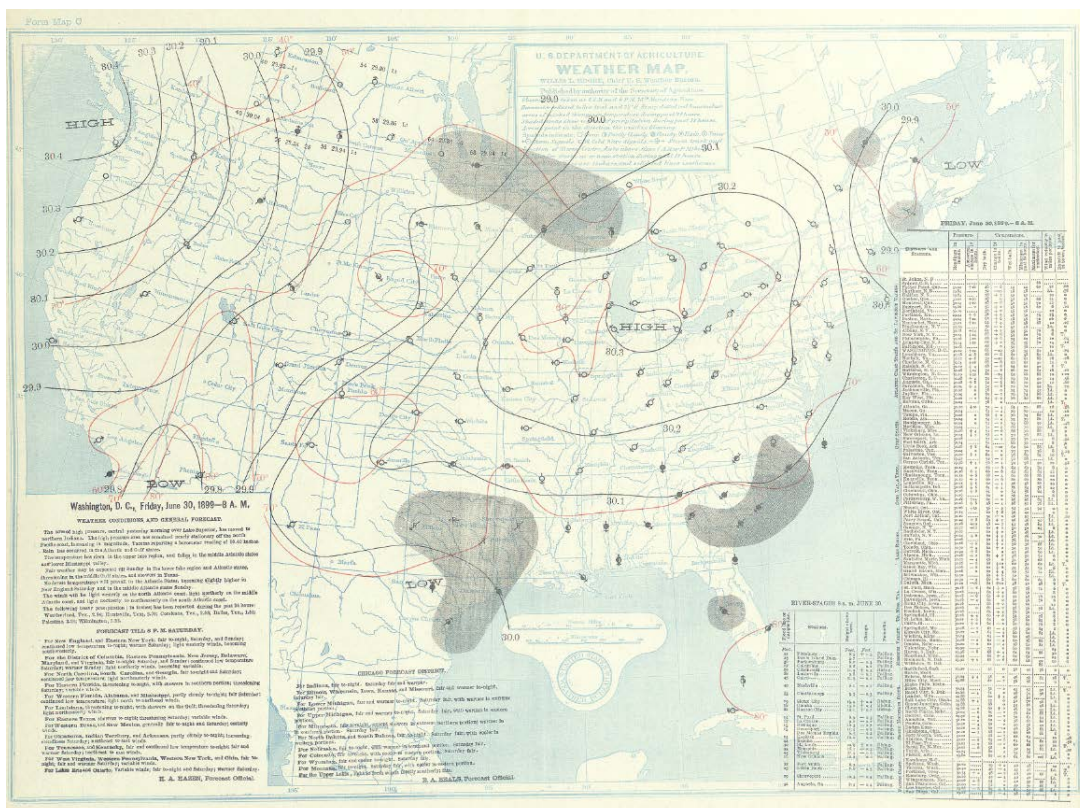
CORPS OF ENGINEERS, U. S. ARMY

STORM STUDIES - ISOHYETAL MAPStorm of June 27-July 1, 1899 Assignment CM 3-4Study Prepared by: Galveston, Tex. District
Southwestern Division**MASS RAINFALL CURVES**

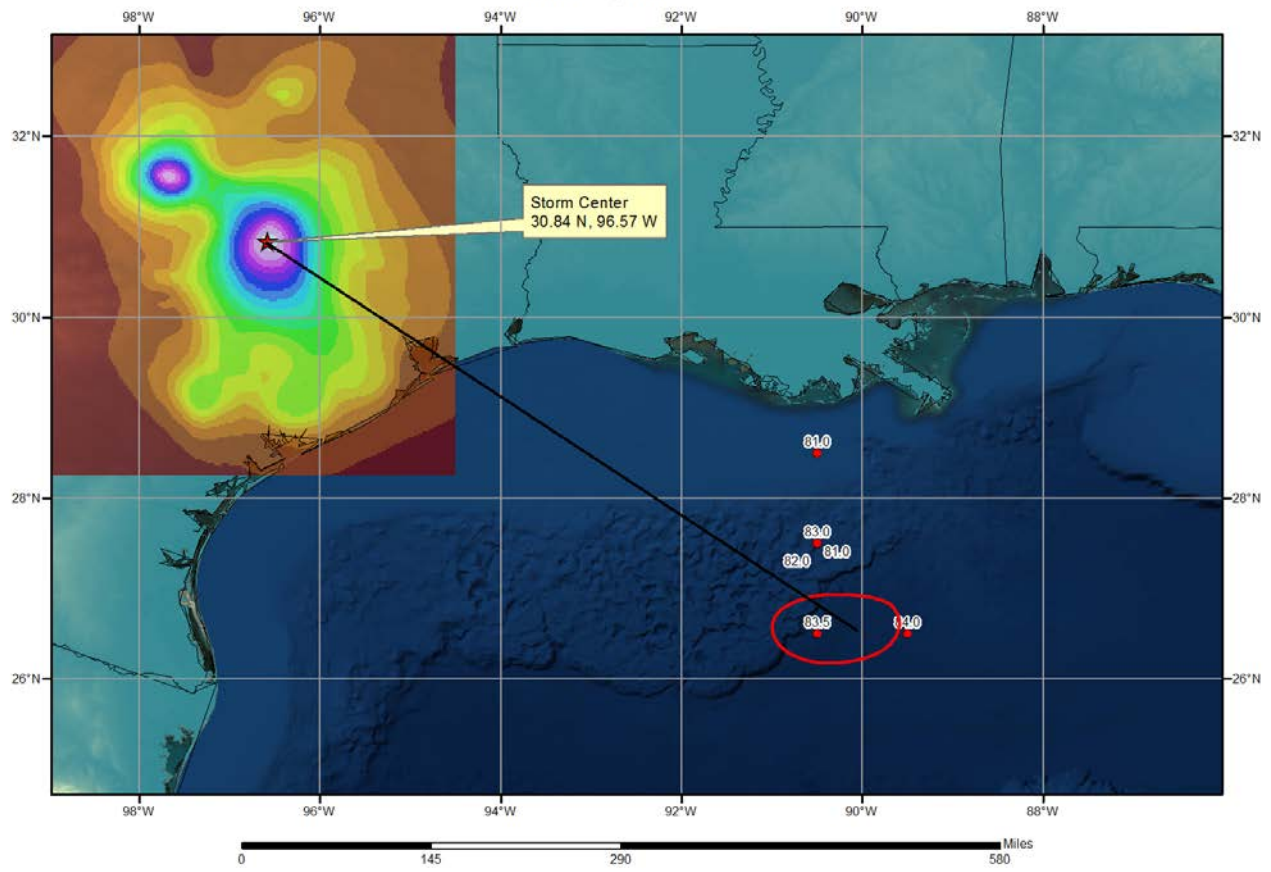
FORM 8-31





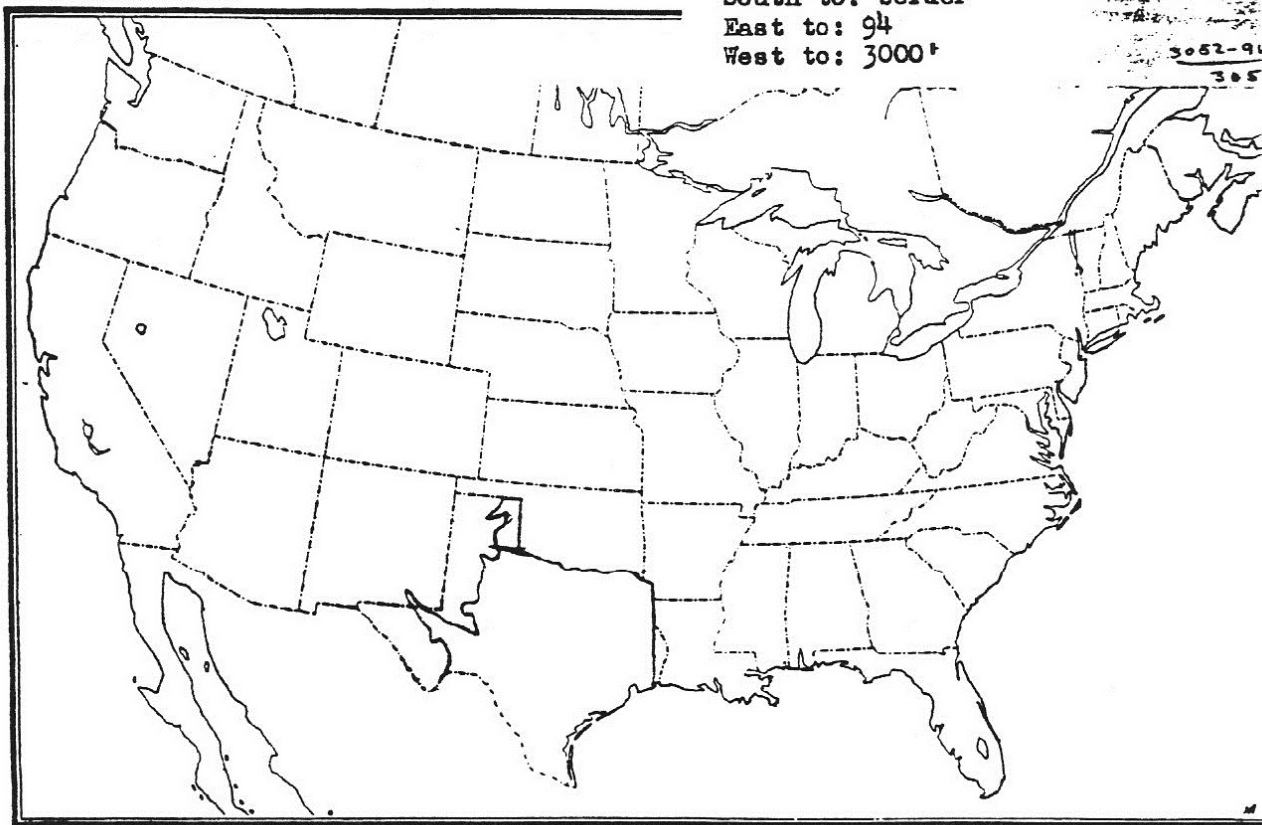


SPAS 1591 Hearne, TX Sea Surface Temperatures (F)
June 28, 1899



GM 3-4...June 27-July 1, 1955, Eastern
12-hr. rfd 75(29th)...125 82 to 78
North to: Texas border
South to: border
East to: 94
West to: 3000'

3052-91
305



Storm Precipitation Analysis System (SPAS) For Storm #1582_1

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"

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

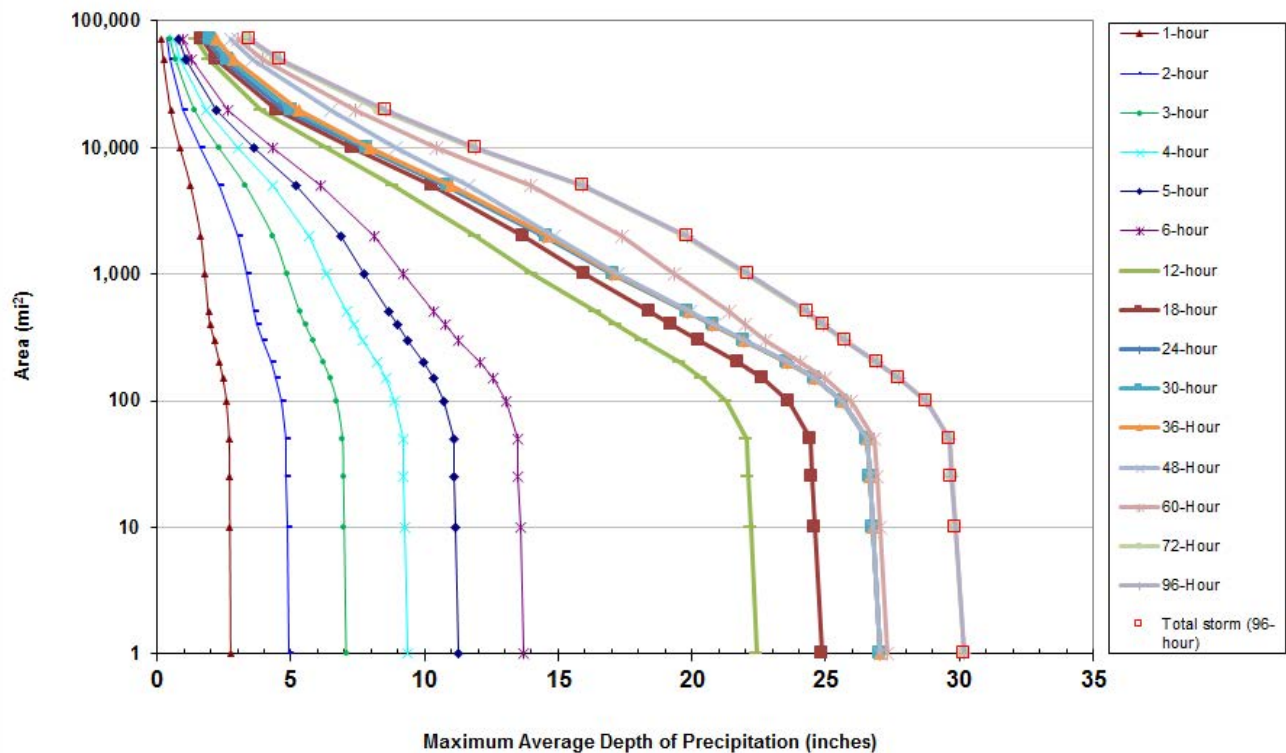
Reliability of results: This analysis was based on hourly data (H), daily data (D) and supplemental data (S). We have a good degree of confidence in the station based storm total results. The spatial pattern is dependent on basemap and the timing is based on five hourly stations.

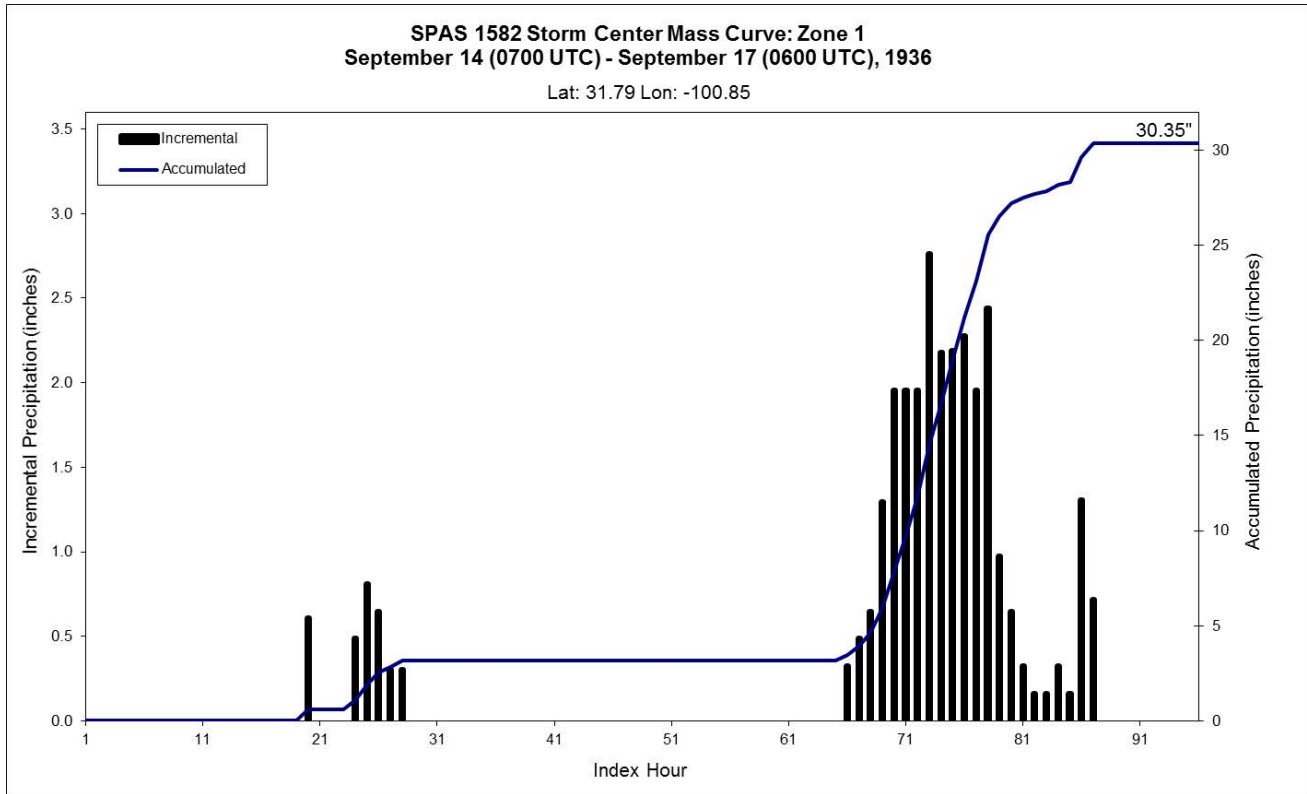
					Storm Rep. Dew Point					Climatological Max. Dew Point						
SPAS Storm ID	LON	LAT	ELEV	ELEV Round	T _d	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	T _d	T _d Round	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	IPMF
1582_1	-100.854	31.788	2,260	2,300	84.00	4.30	0.72	90	3.580	86.00	86.0	4.67	0.76	94	3.910	1.092

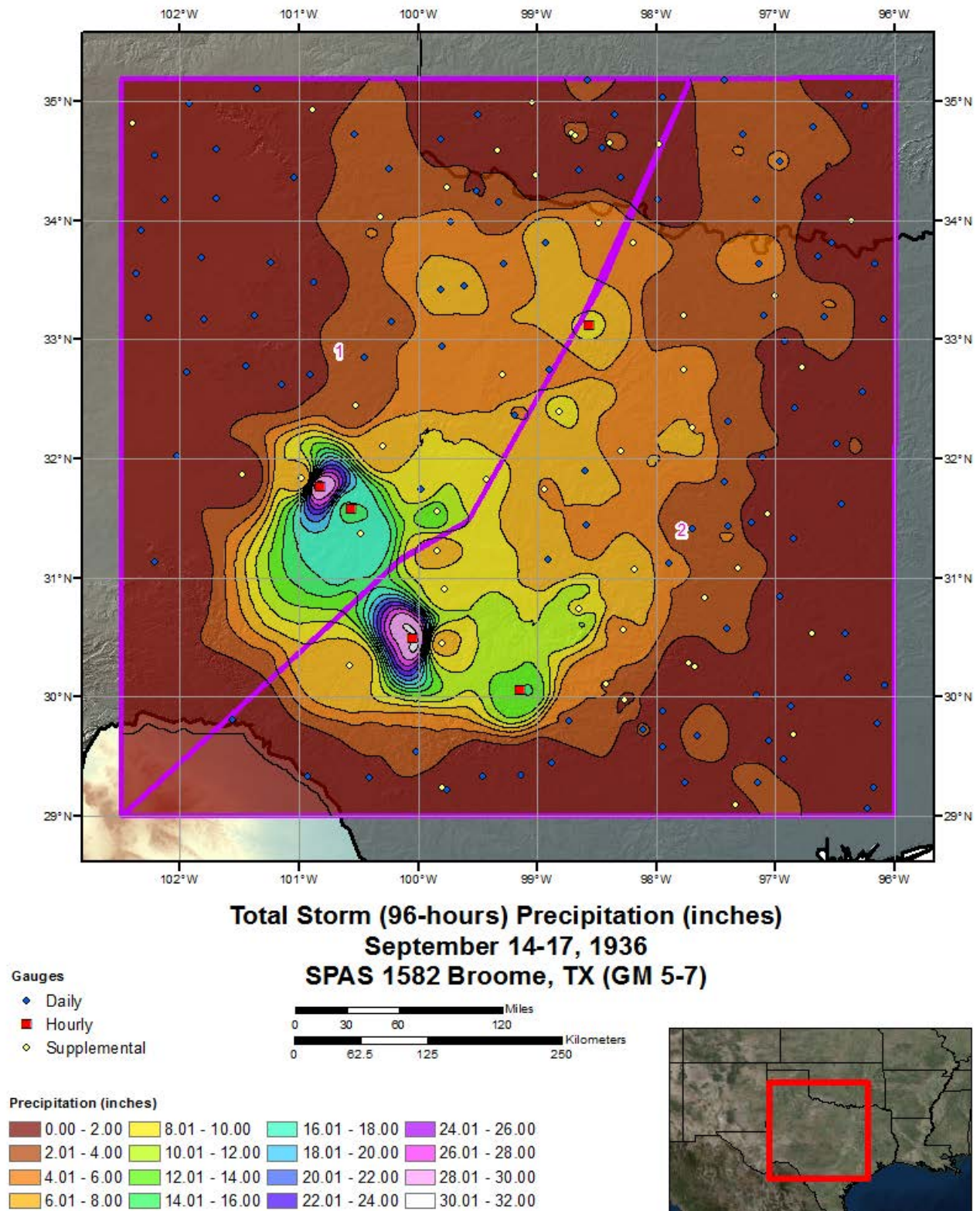
Storm 1582 Zone 1 - Sep. 14 (0700 UTC) - Sep. 17 (0600 UTC), 1936
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)

areasqmi	Duration (hours)															
	1	2	3	4	5	6	12	18	24	30	36	48	60	72	96	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	27.14	27.44	30.29	30.29	30.29
1	2.75	4.90	7.08	9.35	11.29	13.71	22.43	24.86	27.02	27.03	27.03	27.03	27.32	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	26.75	26.74	26.74	27.03	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	26.64	26.63	26.63	26.92	29.72	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	26.54	26.83	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	25.63	25.64	25.97	28.75	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	24.59	24.60	24.99	27.75	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	23.58	23.60	24.04	26.89	26.92	26.92
300	2.14	3.94	5.83	7.70	9.37	11.29	18.16	20.27	21.93	21.95	21.96	21.99	22.73	25.68	25.75	25.75
400	1.99	3.72	5.55	7.34	8.97	10.76	17.19	19.22	20.74	20.78	20.79	20.83	21.97	24.86	24.93	24.93
500	1.92	3.64	5.35	7.07	8.68	10.36	16.40	18.43	19.80	19.85	19.87	19.92	21.38	24.23	24.31	24.31
1,000	1.79	3.34	4.86	6.32	7.73	9.19	14.04	15.98	16.99	17.07	17.12	17.25	19.34	21.98	22.08	22.08
2,000	1.64	3.03	4.35	5.66	6.86	8.12	11.91	13.72	14.45	14.55	14.62	14.84	17.37	19.72	19.82	19.82
5,000	1.26	2.32	3.32	4.34	5.20	6.14	8.85	10.28	10.80	10.89	11.02	11.65	13.97	15.86	15.95	15.95
10,000	0.87	1.61	2.32	3.01	3.64	4.33	6.31	7.30	7.72	7.83	7.98	8.94	10.45	11.78	11.93	11.93
20,000	0.52	0.99	1.41	1.83	2.22	2.63	3.87	4.48	4.78	5.05	5.32	6.52	7.40	8.35	8.54	8.54
50,000	0.25	0.47	0.70	0.88	1.07	1.29	1.92	2.21	2.41	2.63	2.87	3.56	3.94	4.48	4.60	4.60
71,713	0.18	0.35	0.50	0.66	0.81	0.95	1.45	1.68	1.83	2.01	2.19	2.73	3.00	3.39	3.48	3.48

SPAS #1582 DAD Curves Zone 1
September 14-17, 1936

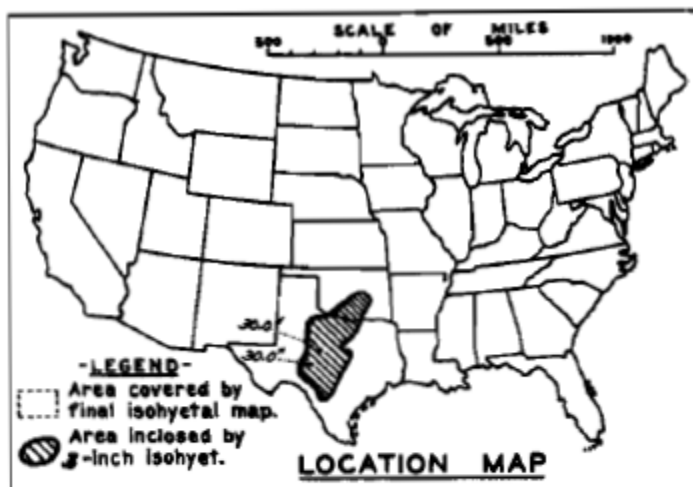






DEPARTMENT OF THE ARMY

CORPS OF ENGINEERS

STORM STUDIES - PERTINENT DATA SHEET (REV.)

Storm of 14-18 September 1936

Assignment GM 5-7

Location Texas- Oklahoma

Study Prepared by:

Southwestern Division

Galveston District Office

Part I Reviewed by H. M. Sec. of
Weather Bureau, 6/26/44Part II Approved by Office, Chief
of Engineers for Distribution
of Factual Data, 6/14/46Remarks: Centers at
Broome and Roosevelt, Texas
Dewpt. 77° - Ref. Pt. 350 SSE
Grid I-17**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)	8
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

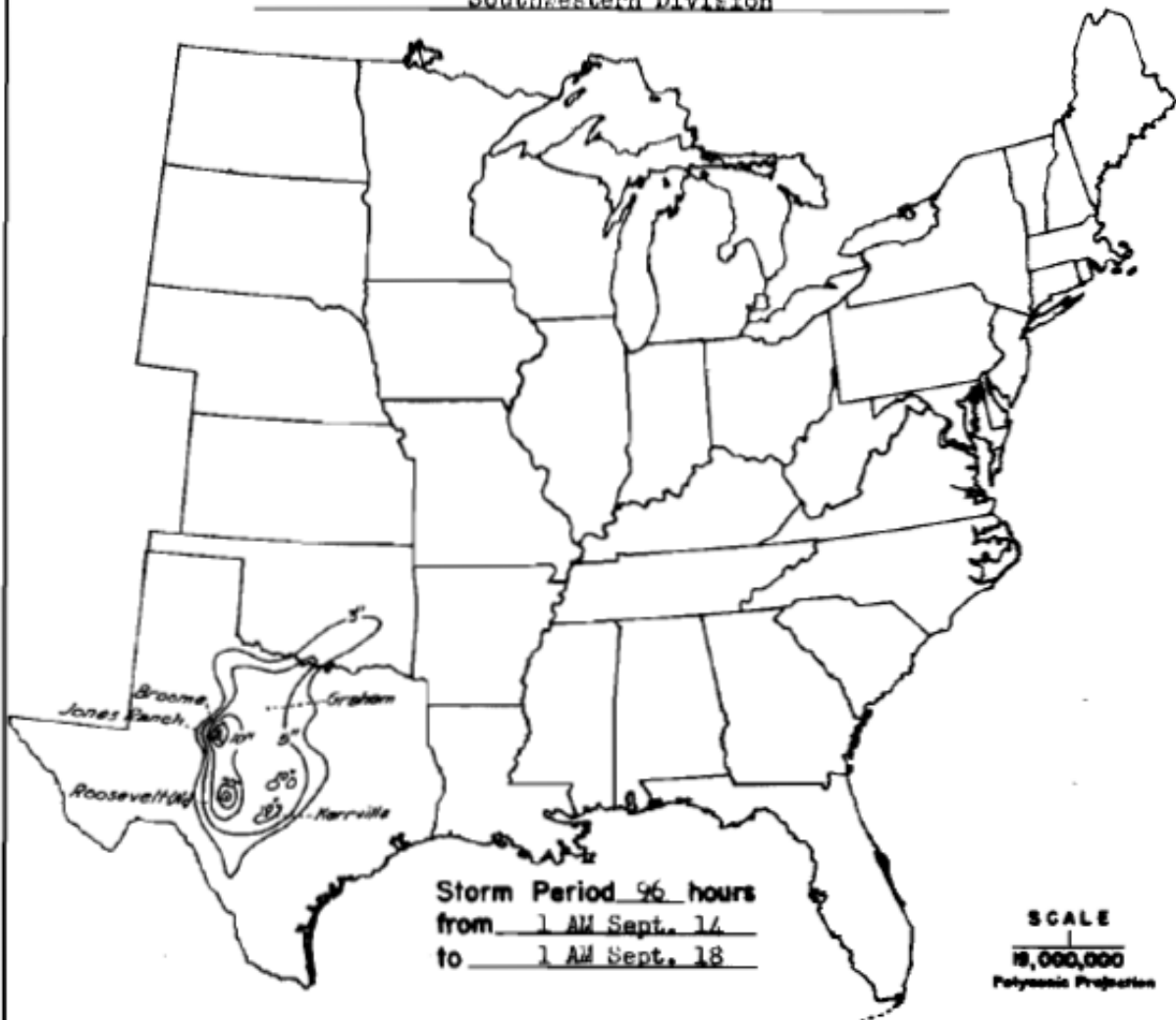
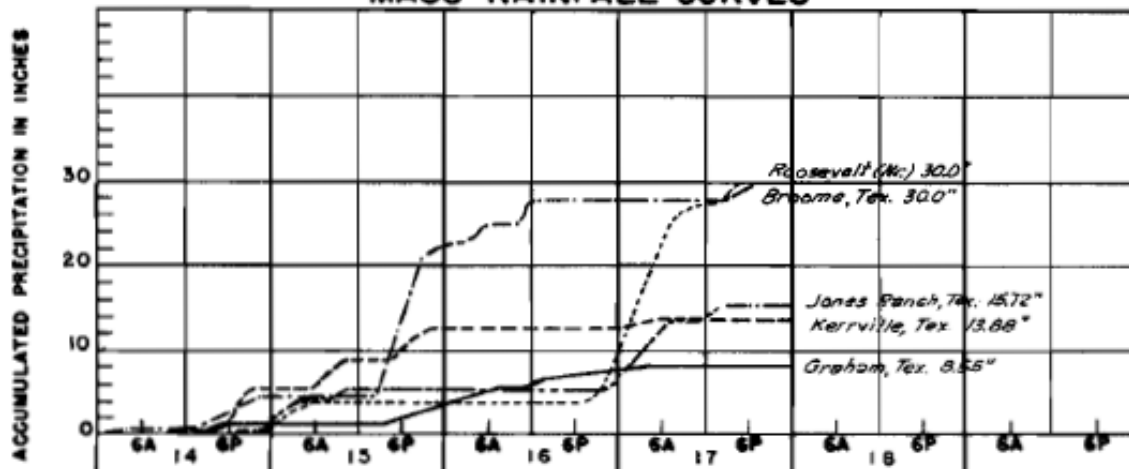
HATCHER 11 - 40 151

DEPARTMENT OF THE ARMY

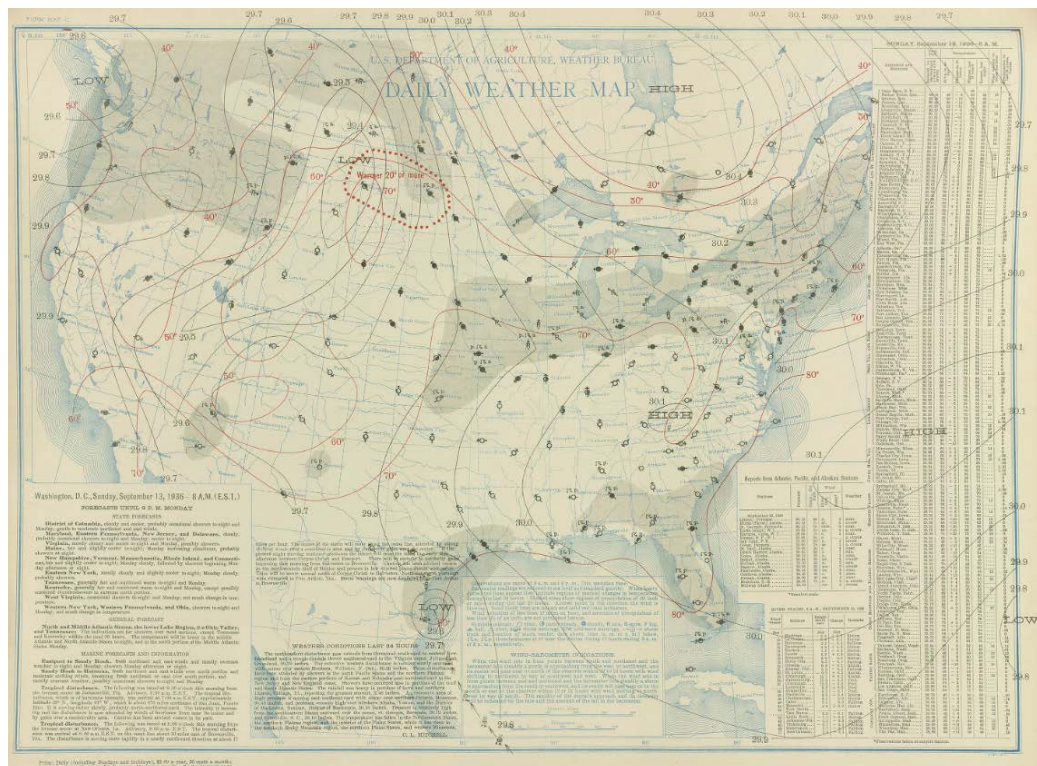
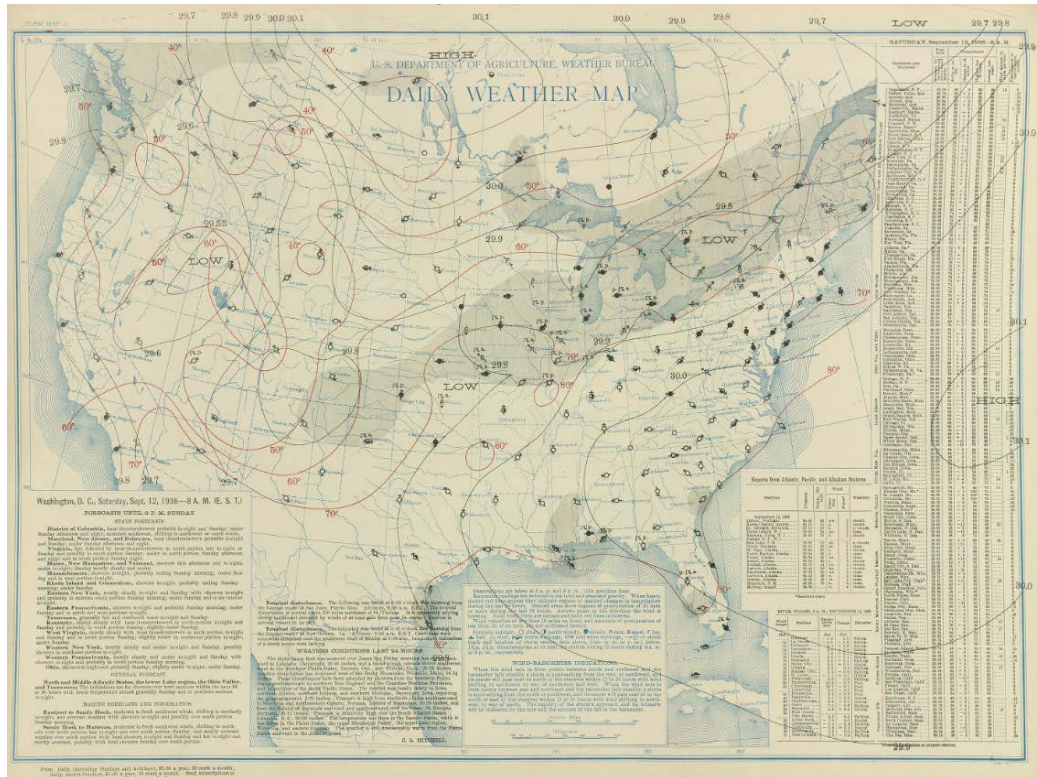
CORPS OF ENGINEERS

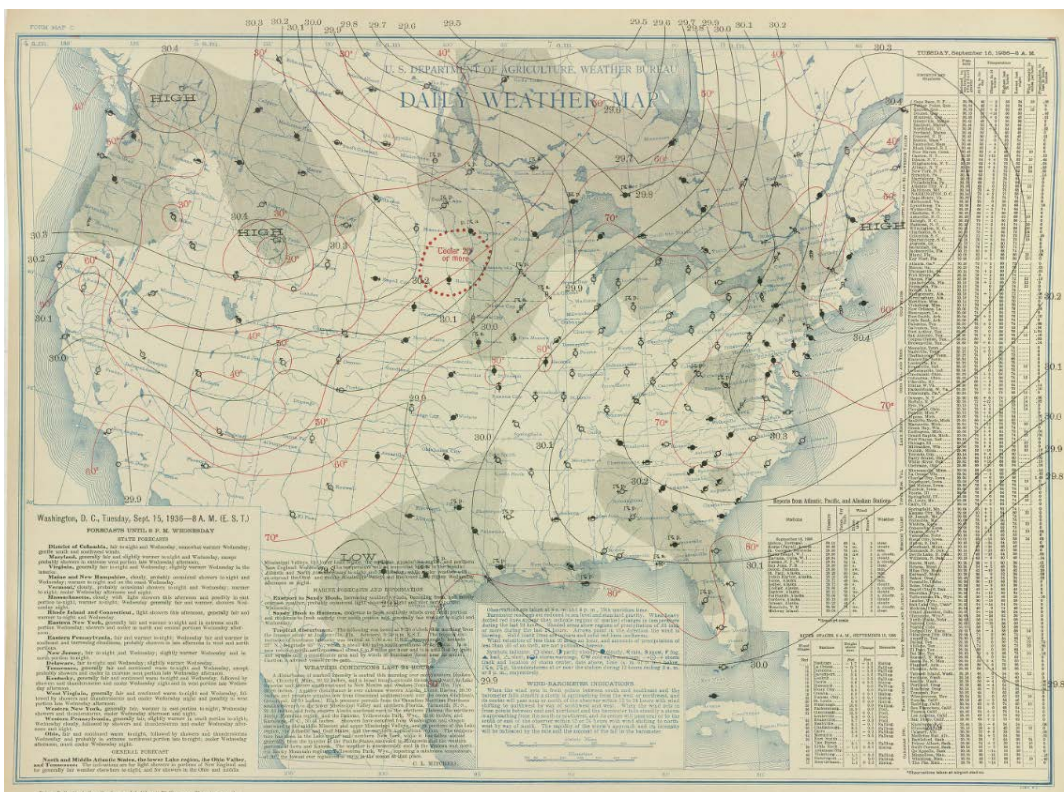
STORM STUDIES - ISOHYETAL MAP

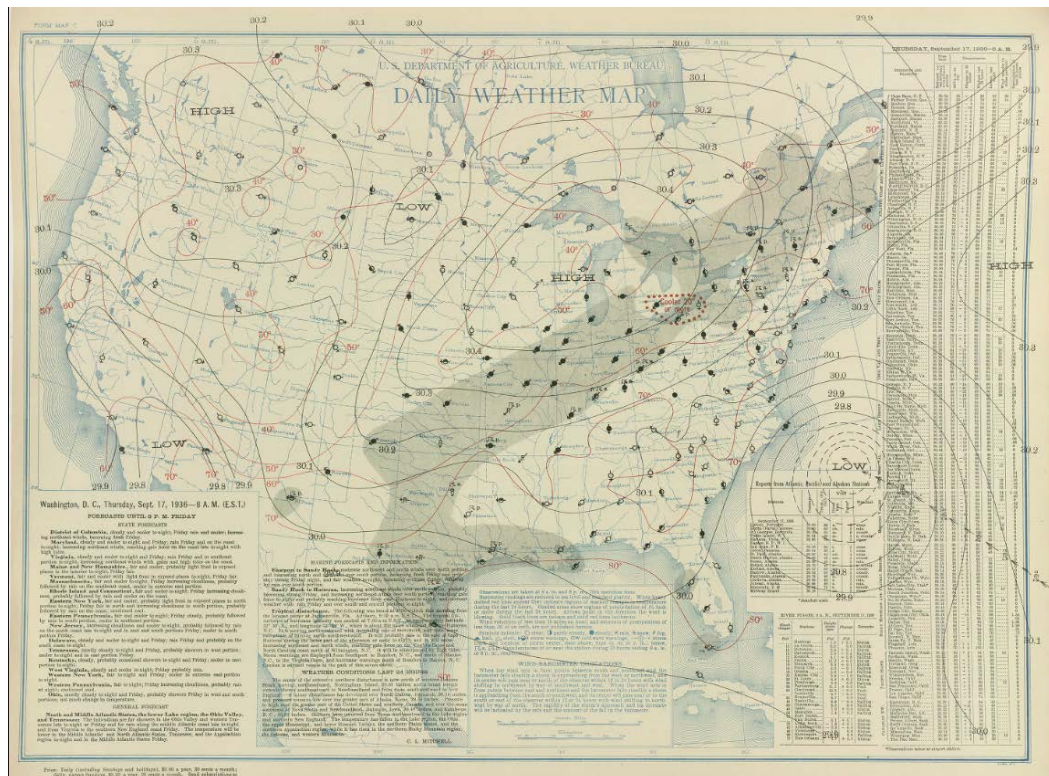
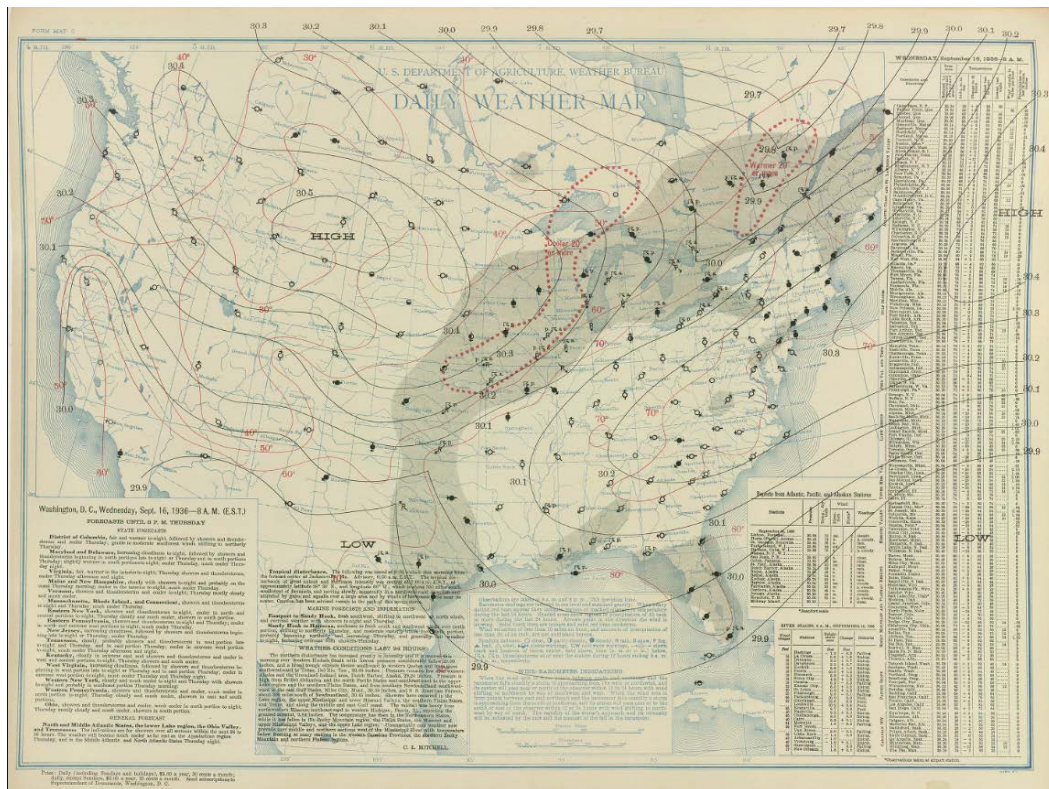
Storm of September 14-18, 1936 Assignment GM 5-7
 Study Prepared by: Gulveston, Texas District
Southwestern Division

**MASS RAINFALL CURVES**

FORM 3-32

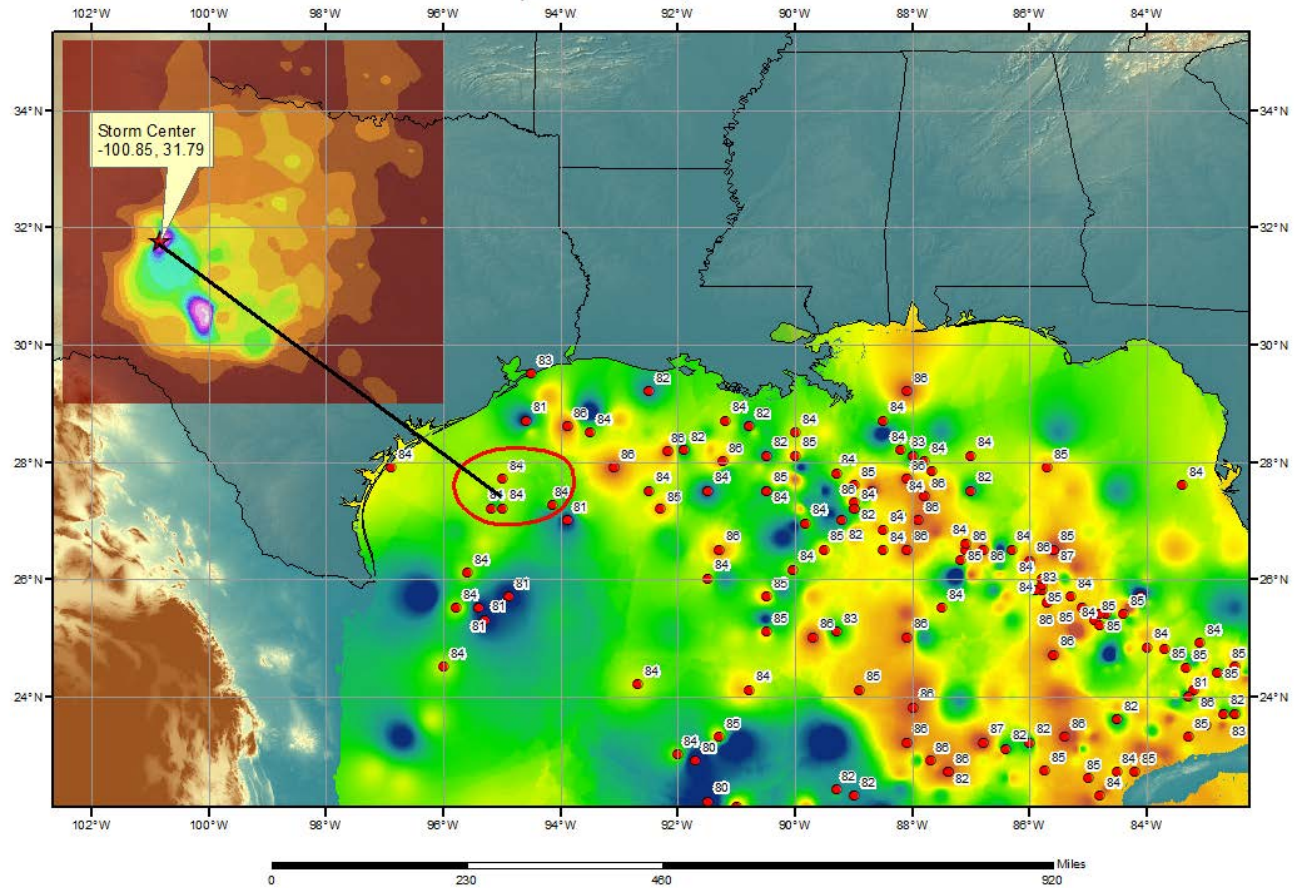






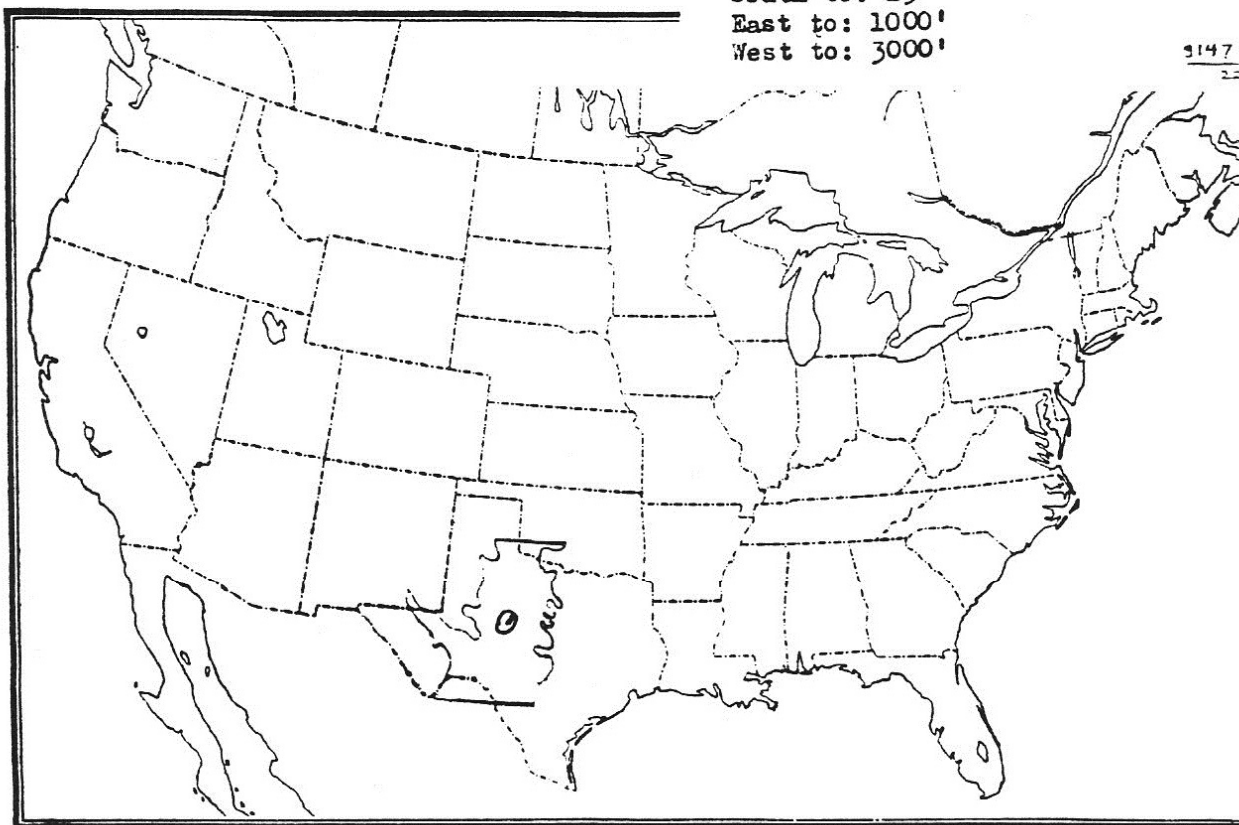
SPAS 1582 Broome, TX (GM 5-7) Storm Analysis Zone 1

September 13-14, 1936



GM 5-7..Sept. 14-18, 1936..Broome.
12-hr. rTd 77(14th)..350 SSE..to
North to: 35
South to: 29
East to: 1000'
West to: 3000'

3147
22



Storm Precipitation Analysis System (SPAS) For Storm #1596_1

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

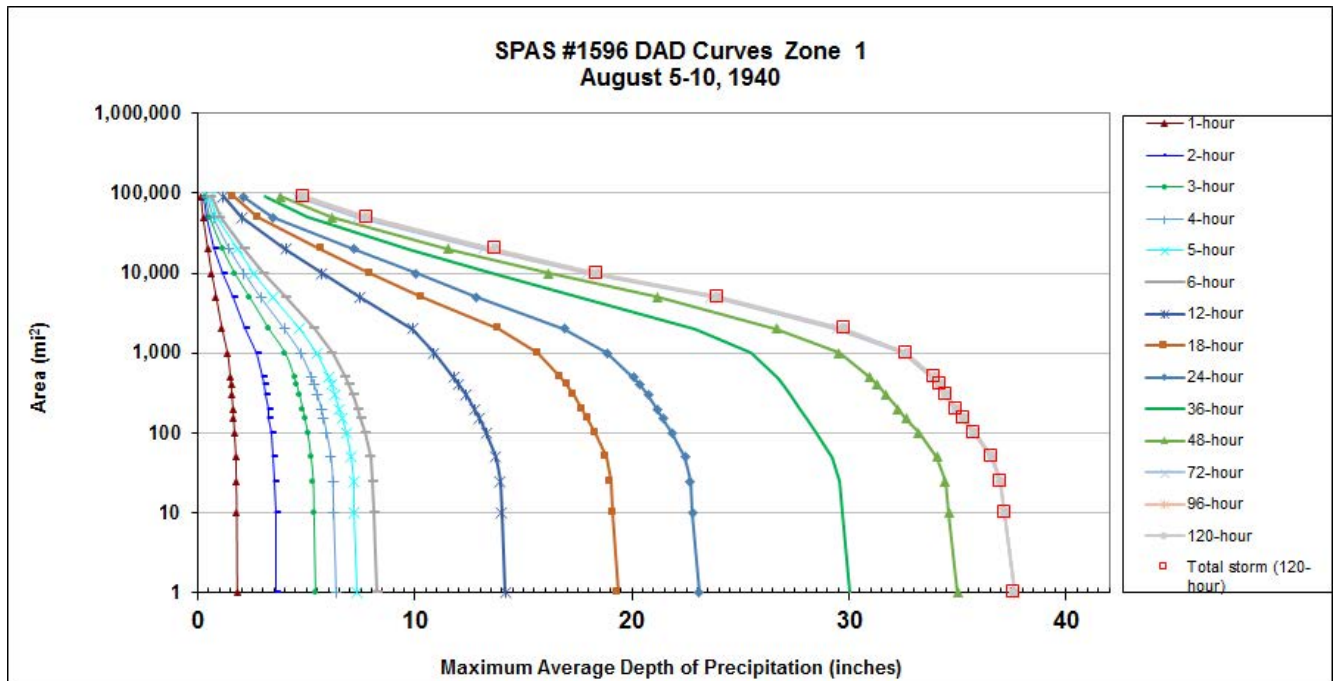
Depth-Area-Duration (DAD) analysis: Yes

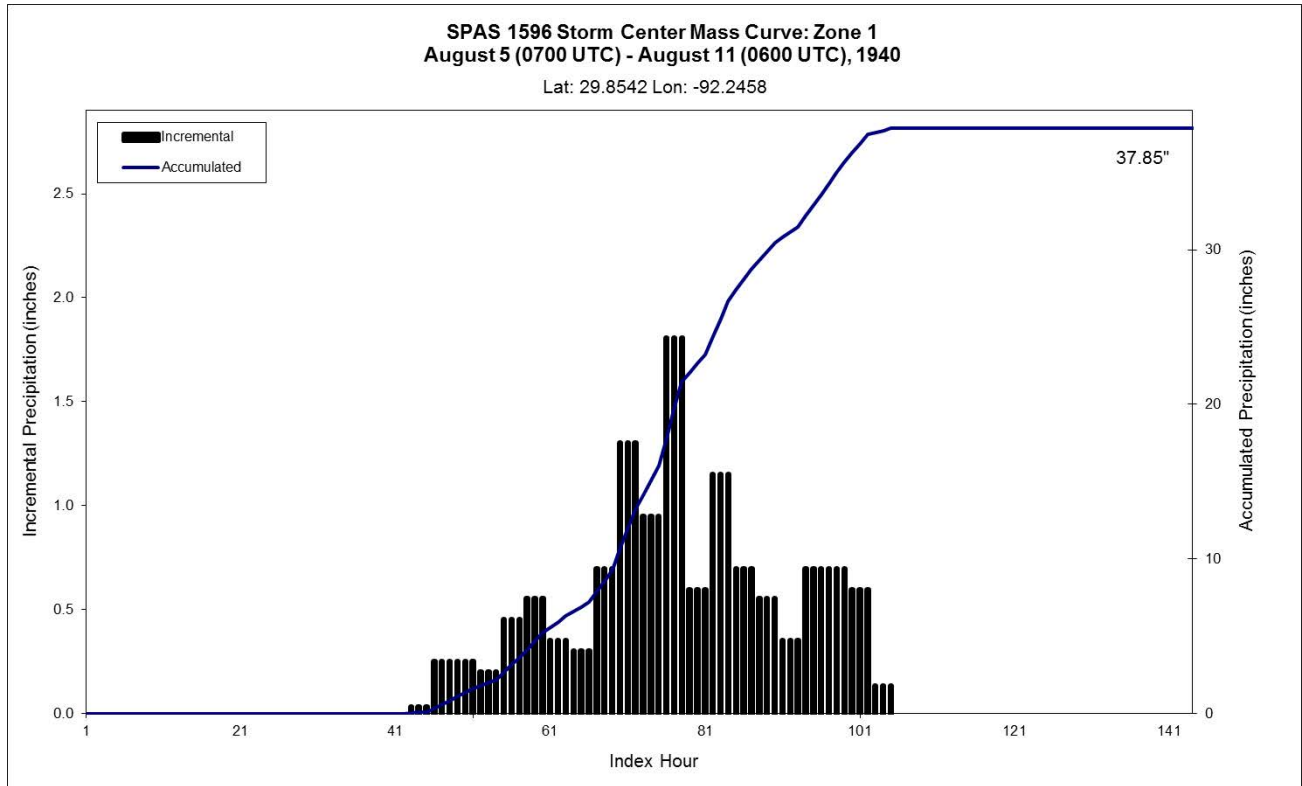
Reliability of results: This analysis was based on 174 hourly stations, daily data, and supplemental station data. We have a good degree of confidence for the station based storm total results. The spatial pattern is dependent heavily on the basemap created from the USACE Isohyetal image provided by 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.

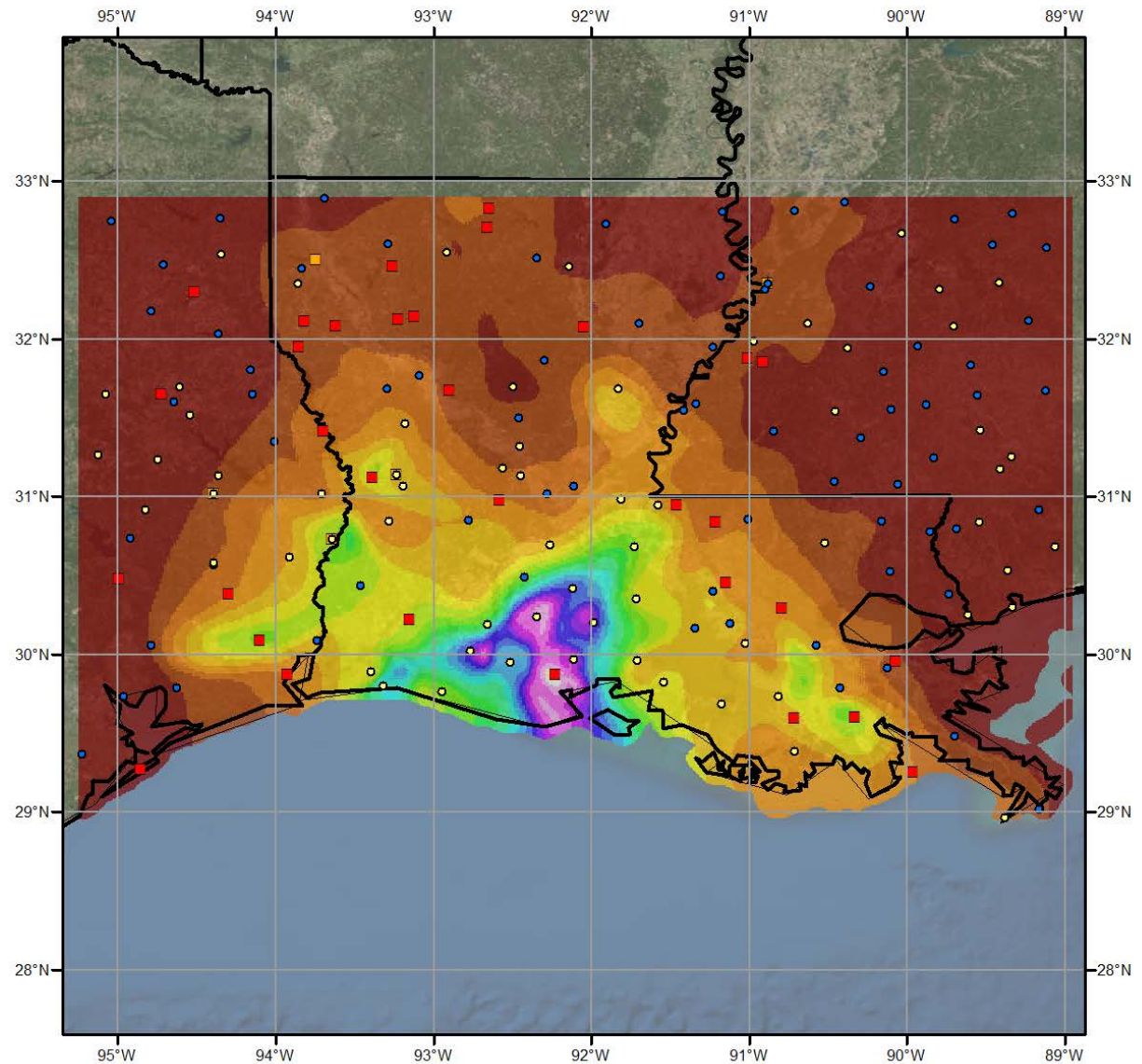
SPAS Storm ID	LON	LAT	ELEV	ELEV Round	Storm Rep. Dew Point					Climatological Max. Dew Point						IPMF
					T _d	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	T _d	T _d Round	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	
1596_1	-92.246	29.854	2	0	85.50	4.58	0.00	93	4.580	87.00	87.0	4.86	0.00	96	4.860	1.061

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	Total
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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	4.89







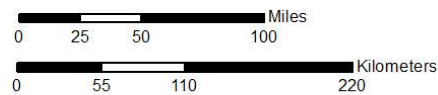
Total Storm (144-hours) Precipitation (inches)

August 5-10, 1940

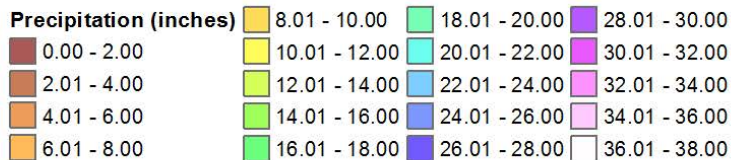
SPAS 1596 - Miller Island, LA

Gauges

- Daily
- Hourly
- Hourly Pseudo
- Supplemental



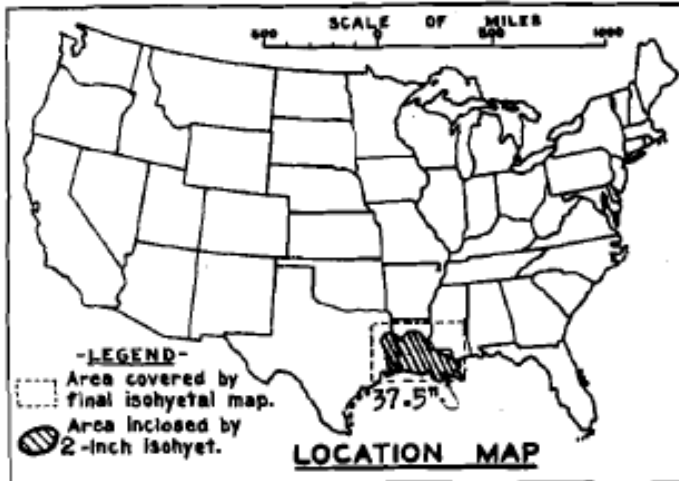
Precipitation (inches)



4/3/2015

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, 3/7/42Part II Approved by Office, Chief
of Engineers for Distribution
of Factual Data, 12/30/43Remarks: 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

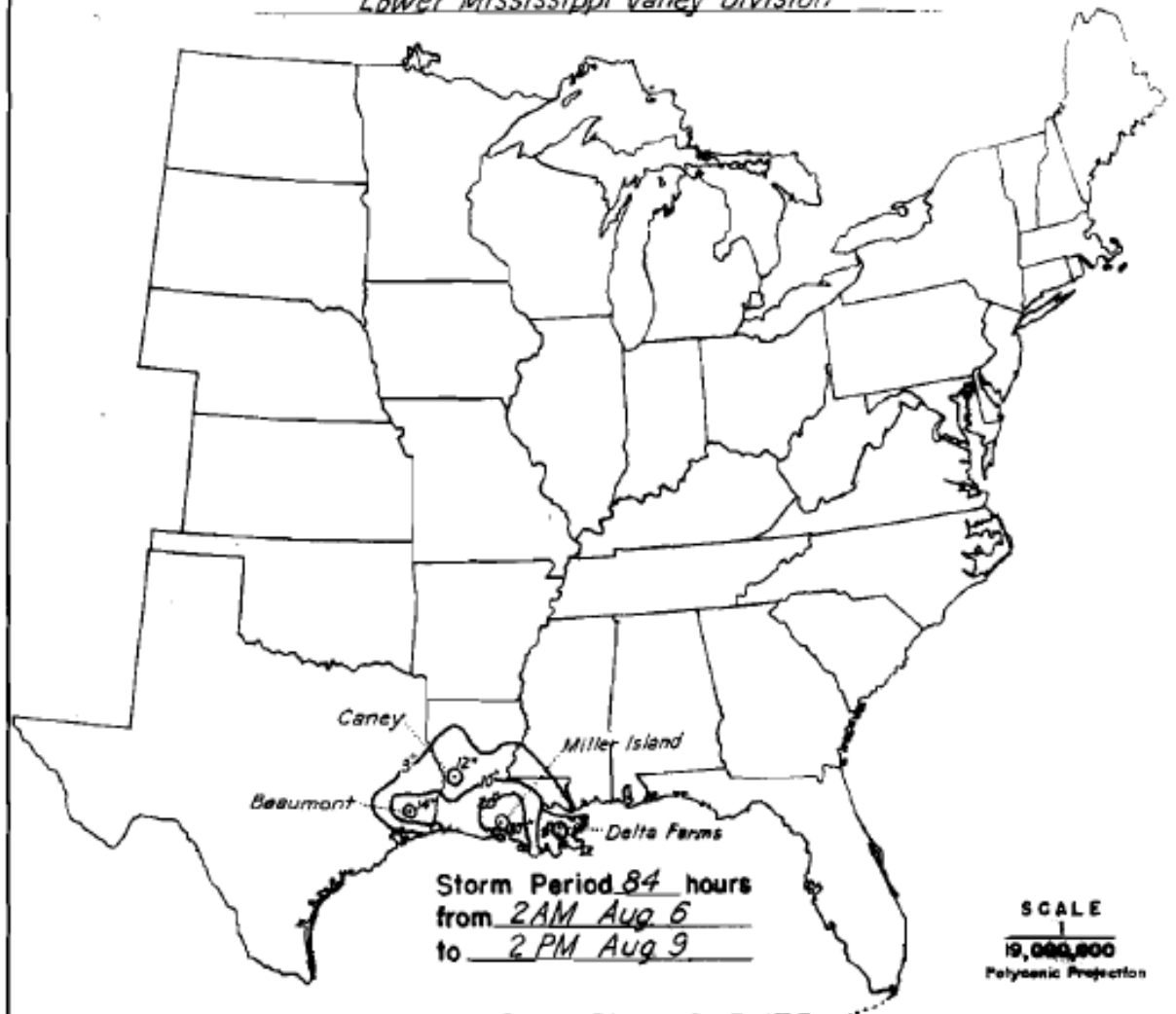
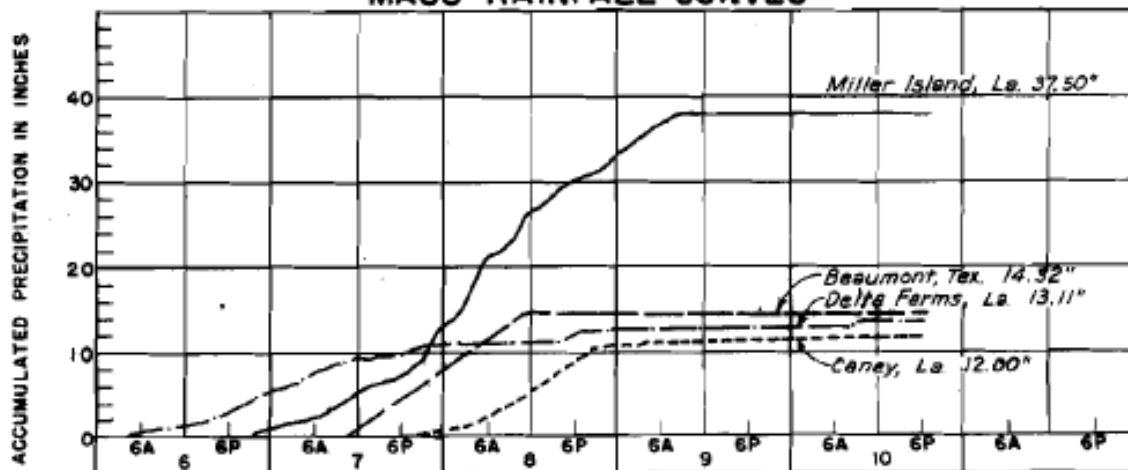
Form S-2

WAR DEPARTMENT

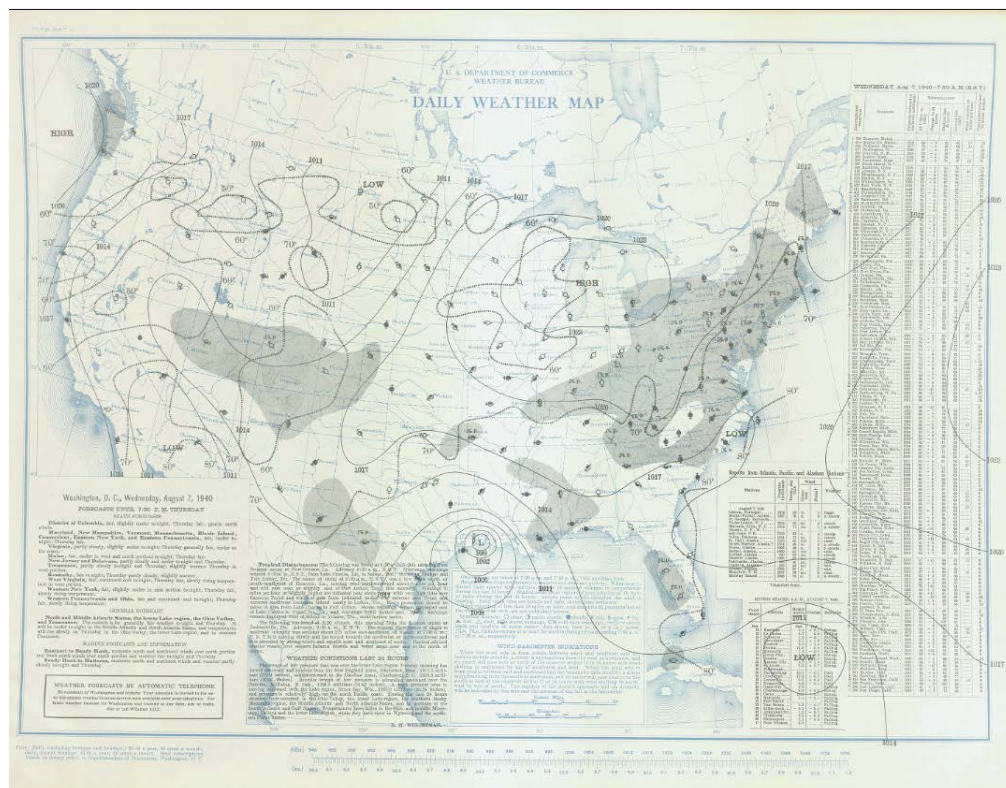
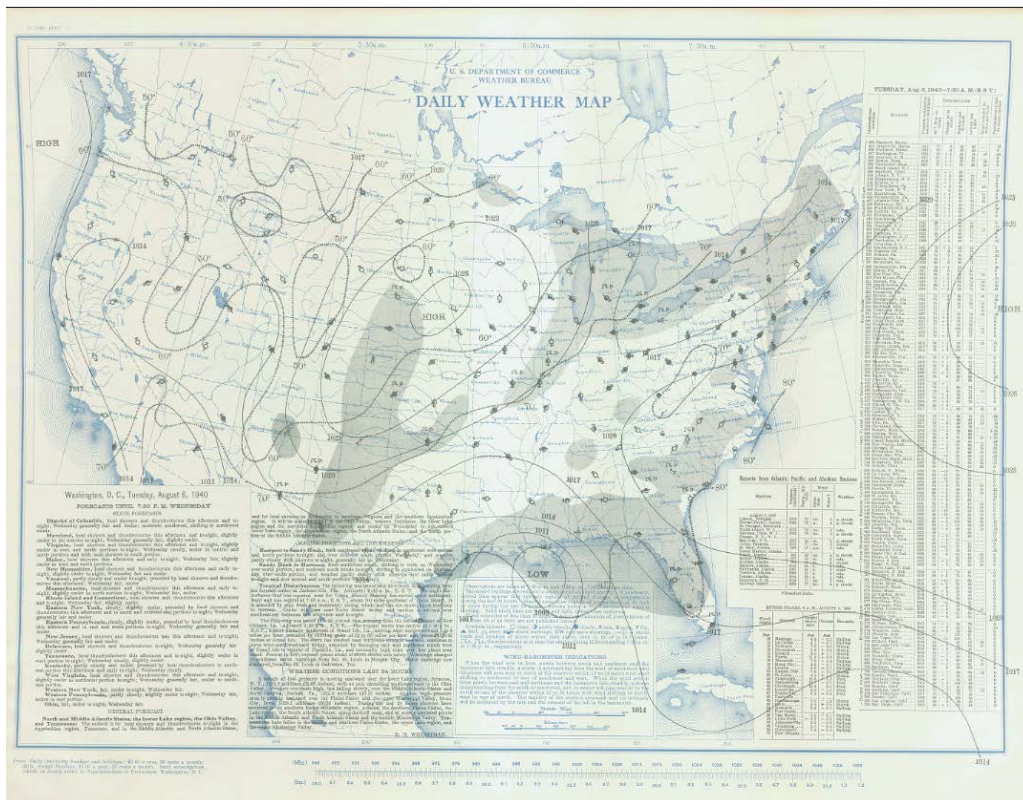
CORPS OF ENGINEERS, U. S. ARMY

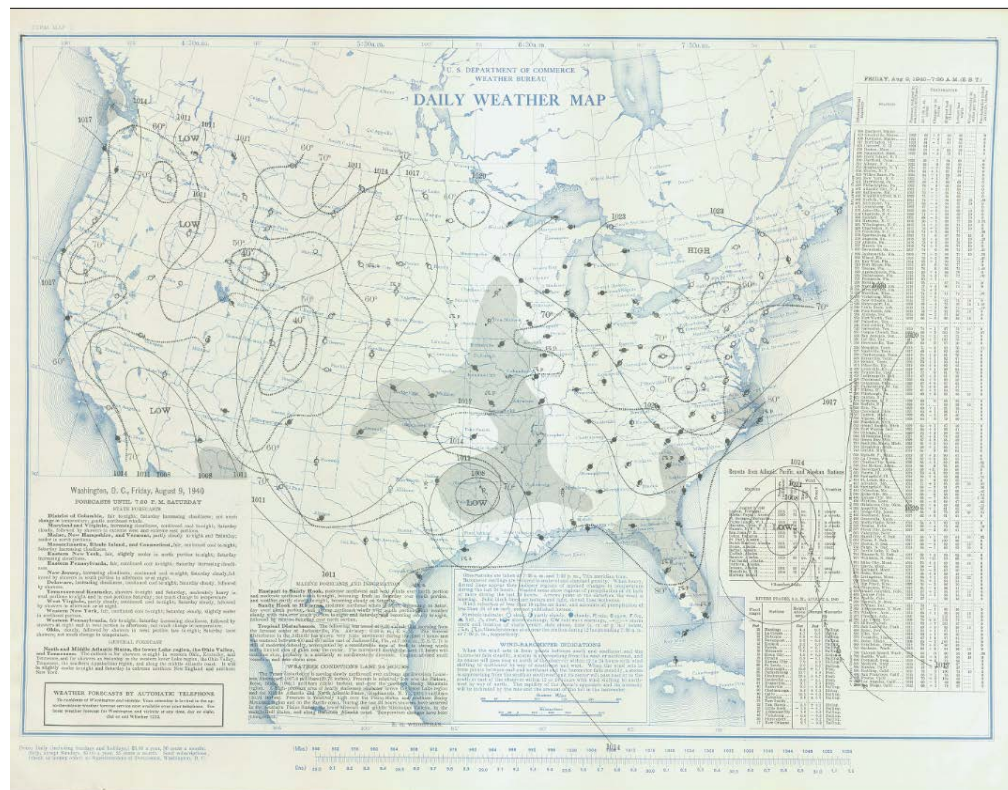
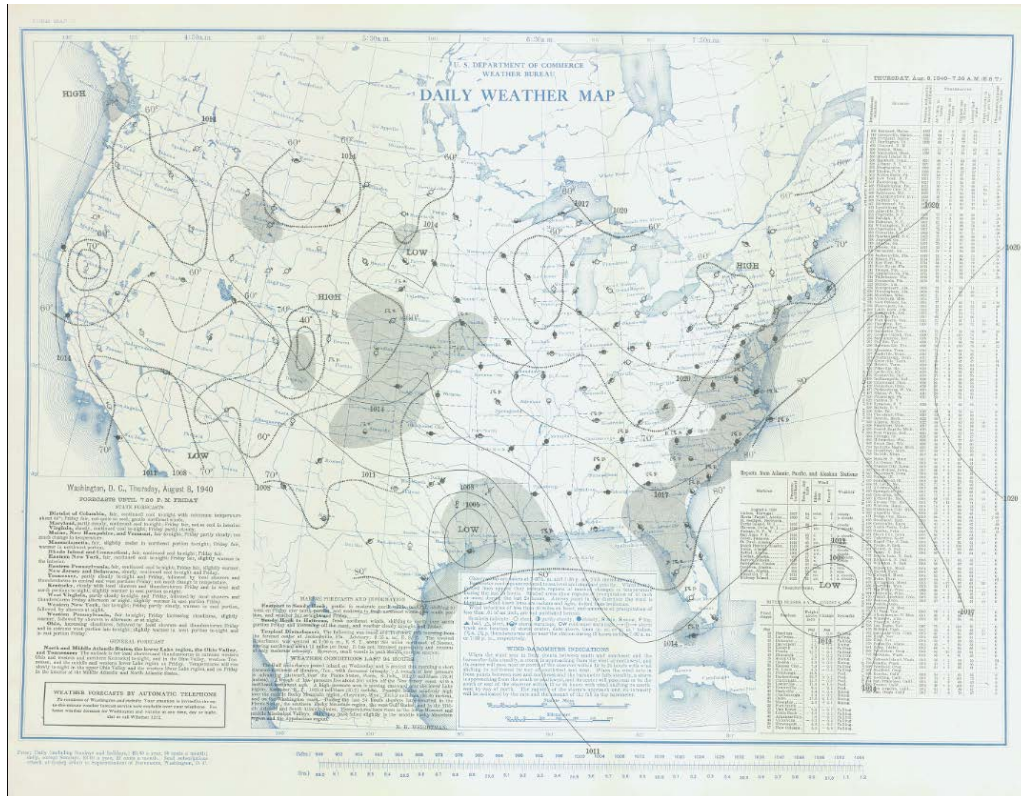
STORM STUDIES - ISOHYETAL MAP

Storm of August 6-9, 1940 Assignment LMV 4-24
 Study Prepared by: New Orleans, La. District
Lower Mississippi Valley Division

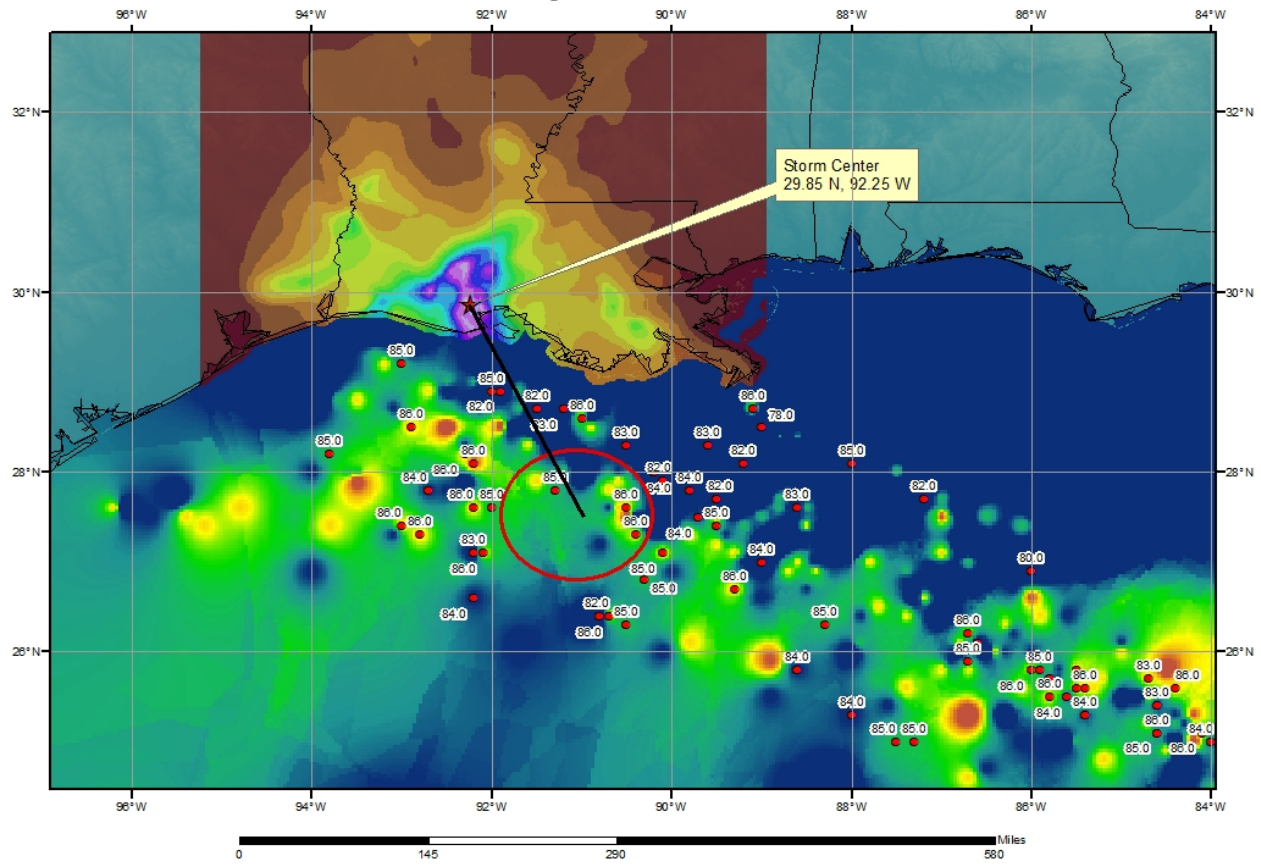
**MASS RAINFALL CURVES**

FORM 8-3E





SPAS 1596 Miller Island, LA Sea Surface Temperatures (F)
August 7, 1940



Storm Precipitation Analysis System (SPAS) For Storm #1519_1

General Storm Location: Florida, Georgia, South Carolina (-83.7, 33.2, 25.7, -79.8)

Storm Dates: September 3 – September 7, 1950

Event: Hurricane Beulah

DAD Zone 1

Latitude: 29.0292

Longitude: -82.7208

Max. Grid Rainfall Amount: 45.18"

Max. Observed Rainfall Amount: 45.25"

Number of Stations: 214

SPAS Version: 10.0

Basemap: Manually contoured basemap based off USACE isohyetal map

Radar Included: No

Depth-Area-Duration (DAD) analysis: Yes

Reliability of results: In addition to the NCDC hourly stations, two hourly stations were estimated from the U.S. Army Corp of Engineers (USACE) mass rainfall curves for the storm center in Yankeeetown and Cedar Key, FL. Over 60 supplemental stations were also added, mainly throughout and to the south of the storm center, from the USACE isohyetal maps. In order to maintain spatial consistency between station locations on the USACE produced map and the MetStat database, some MetStat originated station locations were moved slightly in order to more closely match the map location. In a few cases, stations outside the storm center have a high ($>|0.5|$ inch), quality-controlled observation vs. SPAS value (ΔP). This is due to the difference between the amount of precipitation reported by the USACE station and MetStat database gauge observations between September 4-7, 1950; any stations remaining in the analysis with a large ΔP have resulting SPAS precipitation comparable to USACE station report. Reports indicate that storm center precipitation largely occurred over a 24-hour period, with over 38 inches falling at Yankeeetown, FL. Our analysis resulted in a 24-hour max intensity of 38.9 inches surrounding Yankeeetown, FL, comparable to reports.

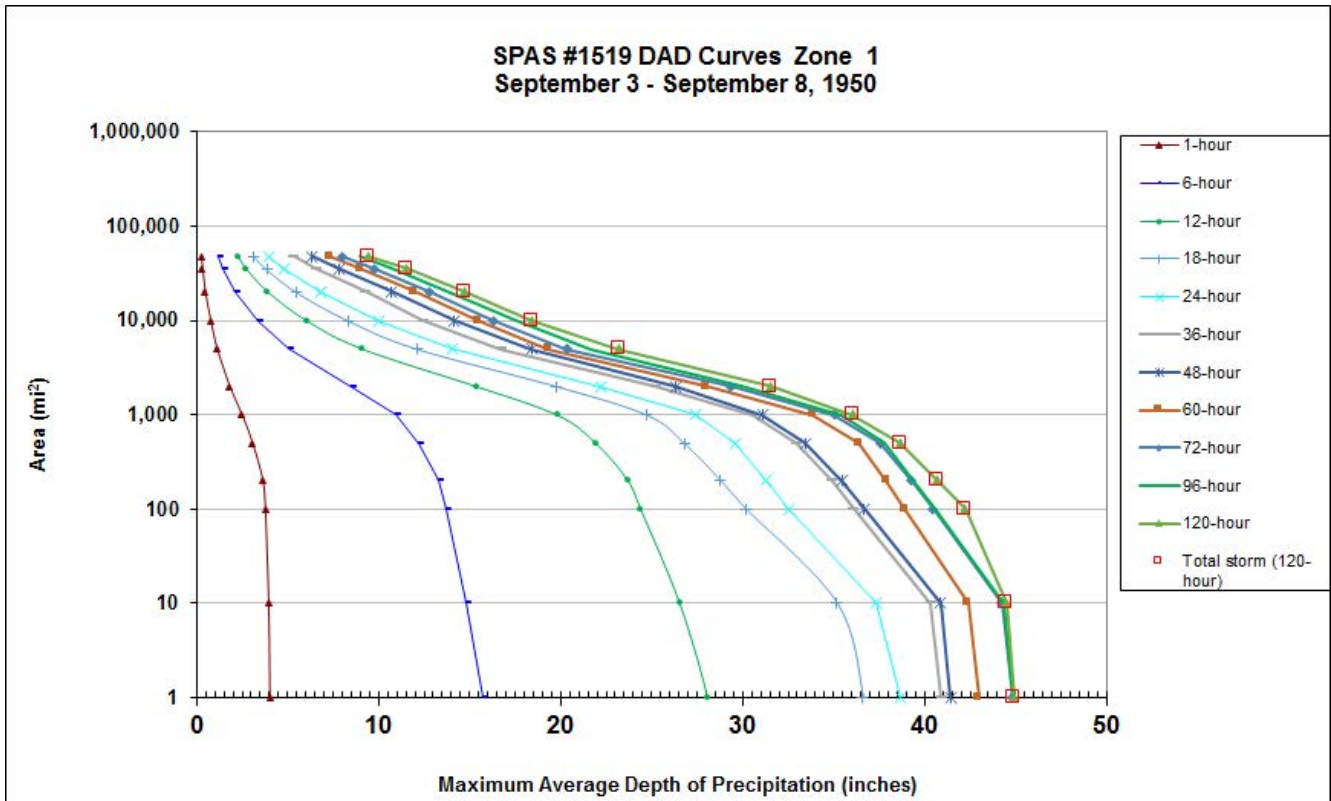
Extensive efforts were done to match the SPAS DAD to the USACE DAD as close as possible, this includes extending precipitation off the coast and using the same size/shape DAD zone. At the smallest areas sizes, results are comparable, however, given discrepancies between the USACE DAD analysis,

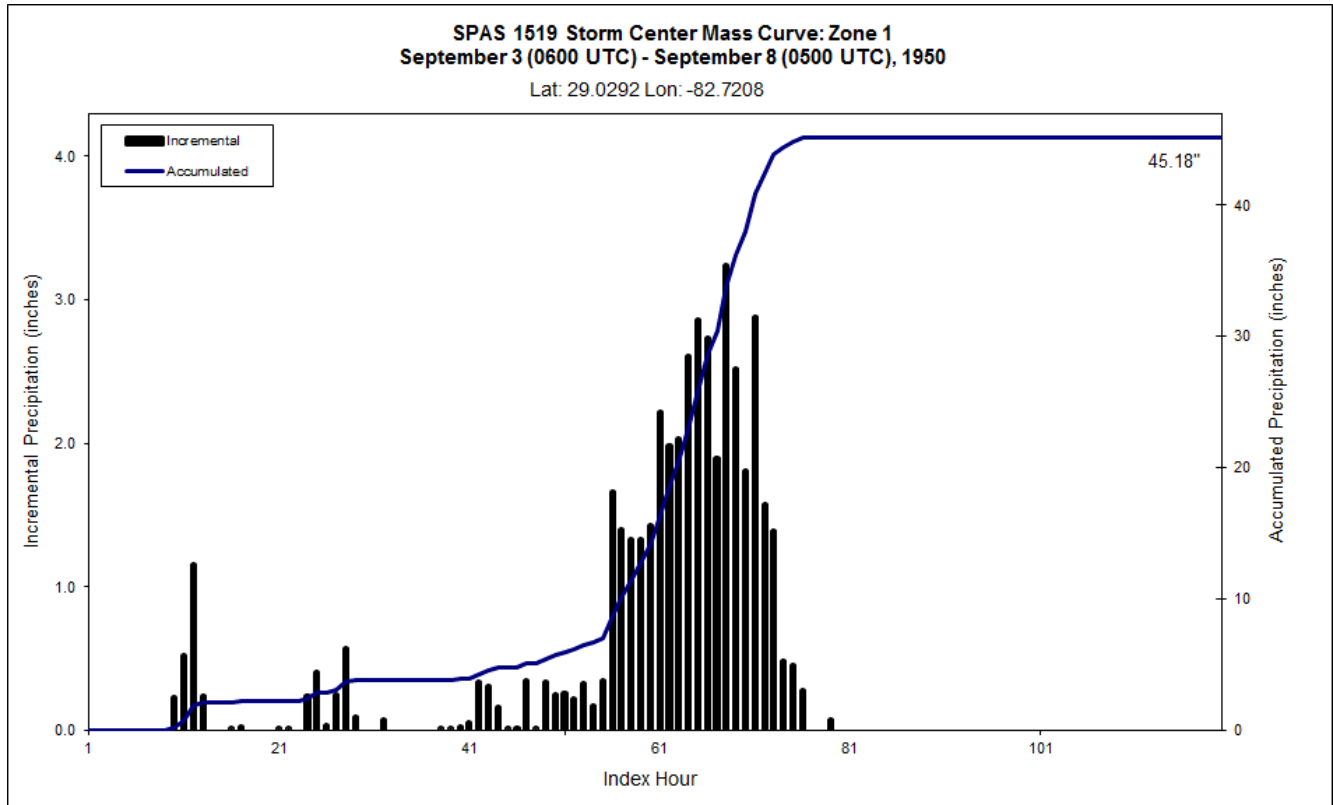
mass curves and isohyetal map, a complete match between SPAS and USACE analysis is not feasible. Given that the pattern of the storm center matches closely to the USACE isohyetal map and timing is aligned, this analysis is still deemed reasonable. Any further analysis of this storm would require part I of USACE document, which is not currently known to be available.

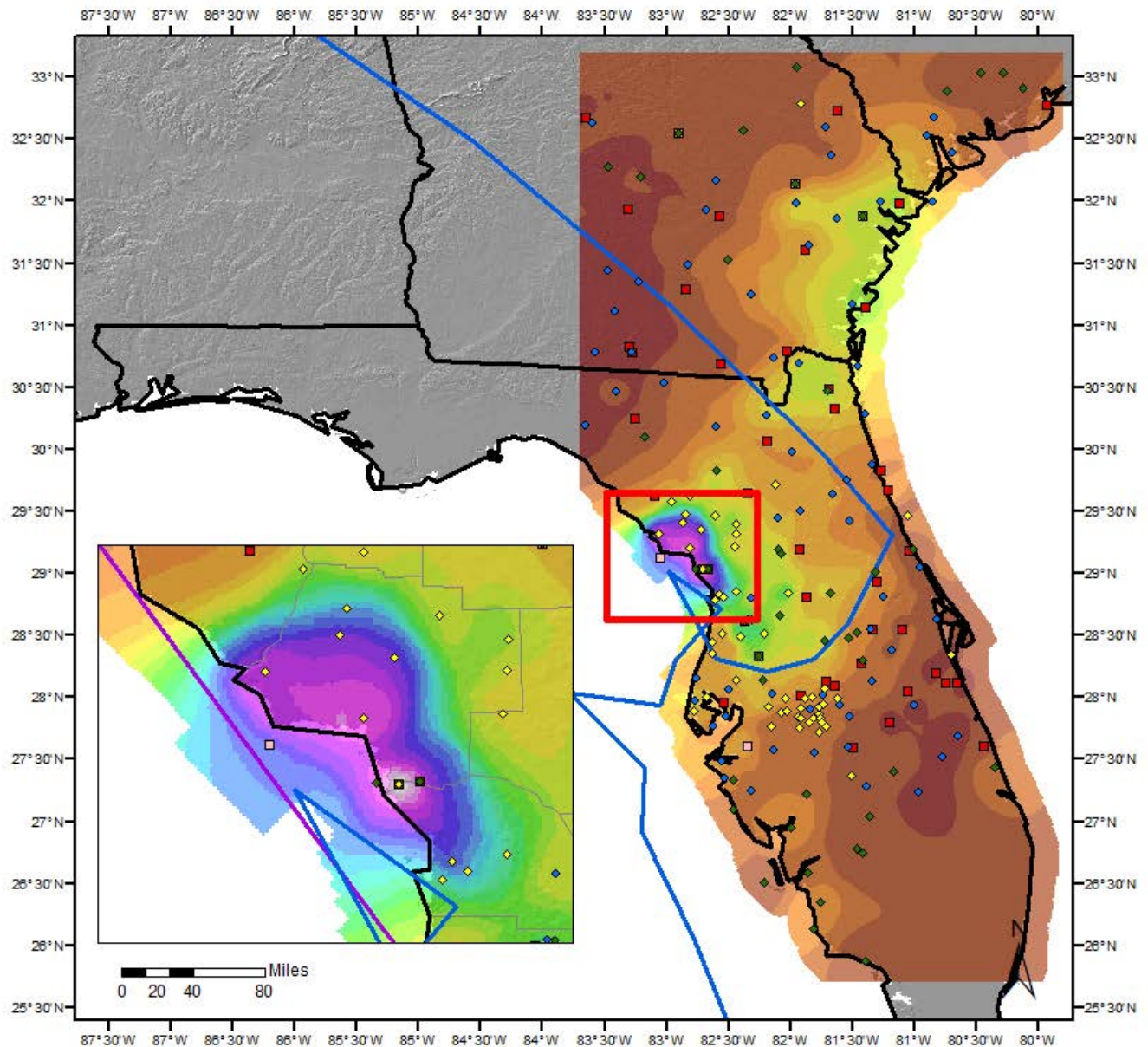
					Storm Rep. Dew Point					Climatological Max. Dew Point						
SPAS Storm ID	LON	LAT	ELEV	ELEV Round	T _d	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	T _d	T _d Round	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	IPMF
1519_1	-82.721	29.029	5	0	84.00	4.30	0.00	90	4.300	86.50	86.5	4.77	0.00	95	4.770	1.109

Storm 1519 - September 3 (0600 UTC) - September 8 (0500 UTC), 1950**MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)**

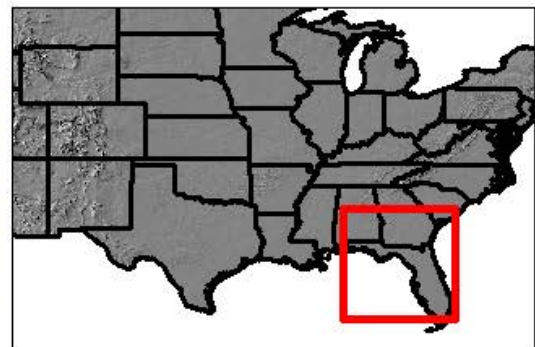
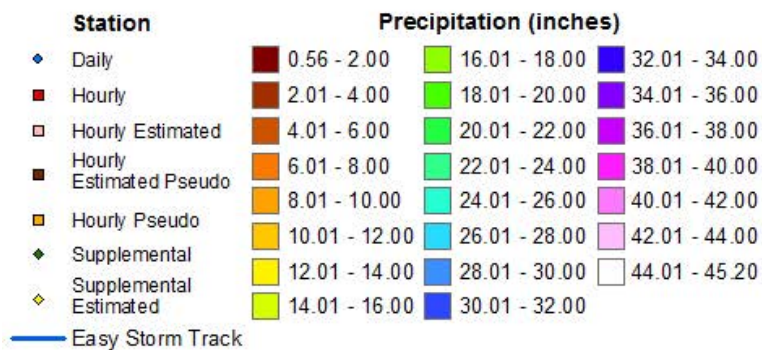
Area (mi ²)	Duration (hours)											
	1	6	12	18	24	36	48	60	72	96	120	Total
0.3	4.05	15.80	28.27	36.80	38.86	41.15	41.63	43.20	45.09	45.10	45.09	45.09
1	4.02	15.70	28.09	36.60	38.66	40.94	41.44	42.97	44.85	44.87	44.92	44.92
10	3.95	14.83	26.57	35.18	37.32	40.35	40.86	42.41	44.25	44.31	44.49	44.49
100	3.77	13.70	24.42	30.19	32.53	36.11	36.66	38.91	40.47	40.55	42.22	42.22
200	3.64	13.29	23.73	28.79	31.30	34.92	35.46	37.89	39.29	39.43	40.71	40.71
500	3.07	12.19	21.95	26.79	29.60	32.92	33.44	36.39	37.57	37.82	38.66	38.66
1000	2.49	10.92	19.82	24.72	27.43	30.53	31.09	33.87	35.06	35.42	36.03	36.03
2000	1.81	8.47	15.39	19.78	22.23	25.19	26.32	28.03	29.35	29.94	31.56	31.56
5000	1.11	5.05	9.10	12.11	14.07	16.74	18.41	19.31	20.33	21.64	23.18	23.18
10000	0.75	3.34	6.03	8.33	10.04	12.45	14.16	15.48	16.30	17.57	18.41	18.41
20000	0.45	2.10	3.92	5.51	6.83	9.29	10.72	11.99	12.78	13.80	14.72	14.72
35,000	0.30	1.43	2.73	3.86	4.81	6.55	7.82	8.97	9.73	10.72	11.54	11.54
47,854	0.23	1.16	2.25	3.16	3.96	5.35	6.36	7.31	7.98	8.95	9.40	9.40





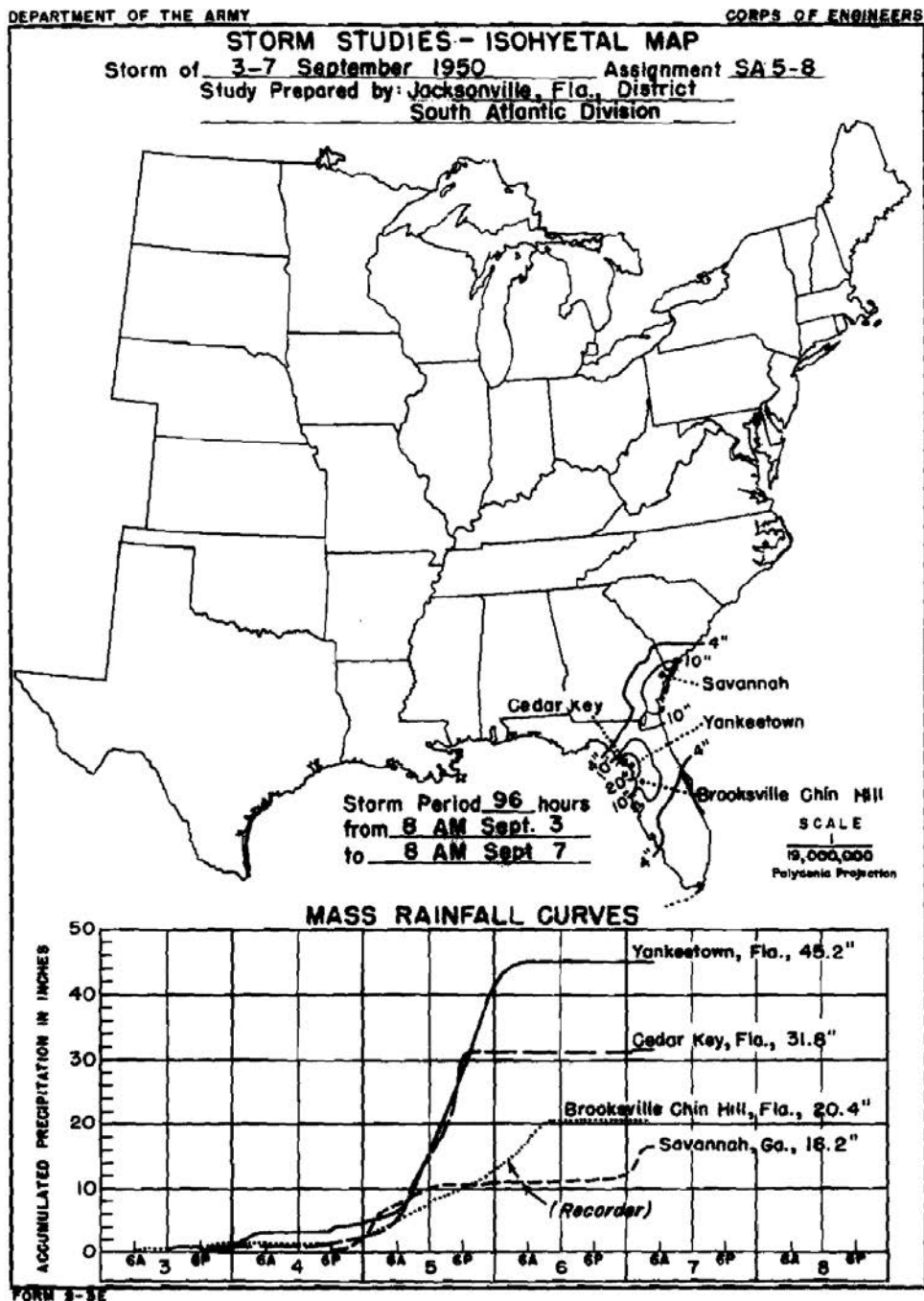


Total 120-hour Precipitation (inches)
September 3, 1950 (0600 UTC) - September 8, 1950 (0500 UTC)
SPAS #1519 - Hurricane "Easy"

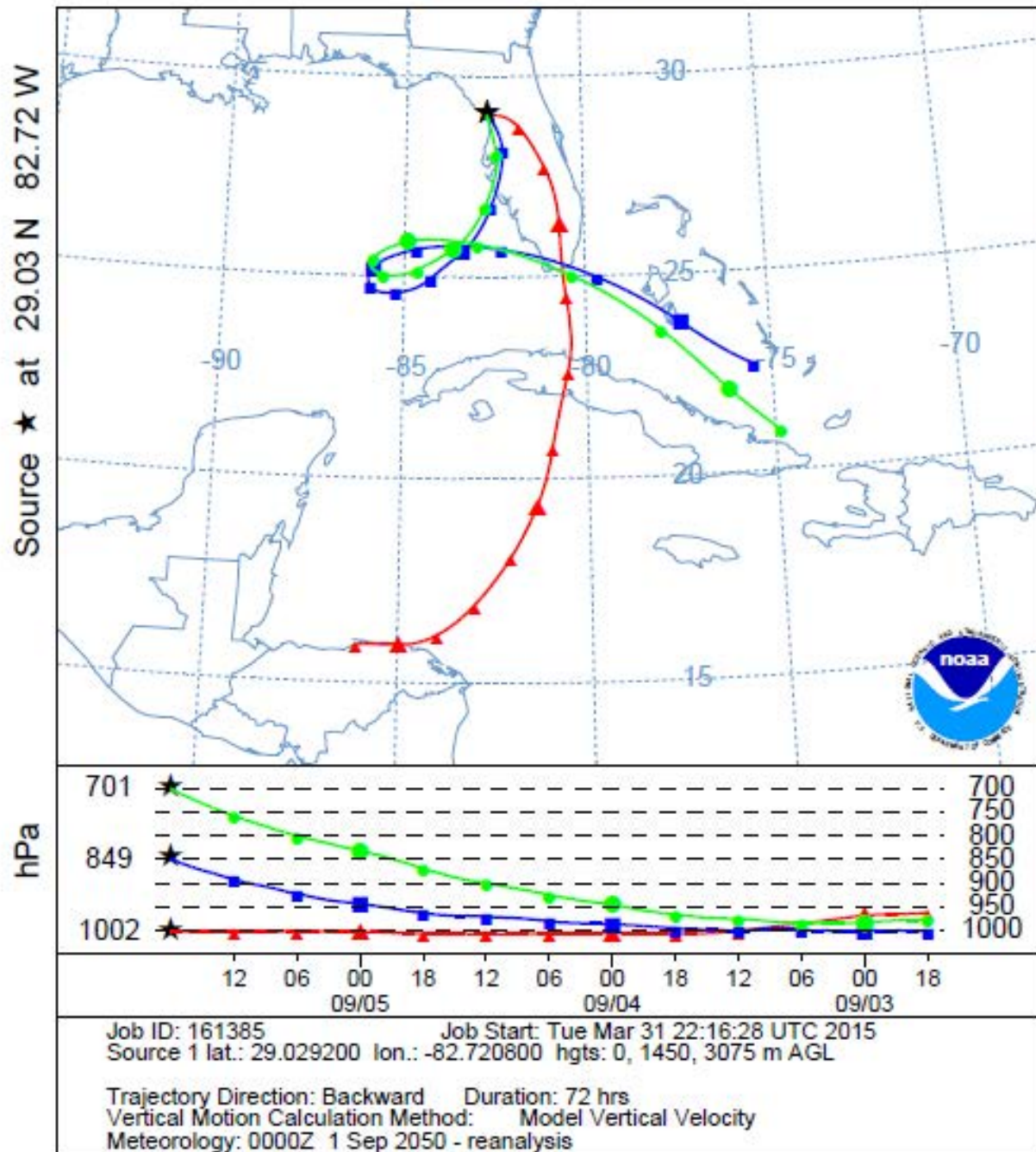


ADH 3/27/15

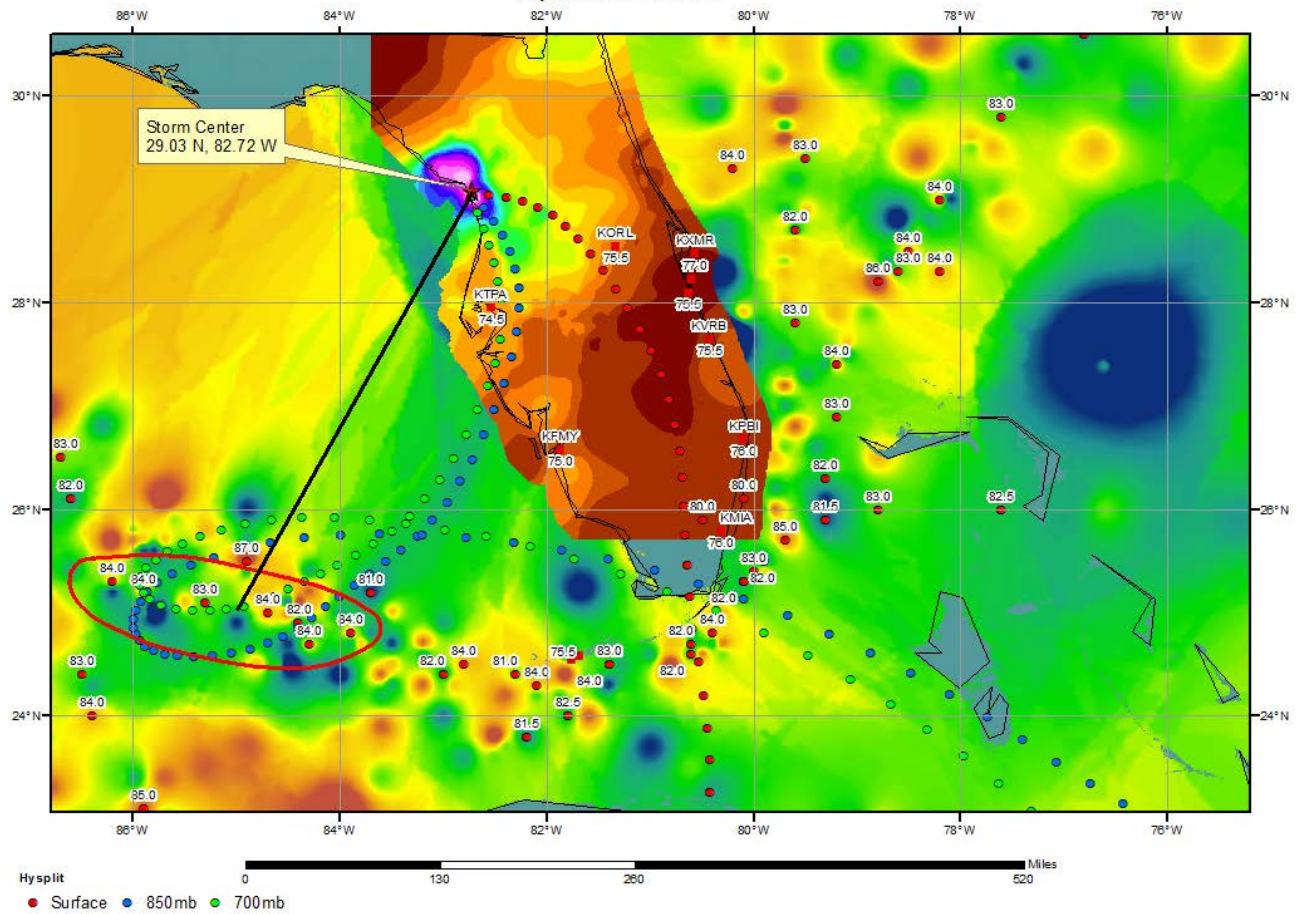
Form 3-2



NOAA HYSPLIT MODEL
Backward trajectories ending at 1800 UTC 05 Sep 50
CDC1 Meteorological Data



SPAS 1519 Yankeetown, FL Sea Surface Temperatures (F)
September 4, 1950



Storm Precipitation Analysis System (SPAS) For Storm #1601_1

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”

Number of Stations: 362

SPAS Version: 10.0

Basemap: Us_ppt_in_map_1961_1990_usda_northamerica

Radar Included: No

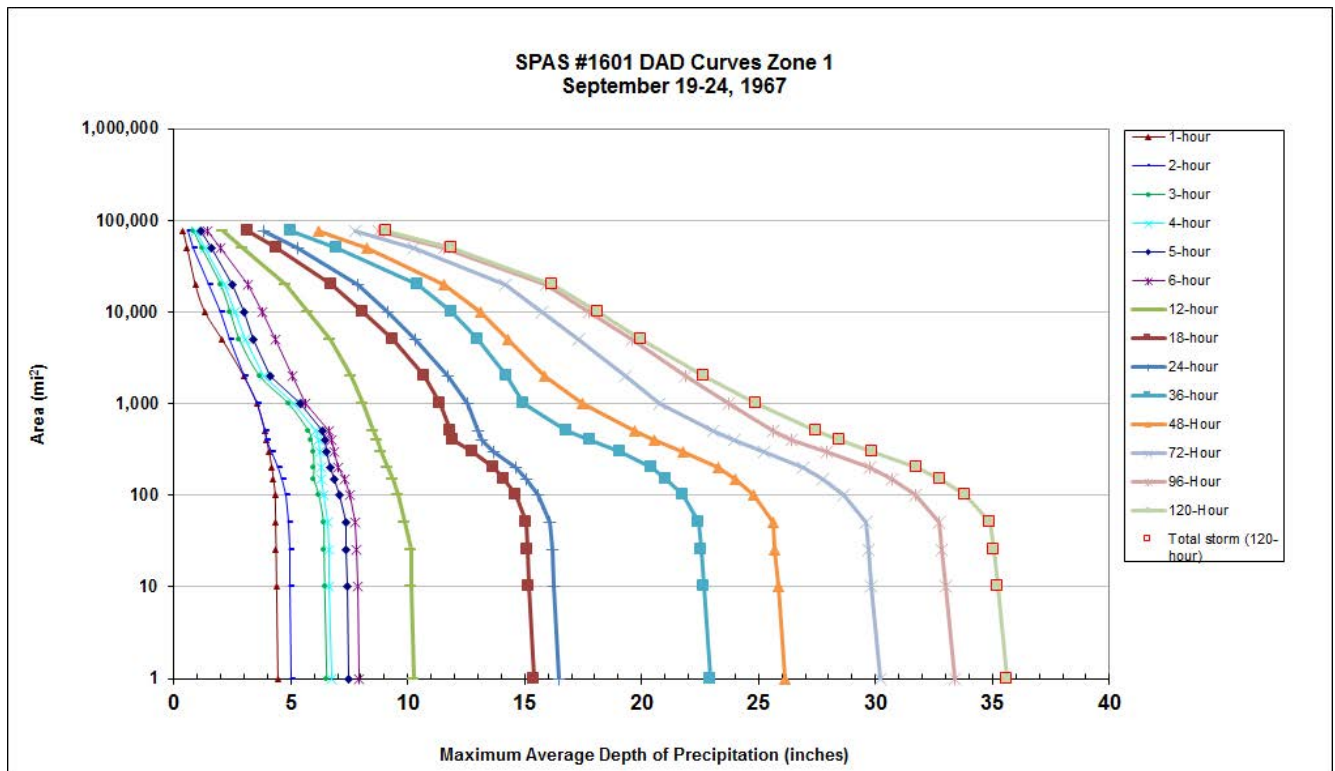
Depth-Area-Duration (DAD) analysis: Yes

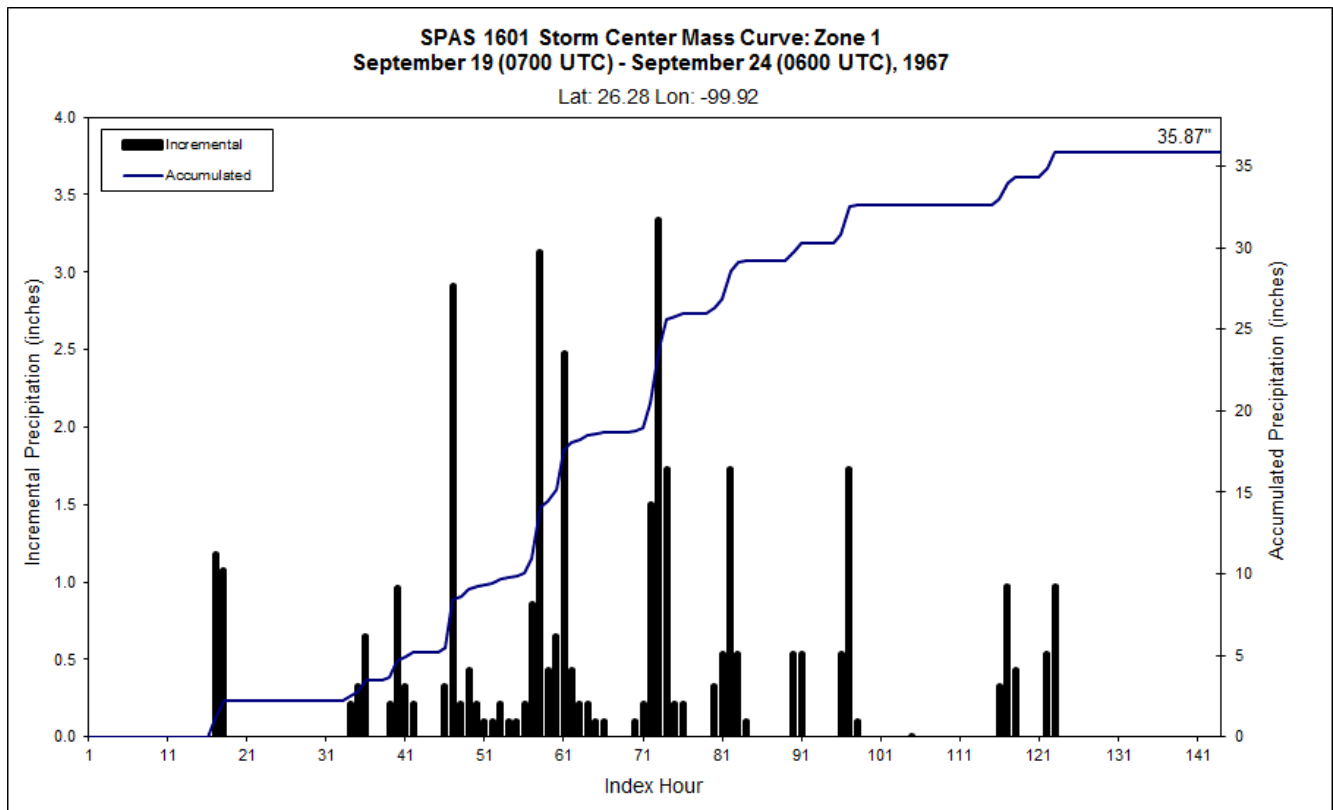
Reliability of results: This analysis was based on hourly data (H), hourly estimated pseudo data (HEP), hourly pseudo data (HP), daily data (D) and supplemental data (S). We have a high degree of confidence in the station based storm total results, the spatial pattern is dependent on basemap and the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

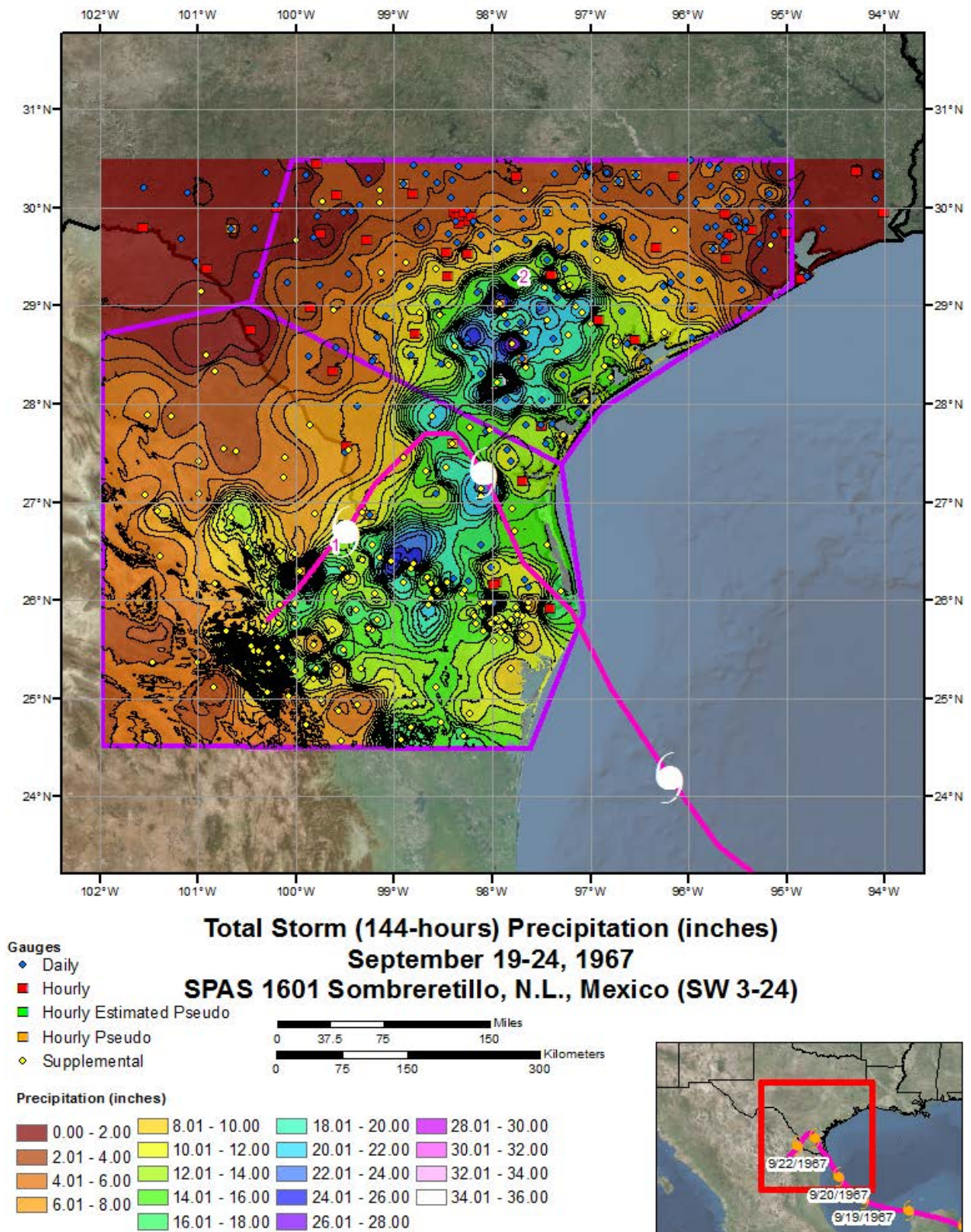
					Storm Rep. Dew Point					Climatological Max. Dew Point						
SPAS Storm ID	LON	LAT	ELEV	ELEV Round	T _d	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	T _d	T _d Round	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	IPMF
1601_1	-99.921	26.279	1,425	1,400	82.00	3.95	0.42	86	3.530	86.00	86.0	4.67	0.50	94	4.170	1.181

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







WAR DEPARTMENT

CORPS OF ENGINEERS, U. S. ARMY

STORM STUDIES - PERTINENT DATA SHEET

Storm of September 19-24 1967Assignment SV 3-24Location Texas and MexicoStudy Prepared by:
Southwestern Division
Fort Worth DistrictPart I Reviewed by Hydromet.
Sec. of Weather Bureau, 2-26-69Part II Approved by Office, Chief
of Engineers for distribution
of factual data, 2-3-70

Remarks

DATA AND COMPUTATIONS COMPILED

PART I

Preliminary Isohyetal map, in 1 sheet scale 1:1,374,400

Precipitation data and mass curves:

(Number of Sheets)

Form 5001-C (Hourly precip. data)..... 32~~Form 5001-D (Hourly precip. data).....~~ Form SV 3-24..... 7Form 5001-D (" " " ")..... 20Misc. precip. records, meteorological data, etc. 2Form 5002 (Mass rainfall curves)..... 68

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)..... 7Form S-11 (Depth-area data from isohyetal map)..... 1Form S-12 (Maximum depth-duration data)..... 13Maximum duration-depth-area curves..... 1Data relating to periods of maximum rainfall..... 4

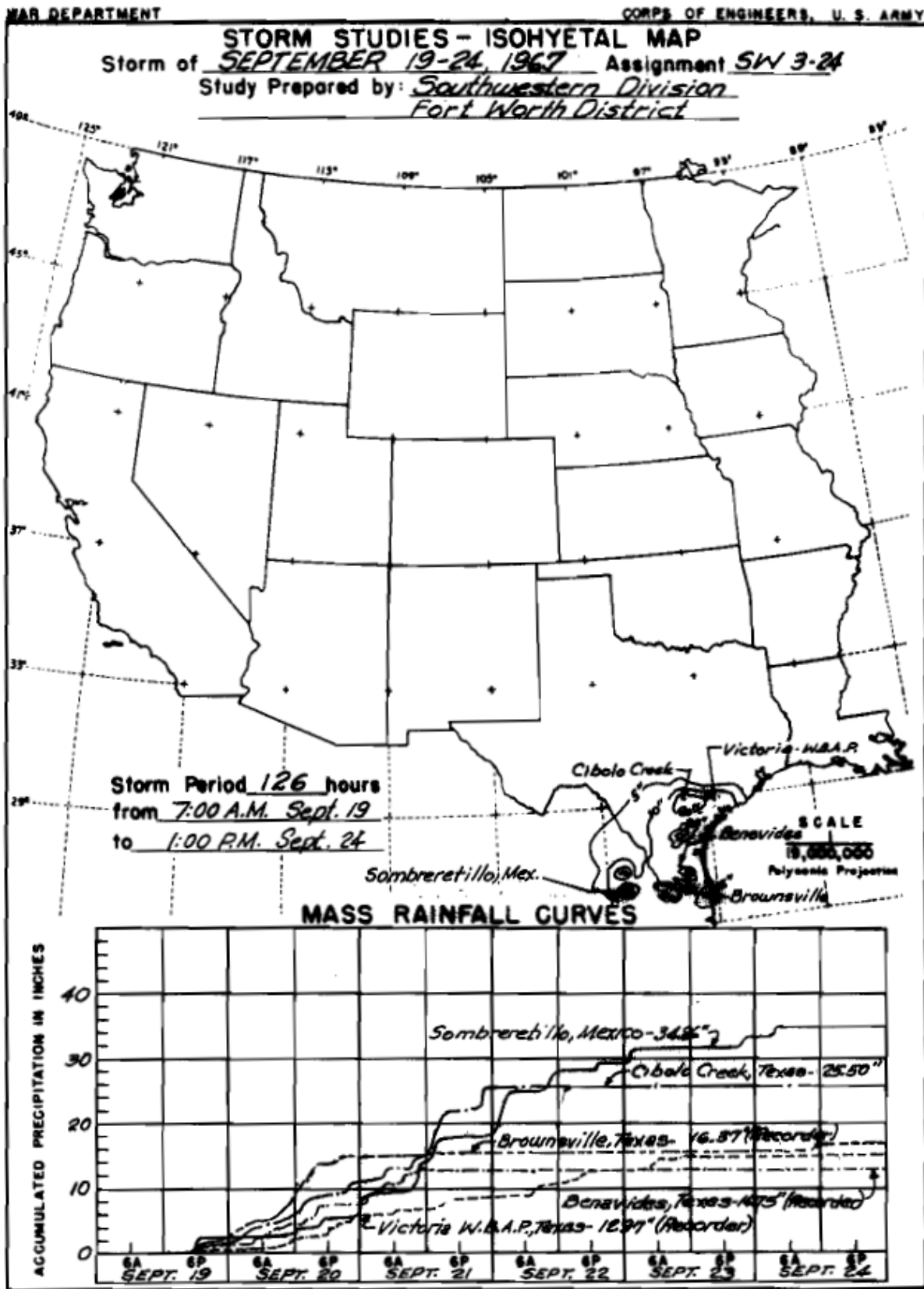
MAXIMUM AVERAGE DEPTH OF RAINFALL IN INCHES

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 8-2

12-5882-100

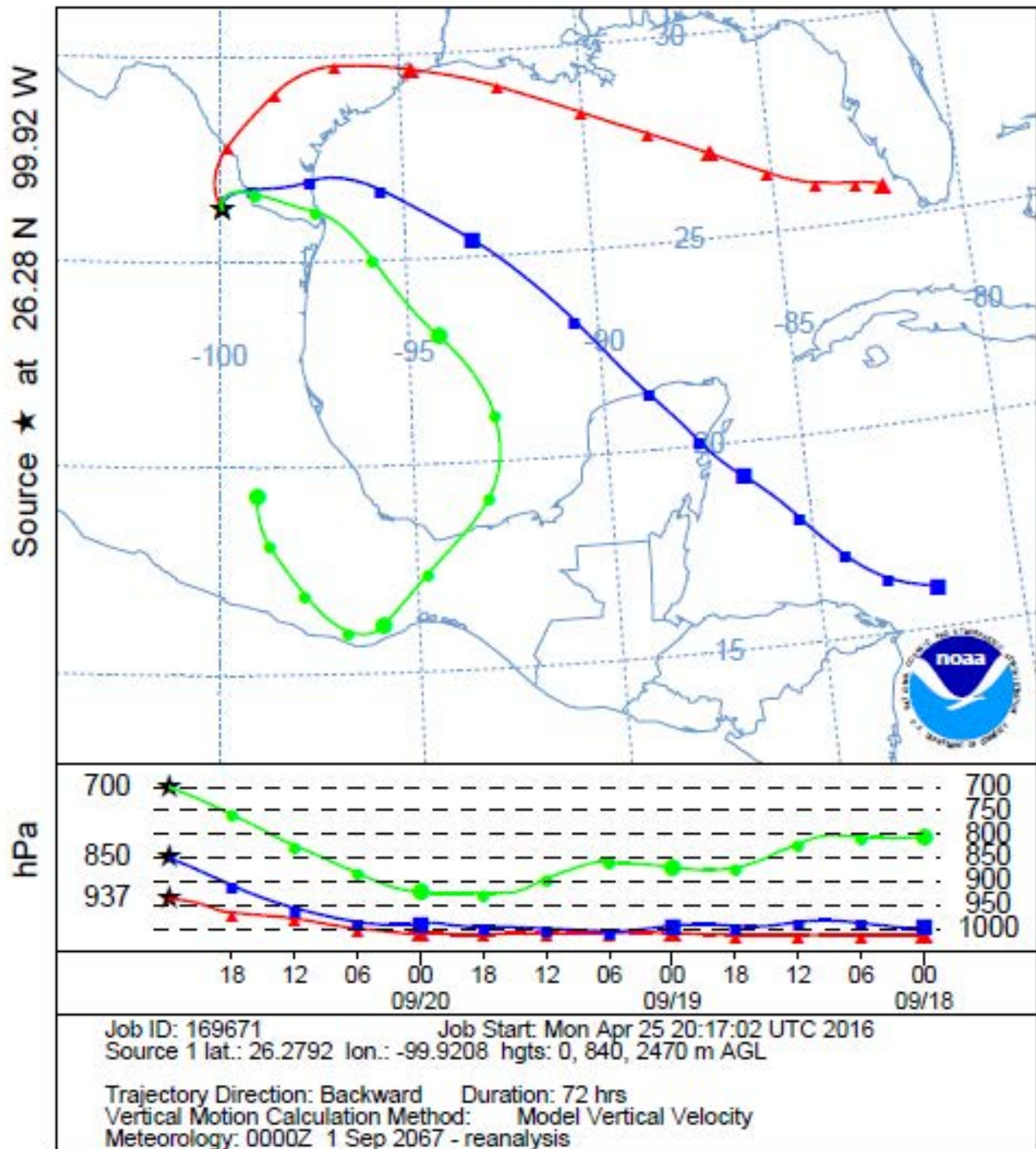
P. 34



FORM 8-3W

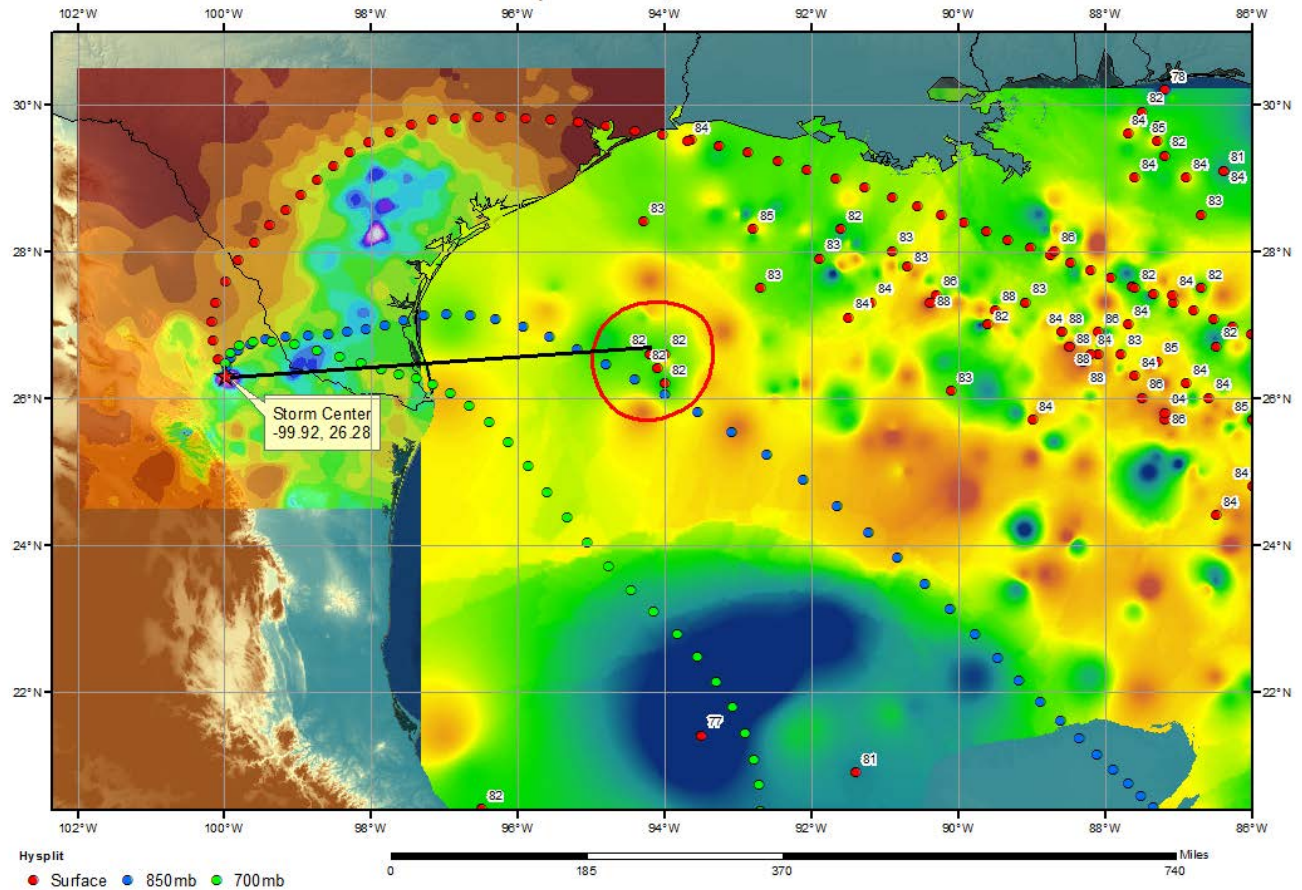
91-6420ABCD-3,000

NOAA HYSPLIT MODEL
 Backward trajectories ending at 0000 UTC 21 Sep 67
 CDC1 Meteorological Data



SPAS 1601 Sombreretillo, N.L., Mexico Storm Analysis Zone 1 (SW 3-24)

September 20, 1967



Storm Precipitation Analysis System (SPAS) For Storm #1601_2

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 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

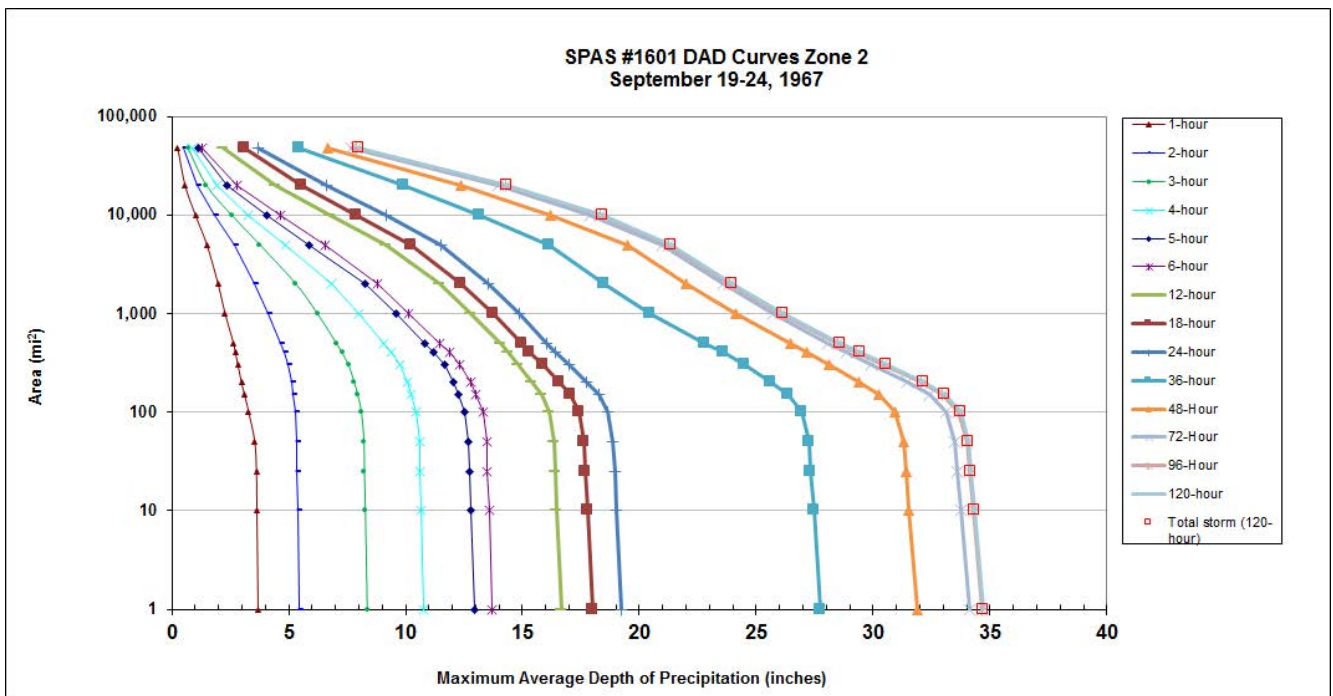
Depth-Area-Duration (DAD) analysis: Yes

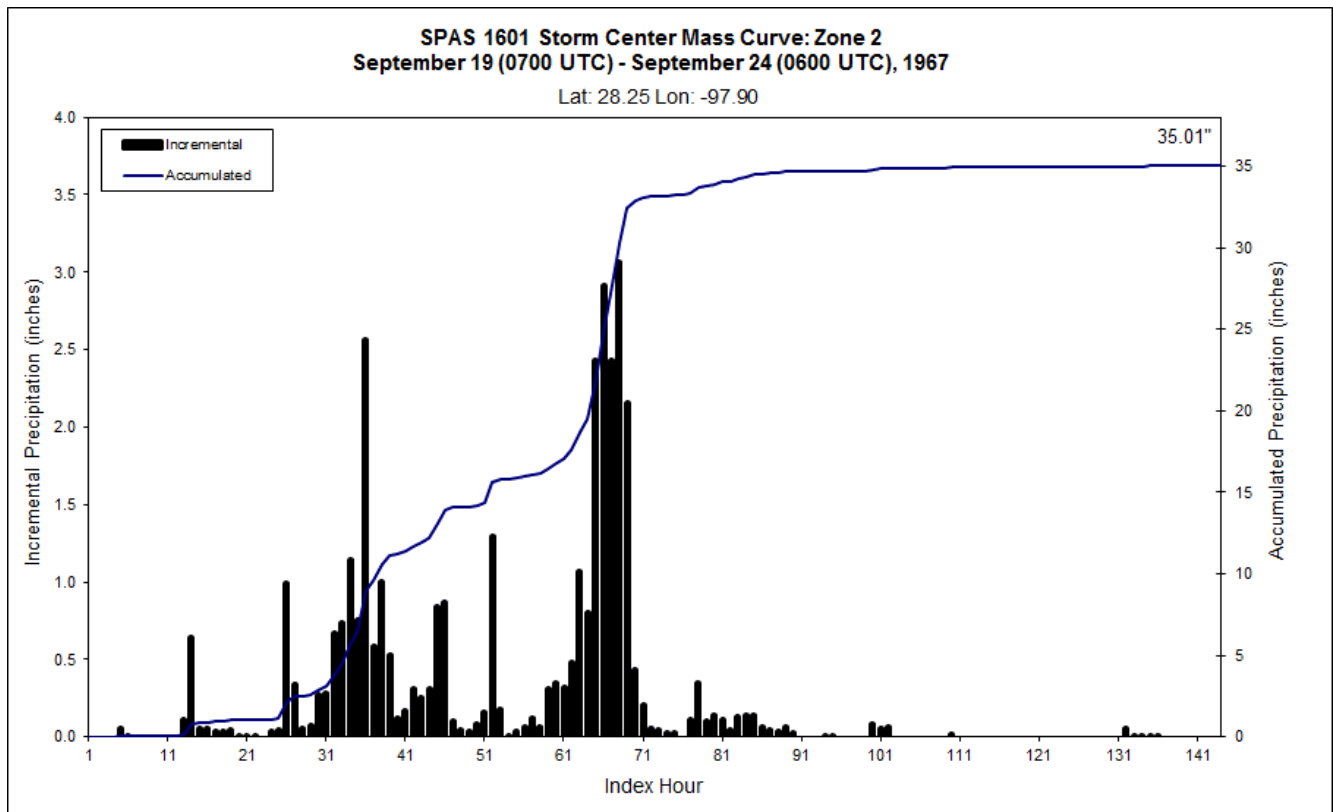
Reliability of results: This analysis was based on hourly data (H), hourly estimated pseudo data (HEP), hourly pseudo data (HP), daily data (D) and supplemental data (S). We have a high degree of confidence in the station based storm total results, the spatial pattern is dependent on basemap and the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

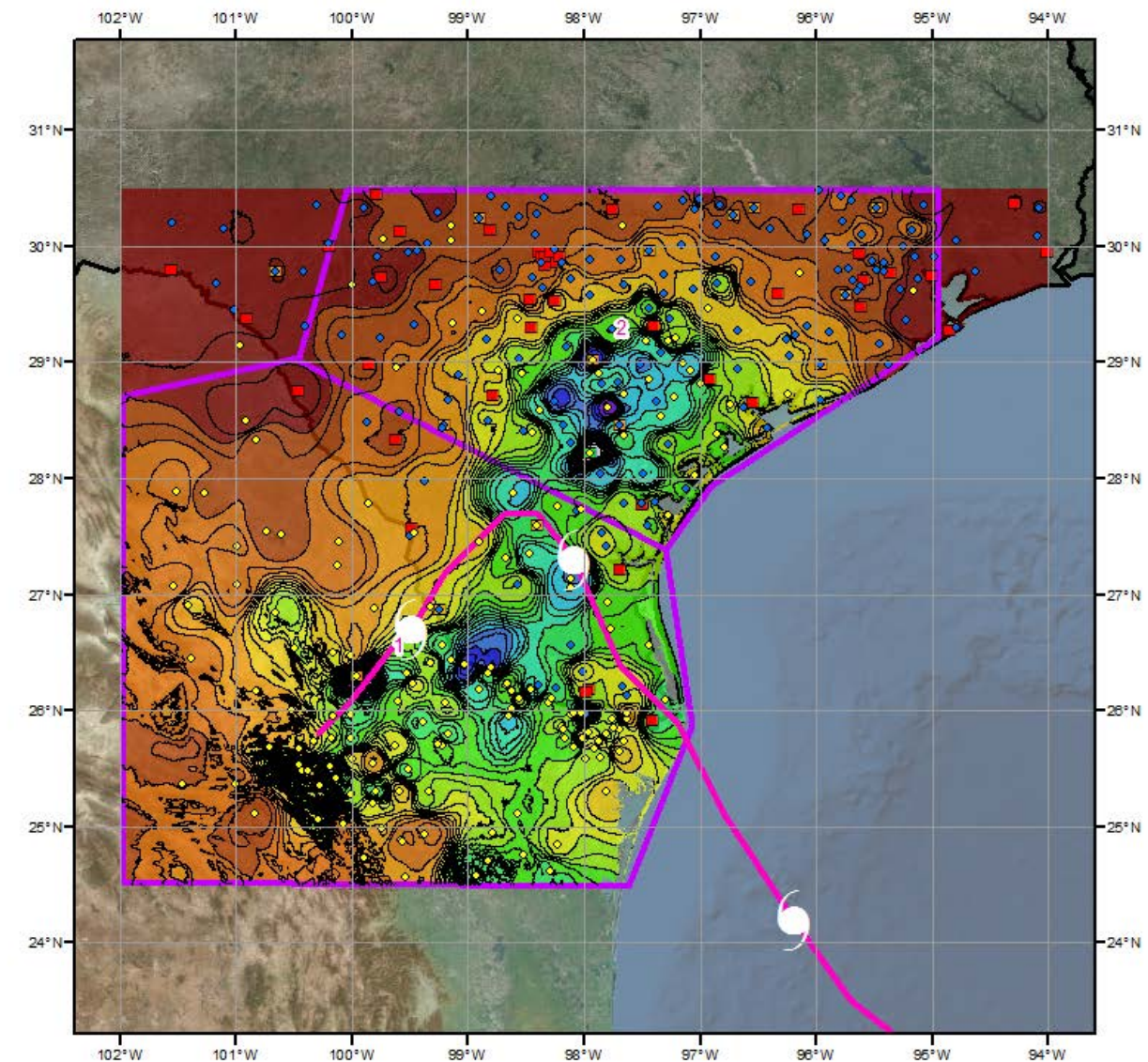
					Storm Rep. Dew Point					Climatological Max. Dew Point						
SPAS Storm ID	LON	LAT	ELEV	ELEV Round	T _d	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	T _d	T _d Round	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	IPMF
1601 2	-97.904	28.254	217	200	82.00	3.95	0.06	86	3.890	86.00	86.0	4.67	0.07	94	4,600	1.183

Storm 1601 Zone 2 - 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
0.3	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







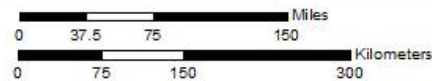
Total Storm (144-hours) Precipitation (inches)

September 19-24, 1967

SPAS 1601 Sombreretillo, N.L., Mexico (SW 3-24)

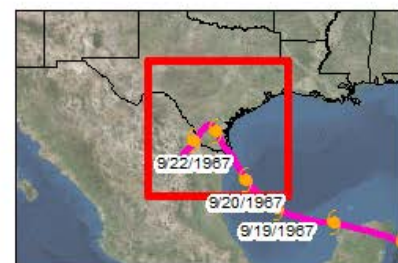
Gauges

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



Precipitation (inches)

0.00 - 2.00	8.01 - 10.00	18.01 - 20.00	28.01 - 30.00
2.01 - 4.00	10.01 - 12.00	20.01 - 22.00	30.01 - 32.00
4.01 - 6.00	12.01 - 14.00	22.01 - 24.00	32.01 - 34.00
6.01 - 8.00	14.01 - 16.00	24.01 - 26.00	34.01 - 36.00
16.01 - 18.00	26.01 - 28.00		



4/19/2016

WAR DEPARTMENT

CORPS OF ENGINEERS, U. S. ARMY

STORM STUDIES - PERTINENT DATA SHEET

Storm of September 19-24 1967Assignment SW 3-24Location Texas and MexicoStudy Prepared by:
Southwestern Division
Fort Worth DistrictPart I Reviewed by Hydromet.
 Sec. of Weather Bureau, 2-26-69Part II Approved by Office, Chief
 of Engineers for distribution
 of factual data, 2-3-70

Remarks _____

DATA AND COMPUTATIONS COMPILED

PART I

Preliminary Isohyetal map, in 1 sheet scale 1:1,374,400

Precipitation data and mass curves: (Number of Sheets)

Form 5001-C (Hourly precip. data).....	32
Form 5001-D (Hourly precip. data).....	7
Form 5001-D (" " " ").....	20
Misc. precip. records, meteorological data, etc.	2
Form 5002 (Mass rainfall curves).....	68

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).....	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

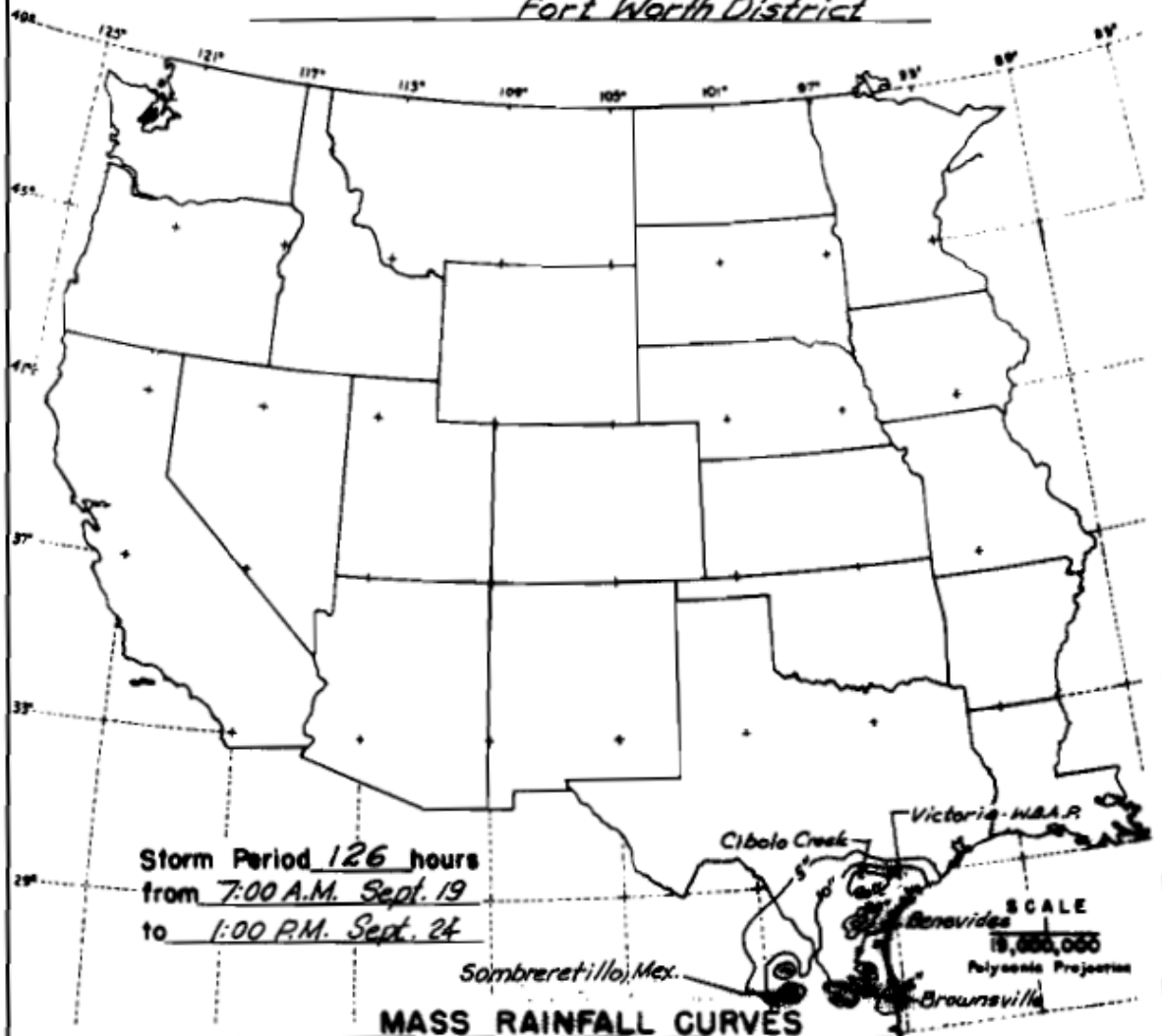
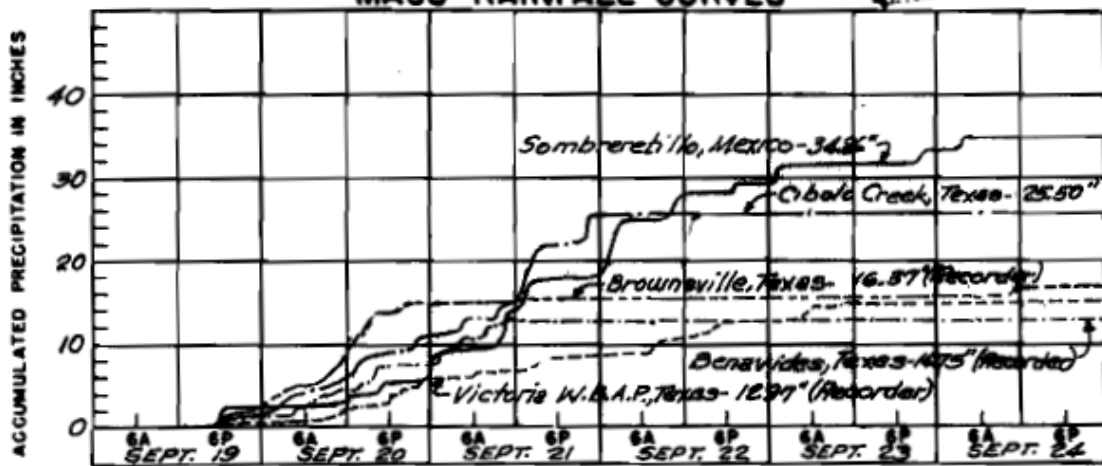
FORM 8-2

12-5888-100

P. 34

WAR DEPARTMENT

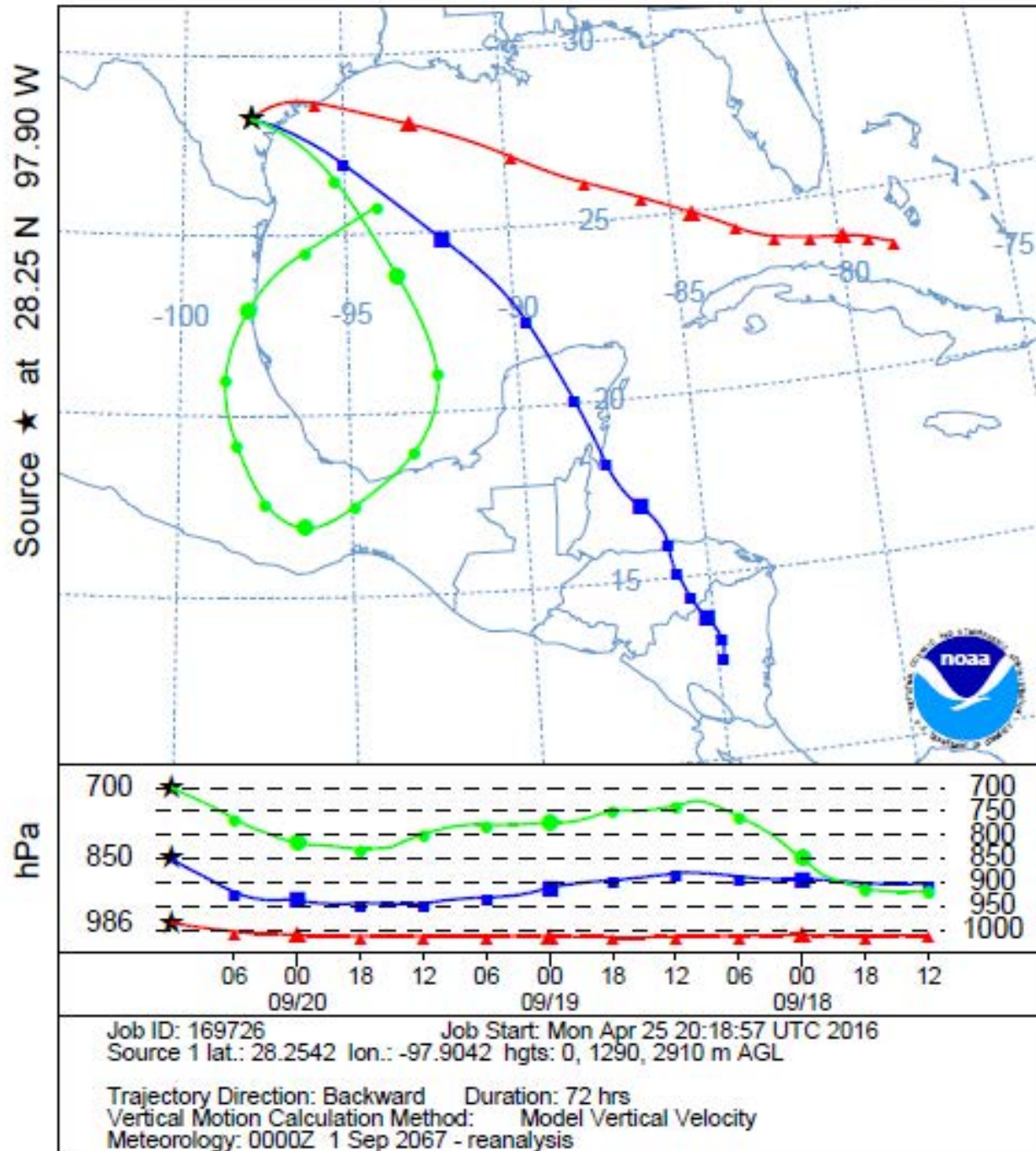
CORPS OF ENGINEERS, U. S. ARMY

STORM STUDIES - ISOHYETAL MAPStorm of SEPTEMBER 19-24, 1967 Assignment SW 3-24Study Prepared by: Southwestern Division
Fort Worth District**MASS RAINFALL CURVES**

FORM 8-3W

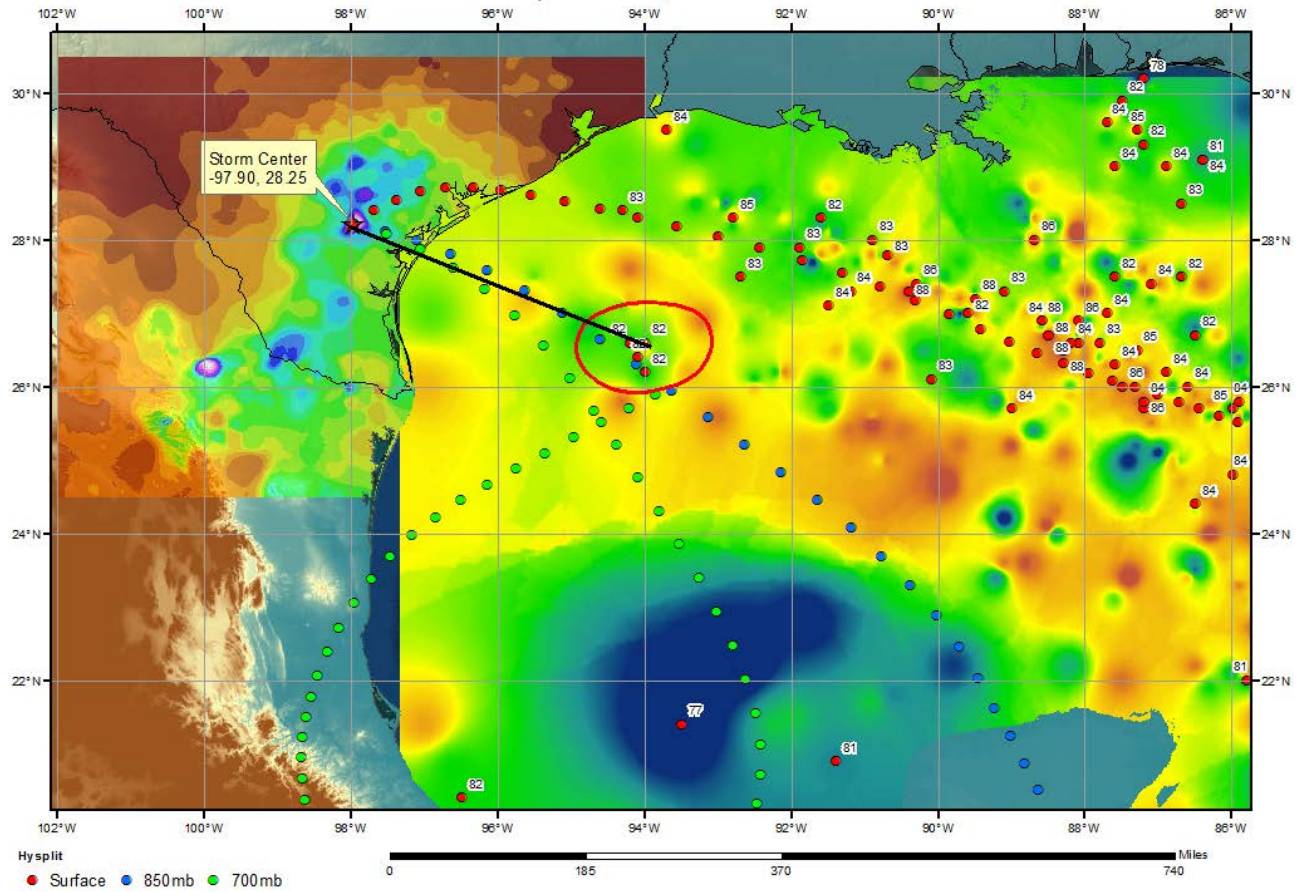
91-6420ABCD-3,000

NOAA HYSPLIT MODEL
Backward trajectories ending at 1200 UTC 20 Sep 67
CDC1 Meteorological Data



SPAS 1601 Dinero, TX Storm Analysis Zone 2 (SW 3-24)

September 20, 1967



Storm Precipitation Analysis System (SPAS) For Storm #1179_1

General Storm Location: Albany, Texas

Storm Dates: July 31 - August 6, 1978

Event: Tropical Storm Remnants

DAD 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

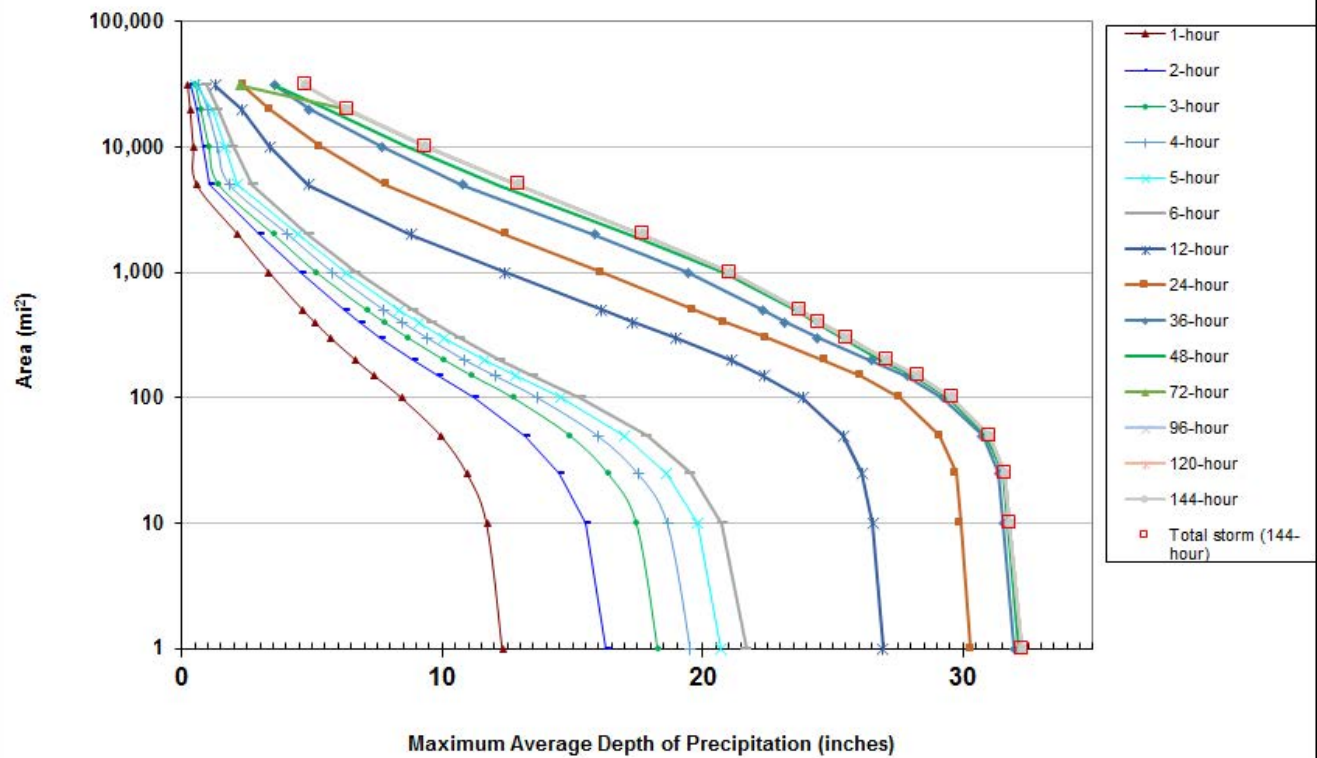
Depth-Area-Duration (DAD) analysis: Yes

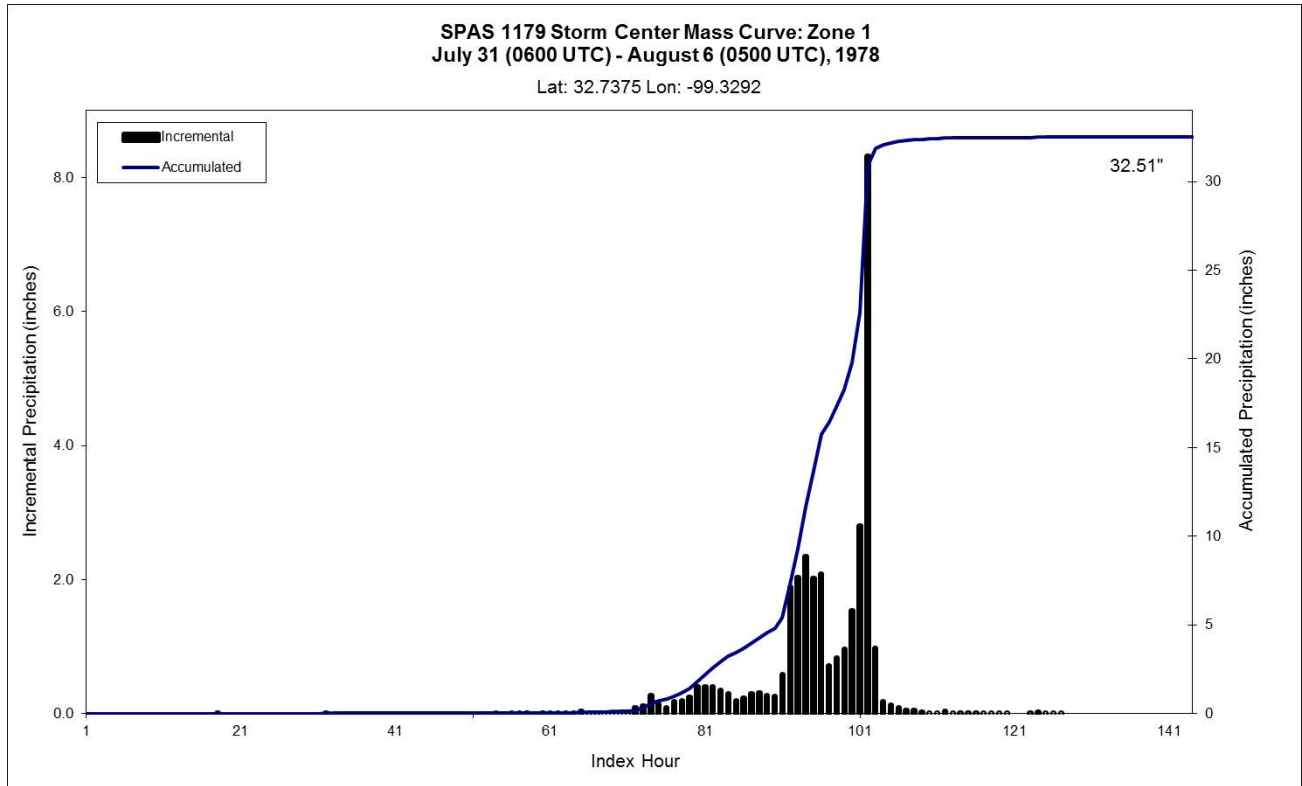
					Storm Rep. Dew Point					Climatological Max. Dew Point						
SPAS Storm ID	LON	LAT	ELEV	ELEV Round	T _d	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	T _d	T _d Round	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	IPMF
1179_1	-99.350	32.726	1,500	1,500	78.00	3.29	0.41	78	2.880	80.80	81.0	3.77	0.45	84	3.320	1.153

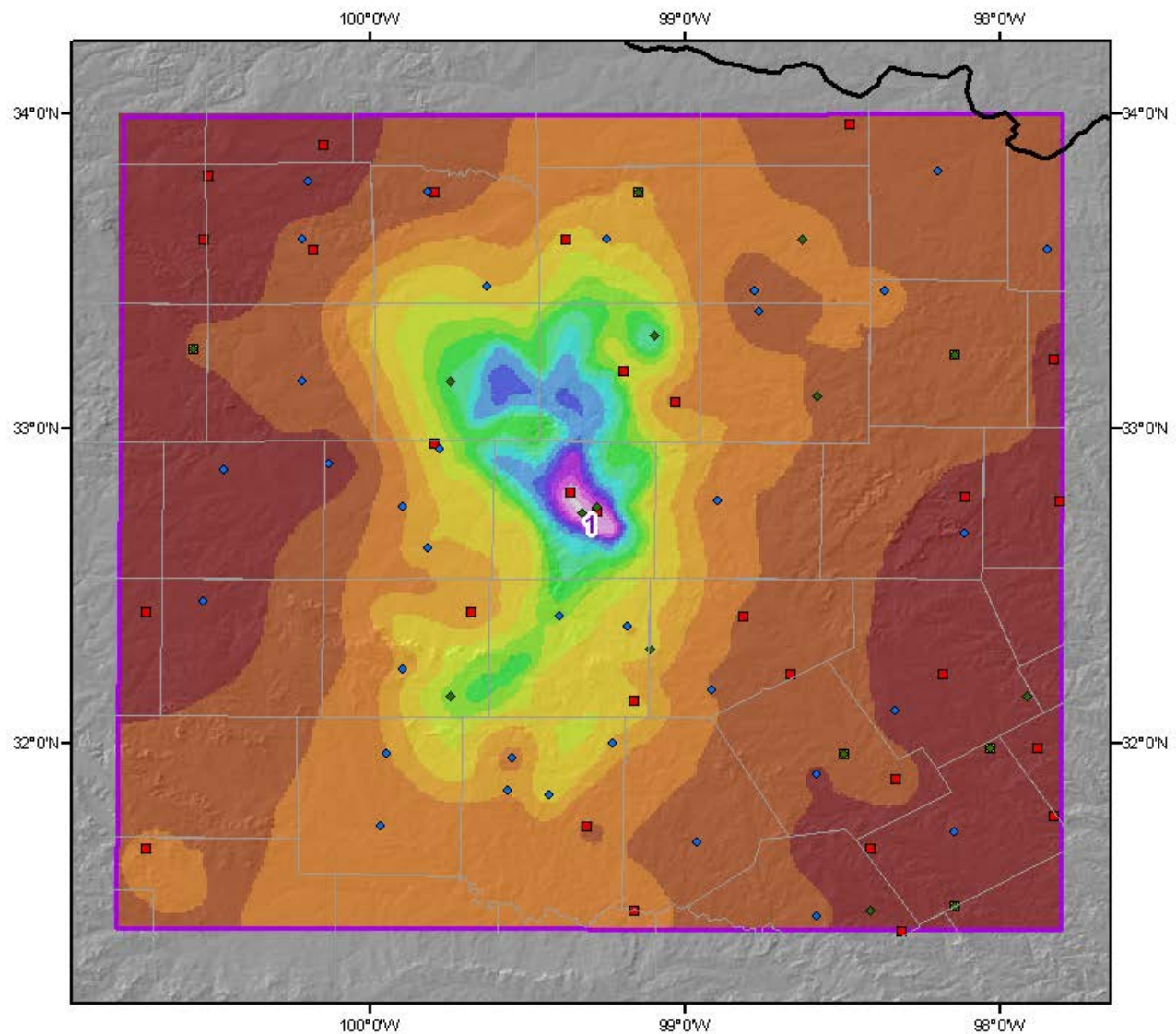
Storm 1179 - July 31 (0600 UTC) - August 6 (0500 UTC), 1978
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)

Area (mi ²)	Duration (hours)														
	1	2	3	4	5	6	12	24	36	48	72	96	120	144	Total
0.4	12.43	16.42	18.46	19.70	20.87	21.86	27.09	30.47	32.15	32.33	32.43	32.44	32.44	32.44	32.44
1	12.32	16.29	18.29	19.53	20.68	21.66	26.93	30.31	31.98	32.15	32.25	32.25	32.26	32.26	32.26
10	11.72	15.50	17.48	18.65	19.80	20.75	26.53	29.90	31.55	31.71	31.79	31.80	31.80	31.80	31.80
25	10.96	14.52	16.38	17.51	18.59	19.51	26.12	29.74	31.38	31.53	31.62	31.62	31.62	31.62	31.62
50	9.95	13.20	14.92	15.96	16.99	17.84	25.41	29.11	30.74	30.91	31.01	31.02	31.02	31.02	31.02
100	8.44	11.23	12.74	13.66	14.57	15.32	23.85	27.57	29.23	29.44	29.56	29.57	29.57	29.57	29.57
150	7.40	9.86	11.17	12.02	12.81	13.49	22.37	26.10	27.84	28.12	28.28	28.28	28.29	28.29	28.29
200	6.68	8.90	10.10	10.87	11.61	12.25	21.12	24.69	26.49	26.90	27.10	27.10	27.11	27.11	27.11
300	5.72	7.65	8.71	9.42	10.09	10.65	18.95	22.44	24.41	25.35	25.56	25.51	25.52	25.52	25.52
400	5.11	6.84	7.79	8.46	9.09	9.61	17.32	20.85	23.17	24.31	24.51	24.45	24.45	24.45	24.45
500	4.65	6.27	7.12	7.76	8.36	8.85	16.12	19.64	22.29	23.53	23.73	23.71	23.72	23.72	23.72
1,000	3.35	4.56	5.18	5.78	6.29	6.69	12.42	16.11	19.43	20.78	21.03	21.05	21.05	21.05	21.05
2,000	2.15	2.95	3.54	4.07	4.47	4.86	8.80	12.46	15.84	17.22	17.67	17.69	17.70	17.70	17.70
5,000	0.56	1.06	1.43	1.82	2.15	2.71	4.87	7.84	10.77	12.14	12.88	12.90	12.91	12.91	12.91
10,000	0.43	0.82	1.05	1.37	1.67	1.97	3.36	5.32	7.67	8.59	9.31	9.35	9.37	9.37	9.37
20,000	0.31	0.60	0.74	0.98	1.17	1.36	2.31	3.37	4.89	5.57	6.26	6.33	6.35	6.35	6.35
31,010	0.22	0.31	0.54	0.64	0.49	0.95	1.27	2.35	3.57	3.62	2.26	4.74	4.75	4.75	4.75

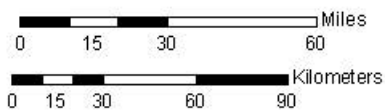
SPAS #1179 DAD Curves Zone 1
July 31 - August 6, 1978



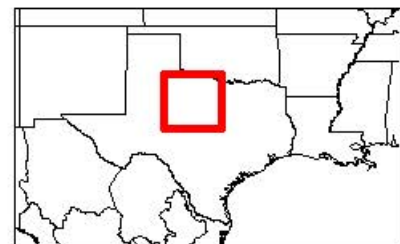
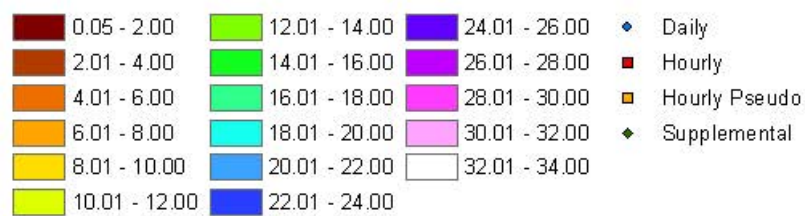




Total Precipitation (144-hours)
SPAS storm number: 1179
July 31, 1978 (0600 UTC) - August 6, 1978 (0500 UTC)

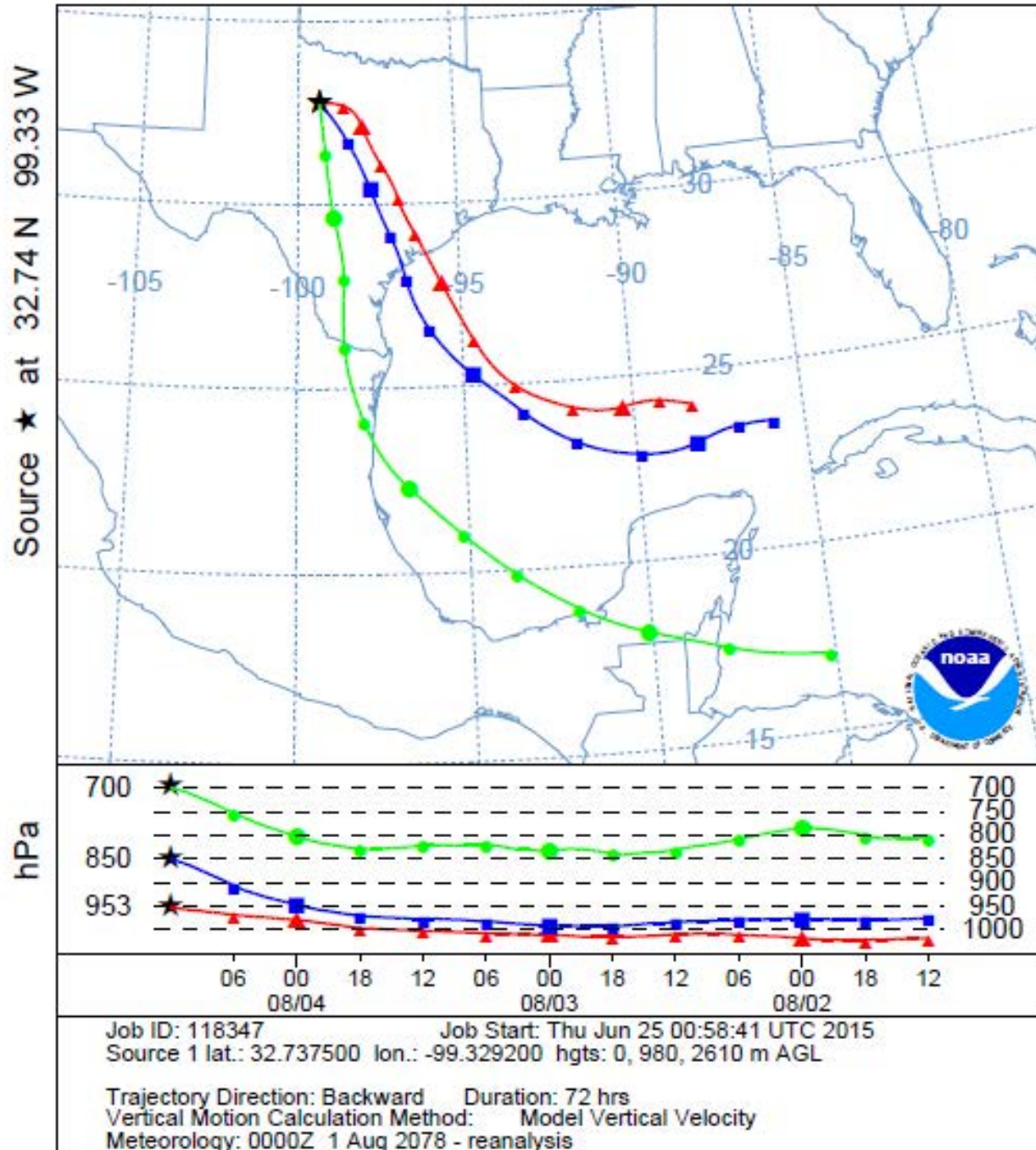


Precipitation (inches)

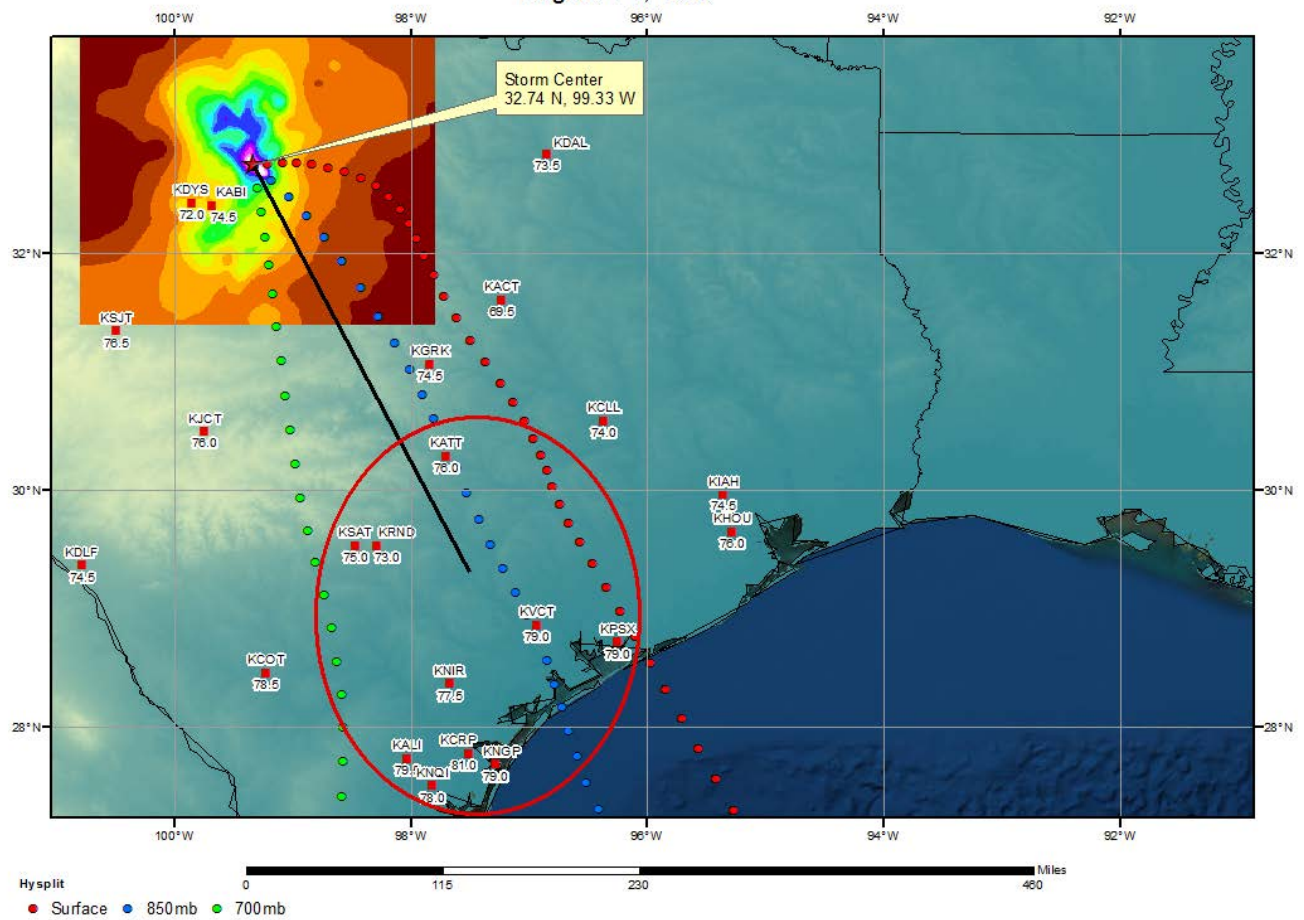


NEC 2010/05/18 May 18, 2010

NOAA HYSPLIT MODEL
Backward trajectories ending at 1200 UTC 04 Aug 78
CDC1 Meteorological Data



SPAS 1179 Albany, TX Storm Analysis
August 1-4, 1978



Storm Precipitation Analysis System (SPAS) For Storm #1463_1

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 (~ 0.3 mi²)

Radar Included: No

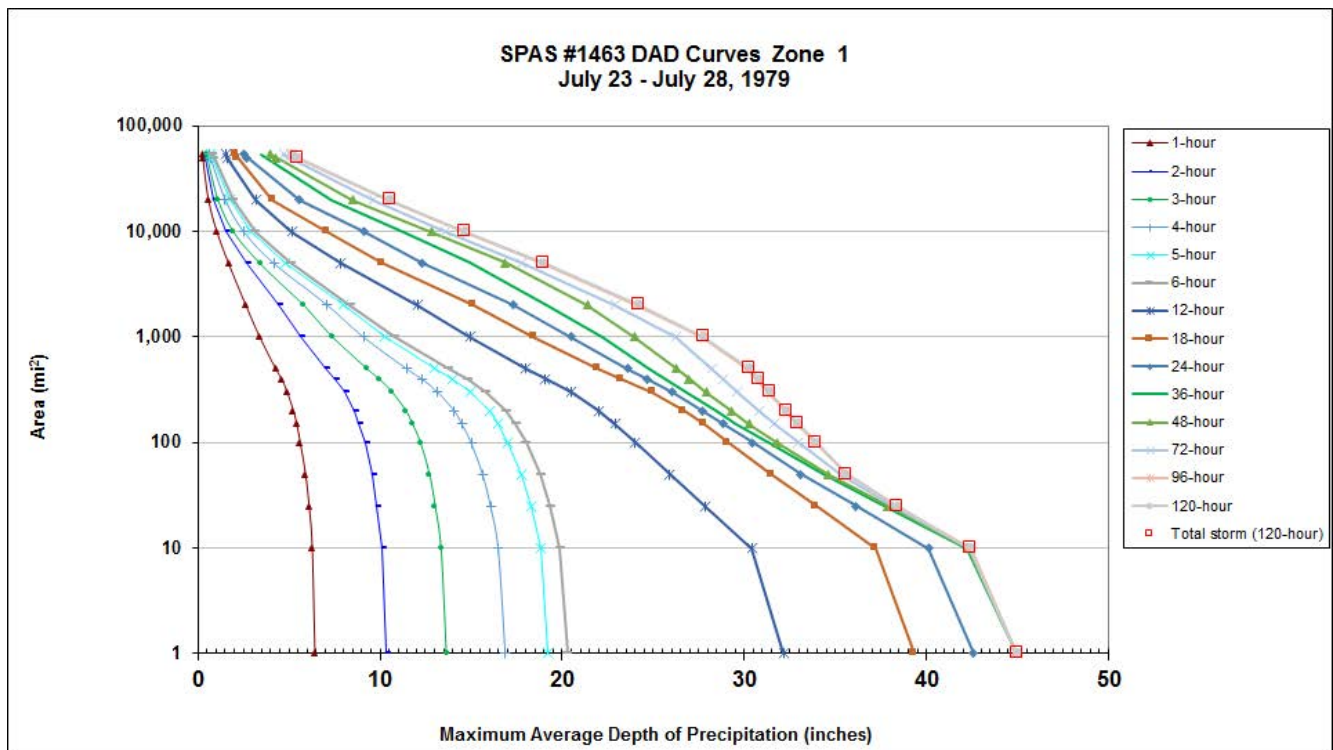
Depth-Area-Duration (DAD) analysis: Yes

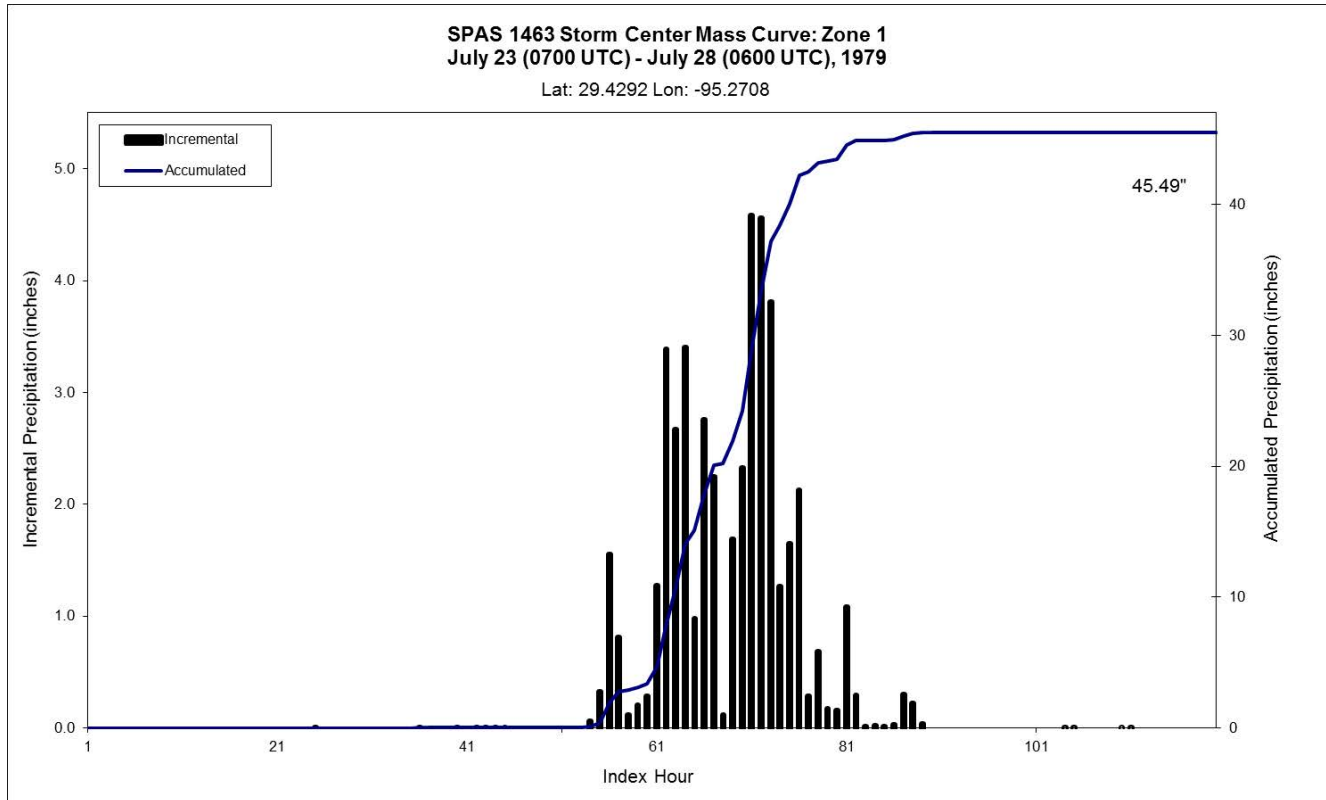
Reliability of results: This analysis was based on hourly data, daily data, supplemental station data and bucket survey data. Hourly station FM528 Clear Creek near Friendswood was digitized from the NWS report. Bucket survey rainfall timing and magnitude at the storm center (Alvin, TX) were diligently 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.

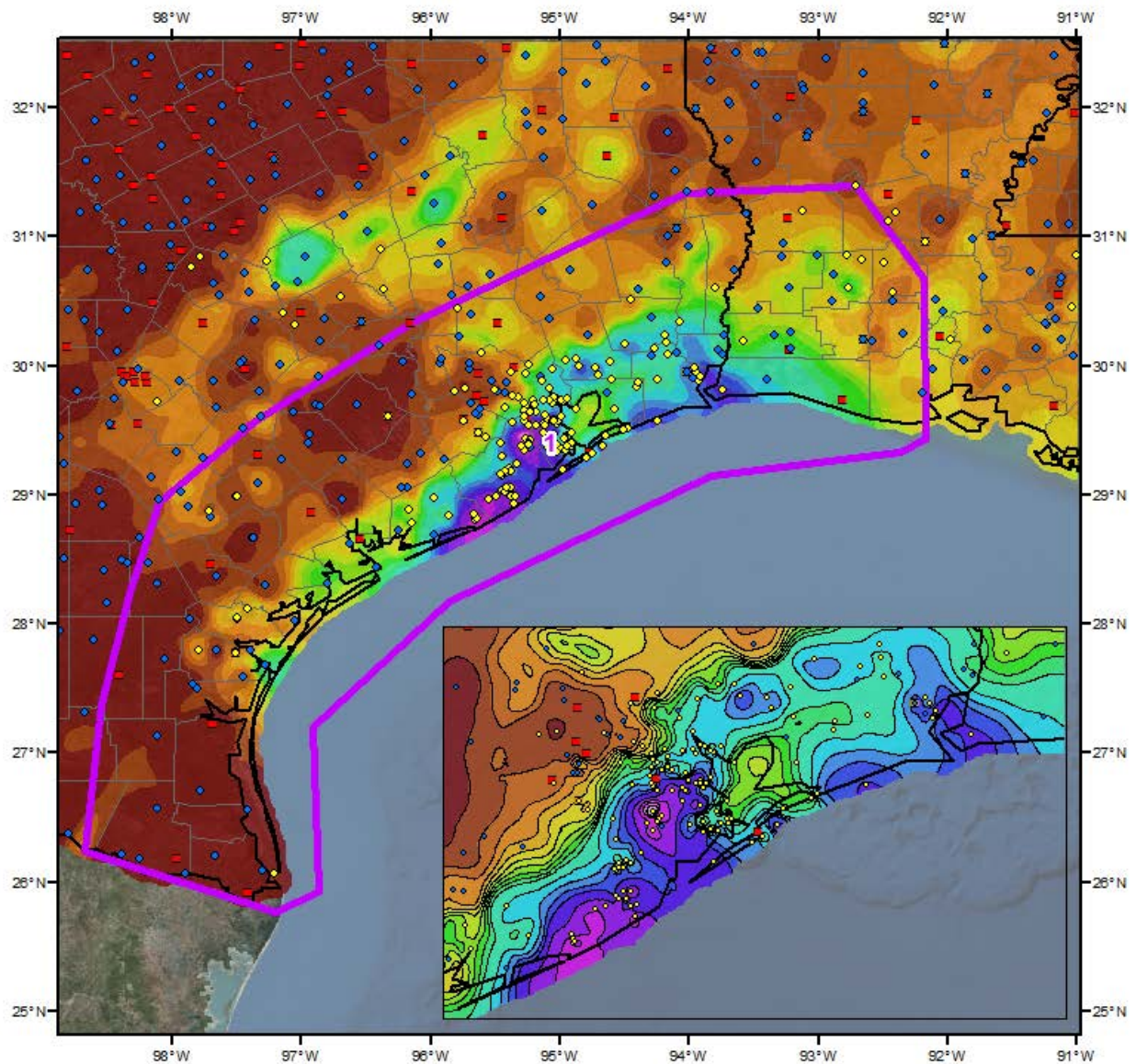
SPAS Storm ID	LON	LAT	ELEV	ELEV Round	Storm Rep. Dew Point					Climatological Max. Dew Point						IPMF
					T _d	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	T _d	T _d Round	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	
1463_1	-95.271	29.429	62	100	85.00	4.48	0.04	92	4.440	86.40	86.5	4.77	0.04	95	4.730	1.065

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
0.4	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	45.35	45.35
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
53,986	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







Total Storm (120-hr) Precipitation (inches)
07/23/1979 0700 UTC - 07/28/1979 0600 UTC
SPAS- #1463

Gauges

- ◆ Daily
- Hourly
- Hourly Pseudo
- ◆ Supplemental

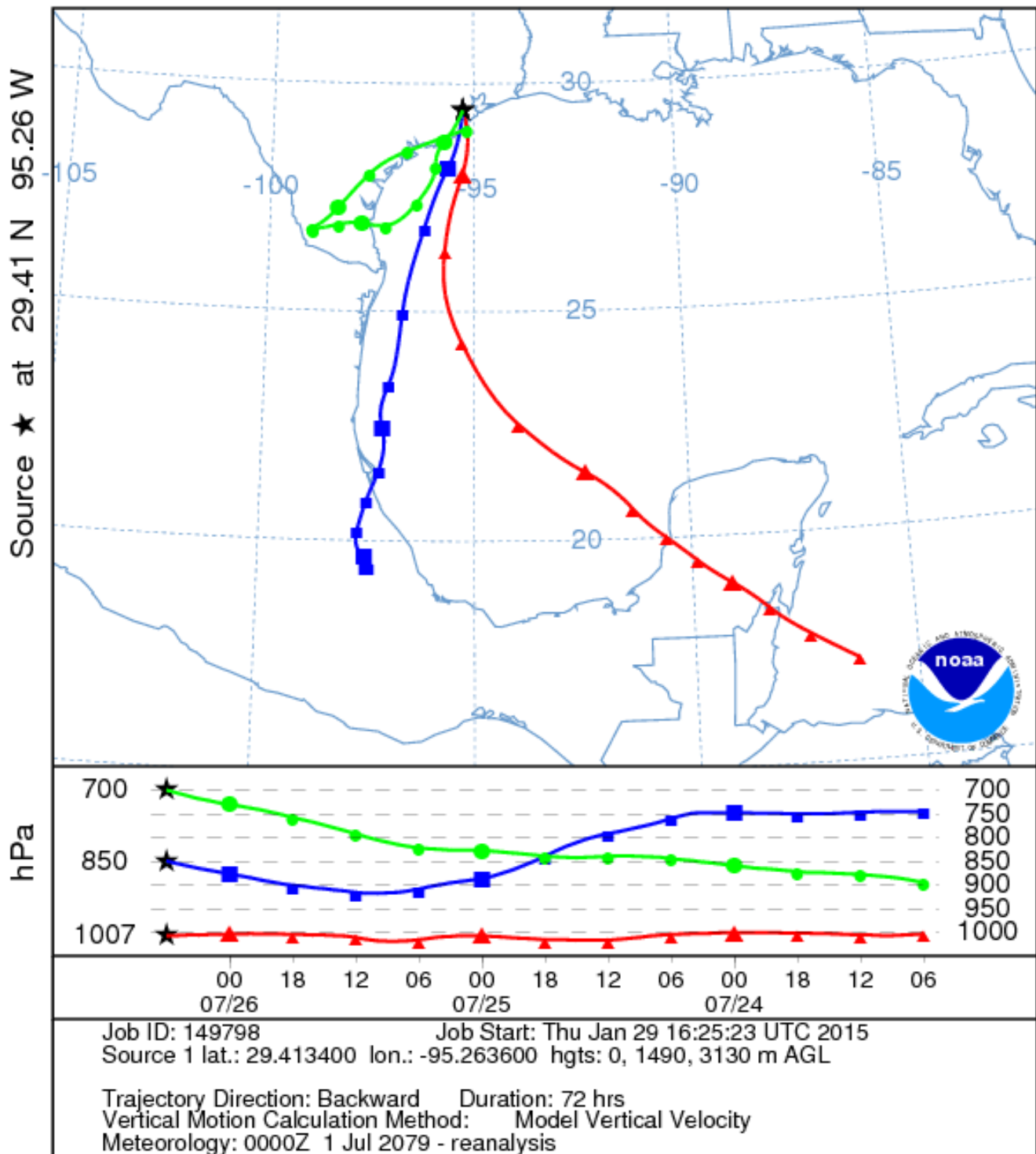
Precipitation (inches)

0.00 - 1.00	4.01 - 5.00	8.01 - 9.00	15.01 - 17.50	30.01 - 35.00
1.01 - 2.00	5.01 - 6.00	9.01 - 10.00	17.51 - 20.00	35.01 - 40.00
2.01 - 3.00	6.01 - 7.00	10.01 - 12.50	20.01 - 25.00	40.01 - 45.00
3.01 - 4.00	7.01 - 8.00	12.51 - 15.00	25.01 - 30.00	45.01 - 50.00

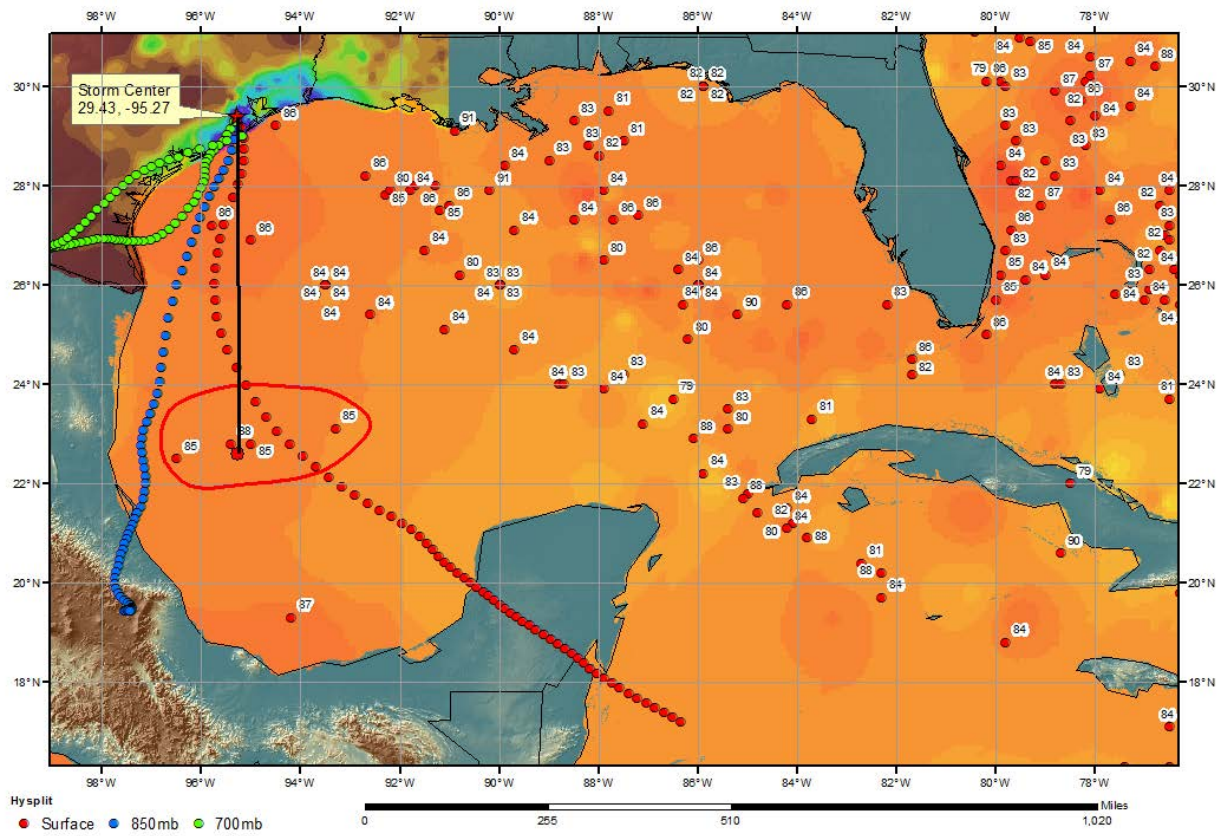


2/10/2015

NOAA HYSPLIT MODEL
Backward trajectories ending at 0600 UTC 26 Jul 79
CDC1 Meteorological Data



SPAS 1463 Alvin, TX Storm Analysis
July 24, 1979



Storm Precipitation Analysis System (SPAS) For Storm #1184_1

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

DAD 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

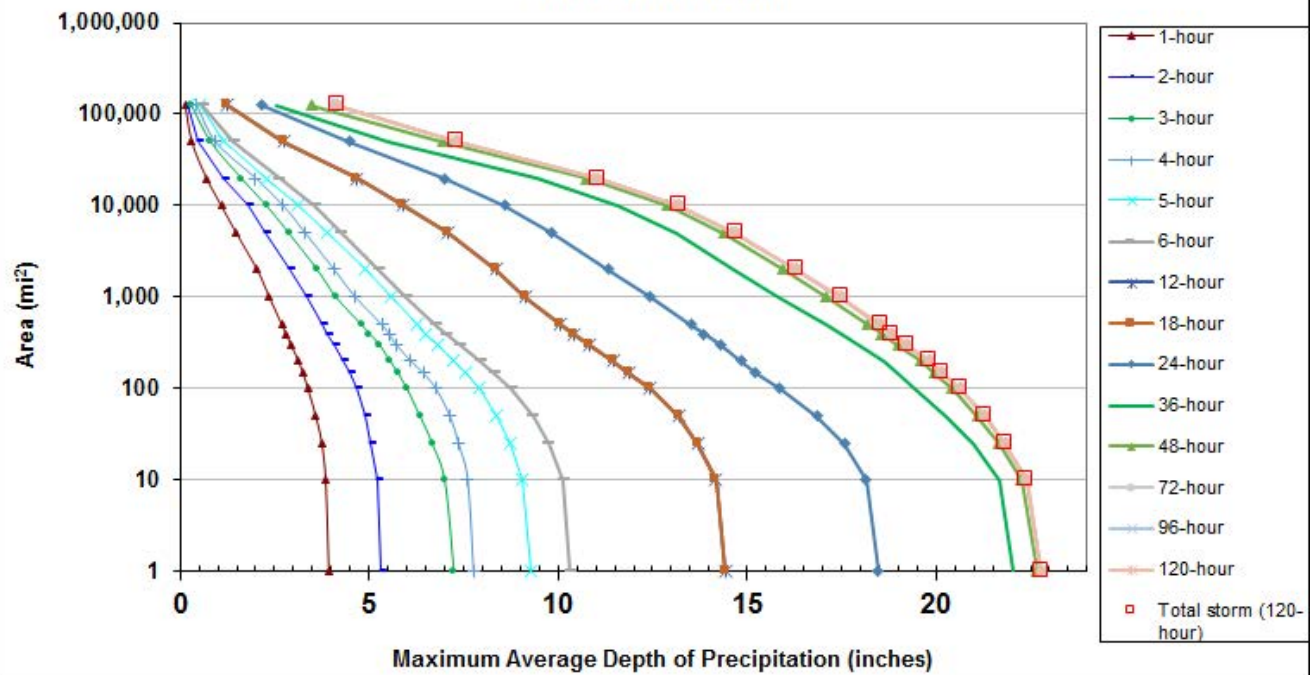
Radar Included: No

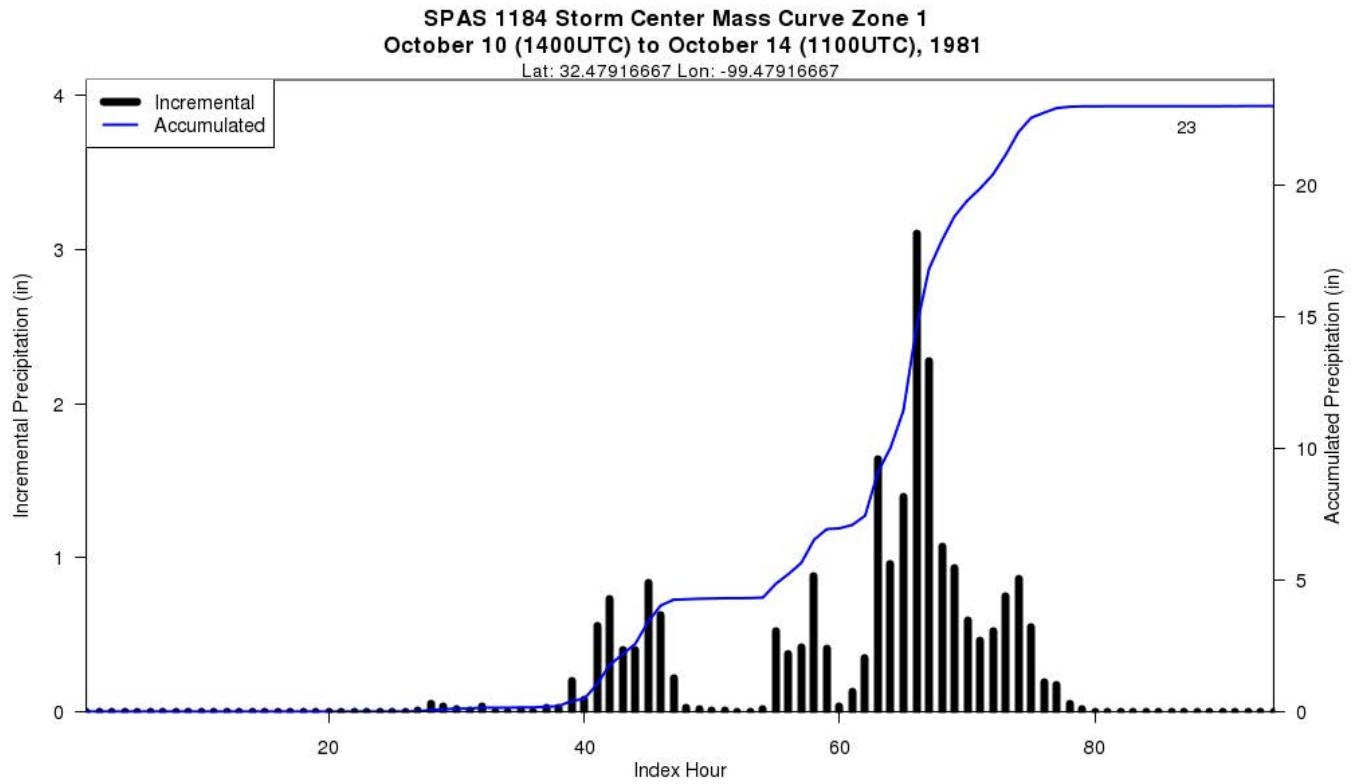
Depth-Area-Duration (DAD) analysis: Yes (1,2,3,4,5,6,12,24,36,48,72,93 hours)

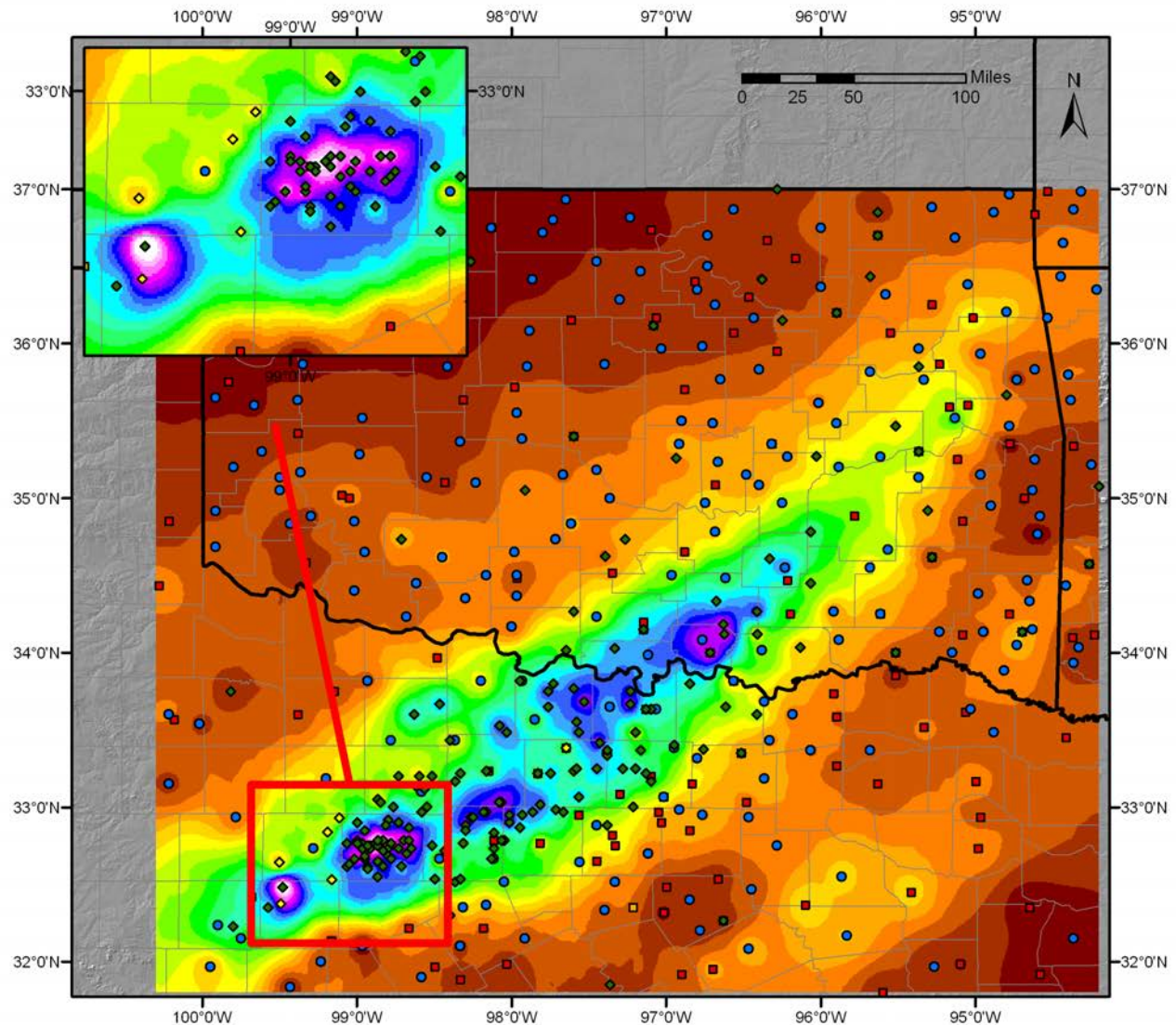
SPAS Storm ID	LON	LAT	ELEV	ELEV Round	Storm Rep. Dew Point					Climatological Max. Dew Point						IPMF
					T _d	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	T _d	T _d Round	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	
1184_1	-99.479	32.479	2,000	2,000	76.00	2.99	0.50	74	2.490	77.70	77.5	3.22	0.53	77	2.690	1.080

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	21.69	22.27	22.40	22.40	22.40
25	3.75	5.05	6.67	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

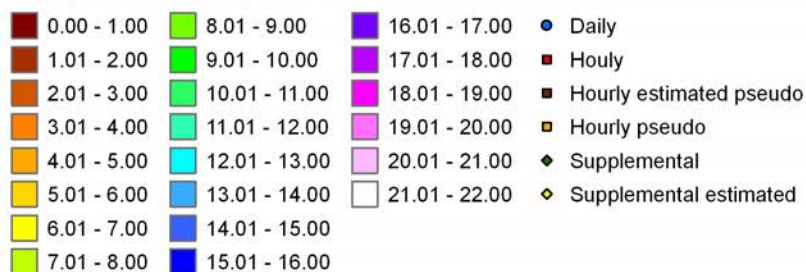
**SPAS #1184 DAD Curves Zone 1
October 10-14, 1981**





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)

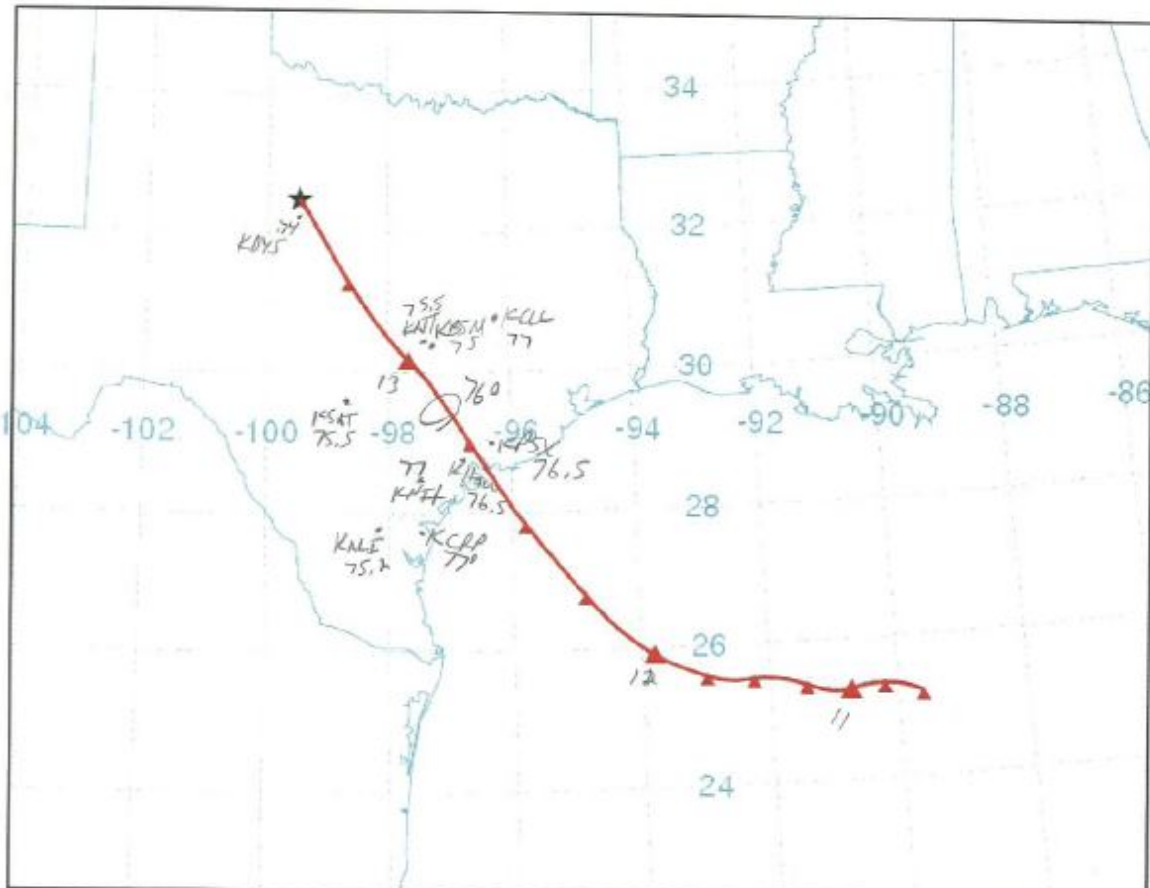
Precipitation (inches)



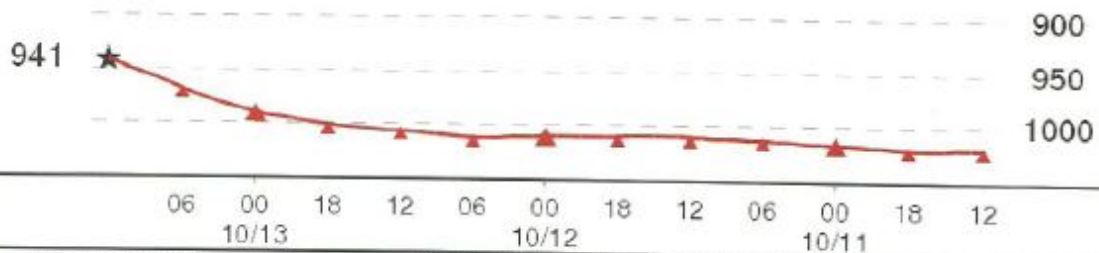
Metstat/AWA May 13, 2010

NOAA HYSPLIT MODEL
Backward trajectory ending at 1200 UTC 13 Oct 81
CDC1 Meteorological Data

Source ★ at 32.48 N 99.48 W



hPa



Job ID: 31385 Job Start: Wed Jun 9 16:32:31 UTC 2010
Source 1 lat.: 32.4797 lon.: -99.4792 height: 0 m AGL

Trajectory Direction: Backward Duration: 72 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 01 Oct 2081 - reanalysis

Storm Precipitation Analysis System (SPAS) For Storm #1317_1

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

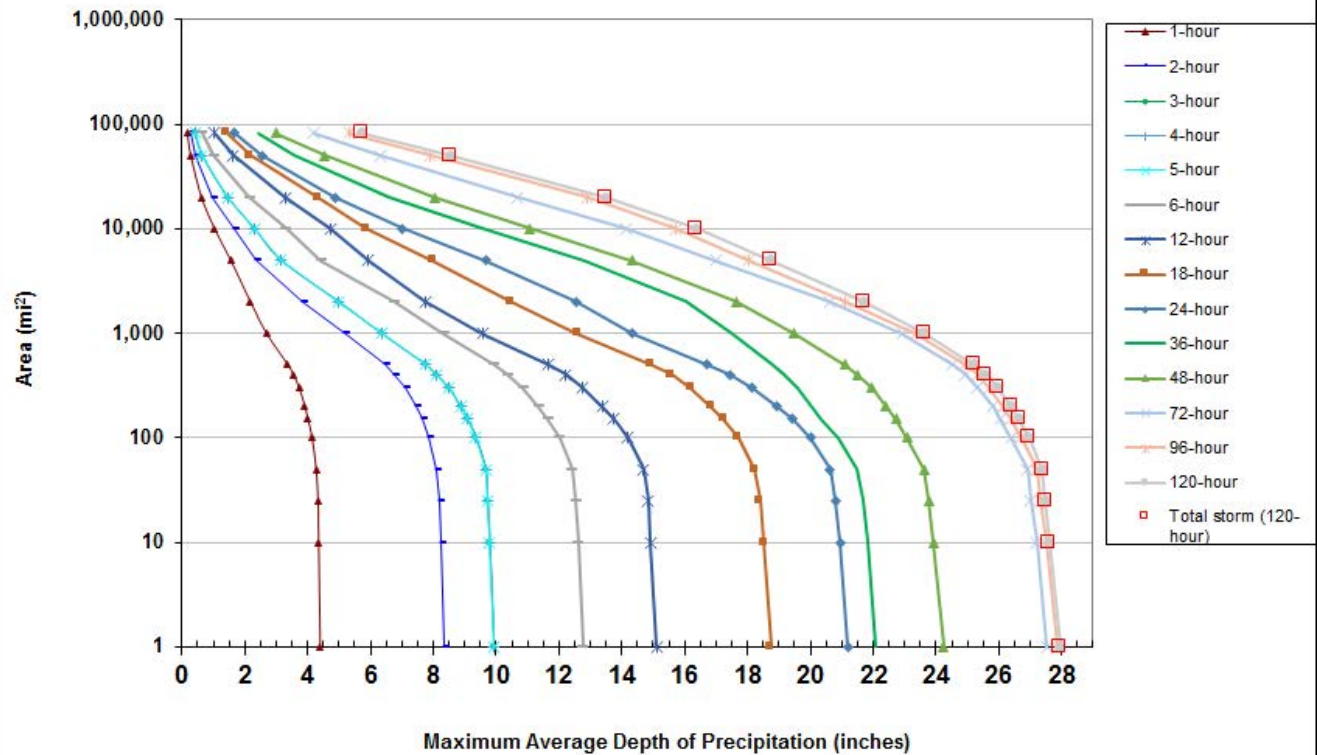
Reliability of Results: This analysis was based on hourly data, daily data, supplemental station data and NWS total storm basemap. We have a good level of confidence in the station based storm total results, the spatial pattern is dependent on the station data and NWS basemap. The timing is based on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

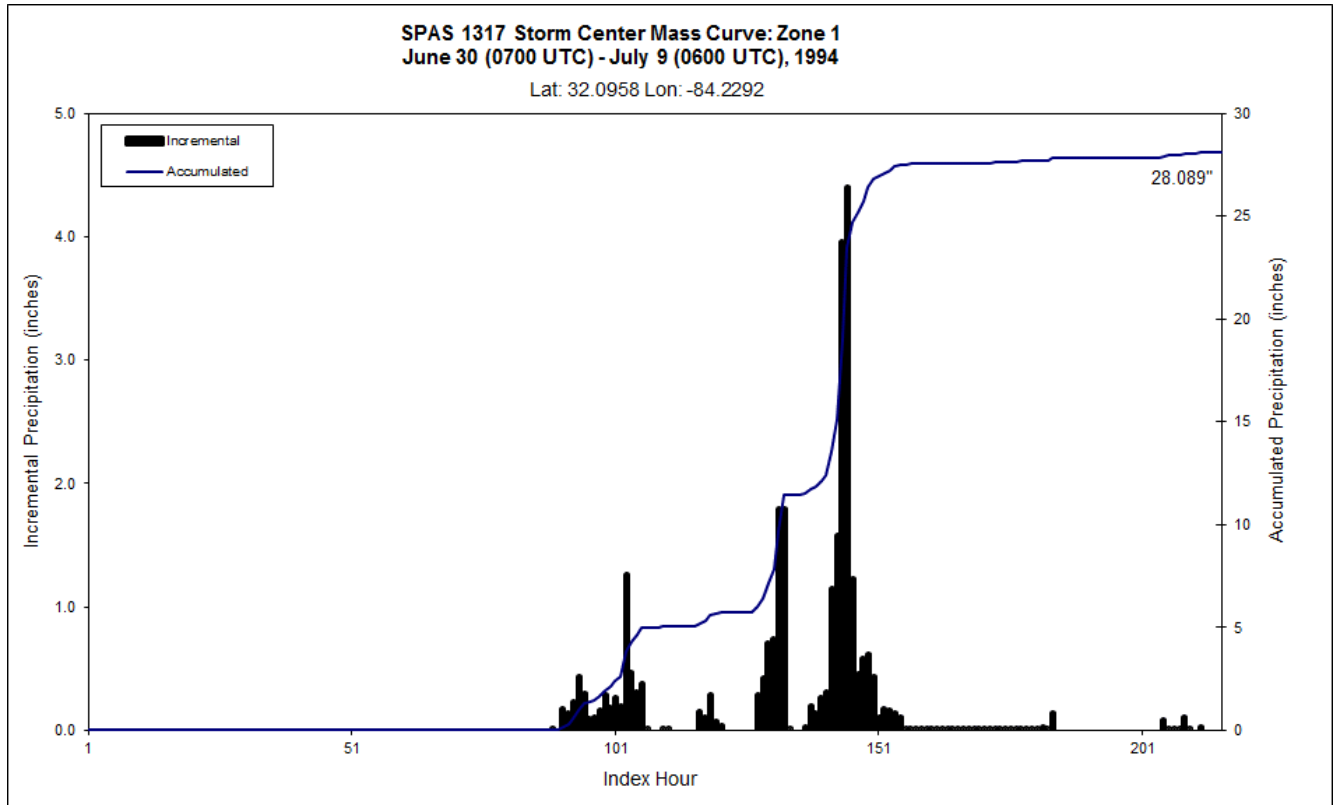
					Storm Rep. Dew Point					Climatological Max. Dew Point						
SPAS Storm ID	LON	LAT	ELEV	ELEV Round	T _d	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	T _d	T _d Round	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	IPMF
1317_1	-84.229	32.096	466	500	76.00	2.99	0.13	74	2.860	80.88	81.0	3.77	0.15	84	3.620	1.266

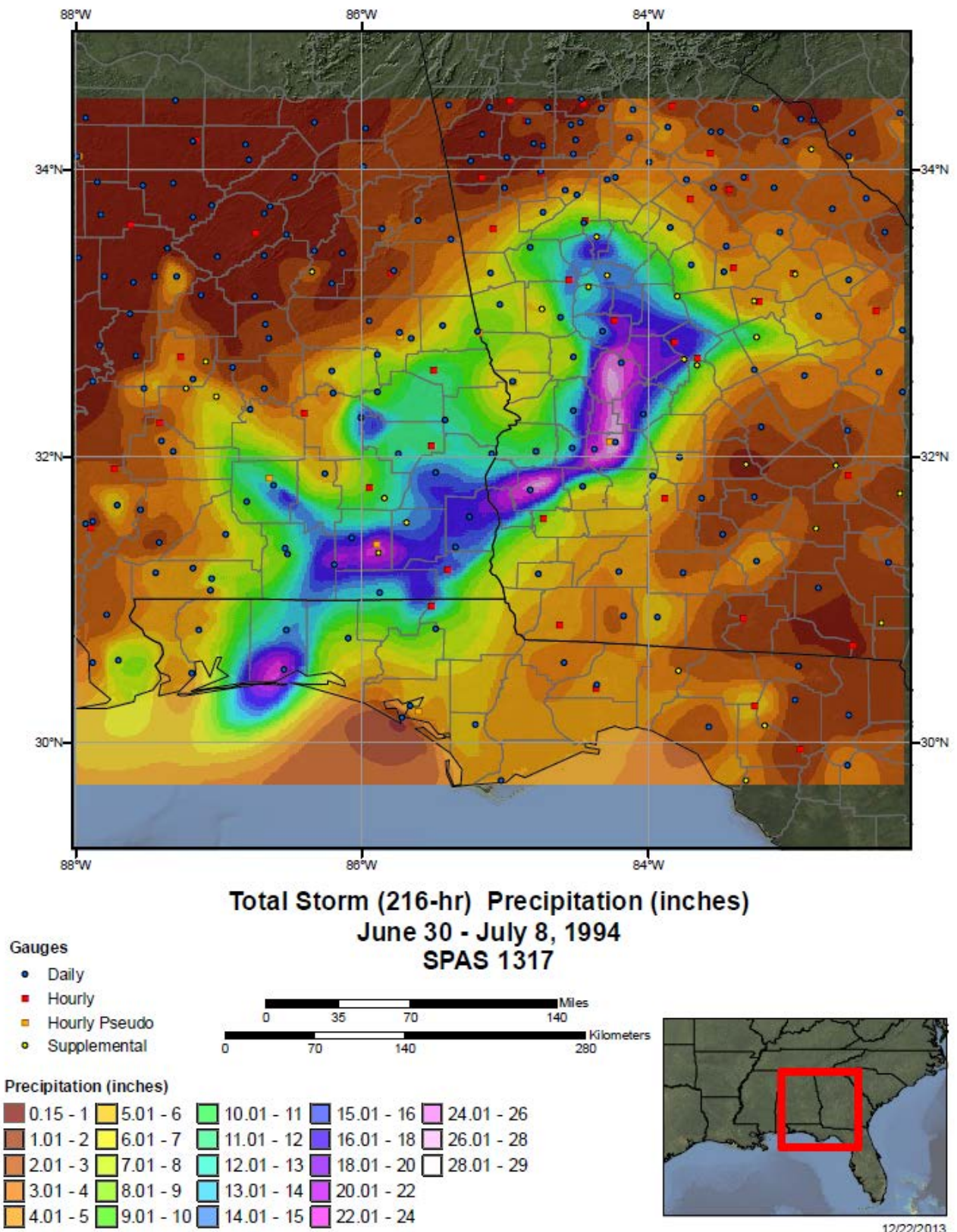
Storm 1317 - June 30 (0700 UTC) - July 9 (0600 UTC), 1994
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)

Area (mi ²)	Duration (hours)														
	1	2	3	4	5	6	12	18	24	36	48	72	96	120	Total
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	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	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	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	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	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	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	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	26.39
300	3.73	7.10	8.49	8.49	8.49	10.86	12.77	16.19	18.16	19.58	21.97	25.32	25.71	25.96	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	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	25.21
1,000	2.69	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	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	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	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	16.37
20,000	0.62	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	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	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	5.74

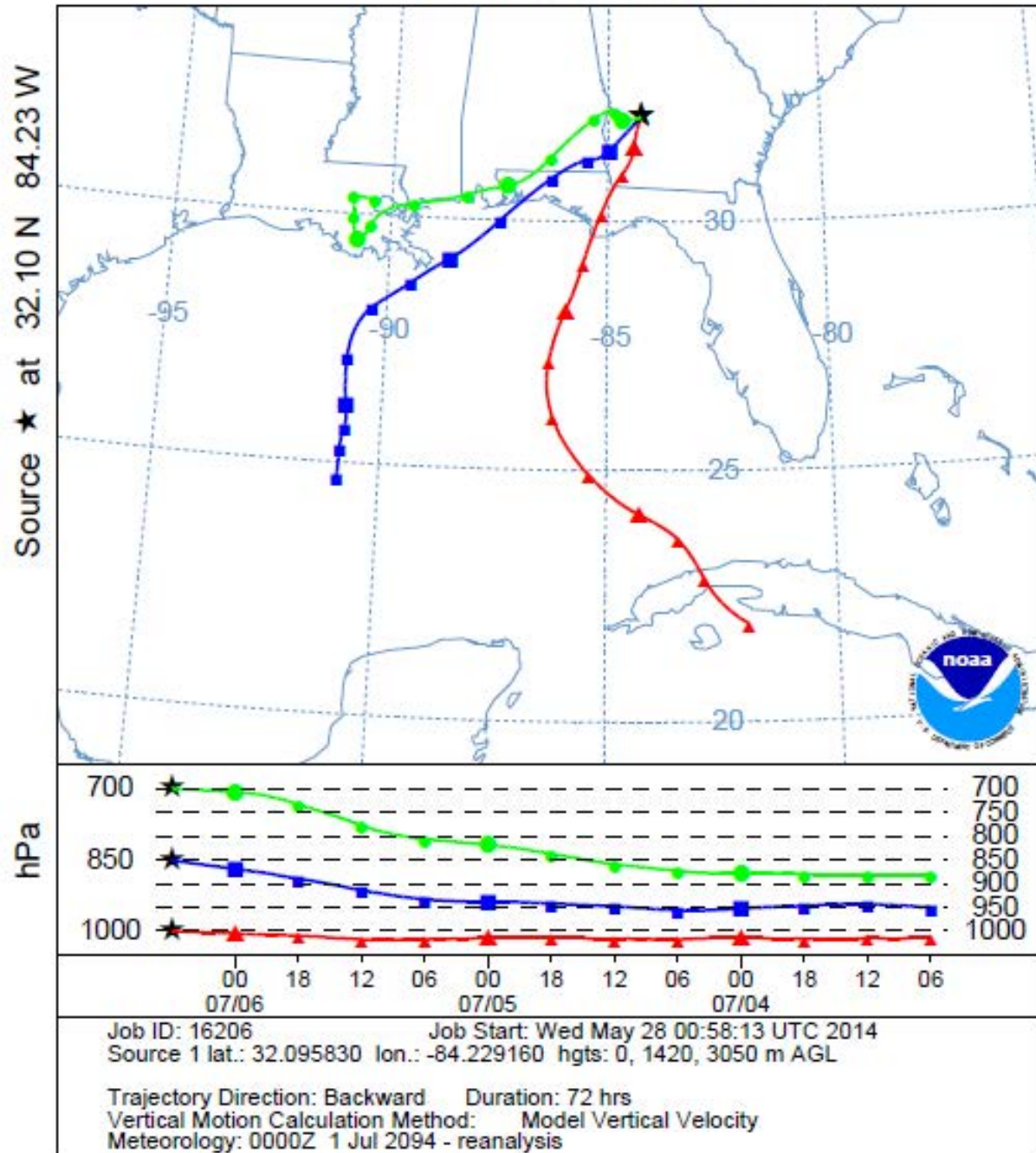
SPAS #1317 DAD Curves Zone 1
June 30 - July 9, 1994



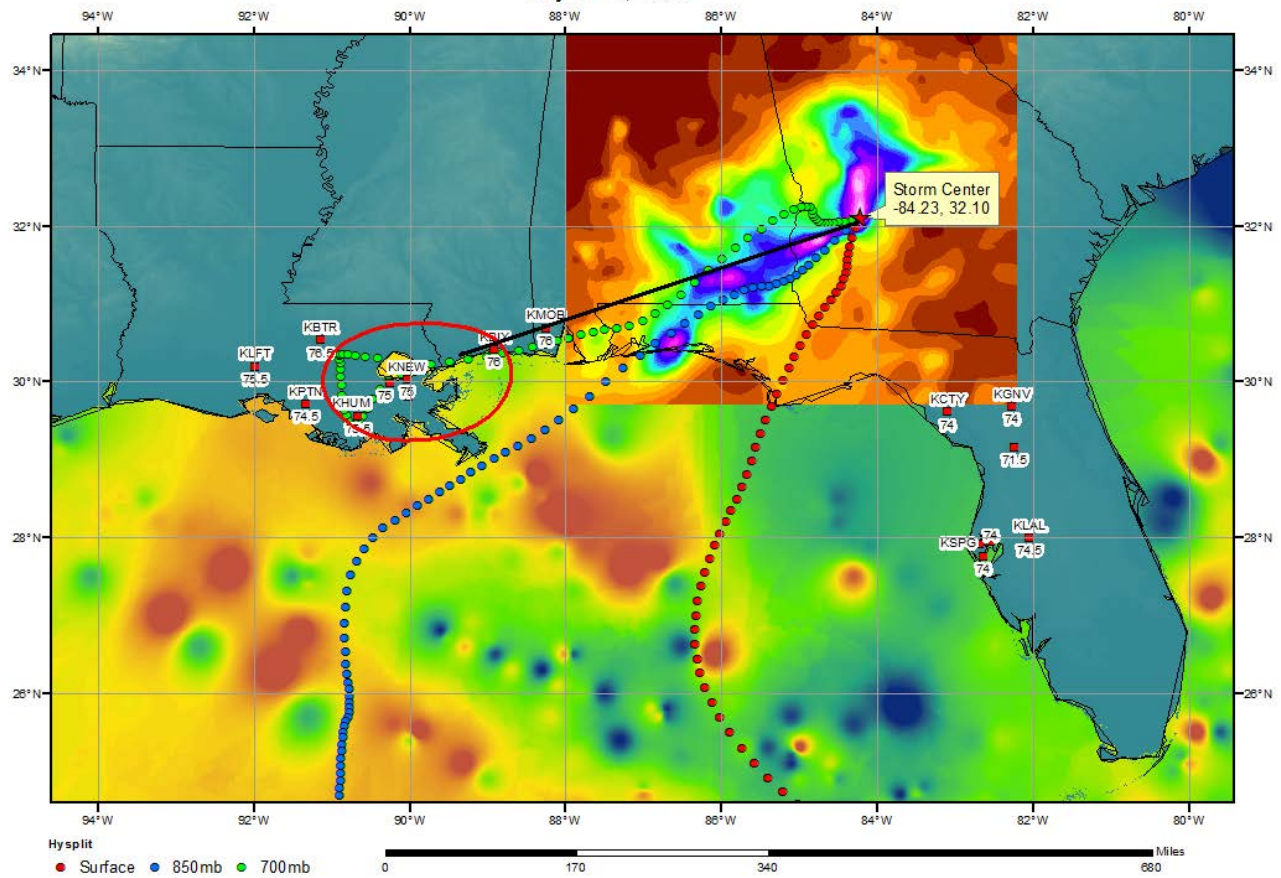




NOAA HYSPLIT MODEL
 Backward trajectories ending at 0600 UTC 06 Jul 94
 CDC1 Meteorological Data



SPAS 1317 Americas, GA Storm Analysis
July 4 - 6, 1994



Storm Precipitation Analysis System (SPAS) For Storm #1569_1

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

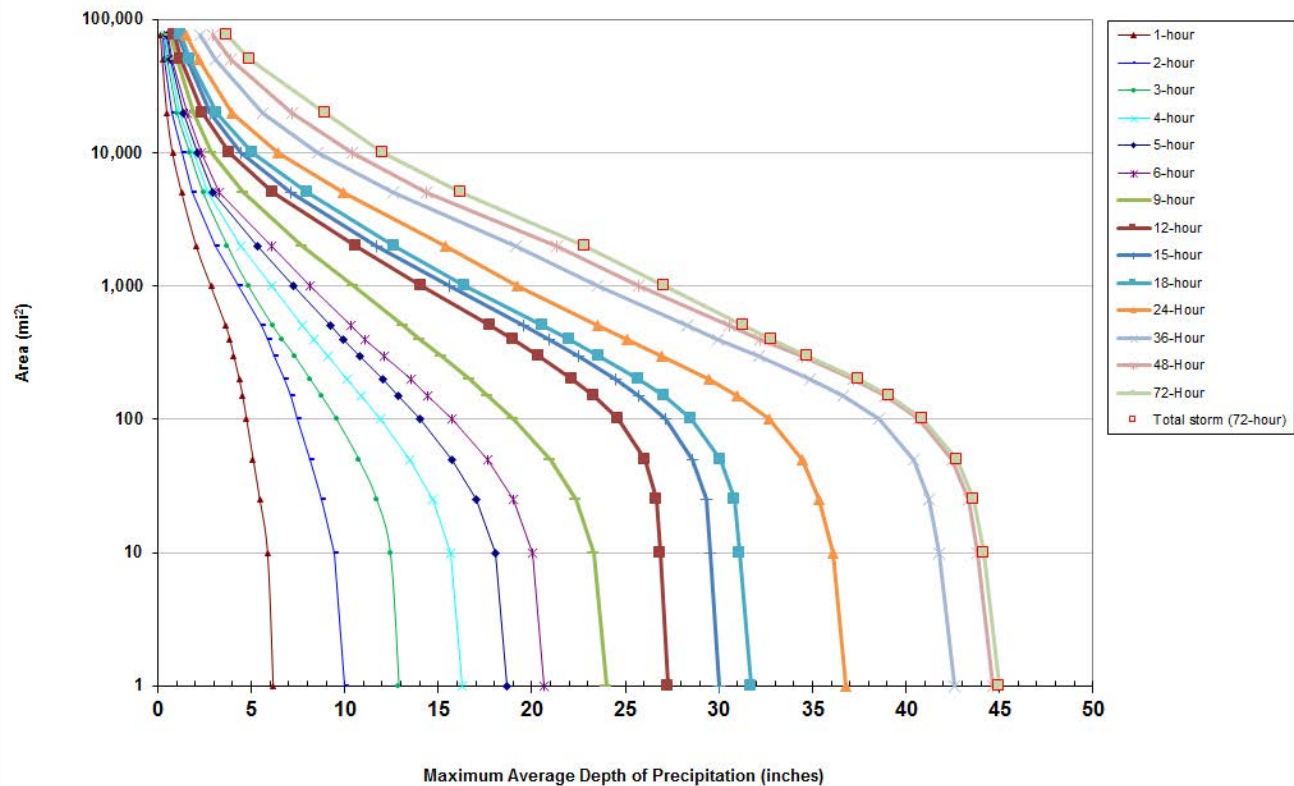
Reliability of Results: This analysis was based on hourly data, hourly pseudo data, daily data, supplemental data, and supplemental estimated station data. We have a high degree of confidence in the station based storm total results, the spatial pattern is dependent on basemap, and the timing is based on hourly and hourly pseudo stations. Radar data was used for this event and had good coverage throughout the storm.

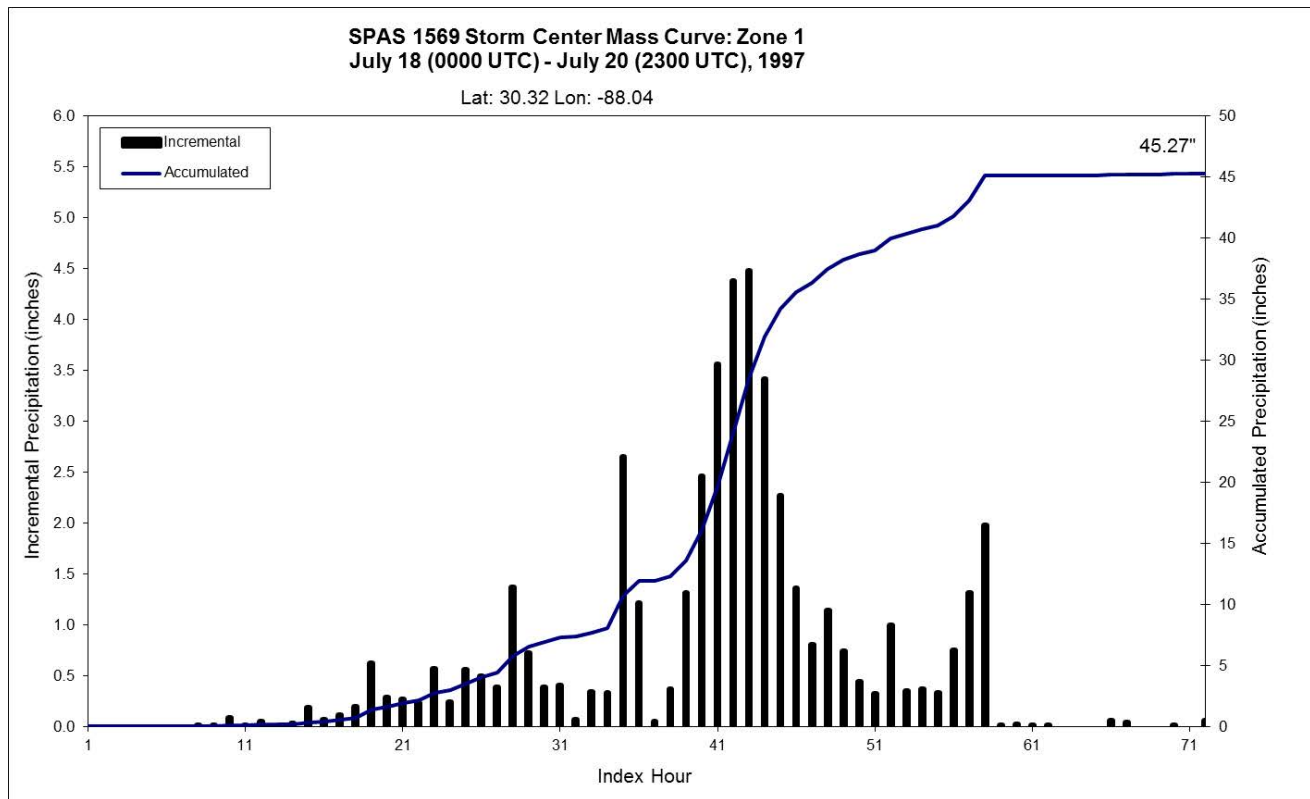
					Storm Rep. Dew Point					Climatological Max. Dew Point						
SPAS Storm ID	LON	LAT	ELEV	ELEV Round	T _d	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	T _d	T _d Round	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	IPMF
1569 1	-88.035	30.315	0	0	85.50	4.58	0.00	93	4.580	86.86	87.0	4.86	0.00	96	4.860	1.061

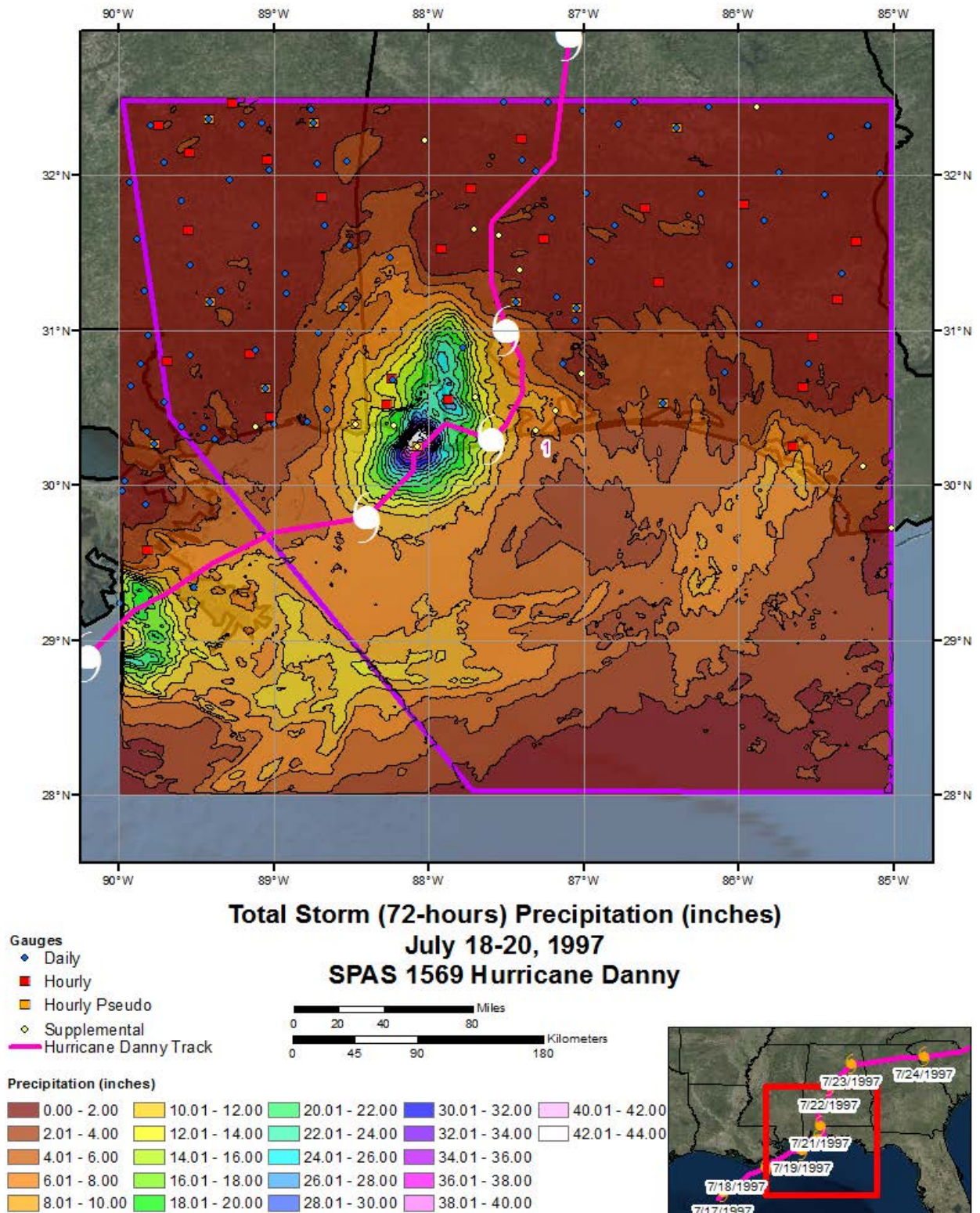
Storm 1569 Zone 1 - Jul. 18 (0000 UTC) - Jul. 20 (2300 UTC), 1997
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)

areasqmi	Duration (hours)														
	1	2	3	4	5	6	9	12	15	18	24	36	48	72	Total
0.4	6.22	10.10	12.98	16.37	18.83	20.75	24.13	27.49	30.17	31.94	37.07	42.90	44.97	45.27	45.27
1	6.16	9.99	12.88	16.25	18.69	20.62	23.97	27.31	29.99	31.71	36.80	42.58	44.66	44.96	44.96
10	5.86	9.41	12.42	15.67	18.07	20.03	23.35	26.86	29.52	31.14	36.12	41.77	43.85	44.15	44.15
25	5.45	8.77	11.69	14.73	17.06	19.04	22.37	26.69	29.32	30.86	35.37	41.23	43.32	43.61	43.61
50	5.10	8.11	10.74	13.49	15.75	17.66	21.02	26.03	28.61	30.10	34.46	40.42	42.48	42.74	42.74
100	4.75	7.48	9.55	11.88	14.00	15.73	19.03	24.63	27.13	28.54	32.68	38.54	40.66	40.90	40.90
150	4.54	7.10	8.74	10.88	12.86	14.43	17.61	23.32	25.71	27.05	30.99	36.65	38.87	39.12	39.12
200	4.36	6.75	8.14	10.12	12.03	13.51	16.71	22.16	24.46	25.70	29.49	34.90	37.20	37.49	37.49
300	4.07	6.26	7.31	9.08	10.82	12.08	15.21	20.37	22.47	23.61	26.96	32.12	34.46	34.76	34.76
400	3.86	5.86	6.64	8.33	9.90	11.08	14.05	18.98	20.93	21.99	25.10	29.96	32.23	32.81	32.81
500	3.65	5.57	6.16	7.76	9.22	10.34	13.16	17.75	19.59	20.60	23.53	28.32	30.57	31.34	31.34
1,000	2.85	4.34	4.85	6.11	7.26	8.14	10.46	14.12	15.57	16.44	19.19	23.52	25.69	27.10	27.10
2,000	2.07	3.08	3.73	4.48	5.37	6.06	7.72	10.57	11.71	12.63	15.36	19.15	21.34	22.85	22.85
5,000	1.30	1.88	2.44	2.70	2.96	3.28	4.56	6.15	7.14	8.00	9.94	12.57	14.38	16.20	16.20
10,000	0.81	1.30	1.72	1.92	2.10	2.35	2.91	3.82	4.47	5.04	6.41	8.54	10.40	12.07	12.07
20,000	0.51	0.76	1.04	1.18	1.36	1.56	1.94	2.38	2.83	3.12	3.96	5.59	7.17	8.98	8.98
50,000	0.26	0.38	0.51	0.61	0.68	0.76	1.04	1.27	1.56	1.69	2.20	3.05	3.92	4.94	4.94
76,822	0.17	0.27	0.35	0.41	0.46	0.54	0.71	0.88	1.08	1.24	1.54	2.24	2.95	3.69	3.69

SPAS #1569 DAD Curves Zone 1
July 18-20, 1997

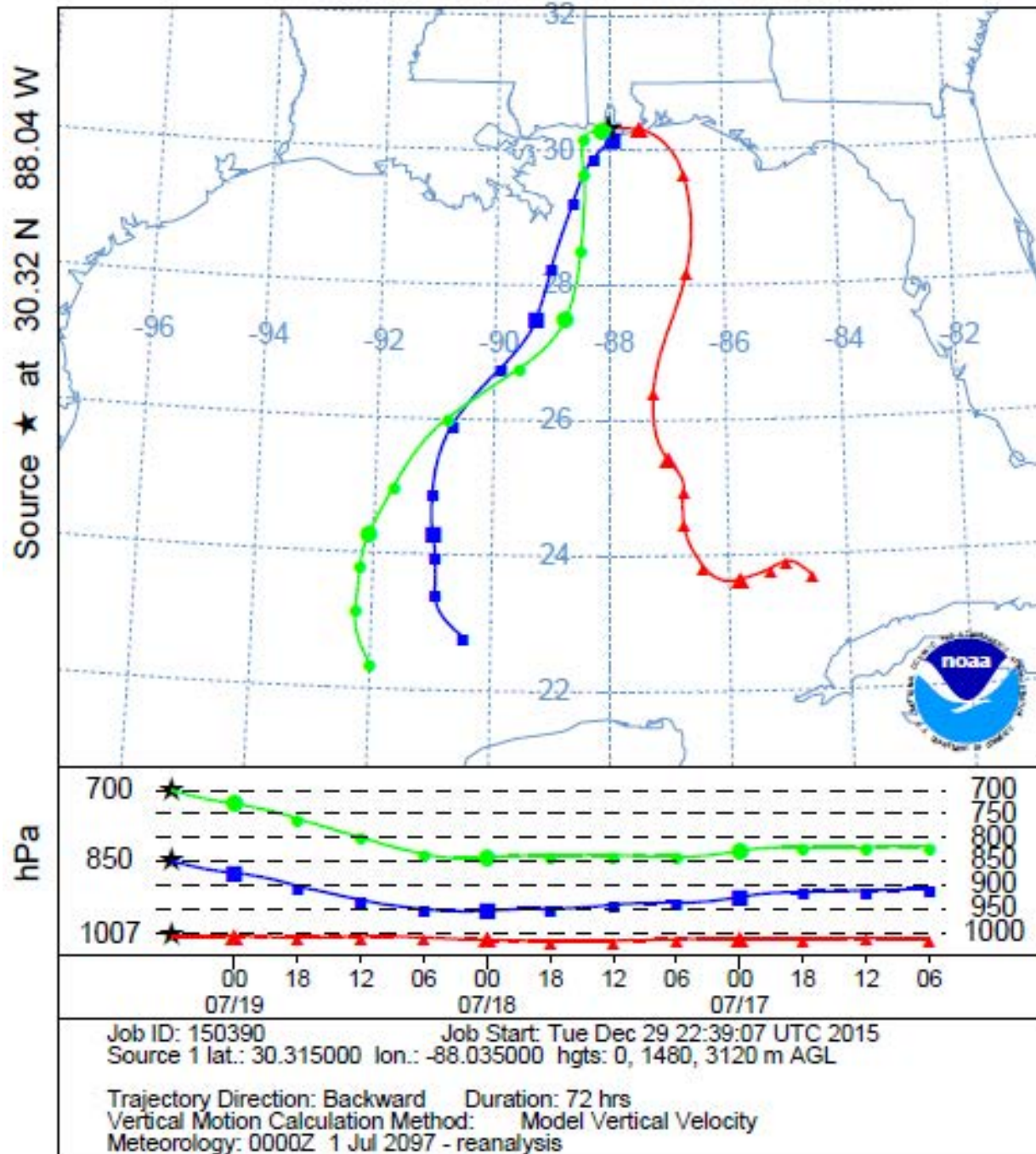




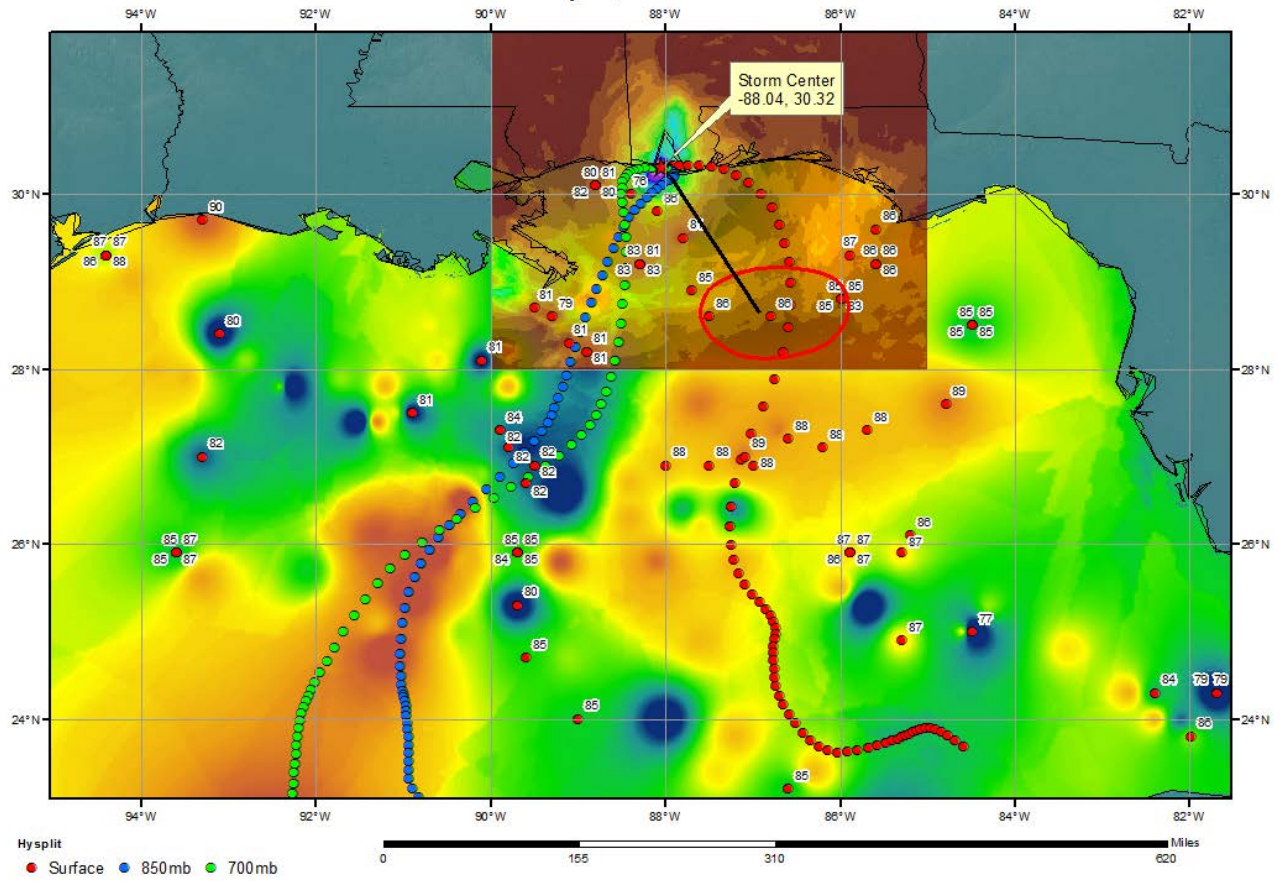


12/20/2015

NOAA HYSPLIT MODEL
 Backward trajectories ending at 0600 UTC 19 Jul 97
 CDC1 Meteorological Data



SPAS 1569 Hurricane Danny Storm Analysis July 18, 1997



Storm Precipitation Analysis System (SPAS) For Storm #1593_1

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

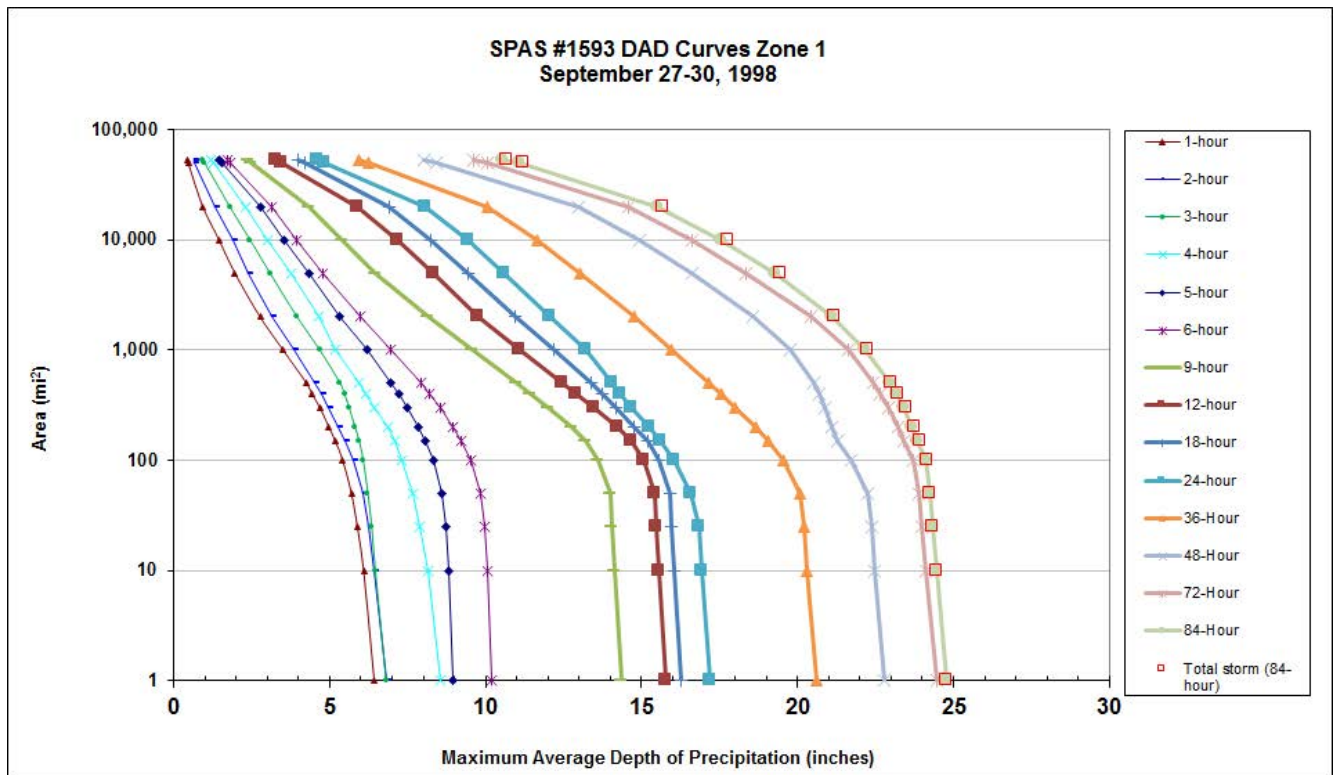
Depth-Area-Duration (DAD) analysis: Yes

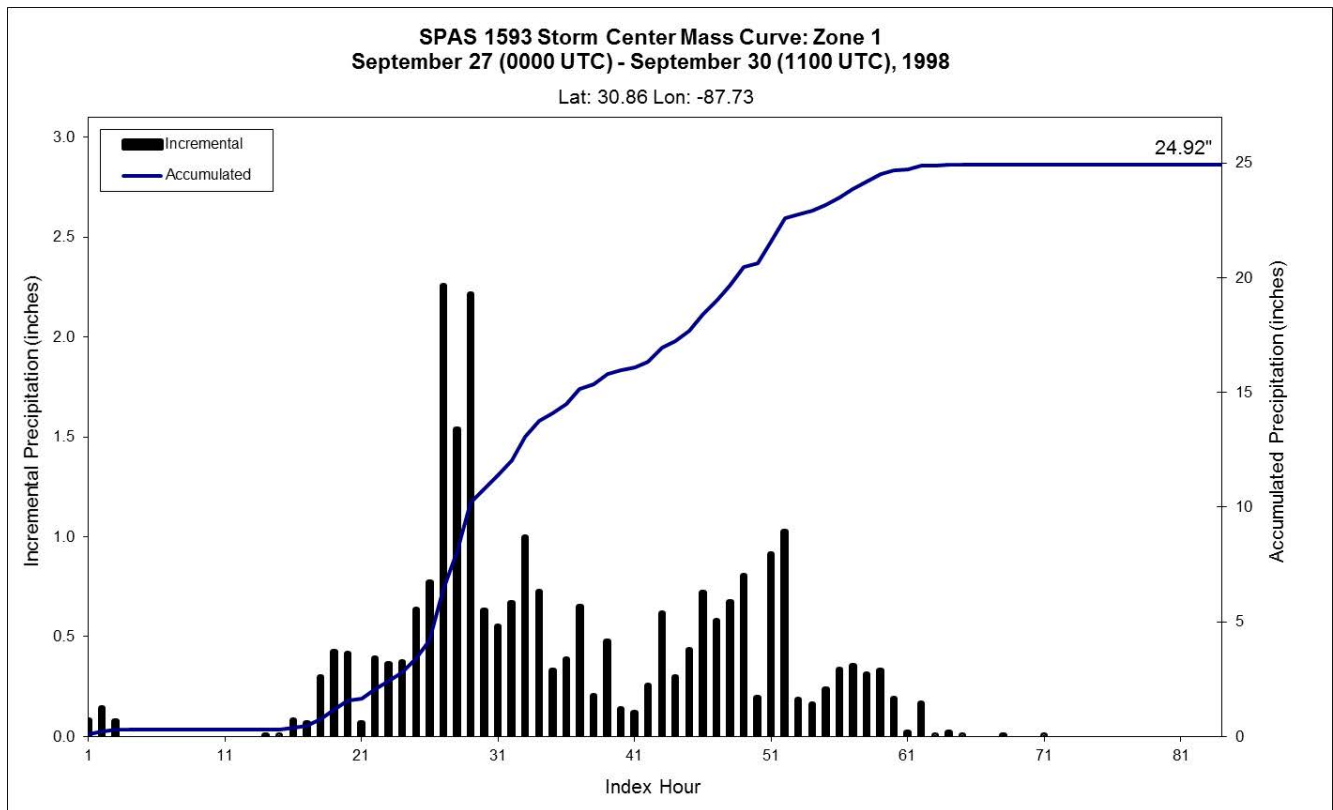
Reliability of Results: This analysis was based on hourly data (H), hourly estimated pseudo data (HEP), hourly pseudo data (HP), daily data (D) and supplemental data (S). We have a high degree of confidence in the station based storm total results, the spatial pattern is dependent on basemap which is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

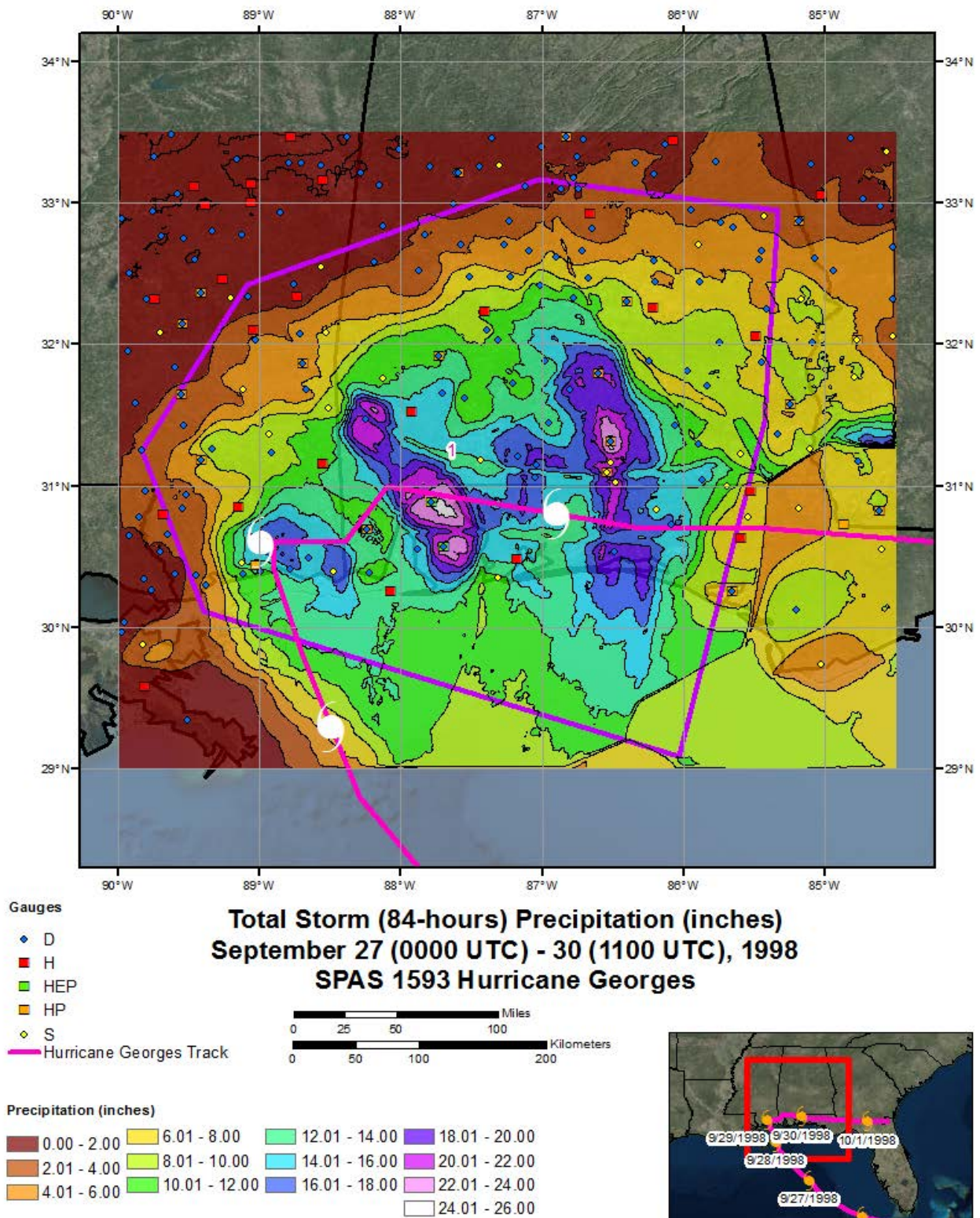
SPAS Storm ID	LON	LAT	ELEV	ELEV Round	Storm Rep. Dew Point					Climatological Max. Dew Point						IPMF
					T _d	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	T _d	T _d Round	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	
1593_1	-87.725	30.855	220	200	82.50	4.03	0.06	87	3.970	85.86	86.0	4.67	0.07	94	4,600	1.159

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	9	12	18	24	36	48	72	84	Total
0.4	6.52	6.90	6.91	8.66	9.03	10.27	14.43	15.85	16.35	17.27	20.69	22.89	24.59	24.92	24.92
1	6.43	6.80	6.80	8.55	8.97	10.21	14.35	15.77	16.27	17.18	20.59	22.78	24.45	24.79	24.79
10	6.09	6.44	6.46	8.14	8.81	10.04	14.15	15.56	16.05	16.94	20.32	22.49	24.11	24.46	24.48
25	5.89	6.25	6.34	7.89	8.75	9.97	14.07	15.48	15.96	16.85	20.21	22.37	23.98	24.34	24.35
50	5.70	6.06	6.22	7.66	8.58	9.83	13.99	15.42	15.90	16.57	20.09	22.26	23.88	24.24	24.26
100	5.42	5.75	6.07	7.31	8.31	9.53	13.61	15.06	15.57	16.03	19.56	21.71	23.70	24.12	24.17
150	5.18	5.51	5.94	7.09	8.05	9.22	13.20	14.65	15.19	15.60	19.07	21.26	23.42	23.85	23.93
200	4.98	5.28	5.81	6.85	7.82	8.95	12.77	14.23	14.78	15.25	18.65	21.09	23.22	23.67	23.74
300	4.69	4.98	5.62	6.44	7.49	8.55	12.02	13.47	14.17	14.68	18.01	20.87	22.93	23.42	23.48
400	4.44	4.73	5.47	6.14	7.21	8.21	11.45	12.91	13.74	14.32	17.53	20.71	22.63	23.17	23.24
500	4.26	4.53	5.33	5.92	6.96	7.92	10.99	12.46	13.39	14.05	17.16	20.51	22.41	22.95	23.02
1,000	3.51	3.84	4.68	5.18	6.20	6.97	9.56	11.08	12.17	13.19	15.94	19.76	21.62	22.18	22.25
2,000	2.77	3.14	3.95	4.67	5.33	5.99	8.17	9.74	10.96	12.07	14.77	18.55	20.42	21.09	21.20
5,000	1.96	2.38	3.08	3.75	4.33	4.80	6.47	8.33	9.42	10.60	13.04	16.61	18.33	19.26	19.45
10,000	1.45	1.88	2.44	3.00	3.52	3.93	5.40	7.17	8.22	9.45	11.66	14.92	16.62	17.53	17.77
20,000	0.93	1.34	1.79	2.29	2.80	3.12	4.33	5.87	6.89	8.08	10.07	12.98	14.58	15.49	15.71
50,000	0.46	0.68	0.98	1.26	1.56	1.79	2.48	3.44	4.19	4.84	6.24	8.40	10.05	11.07	11.20
62,972	0.44	0.64	0.92	1.20	1.47	1.70	2.38	3.28	4.00	4.61	5.94	8.01	9.60	10.55	10.68

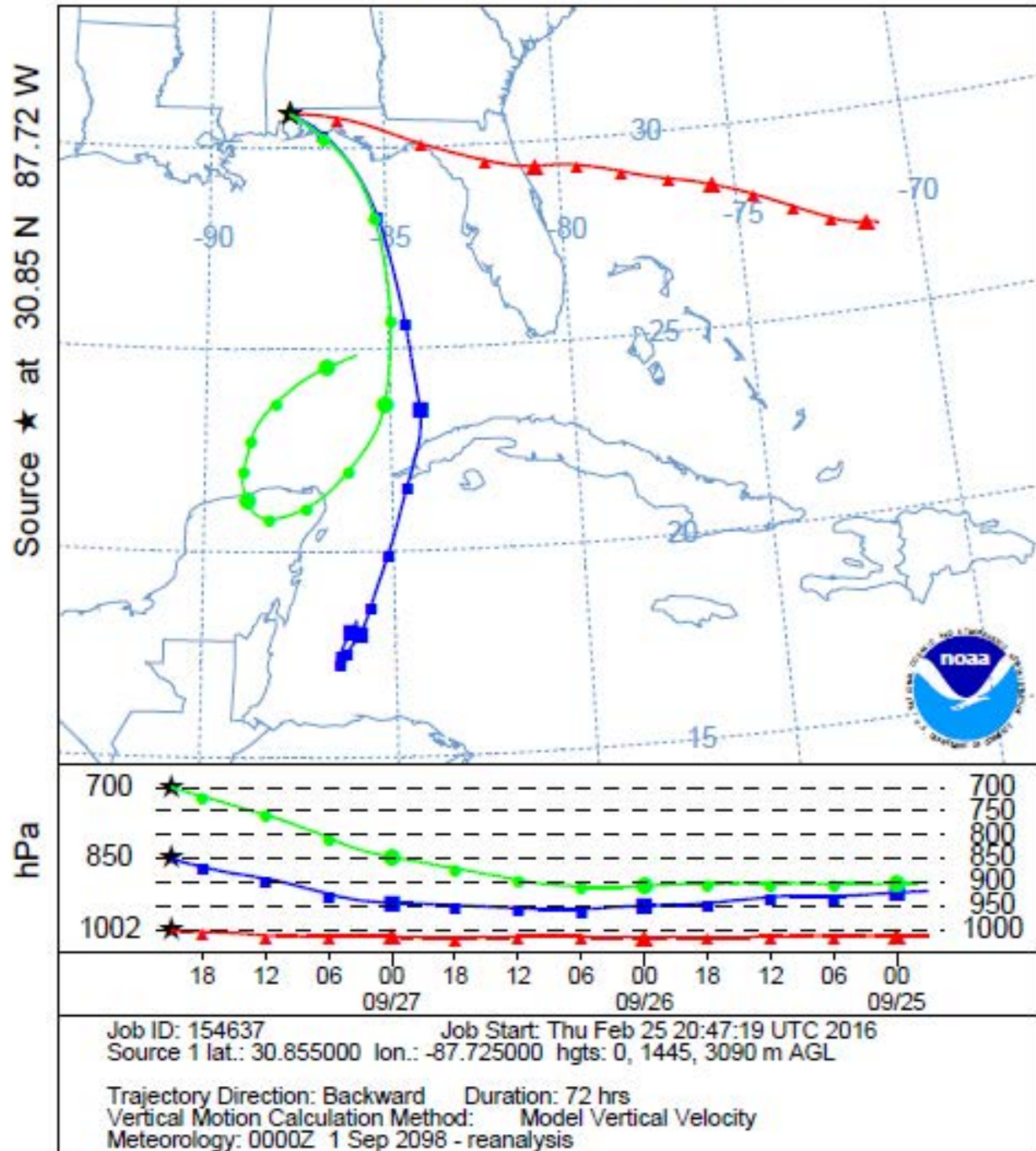




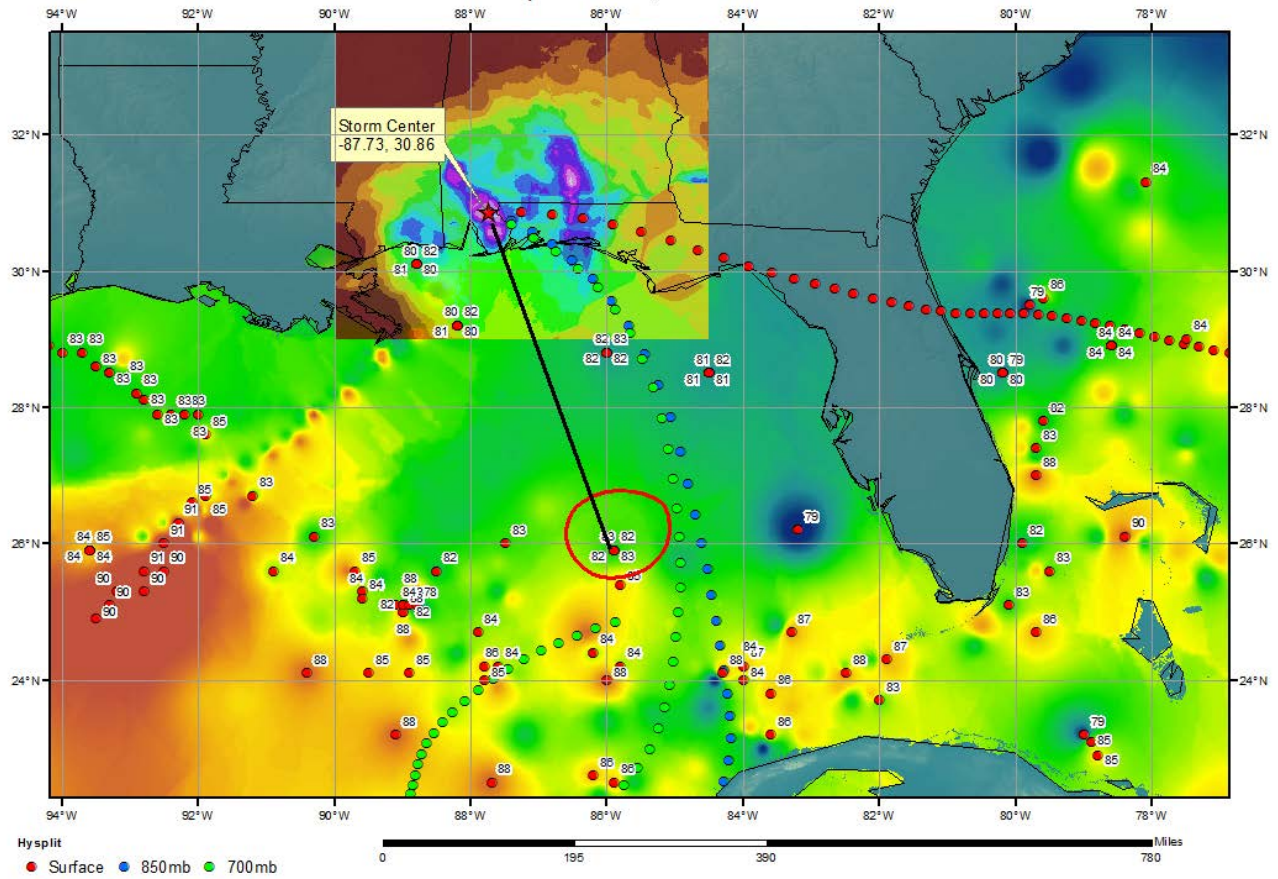


1/5/2016

NOAA HYSPLIT MODEL
 Backward trajectories ending at 2100 UTC 27 Sep 98
 CDC1 Meteorological Data



SPAS 1593 Hurricane Georges Storm Analysis
September 27, 1998



Storm Precipitation Analysis System (SPAS) For Storm #1464_1

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.

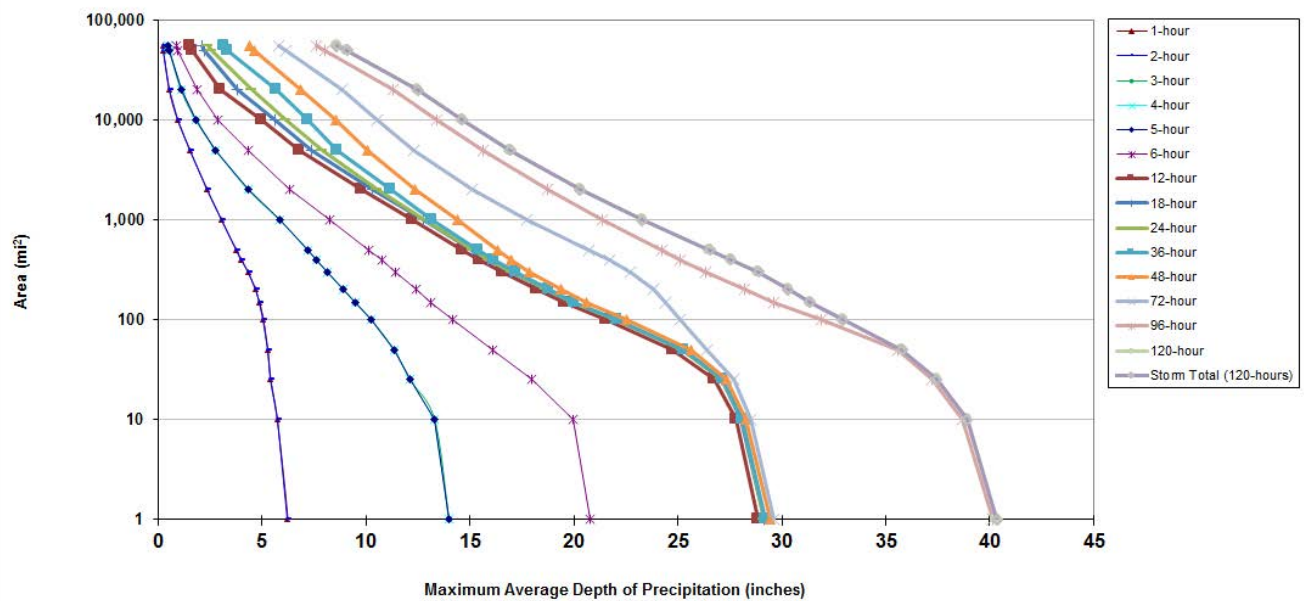
					Storm Rep. Dew Point					Climatological Max. Dew Point						
SPAS Storm ID	LON	LAT	ELEV	ELEV Round	T _d	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	T _d	T _d Round	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	IPMF
1464 1	-95.275	29.755	53	100	82.50	4.03	0.03	87	4.000	84.54	84.5	4.39	0.04	91	4.350	1.088

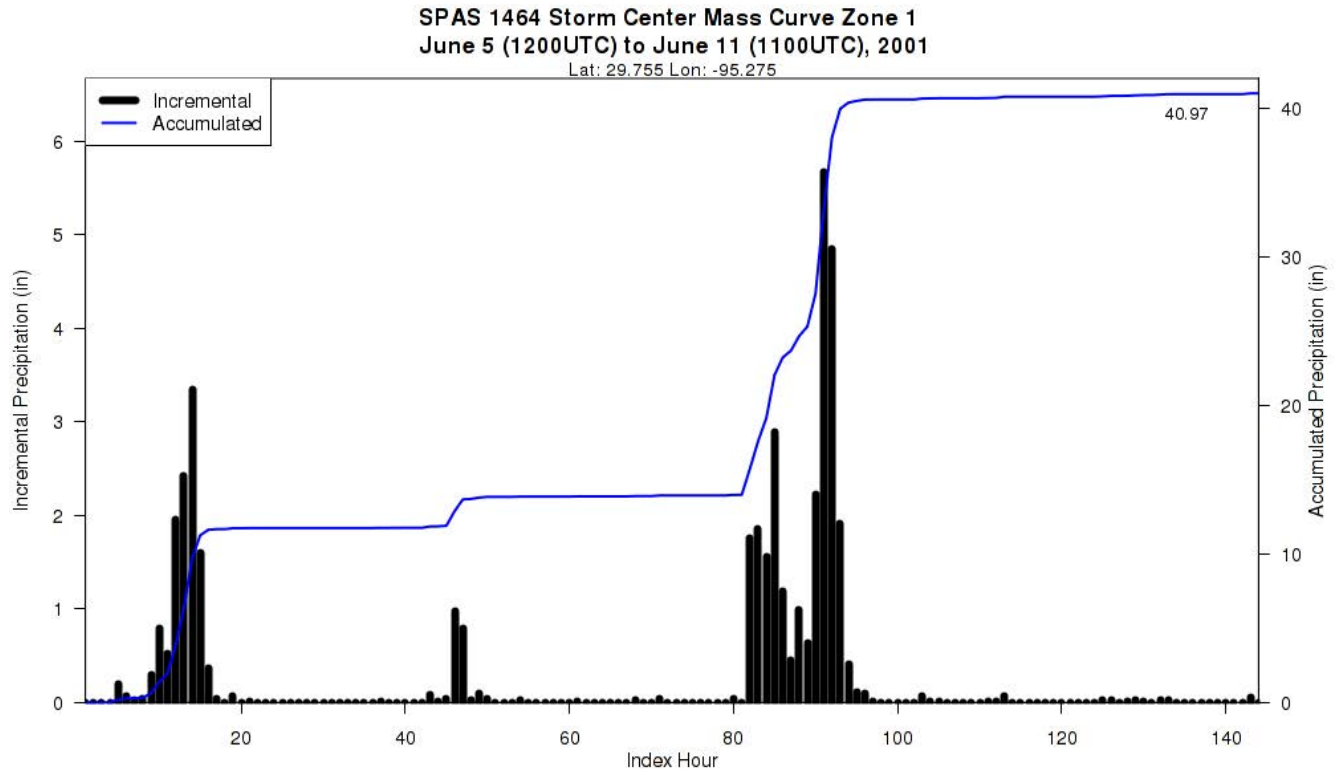
Storm 1464 - June 5 (1200 UTC) - June 11 (1100 UTC), 2001

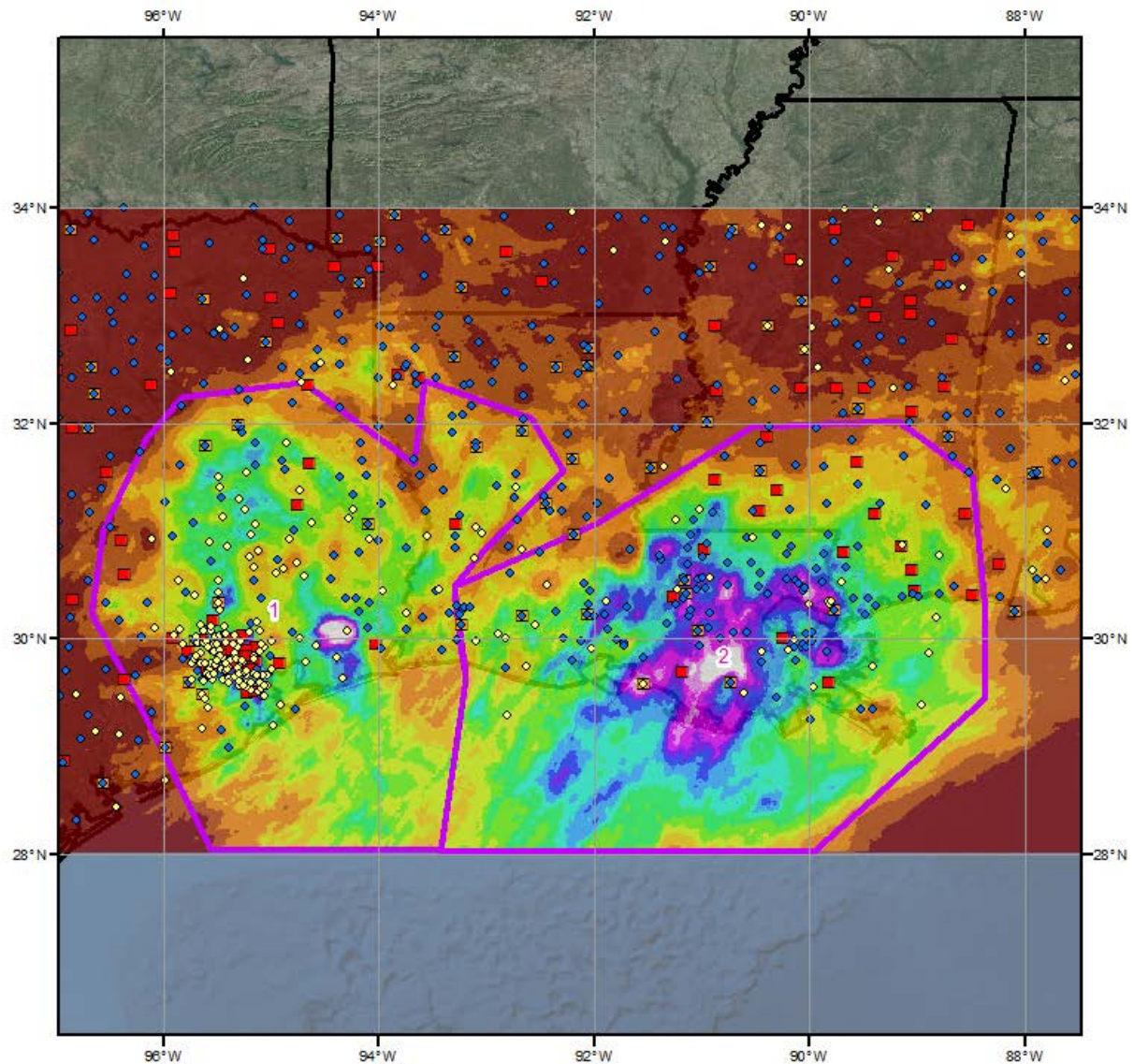
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)

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
150	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

SPAS #1464 DAD Curves Zone 1
June 5-11, 2001







Total Storm (144-hours) Precipitation (inches)
June 5 (1200 UTC) - June 11 (11 UTC), 2001
SPAS #1464 TS Allison

0 45 90 180 Miles

Gauges

- ◆ Daily
- Hourly
- Hourly Pseudo
- ◇ Supplemental

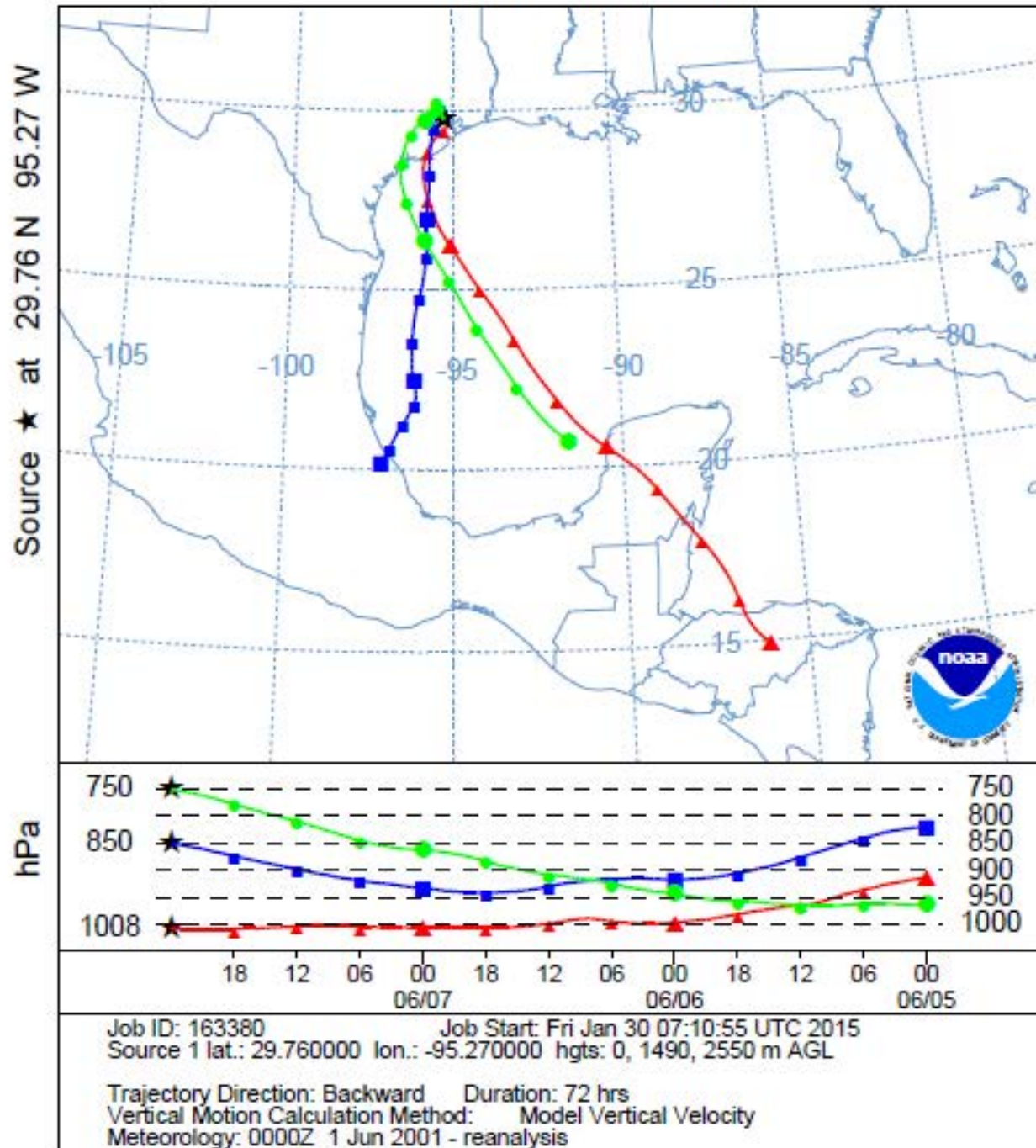
Precipitation

0 - 2	8.000000001 - 10	18.000000001 - 20
2.000000001 - 4	10.000000001 - 12	20.000000001 - 22
4.000000001 - 6	12.000000001 - 14	22.000000001 - 24
6.000000001 - 8	14.000000001 - 16	24.000000001 - 26
	16.000000001 - 18	26.000000001 - 28

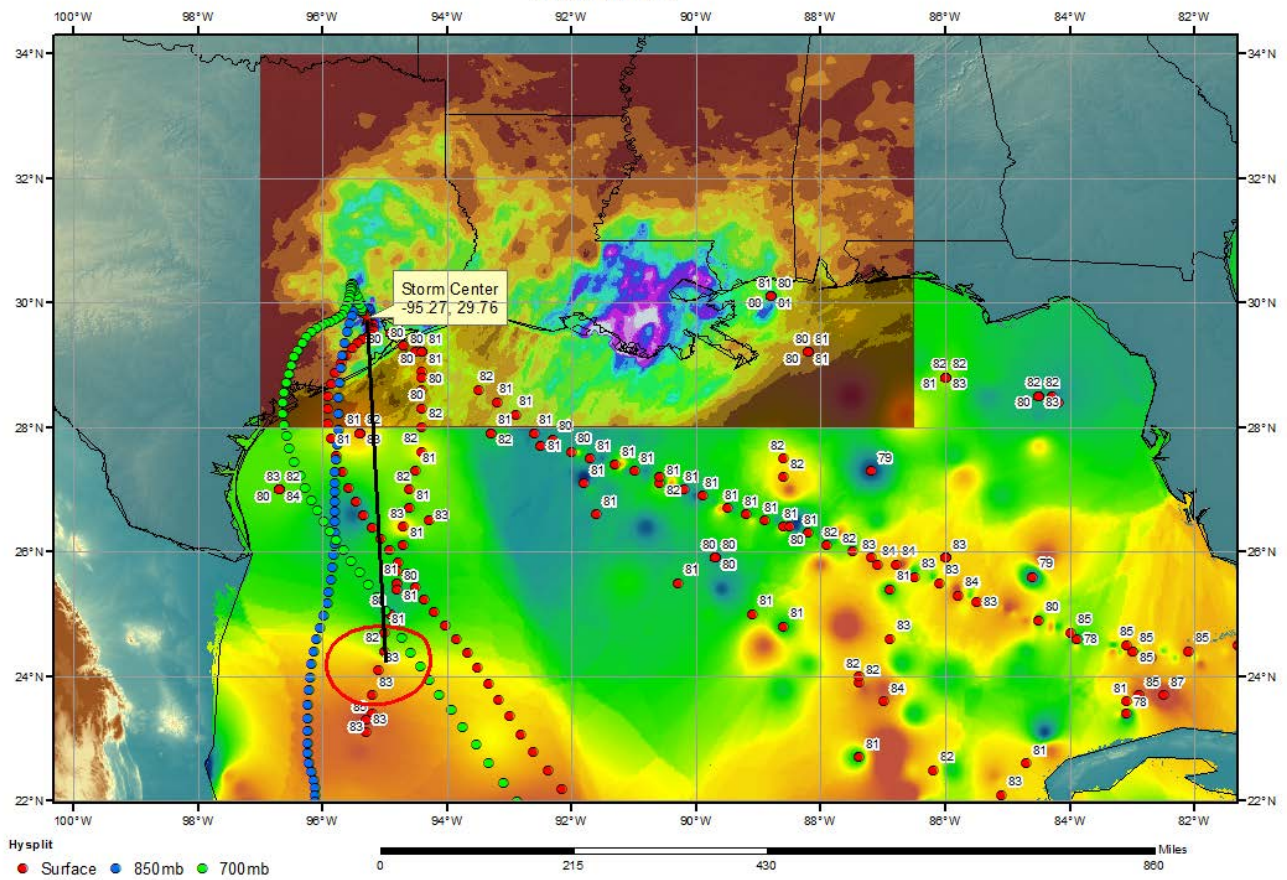


2/11/2015

NOAA HYSPLIT MODEL
Backward trajectories ending at 0000 UTC 08 Jun 01
CDC1 Meteorological Data



SPAS 1464 TS Allison Storm Analysis Zone 1
June 8, 2001



Storm Precipitation Analysis System (SPAS) For Storm #1631_1

General Storm Location: Louisiana (32.0, -93.6, 28.5, -89.0)

Storm Dates: August 10 (0700 UTC) – August 14 5 (0600 UTC), 2016 (96-hours)

Event: Synoptic

DAD Zone 1

Latitude: 30.555

Longitude: -90.965

Max. Grid Rainfall Amount: 34.65"

Max. Observed Rainfall Amount: 31.39"

Number of Stations: 278

SPAS Version: 10.0

Basemap: conus_prism_ppt_in_1981_2010_06 and P_default

Spatial resolution: 00:00:36

Radar Included: Yes

Depth-Area-Duration (DAD) analysis: Yes

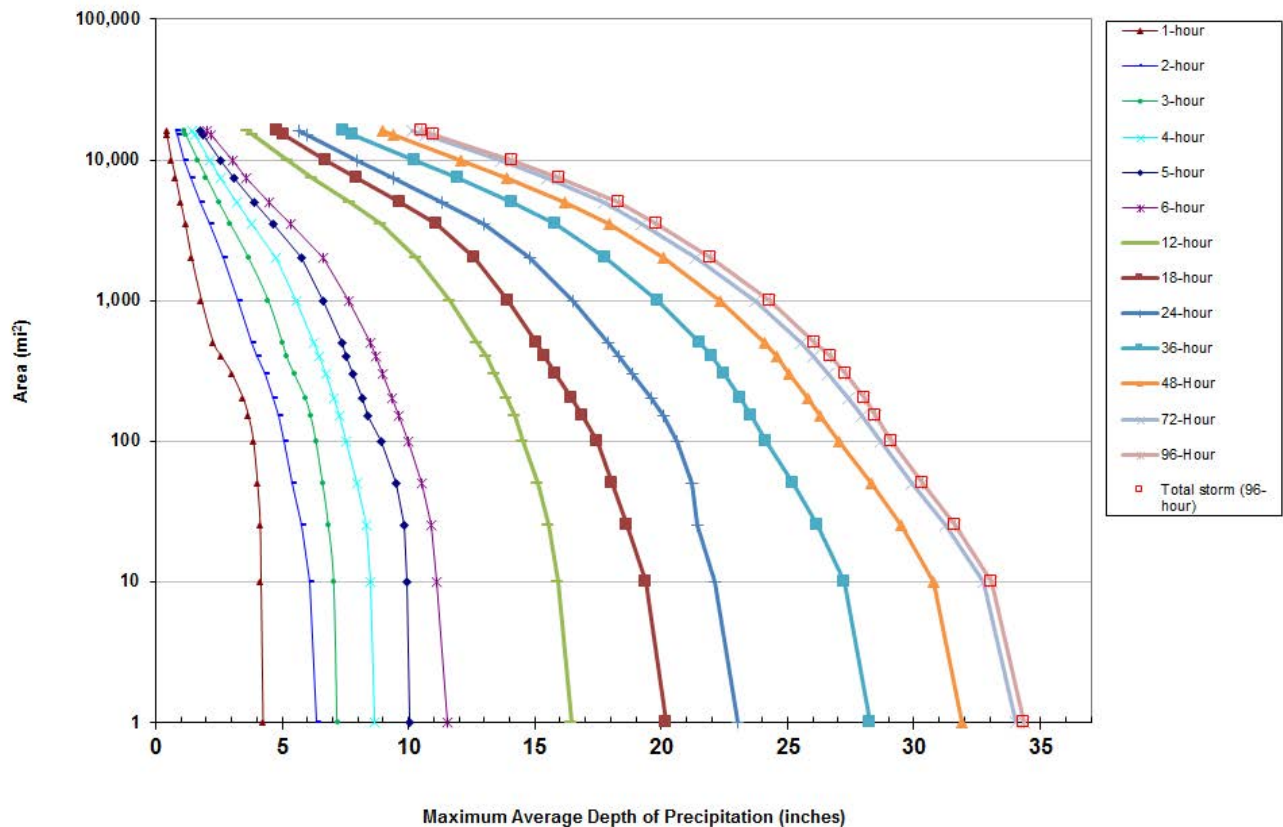
Reliability of results: This analysis was based on hourly data (H), hourly estimated pseudo data (HEP), hourly pseudo data (HP), daily data (D), supplemental data (S) and supplemental estimated data (SE). We have a high degree of confidence in the station based storm total results, the spatial pattern is dependent on basemap (especially weighting) 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 but often had different timing than observed hourly data.

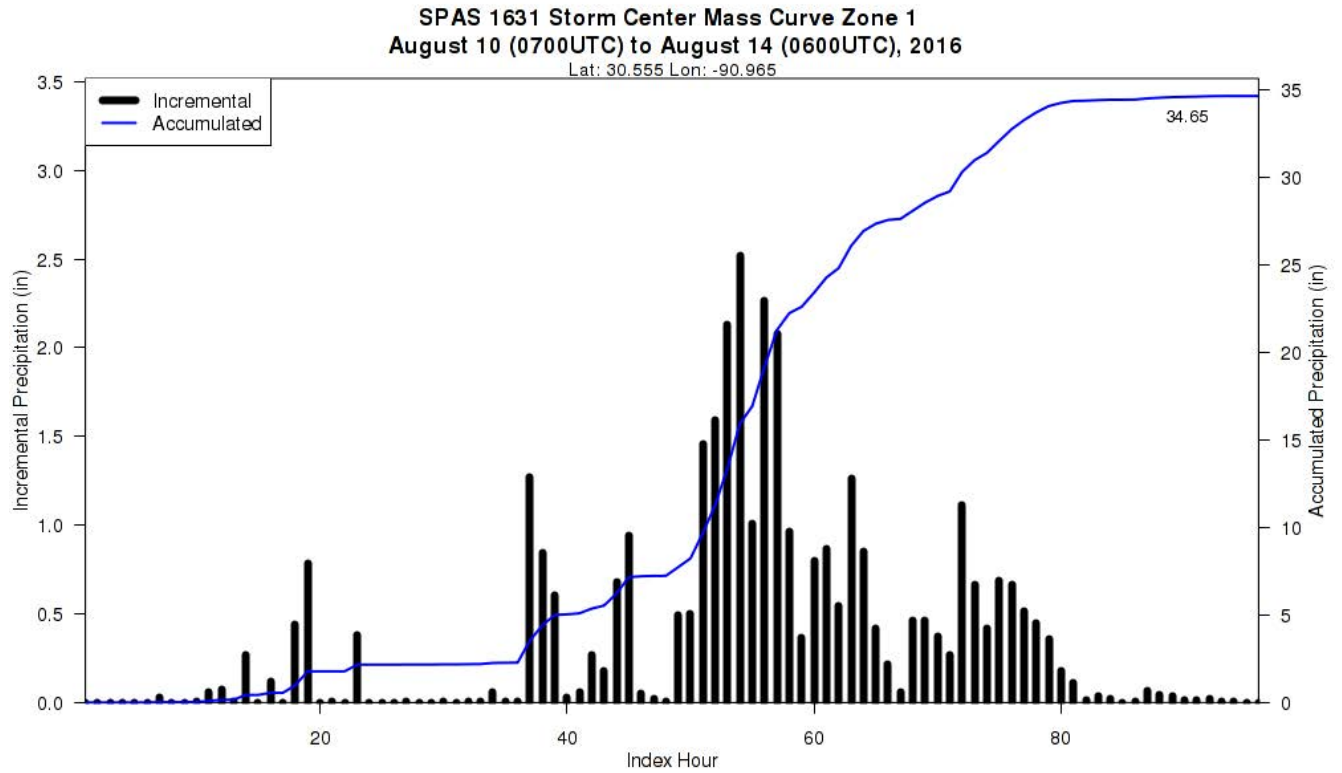
SPAS Storm ID	LON	LAT	ELEV	ELEV Round	Storm Rep. Dew Point					Climatological Max. Dew Point						IPMF
					T _d	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	T _d	T _d Round	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	
1631_1	-90.965	30.555	50	100	86.50	4.77	0.04	95	4.730	87.50	87.5	4.96	0.04	97	4.920	1.040

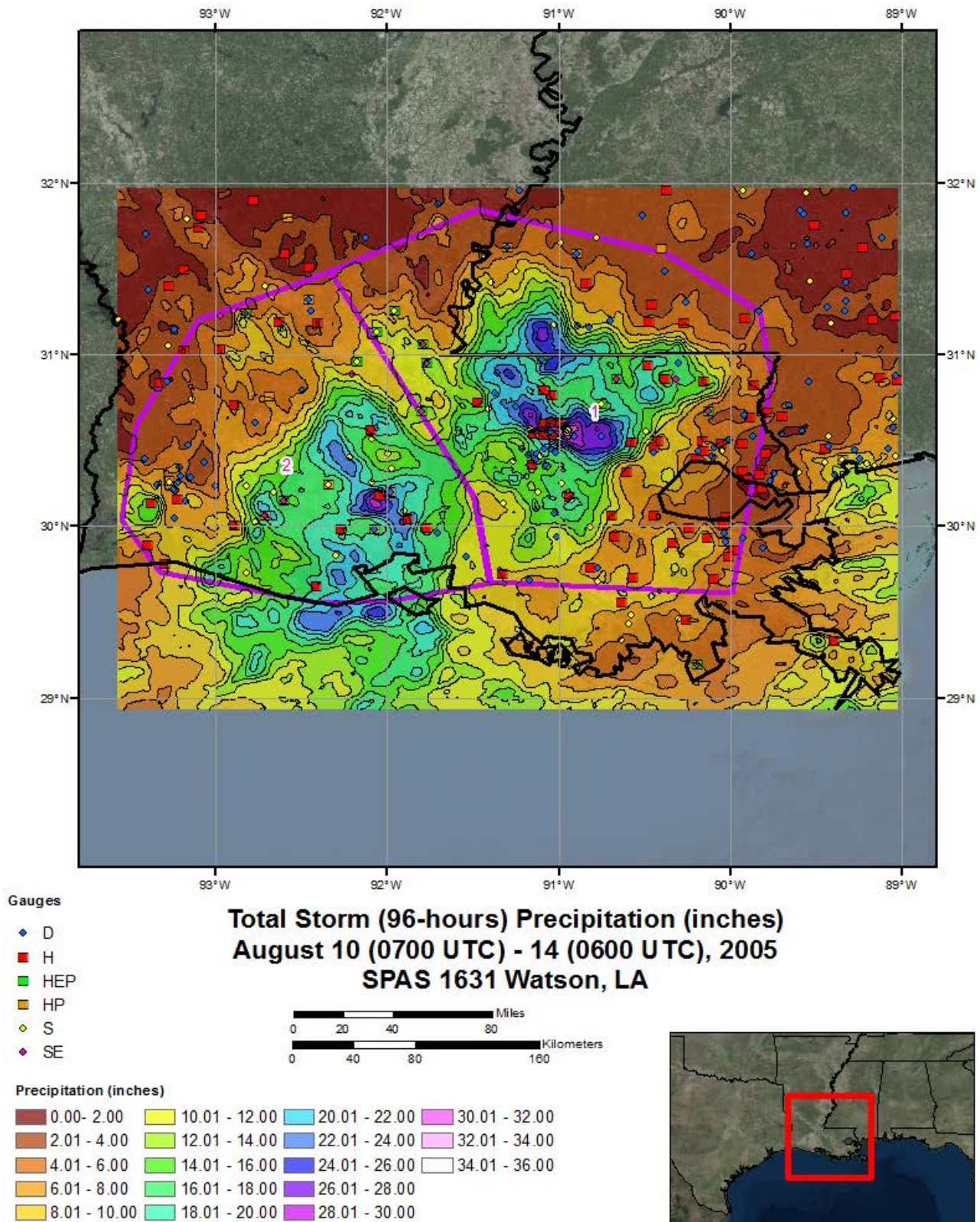
Storm 1631 Zone 1 - Aug. 10 (0700 UTC) - Aug. 14 (0600 UTC), 2016
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)

areasqmi	Duration (hours)													
	1	2	3	4	5	6	12	18	24	36	48	72	96	Total
0.4	4.25	6.39	7.24	8.71	10.11	11.64	16.59	20.36	23.25	28.53	32.17	34.35	34.65	34.65
1	4.22	6.34	7.19	8.65	10.06	11.54	16.43	20.18	23.05	28.29	31.90	34.06	34.35	34.35
10	4.14	6.07	7.06	8.50	9.93	11.12	15.92	19.38	22.14	27.25	30.77	32.74	33.08	33.08
25	4.11	5.75	6.85	8.32	9.83	10.88	15.53	18.63	21.44	26.19	29.47	31.26	31.62	31.62
50	4.00	5.40	6.62	7.98	9.52	10.52	15.10	18.07	21.19	25.23	28.31	29.94	30.34	30.34
100	3.84	5.05	6.35	7.53	8.90	9.97	14.55	17.46	20.64	24.17	27.05	28.68	29.14	29.14
150	3.65	4.84	6.15	7.27	8.40	9.60	14.22	16.91	20.10	23.56	26.31	27.97	28.49	28.49
200	3.44	4.66	5.94	7.06	8.16	9.35	13.90	16.47	19.60	23.14	25.80	27.42	28.05	28.05
300	3.00	4.34	5.49	6.72	7.79	8.98	13.43	15.83	18.87	22.47	25.08	26.63	27.30	27.30
400	2.58	4.03	5.18	6.46	7.55	8.71	13.07	15.38	18.35	21.99	24.57	26.02	26.69	26.69
500	2.26	3.78	5.02	6.25	7.35	8.50	12.74	15.05	17.91	21.55	24.08	25.52	26.09	26.09
1,000	1.79	3.25	4.46	5.58	6.64	7.66	11.66	13.95	16.50	19.85	22.31	23.72	24.31	24.31
2,000	1.41	2.67	3.68	4.74	5.75	6.60	10.33	12.63	14.82	17.81	20.07	21.39	21.95	21.95
3,500	1.15	2.14	2.95	3.81	4.63	5.35	8.92	11.12	13.01	15.79	17.94	19.25	19.83	19.83
5,000	0.97	1.77	2.49	3.22	3.89	4.51	7.71	9.68	11.31	14.13	16.21	17.74	18.30	18.30
7,500	0.77	1.41	2.00	2.57	3.09	3.59	6.20	7.94	9.40	11.97	13.91	15.49	15.99	15.99
10,000	0.61	1.14	1.65	2.14	2.59	3.02	5.23	6.73	7.95	10.27	12.10	13.66	14.09	14.09
15,000	0.43	0.83	1.19	1.54	1.89	2.20	3.85	5.05	5.96	7.80	9.41	10.69	11.03	11.03
16,075	0.41	0.78	1.11	1.44	1.76	2.05	3.61	4.79	5.66	7.41	8.95	10.16	10.50	10.50

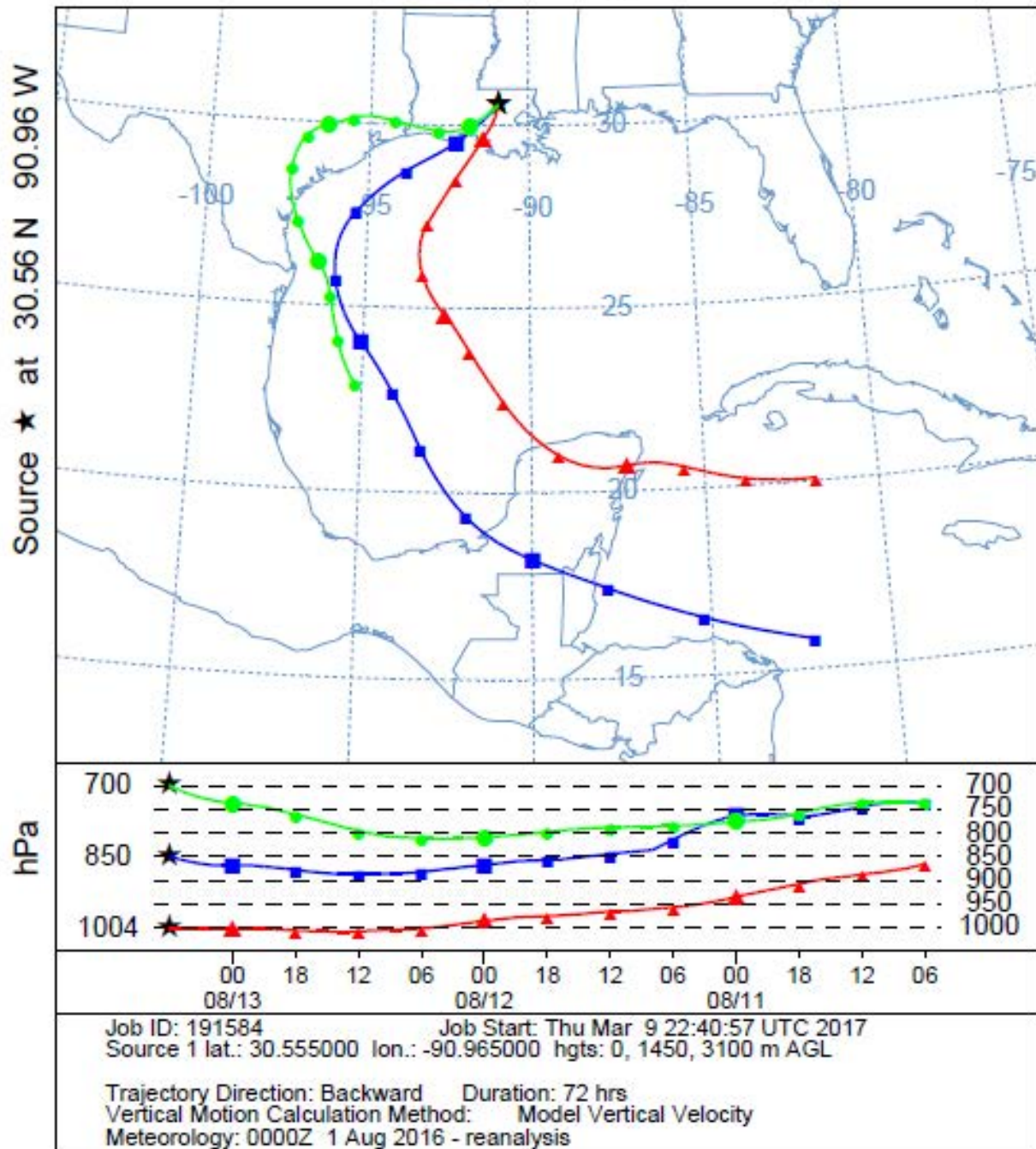
SPAS #1631 DAD Curves Zone 1
August 10-14, 2016



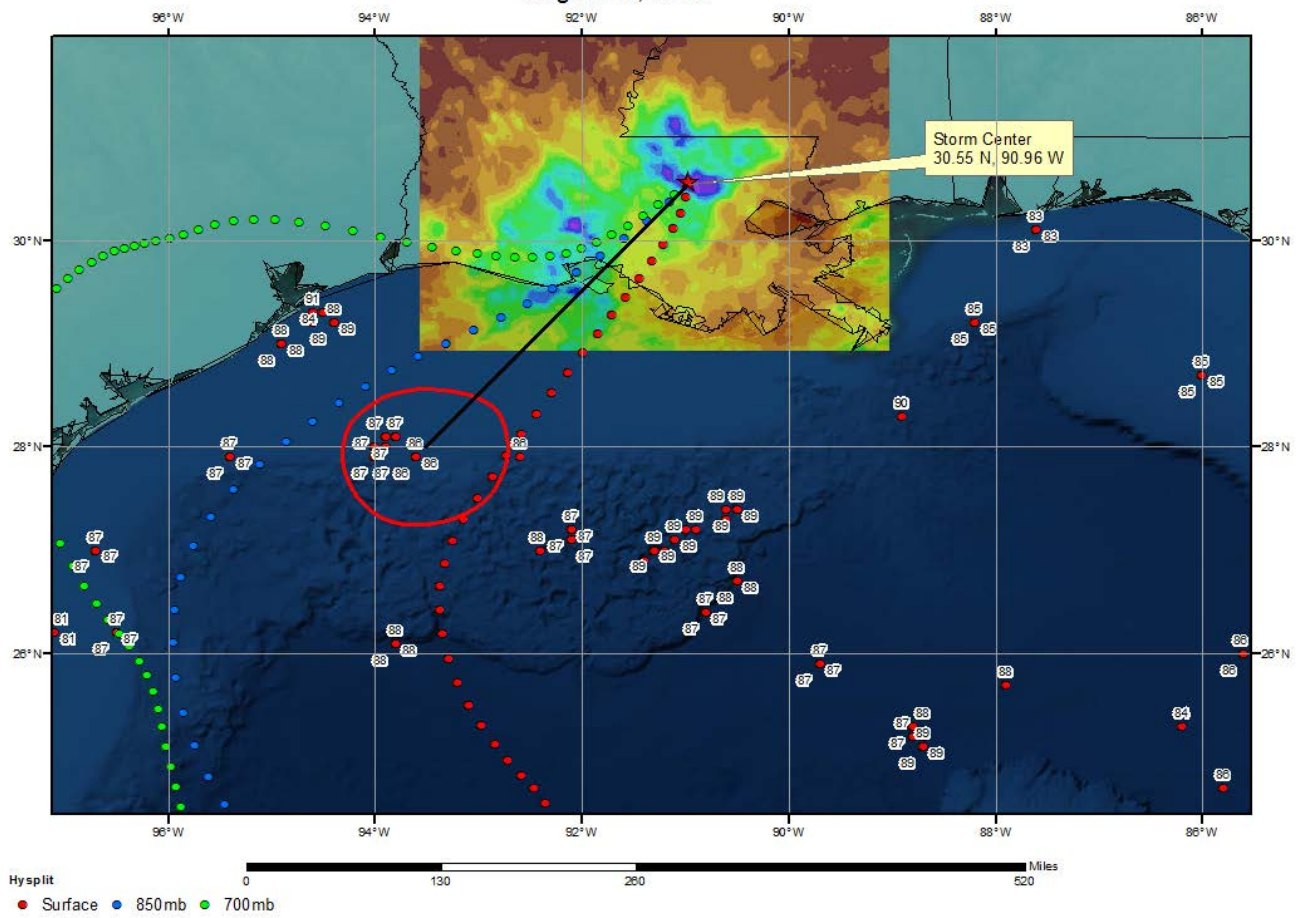




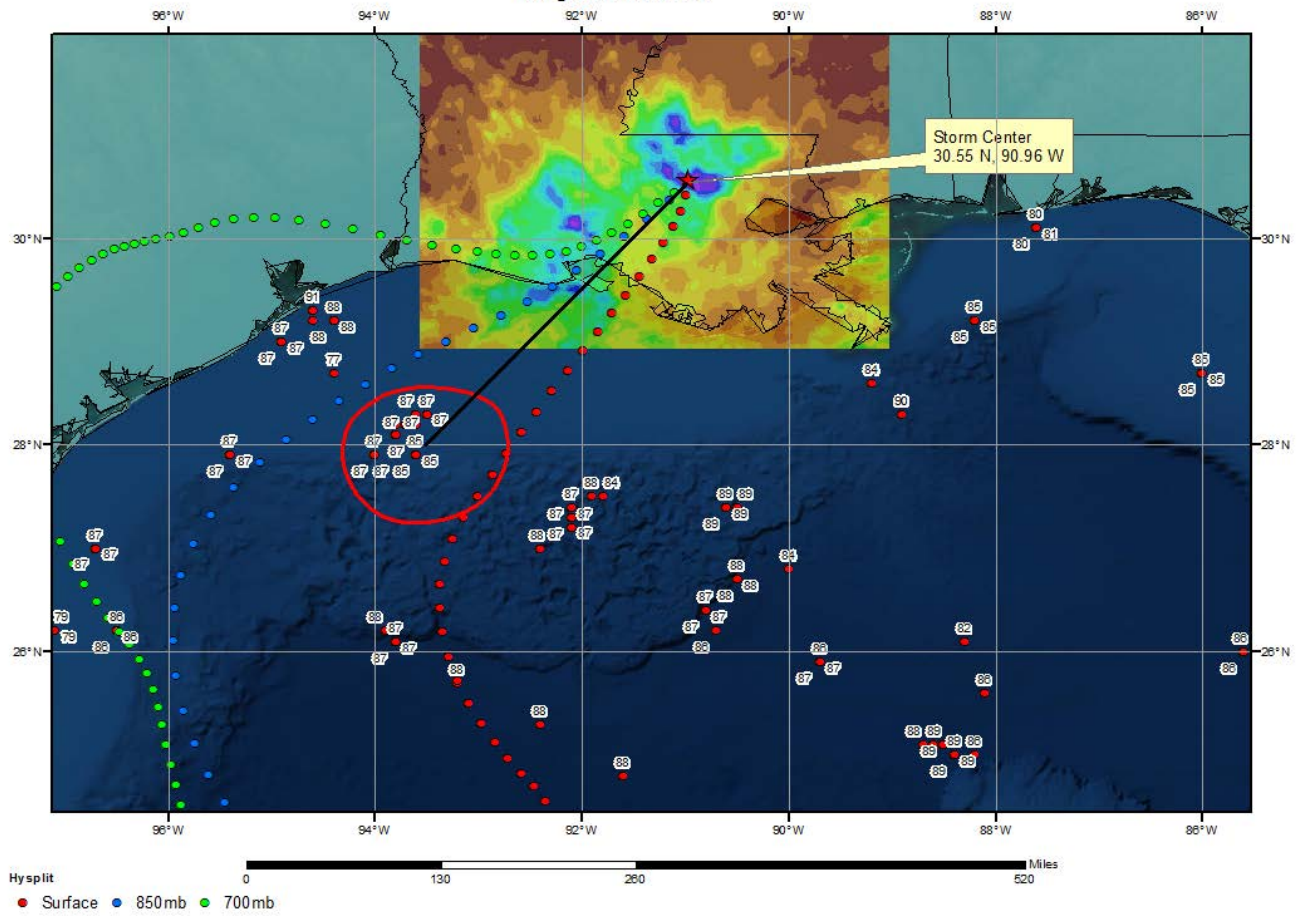
NOAA HYSPLIT MODEL
Backward trajectories ending at 0600 UTC 13 Aug 16
CDC1 Meteorological Data



SPAS 1631 Watson, LA Storm Analysis Zone 1
August 11, 2016



SPAS 1631 Watson, LA Storm Analysis Zone 1
August 12, 2016



Storm Precipitation Analysis System (SPAS) For Storm #1631_2

General Storm Location: Louisiana (32.0, -93.6, 28.5, -89.0)

Storm Dates: August 10 (0700 UTC) – August 14 5 (0600 UTC), 2016 (96-hours)

Event: Synoptic

DAD Zone 2

Latitude: 30.145

Longitude: -92.085

Max. Grid Rainfall Amount: 28.74”

Max. Observed Rainfall Amount: 19.69”

Number of Stations: 278

SPAS Version: 10.0

Basemap: conus_prism_ppt_in_1981_2010_06 and P_default

Spatial resolution: 00:00:36

Radar Included: Yes

Depth-Area-Duration (DAD) analysis: Yes

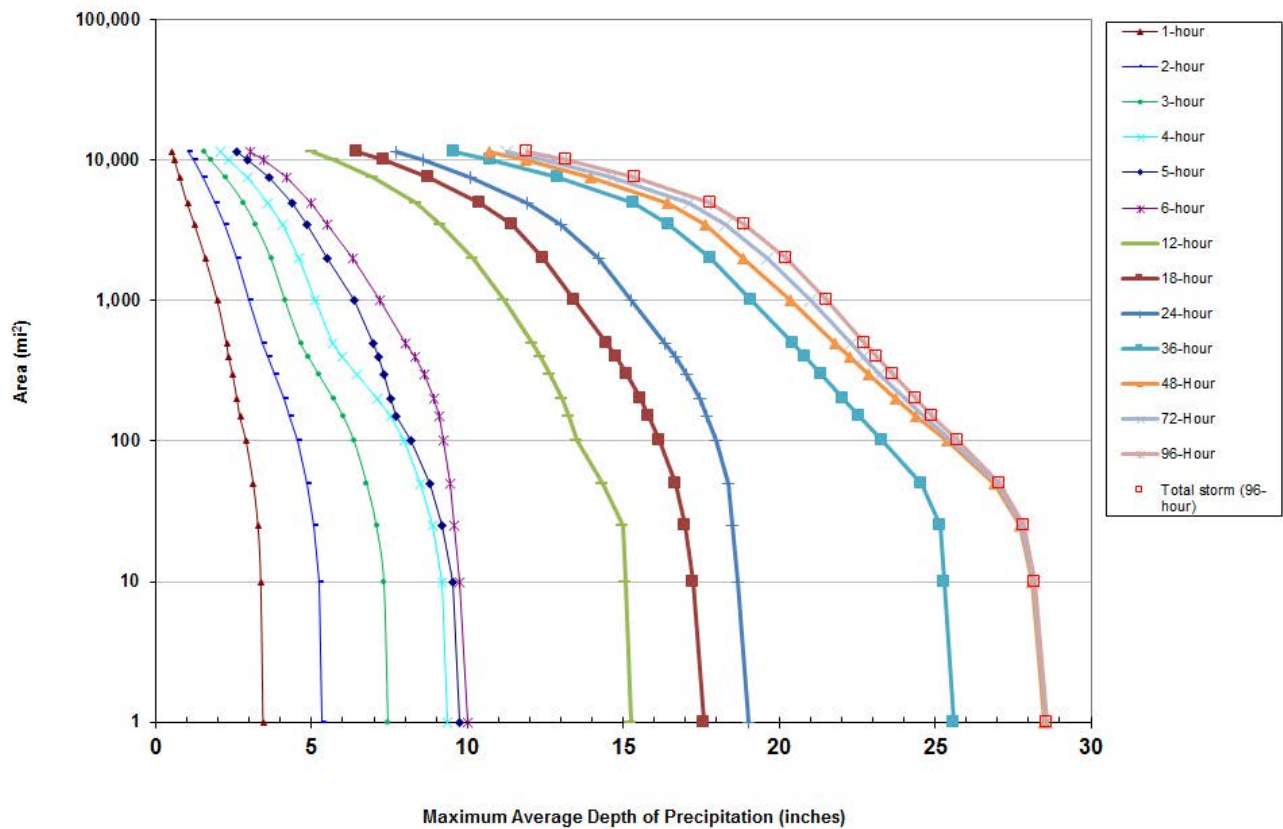
Reliability of results: This analysis was based on hourly data (H), hourly estimated pseudo data (HEP), hourly pseudo data (HP), daily data (D), supplemental data (S) and supplemental estimated data (SE). We have a high degree of confidence in the station based storm total results, the spatial pattern is dependent on basemap (especially weighting) 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 but often had different timing than observed hourly data.

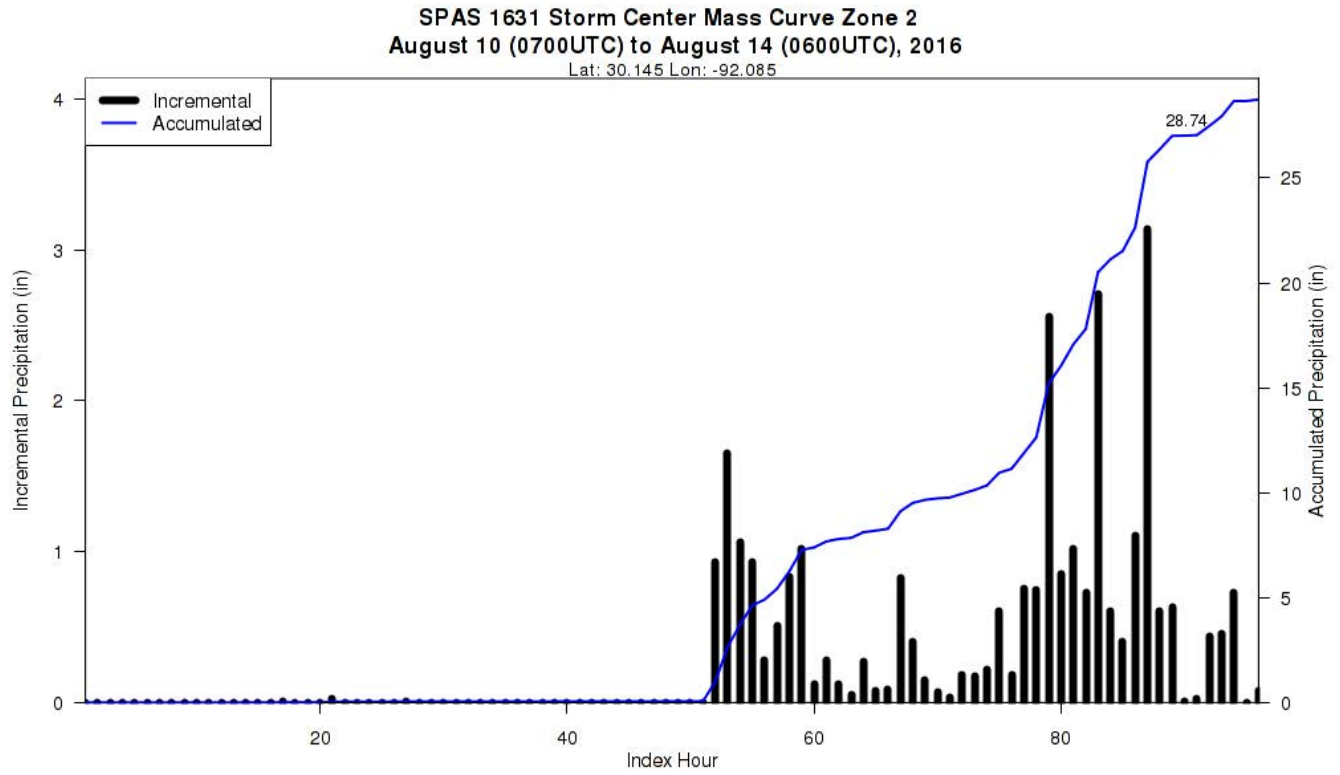
					Storm Rep. Dew Point					Climatological Max. Dew Point						
SPAS Storm ID	LON	LAT	ELEV	ELEV Round	T _d	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	T _d	T _d Round	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	IPMF
1631 2	-92.085	30.145	26	0	86.50	4.77	0.00	95	4.770	87.50	87.5	4.96	0.00	97	4.960	1.040

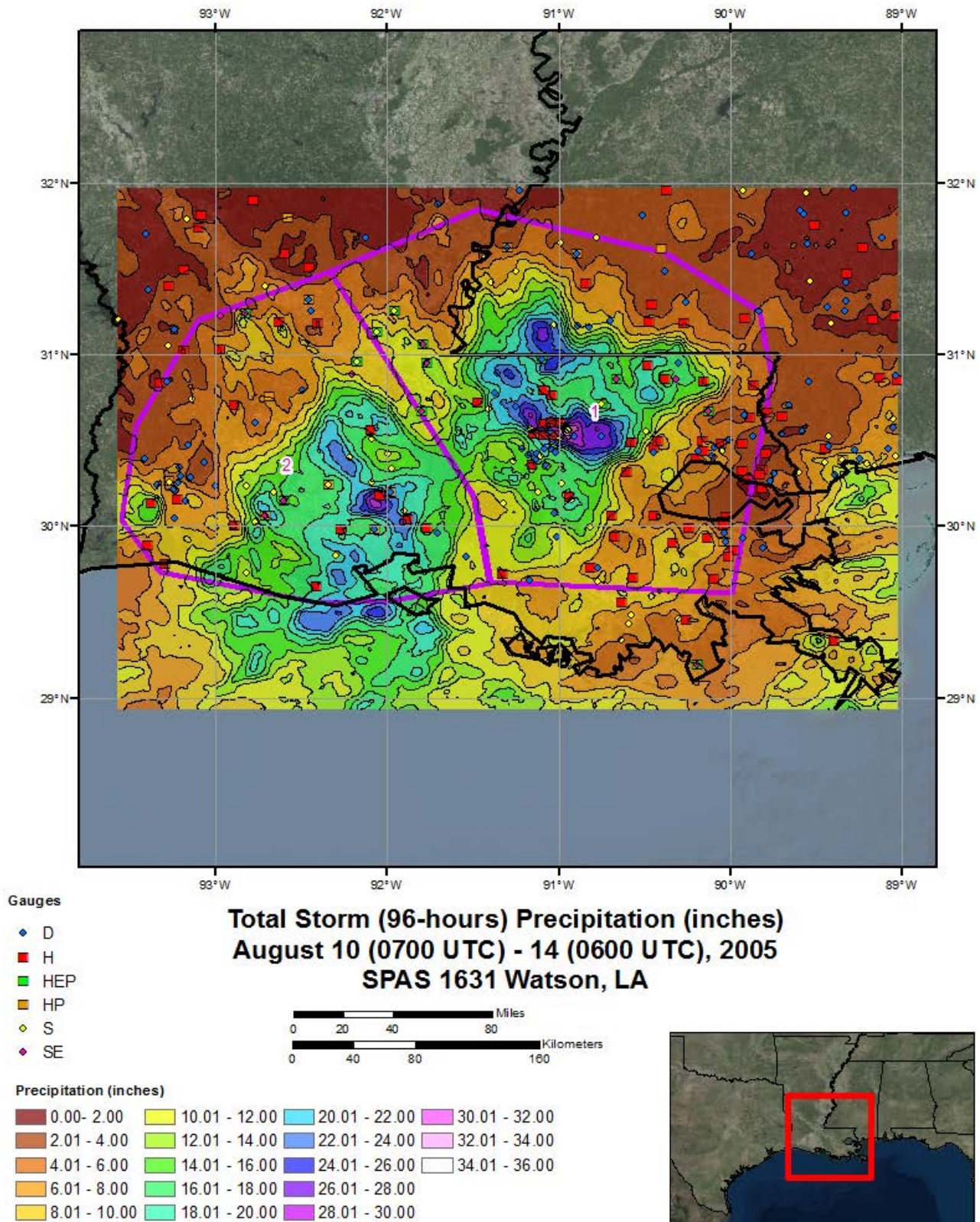
Storm 1631 Zone 2 - Aug. 10 (0700 UTC) - Aug. 14 (0600 UTC), 2016
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)

areasqmi	Duration (hours)													
	1	2	3	4	5	6	12	18	24	36	48	72	96	Total
0.4	3.48	5.38	7.51	9.41	9.81	10.07	15.30	17.73	19.16	25.73	28.68	28.70	28.74	28.74
1	3.45	5.34	7.46	9.35	9.73	10.00	15.23	17.60	19.02	25.60	28.52	28.55	28.59	28.59
10	3.38	5.23	7.33	9.18	9.51	9.73	15.07	17.25	18.66	25.28	28.12	28.17	28.20	28.20
25	3.29	5.09	7.09	8.89	9.19	9.56	14.97	17.00	18.49	25.15	27.74	27.78	27.84	27.84
50	3.14	4.85	6.78	8.50	8.79	9.43	14.33	16.68	18.35	24.57	26.92	26.97	27.08	27.08
100	2.91	4.54	6.38	7.98	8.20	9.23	13.53	16.15	17.97	23.31	25.38	25.50	25.72	25.72
150	2.71	4.30	6.03	7.52	7.69	9.08	13.26	15.82	17.69	22.57	24.39	24.63	24.92	24.92
200	2.62	4.10	5.72	7.10	7.55	8.94	13.03	15.55	17.44	22.06	23.73	24.03	24.38	24.38
300	2.48	3.80	5.24	6.46	7.34	8.63	12.65	15.11	17.02	21.37	22.86	23.24	23.64	23.64
400	2.35	3.59	4.91	6.00	7.15	8.30	12.33	14.76	16.66	20.85	22.25	22.70	23.14	23.14
500	2.28	3.43	4.66	5.66	6.98	8.01	12.07	14.46	16.32	20.44	21.77	22.29	22.75	22.75
1,000	1.99	3.00	4.16	5.13	6.35	7.21	11.18	13.45	15.27	19.10	20.34	21.03	21.52	21.52
2,000	1.61	2.60	3.71	4.61	5.49	6.33	10.19	12.44	14.22	17.79	18.86	19.61	20.21	20.21
3,500	1.26	2.20	3.21	4.06	4.85	5.50	9.12	11.42	12.99	16.47	17.65	18.30	18.90	18.90
5,000	1.02	1.90	2.83	3.61	4.39	5.00	8.34	10.41	11.93	15.32	16.40	17.10	17.81	17.81
7,500	0.79	1.52	2.27	2.96	3.66	4.21	6.97	8.75	10.09	12.92	13.94	14.63	15.39	15.39
10,000	0.62	1.20	1.79	2.35	2.95	3.47	5.73	7.31	8.56	10.74	11.85	12.46	13.19	13.19
11,596	0.54	1.04	1.57	2.06	2.59	3.04	5.02	6.44	7.70	9.59	10.69	11.25	11.93	11.93

SPAS #1631 DAD Curves Zone 2
August 10-14, 2016

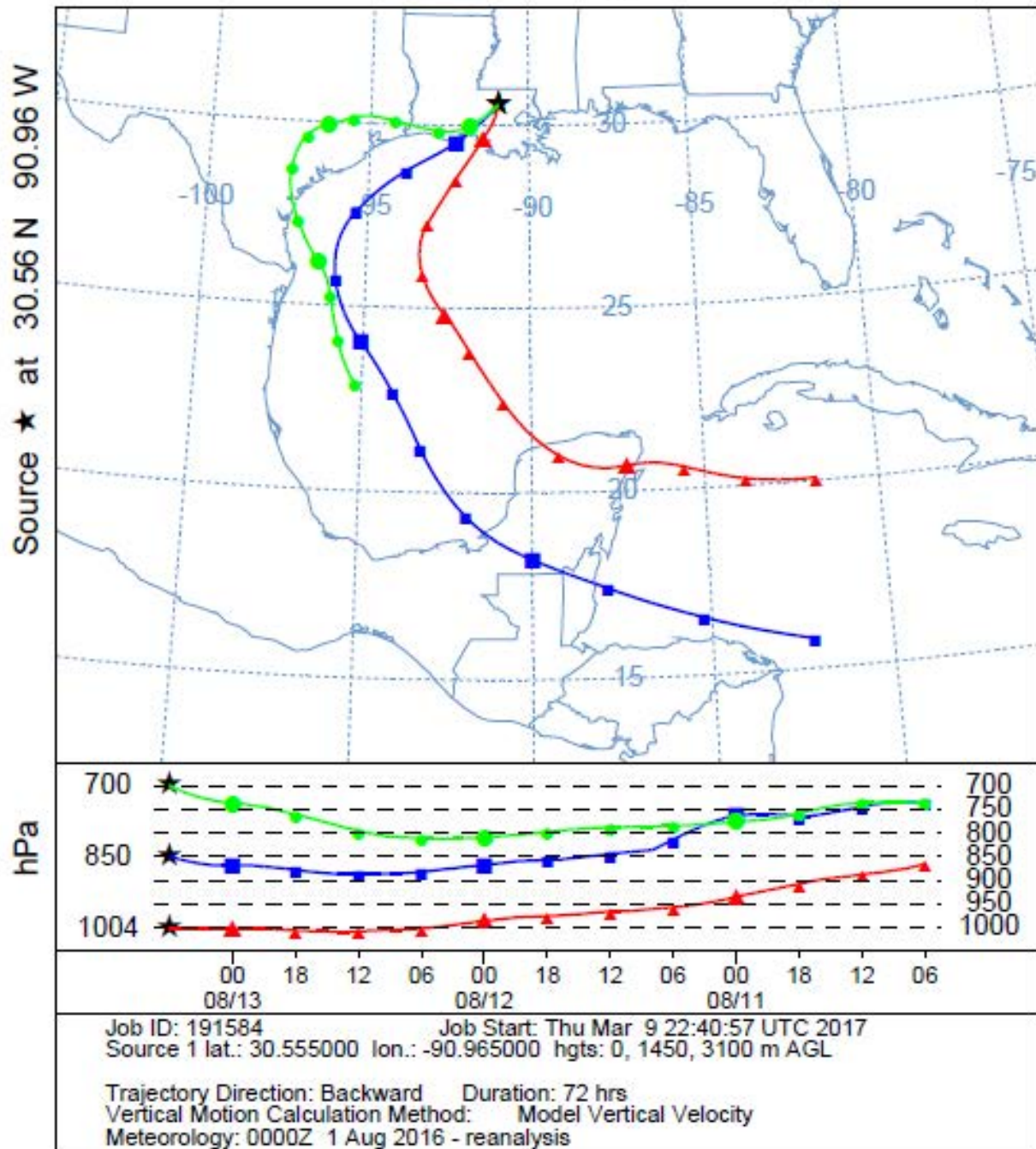




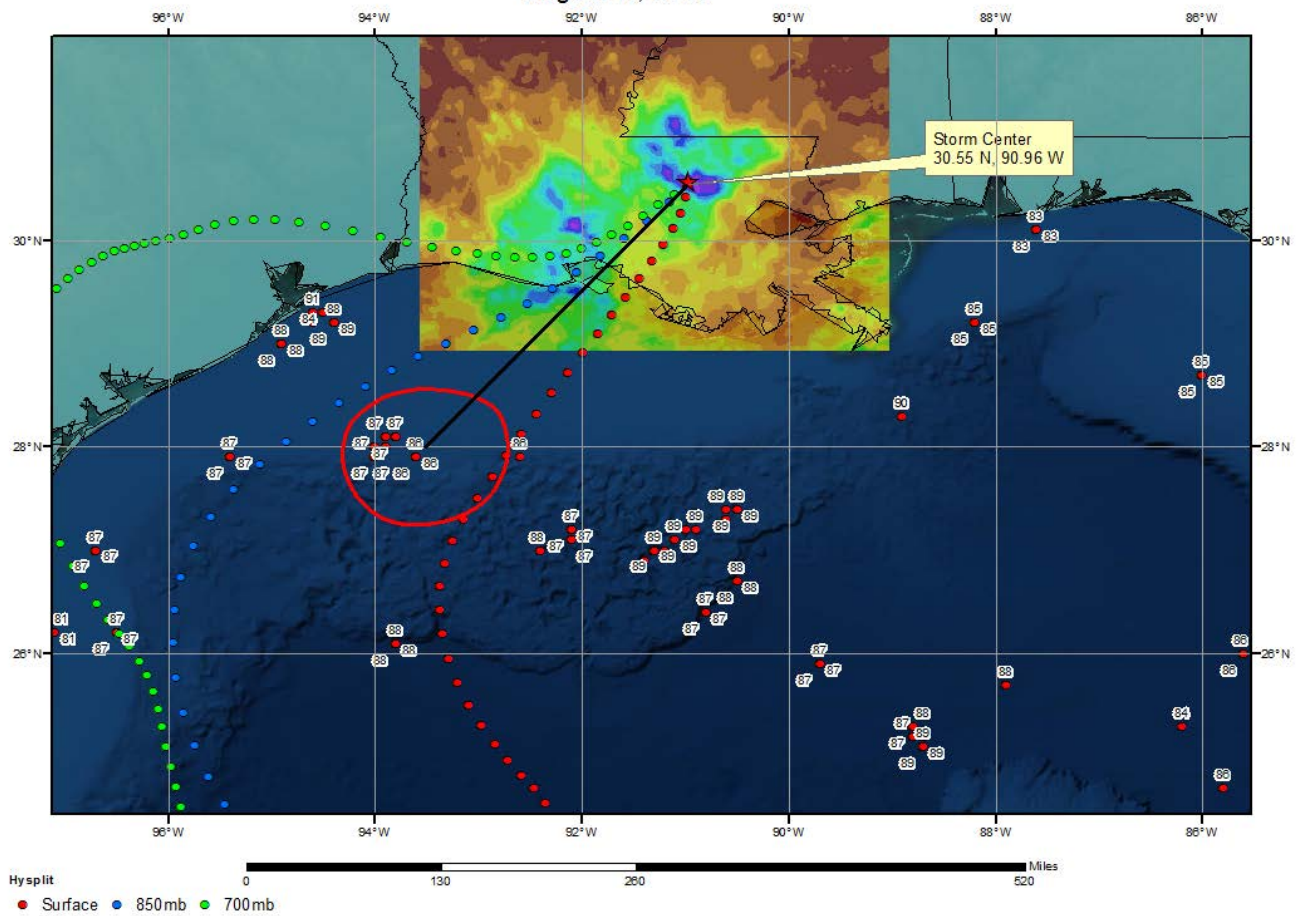


3/6/2016

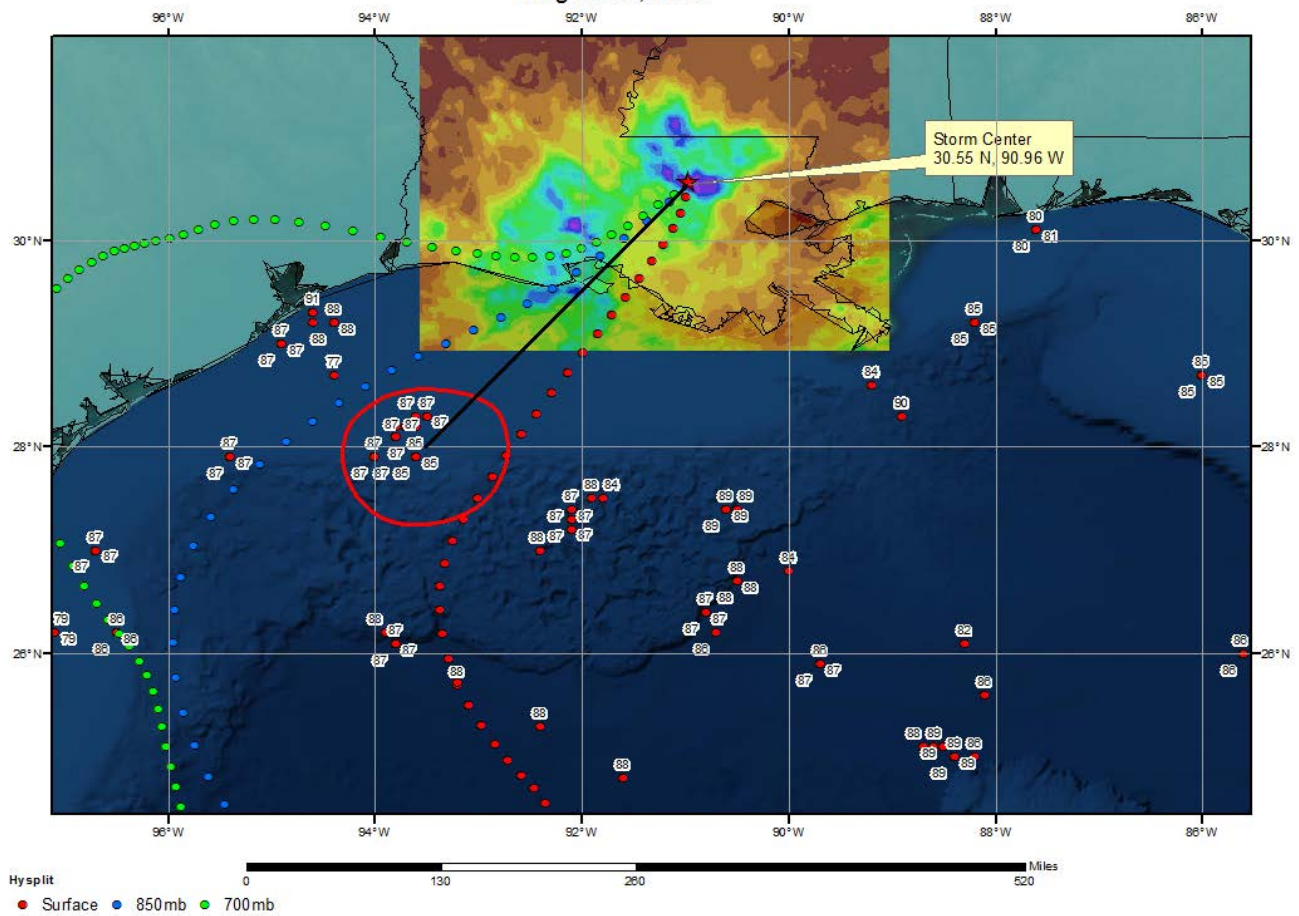
NOAA HYSPLIT MODEL
Backward trajectories ending at 0600 UTC 13 Aug 16
CDC1 Meteorological Data



SPAS 1631 Watson, LA Storm Analysis Zone 1
August 11, 2016



SPAS 1631 Watson, LA Storm Analysis Zone 1
August 12, 2016



Storm Precipitation Analysis System (SPAS) For Storm #1667_1

General Storm Location: Nederland, TX

Storm Dates: August 25-31, 2017 (156-hours)

Event: Hurricane Harvey

DAD Zone 1

Latitude: 29.9650

Longitude: -93.9150

Max. Grid Rainfall Amount: 61.10"

Max. Observed Rainfall Amount: 60.56"

Number of Stations: 1302

SPAS Version: 10.0

Basemap: Default ZR Total Precipitation

Spatial resolution: 0.01 dd

Radar Included: Yes

Depth-Area-Duration (DAD) analysis: Yes

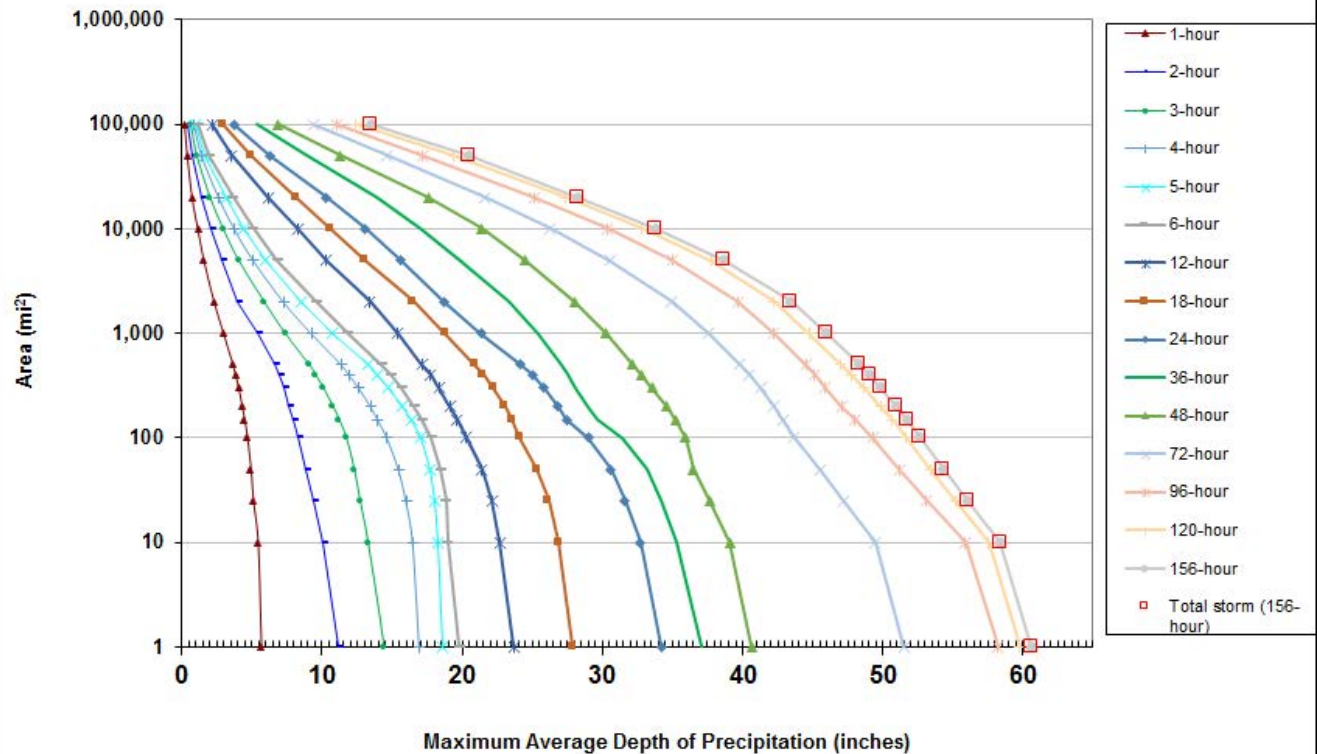
Reliability of results: This analysis was based on 1302 hourly stations, daily data, supplemental station data, and radar data. We have a good degree of confidence for the station based storm total results. The spatial pattern is dependent on the radar data, gauge data, and basemap. There is a good degree 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.

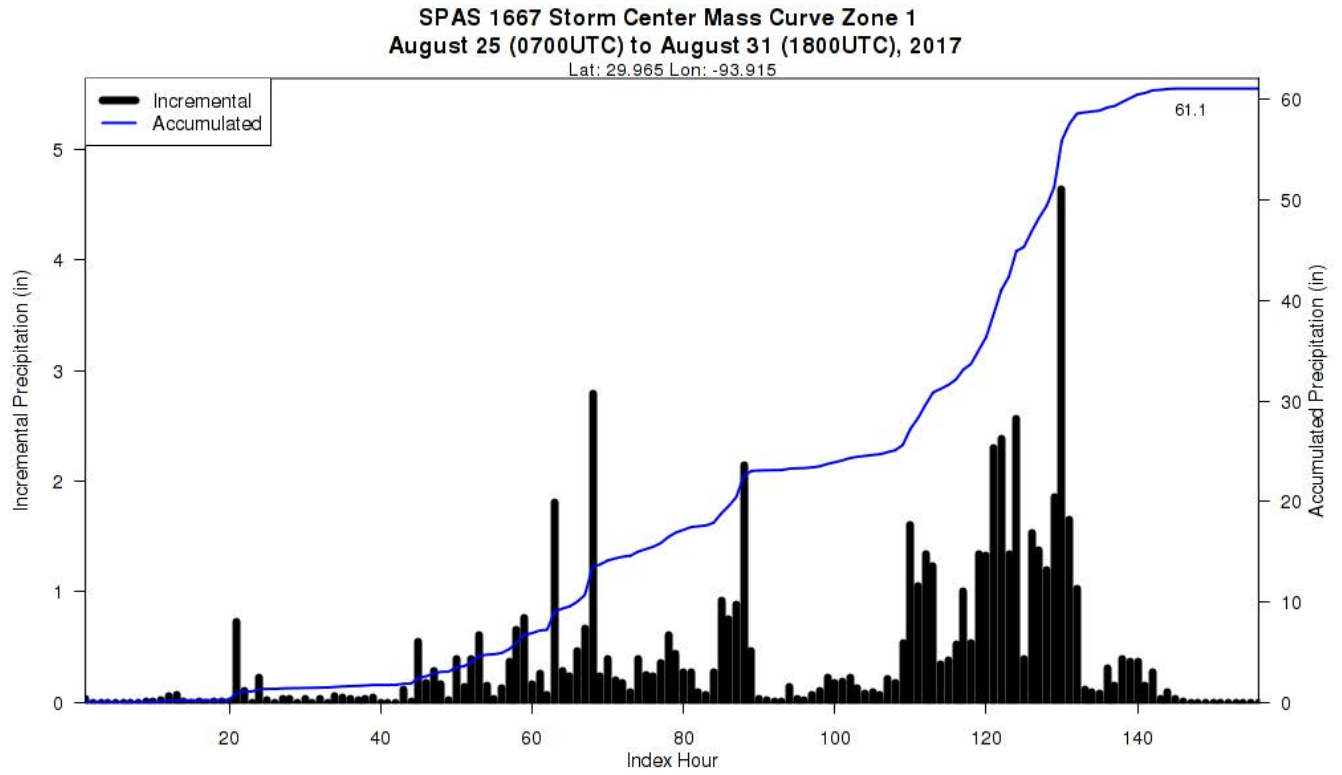
					Storm Rep. Dew Point					Climatological Max. Dew Point						
SPAS Storm ID	LON	LAT	ELEV	ELEV Round	T _d	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	T _d	T _d Round	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	IPMF
1667_1	-93.915	29.965	30	0	86.00	4.67	0.00	94	4.670	87.08	87.0	4.86	0.00	96	4.860	1.041

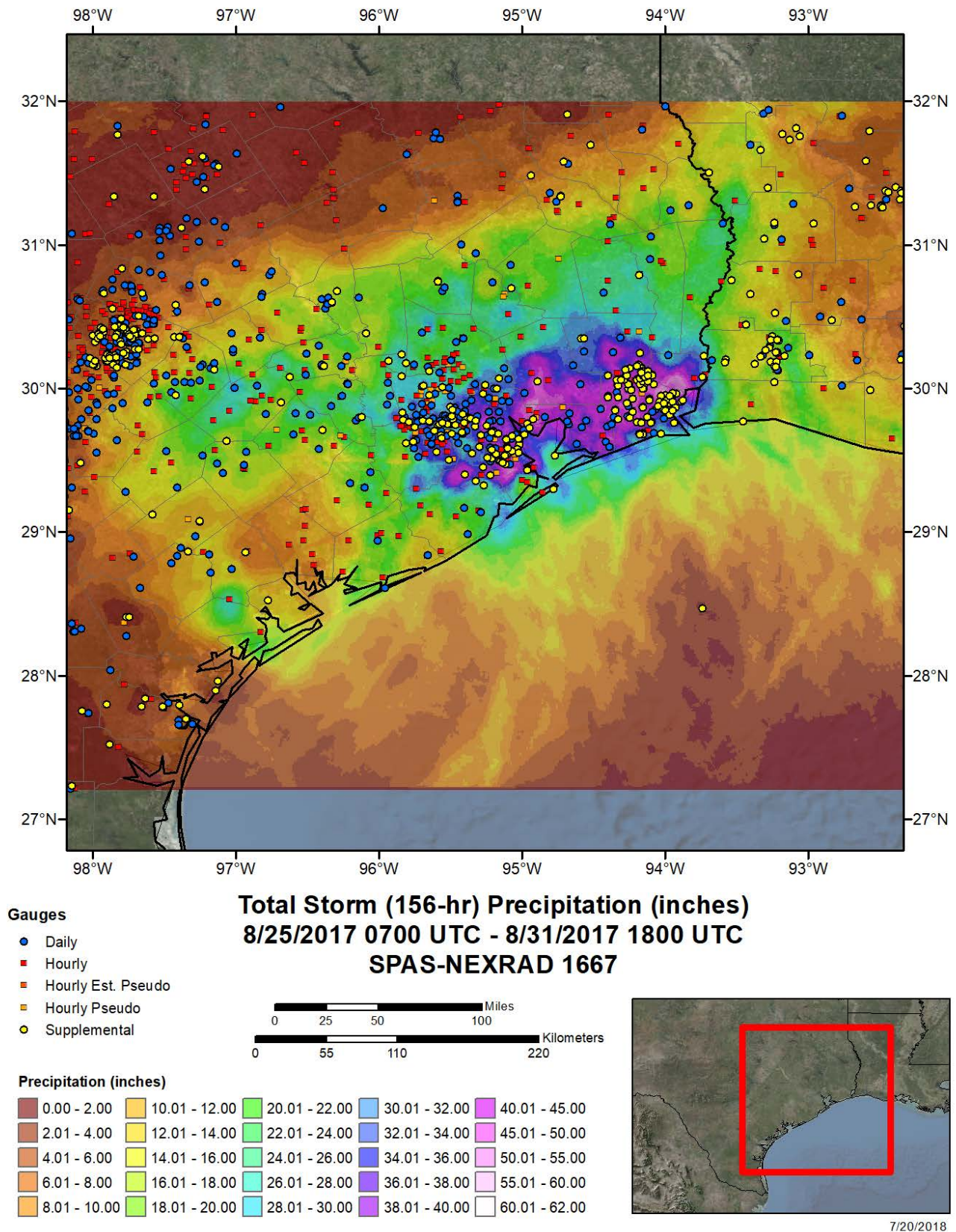
Storm 1667 - August 25 (0700 UTC) - August 31 (1800 UTC), 2017
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)

Area (mi ²)	Duration (hours)															
	1	2	3	4	5	6	12	18	24	36	48	72	96	120	156	Total
0.4	5.80	11.47	14.56	17.08	18.76	19.93	23.92	28.16	34.52	37.39	40.95	51.84	58.62	60.25	61.11	61.11
1	5.64	11.18	14.38	16.94	18.63	19.76	23.67	27.88	34.19	37.04	40.61	51.48	58.23	59.78	60.62	60.62
10	5.40	10.04	13.25	16.48	18.28	18.98	22.68	26.86	32.72	35.34	39.07	49.43	55.91	57.53	58.36	58.36
25	5.07	9.37	12.68	15.99	18.03	18.85	22.11	26.19	31.60	34.18	37.64	47.20	53.09	55.15	56.06	56.06
50	4.90	8.84	12.27	15.46	17.68	18.47	21.37	25.35	30.62	33.17	36.49	45.49	51.16	53.37	54.31	54.31
100	4.65	8.25	11.71	14.64	17.01	17.79	20.29	24.09	28.98	31.40	35.93	43.68	49.29	51.66	52.67	52.67
150	4.45	7.92	11.20	13.98	16.34	17.13	19.64	23.56	27.45	29.59	35.19	42.85	48.01	50.68	51.73	51.73
200	4.28	7.67	10.77	13.46	15.73	16.58	19.12	23.06	26.81	28.97	34.57	42.27	47.04	49.83	51.01	51.01
300	4.03	7.24	10.09	12.64	14.74	15.67	18.35	22.22	25.81	28.13	33.54	41.28	45.90	48.66	49.86	49.86
400	3.81	6.95	9.54	11.94	13.99	14.91	17.71	21.52	24.98	27.55	32.75	40.47	45.10	47.75	49.06	49.06
500	3.63	6.61	9.08	11.39	13.27	14.22	17.14	20.88	24.18	27.07	32.15	39.80	44.50	47.01	48.34	48.34
1,000	2.96	5.40	7.36	9.23	10.76	11.88	15.42	18.81	21.34	25.41	30.24	37.57	42.27	44.73	46.03	46.03
2,000	2.30	4.00	5.87	7.24	8.55	9.57	13.40	16.53	18.70	23.35	27.98	34.95	39.66	42.23	43.44	43.44
5,000	1.57	2.82	4.03	5.06	5.98	6.82	10.33	13.10	15.65	19.87	24.52	30.54	35.04	37.73	38.71	38.71
10,000	1.14	2.04	2.92	3.71	4.43	5.08	8.23	10.59	13.06	17.01	21.37	26.28	30.36	32.83	33.77	33.77
20,000	0.73	1.37	1.99	2.59	3.15	3.63	6.13	8.16	10.29	13.90	17.59	21.62	25.09	27.36	28.23	28.23
50,000	0.39	0.70	1.03	1.37	1.68	1.96	3.52	4.94	6.28	8.93	11.31	14.62	17.14	19.33	20.46	20.46
100,000	0.20	0.40	0.59	0.81	0.99	1.17	2.17	2.95	3.70	5.36	6.85	9.34	11.03	12.43	13.44	13.44

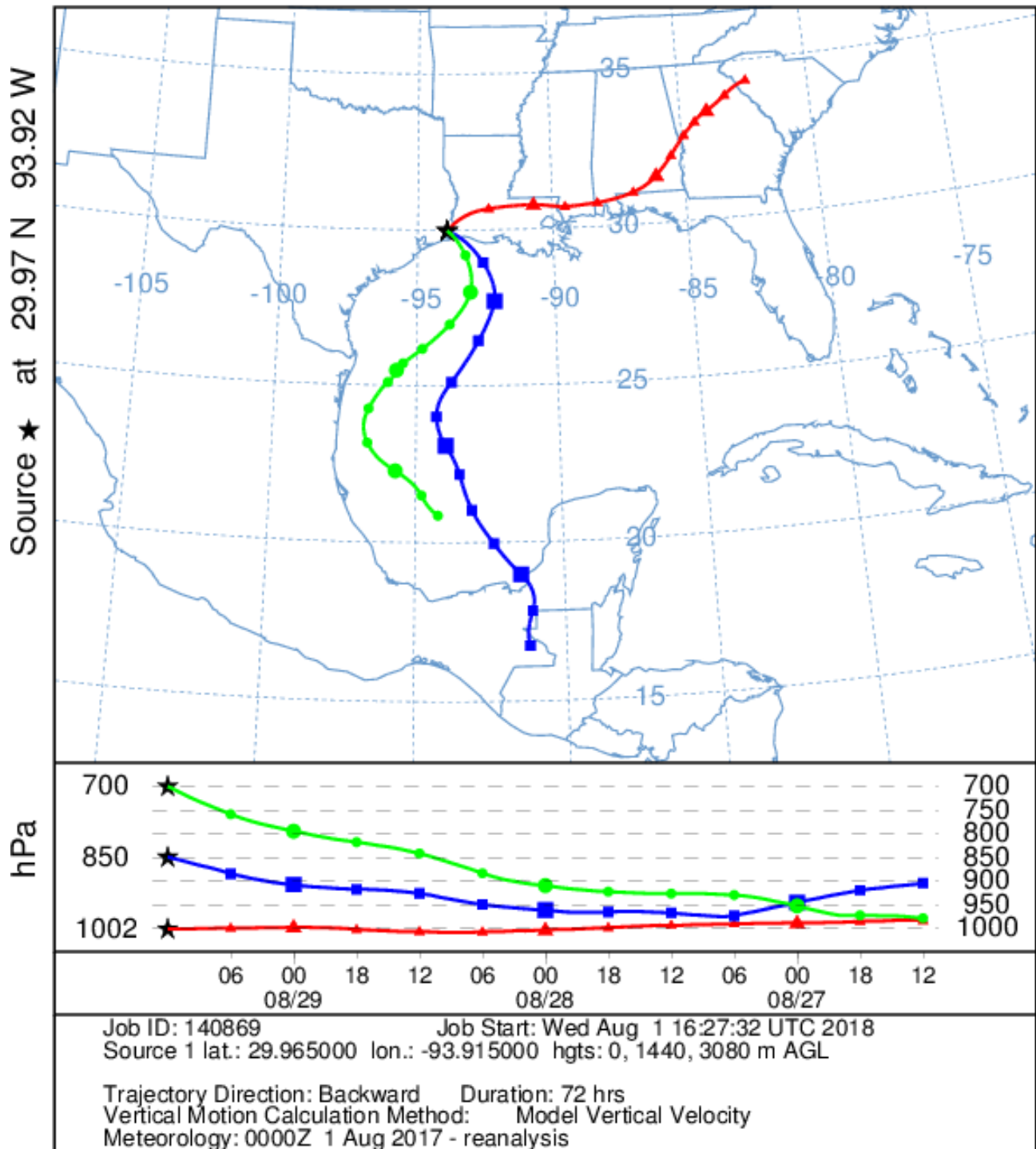
SPAS #1667 DAD Curves Zone 1
August 25-31, 2017



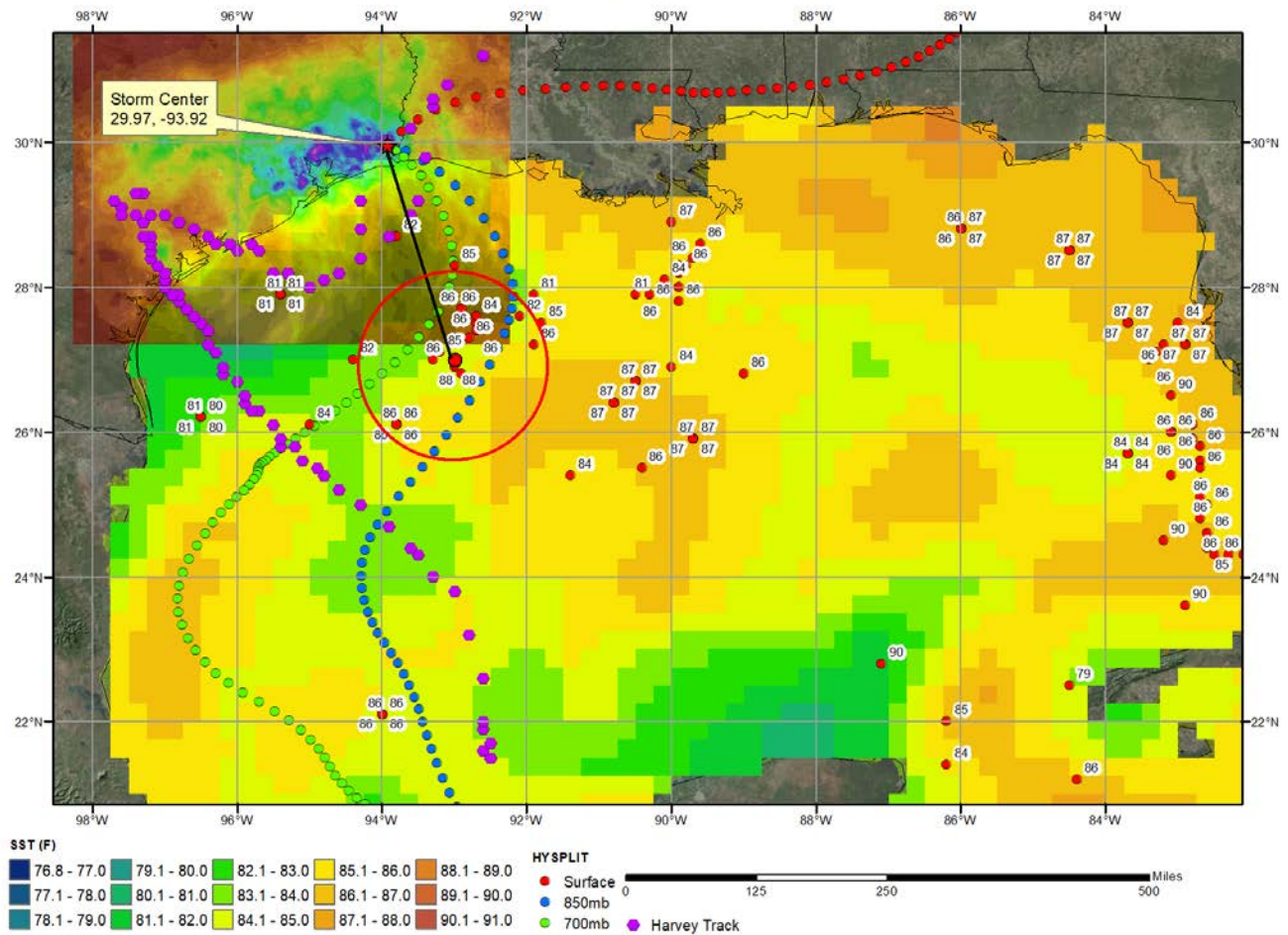




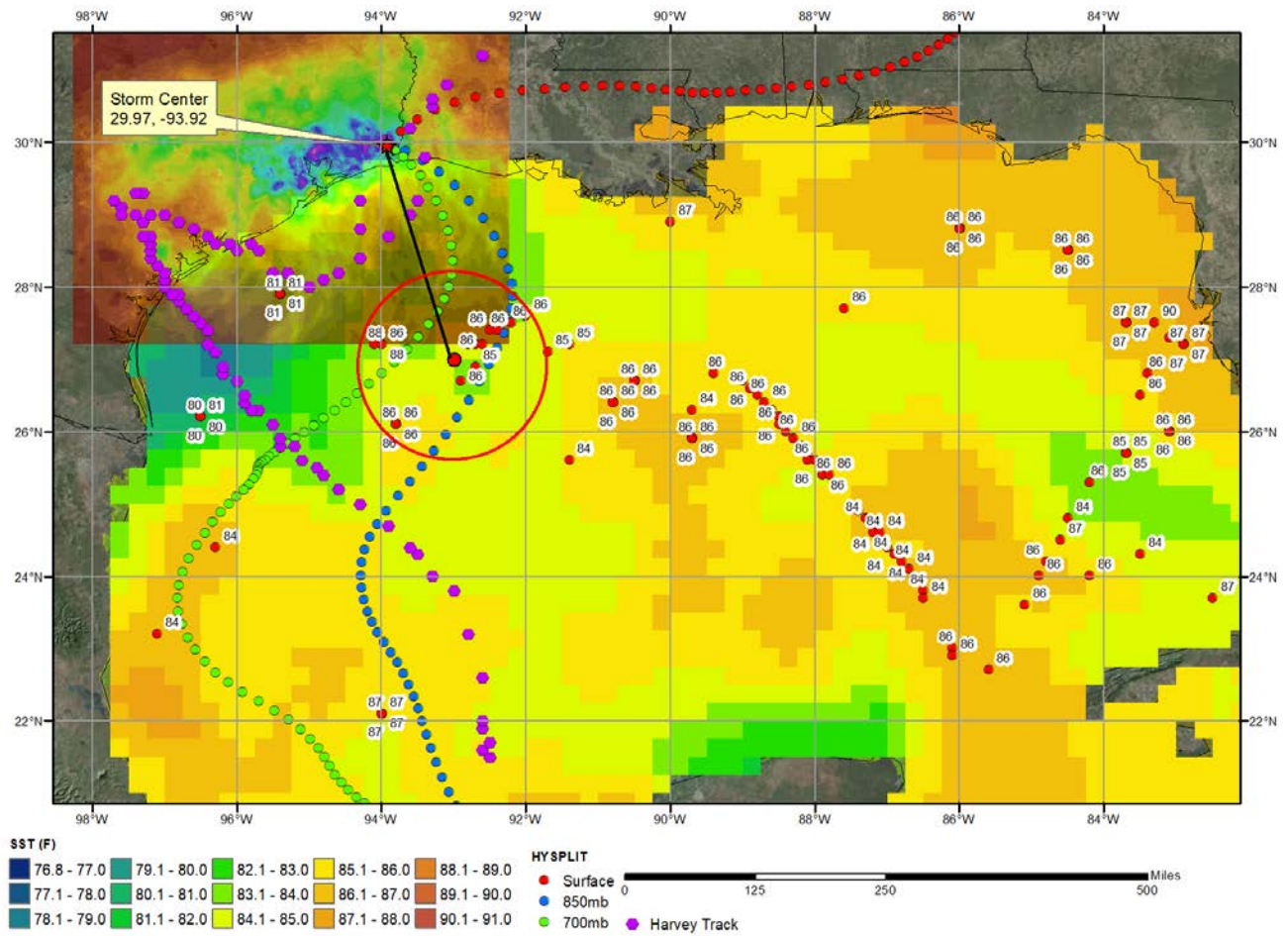
NOAA HYSPLIT MODEL
Backward trajectories ending at 1200 UTC 29 Aug 17
CDC1 Meteorological Data



SPAS 1667 Harvey, TX Storm Analysis
August 28, 2017



SPAS 1667 Harvey, TX Storm Analysis August 29, 2017



Hybrid Storms

Storm Precipitation Analysis System (SPAS) For Storm #1294_1

A re-run of SPAS #1008

*** Update addressed excess precipitation above 7500ft, created 2 DAD zones based on 7500ft elevation.

General Storm Location: Colorado Front Range, adjacent high plains and extreme northeastern New Mexico.

Storm Dates: June 3-4, 1921 (24-hours)

Event: Thunderstorm “cloudburst”

DAD Zone 1 (<7500ft)

Latitude: 38.4638

Longitude: -105.0705

Max. Grid Rainfall Amount: 12.19”

Max. Observed Rainfall Amount: 12.00” (Penrose, CO)

Number of Stations: 76 (0 Daily, 1 Hourly, 0 Hourly Estimated, 0 Hourly Pseudo, 65 Supplemental, and 10 Supplemental Estimated)

SPAS Version: 9.5

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

Spatial resolution: 30 seconds

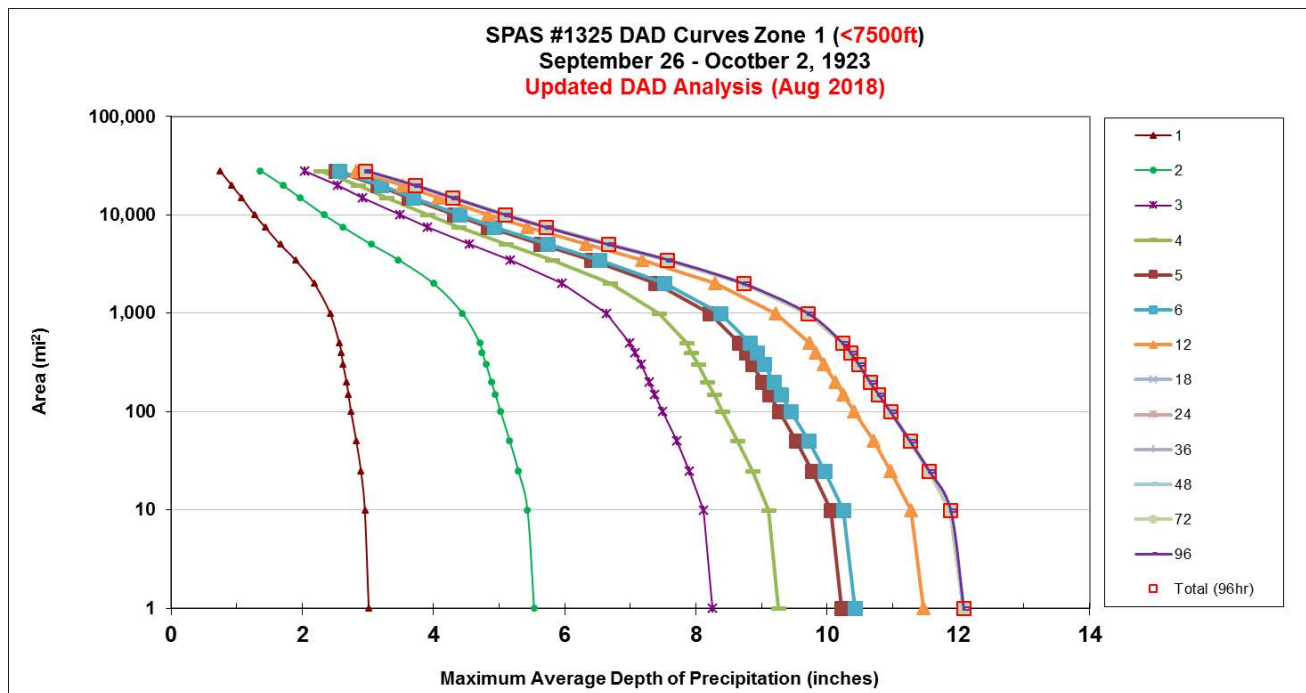
Radar Included: No

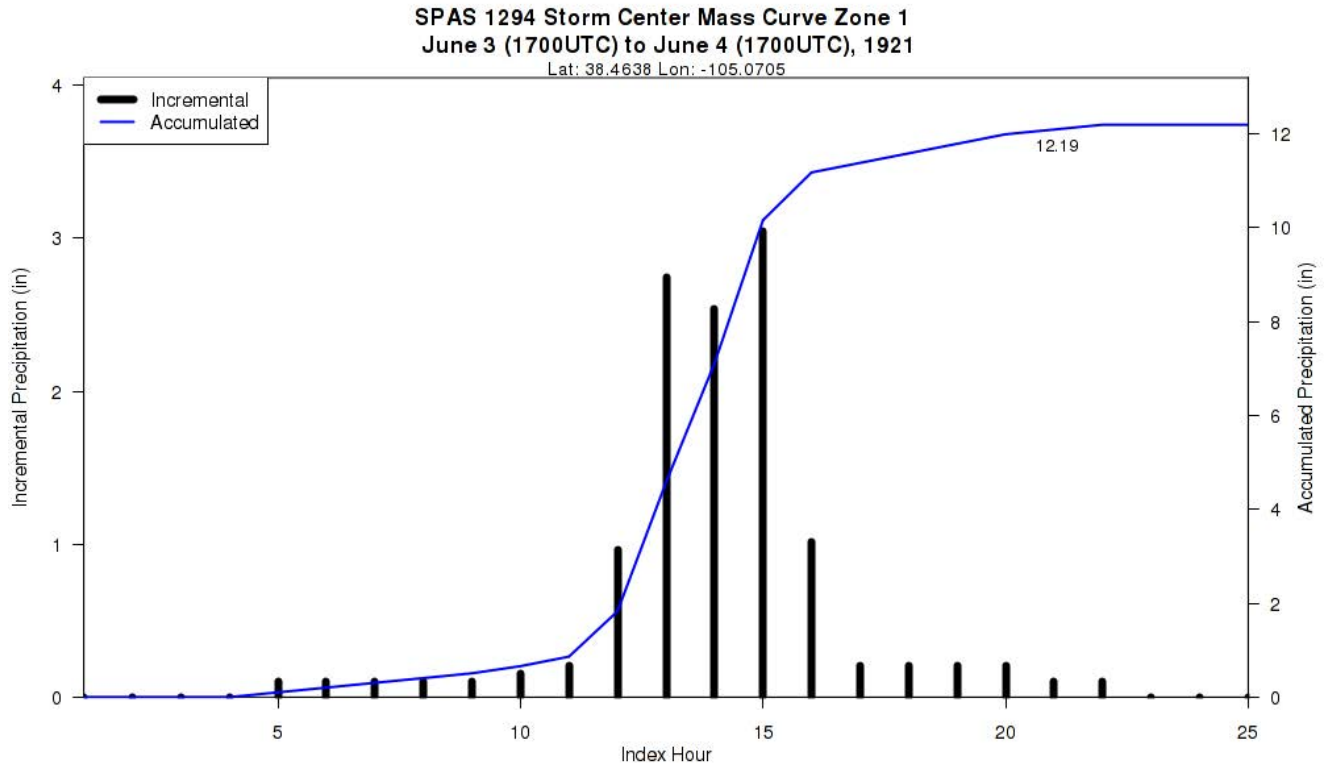
Depth-Area-Duration (DAD) analysis: Yes

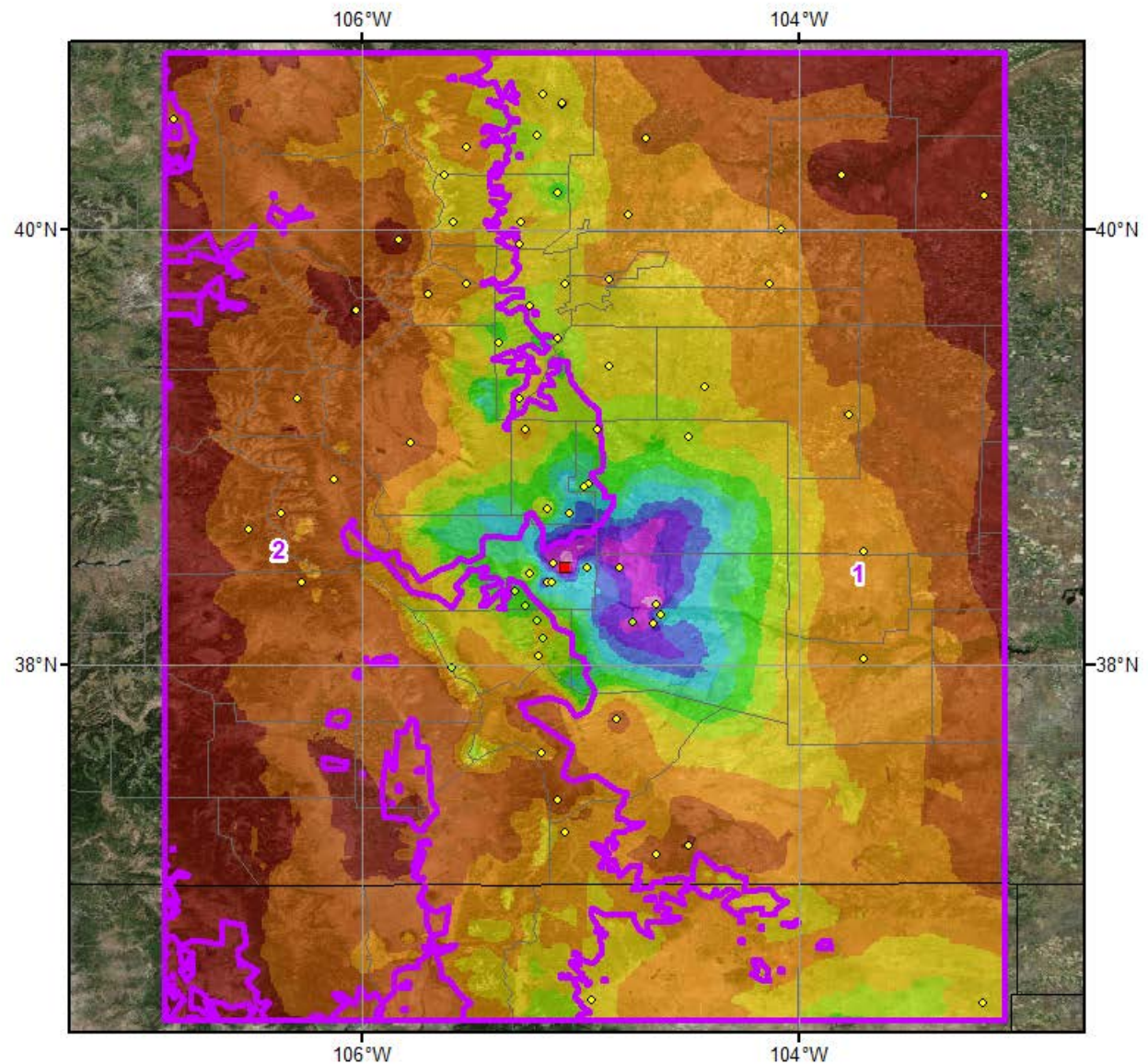
Reliability of results: This storm suffered from a severe lack of hourly data. In fact, only one hourly “station” was used at the storm center. The hourly data was gleamed from page 24 of HMR 55A; two other hourly stations were provided in the report, but were located beyond the analysis domain of this storm. Therefore, only the timing is reliable in/around the storm center. The storm magnitude is anchored by limited data, so it too is only reliable in/around the storm center.

					Storm Rep. Dew Point					Climatological Max. Dew Point						
SPAS Storm ID	LON	LAT	ELEV	ELEV Round	T _d	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	T _d	T _d Round	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	IPMF
1294_1_loc	-105.070	38.464	5,560	5,500	74.00	2.73	1.14	70	1.590	80.46	80.5	3.68	1.43	83	2.250	1.415

Storm 1294 Zone 1 - June 3 (1700 UTC) - June 4 (1700 UTC), 1921														
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES) Updated Analysis (<7500ft)														
areasqmi	Duration (hours)													
	1	2	3	4	5	6	12	18	24	36	48	72	96	Total (96hr)
0.4	3.04	5.57	8.31	9.32	10.28	10.49	11.55	12.16	12.16	12.16	12.16	12.16	12.16	12.16
1	3.01	5.53	8.25	9.26	10.22	10.42	11.47	12.08	12.08	12.08	12.08	12.08	12.08	12.08
10	2.95	5.43	8.12	9.10	10.05	10.25	11.27	11.88	11.88	11.88	11.88	11.88	11.88	11.88
25	2.89	5.29	7.89	8.86	9.77	9.96	10.97	11.55	11.55	11.55	11.55	11.55	11.55	11.55
50	2.82	5.16	7.70	8.63	9.53	9.71	10.70	11.26	11.26	11.26	11.26	11.26	11.26	11.26
100	2.74	5.02	7.49	8.40	9.27	9.45	10.41	10.96	10.96	10.96	10.96	10.96	10.96	10.96
150	2.70	4.94	7.37	8.27	9.12	9.30	10.24	10.78	10.78	10.78	10.78	10.78	10.78	10.78
200	2.67	4.88	7.28	8.17	9.01	9.19	10.12	10.65	10.65	10.65	10.65	10.65	10.65	10.65
300	2.62	4.80	7.16	8.03	8.86	9.04	9.95	10.48	10.48	10.48	10.48	10.48	10.48	10.48
400	2.59	4.74	7.07	7.93	8.76	8.93	9.83	10.35	10.35	10.35	10.35	10.35	10.35	10.35
500	2.56	4.70	6.99	7.85	8.66	8.82	9.73	10.23	10.23	10.23	10.23	10.23	10.23	10.23
1,000	2.42	4.44	6.63	7.44	8.21	8.37	9.21	9.70	9.70	9.70	9.70	9.70	9.70	9.70
2,000	2.18	4.00	5.96	6.69	7.38	7.52	8.29	8.72	8.72	8.72	8.72	8.72	8.72	8.72
3,500	1.89	3.46	5.17	5.80	6.40	6.53	7.18	7.56	7.56	7.56	7.56	7.56	7.56	7.56
5,000	1.66	3.05	4.55	5.10	5.63	5.74	6.32	6.66	6.66	6.66	6.66	6.66	6.66	6.66
7,500	1.43	2.62	3.90	4.38	4.83	4.93	5.43	5.71	5.71	5.71	5.71	5.71	5.71	5.71
10,000	1.27	2.33	3.48	3.90	4.31	4.39	4.83	5.09	5.09	5.09	5.09	5.09	5.09	5.09
15,000	1.07	1.96	2.92	3.28	3.62	3.69	4.07	4.28	4.28	4.28	4.28	4.28	4.28	4.28
20,000	0.92	1.70	2.54	2.85	3.14	3.20	3.52	3.71	3.71	3.71	3.71	3.71	3.71	3.71
28,202	0.74	1.36	2.03	2.27	2.51	2.56	2.82	2.96	2.96	2.96	2.96	2.96	2.96	2.96



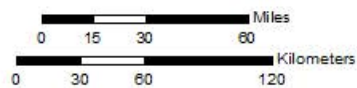




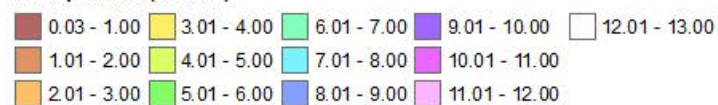
Total Storm (24-hr) Precipitation (in)
6/3/1921 1700 UTC - 6/04/1921 1800
SPAS #1294

Gauges

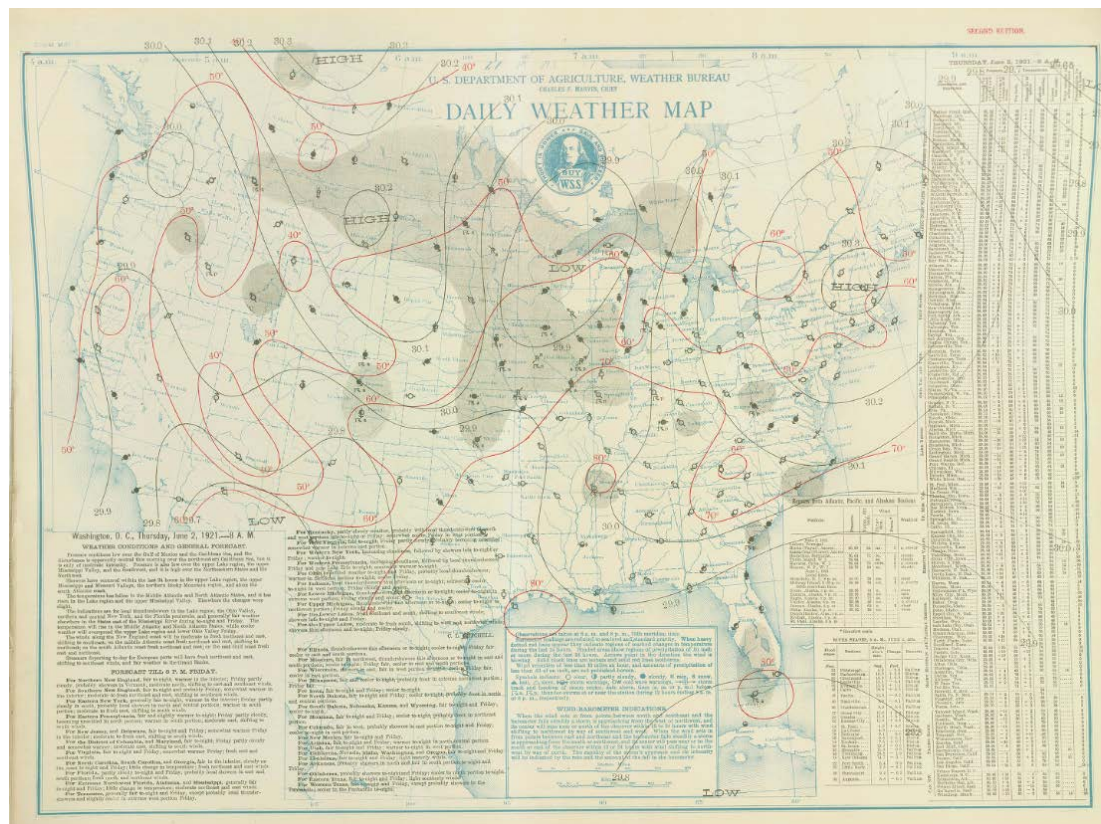
- Hourly
- ◆ Supplemental
- ◆ SE



Precipitation (inches)



3/1/2018



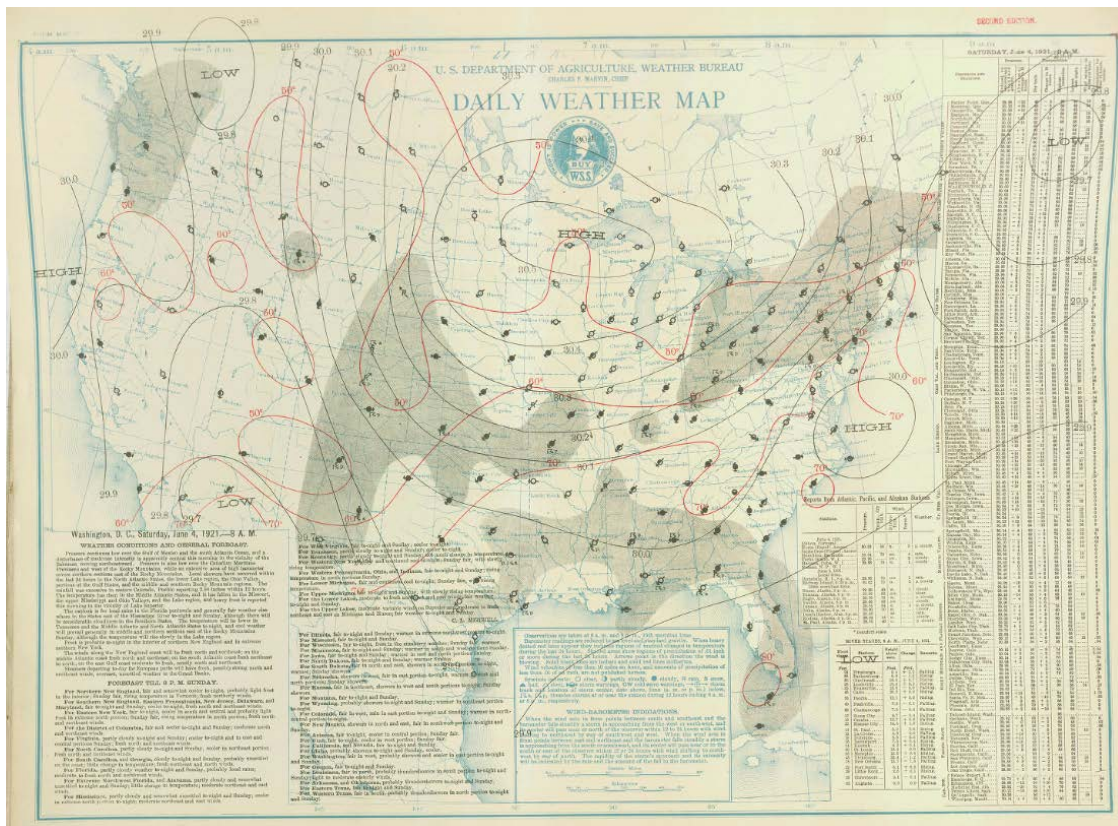
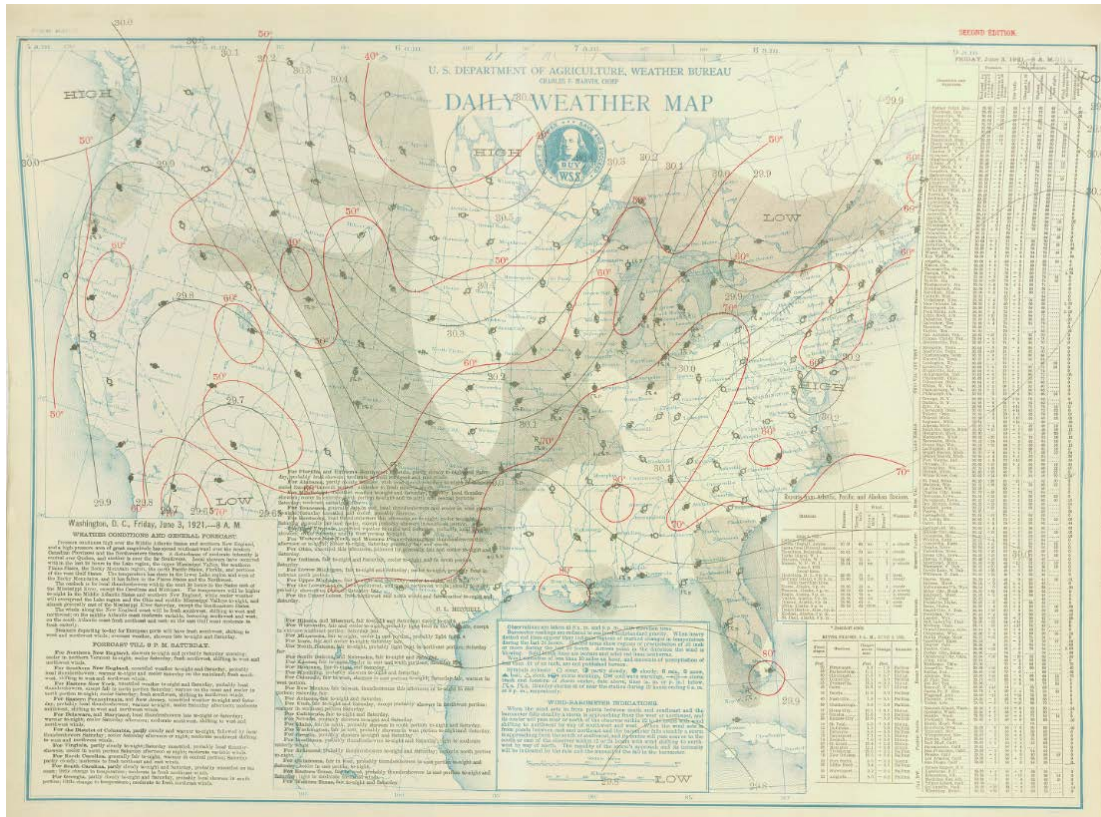
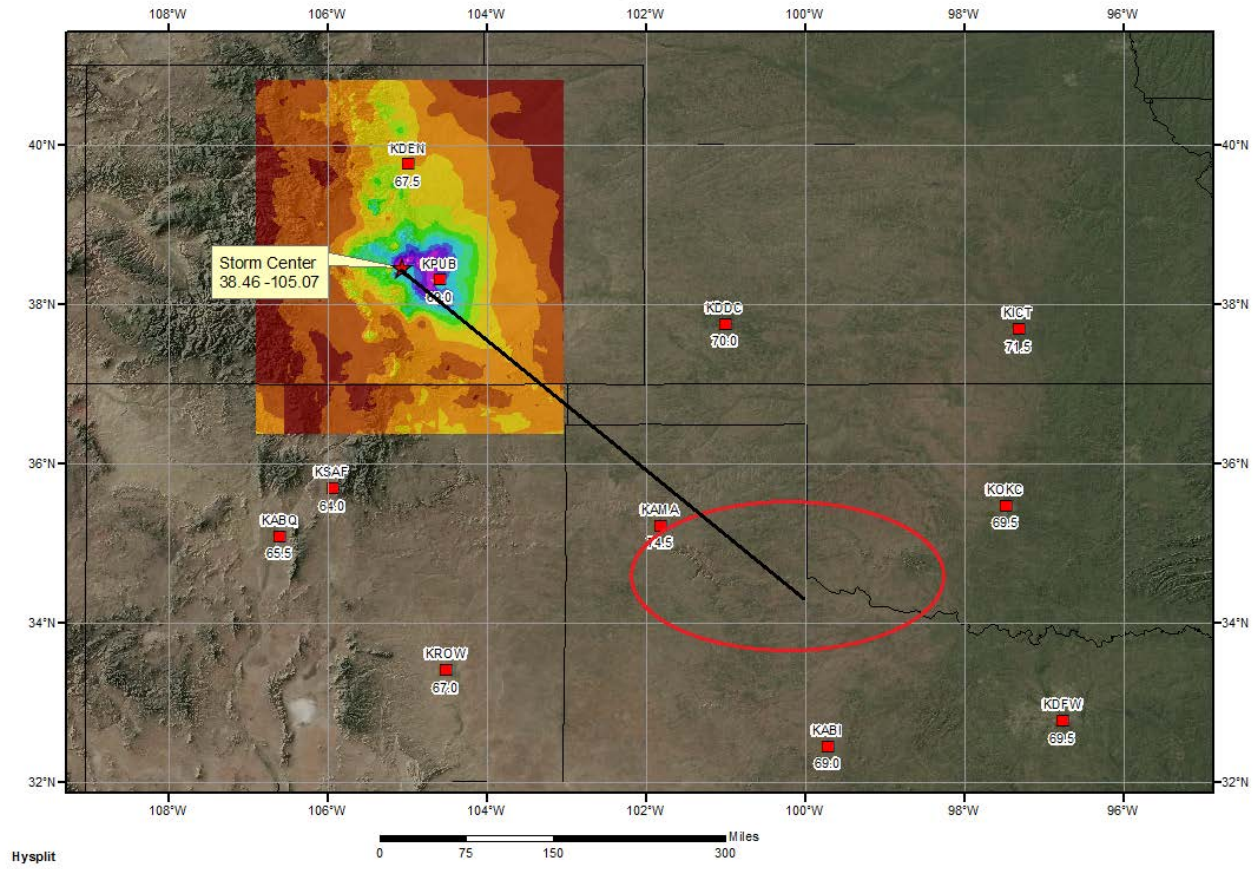


Table 5.1.--Representative persisting 12-hr 1000-mb storm and maximum dew points for important storms in and near study region

Storm		Storm T _d			Ref.	Loc.	Max. T _d		Stations
No.	Name	Old	New	Date+	Old	New	Old	New	
1.	Ward District, CO	62	64	30	325SE	350SE	75	77	AMA, DDC
6.	Boxelder, CO	60	60	4	350SE	320SE	72	74	DEN, PUB, DDC, OKC, ICT
8.	Rociada, NM	72	72	28	170SSE	300ESE	76	77	ABI, AMA
10.	Warrick, MT	64	64	6	380ESE	380ESE	73	75	ISN, PIR
13.	Evans, MT	65	65	4	510ESE	510ESE	75	76	BIS, RAP, PIR, VTN, HON
86.	May Valley, CO	67	67	18	450SSE	450SSE	76	76	AMA, ABI, FTW, SAT
20.	Clayton, NM	68	69	1	550SE	560SSE	76	77	SAT, DRT, CRP
23.	Tajique, NM	69	69	21	80SE	160SSE	77	78	ELP, ROW
25.	Lakewood, NM	-	76	7	-	350SE	-	79	DRT, SAT
27.	Meek, NM	72	72	15	390ESE	400ESE	78	79	AMA, ABI, FTW, OKC, SAT, GBK
30.	Fry's Ranch, CO	56	63	15	550ESE	700SE	71	74	FWH, DAL
31.	Penrose, CO	67	70	4	400SE	350SE	77	77	AMA, OKC
32.	Springbrook, MT	71	72	18	500ESE	370ESE	76	77	PIR, HON, FAR
35.	Virsylvania, NM (Cerro)	-	66	17	-	120SW	-	77	ABQ
38.	Savageton, WY	68	72	28	550SE	530SE	75	76	FRI, CNK
44.	Porter, NM	70	71	11	540SE	380SE	78	77	DRT, AUS, FTW, ABI
46.	Kassler, CO	71	66	10	440SE	420SE	77	77	OKC, DDC
47.	Cherry Creek, CO	72	71	30	540SE	560SE	76	79	ABI, ACT, FTW, SPS
101.	Hale, CO	72	71	30	540SE	560SE	76	79	ABI, ACT, FTW, SPS
48.	Las Cruces, NM*	-	71	30	-	-	-	78	ELP
105.	Broome, TX	77	77	14	350SSE	350SSE	78	80	CRP, BRO
53.	Loveland, CO	71	71	1	180SE	210SE	76	76	PUB, GLD
55.	Masonville, CO*	-	65	10	-	-	-	74	AKO
108.	Snyder, TX	73	75	19	100SE	340SSE	78	79	SAT, CRP
56.	Prairieview, NM	70	73	20	390SE	370SE	77	78	SAT, AUS
58.	McColiseum Ranch, NM	72	72	21	50SE	300SE	77	79	ELP, DRT, SAT, CRP
60.	Rancho Grande, NM	74	75	31	250SE	250SE	77	78	LBB, BGS, ABI
66.	Ft. Collins, CO	66	67	30	570SE	600SE	78	78	GAG, TUL
67.	Golden, CO*	65	65	7	-	-	76	75	AMA

SPAS 1294 Penrose, CO Storm Analysis June 3-4, 1921



Storm Precipitation Analysis System (SPAS) For Storm #1294_2

A re-run of SPAS #1008

*** Update addressed excess precipitation above 7500ft, created 2 DAD zones based on 7500ft elevation.

General Storm Location: Colorado Front Range, adjacent high plains and extreme northeastern New Mexico.

Storm Dates: June 3-4, 1921 (24-hours)

Event: Thunderstorm “cloudburst”

DAD Zone 2 (>7500ft)

Latitude: 38.6304

Longitude: -104.9622

Max. Grid Rainfall Amount: 9.27”

Number of Stations: 76 (0 Daily, 1 Hourly, 0 Hourly Estimated, 0 Hourly Pseudo, 65 Supplemental, and 10 Supplemental Estimated)

SPAS Version: 9.5

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

Spatial resolution: 30 seconds

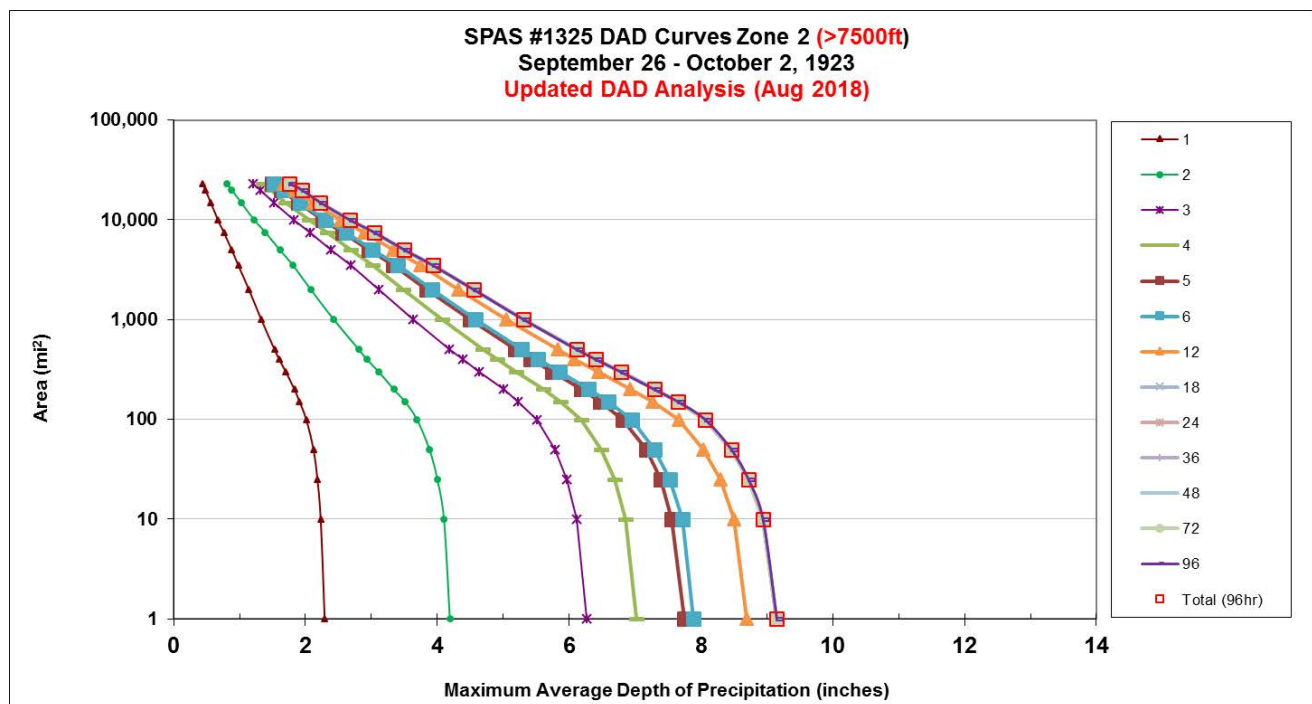
Radar Included: No

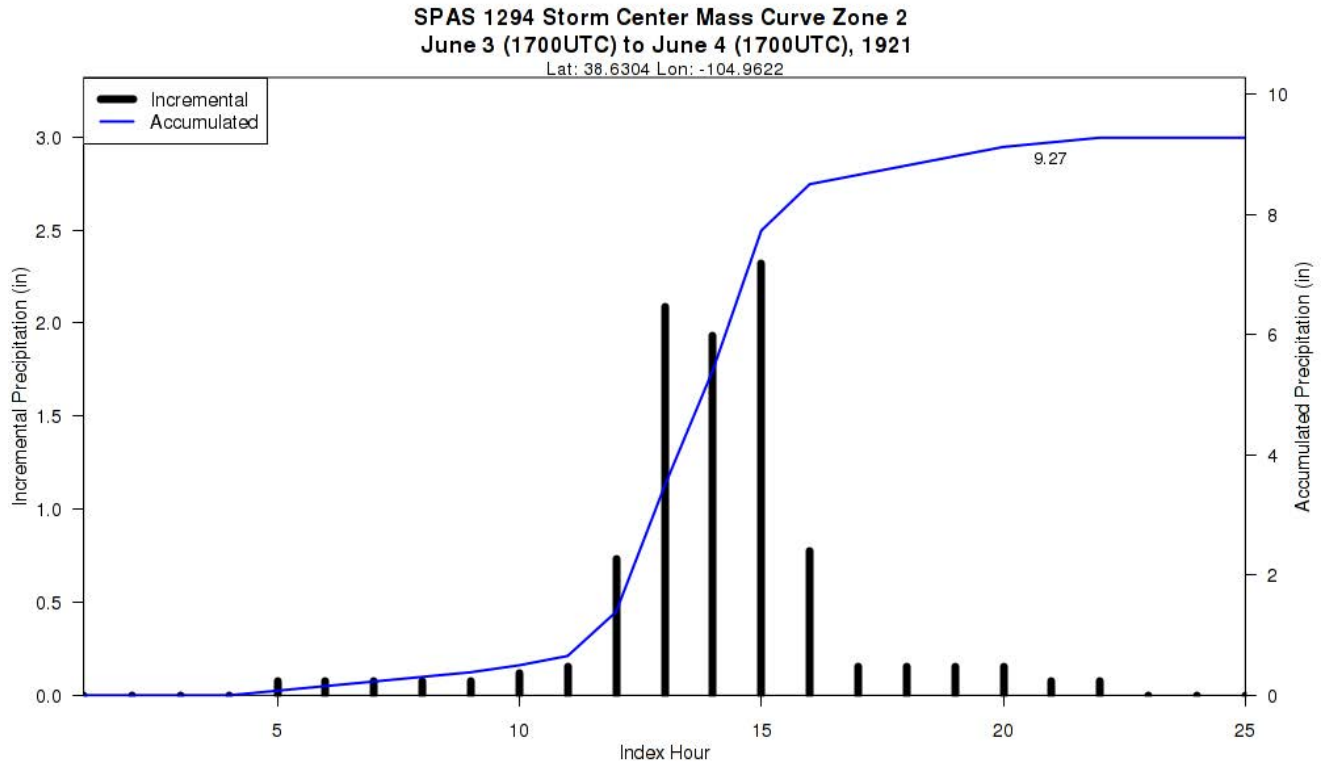
Depth-Area-Duration (DAD) analysis: Yes

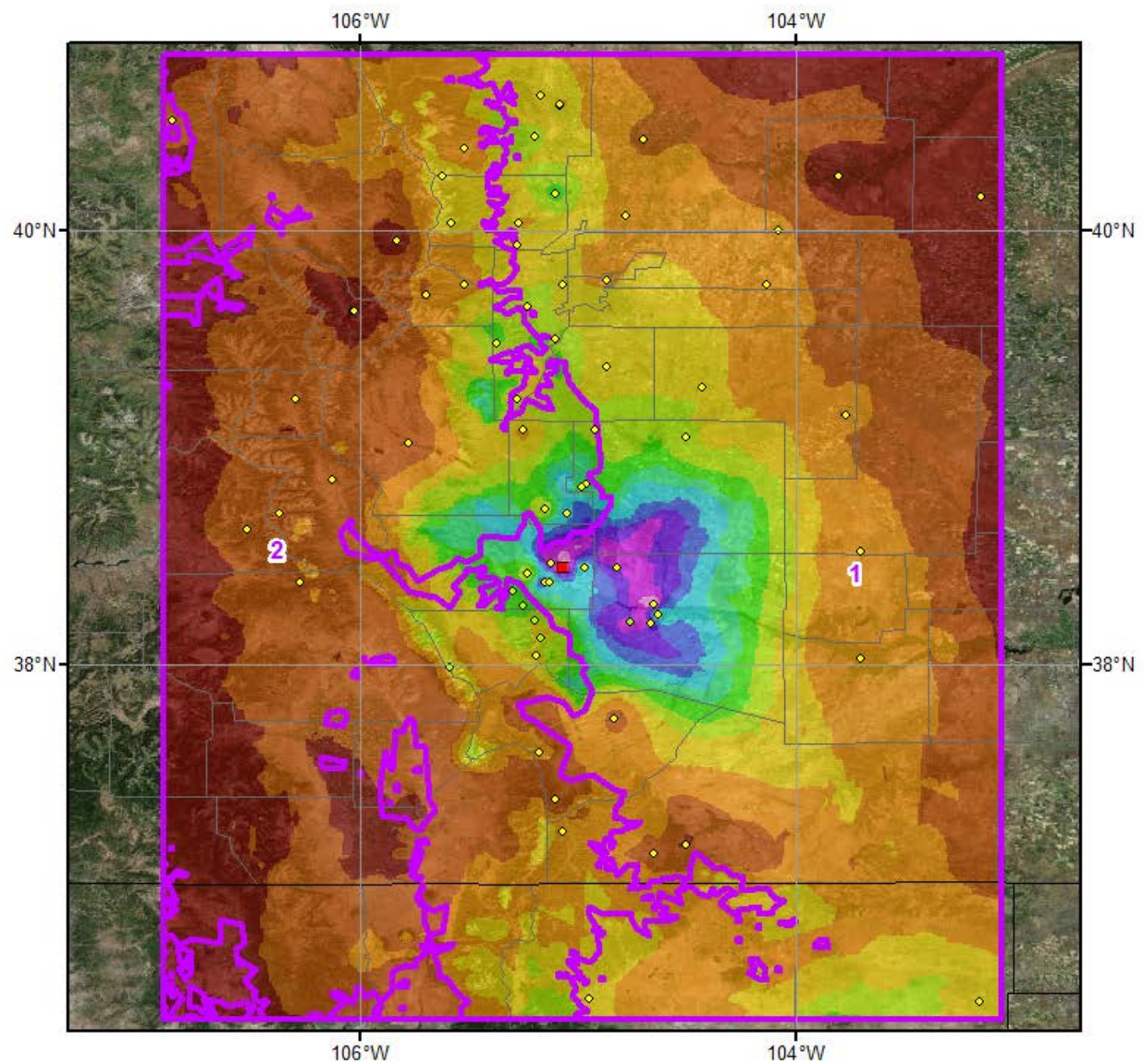
Reliability of results: This storm suffered from a severe lack of hourly data. In fact, only one hourly “station” was used at the storm center. The hourly data was gleamed from page 24 of HMR 55A; two other hourly stations were provided in the report, but were located beyond the analysis domain of this storm. Therefore, only the timing is reliable in/around the storm center. The storm magnitude is anchored by limited data, so it too is only reliable in/around the storm center.

					Storm Rep. Dew Point					Climatological Max. Dew Point						
SPAS Storm ID	LON	LAT	ELEV	ELEV Round	T _d	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	T _d	T _d Round	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	IPMF
1294 2 loc	-104.962	38.630	8,465	8,500	74.00	2.73	1.59	70	1.140	80.46	80.5	3.68	2.00	83	1.680	1.474

Storm 1294 Zone 2 - June 3 (1700 UTC) - June 4 (1700 UTC), 1921														
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES) Updated Analysis (>7500ft)														
areasqmi	Duration (hours)													
	1	2	3	4	5	6	12	18	24	36	48	72	96	Total (96hr)
0.4	2.31	4.23	6.31	7.08	7.81	7.97	8.77	9.23	9.23	9.23	9.23	9.23	9.23	9.23
1	2.29	4.19	6.26	7.02	7.75	7.89	8.69	9.15	9.15	9.15	9.15	9.15	9.15	9.15
10	2.23	4.10	6.12	6.86	7.55	7.72	8.50	8.94	8.94	8.94	8.94	8.94	8.94	8.94
25	2.18	4.00	5.97	6.69	7.39	7.53	8.29	8.72	8.72	8.72	8.72	8.72	8.72	8.72
50	2.12	3.88	5.79	6.49	7.17	7.30	8.04	8.46	8.46	8.46	8.46	8.46	8.46	8.46
100	2.01	3.69	5.51	6.18	6.82	6.95	7.66	8.06	8.06	8.06	8.06	8.06	8.06	8.06
150	1.91	3.51	5.23	5.87	6.47	6.60	7.27	7.65	7.65	7.65	7.65	7.65	7.65	7.65
200	1.83	3.34	5.00	5.61	6.19	6.29	6.93	7.29	7.29	7.29	7.29	7.29	7.29	7.29
300	1.70	3.11	4.64	5.20	5.74	5.85	6.45	6.78	6.78	6.78	6.78	6.78	6.78	6.78
400	1.60	2.93	4.38	4.91	5.41	5.52	6.08	6.40	6.40	6.40	6.40	6.40	6.40	6.40
500	1.53	2.81	4.18	4.69	5.18	5.28	5.82	6.12	6.12	6.12	6.12	6.12	6.12	6.12
1,000	1.33	2.43	3.63	4.07	4.49	4.58	5.05	5.31	5.31	5.31	5.31	5.31	5.31	5.31
2,000	1.14	2.08	3.11	3.48	3.84	3.92	4.32	4.55	4.55	4.55	4.55	4.55	4.55	4.55
3,500	0.98	1.81	2.69	3.02	3.33	3.40	3.74	3.93	3.93	3.93	3.93	3.93	3.93	3.93
5,000	0.88	1.61	2.39	2.68	2.96	3.02	3.33	3.50	3.50	3.50	3.50	3.50	3.50	3.50
7,500	0.76	1.39	2.07	2.33	2.56	2.62	2.89	3.04	3.04	3.04	3.04	3.04	3.04	3.04
10,000	0.67	1.22	1.82	2.05	2.26	2.30	2.54	2.67	2.67	2.67	2.67	2.67	2.67	2.67
15,000	0.56	1.02	1.52	1.70	1.89	1.92	2.11	2.22	2.22	2.22	2.22	2.22	2.22	2.22
20,000	0.48	0.88	1.32	1.48	1.63	1.67	1.84	1.94	1.94	1.94	1.94	1.94	1.94	1.94
23,121	0.44	0.81	1.20	1.35	1.49	1.52	1.67	1.76	1.76	1.76	1.76	1.76	1.76	1.76



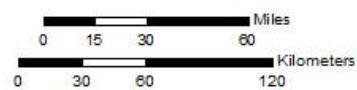




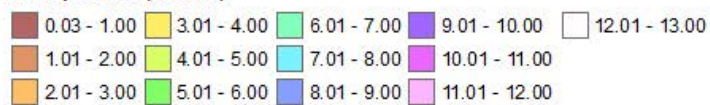
Total Storm (24-hr) Precipitation (in)
6/3/1921 1700 UTC - 6/04/1921 1800
SPAS #1294

Gauges

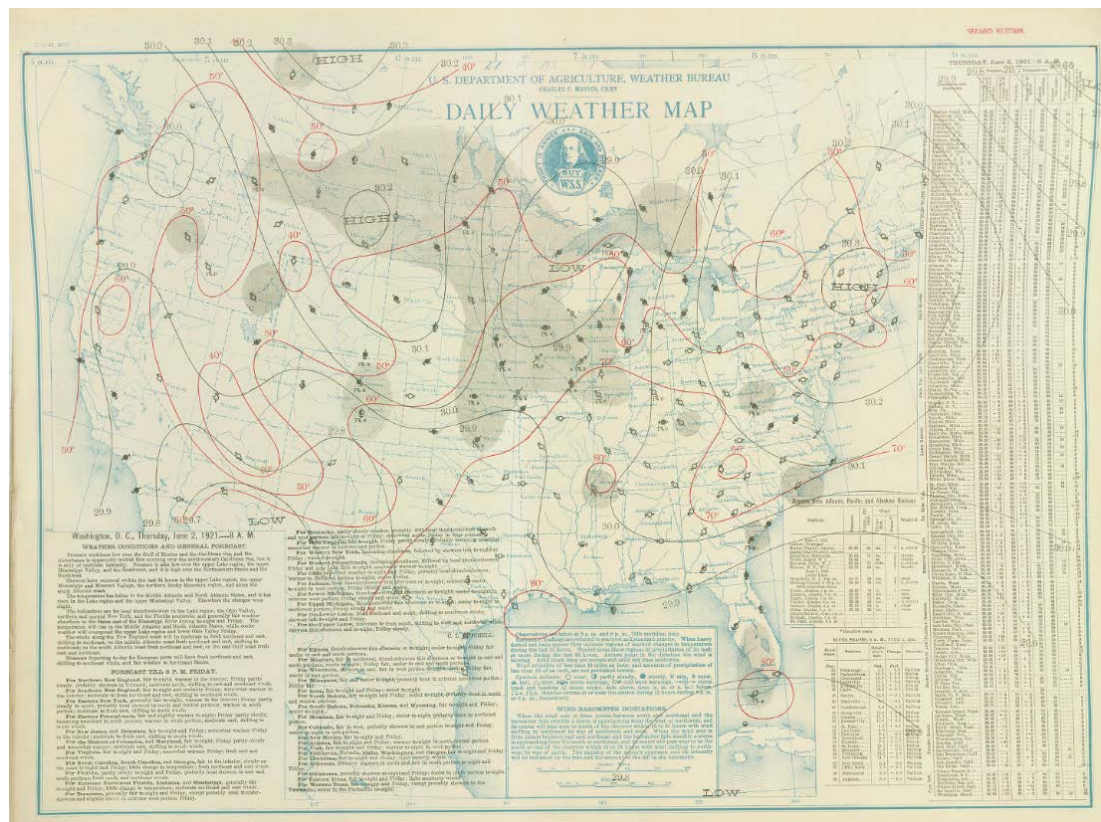
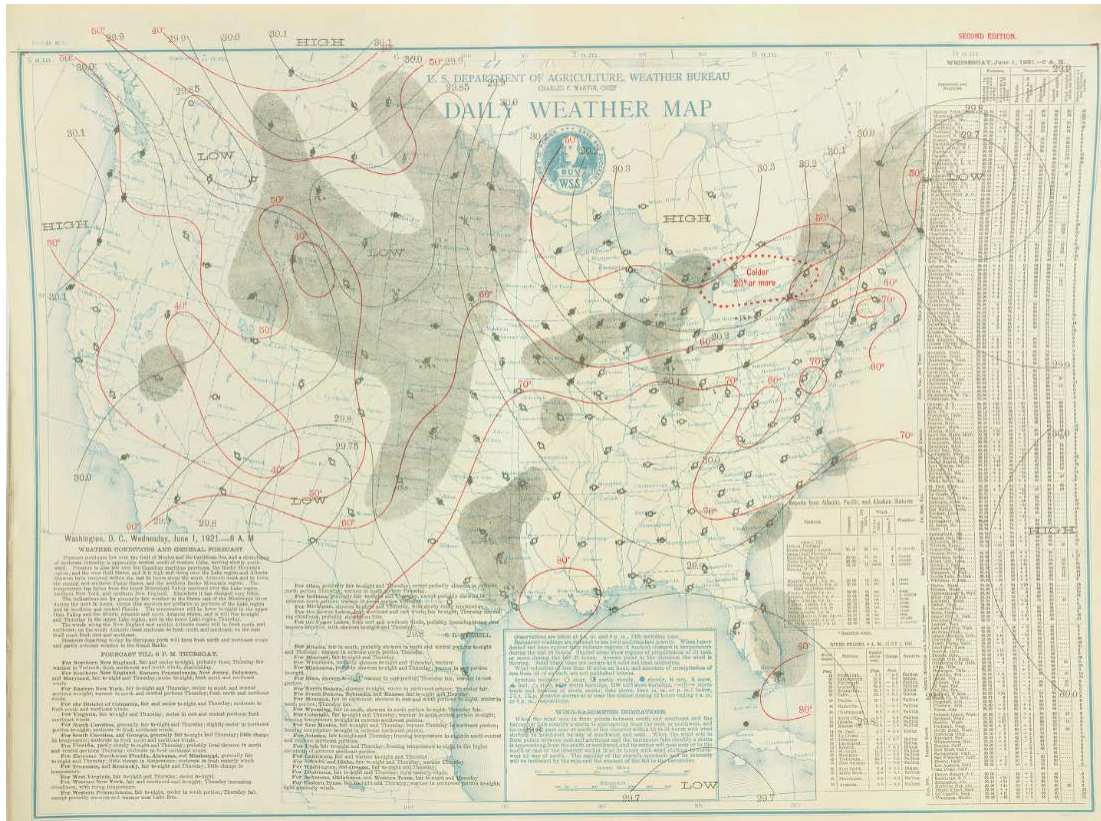
- Hourly
- ◆ Supplemental
- ◆ SE



Precipitation (inches)



3/1/2018



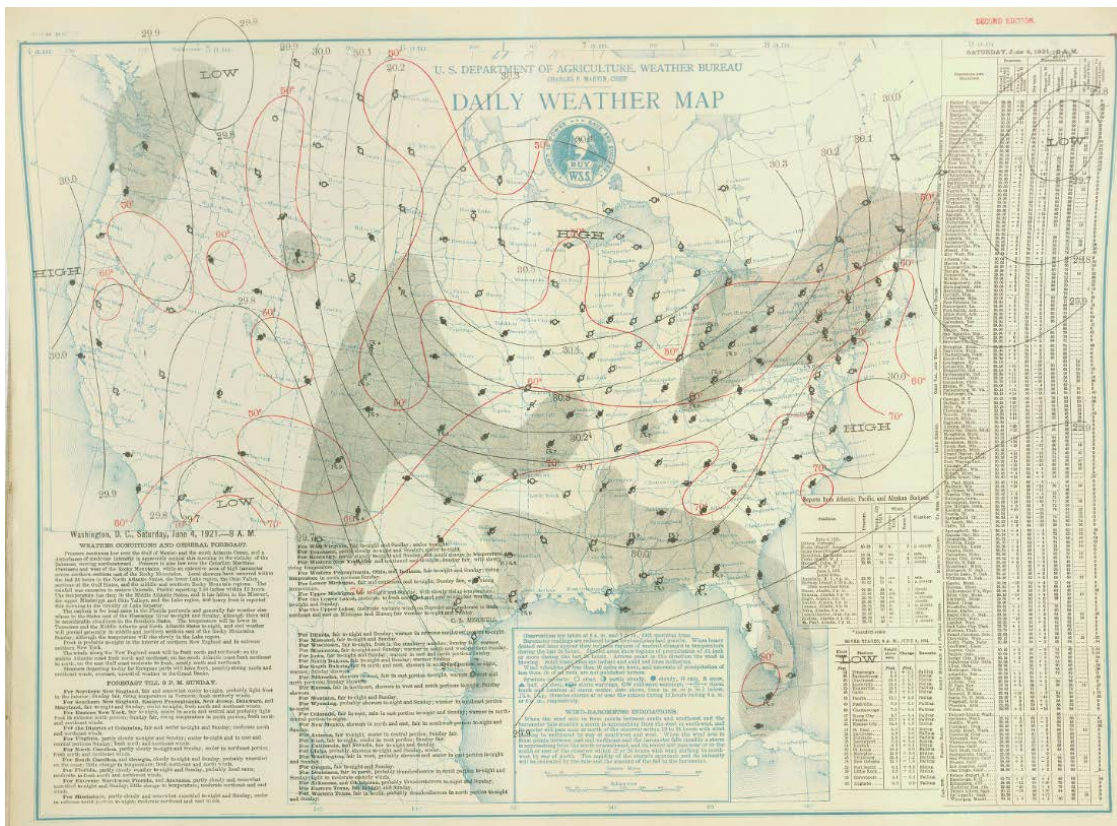
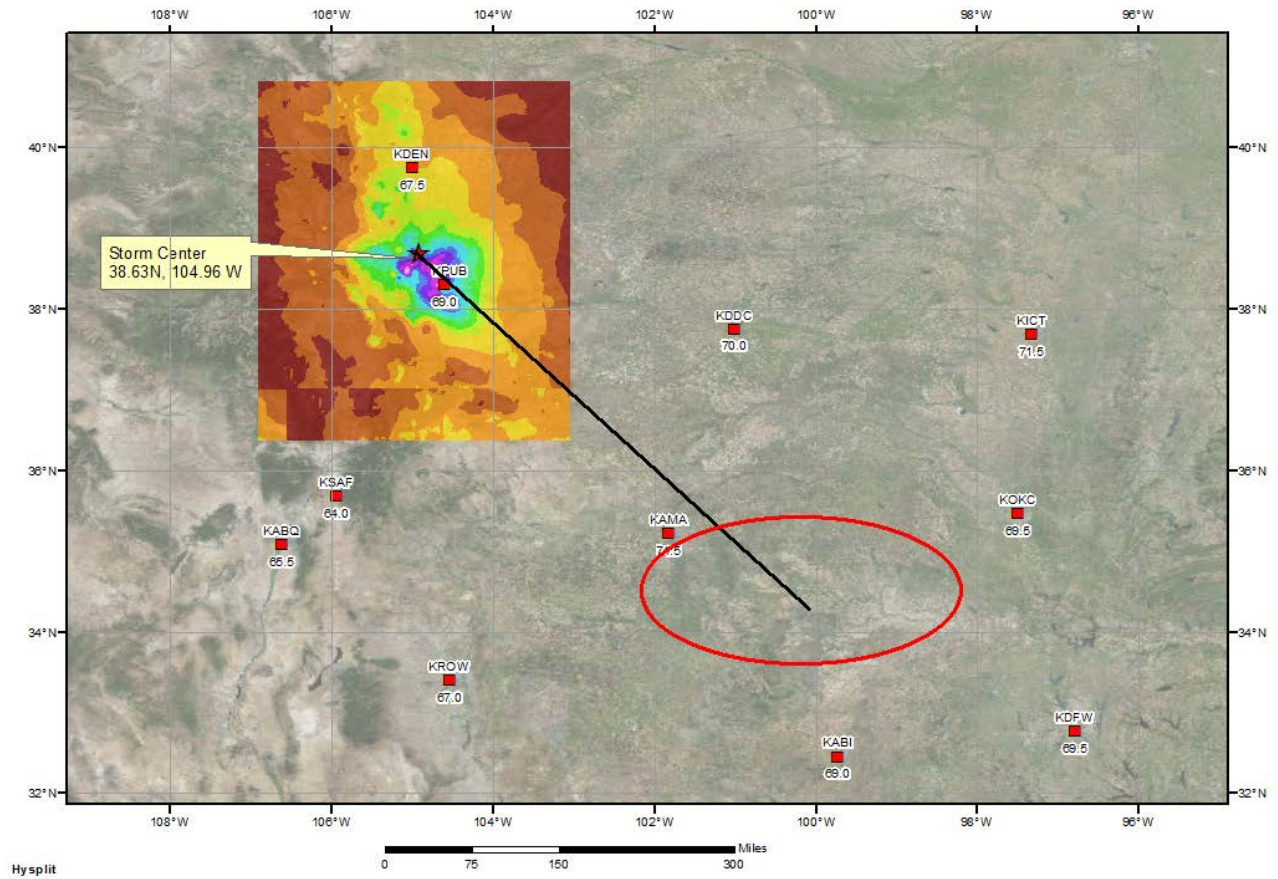


Table 5.1.--Representative persisting 12-hr 1000-mb storm and maximum dew points for important storms in and near study region

Storm		Storm T _d			Ref.	Loc.	Max. T _d		Stations
No.	Name	Old	New	Date+	Old	New	Old	New	
1.	Ward District, CO	62	64	30	325SE	350SE	75	77	AMA, DDC
6.	Boxelder, CO	60	60	4	350SE	320SE	72	74	DEN, PUB, DDC, OKC, ICT
8.	Rociada, NM	72	72	28	170SSE	300ESE	76	77	ABI, AMA
10.	Warrick, MT	64	64	6	380ESE	380ESE	73	75	ISN, PIR
13.	Evans, MT	65	65	4	510ESE	510ESE	75	76	BIS, RAP, PIR, VTN, HON
86.	May Valley, CO	67	67	18	450SSE	450SSE	76	76	AMA, ABI, FTW, SAT
20.	Clayton, NM	68	69	1	550SE	560SSE	76	77	SAT, DRT, CRP
23.	Tajique, NM	69	69	21	80SE	160SSE	77	78	ELP, ROW
25.	Lakewood, NM	-	76	7	-	350SE	-	79	DRT, SAT
27.	Meek, NM	72	72	15	390ESE	400ESE	78	79	AMA, ABI, FTW, OKC, SAT, GBK
30.	Fry's Ranch, CO	56	63	15	550ESE	700SE	71	74	FWH, DAL
31.	Penrose, CO	67	70	4	400SE	350SE	77	77	AMA, OKC
32.	Springbrook, MT	71	72	18	500ESE	370ESE	76	77	PIR, HON, FAR
35.	Virsylvania, NM (Cerro)	-	66	17	-	120SW	-	77	ABQ
38.	Savageton, WY	68	72	28	550SE	530SE	75	76	FRI, CNK
44.	Porter, NM	70	71	11	540SE	380SE	78	77	DRT, AUS, FTW, ABI
46.	Kassler, CO	71	66	10	440SE	420SE	77	77	OKC, DDC
47.	Cherry Creek, CO	72	71	30	540SE	560SE	76	79	ABI, ACT, FTW, SPS
101.	Hale, CO	72	71	30	540SE	560SE	76	79	ABI, ACT, FTW, SPS
48.	Las Cruces, NM*	-	71	30	-	-	-	78	ELP
105.	Broome, TX	77	77	14	350SSE	350SSE	78	80	CRP, BRO
53.	Loveland, CO	71	71	1	180SE	210SE	76	76	PUB, GLD
55.	Masonville, CO*	-	65	10	-	-	-	74	AKO
108.	Snyder, TX	73	75	19	100SE	340SSE	78	79	SAT, CRP
56.	Prairieview, NM	70	73	20	390SE	370SE	77	78	SAT, AUS
58.	McColiseum Ranch, NM	72	72	21	50SE	300SE	77	79	ELP, DRT, SAT, CRP
60.	Rancho Grande, NM	74	75	31	250SE	250SE	77	78	LBB, BGS, ABI
66.	Ft. Collins, CO	66	67	30	570SE	600SE	78	78	GAG, TUL
67.	Golden, CO*	65	65	7	-	-	76	75	AMA

SPAS 1294 Adelaide, CO Storm Analysis_Zone 2 June 3-4, 1921



Storm Precipitation Analysis System (SPAS) For Storm #1592_1

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

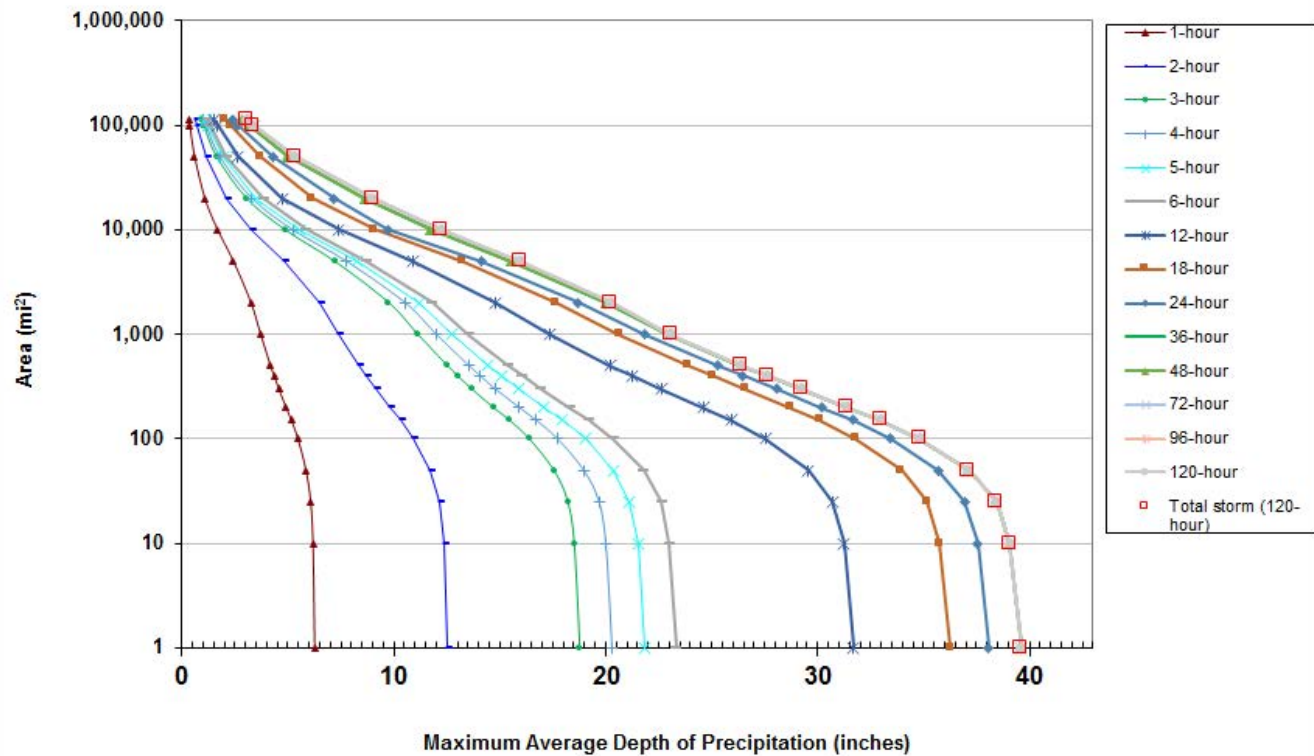
Depth-Area-Duration (DAD) analysis: Yes

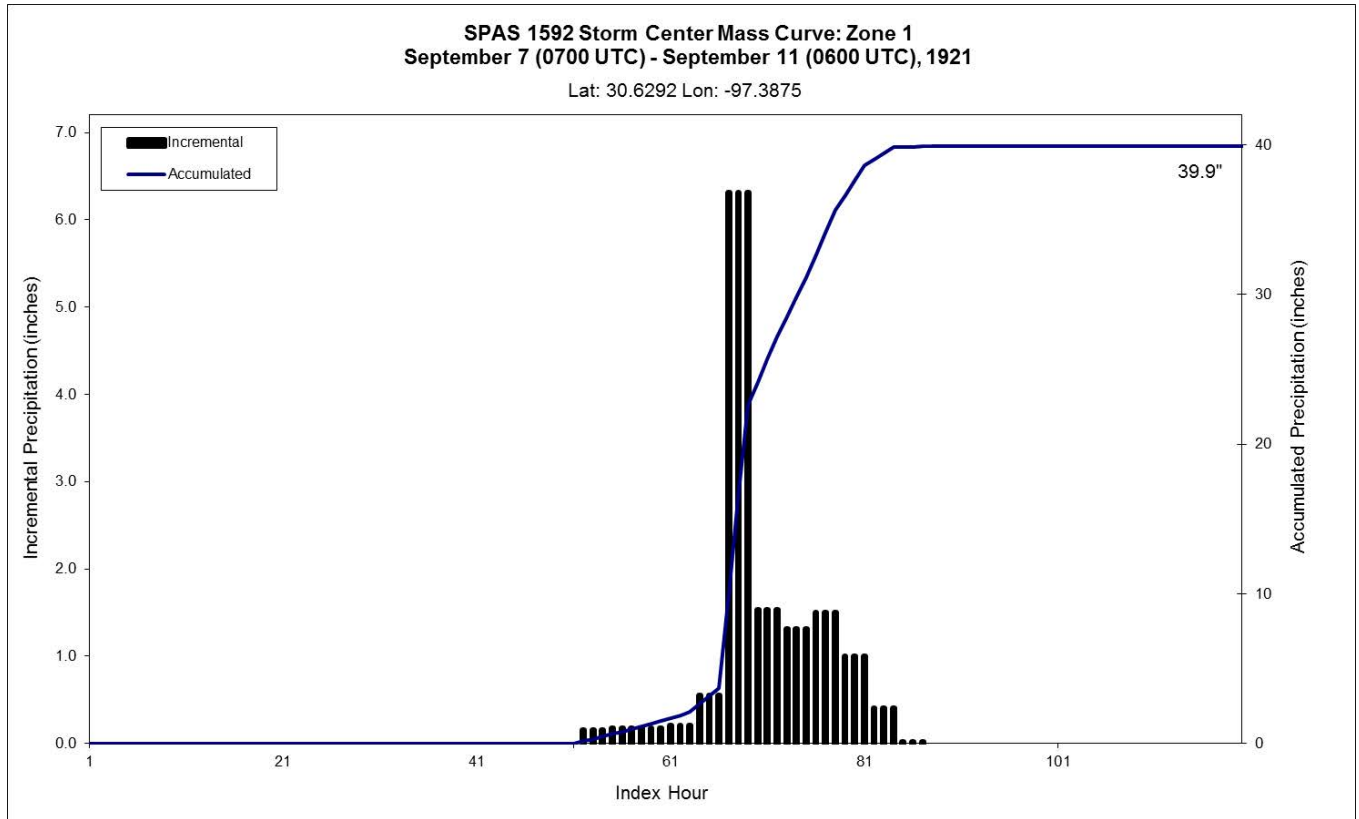
Reliability of results: This analysis was based on hourly data, daily data, and supplemental station data. We have a high degree of confidence in the station based storm total results. The spatial pattern is dependent heavily on the Weather Bureau Isohyetal basemap, and the timing is based on hourly, hourly pseudo, and hourly estimated pseudo stations. An additional 56 supplemental stations were created to ensure data consistency.

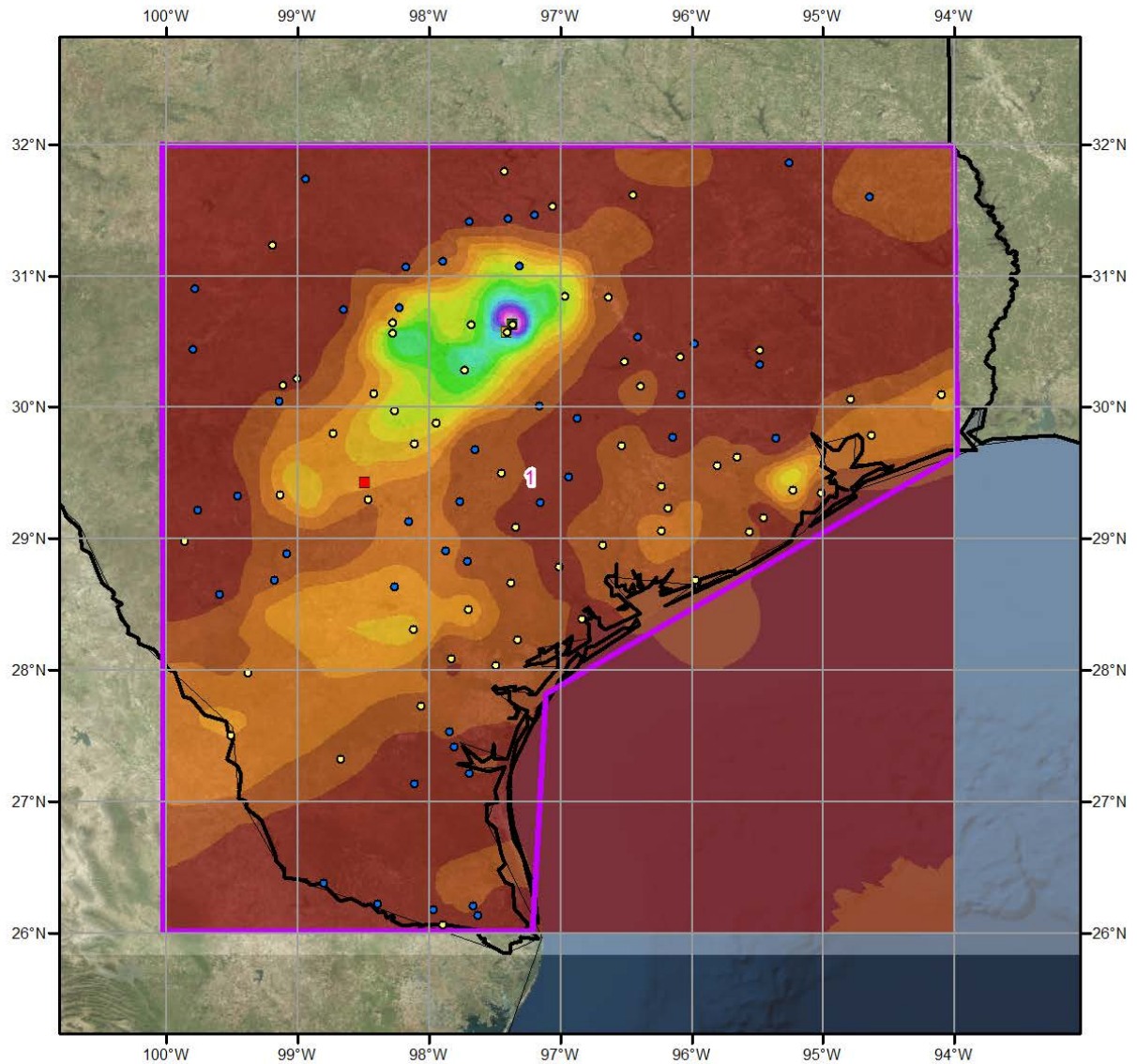
					Storm Rep. Dew Point					Climatological Max. Dew Point						
SPAS Storm ID	LON	LAT	ELEV	ELEV Round	T _d	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	T _d	T _d Round	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	IPMF
1592_1_loc	-97.388	30.629	600	600	79.00	3.44	0.17	80	3.270	81.33	81.5	3.86	0.18	85	3.680	1.125

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	Total
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	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	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	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	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	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	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	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	31.40
300	4.57	9.13	13.68	14.79	15.87	16.95	22.63	26.58	28.08	29.22	29.22	29.25	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	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	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	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	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	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	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	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	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	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	3.09

**SPAS #1592 DAD Curves Zone 1
September 7-11, 1921**

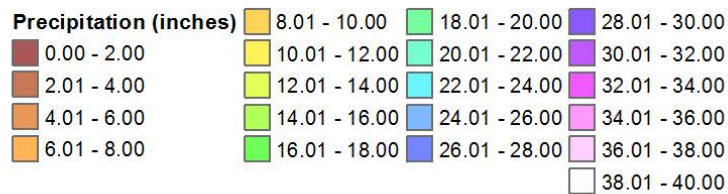




Total Storm (120-hours) Precipitation (inches)
September 7-11, 1921
SPAS 1592 - Thrall, TX

Gauges

- Daily
- Hourly
- HEP
- Hourly Pseudo
- Supplemental



4/3/2015

WAR DEPARTMENT

CORPS OF ENGINEERS, U.S. ARMY

STORM STUDIES - PERTINENT DATA SHEET

Storm of 8-10 Sept. 1921
 Assignment GM 4-12
 Location Central Texas
 Study Prepared by:
 Southwestern Division
 Galveston District Office
 & Hydrometeorological Section

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
 Remarks: Center near
 Thrall (Taylor), Texas

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) ----- 7
 Form 5001-B (24-hour " ") ----- 23
 Form 5001-D (" " " ") ----- 2
 Misc. precip. records, meteorological data, etc. ----- 30
 Form 5002 (Mass rainfall curves) ----- 35

PART II

Final isohyetal maps, in 1 sheet, scale 1:500,000
 Data and computation sheets:
 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 -----

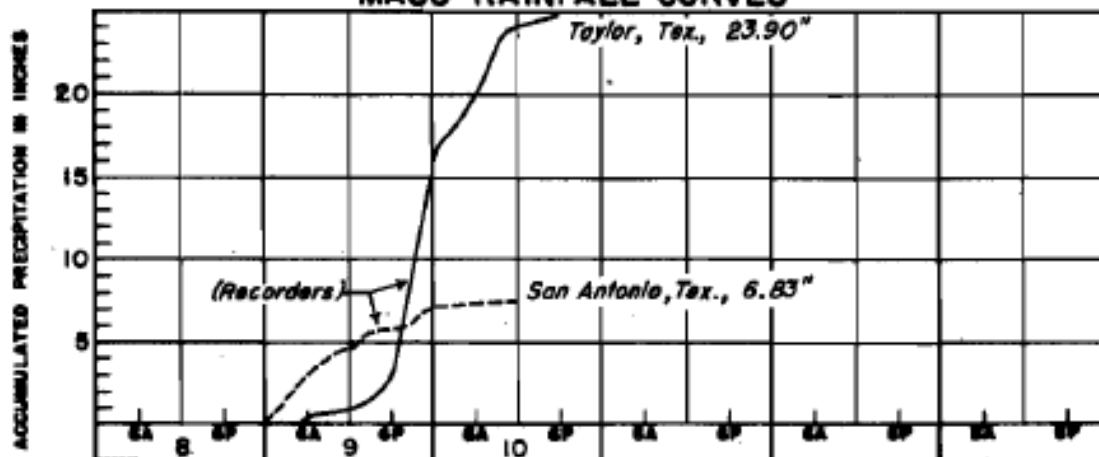
MAXIMUM AVERAGE DEPTH OF RAINFALL IN INCHES

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					

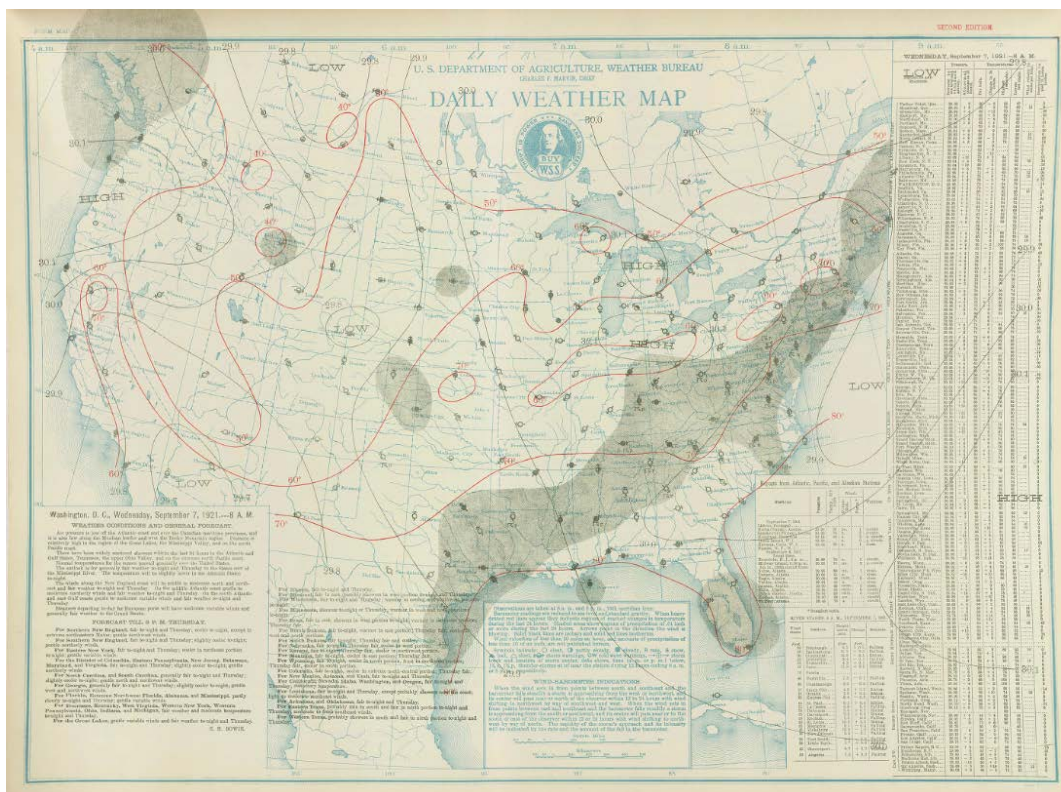
Form 3-2

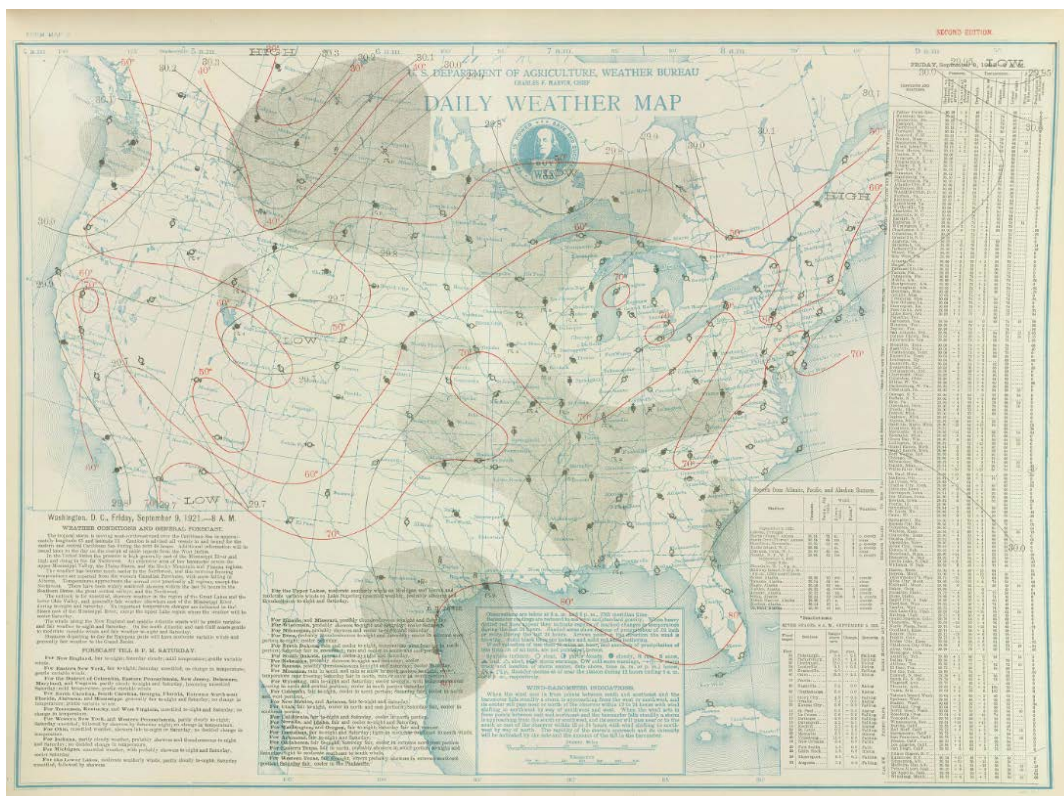
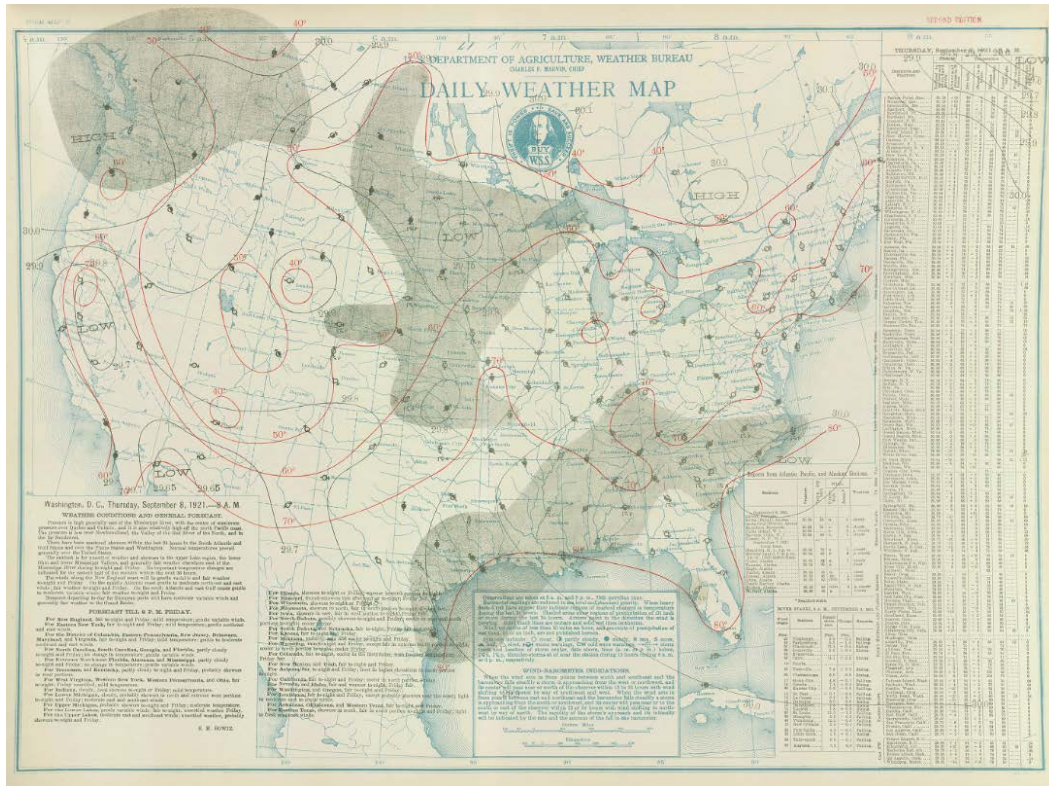
WAR DEPARTMENT

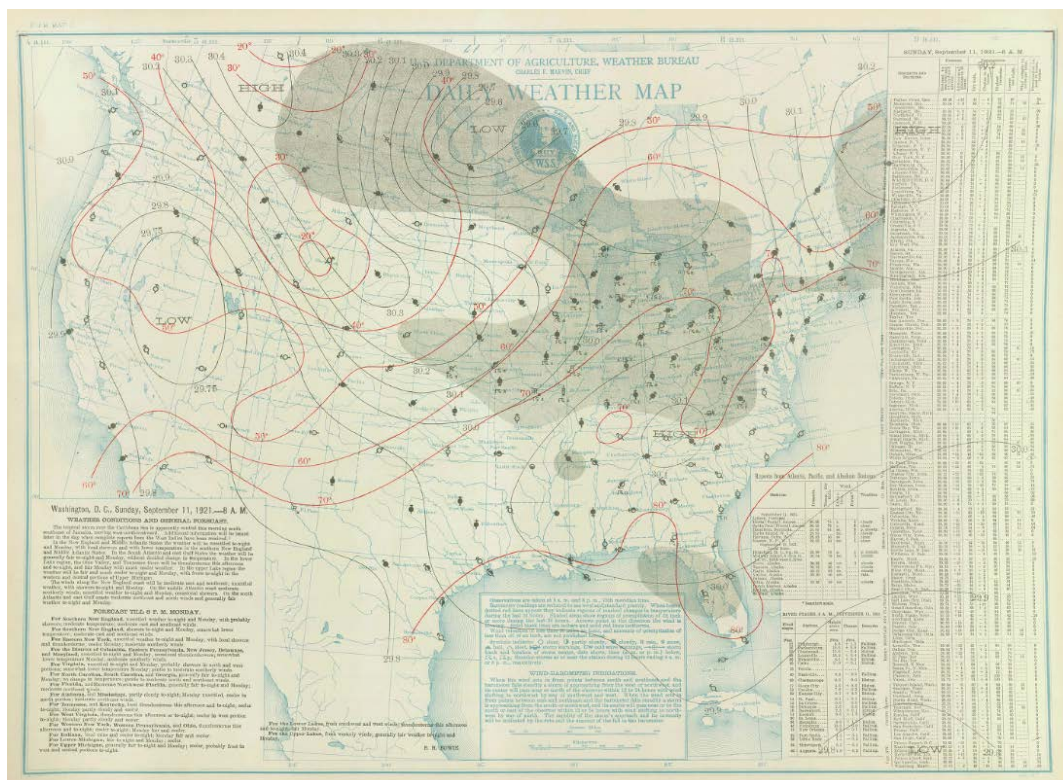
CORPS OF ENGINEERS, U. S. ARMY

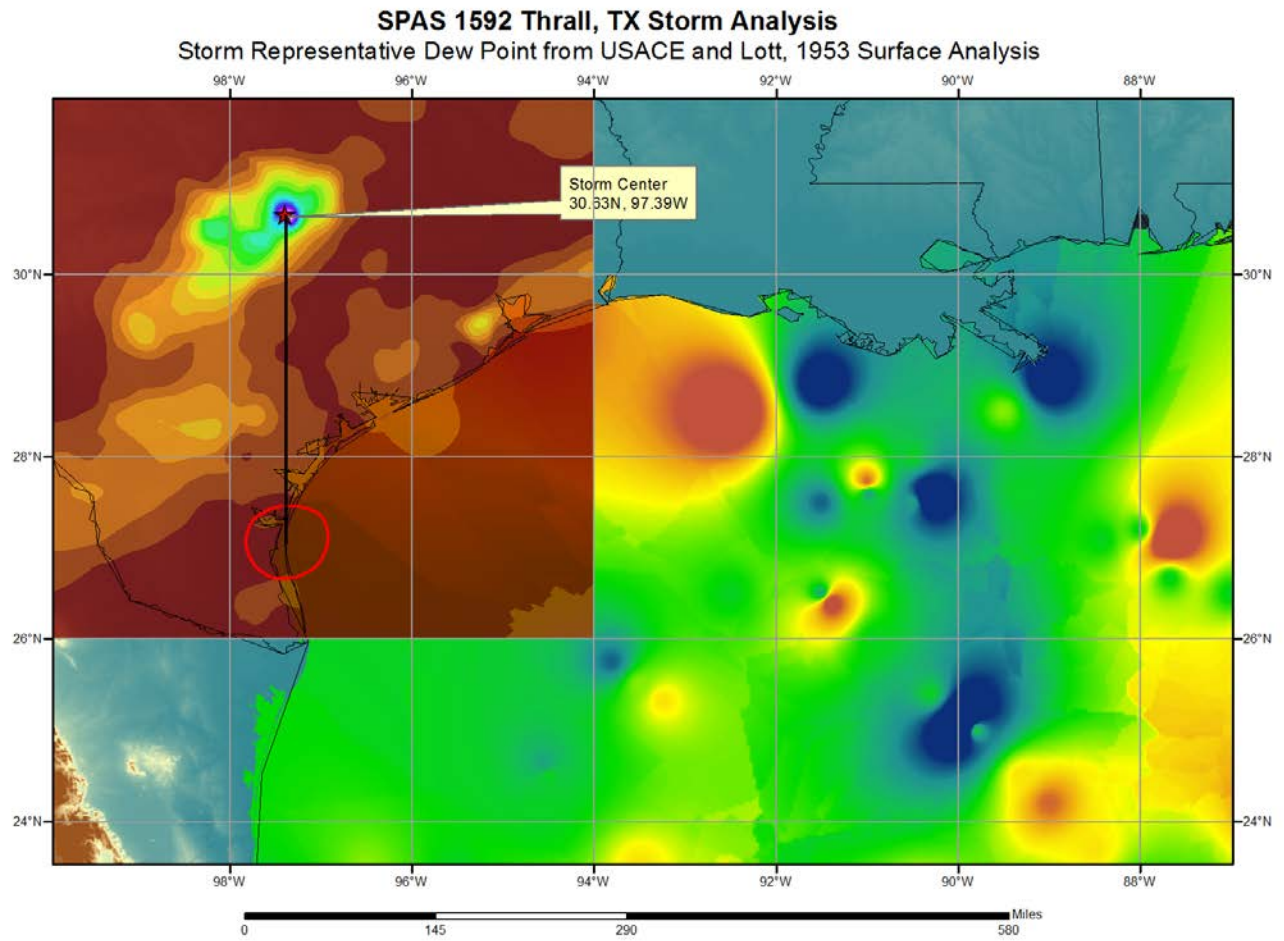
STORM STUDIES - ISOHYETAL MAPStorm of September 8-10, 1921 Assignment GM 4-12Study Prepared by: Galveston, Tex. District
Southwestern Division & Hydrometeorological Section**MASS RAINFALL CURVES**

FORM 8-32

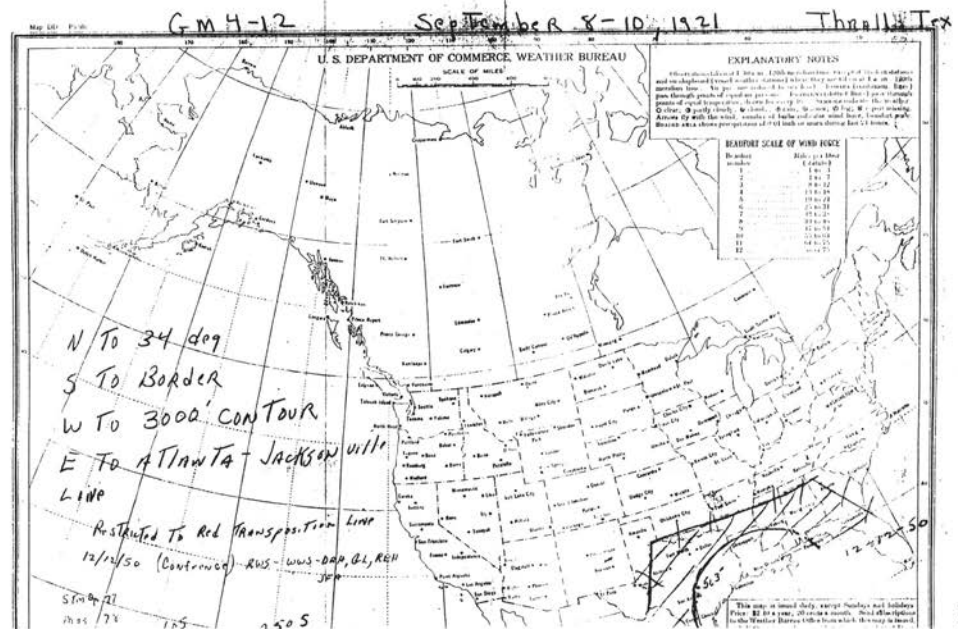








Storm Date	Assignment Number	Representative Storm Dewpoint	Reference Point
<u>1919 (cont.)</u>			
Sep 14-15	GM 5-15A	75	125 E of George West, Tex.
Sep 15-17	GM 5-15B	72	390 ESE of Meek, N. Mex.
Sep 16-19	MR 2-23	70	325 SE of Bruning, Nebr.
Sep 27-28	MR 5-24	41	450 ESE of Browning, Mont.
Oct 25-28	LMV 1-13A	70	125 SE of Steelville, Mo.
Oct 30-Nov 1	LMV 1-13B	67	150 SSE of Litchfield, 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) (68)	400 SSW of Warsaw, Mo. 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 Harrisonville, 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.



Storm Precipitation Analysis System (SPAS) For Storm #1560_1

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

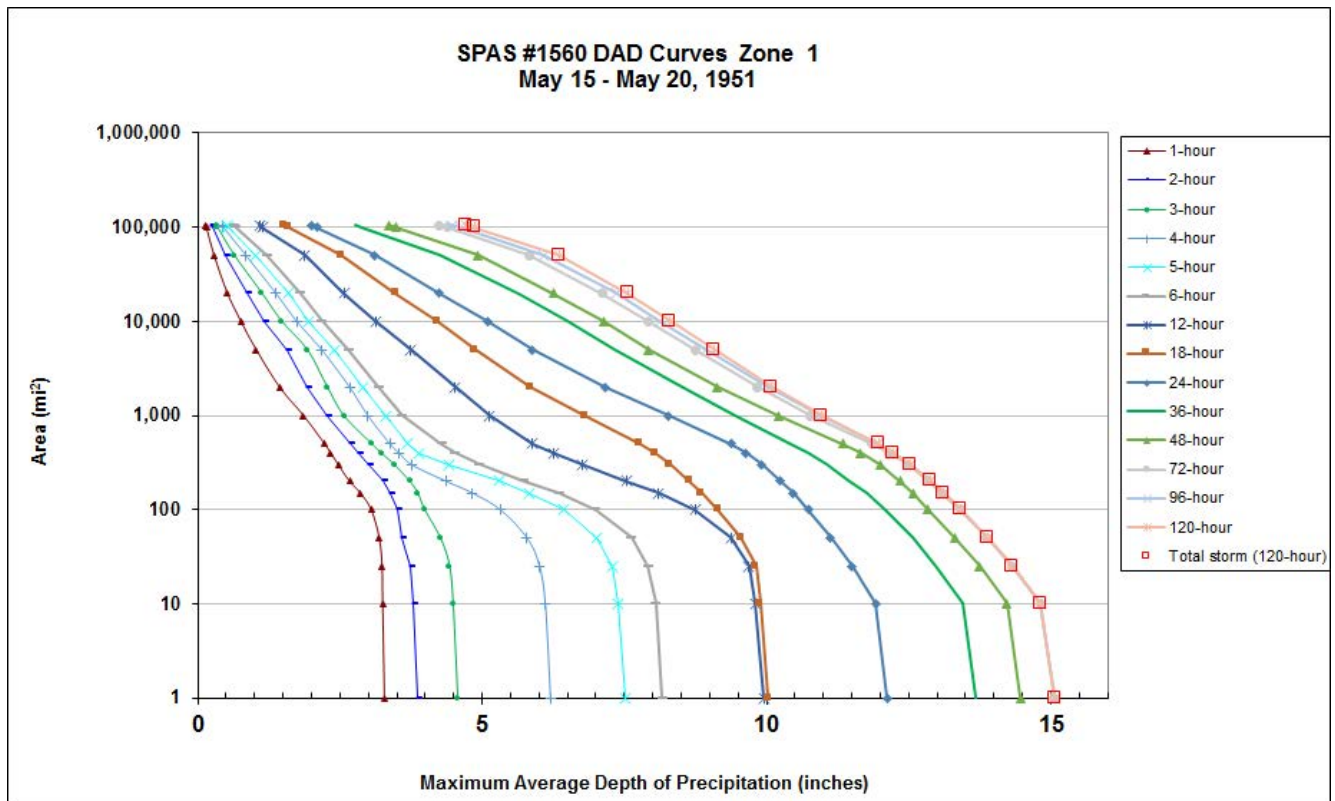
Radar Included: No

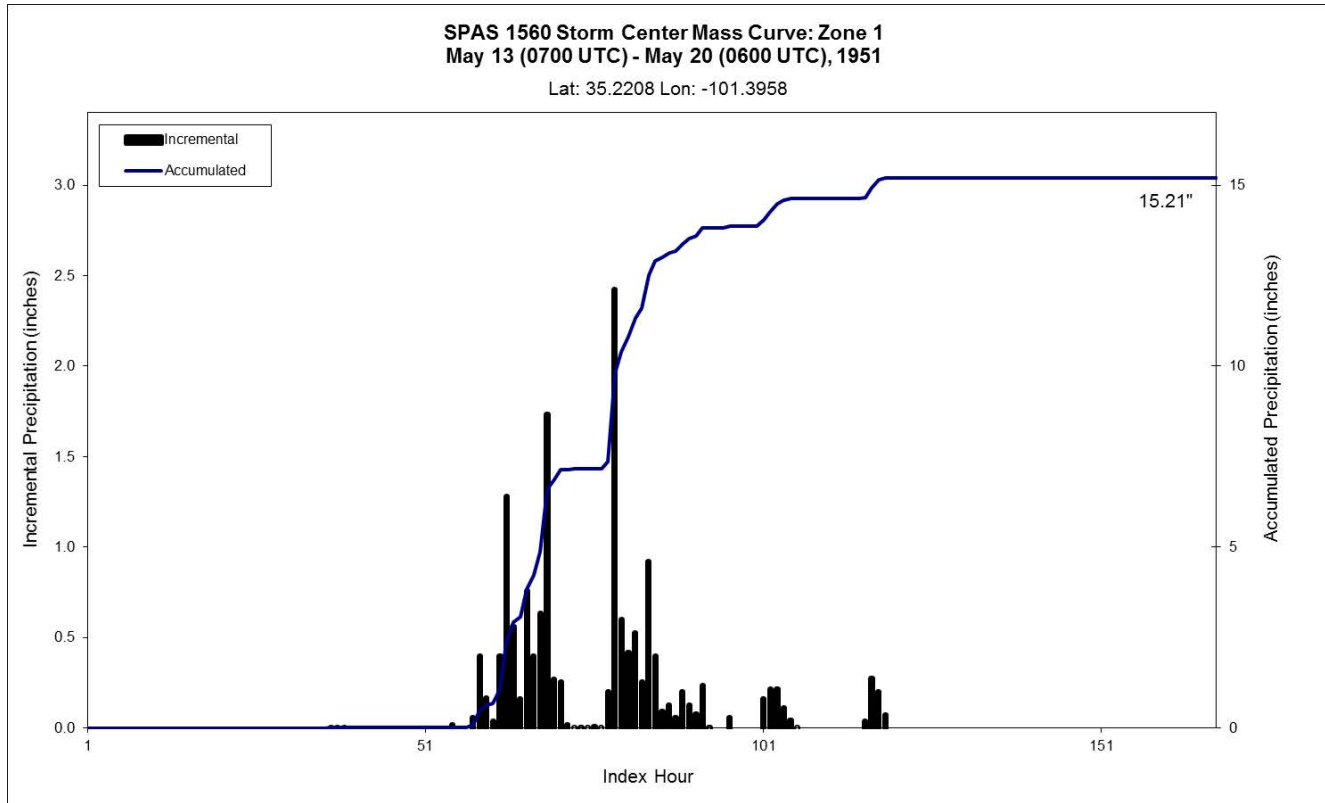
Depth-Area-Duration (DAD) analysis: Yes

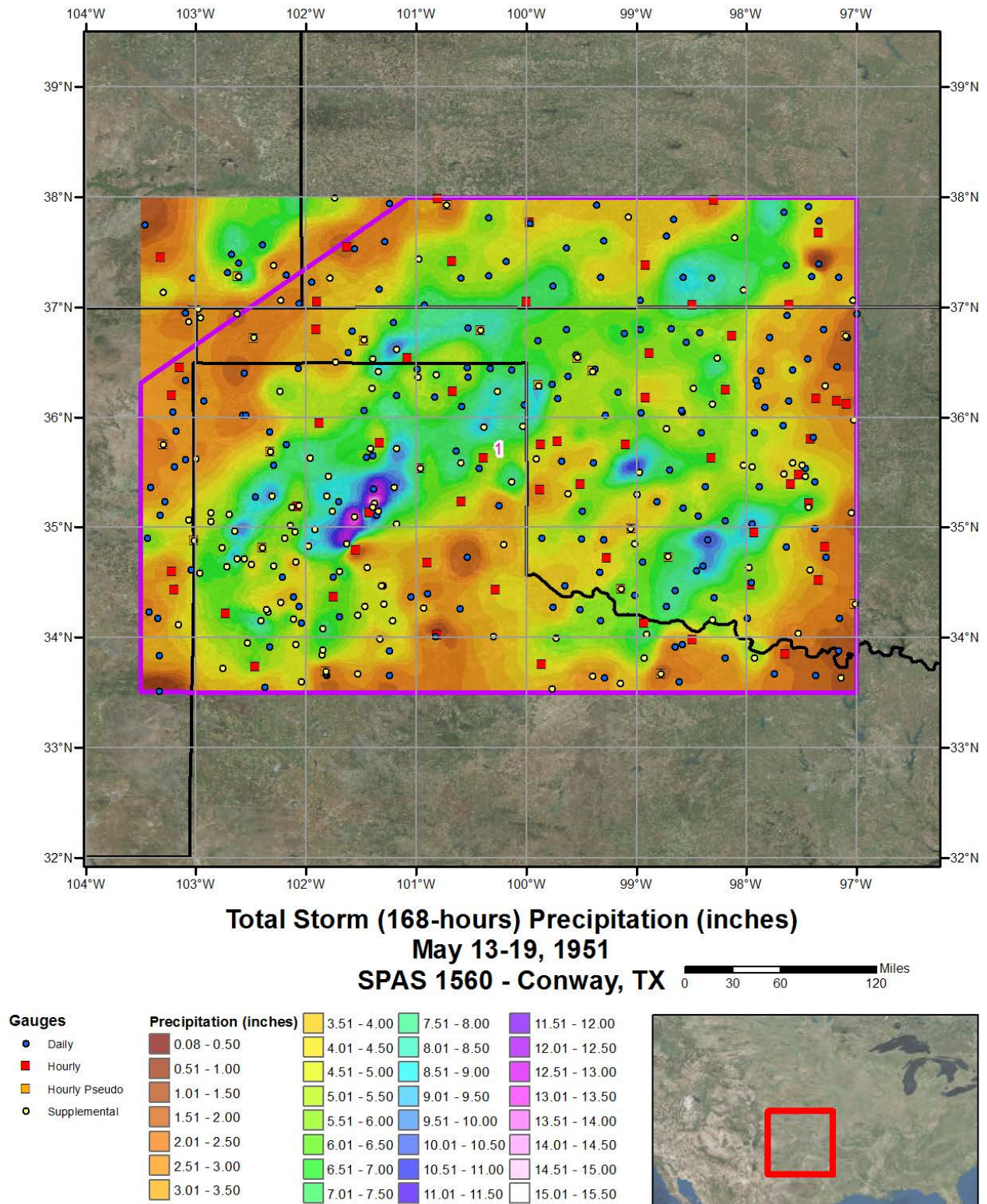
Reliability of results: This analysis was based on hourly data, daily data, and supplemental station data. We have a high degree of confidence in the station based storm total results. The spatial pattern is dependent on the blended basemap, and the timing is based on hourly and hourly pseudo stations. An additional 138 supplemental stations were created to ensure data consistency.

					Storm Rep. Dew Point					Climatological Max. Dew Point						
SPAS Storm ID	LON	LAT	ELEV	ELEV Round	T _d	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	T _d	T _d Round	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	IPMF
1560 1 loc	-101.396	35.221	3,450	3,500	71.50	2.42	0.72	65	1.700	78.18	78.0	3.29	0.89	78	2.400	1.412

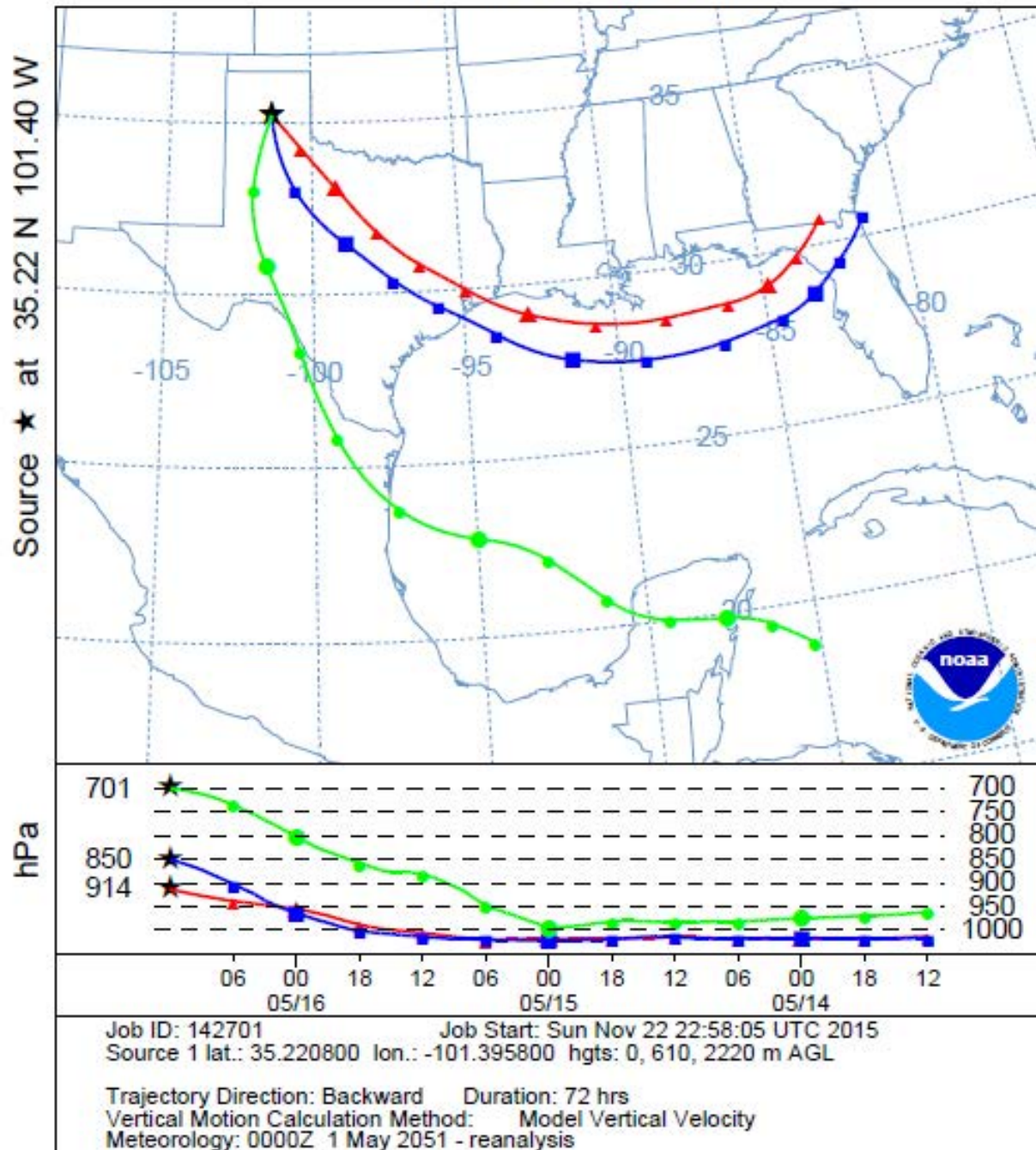
Storm 1560 - May 13 (0700 UTC) - May 20 (0600 UTC), 1951															
MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)															
Area (mi ²)	Duration (hours)														
	1	2	3	4	5	6	12	18	24	36	48	72	96	120	Total
0.3	3.29	3.88	4.60	6.24	7.56	8.21	10.01	10.09	12.20	13.76	14.56	15.16	15.17	15.21	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	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	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	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	13.89
100	3.05	3.51	3.99	5.32	6.44	7.00	8.74	9.15	10.73	12.08	12.84	13.40	13.42	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	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	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	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	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	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	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	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	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	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	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	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	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	4.71



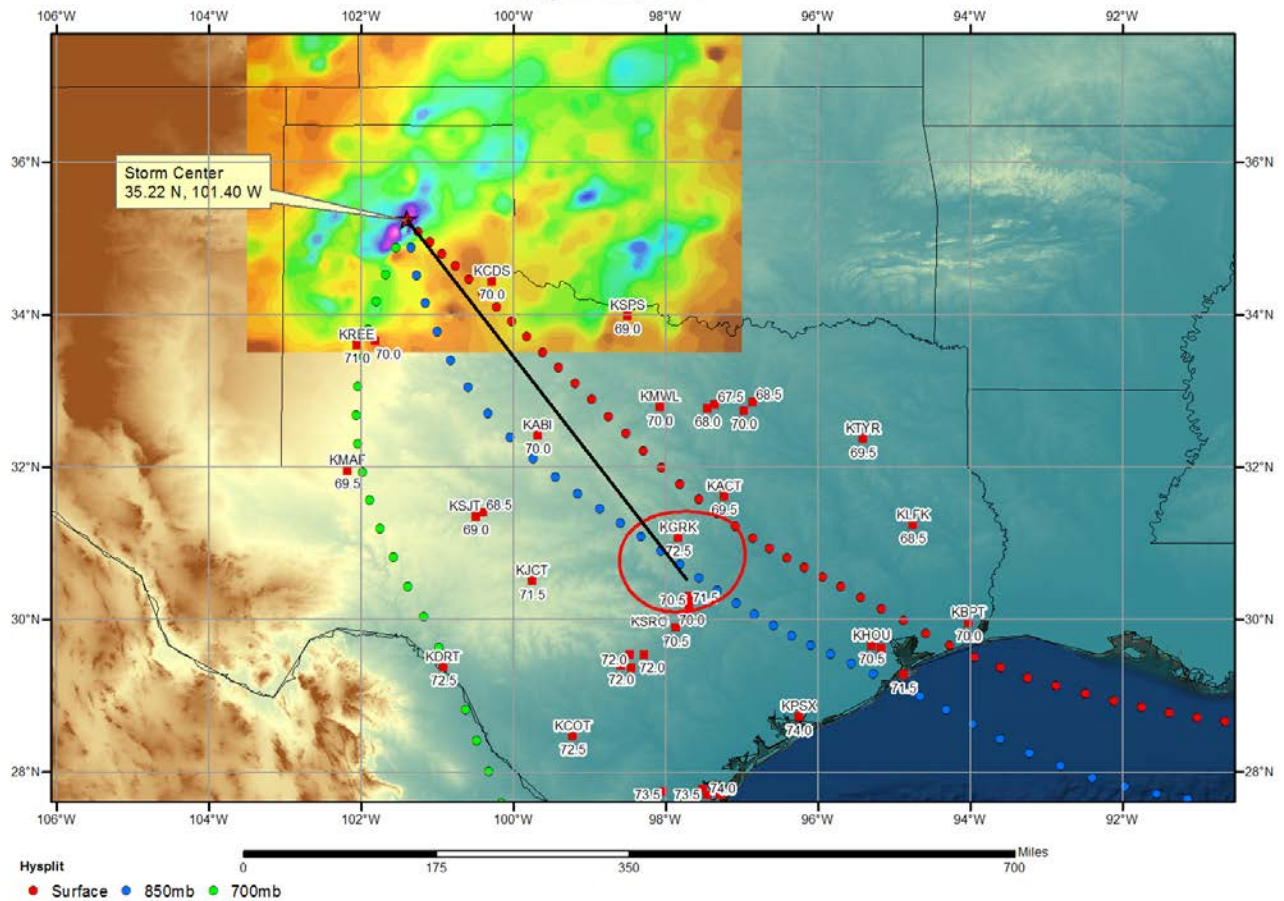




NOAA HYSPLIT MODEL
 Backward trajectories ending at 1200 UTC 16 May 51
 CDC1 Meteorological Data



SPAS 1560 Conway, TX Storm Analysis May 14-16, 1951



Storm Precipitation Analysis System (SPAS) For Storm #1293_3 (Re-Run of SPAS #1009)

General Storm Location: Southeastern Colorado, extreme northeastern New Mexico and extreme eastern Kansas.

Storm Dates: June 14 – 19, 1965

Event: Thunderstorms and possible Mesoscale Convective Complex (MCC)

DAD Zone 3 (South of Denver, CO – Elbert, eastern El Paso, Teller, western Adams & eastern Arapahoe Counties)

Latitude: 39.1875

Longitude: -104.29583

Max. Grid Rainfall Amount: 16.28”

Max. Observed Rainfall Amount: 14.00”

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:

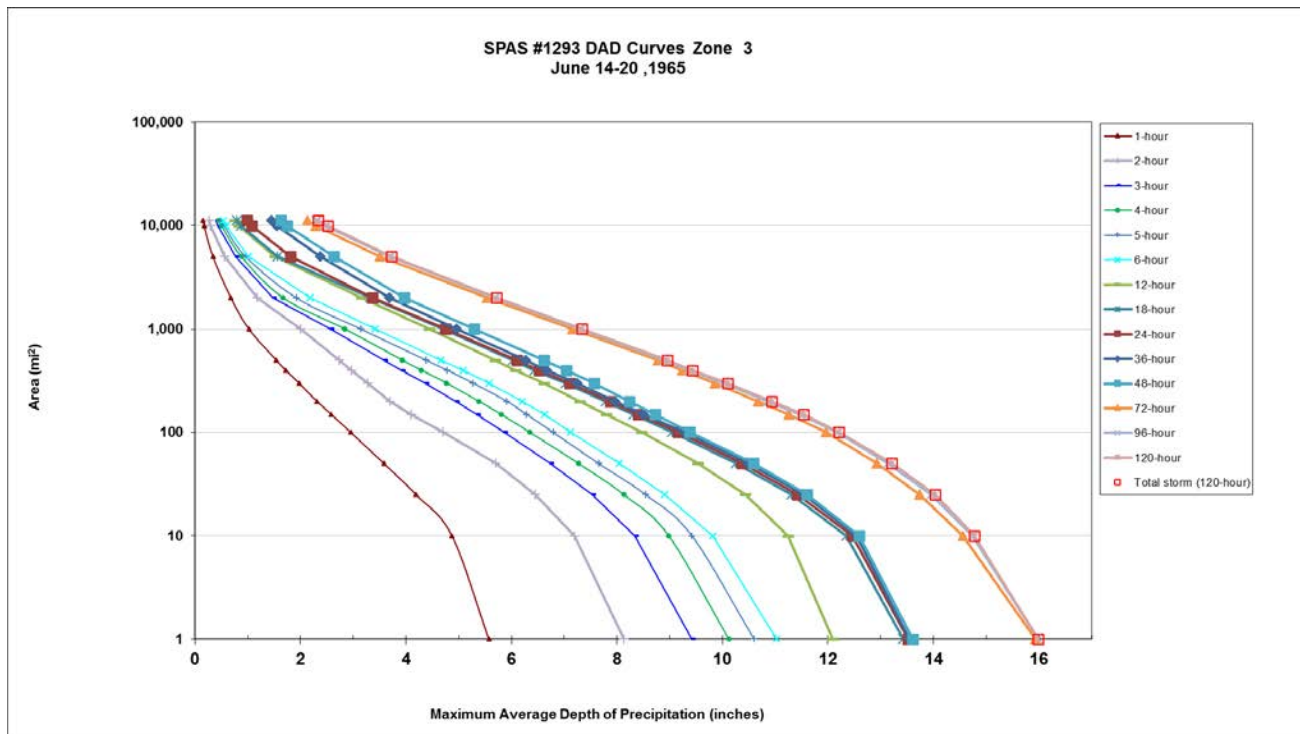
- This analysis was a re-analysis of SPAS #1009. Since then, several software enhancements have taken place. Plus, a large amount of additional data (Bucket Survey) was added, mainly to address the western storm centers (southeast of Denver). Also, a USGS isohyetal map was used as the basemap, which 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.

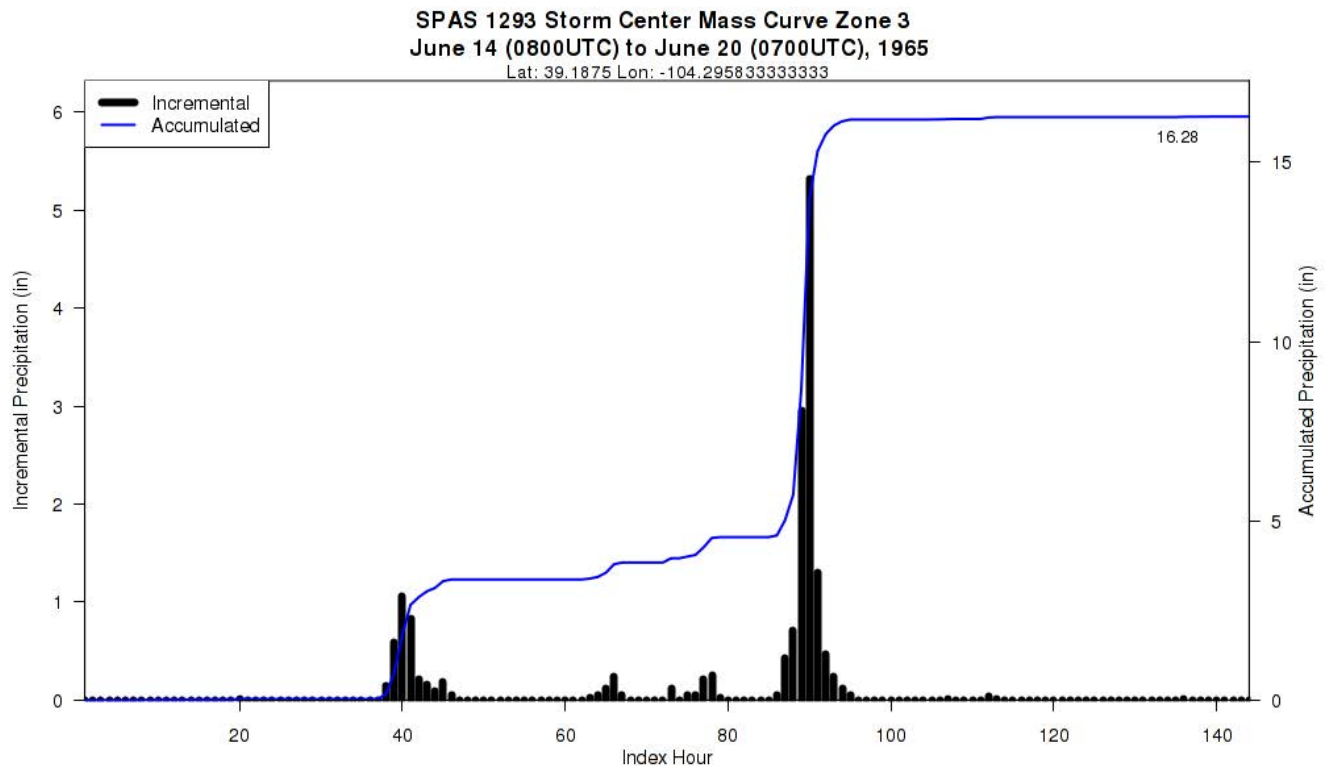
- 251 Bucket Survey amounts were added from the Colorado Climatological Data. After QC, a total of 224 remained in the data set.

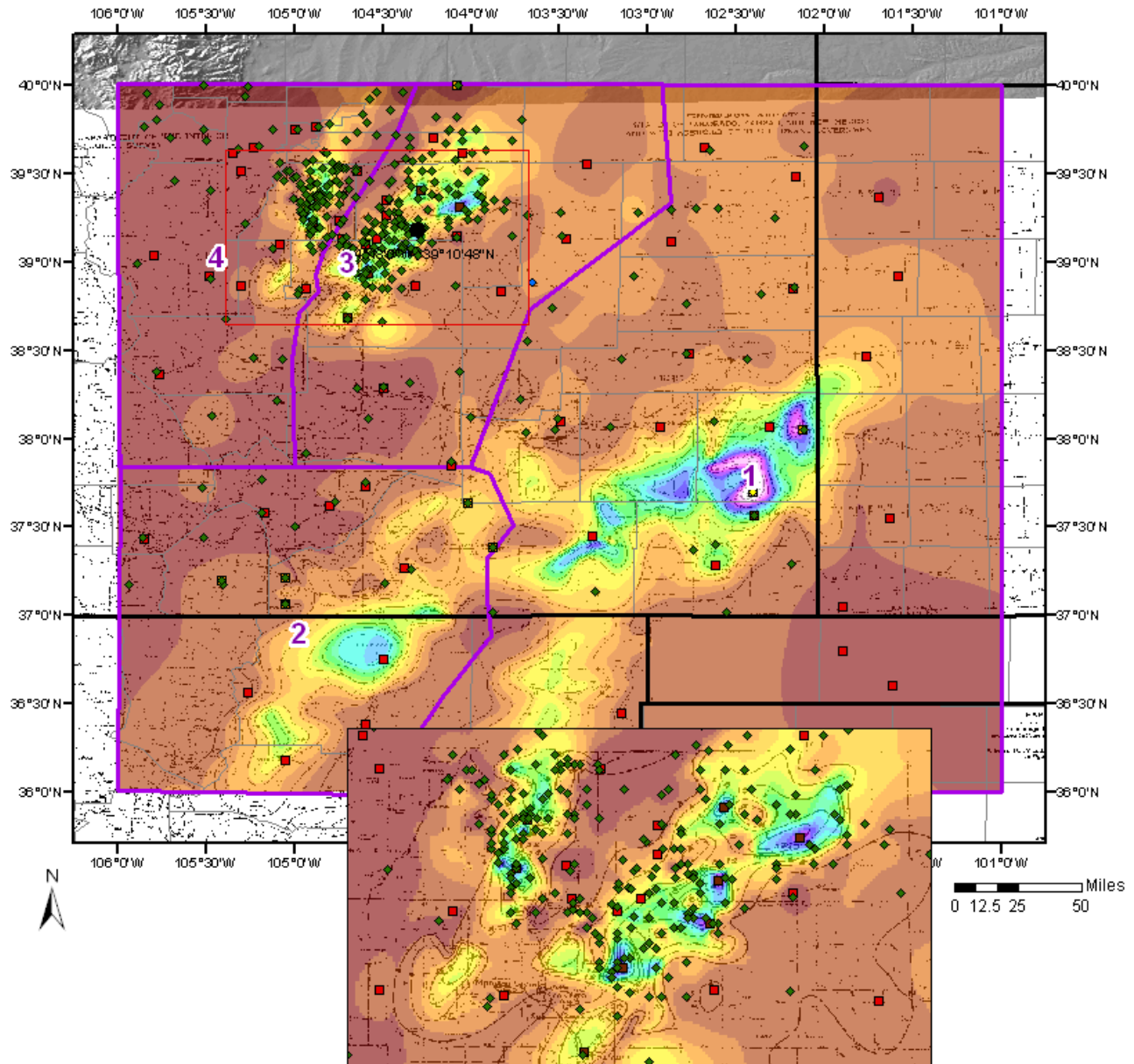
Unlike SPAS #1009 where the storm center was near Holly, SPAS #1293 has the storm center about 30 miles southwest of Holly (or 28 miles south–southeast of Lamar, CO). The USGS report stated intense rains began on June 16th in this area and dropped 15.5” of rain. Coupled with other rain showers during 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.

					Storm Rep. Dew Point					Climatological Max. Dew Point						
SPAS Storm ID	LON	LAT	ELEV	ELEV Round	T _d	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	T _d	T _d Round	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	IPMF
1293_3_loc	-104.296	39.188	6,215	6,000	77.00	3.14	1.36	76	1.780	80.95	81.0	3.77	1.57	84	2.200	1.236

SPAS 1293 - June 14 (800 UTC) - June 20 (700 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
0.4	5.65	8.23	9.53	10.24	10.71	11.14	12.25	13.61	13.71	13.73	13.76	16.1	16.16
1	5.57	8.13	9.42	10.12	10.6	11.02	12.09	13.43	13.52	13.54	13.61	15.93	15.99
10	4.87	7.19	8.34	8.98	9.42	9.81	11.24	12.35	12.46	12.54	12.59	14.56	14.74
25	4.19	6.45	7.53	8.13	8.54	8.9	10.43	11.3	11.42	11.54	11.6	13.74	13.96
50	3.58	5.7	6.73	7.27	7.65	8.04	9.53	10.25	10.37	10.48	10.59	12.92	13.13
100	2.95	4.7	5.86	6.35	6.79	7.12	8.47	9.05	9.16	9.27	9.38	11.96	12.17
150	2.58	4.09	5.34	5.8	6.28	6.63	7.8	8.31	8.4	8.51	8.72	11.25	11.46
200	2.31	3.7	4.95	5.38	5.91	6.21	7.3	7.78	7.87	7.96	8.24	10.68	10.86
300	1.97	3.27	4.37	4.77	5.27	5.57	6.62	7.02	7.1	7.24	7.56	9.86	10.02
400	1.72	2.97	3.91	4.29	4.78	5.09	6.08	6.44	6.52	6.67	7.04	9.37	9.43
500	1.54	2.73	3.58	3.93	4.38	4.66	5.69	6.03	6.1	6.27	6.62	8.78	8.89
1,000	1.02	2	2.57	2.84	3.14	3.41	4.44	4.7	4.75	4.96	5.29	7.15	7.29
2,000	0.68	1.18	1.48	1.67	1.92	2.18	3.16	3.33	3.36	3.68	3.97	5.53	5.68
5,000	0.34	0.56	0.77	0.88	0.96	1.01	1.51	1.57	1.81	2.37	2.63	3.5	3.69
10,000	0.17	0.29	0.43	0.5	0.55	0.59	0.83	0.87	1.07	1.55	1.75	2.29	2.47
11,201	0.15	0.26	0.39	0.45	0.49	0.54	0.75	0.79	0.98	1.45	1.63	2.13	2.3

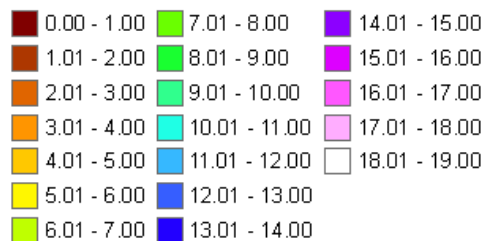




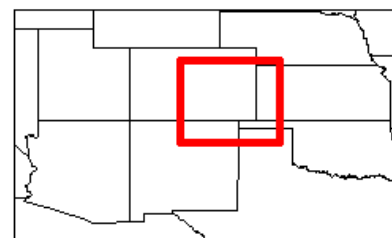
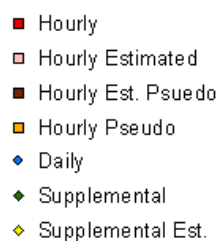


Total 144-hour Precipitation (inches)
06/14/1965 08 UTC - 06/20/1965 07 UTC
SPAS #1293

Precipitation (inches)

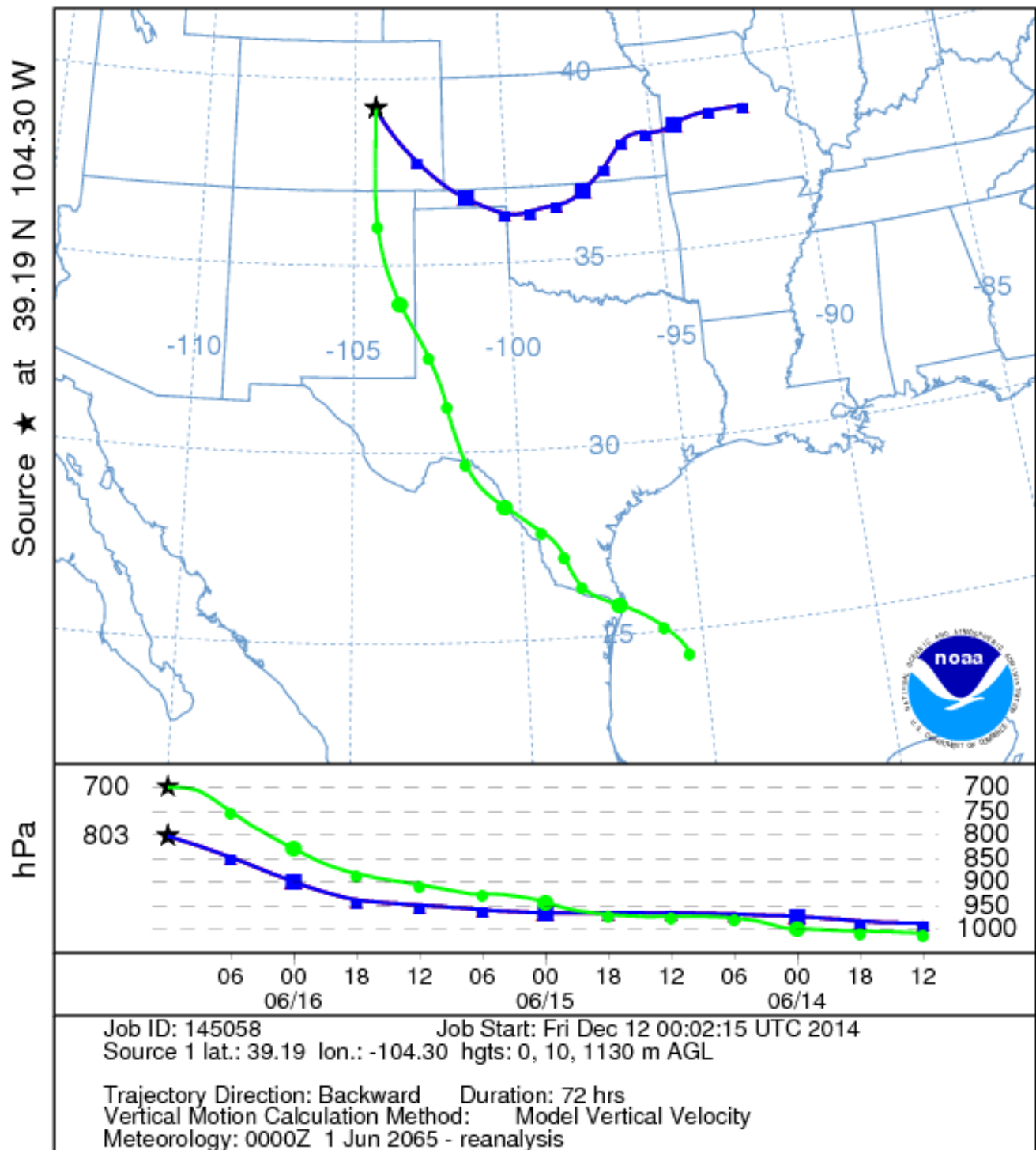


Stations

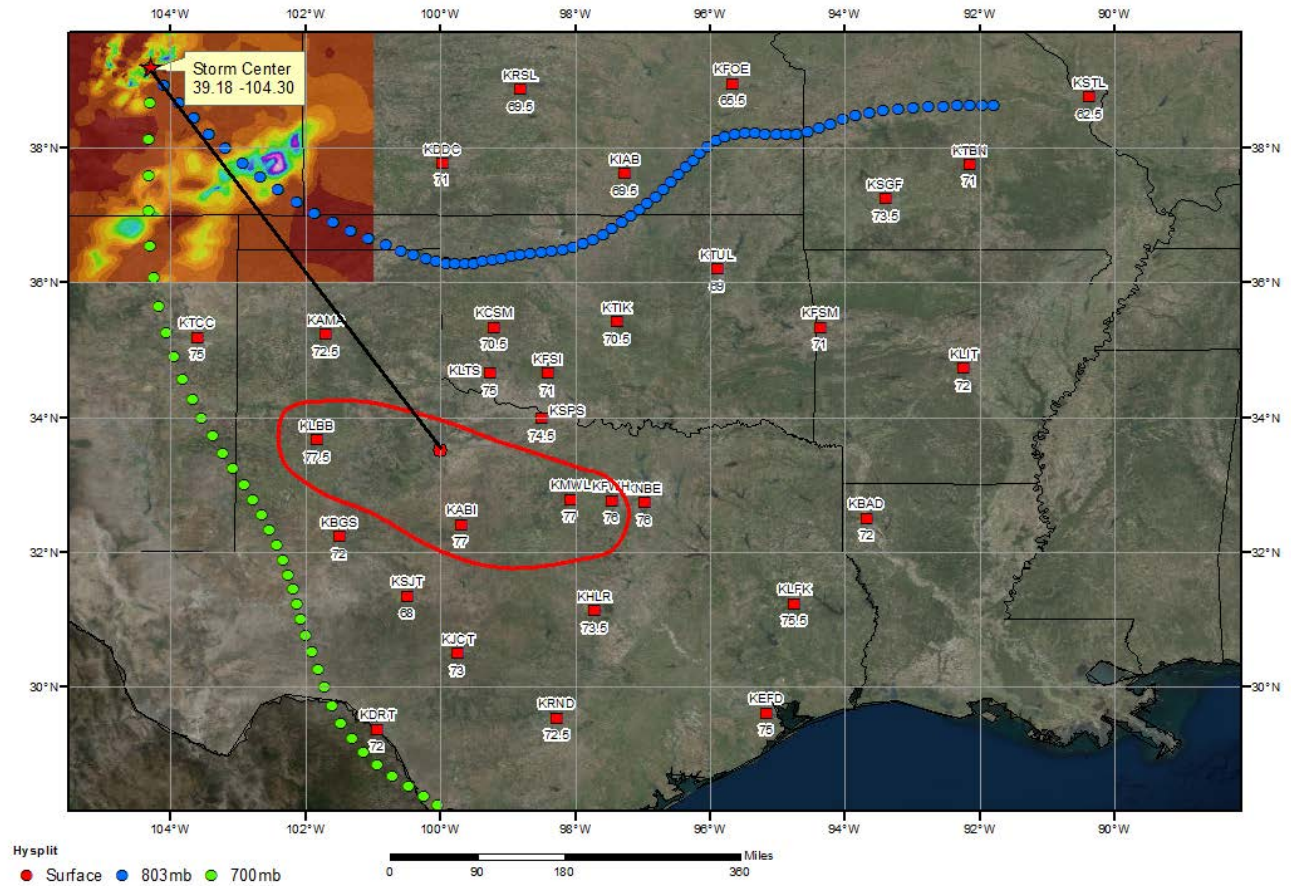


08/20/2013 (updated 12/9/13)

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



SPAS 1293 Zone 3 Elbert, CO Storm Analysis June 13-16, 1965



Storm Precipitation Analysis System (SPAS) For Storm #1568_1

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

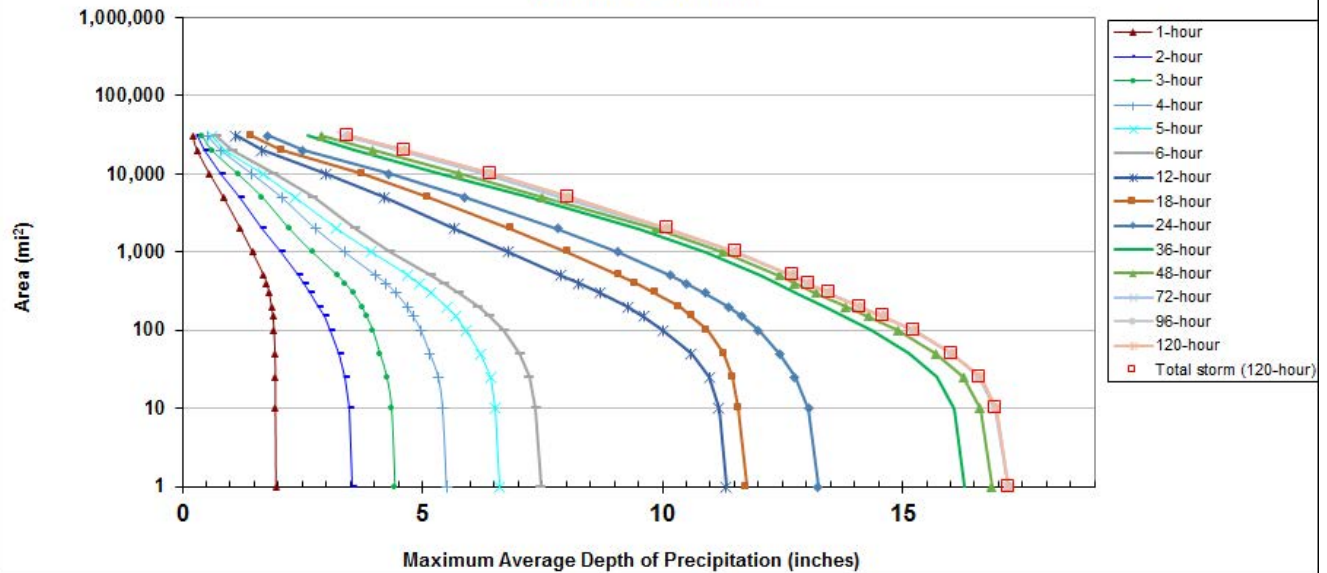
Reliability of results: This analysis was based on hourly data, daily data, and supplemental station data. We have a high degree of confidence in the station based storm total results. The spatial pattern is dependent on the blended basemap, and the timing is based on hourly and hourly pseudo stations. An additional 22 supplemental stations were created to ensure data consistency.

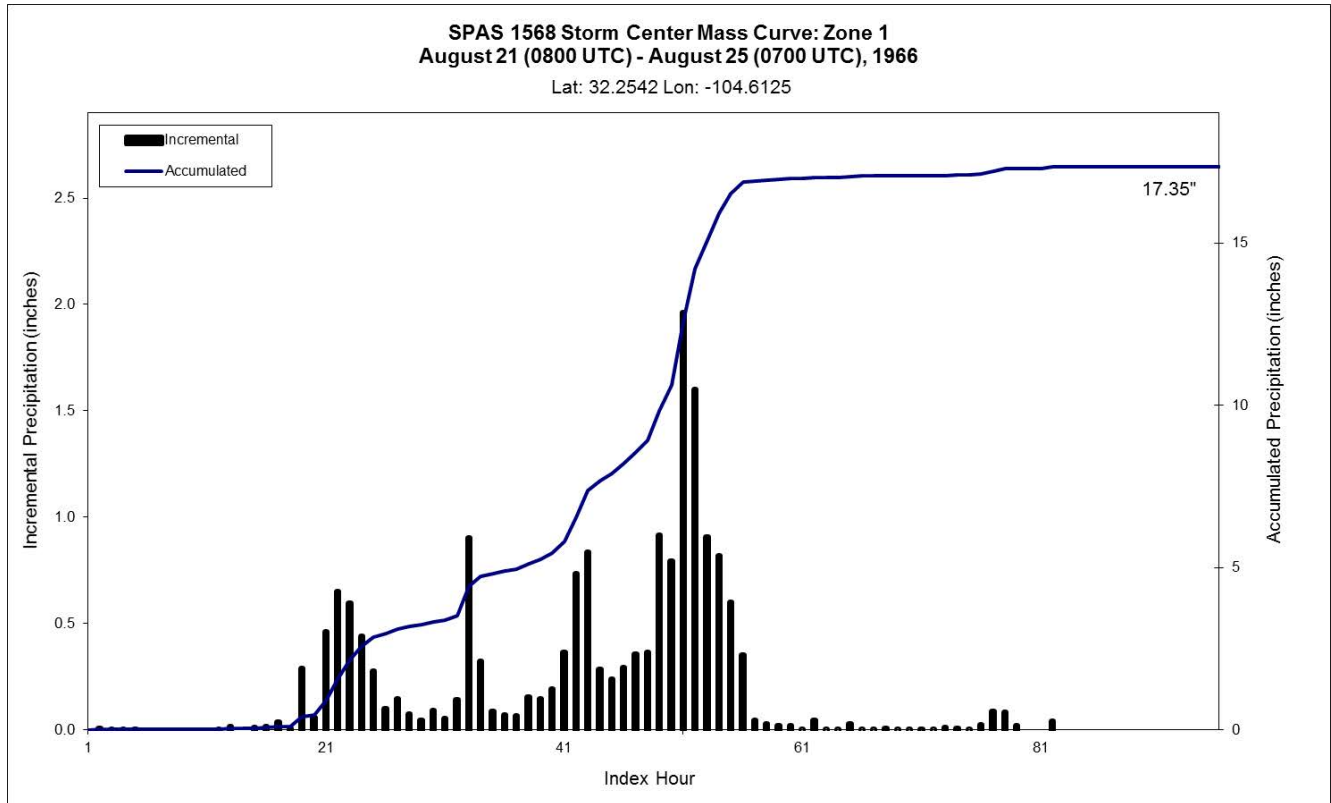
					Storm Rep. Dew Point					Climatological Max. Dew Point						
SPAS Storm ID	LON	LAT	ELEV	ELEV Round	T _d	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	T _d	T _d Round	Precip. Water @ 30,000 ft	Precip. Water @ Storm Elev.	PW Lookup Table Column	Avail. Moisture	IPMF
1568_1_loc	-104.613	32.254	4,342	4,300	74.00	2.73	0.93	70	1.800	78.89	79.0	3.44	1.10	80	2.340	1.300

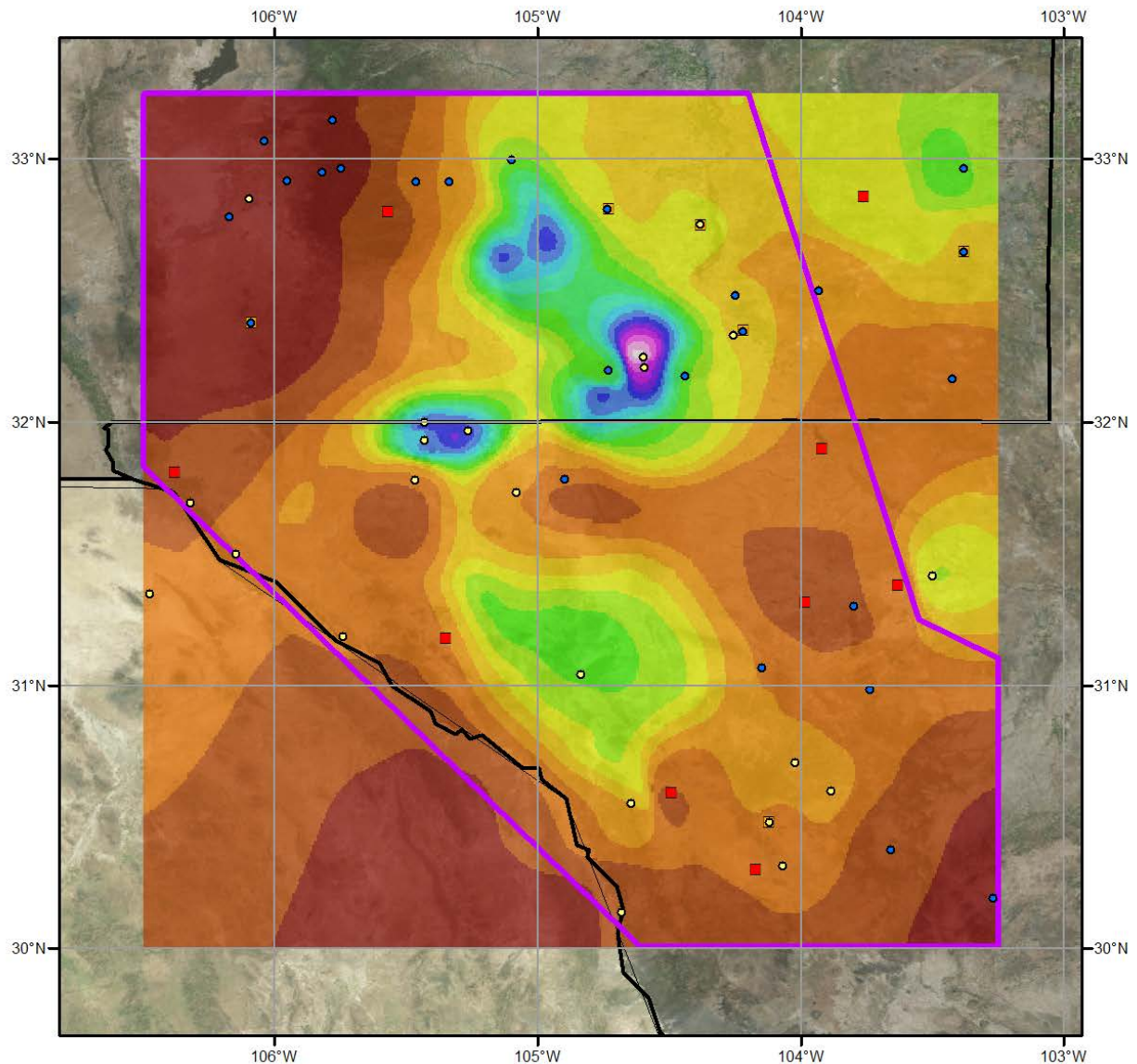
Storm 1568 - August 21 (0800 UTC) - August 25 (0700 UTC), 1966**MAXIMUM AVERAGE DEPTH OF PRECIPITATION (INCHES)**

Area (mi ²)	Duration (hours)													
	1	2	3	4	5	6	12	18	24	36	48	72	96	120
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
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
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
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
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
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
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
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
300	1.81	2.66	3.56	4.45	5.18	5.77	8.71	9.86	10.88	12.80	13.19	13.45	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
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
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
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
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
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
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
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

SPAS #1568 DAD Curves Zone 1
August 21 - 25, 1966



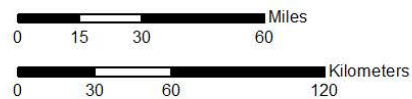




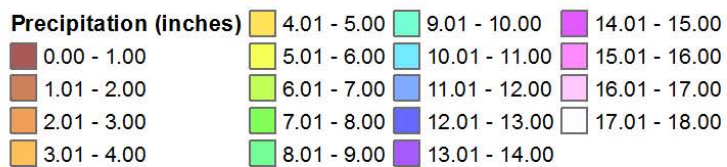
Total Storm (96-hours) Precipitation (inches)
August 21-24, 1966
SPAS 1568 - Carlsbad, NM

Gauges

- Daily
- Hourly
- Hourly Pseudo
- Supplemental

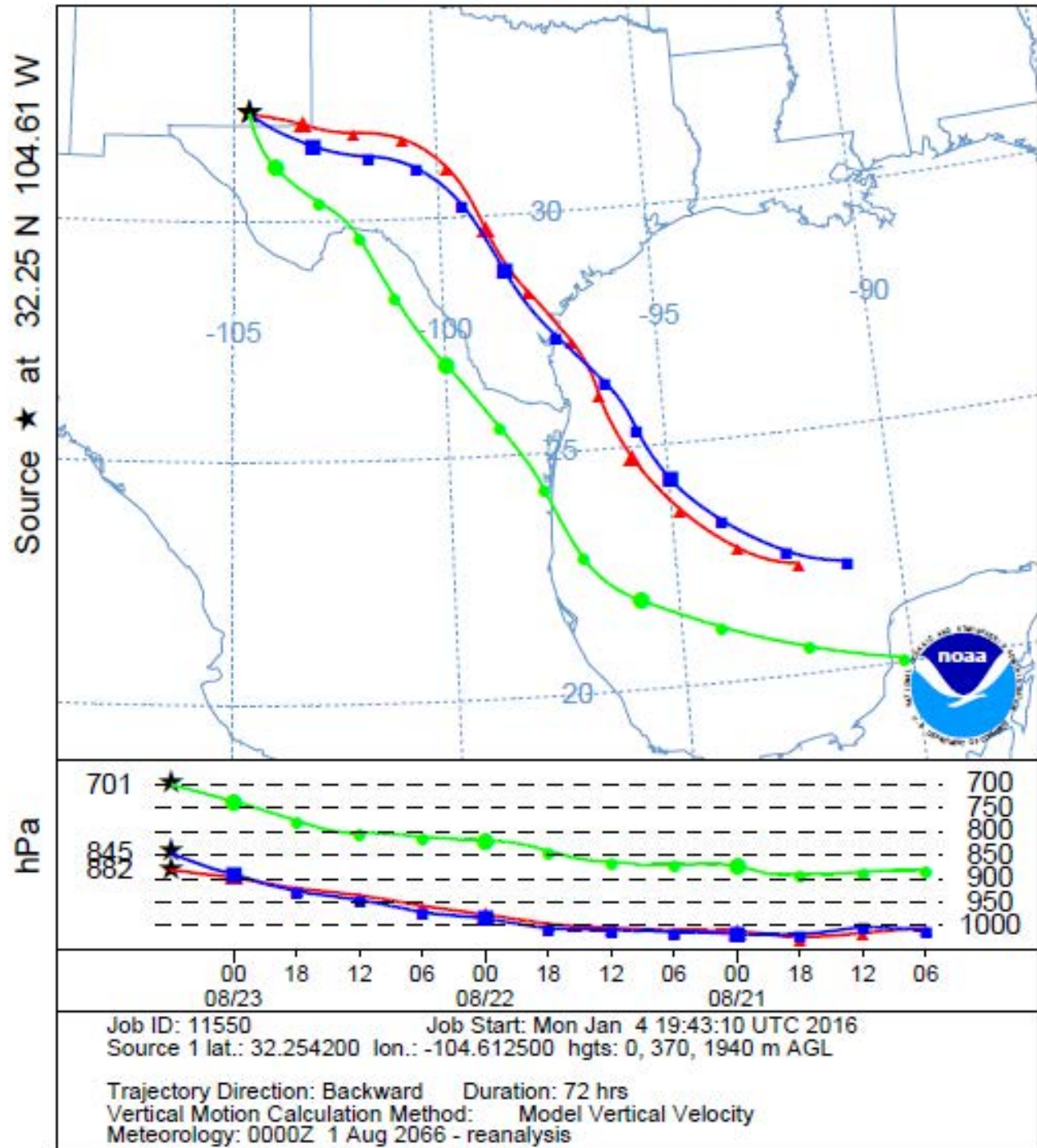


Precipitation (inches)



4/3/2015

NOAA HYSPLIT MODEL
 Backward trajectories ending at 0600 UTC 23 Aug 66
 CDC1 Meteorological Data



SPAS 1568 Carlsbad, NM Storm Analysis August 20-23, 1966

