Weather, Climate, and Climate Change…
What the Data Tell Us
Class and Instructor Introduction

Bob Endlich

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4 Sep 2019

https://casf.me/

Instructor Introduction:

- Grew up in New Jersey; Life-long interest Earth Sciences
- Bachelor's: Geology, Rutgers, '62
- Basic Meteorology: Texas A&M, '63-64
- Master's: Meteorology, Penn State, '69
- 21 Years USAF Weather Officer
- 14 Years ABQ =>WSMR Atmospheric Team Leader, High Energy Lasers
- 15 Years: Military Instructor, Weather Ef
  Systems, Software Test Engineer
- Sailplane Pilot: 500 Hours

News Stories the last several weeks introduce this subject:

Claims Hot Weather in Europe and Greenland set new extreme maximums of temperature, ice melt.

“Record Fires” in the Amazon Rain Forest

Much more about this later today.

Class Web Page and resources for class members:

https://casf.me/

URLs for Operational Weather Products I use

URLs for Geophysicial data in climate studies I use.

Class presentations…all will be in PDF format.

Email contact: bendlich@msn.com

Interested in what I've written; what others have written about me?

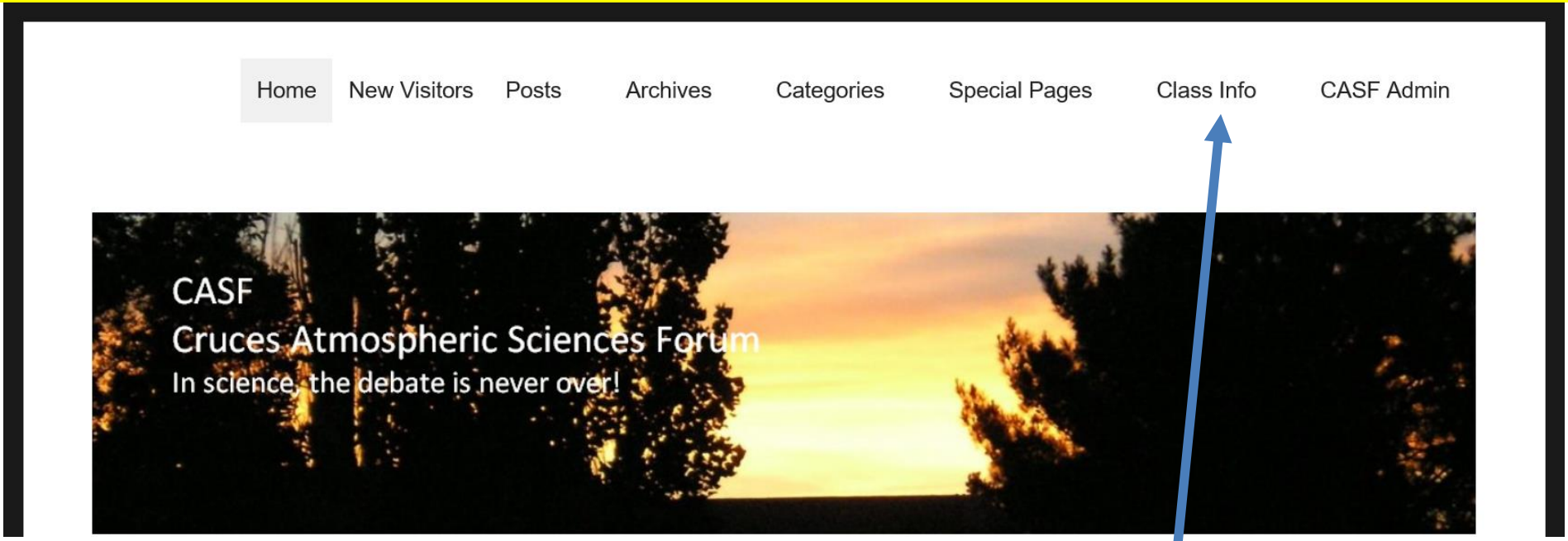
Google search <Robert W. Endlich> same in Las Cruces Sun-News.

I welcome brief discussions from class members:

class is about facts, measurements, observations and data:

on weather, climate, and climate change.

https://casf.me/



Info for this class will be under….Class Info

I taught a previous class at OLLI UTEP in 2017

Let's see some features of the web page

Class is about what the data say.

Disagree? phrase your comments with specific data source.

Journal article or web reference

Much is said about “peer review”

Peer review is no substitute for the scientific method.

Don’t want to get into emotional discussions or arguments in class.

Emotion: potent force that has its place in certain life areas…

…physical, chemical, meteorological or mathematical subjects… not so much

Some subjects: amenable to after-class discussions or email?

Subjects I hope to cover:

Types of weather and atmospheric measurements and their data

Climate data, sources / resources for climate information

The North American monsoon: how it controls our rainfall / climate.

El Nino, also called El Nino Southern Oscillation

La Nina, not quite opposite of El Nino

The Pacific Decadal Oscillation and long-term wetness / drought here.

Is the US Surface Temperature Record Reliable?

Proxy Temperature/<CO2> data: past 10,000 years:

Ice Core and Tree Ring Temperature data and <CO2> from the geologic record -- past 600 MILLION years.

More Subjects I hope to cover:

Sea Level, Sea Level History: non-occurrence of anthropogenic sea level rise.

Climate forecasts, Climate forecast failures.

Atmospheric CO2: data from NASA's Orbiting Carbon Observatory-2

2017's Hurricane Harvey 2016 flooding rains in Baton Rouge, LA, area

Source of "97% of Climate Scientists Agree on Climate Catastrophe"

Promises of Biofuels and Green Energy: 21st Century Snake Oil

The Deliberate Corruption of Climate Science

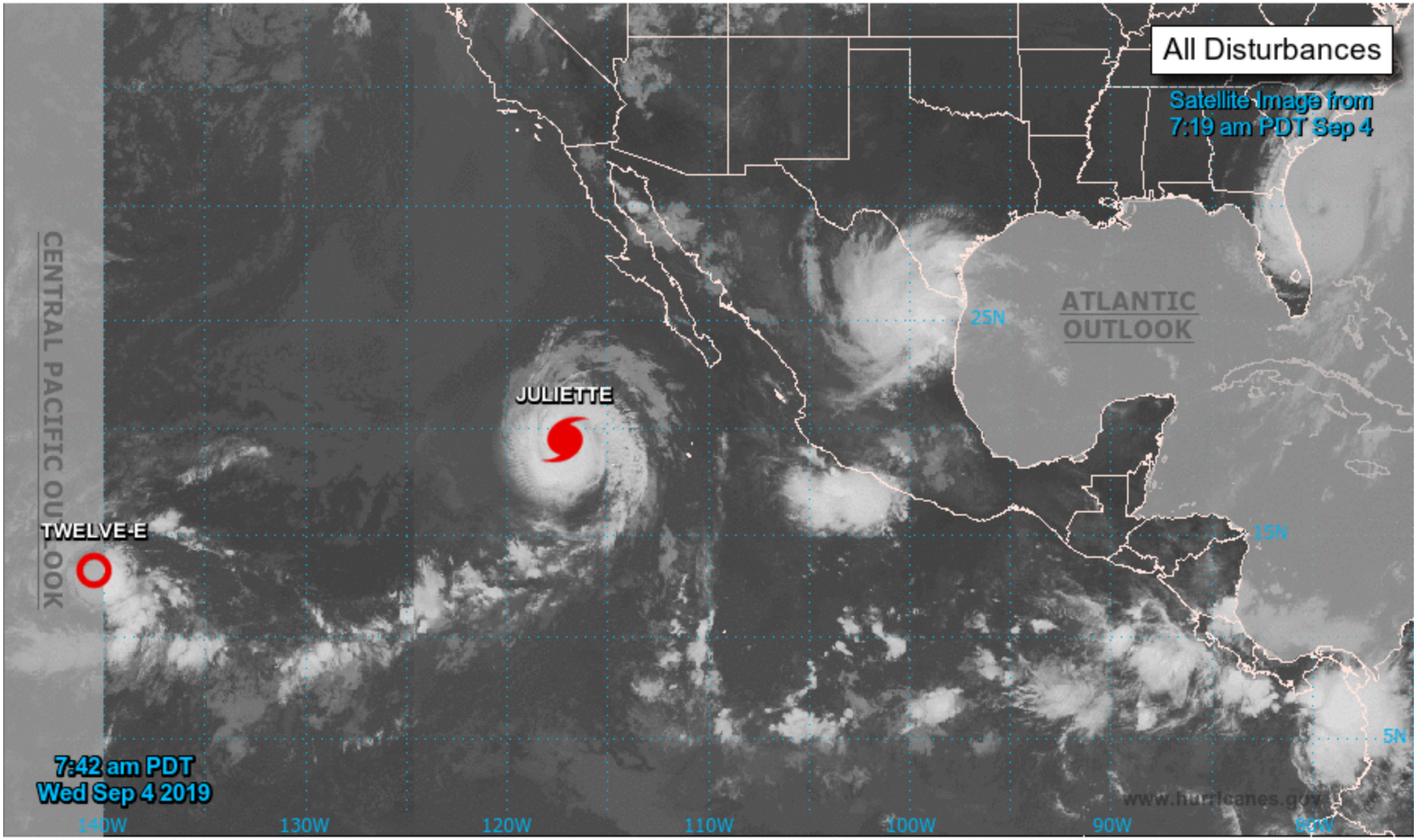
Sure looks like Temperature Adjustment Fraud to me:
NASA, Wikipedia, and the American Meteorological Society.

Each class I'll get into a current weather briefing so class gets a feel for the operational vs. the research side of this science.

https://www.nhc.noaa.gov/gtwo.php?basin=epac&fdays=2

Two-Day Graphical Tropical Weather Outlook

National Hurricane Center Miami, Florida



Current Disturbances and Two-Day Cyclone Formation Chance: < 40% 40-60% > 60%

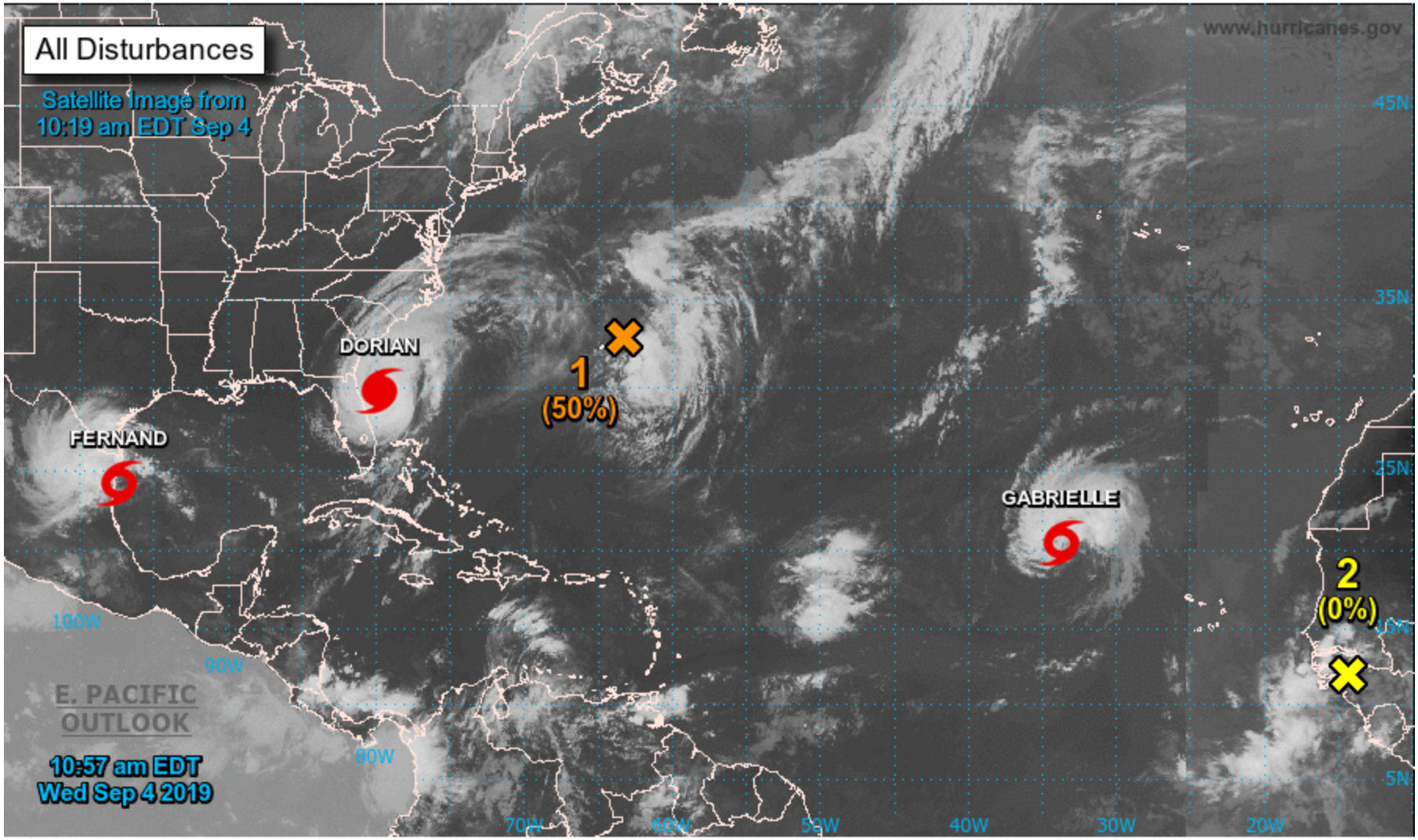
Tropical or Sub-Tropical Cyclone: Depression Storm Hurricane

Post-Tropical Cyclone or Remnants

https://www.nhc.noaa.gov/gtwo.php?basin=atlc&fdays=2

Two-Day Graphical Tropical Weather Outlook

National Hurricane Center Miami, Florida



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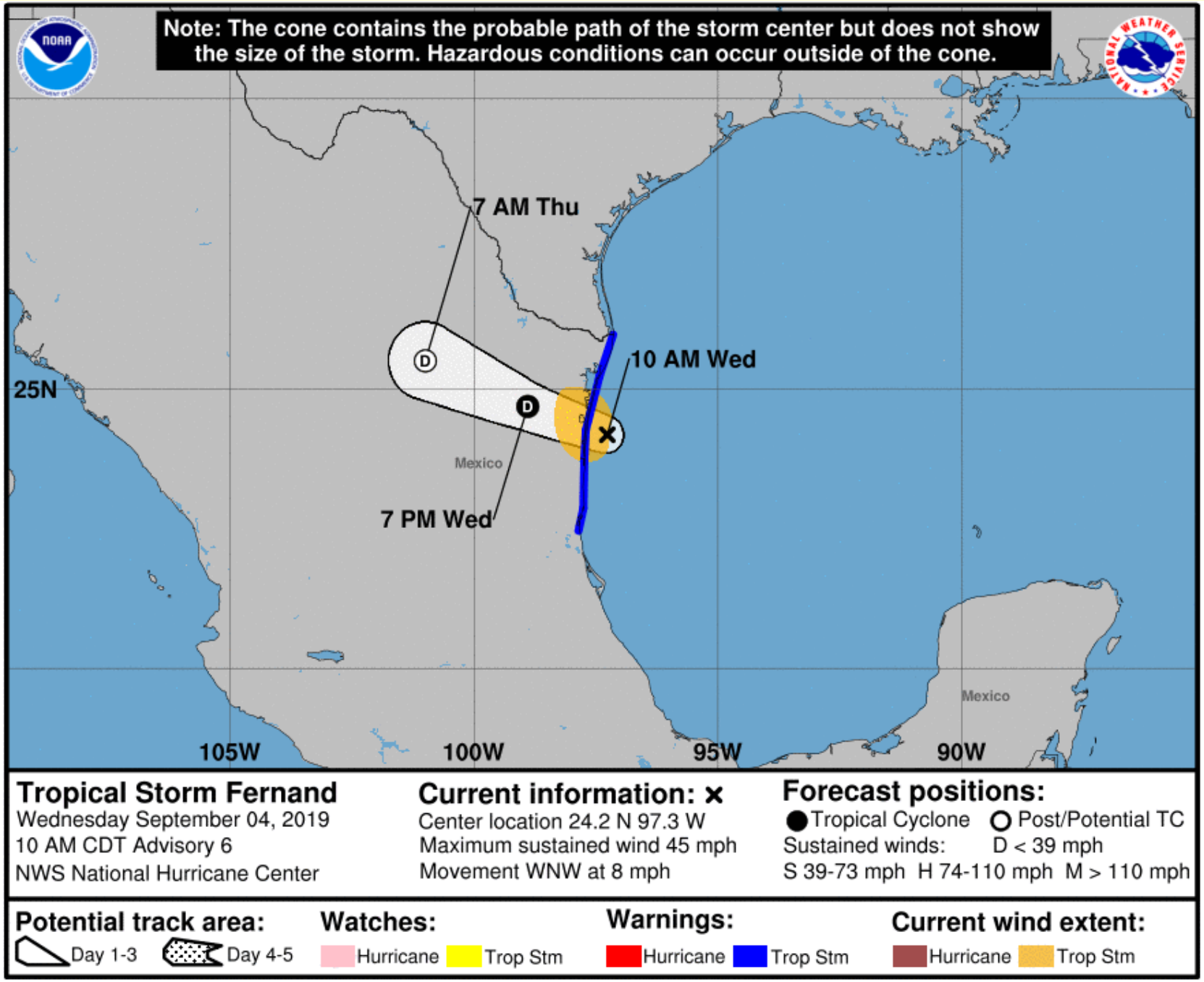
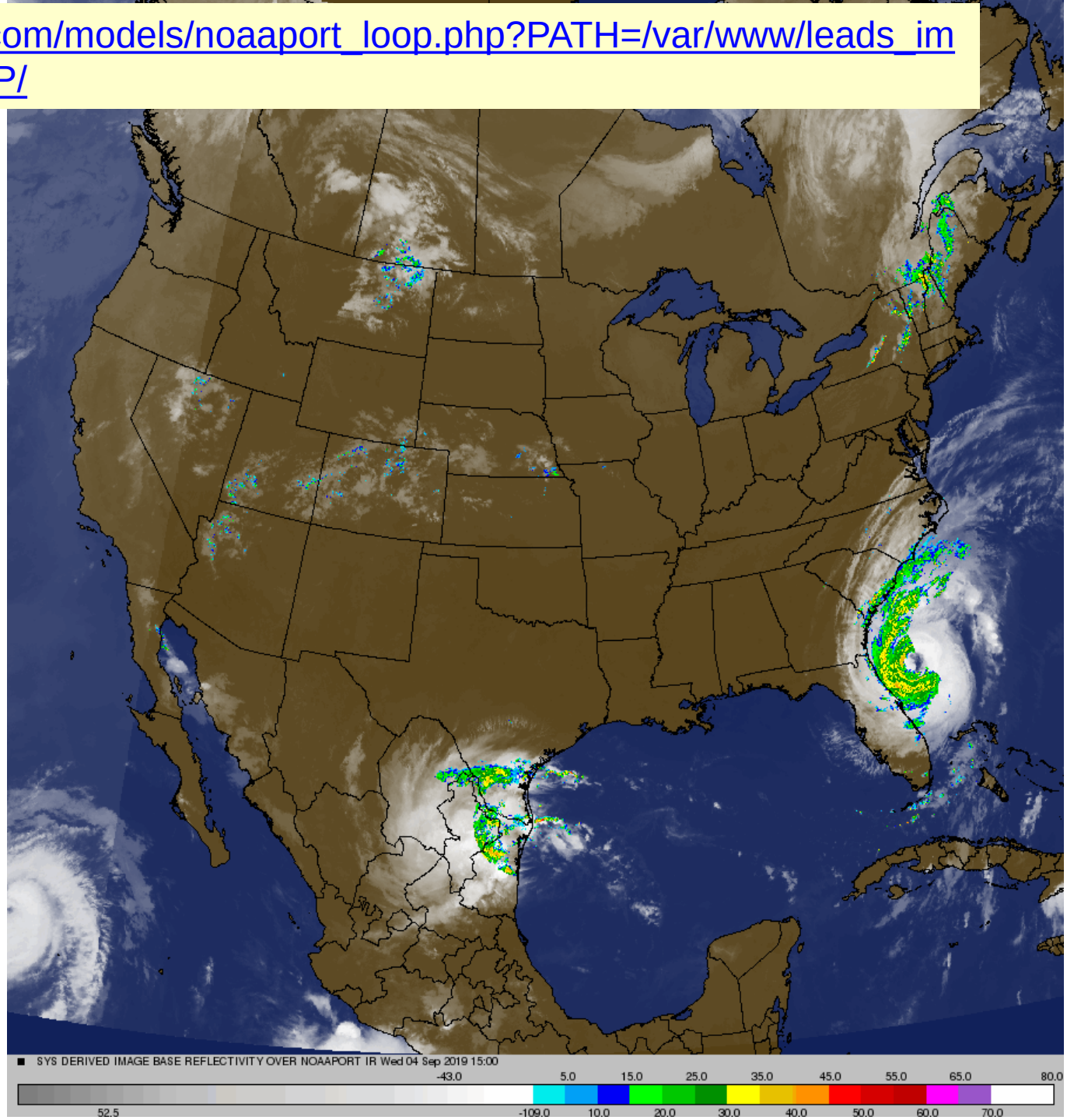
https://www.nhc.noaa.gov/refresh/graphics_at2+shtml/143431.shtml?cone#contents



http://wxweb.meteostar.com/models/noaaport_loop.php?PATH=/var/www/leads_images/satellite/SYS/COMP/



http://wxweb.meteostar.com/models/noaaport_loop.php?PATH=/var/www/leads_images/satellite/SYS/COMP

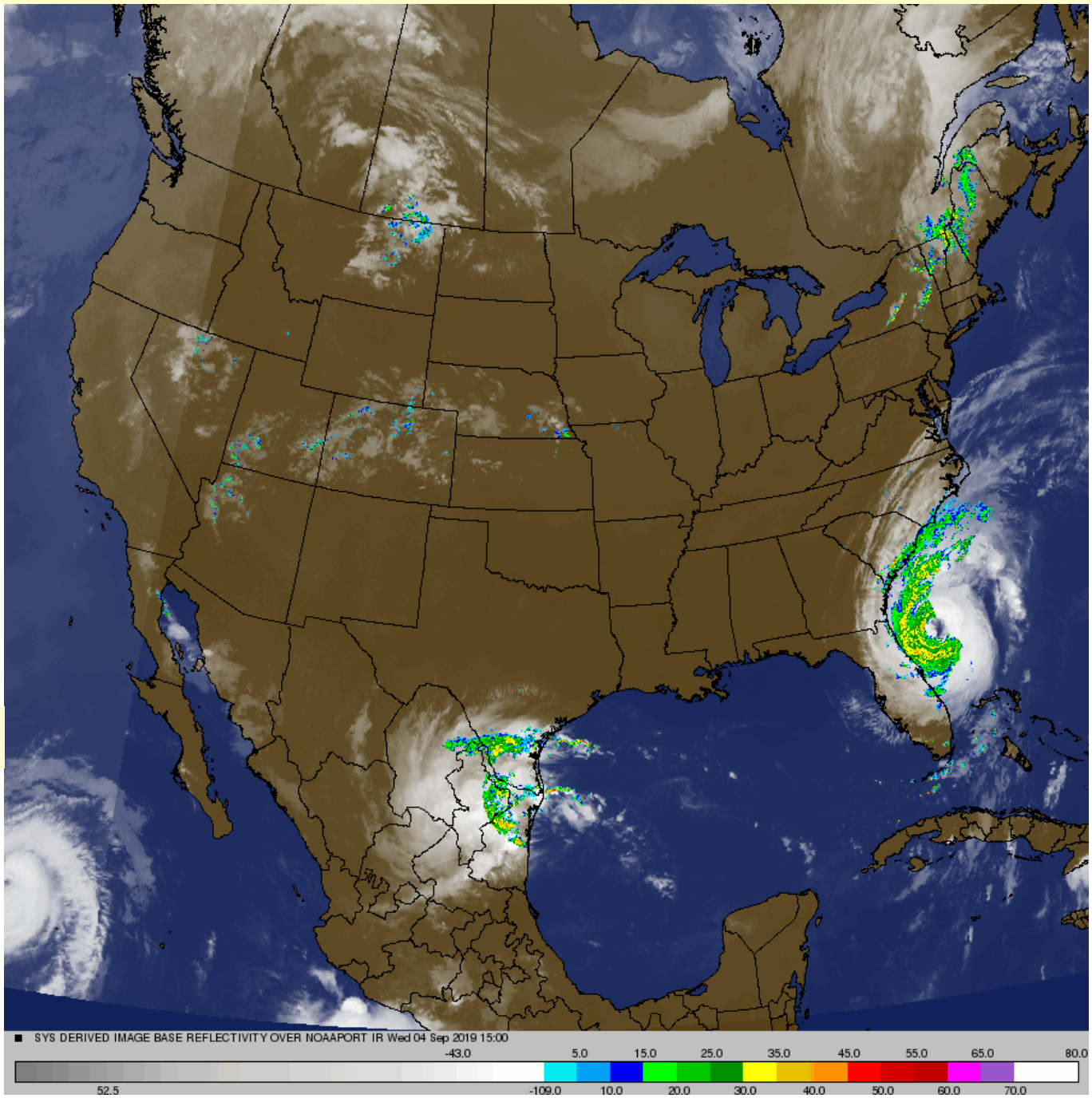
Westerlies and storm track

Subtropical Ridge

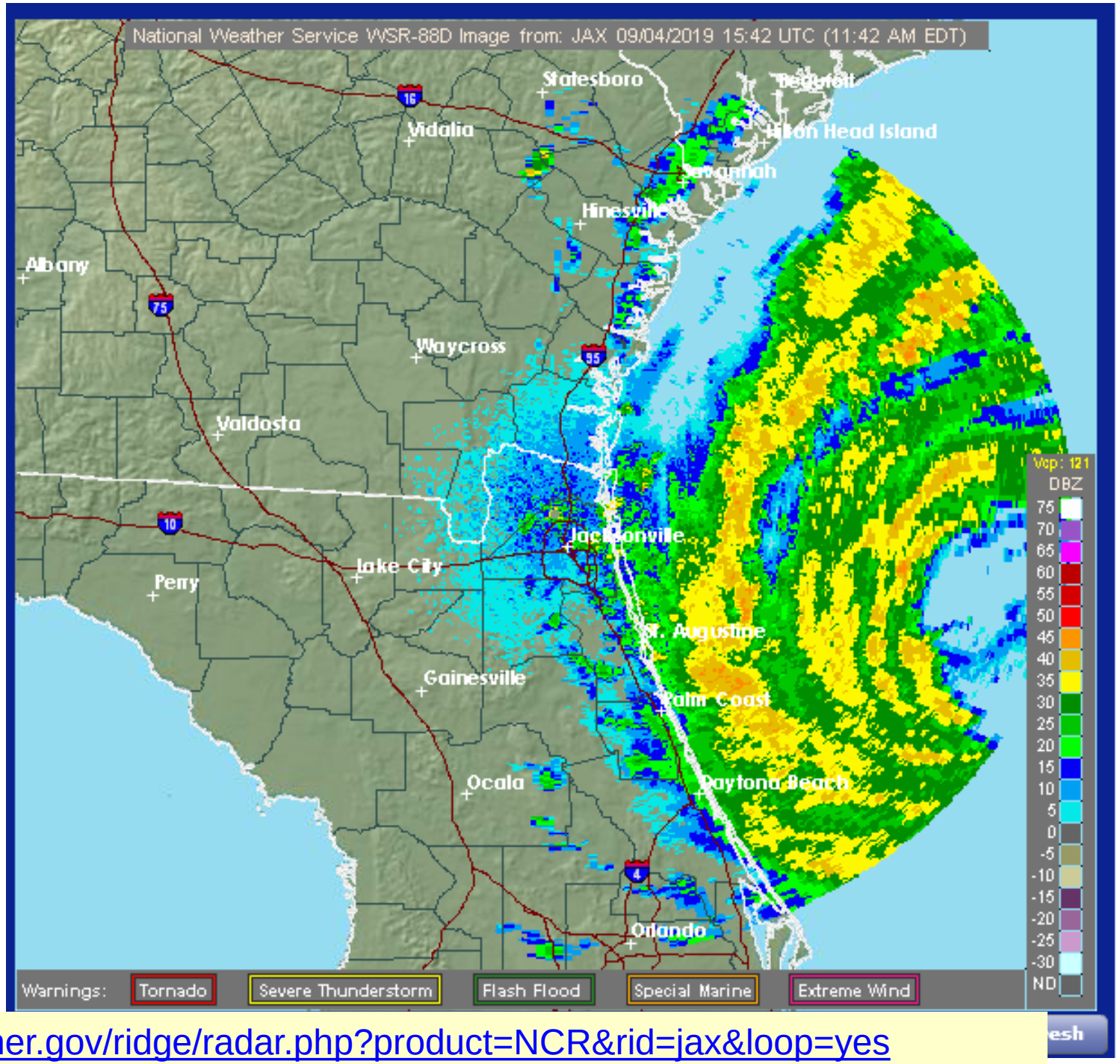
Dorian

Ferdinand

Juliette



https://radar.weather.gov/ridge/radar.php?product=NCR&rid=jax&loop=yes

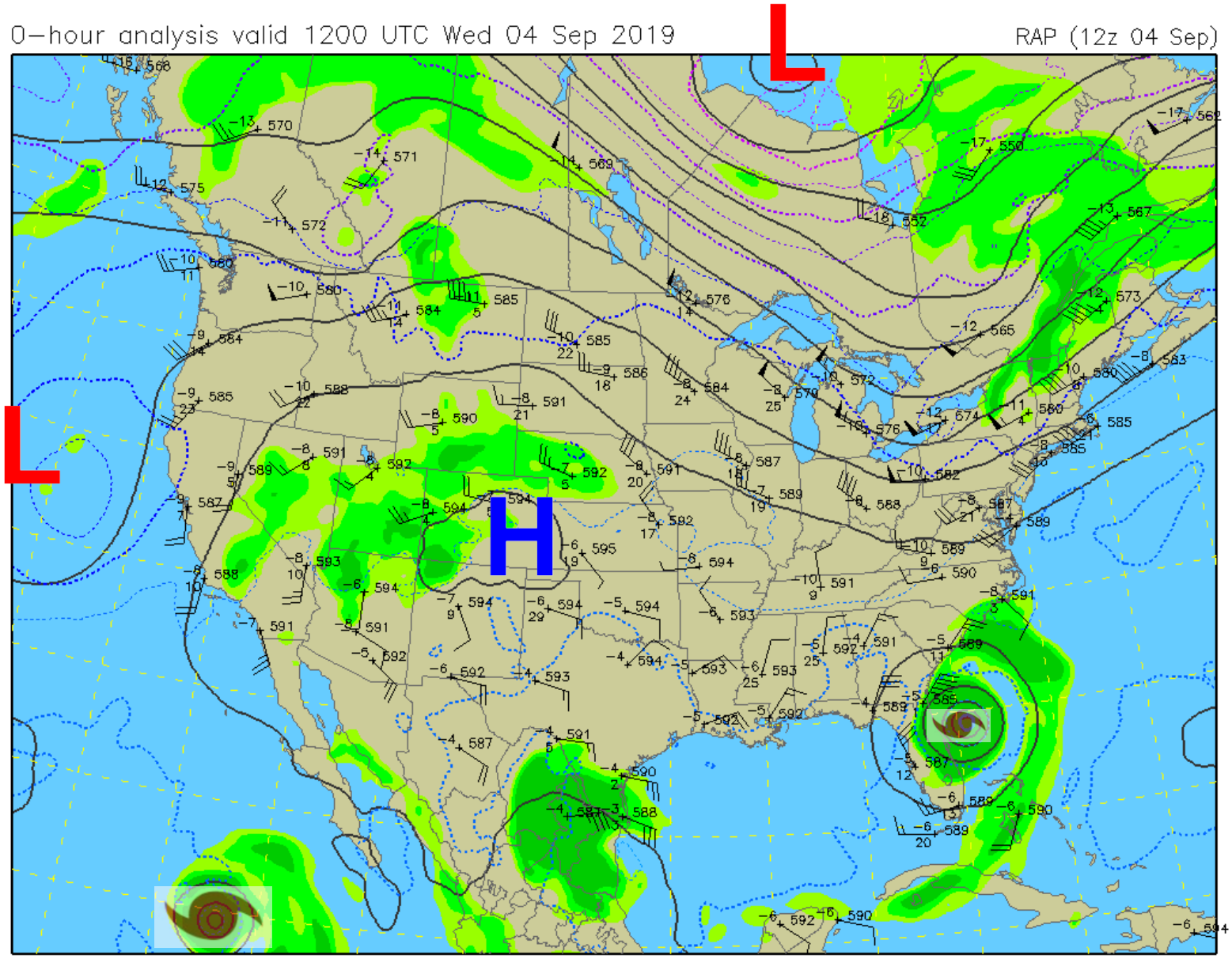


https://radar.weather.gov/ridge/radar.php?product=NCR&rid=jax&loop=yes

http://weather.rap.ucar.edu/upper/upaCNTR_500.gif

500 mb rawinsonde data 12z Wed 04 Sep 2019

500 mb Heights (dm) / Temperature (°C) / Humidity (%)



http://weather.rap.ucar.edu/upper/epz.gif

Skew-T Log P diagram

Pw = 1.83

Also Blue

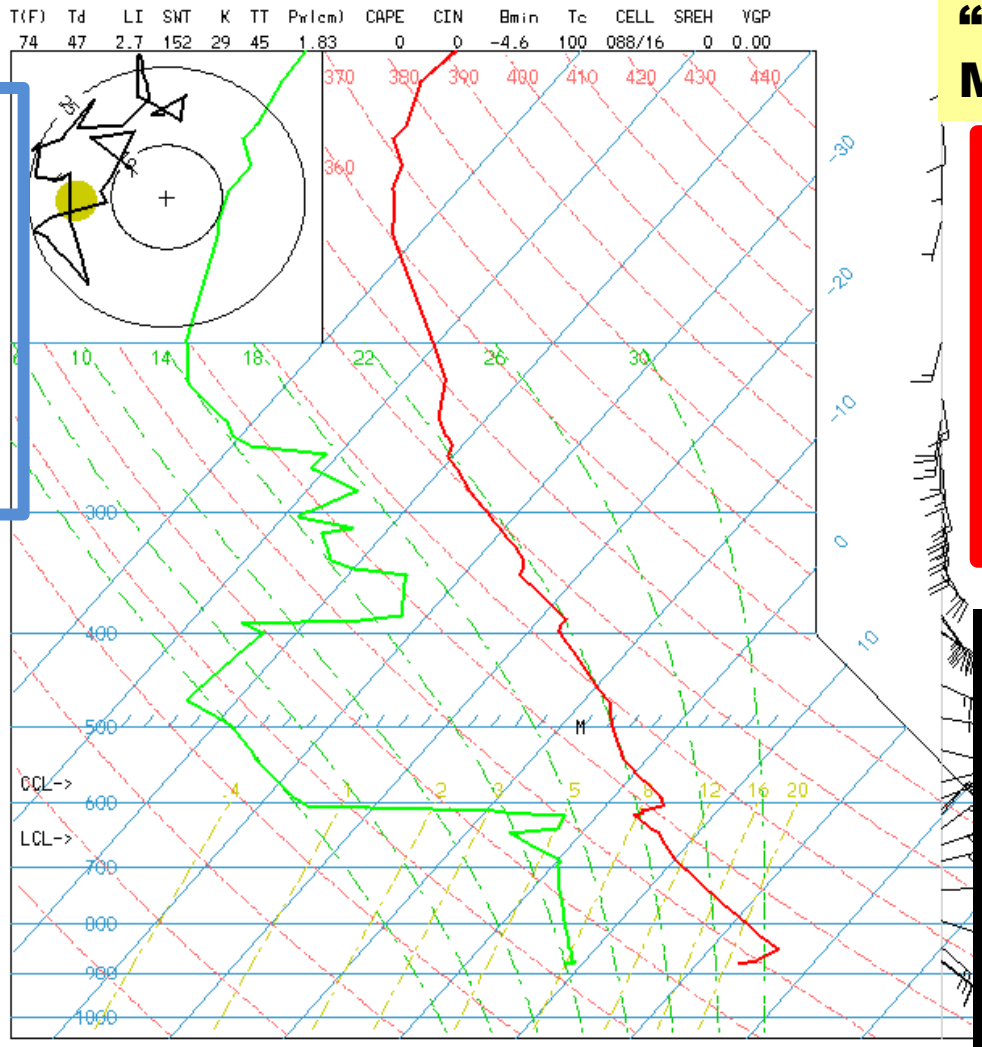
in the Vertical

Pressures decrease

logarithmically

The GREEN LINE is the Dew Point temperature from the same sounding.

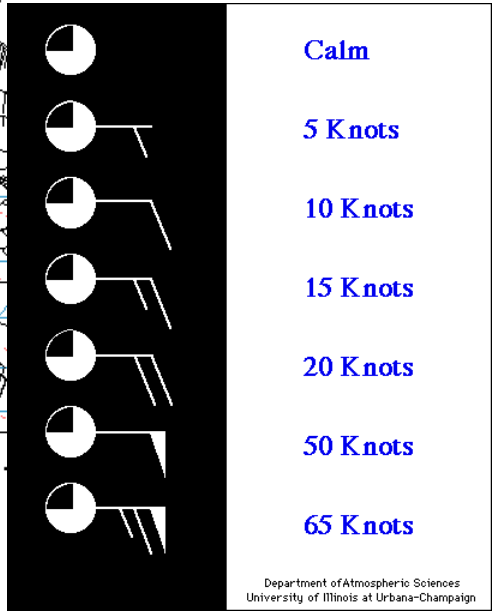
4 Sep 2019/1200Z



Skewed Temperatures in Blue

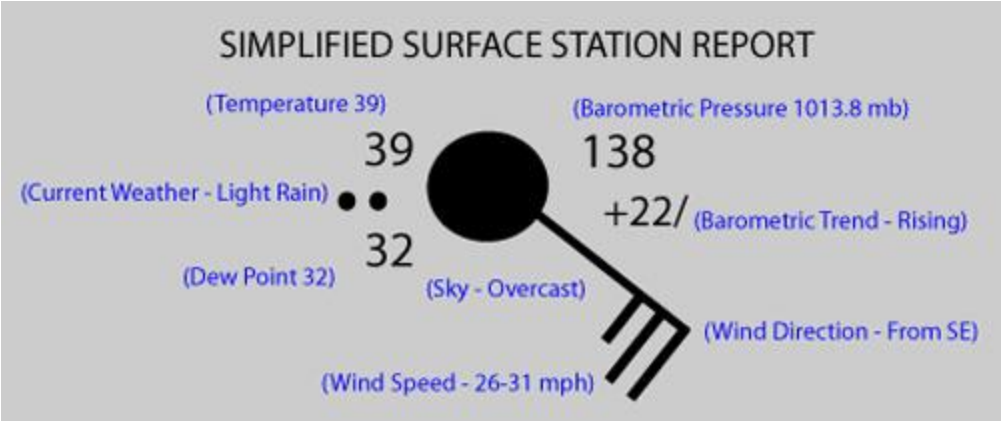
"Graph paper" for Meteorologists

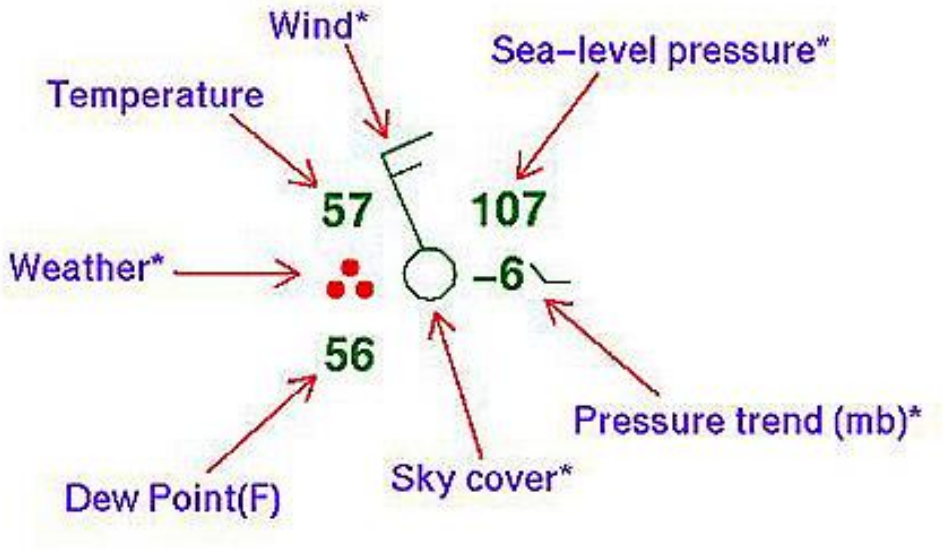
The RED line is the temperature from the weather balloon sounding



The Skew-T allows easy calculation of dozens of thermodynamic variables

Surface weather observations are plotted on a map in this stylistic manner:





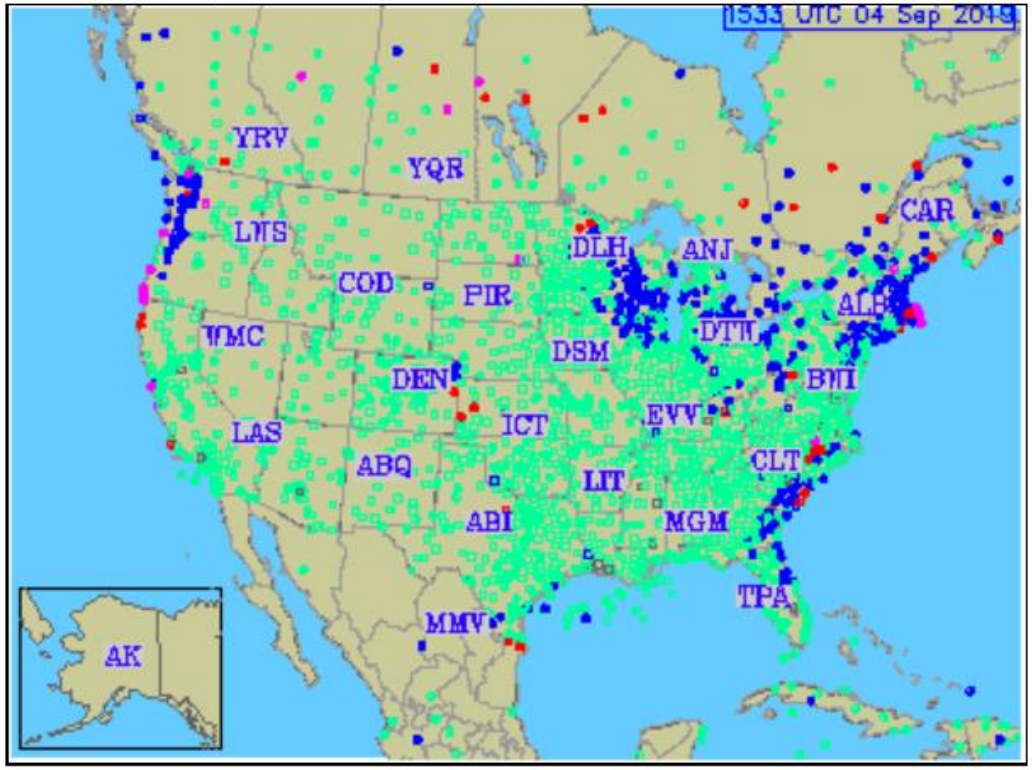
The National Center for Atmospheric Research
Operated by the University Corporation for Atmospheric Research

NCAR RAL Real-Time Weather Data

Home / RAL : Weather Home | Satellite | Radar | Surface | Upper-Air | Forecast

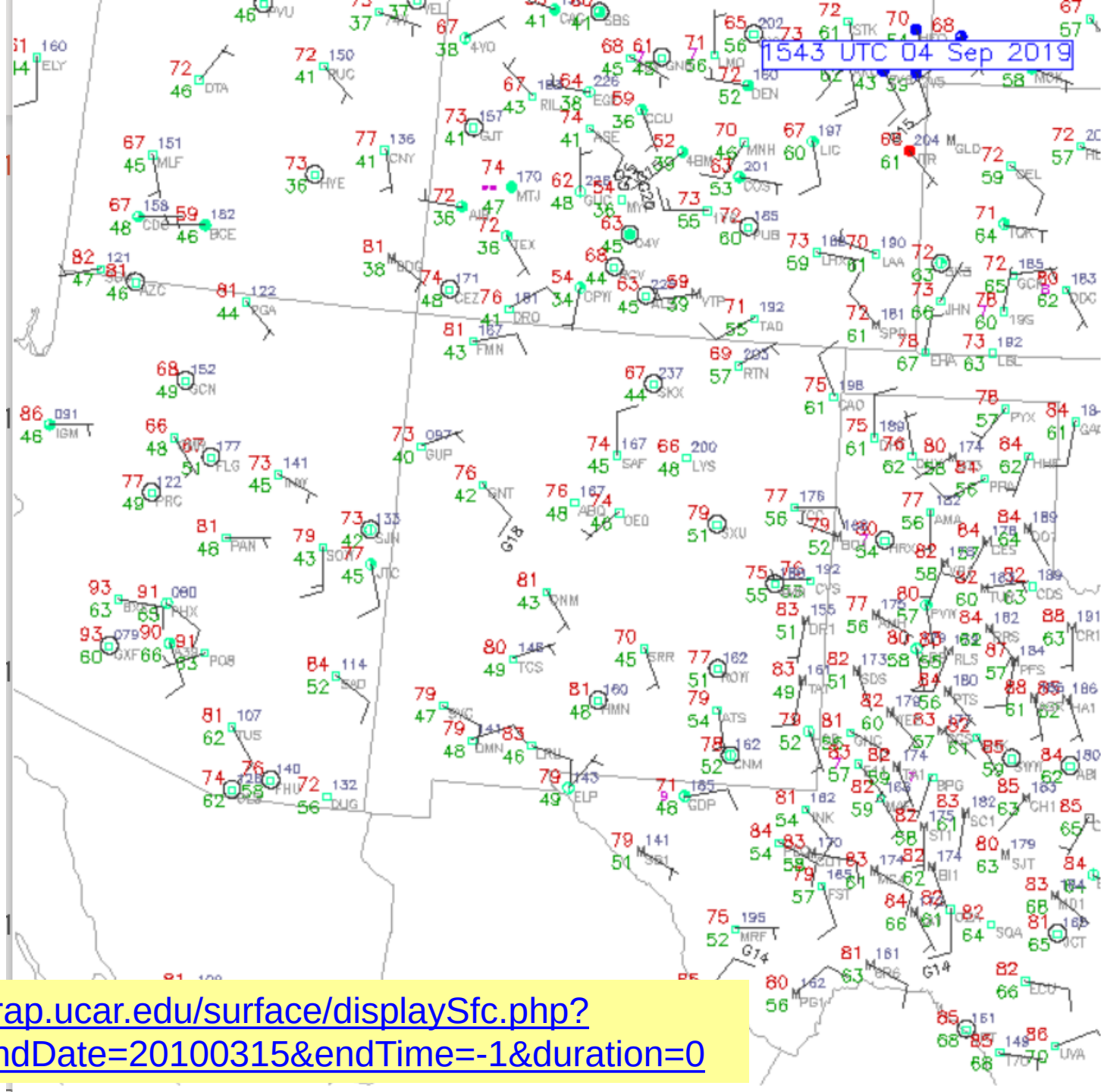
http://weather.rap.ucar.edu/surface/

End date: Today
End time: Most recent
Loop duration: Single image



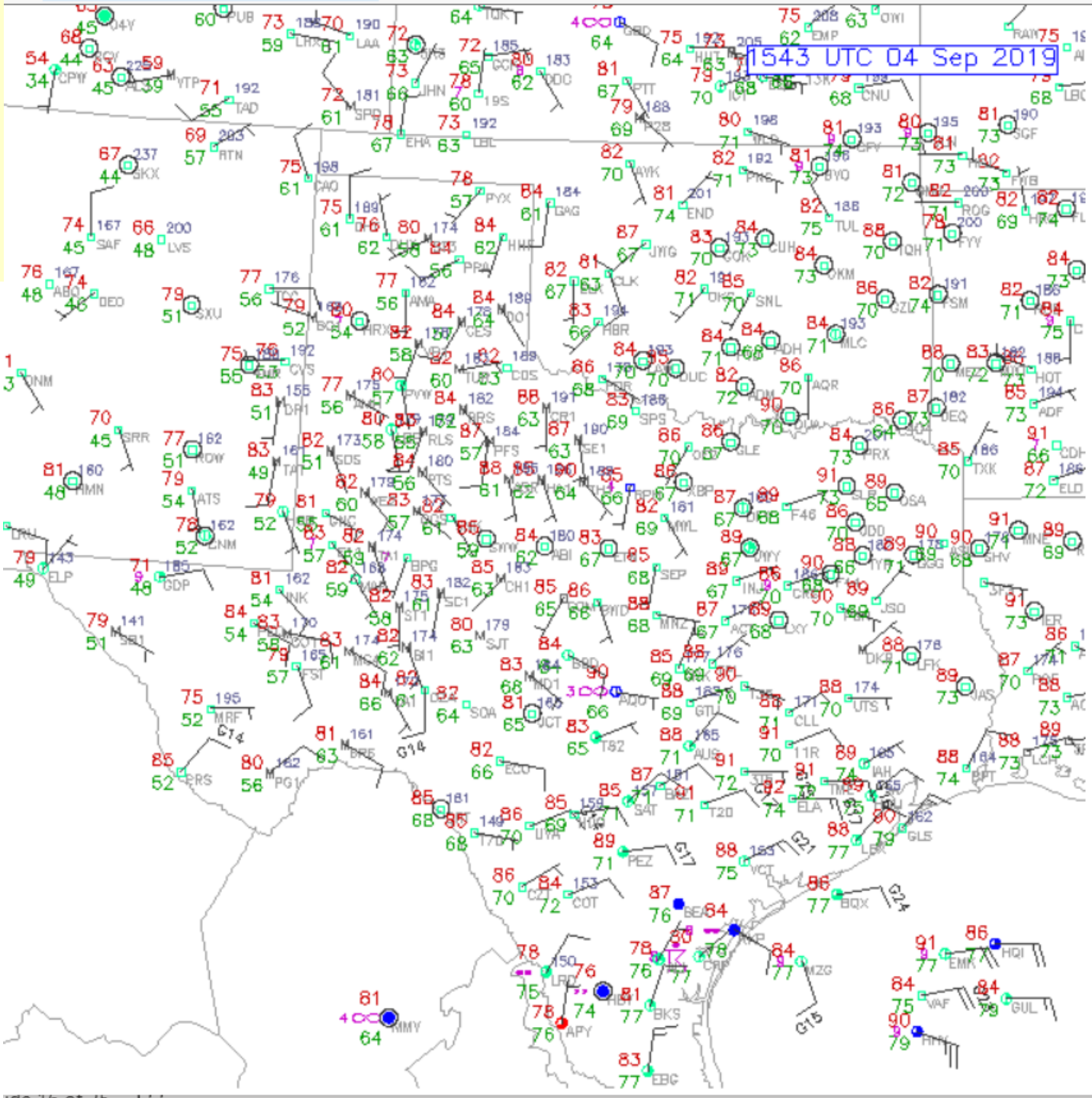
Interactive METARs Java applet or large version.

Tornado alley overlay at DEN Go



http://weather.rap.ucar.edu/surface/displaySfc.php?region=abq&endDate=20100315&endTime=-1&duration=0

http://weather.rap.ucar.edu/surface/displaySfc.php?region=abi&endDate=20190904&endTime=-1&duration=0



http://forecast.weather.gov/product.php?site=NWS&issuedby=EPZ&product=AFD&format=CI&version=1&glossary=1

Area Forecast Discussion

Issued by NWS

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AFDEPZ

Area Forecast Discussion
National Weather Service El Paso Tx/Santa Teresa NM
332 AM MDT Wed Sep 4 2019

.SYNOPSIS...
High pressure aloft will bring seasonably warm and mostly dry weather across southern New Mexico and west Texas today through Friday. Moist unstable air will then flow into the region and this will cause an increase in shower and thunderstorm activity this coming weekend into early next week.

&&

.DISCUSSION...
Broad upper ridge axis remains aligned east to west across the Colorado-New Mexico border region with the attendant anticyclonic circulation transporting dry stable continental air from east and northeast into southern New Mexico and far west Texas. Water vapor images are consistent with this showing pronounced drying at mid and upper levels. In addition soundings also indicate a subsidence inversion at mid levels. The dry air inflow aloft and subsidence should therefore bring mostly dry seasonably warm weather today through Friday as ridge axis will exhibit little movement over the next several days while precipitable water remains mostly below an inch while CAPE`s will be generally less than 500 J/kg.

http://forecast.weather.gov/product.php?site=NWS&issuedby=EPZ&product=AFD&format=CI&version=1&glossary=1

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http://forecast.weather.gov/product.php?site=NWS&issuedby=EPZ&product=AFD&format=CI&version=1&glossary=1

This pattern evolution will support a circulation and flow trajectories favorable for the transport of low and mid level moisture from the southeast...south and southwest this weekend into early next week. Consequently surface dewpoints will rise into the 50s and lower 60s while precipitable water increases to around 1.2 to 1.5 inches by Sunday afternoon. The rise in moisture content will make air mass at least weakly unstable with afternoon CAPEs around 500 to 1000 J/kg.

Models suggest possible weak embedded waves aloft may enter the CWA while at the surface a persistent trough axis will extend into the region providing low level convergence. These factors expected to generate an increase in convection beginning Saturday afternoon and continuing into at least next Tuesday. Given the abundant moisture and weak steering flow expect heavy rains to be the primary weather hazard.

https://www.wrh.noaa.gov/twc/monsoon/monsoon.php

NATIONAL WEATHER SERVICE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

Yearly Monsoon Statistics for Tucson

Share

Tucson, AZ
Weather Forecast Office

Monsoon statistics for Tucson (1895-2019)

Top 10 Wettest Monsoon		Top 10 Driest Monsoon	
1) 13.84"/1964	6) 10.20"/2006	1) 1.59"/1924	6) 2.50"/1902
2) 13.08"/1955	7) 9.94"/1984	2) 2.33"/1973	7) 2.58"/1994
3) 11.04"/1921	8) 9.85"/1990	3) 2.40"/1989	8) 2.75"/1913
4) 10.50"/1983	9) 9.43"/1966	4) 2.42"/2004	9) 2.79"/1918
5) 10.21"/1919	10) 8.62"/2011	5) 2.45"/1900	10) 2.81"/2001

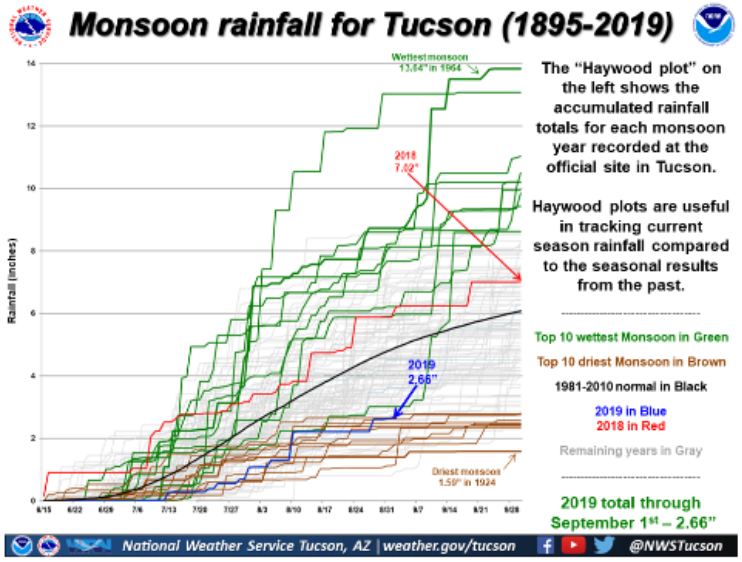
Month by month rainfall

as of September 1st

Year	June (15-30)	July	August	September	Total
Normal	0.15"	2.25"	2.39"	1.29"	6.08"
2019	Trace	1.07"	1.57"	0.02"	2.66"
2018	0.91"	2.26"	2.71"	1.14"	7.02"
2017	Trace	6.80"	1.74"	0.03"	8.57"
2016	1.39"	3.32"	1.09"	1.60"	7.40"
2015	0.35"	2.08"	1.80"	2.40"	6.63"
2014	0.00"	1.43"	1.89"	2.76"	6.08"
2013	0.03"	2.60"	0.48"	0.63"	3.74"
2012	0.34"	4.13"	1.17"	0.38"	6.02"
2011	0.03"	1.64"	1.35"	5.60"	8.62"
2010	0.00"	2.71"	2.04"	0.70"	5.45"
2009	0.01"	1.78"	0.33"	0.74"	2.86"
2008	0.16"	3.42"	1.70"	0.24"	5.52"
2007	0.00"	5.22"	0.90"	0.45"	6.57"
2006	0.19"	5.40"	3.01"	1.60"	10.20"
2005	0.01"	0.72"	4.52"	0.05"	5.30"
2004	0.00"	0.86"	0.95"	0.61"	2.42"
2003	0.00"	2.50"	2.04"	2.16"	6.70"

Haywood plot of monsoon rainfall years

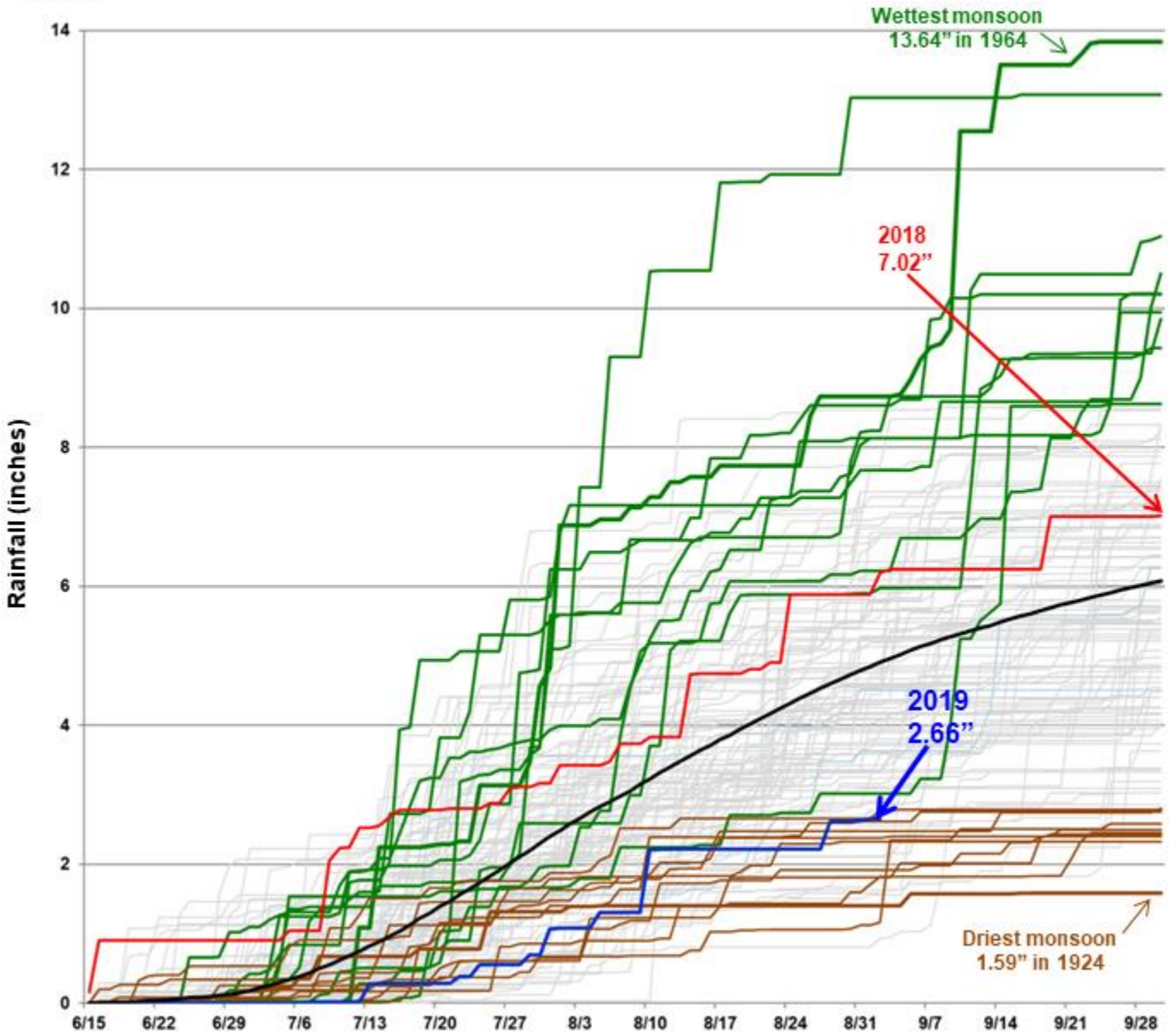
for Tucson since 1895
Click on image for larger view



Historical rankings for 2019 monsoon rainfall:
June 15th-30th: Trace (48th period with no measurable)
July: 1.07" (25th driest July on record)
August: 1.57" (45th driest August on record)
September: 0.02" (?)
Overall: 2.66" (thru September 1st, the 21st driest Monsoon on record **to date**)

https://www.wrh.noaa.gov/twc/monsoon/monsoon.php

Monsoon rainfall for Tucson (1895-2019)



The "Haywood plot" on the left shows the accumulated rainfall totals for each monsoon year recorded at the official site in Tucson.

Haywood plots are useful in tracking current season rainfall compared to the seasonal results from the past.

Top 10 wettest Monsoon in Green

Top 10 driest Monsoon in Brown

1981-2010 normal in Black

2019 in Blue
2018 in Red

Remaining years in Gray

2019 total through September 1st – 2.66"

https://www.wrh.noaa.gov/twc/monsoon/monsoon.php

Features of the Monsoon Tracker