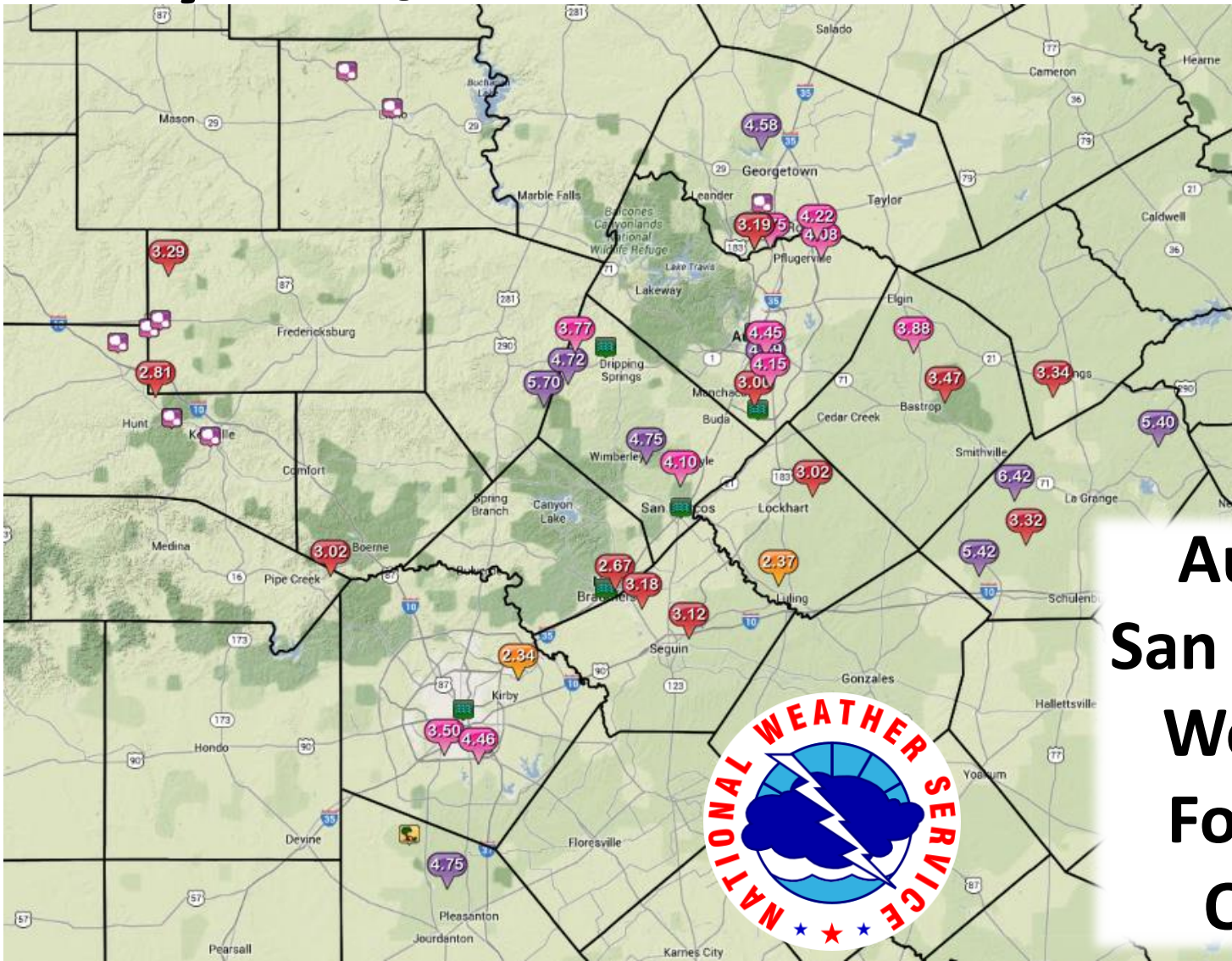
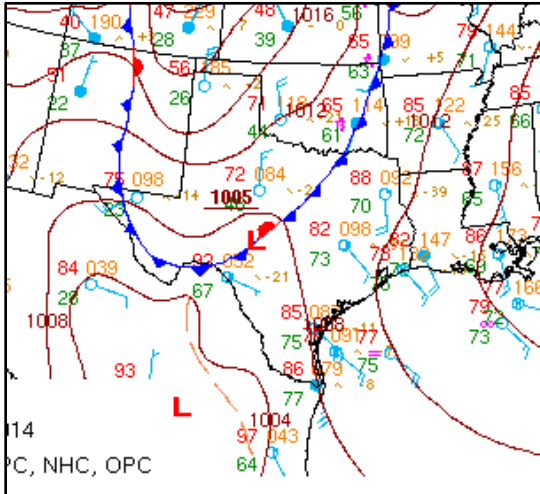


May 12th/13th Storms and Flooding

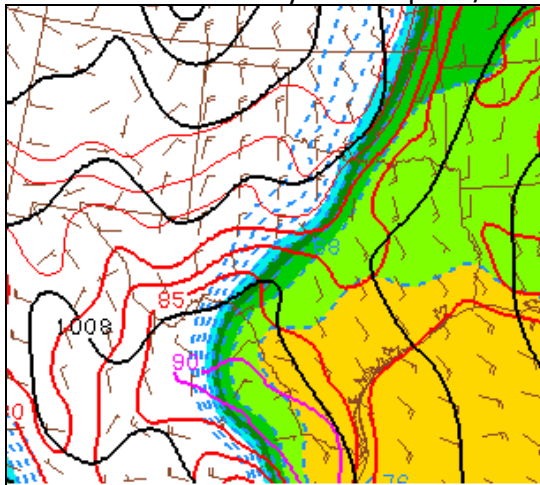


**Austin -
San Antonio
Weather
Forecast
Office**

Synoptic Set Up - Summary



WPC Surface Analysis for 4 pm 5/12



SPC Mesoanalysis of Temperature/Dewpoint and Pressure at 1 pm 5/12

The combination of rich Gulf moisture, an upper level low pressure system, and a strong and slow moving Pacific cold front came together to produce a line of showers and thunderstorms that moved across South Central Texas on the evening of Monday, May 12th into the early morning of Tuesday, May 13th.

In addition to dew point, another atmospheric variable that measures moisture in the air is precipitable water. It is the total atmospheric water vapor contained in a vertical column. Think of it as a measure of how much water vapor is available in the atmosphere to turn into precipitation at a specific point. The values for May 12th were well above normal.

One thing that kept the severe weather threat minimal was the fact that storms developed along the squall line and in clusters. With the storms developing in close proximity to each other, this reduces the amount of fuel each storm can take in and limits the potential for larger hail, very strong winds, and tornadoes.

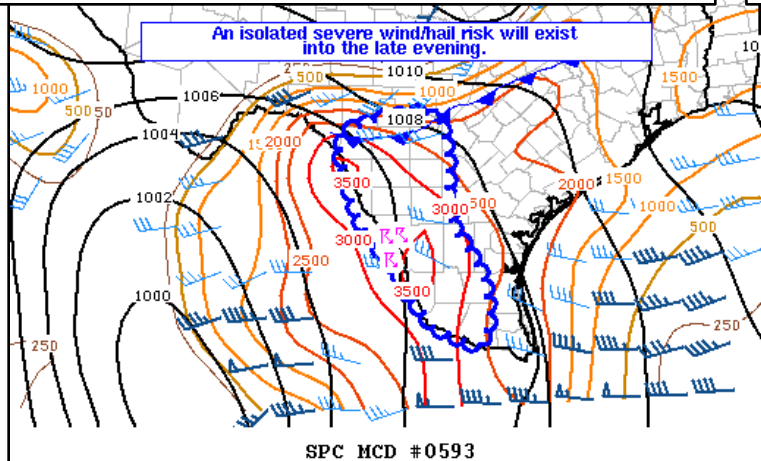
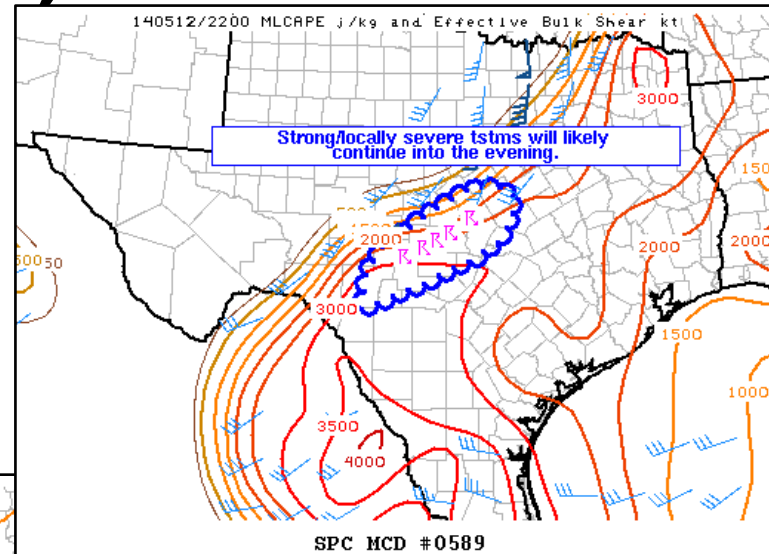
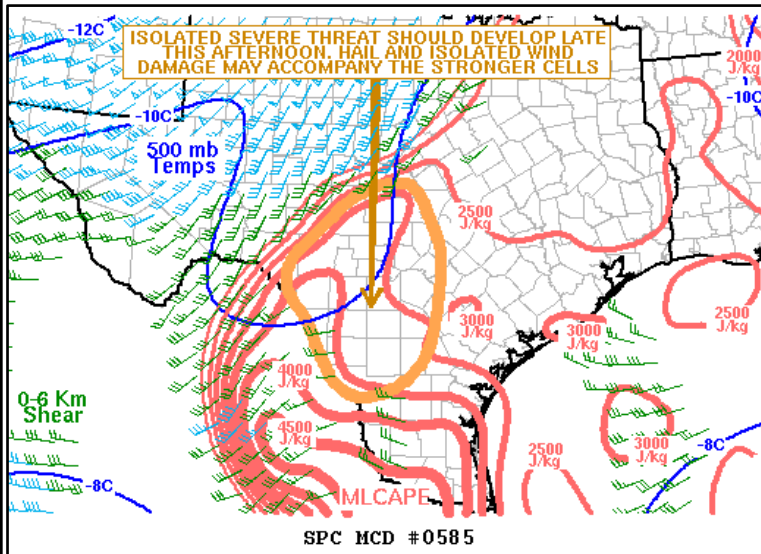
Flash Flood Watch



Valid from 7:00 pm on Monday, May 12, 2014 to Tuesday, May 13th at Noon (was canceled at 3:39 am on the 13th).

Issued by the local Weather Forecast Office due to the widespread 2-4 inch rainfall totals predicted. Some totals up to 6 inches also noted as possible. These could lead to flash flooding in urban areas and along rivers/creeks.

Severe Mesoscale Discussions #585, #589, & #593

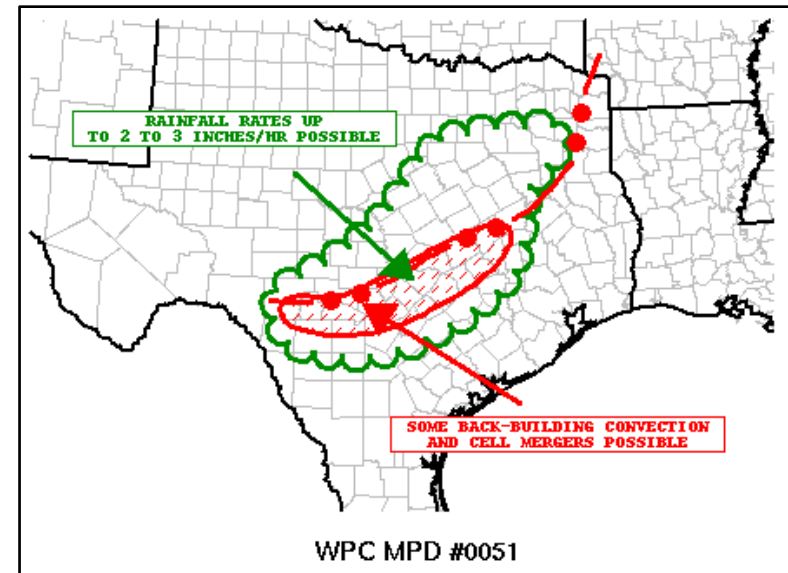
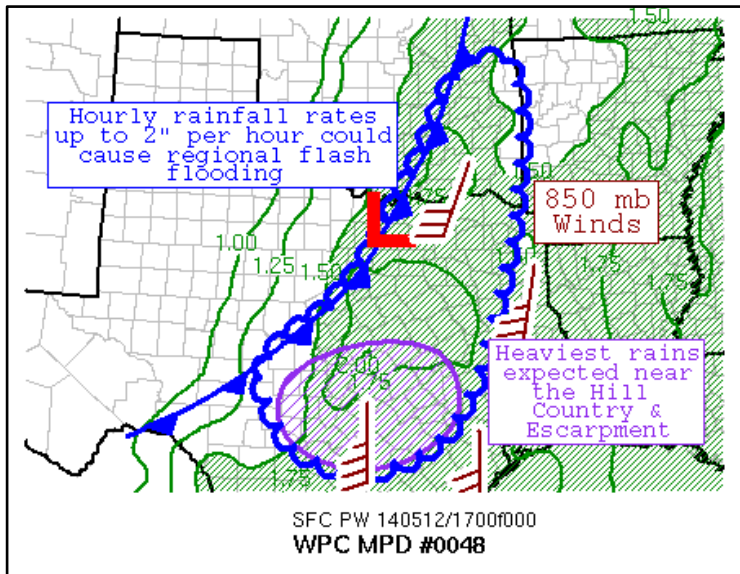


Issued by Storm Prediction Center in Norman, OK #585 at 2:38 pm, #589 at 6:08 pm, #593 at 9:19 pm

All three highlighted the marginal and localized threat of severe hail and damaging winds. Threat was kept low due to storms being multi-cellular instead of supercell storms. No Severe Thunderstorm Watch was issued.

Mesoscale Precipitation Discussions

#48, #51



Issued by Weather Prediction Center in College Park, MD... #48 at 2:47 pm and #51 at 9:26 pm

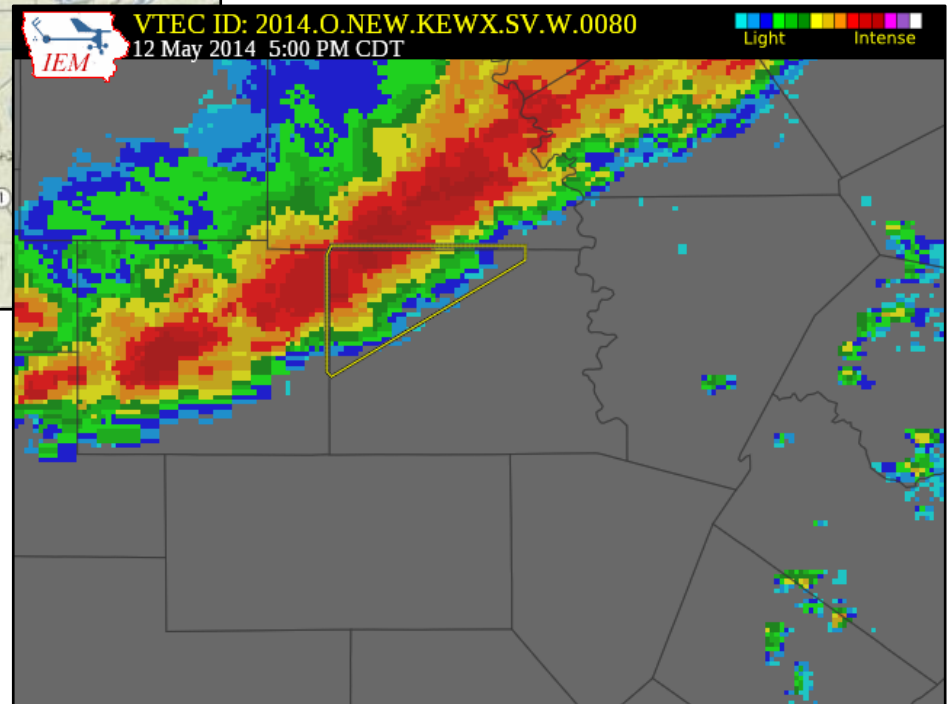
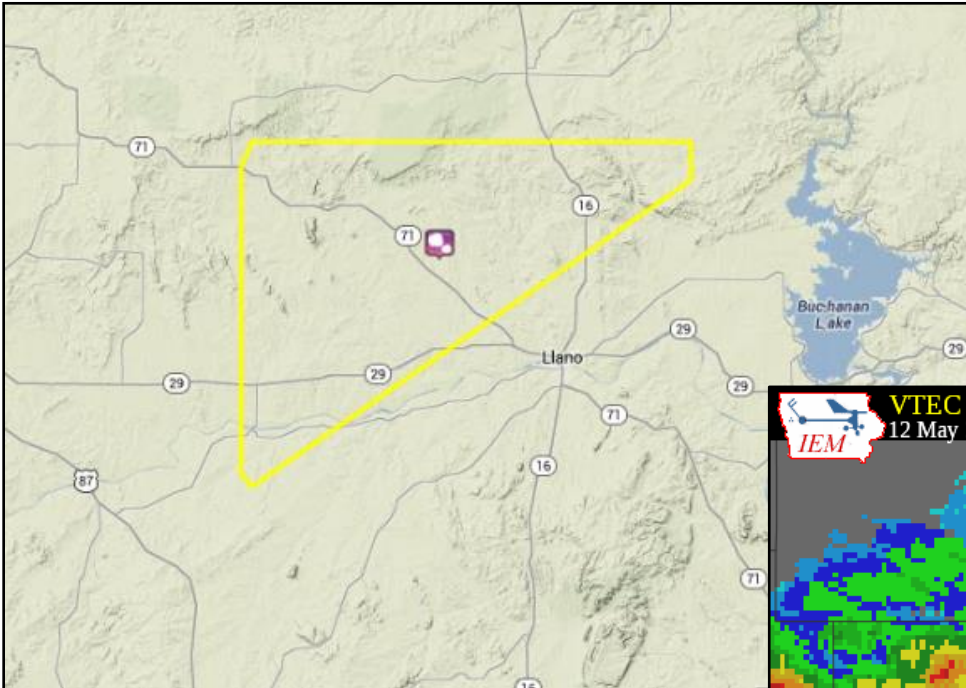
Discussed how the combination of a slowly progressing cold front, high precipitable water values, along with shear and instability were producing a band of thunderstorms that were capable of producing rainfall amounts of 2+” an hour (with even higher rain rates possible later in the evening).

Later discussion mentioned how back-building storms and cell-mergers were increasing the flash flooding threat by promoting 2”-3” an hour rain rates.

Severe Thunderstorm Warning #80

Northwestern Llano County

5:00 pm – 5:45 pm



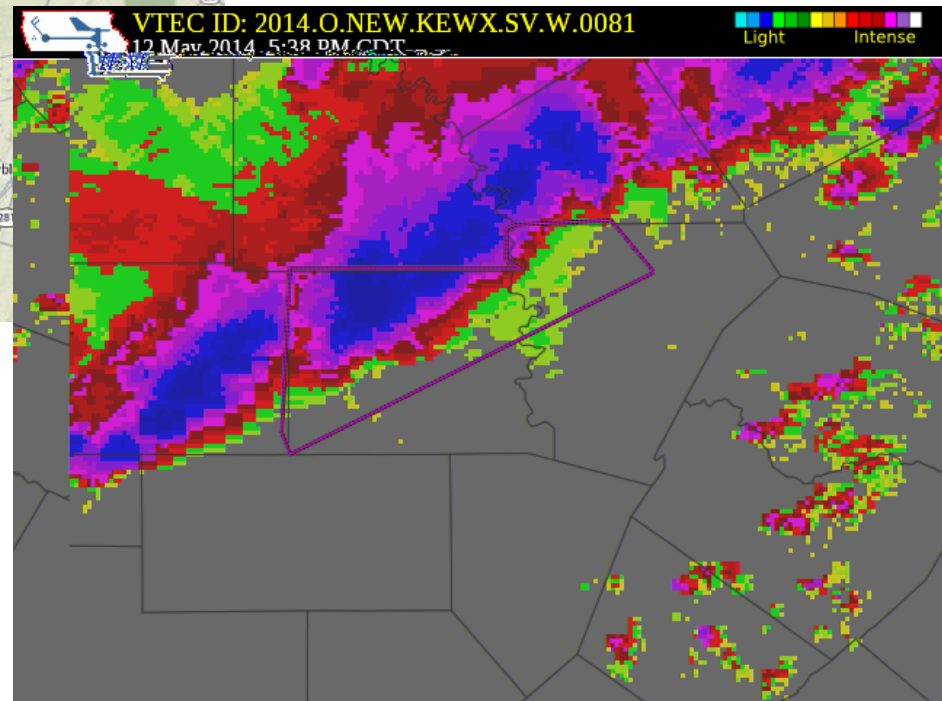
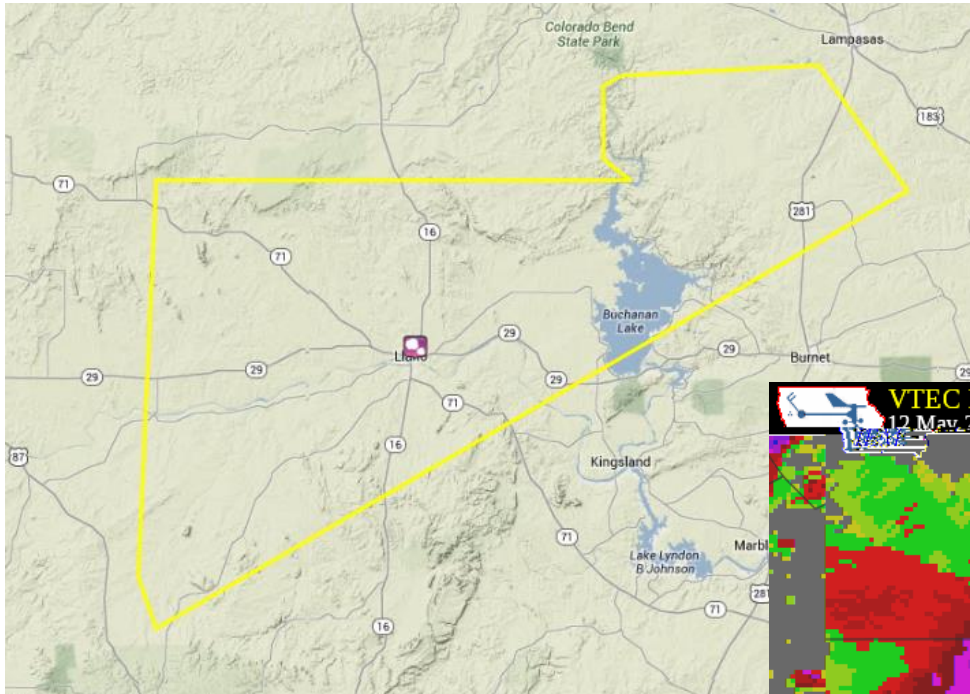
Reports:

- 5:33 pm...0.25" Hail...10 NW Llano

Severe Thunderstorm Warning #81

Northwestern Burnet and
Northwestern Llano Counties

5:38 pm – 6:45 pm



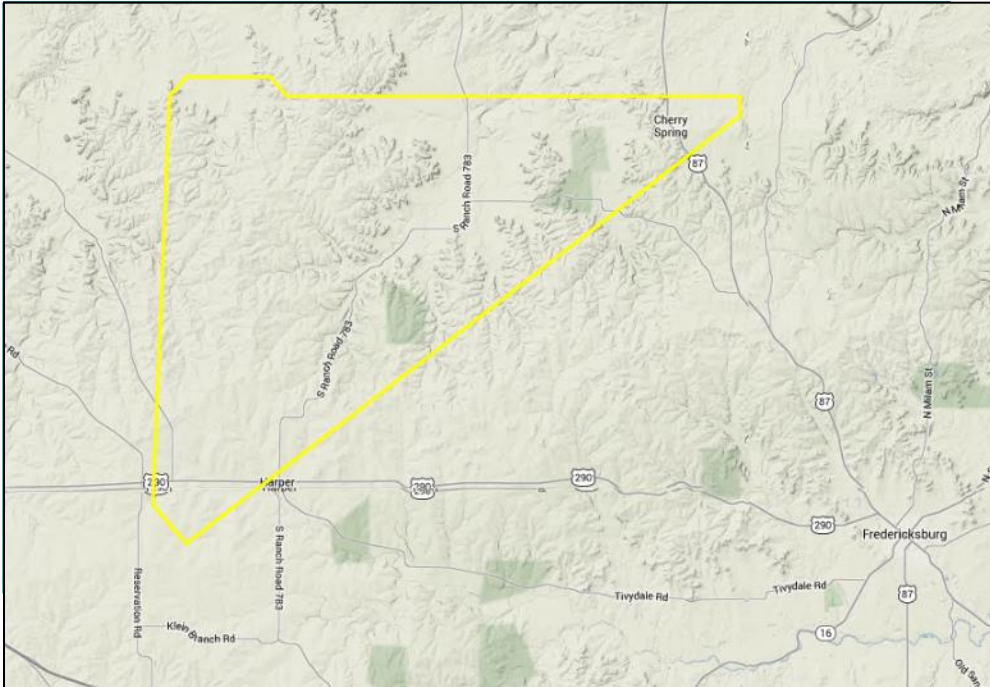
Reports:

- 5:29 pm...0.25" Hail...1 N Llano

Severe Thunderstorm Warning #82

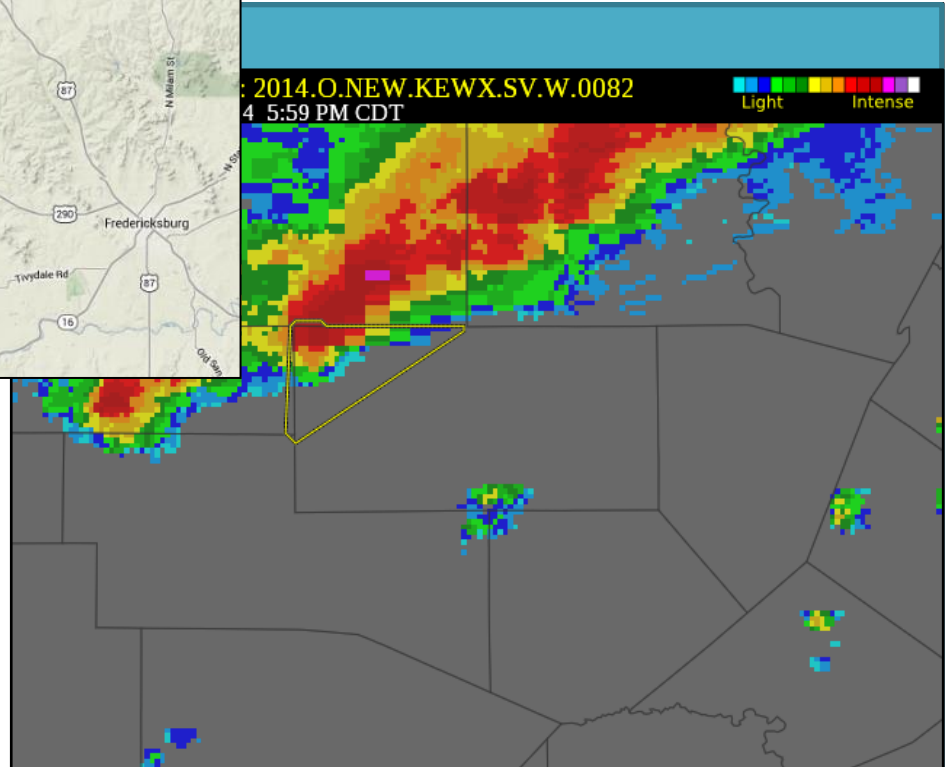
Northwestern Gillespie County

5:59 pm – 6:45 pm



2014.O.NEW.KEWX.SV.W.0082
4 5:59 PM CDT

Light Intense

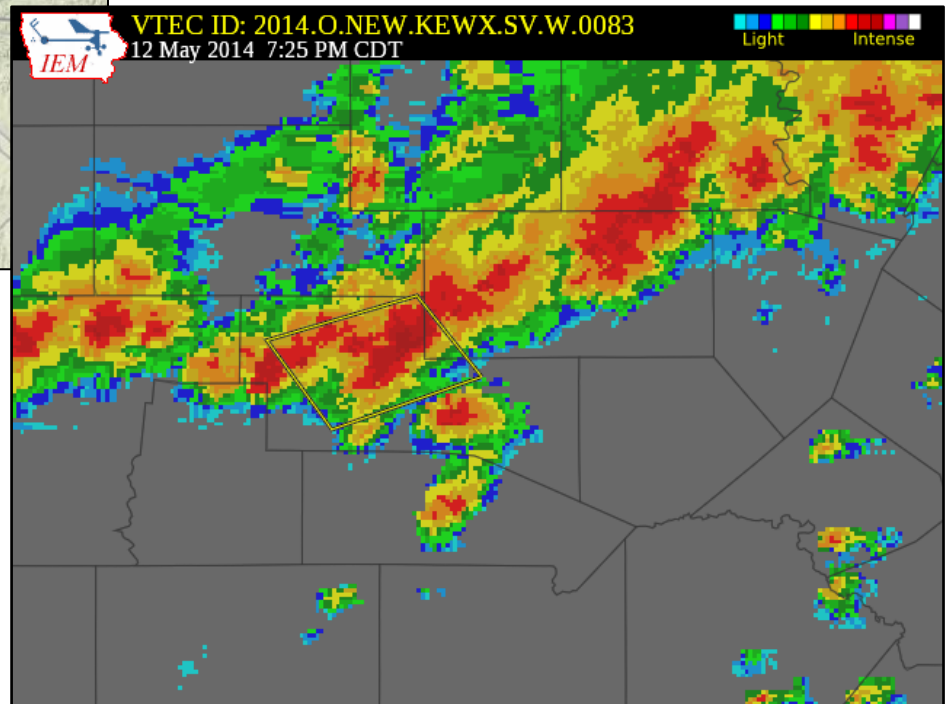


Reports:

Severe Thunderstorm Warning #83

Southwestern Gillespie and Western
Kerr Counties

7:25 pm – 8:00 pm



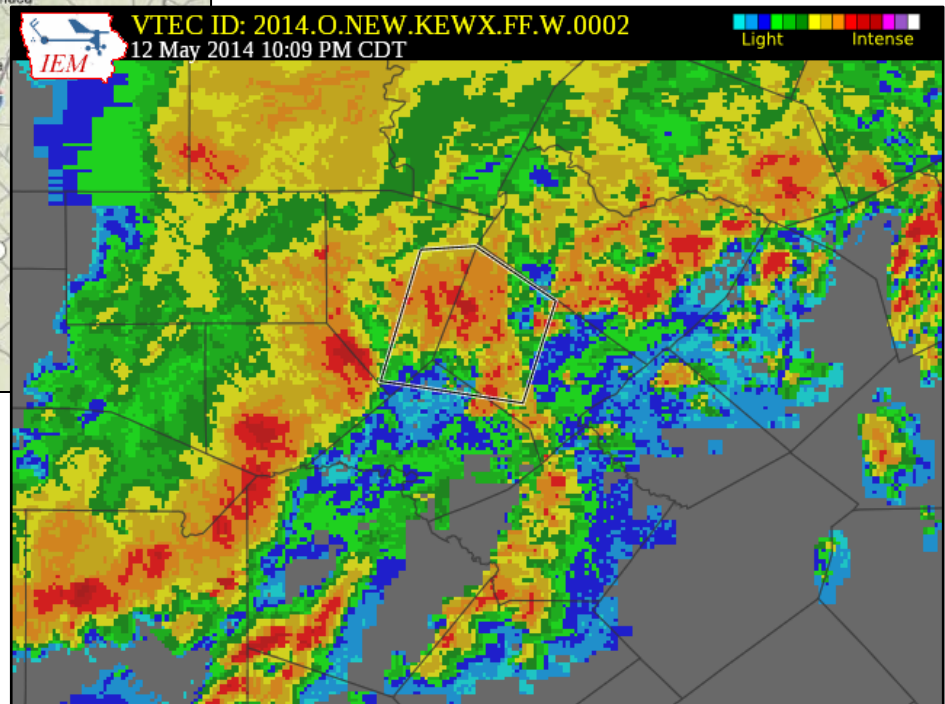
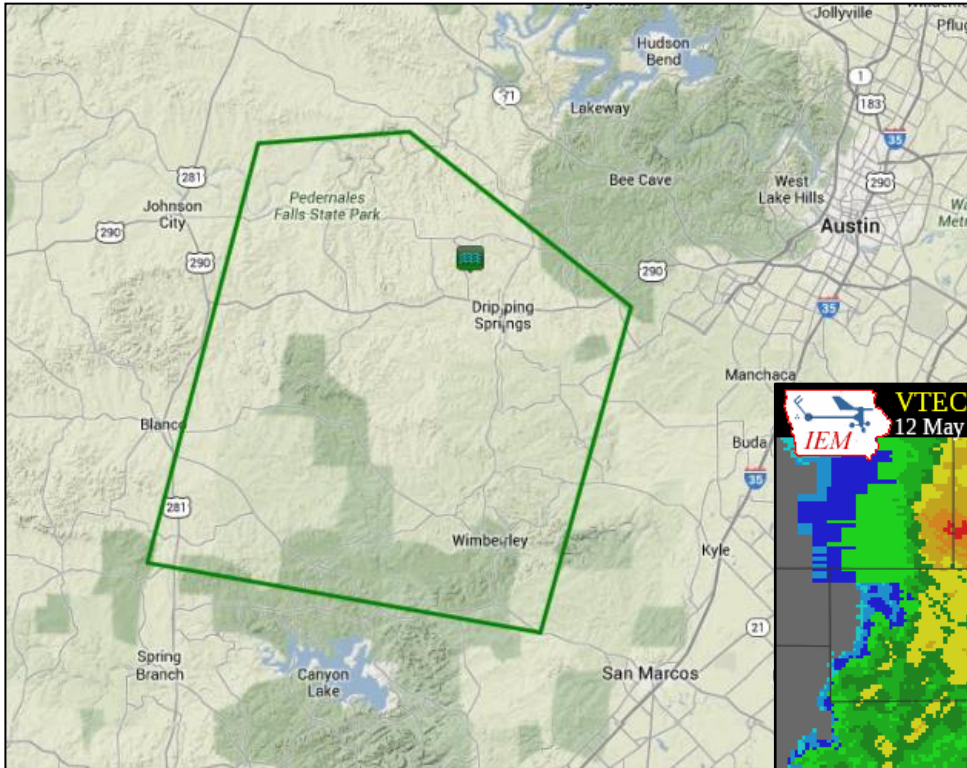
Reports:

- 7:41 pm...0.70" Hail...Ingram
- 7:52 pm...0.25" Hail...Ingram

Flash Flood Warning #2

Southeastern Blanco, North
Central Comal, and Western Hays
Counties

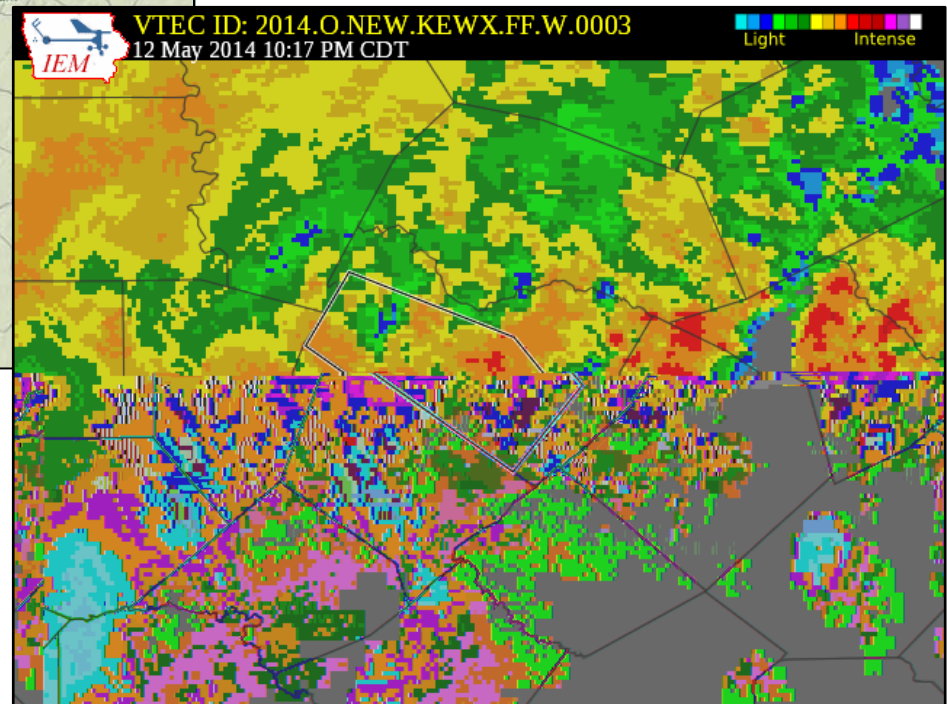
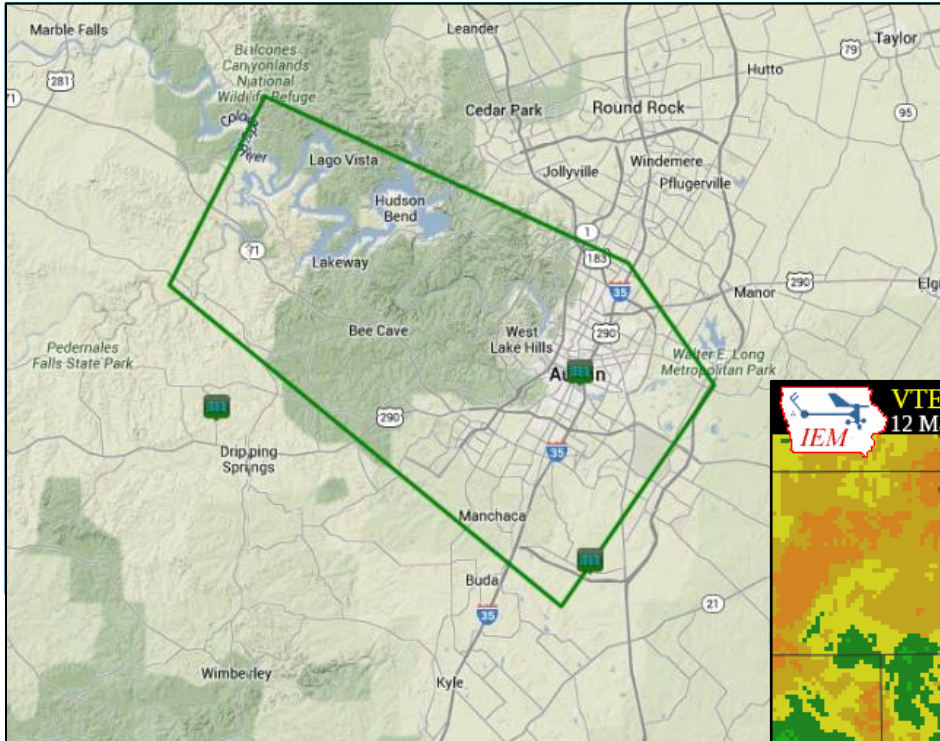
10:09 pm – 1:00 am (5/13)



Flash Flood Warning #3

Travis County

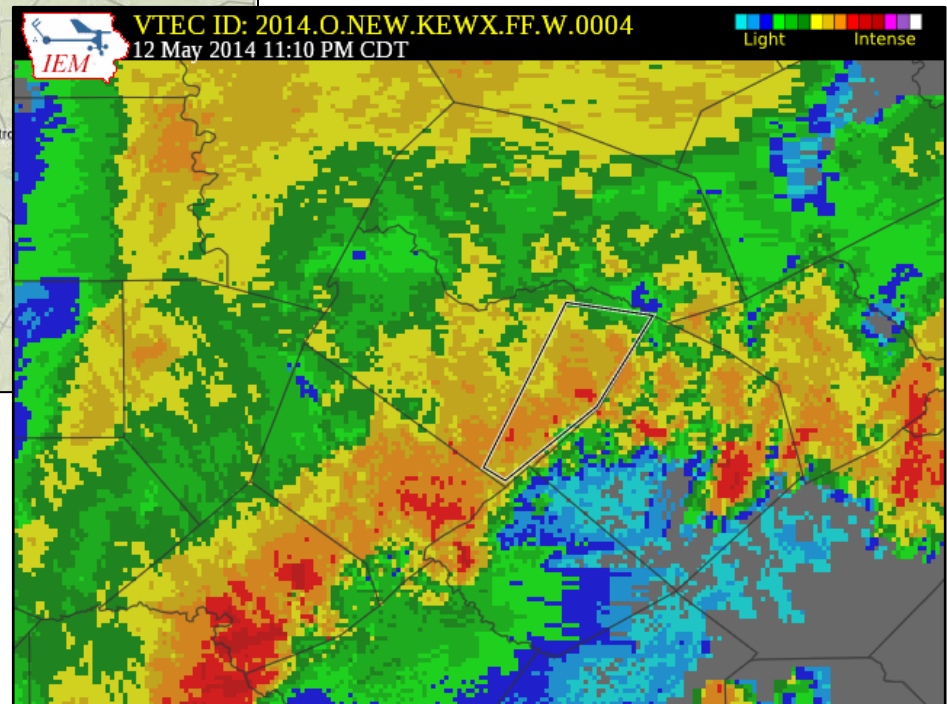
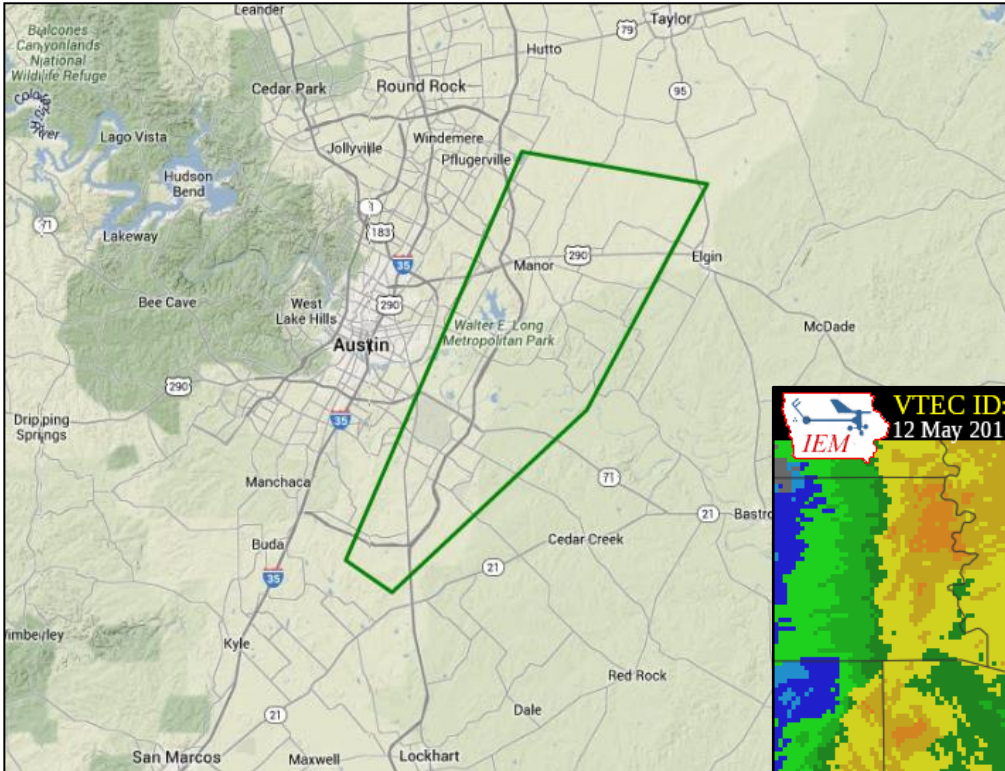
10:17 pm – 1:15 am (5/13)



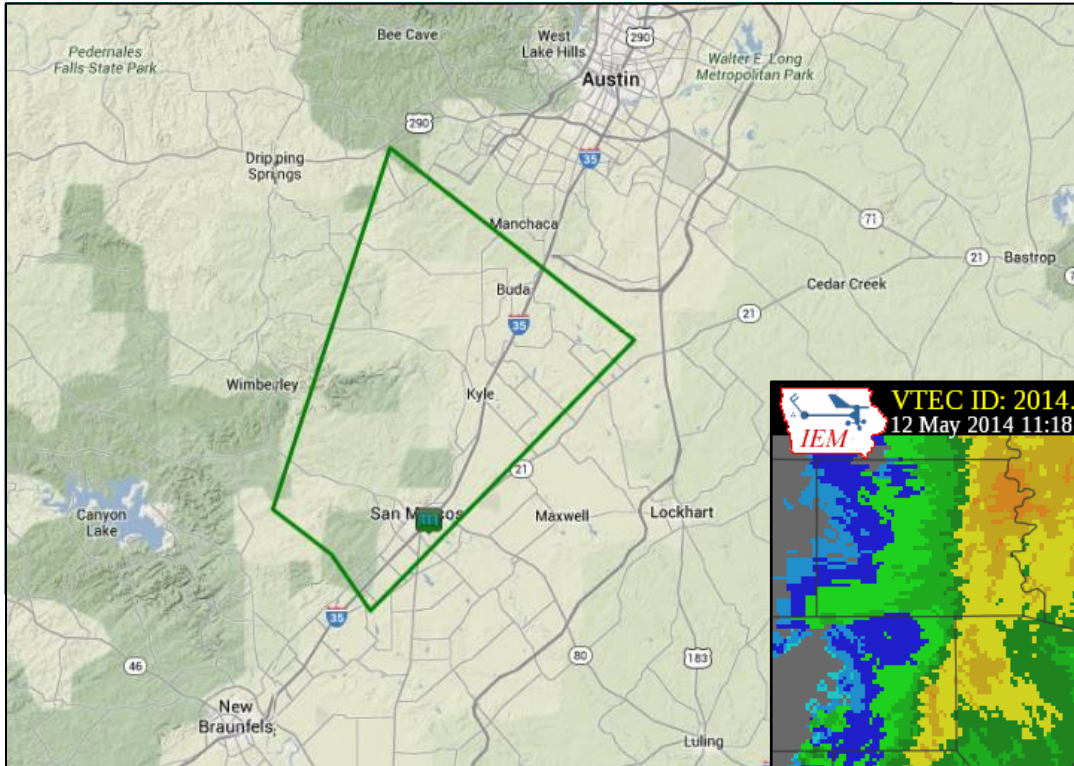
Flash Flood Warning #4

Southeastern Travis County

11:10 pm – 1:15 am (5/13)

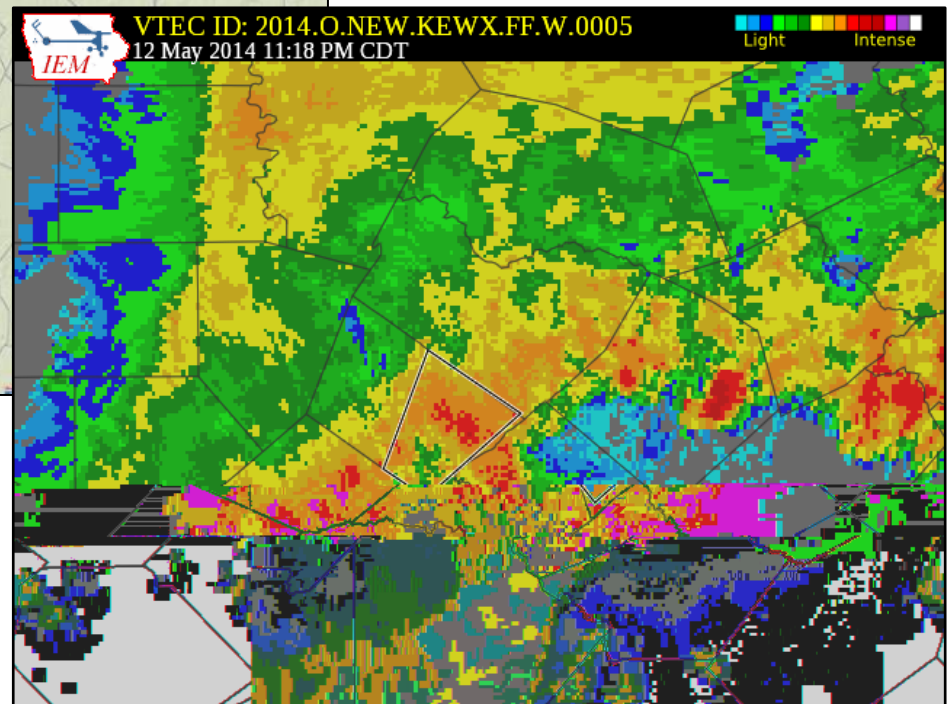


Flash Flood Warning #5



Eastern Hays and South
Central Travis Counties

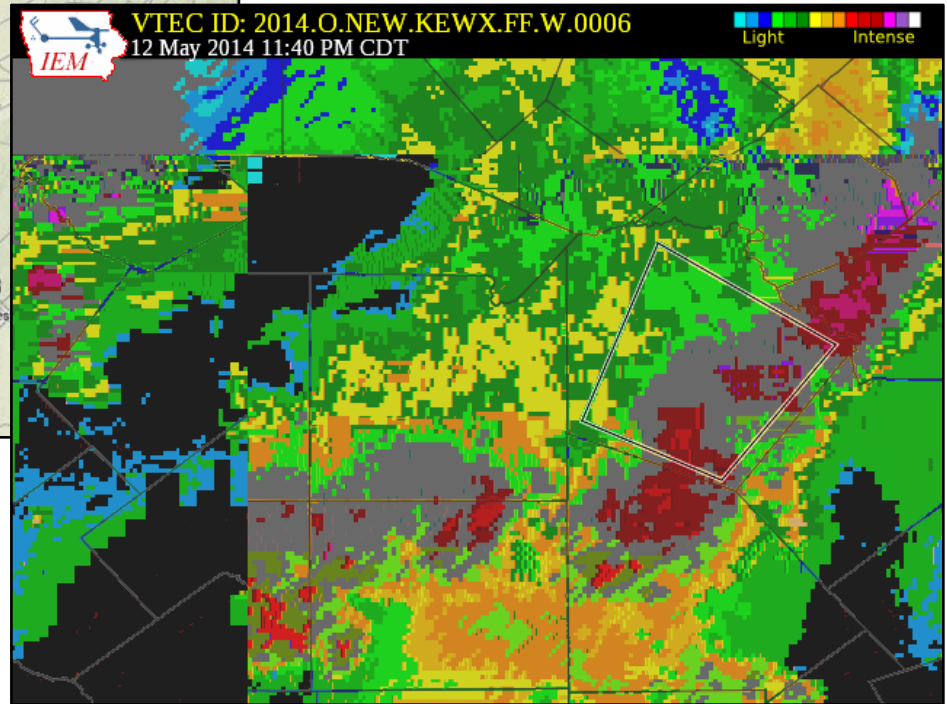
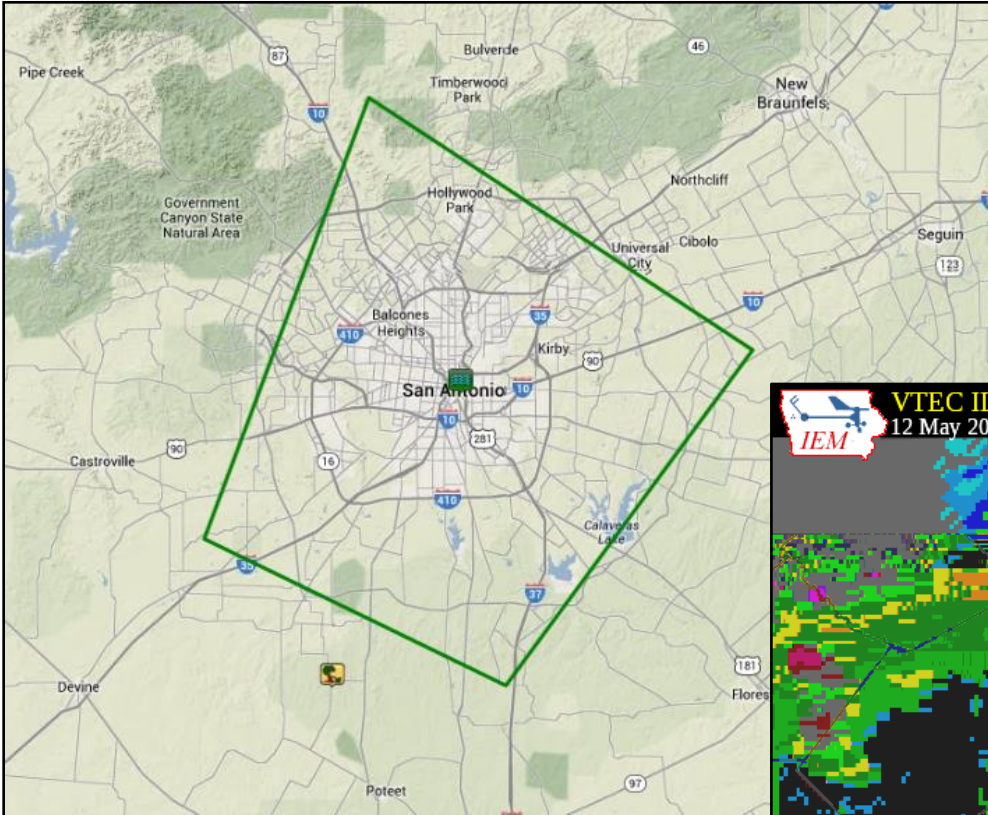
11:18 pm – 2:15 am (5/13)



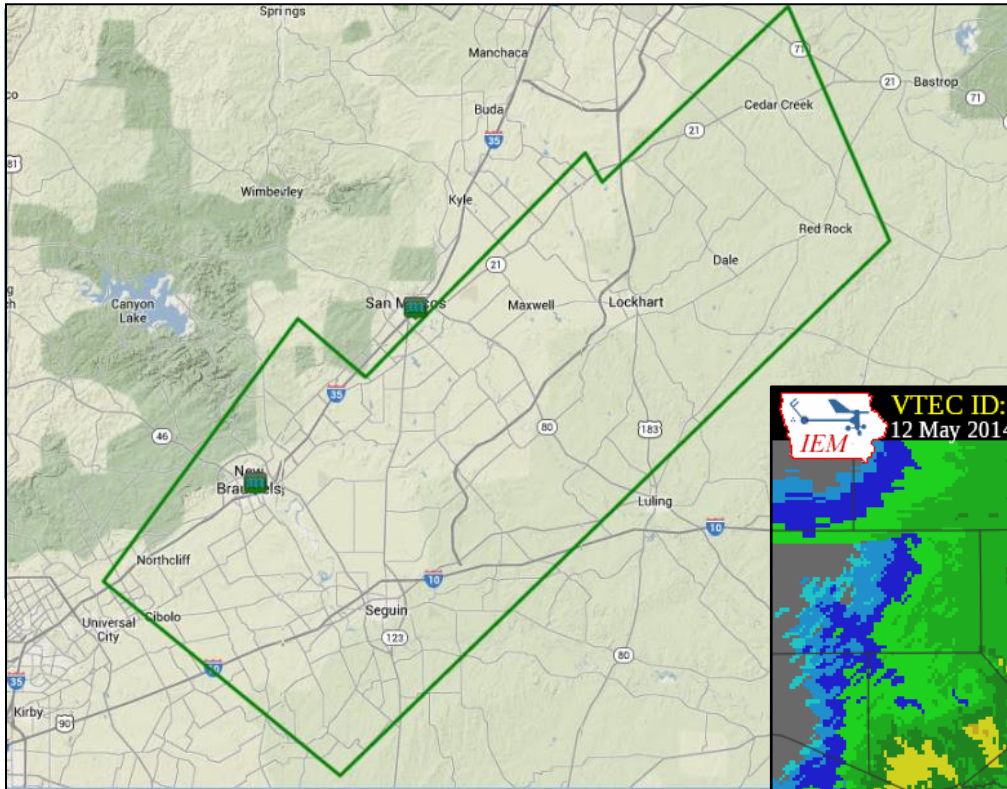
Flash Flood Warning #6

Bexar County

11:40 pm – 1:45 am (5/13)

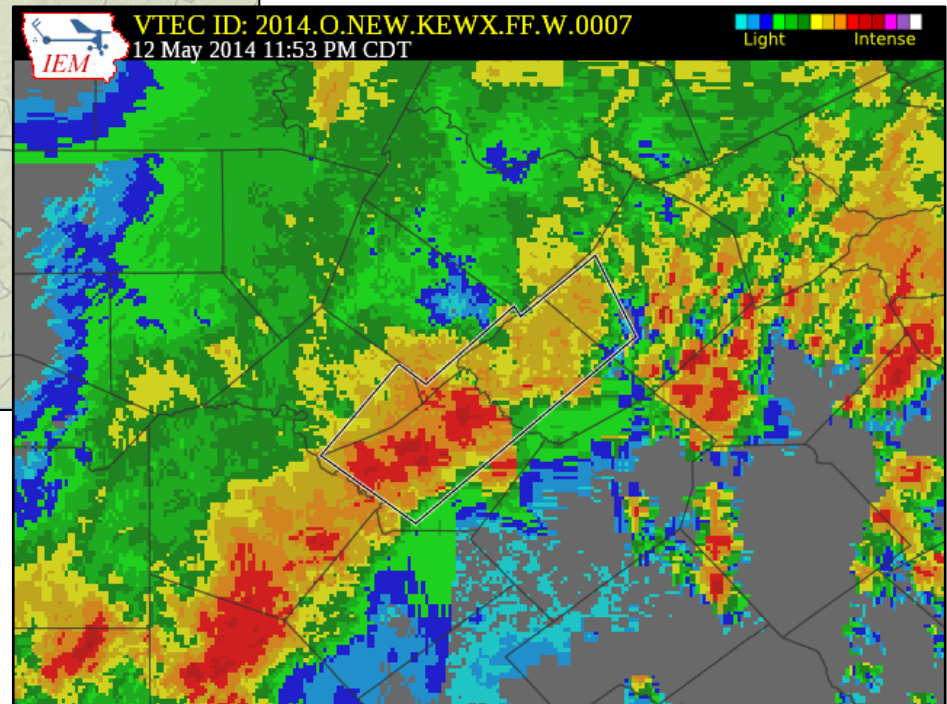


Flash Flood Warning #7

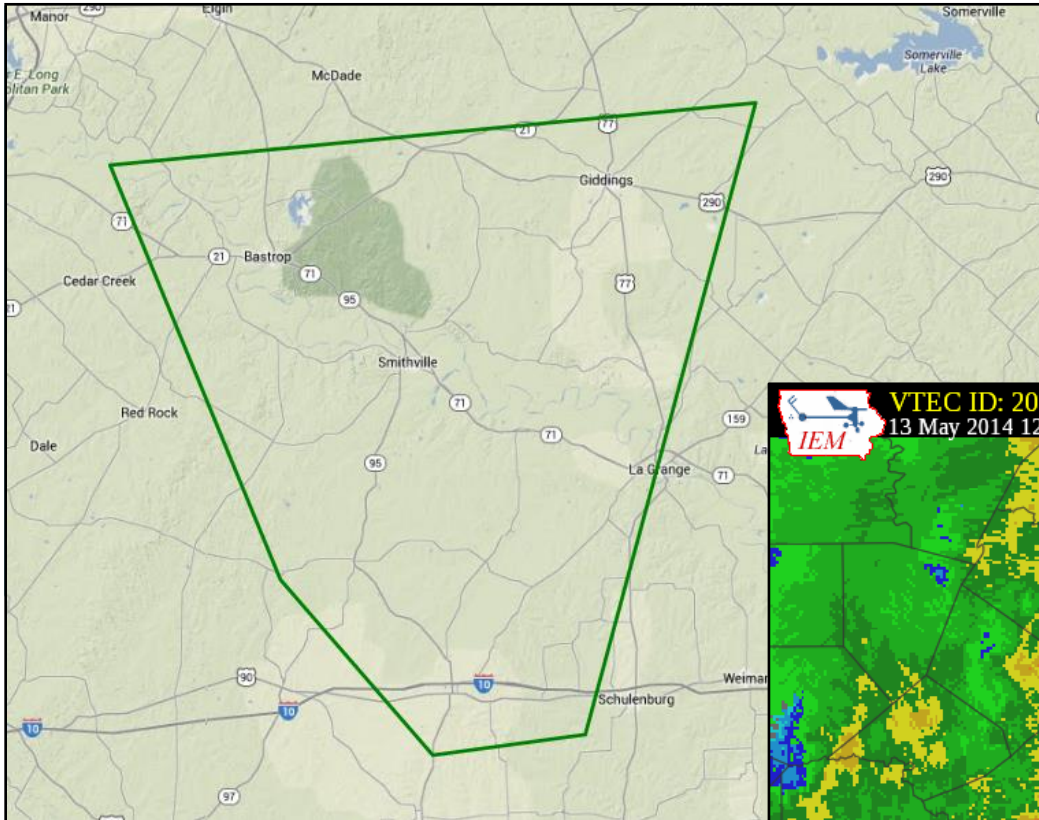


West Central Bastrop, Caldwell,
Southeastern Comal, Guadalupe,
and Southeastern Hays Counties

11:53 pm – 2:45 am (5/13)

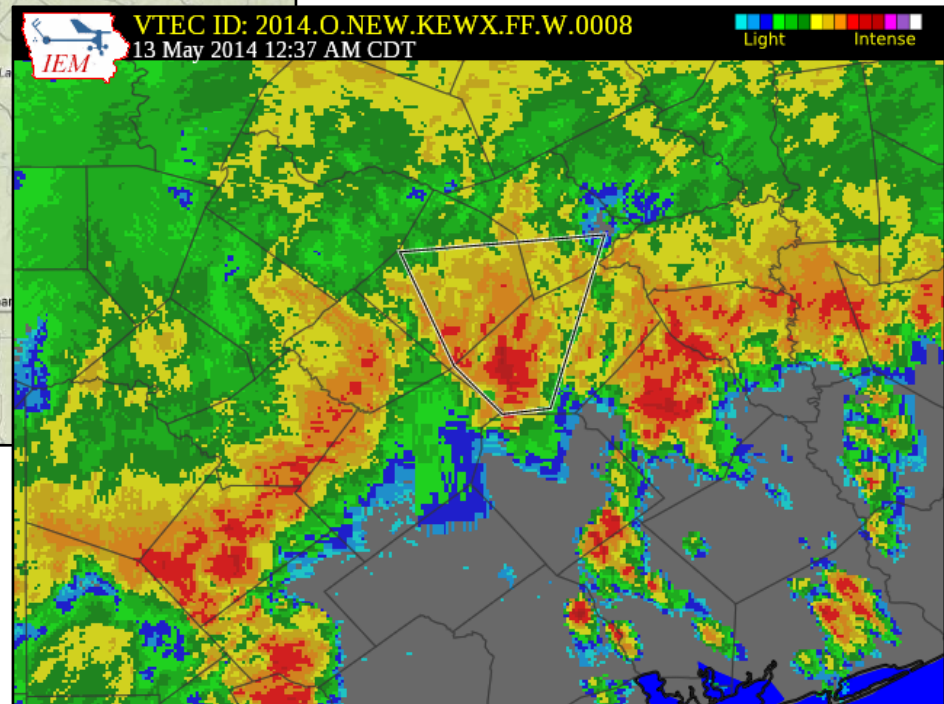


Flash Flood Warning #8



Southern Bastrop, Western Fayette, Extreme Northeastern Gonzales, and South Central Lee Counties

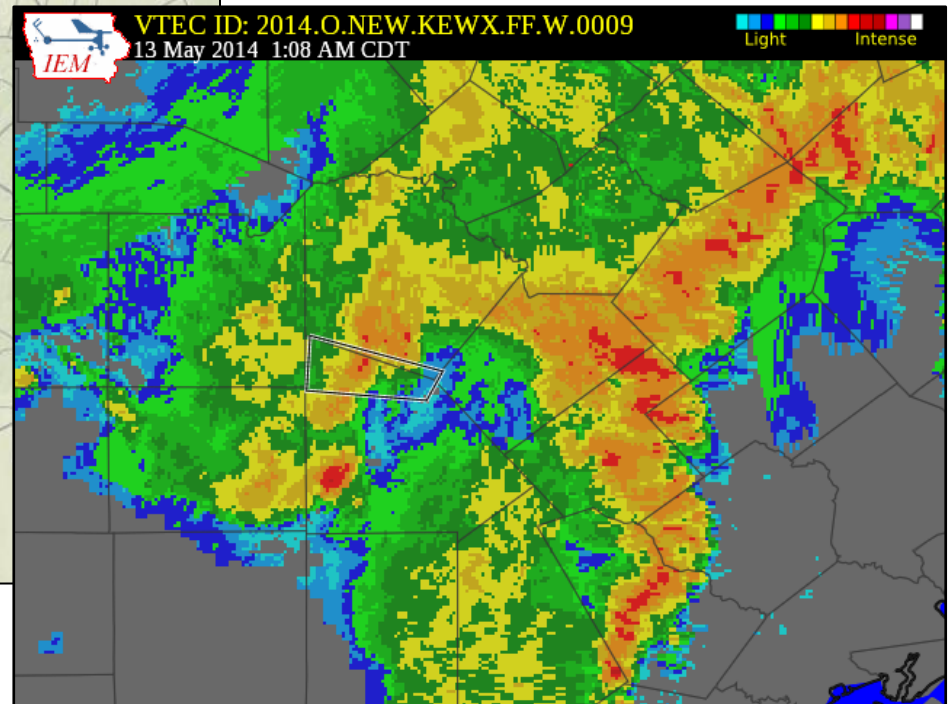
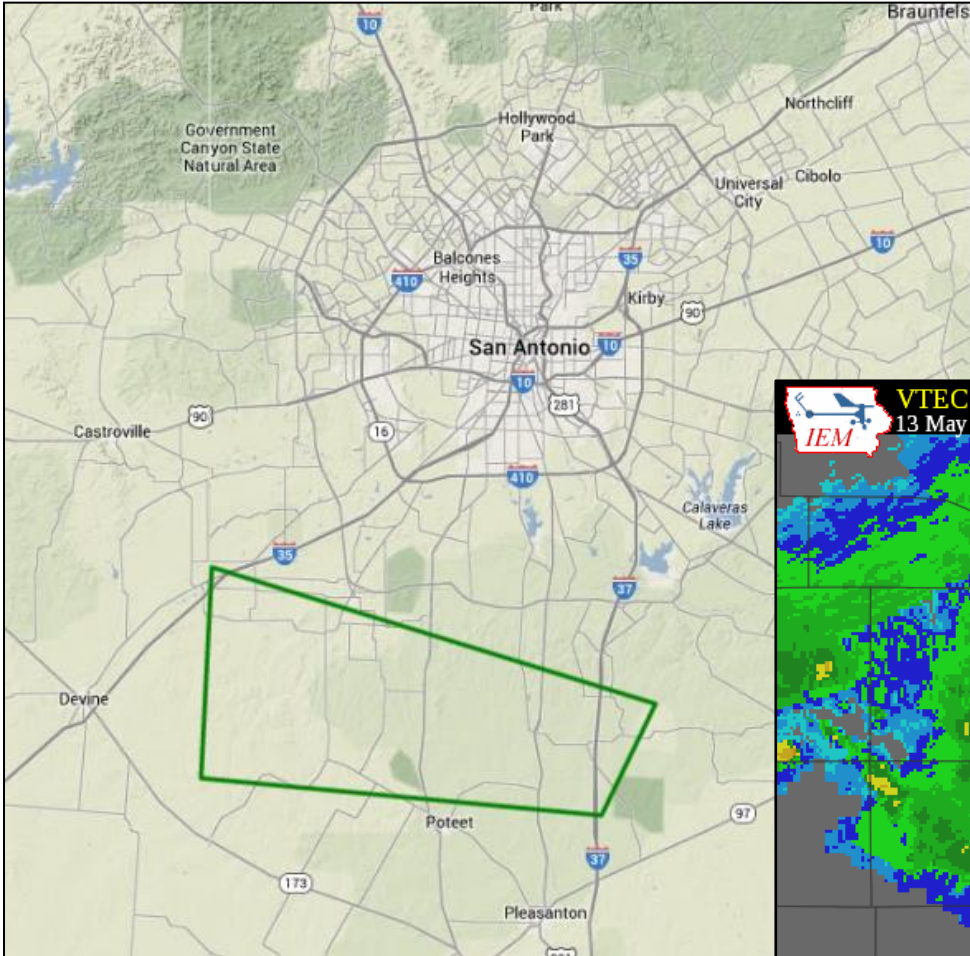
12:37 am (5/13) – 2:30 am (5/13)



Flash Flood Warning #9

Northwestern Atascosa and
Southwestern Bexar Counties

1:08 am (5/13) – 4:00 am (5/13)



Areal Flood Advisories #5 - #17

Event	Product Issued	VTEC Issued	Initial Expire	VTEC Expired	Area km**2	Locations
5	May 12, 2014 6:50 PM CDT	May 12, 2014 6:50 PM CDT	May 12, 2014 9:30 PM CDT	May 12, 2014 9:30 PM CDT	7904	Llano [TX], Gillespie [TX], Burnet [TX]
6	May 12, 2014 9:01 PM CDT	May 12, 2014 9:01 PM CDT	May 13, 2014 12:00 AM CDT	May 13, 2014 12:00 AM CDT	5592	Williamson [TX], Travis [TX]
7	May 12, 2014 10:36 PM CDT	May 12, 2014 10:36 PM CDT	May 13, 2014 12:30 AM CDT	May 13, 2014 12:30 AM CDT	3259	Bexar [TX]
8	May 12, 2014 10:47 PM CDT	May 12, 2014 10:47 PM CDT	May 13, 2014 12:30 AM CDT	May 13, 2014 12:30 AM CDT	9559	Williamson [TX], Travis [TX], Lee [TX], Bastrop [TX]
9	May 12, 2014 11:21 PM CDT	May 12, 2014 11:21 PM CDT	May 13, 2014 1:30 AM CDT	May 13, 2014 1:30 AM CDT	8698	Comal [TX], Guadalupe [TX], Wilson [TX], Bexar [TX]
10	May 12, 2014 11:26 PM CDT	May 12, 2014 11:26 PM CDT	May 13, 2014 1:30 AM CDT	May 13, 2014 1:30 AM CDT	23916	Zavala [TX], Uvalde [TX], Medina [TX], Maverick [TX]
11	May 12, 2014 11:30 PM CDT	May 12, 2014 11:30 PM CDT	May 13, 2014 1:30 AM CDT	May 13, 2014 1:30 AM CDT	6456	Lee [TX], Fayette [TX], Bastrop [TX]
12	May 12, 2014 11:38 PM CDT	May 12, 2014 11:38 PM CDT	May 13, 2014 1:30 AM CDT	May 13, 2014 1:30 AM CDT	4761	Guadalupe [TX], Comal [TX], Caldwell [TX]
13	May 13, 2014 12:05 AM CDT	May 13, 2014 12:05 AM CDT	May 13, 2014 2:00 AM CDT	May 13, 2014 2:00 AM CDT	6231	Fayette [TX], Caldwell [TX], Bastrop [TX]
14	May 13, 2014 12:48 AM CDT	May 13, 2014 12:48 AM CDT	May 13, 2014 3:00 AM CDT	May 13, 2014 3:00 AM CDT	4051	Wilson [TX], Karnes [TX]
15	May 13, 2014 12:56 AM CDT	May 13, 2014 12:56 AM CDT	May 13, 2014 3:00 AM CDT	May 13, 2014 3:00 AM CDT	6046	Guadalupe [TX], Gonzales [TX], Caldwell [TX]
16	May 13, 2014 1:39 AM CDT	May 13, 2014 1:39 AM CDT	May 13, 2014 4:30 AM CDT	May 13, 2014 4:30 AM CDT	7652	Lavaca [TX], Gonzales [TX], DeWitt [TX]
17	May 13, 2014 1:54 AM CDT	May 13, 2014 1:54 AM CDT	May 13, 2014 4:00 AM CDT	May 13, 2014 4:00 AM CDT	3259	Bexar [TX]

Most counties along and east/south of I-35 were covered (at least in part) by an Areal Flood Advisory at some point during the event.

13 different advisories issued between 6:50 pm on May 12, 2014 through 4:00 am on May 13, 2014.

Typically issued for flooding that develops more gradually, usually from prolonged and persistent moderate to heavy rainfall. They indicate minor flooding problems, and are a good transition product as flooding increases (prior to a Flash Flood Warning).

All Hail Reports / Pictures

0533 PM HAIL 10 NW LLANO 30.85N 98.79W
05/12/2014 E0.25 INCH LLANO TX CO-OP OBSERVER

PEA SIZED HAIL ONGOING.

0629 PM HAIL 1 N LLANO 30.77N 98.67W
05/12/2014 E0.25 INCH LLANO TX PUBLIC

A BIT OF PEA SIZED HAIL FELL WITH LOTS OF RAIN.

0646 PM HAIL 6 N MOUNTAIN HOME 30.25N 99.38W
05/12/2014 E0.25 INCH KERR TX COCORAHS

RAIN JUST BEGINNING...BIT OF PEA SIZED HAIL MIXED IN.

0718 PM HAIL 4 WSW HARPER 30.28N 99.30W
05/12/2014 E1.00 INCH KERR TX AMATEUR RADIO

QUARTER SIZE HAIL WITH VERY HEAVY RAIN. 1.00 INCH
OVER THE LAST 45 MINUTES.

0730 PM HAIL 1 W HARPER 30.30N 99.27W
05/12/2014 E0.50 INCH GILLESPIE TX COCORAHS

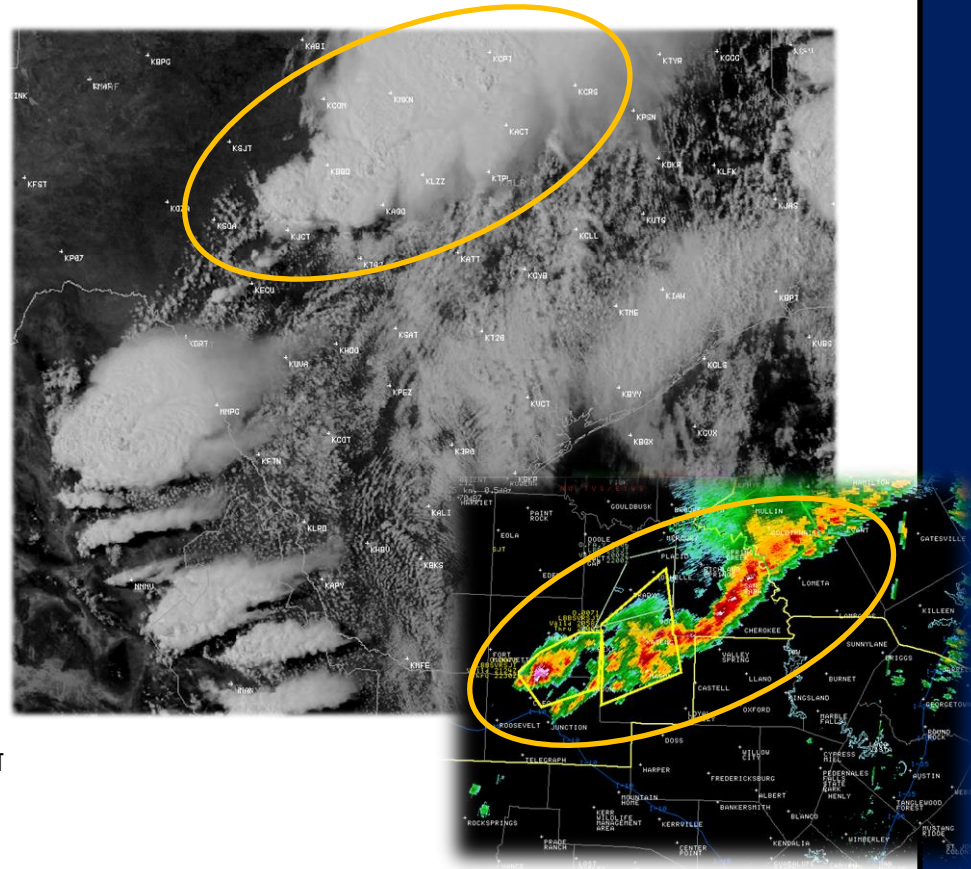
PEA TO MARBLE SIZED HAIL MIXED WITH VERY HEAVY RAIN
AND SOME GUSTY WINDS.

0741 PM HAIL INGRAM 30.08N 99.24W
05/12/2014 E0.70 INCH KERR TX PUBLIC

MARBLE TO DIME SIZE HAIL REPORTED IN INGRAM.

0752 PM HAIL INGRAM 30.08N 99.24W
05/12/2014 E0.25 INCH KERR TX PUBLIC

PEA SIZED HAIL FALLING IN INGRAM.



Visible Satellite and radar from 4:30 pm on May 12th. You can see the bright white cumulonimbus clouds and associated storms lining up along the front across Texas (orange ovals). In addition, on the satellite you can see the thunderstorms being sparked off by the mountains in Northern Mexico to the west of the Rio Grande.

All Reports / Pictures

0800 PM HAIL KERRVILLE 30.04N 99.14W
05/12/2014 E0.25 INCH KERR TX TRAINED SPOTTER

FEW MINUTES OF PEA SIZE HAIL...HAS NOW LET UP.

0902 PM HAIL 4 NW ROUND ROCK 30.56N 97.72W
05/12/2014 E0.50 INCH WILLIAMSON TX TRAINED SPOTTER

PEA TO MARBLE SIZE HAIL. ONLY LASTED ABOUT A MINUTE.

1041 PM FLASH FLOOD AUSTIN 30.27N 97.74W
05/12/2014 TRAVIS TX CITY OFFICIAL

LOW WATER CROSSINGS AT 15TH AND RED RIVER AND AT
3523 MCNEIL DRIVE IN AUSTIN CLOSED DUE TO FLOODING.

1055 PM FLASH FLOOD 1 ENE CREEDMOOR 30.10N 97.73W
05/12/2014 TRAVIS TX PUBLIC

MAHA CREEK AT 1327 AND EVELYN ROAD IS FLOODING
OVER THE ROADWAY.

1059 PM HAIL 6 SSE SAN ANTONIO 29.35N 98.44W
05/12/2014 E0.70 INCH BEXAR TX TRAINED SPOTTER

DIME SIZED HAIL...NOT ACCUMULATING.

1107 PM HEAVY RAIN 6 WSW BOERNE 29.77N 98.83W
05/12/2014 M3.02 INCH KENDALL TX COCORAHS

3.02 INCHES IN 70 MINUTES.



It was nice to see a lot of rain in area rain gauges. This picture came to us from "atx weather girl" via Twitter. She received 2.51" in Lakeway, TX (Travis County).

All Reports / Pictures

1136 PM FLASH FLOOD SAN ANTONIO 29.43N 98.49W
05/12/2014 BEXAR TX BROADCAST MEDIA

TXDOT CLOSING THE LOWER LEVELS OF I-35 IN
DOWNTOWN DUE TO FLOODING.

1213 AM TSTM WND DMG 5 SSE SOMERSET 29.15N 98.63W
05/13/2014 ATASCOSA TX PUBLIC

A FEW TREE LIMBS DOWN.

1215 AM FLASH FLOOD 4 NNW DRIPPING SPRINGS 30.24N
98.12W
05/13/2014 HAYS TX COUNTY OFFICIAL

BELL SPRINGS ROAD AT BARTON CREEK HAS .75 FEET OF
WATER OVER THE ROAD. REPORT FROM
HAYSINFORMED.COM. CORRECTED APPROX. EVENT
CLOSING TIME.

1230 AM HEAVY RAIN 3 W LEMING 29.07N 98.53W
05/13/2014 M4.75 INCH ATASCOSA TX AMATEUR RADIO

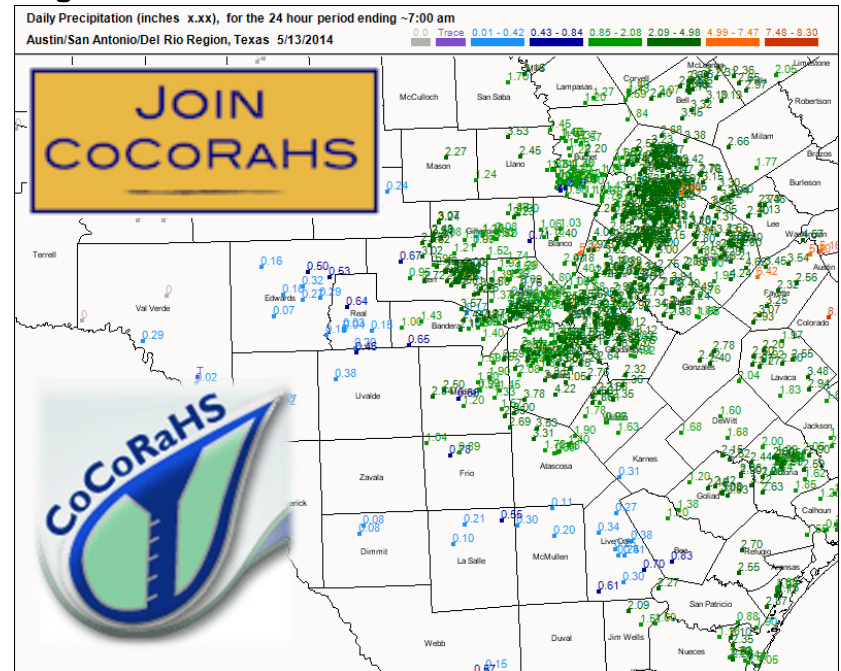
RECEIVED 4.75 INCHES OF RAIN IN 90 MINUTES

0103 AM FLASH FLOOD SAN ANTONIO 29.43N 98.49W
05/13/2014 BEXAR TX COUNTY OFFICIAL

SEVERAL LANE CLOSURES ON BOTH THE NORTH AND SOUTH
SIDE OF SAN ANTONIO DUE TO FLOODING.

0109 AM FLASH FLOOD NEW BRAUNFELS 29.70N 98.12W
05/13/2014 COMAL TX EMERGENCY MNGR

8 ROADS WITHIN NEW BRAUNFELS CITY LIMITS HAVE BEEN
CLOSED AND BARRICADED DUE TO FLOODING



Want to submit rain, hail, and snow reports to us on a daily basis? Become a CoCoRaHS volunteer observer by going to www.cocorahs.org! The image above is of all of our CoCoRaHS rainfall reports from the last 24 hours. Even though the map is full of reports we could always use more!

Through the site you can buy a discounted rain gauge like the one on the previous slide. Then you just measure how much rain you received and submit it daily!

All Reports / Pictures

0200 AM FLASH FLOOD SAN MARCOS 29.88N 97.93W
 05/13/2014 HAYS TX EMERGENCY MNGR

MOST LOW WATER CROSSINGS AROUND SAN MARCOS CLOSED
 EARLY MORNING DUE TO FLOODING. TIME ESTIMATED.

0400 AM HEAVY RAIN 3 NNE NEW BRAUNFELS 29.74N 98.10W
 05/13/2014 M2.67 INCH COMAL TX COCORAHS

0440 AM HEAVY RAIN 2 NE MULDOON 29.84N 97.04W
 05/13/2014 M3.32 INCH FAYETTE TX MESONET

0441 AM HEAVY RAIN 5 SE CISTERN 29.77N 97.16W
 05/13/2014 M5.42 INCH FAYETTE TX MESONET

0441 AM HEAVY RAIN 4 SSE AUSTIN 30.22N 97.71W
 05/13/2014 M4.69 INCH TRAVIS TX MESONET

0441 AM HEAVY RAIN 6 NNW CAMP SWIFT 30.27N 97.33W
 05/13/2014 M3.88 INCH BASTROP TX MESONET

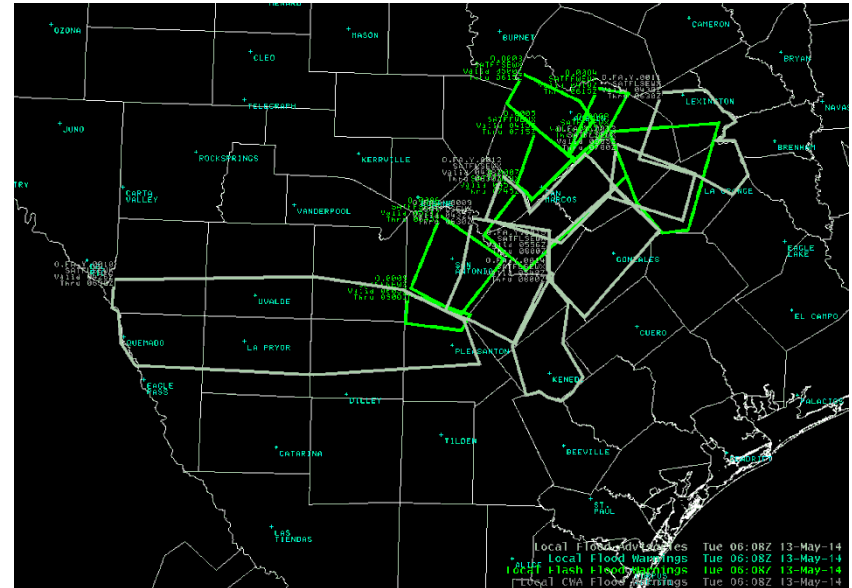
0442 AM HEAVY RAIN HENLY 30.20N 98.22W
 05/13/2014 M4.72 INCH HAYS TX MESONET

0442 AM HEAVY RAIN 3 NNW AUSTIN BERGSTROM 30.26N 97.71W
 05/13/2014 M4.45 INCH TRAVIS TX MESONET

0456 AM HEAVY RAIN 3 WSW GIDDINGS 30.17N 96.97W
 05/13/2014 M3.34 INCH LEE TX MESONET

0456 AM HEAVY RAIN 10 N HARPER 30.44N 99.25W
 05/13/2014 M3.29 INCH GILLESPIE TX MESONET

0456 AM HEAVY RAIN 7 NE LOCKHART 29.95N 97.59W
 05/13/2014 M3.02 INCH CALDWELL TX MESONET



All of the Flash Flood Warnings (Lime Green – 7 Pictured) and Urban/Small Stream Flood Advisories (Jungle Green – 7 pictured) at the height of the flooding around 1:00 am on May 13th.

We issued a total of 8 Flash Flood Warnings and 13 Areal (Urban/Small Stream) Flood Advisories for this event.

All Reports / Pictures

0457 AM HEAVY RAIN 4 SE PEDERNALES FALLS S 30.27N 98.20W
05/13/2014 M3.77 INCH HAYS TX MESONET

0503 AM HEAVY RAIN 4 NE PFLUGERVILLE 30.48N 97.57W
05/13/2014 M4.08 INCH TRAVIS TX MESONET

0509 AM HEAVY RAIN 3 SW HUTTO 30.52N 97.58W
05/13/2014 M4.22 INCH WILLIAMSON TX MESONET

0516 AM HEAVY RAIN 5 E MOUNTAIN HOME 30.17N 99.28W
05/13/2014 M2.81 INCH GILLESPIE TX MESONET

0520 AM HEAVY RAIN 5 SW SAN ANTONIO 29.37N 98.54W
05/13/2014 M3.50 INCH BEXAR TX COCORAHS

0529 AM HEAVY RAIN 5 NNW LULING 29.75N 97.68W
05/13/2014 M2.37 INCH CALDWELL TX NWS EMPLOYEE

0534 AM HEAVY RAIN 5 NE BASTROP 30.16N 97.25W
05/13/2014 M3.47 INCH BASTROP TX COCORAHS

24 HOUR TOTAL

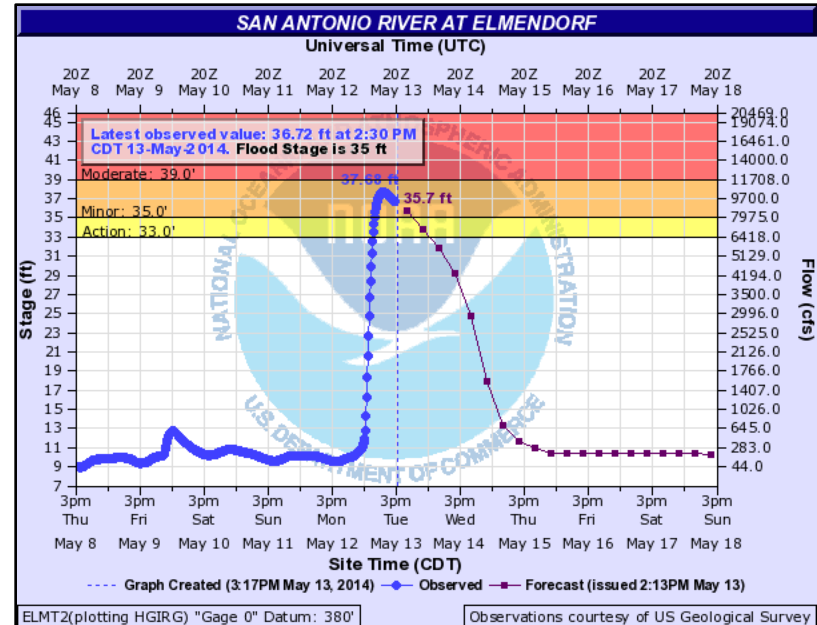
0542 AM HEAVY RAIN 1 SSW LIVE OAK 29.54N 98.35W
05/13/2014 M2.34 INCH BEXAR TX COCORAHS

24 HOUR TOTAL

0545 AM HEAVY RAIN 5 NE SEGUIN 29.63N 97.91W
05/13/2014 M3.12 INCH GUADALUPE TX COCORAHS

0549 AM HEAVY RAIN 3 ENE ONION CREEK 30.15N 97.74W
05/13/2014 M3.00 INCH TRAVIS TX COCORAHS

0625 AM HEAVY RAIN 6 SSE AUSTIN 30.19N 97.70W
05/13/2014 M4.15 INCH TRAVIS TX COCORAHS



San Antonio River at Elmendorf Hydrograph. The river level increased quickly from 9 feet to 37 feet on the morning of Tuesday, May 13th. Action Stage is 33' and Minor Flood Stage is 35', so some minor flooding occurred. The river is expected to be back below flood stage by the morning of Wednesday, May 14th.

All Reports / Pictures

0629 AM HEAVY RAIN 2 SW ROUND ROCK 30.50N 97.70W
05/13/2014 M3.75 INCH WILLIAMSON TX COCORAHS

24 HOUR TOTAL

0647 AM HEAVY RAIN 7 SE SMITHVILLE 29.94N 97.07W
05/13/2014 M6.42 INCH FAYETTE TX COCORAHS

0648 AM HEAVY RAIN ROUND TOP 30.06N 96.70W
05/13/2014 M5.40 INCH FAYETTE TX COCORAHS

0700 AM HEAVY RAIN 6 N SAN MARCOS 29.97N 97.93W
05/13/2014 M4.10 INCH HAYS TX COCORAHS

0700 AM HEAVY RAIN 1 S BRUSHY CREEK 30.50N 97.74W
05/13/2014 M3.19 INCH WILLIAMSON TX COCORAHS

0700 AM HEAVY RAIN 5 SW HENLY 30.15N 98.28W
05/13/2014 M5.70 INCH BLANCO TX COCORAHS

0700 AM HEAVY RAIN 5 ENE WIMBERLEY 30.02N 98.02W
05/13/2014 M4.75 INCH HAYS TX COCORAHS

0700 AM HEAVY RAIN 2 NW SERENADA 30.72N 97.72W
05/13/2014 M4.58 INCH WILLIAMSON TX COCORAHS

0805 AM HEAVY RAIN 6 SSE SAN ANTONIO 29.35N 98.45W
05/13/2014 M4.46 INCH BEXAR TX ASOS

STINSON AIRPORT 24 HOUR TOTAL

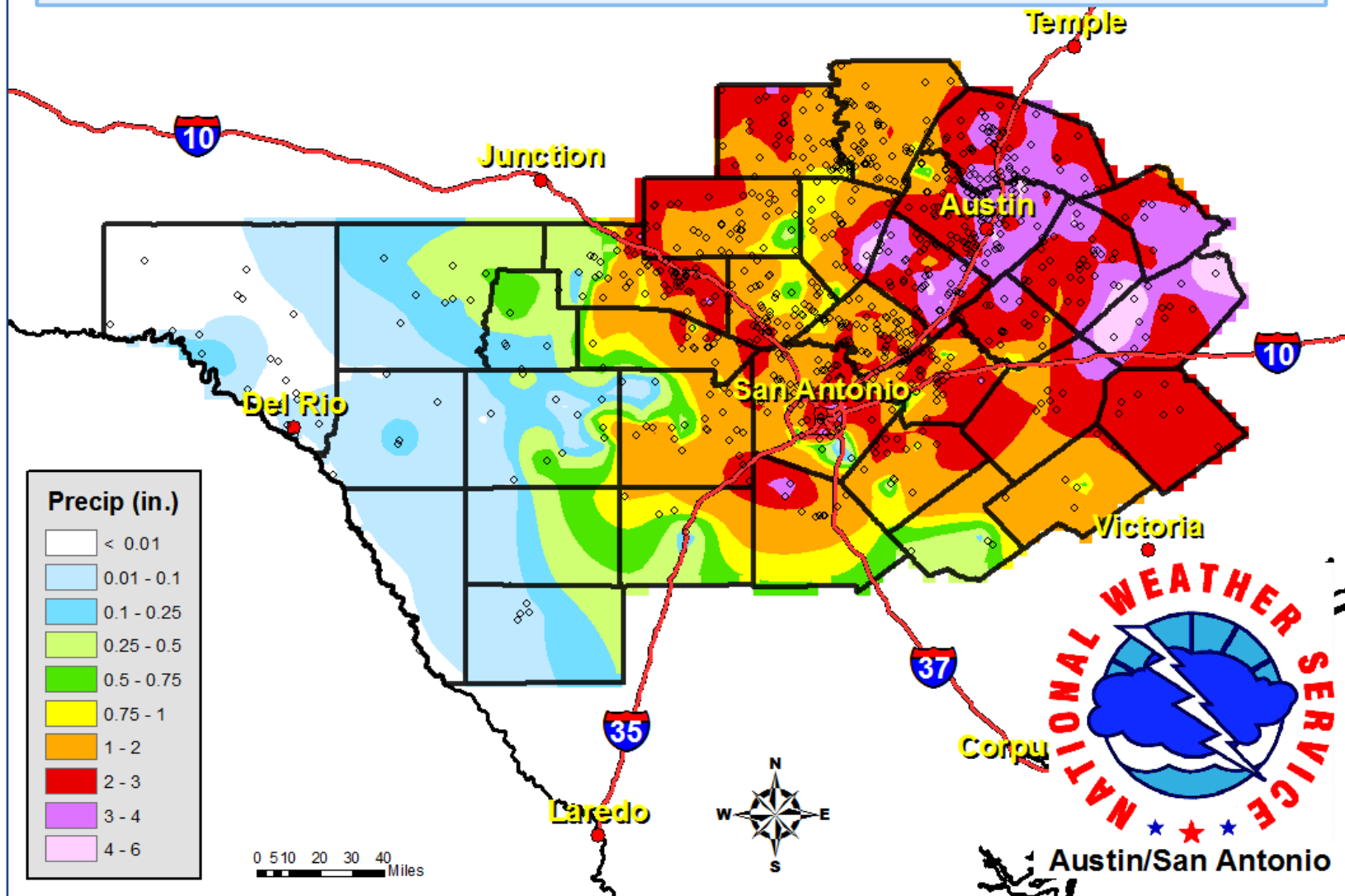
0822 AM HEAVY RAIN 5 E NEW BRAUNFELS 29.70N 98.03W
05/13/2014 M3.18 INCH GUADALUPE TX NWS OFFICE



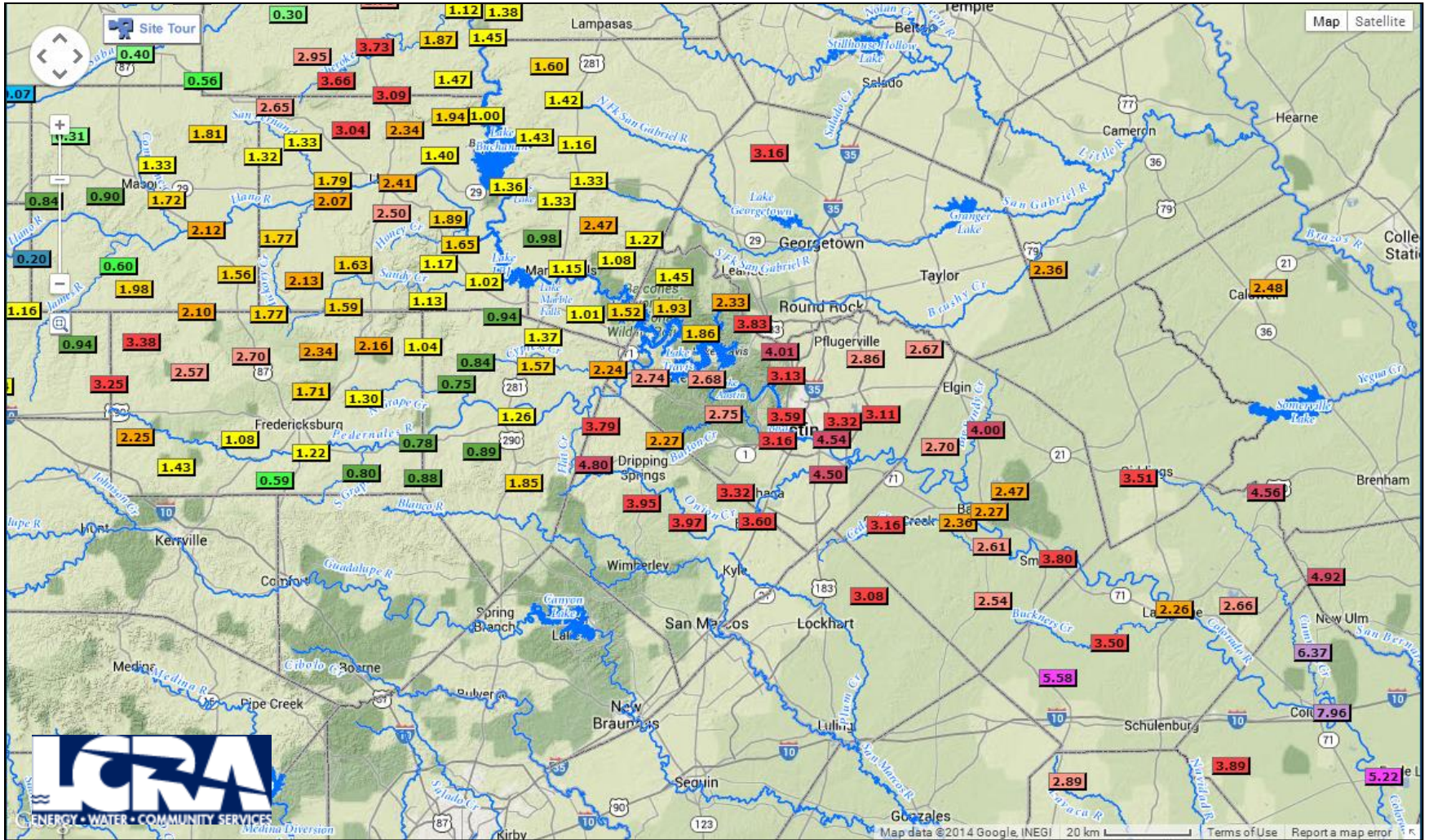
You can view a full list of
area rainfall totals here.
The totals are broken down by county:

[https://nwschat.weather.gov/p.php?pid=201405131635-KEWX-NOUS44-
PNSEWX](https://nwschat.weather.gov/p.php?pid=201405131635-KEWX-NOUS44-PNSEWX)

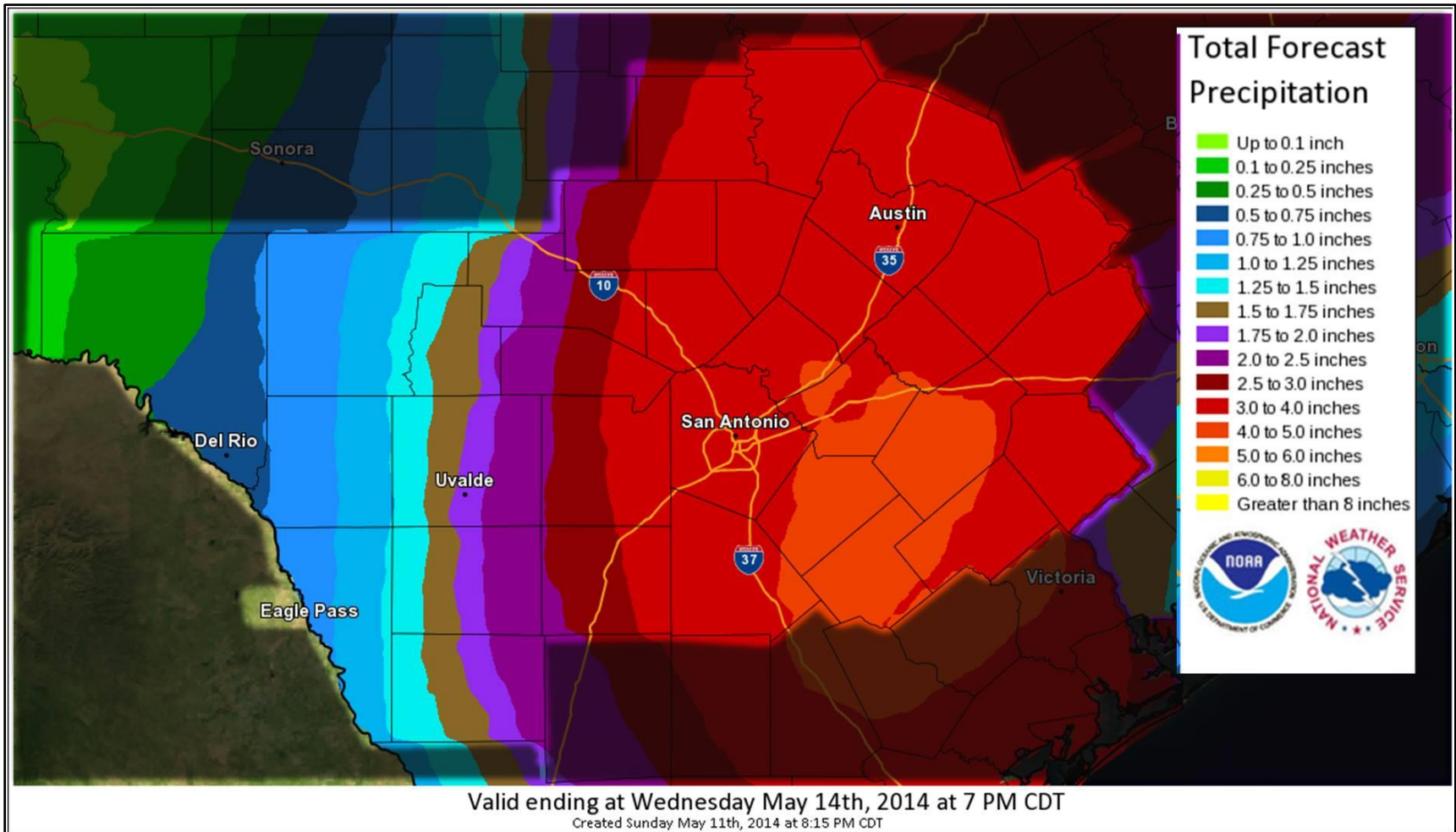
24Hr Rainfall Ending 7AM May 13, 2014



LCRA Hydromet Rainfall



Predicted Rainfall



Predicted Rainfall Totals from our forecast grids 24 hours before the event. Our bullseye for the heaviest rain was a little south and west of where the heaviest rain fell, but the forecast matches up very well with the ground truth reports from the previous slides.

Social Media

Climate Records for May 12th and May 13th:

- A RECORD RAINFALL OF 3.07 INCHES WAS SET AT AUSTIN BERGSTROM FOR MAY 12TH. THIS BREAKS THE OLD RECORD OF 1.66 SET IN 2011.
- A RECORD RAINFALL OF 2.10 INCHES WAS SET AT SAN ANTONIO FOR MAY 12TH. THIS TIES THE OLD RECORD OF 2.10 SET IN 1893.
- A RECORD LOWEST MAX TEMPERATURE OF 66 DEGREES WAS SET ON MAY 13TH AT SAN ANTONIO. THE PREVIOUS RECORD LOWEST MAX TEMPERATURE WAS 67 DEGREES SET IN 1953.



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