UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Weather Service
Space Weather Prediction Center
325 Broadway W/NP9
Boulder, CO 80305

May 14, 2024

FROM: Clinton Wallace
Director, Space Weather Prediction Center

SUBJECT: Preliminary Event Summary - May 2024 Extreme Geomagnetic Storm

Solar Cycle 25 has been more active than anticipated, with an intense surge in solar activity marking the beginning of May. A large group of unstable sunspots on the Sun's surface unleashed several powerful solar flares, immediately affecting the Earth's outer atmosphere and causing disruptions in high-frequency (HF) radio communications. This had significant implications for trans-oceanic aviation, which relies heavily on HF radio for communication over long distances.

As the initial sunspot group rotated out of view, an even larger and more complex group of sunspots, designated NOAA Region 3664, emerged. It first appeared on May 1st and rapidly expanded, becoming the most complex sunspot group of the solar cycle thus far. As it rotated towards the center of the solar disk, it began producing frequent and strong solar flares, raising the probability of significant space weather events.

On the night of May 7th-8th, Region 3664 produced a particularly powerful R3-level flare accompanied by multiple radio signatures indicating a large coronal mass ejection (CME) aimed at Earth. SWPC forecasters quickly analyzed the data, confirming the CME's trajectory and estimating its arrival late on May 10th. Subsequently, another faster CME erupted from the same region, further compounding the threat.

Given the severity of the situation, SWPC conducted in-depth analyses and decided that an initial Watch for geomagnetic activity was necessary. As additional data confirmed the threat, SWPC upgraded the Watch to a rare G4 or greater geomagnetic storm watch (Severe to Extreme). This prompted immediate action to provide decision support services to critical technology and infrastructure operators, including electric power grid coordinators, satellite operators, aviation, and other sectors.

On May 9th, SWPC staff activated the North American Electric Reliability Corporation (NERC) hotline to discuss the G4 or greater Watch. NERC disseminated the information, providing nearly six hours of advanced lead time for around 3,000 electric utility companies nationwide to prepare for the forecasted geomagnetic storm. NERC leadership acknowledged the support, saying, “SWPC was indispensable to NERC…grid operators across North America took significant steps to prepare before the storm.”

SWPC also communicated extensively with State Watch Centers, FEMA Regions 1-10, and the Cybersecurity and Infrastructure Security Agency (CISA), providing detailed briefings on the expected impacts and recommended precautions. SWPC and NOAA Public Affairs organized a mass media teleconference with over 1,300 participants to ensure the public was well-informed about the situation.

When the massive CME arrived early on May 10th, storm conditions escalated rapidly to G4 (Severe) and eventually G5 (Extreme) levels. The storm's intensity was driven by the CME's magnetic field, which was significantly stronger than normal (~15x) and strongly connected with Earth's magnetic field. This led to severe and extreme conditions until noon on May 11th, with G3 (Strong) conditions persisting for another 12 hours.

SWPC maintained continuous communication with decision-makers throughout the event, providing real-time updates and support. This included ongoing briefings to partners, industries, and customers to help them understand and mitigate the impacts of the geomagnetic storm.

The extreme geomagnetic storm caused significant disruptions across multiple sectors, including navigation, power grids, aviation, and satellite operations. A sampling of preliminary and yet-to-be-confirmed reports of impacts follows.

Power Grids

- Grid operators across the U.S. and Canada took significant preventive measures to maintain grid stability. SWPC has not confirmed any reports of power outages in the U.S. or Canada due to the storm.
- British Columbia: Activated a "ground-induced current response plan" due to irregularities.
- Scotland: National Grid observed increased currents and heating effects in transformers; utilities took precautionary measures.
- Florida: Power outage mistakenly attributed to the geomagnetic storm caused confusion.

GPS Systems

- Significant degradation of GPS systems, with reports of navigation system disruptions for aviation over North America and parts of Europe.
- Midwest: Farmers reported GPS malfunctions in planting operations.

Satellite Operations

- Low-Earth Orbit (LEO) satellite navigation maneuvers were required to ensure satellite instrumentation was not damaged by the storm.
- Elon Musk reported degraded service for Starlink satellites.

Communication Systems

- Airlines experienced HF frequency degradation affecting aircraft communications.
- U.S. and European flights rerouted farther south to avoid radio disruptions, extending flight times.
- Ham radio operators reported severe noise and signal loss on various frequencies.

This event underscored the interconnectedness and vulnerability of modern infrastructure to space weather. Proactive measures and robust procedures largely mitigated severe impacts but highlighted areas for improvement in preparedness and response. Ongoing monitoring and cross-sector communication were crucial in managing the storm's effects.

This event highlighted the critical role of SWPC in forecasting space weather and communicating effectively with decision-makers. SWPC's proactive measures and detailed briefings enabled industries to implement necessary precautions, mitigating the potentially severe impacts of the solar storm. The successful handling of this event demonstrated the importance of preparedness and the effectiveness of coordinated responses to space weather threats.

cc: NWS Executive Team
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NWS Operations Center

Daily Operations Briefing

Monday, May 13, 2024

NWSOC		Critical Weather Day		Enhanced Caution Event	
Level 3		No		In Effect	
Pacific	**Alaska**	**Western**	**Central**	**Southern**	**Eastern**
Level 3	Level 3	Level 4	Level 4	Level 3	Level 4
Continuity of Govt.	**NOAA ICC**	**FEMA HQ**	**NSSE/SEAR**		
Level 4	Level 4	Watch / Steady State	No		
NWS Liaison to N-IMAT Red	**NWS Liaison to N-IMAT Blue**	**NWS Liaison to N-IMAT White**			
Not Deployed	Not Deployed	Not Deployed			

Contact us at: **nws.opscenter@noaa.gov or 301-244-9650**

Monday, May 13, 2024

Weather Headlines

- Severe thunderstorms and heavy rain continues today from the southern Plains into the Lower Mississippi Valley region. Damaging winds, large hail and a few tornadoes are possible. An Enhanced Risk (Level 3 of 5) in the outlook today.

- A Moderate Risk (level 3 of 4) of excessive rainfall for portions of the central Gulf Coast into the western Florida Panhandle. Considerable flash and urban flooding are likely. River flooding will also be possible.

- The thunderstorm and heavy rainfall threat will shift eastward across the Tennessee Valley, southern Appalachians and Southeast on Tuesday. Additional flash flooding potential will exist.

- A cold front moving south across the Rockies through Tuesday which may produce low elevation rain and high elevation snow.

- Geomagnetic storming is expected to wane through today into early Tuesday due to lingering influences from the recent Coronal Mass Ejections.

System Readiness Summary

ASOS and Buoys: 13 May 2024

Units:	Network % Avail./ Ao:	Impacts / Totals (Units):	Returned To Service (RTS):	**ATC**= Awaiting ticket closure **ACU**= Acquisition Control Unit **AP**= Airport, **Bdcst**= Broadcast **Comm's**= Communications **DCP**= Data Collection Package **Degraded**= *Italics*, **DP**= Dew Pt	**EDRTS**= Est. Date of Return to Service **EQP**= Equipment, **GTA**= Pilot Radio **Gen**= Generator, **Intmt**= Intermittent **L/L**= Long Line / ADAS Comm's, **Mt**= Mount **Obs.**= Observations, **OOS**= Out Of Service **Ops**= Operations, **PS**= Power Supply	**PwrCo**= Power Co., **T/S**= Troubleshooting **Sys.**= System, **TSTMs**= Thunderstorms **TP**= Temperature, **TBD**= To Be Determined, **TelCo**= Tel. Co., **Vsby**= Visibility **Underline**= EMRS/USOS/Tech or NDBC validated **Wx**= Weather, **Xmtr**= Transmitter
ASOS	97.7 / 96.0	20 / 876		**Short-Term OOS: < 7 ≥ 1 Day – Action (Start-EDRTS)**		**Long-Term OOS: ≥ 7 Days – Action (Start-EDRTS)**
NWS	98.4 / 96.0	5 / 304	None	**No Short-Term Impacts or Outages**		**Pine Springs (GDP), TX:** *Decommissioning* (15Dec23-15Jun24) **Roanoke (ROA), VA:** L/L OOS- T/S ADAS; ATC (23Feb24-TBD) **Shreveport (SHV),LA:** L/L OOS- New line; ATC (9May23-TBD) ***Topeka (TOP), KS*:**Only pres. data; Intmt METARs(13Apr24-TBD) **Winnemucca (WMC), NV:** L/L OOS- FAA/Harris T/S ADAS circuit outage; No METARs in AWIPS/Web (2-17May24)
FAA	97.3 / 96.0	15 / 564	***Carbondale(MDH), IL*** ***Lees Summit(LXT),MO***	***Lewistown (LWT), MT:*** AOMC notified of FAA Comm's problem; $-METARs online (12-13May24) ***Houston(DWH),TX:*** L/L & Internet OOS;T/S(7May24-TBD)		***Bettles (ABT), AK*:** L/L OOS-T/S ADAS;ATC (23Oct23-TBD) ***Bluefield (BLF), WV:*** L/L OOS-T/S ADAS (4May24-TBD) **Christiansted (STX), VI:** L/L OOS-TelCo T/S (6Apr24-TBD) ***Ketchikan (AKT), AK:*** Unit is past due for preventive maintenance (PMS); awaiting PMS funds (11Apr-11Jun24) **Kivalina (KVL), AK:** L/L OOS-Village fire; T/S (10Apr24-TBD) ***Northway (ORT),AK:*** Replace freezing rain sensor(15Apr-30May24) **Salina (SLN), KS:** DCP OOS- Ordered parts (18Apr24-TBD) ***Springfield (SPI), IL*:** Intmt ACU Comms- T/S (19Apr24-TBD) **St. Johns(SJN),AZ:** OOS-ACU parts ordered (11Jun22-11Jun24) **Tallulah (TVR), LA:** L/L OOS-T/S ADAS/CPU failures (28Apr24-TBD) ***Tanana (ATA), AK:*** Vsby down-T/S; $-METARs augmented by observers 6AM-9:30 PM (11Apr-17May24) **Valdosta(VLD), GA:** ACU/DCP Comm's OOS-T/S(21Apr24-TBD) ***Wainwright (AWI), AK:*** L/L OOS-Techs to T/S (15Apr24-TBD)
DOD	100 / 96.0	0 / 8	None	**No Short-Term Impacts or Outages**		**No Long-Term Impacts or Outages**
BUOYS	81.9 / 80	42 / 232	RTS	**Scheduled Repairs (in order of projected RTS) & Select Outages of Interest (Long-Term unless otherwise noted):**		
Wx Data	81.7 / 80	19/ 104	**#42035** (Galveston, TX)	**#44065** (TBD), **46015** (May24), **42020** (May24), **46085** (Jun24), **46035** (Sep24), **46002** (Oct24), **46026** (Dec24), **46029** (Dec24), **46042** (Dec24), **46073** (Dec24), **46089** (Dec24), **44005** (May25), **46071** (May25), **41041** (Dec25), **42003** (Dec25), **44017** (Dec25), **41048** (Dec25), **44066** (Dec25) and **42039** (Dec25).		
C-MAN	87.5 / 80	5 / 40	None	**#CDRF1** (TBD), **FWYF1** (TBD), **KTNF1** (TBD), **STDM4** (Dec24), and **PTGC1** (Dec25, Tower removed; preparing station termination).		
TAO	81.6 / 80	9 / 49	None	**#51308**(May24), **52310** (Jul24), **51009**(Aug24), **51007**(Sep24), **52321**(Sep24), **51011**(Nov24), **32323**(May25), **43301**(May25) and **51008**(May25).		
DART	76.9 / 80	9 / 39	None	**#21413** (May24), **46402** (May24), **46407** (Apr24), **46411** (Jun24), **46419** (Jun24), **52402** (Jun24), **52404** (Jun25), **51425** (Jul24) and **52406** (Aug24).		

New impacts are highlighted in **Blue** text (**Red** = **Storm Impacted**)

Office of Observations

System Readiness Summary

NEXRAD, Upper Air and NWR: 13 May 2024

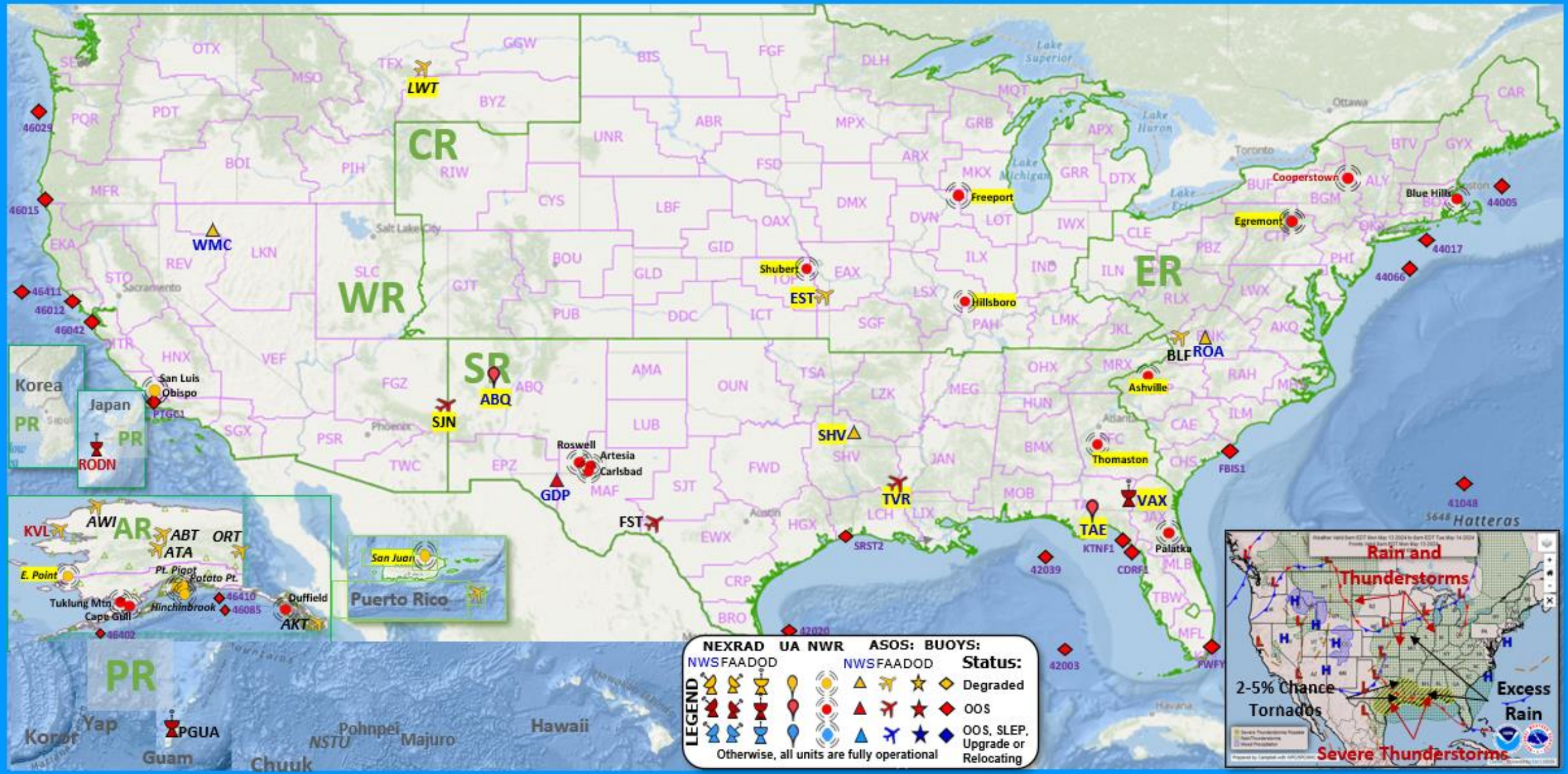
Units:	Network % Avail./ Ao	Impacted / Totals (Units):	Returned To Service (RTS):	ATC= Awaiting ticket closure Bdcst= Broadcast Comm's= Communications Degraded Ops= *Italics*, EM = Emergency FLT= Flight, Gen= Generator GEF= Ground Equipment Failure	Ltd= Limited, MN#= Mod Note Number Mt= Mount, OBS= Observations OOS= Out Of Service, Ops= Operations PS= Power Supply, PwrCo= Power Co. Pwr= Power, Pgm= Program Sched= Scheduled, T/S= Troubleshoot,	TT= Trouble Ticket, TBD= To Be Determined TSTMs= Thunderstorms, Twr= Tower TelCo's= Telephone Companies Underline= EMRS/USOS/Tech, SDM validated Vsby= Visibility, Unfav=Unfavorable, Wx= Weather, Xmtr= Transmitter
NEXRAD	98.1 / 96.0	3 / 159		Short-Term OOS: <7≥1 Day – Action (Start-EDRTS)		Long-Term OOS: ≥ 7 Days – Action (Start-EDRTS)
NWS	100 / 96.0	0 / 122	Hytop (HTX), AL	No Short-Term Impacts or Outages		No Long-Term Impacts or Outages
FAA	100 / 96.0	0 / 12	None	No Short-Term Impacts or Outages		No Long-Term Impacts or Outages
DOD	88.0 / 96.0	3 / 25	None	No Short-Term Impacts or Outages		**Andersen AFB (GUA),GU:** OOS-Order TPS batteries(25Jan24-TBD) **Kadena AB (RODN), Japan:** OOS- NEXRAD was destroyed by *TC. Khanum;* Awaiting DOD disposition of assets (1Aug23-TBD) **Moody (VAX) AFB, GA:** OOS- Waiting for SPIP (23Apr-30May24)
UA	97.8 / 90.0	2.0 / 90	RTS	Short-Term Outage/Impacted Flights: <7>1 Day(s)		Long-Term Outage/Impacted Flights: ≥ 7days
	Ops: 98.9 Avail: 97.8	*Pago Pago (NSTU), AS*		**Albuquerque (ABQ), NM:** OOS- T/S GEF (11May24-TBD) **Tallahassee (TAE), FL:** OOS-Missed two consecutive flights i.e. 12z 11May and 00z 12May soundings (11May24-TBD)		No Long-Term Impacts or Outages
NWR	97.6 / 96.0	25/1033	RTS	Short-Term Outage: <30≥1 Day – Action (Start-EDRTS)		Long-Term Outage: ≥ 30 Days – Action (Start-EDRTS)
NWS		**Americus, GA** (circuit repaired) **Payson, AZ** (replaced parts) **Milo, ME** **Gore Mtn., NY** **North Creek, NY** **Waycross, GA**		***Asheville, NC:*** Intmt. Bdcst; TelCo to T/S issue (10May24-TBD) **Boston/Blue Hills, MA:** OOS- Techs to T/S (12-13May24) **Freeport, IL:** OOS- Verizon is T/S Line input (11-13May24) ***Cape Hinchinbrook, East Pt, Pt Pigot, Potato Pt, AK:*** OOS- USCG aware of circuit outage (19Apr24-TBD) **Gore Mtn., NY:** OOS- Outage posted to T/S (9May24-TBD) **Mt. McArthur, AK:** OOS- USCG aware (23Apr24-TBD) ***San Luis Obispo, CA:*** T/S Intmt. T1 circuit (8-13May24) **Shubert, NE:** OOS- Coverage includes the Cooper Nuclear Power Station; Verizon is T/S outage (5May24-TBD) **Thomaston, GA:** OOS- Outage posted to T/S (8May24-TBD) **Tuklung Mtn., AK:** OOS- USCG aware of outage (1May24-TBD) ***Wrangell, AK:*** Operating on reduced power (2May24-TBD)		**Artesia, NM:** OOS-Replace Xmtr (4Jan22-TBD) **Cape Gull, AK:** OOS- USCG aware of outage (30Nov23-TBD) **Carlsbad, NM:** OOS-Repair Xmtr (21Jan22-TBD) **Cooperstown, NY:** OOS-Lightning strike; T/S (13Jul23-30Aug24) **Duffield Peninsula, AK:** OOS- USCG aware (26Mar24-TBD) **Hillsboro, IL:** OOS-T/S (17May23-TBD) **Morgantown, WV:** OOS-Need $ to install antenna (26Mar-1Jun24) **Palatka, FL:** OOS- Owner relocating tower (19Mar-28May24) **Roswell, NM:** OOS-Outage posted (14Jan23-TBD) ***San Juan, PR:*** Low signal output (20Mar24-TBD) **S. Egremont, MA:** OOS-T/S Utility circuit off-grid (7Mar-31May24)

New impacts are highlighted in **Blue** text (**Red** = **Storm Impacted**)

Office of Observations

Storm Events System Readiness Summary

Observations & Dissemination: 13 May 2024



Storm Impacts are in **Red** text | **Potential Stormy Weather is in Yellow Backdrop** to Vulnerable Impacted Units & Communities

Office of Observations

Enterprise-Impacting or Major NCO Changes

- Notable changes for the week of May 13:

- RFC 12603 - Migrate the National Hurricane Center WAN (Wide Area Connection) from Lumen to N-Wave L3 Circuit. This change is part of an effort to migrate the NWS OneNWSNet from Lumen connections to N-Wave L3VPN. To be implemented as follows:
  - Part I: May 9 at 1600Z - NHC NAT Changes (CPRK)
  - May 10 at 1600Z - NHC NAT Changes (BLDR)
  - Part II: May 14 at 1700Z - BGP Peering & Migrate Traffic to NWave
  - Part III: May 15 at 1600Z - Clean-UP

  - **There'll be an outage of up to 15 min per circuit during Part II migration, starting at 1700Z.** Work each day begins at 1600Z and ends at 2000Z. (Please note that this RFC was delayed due to ECE/CWD from its earlier implementation dates of May 7 - May 9. Migration was to have taken place on May 8.)

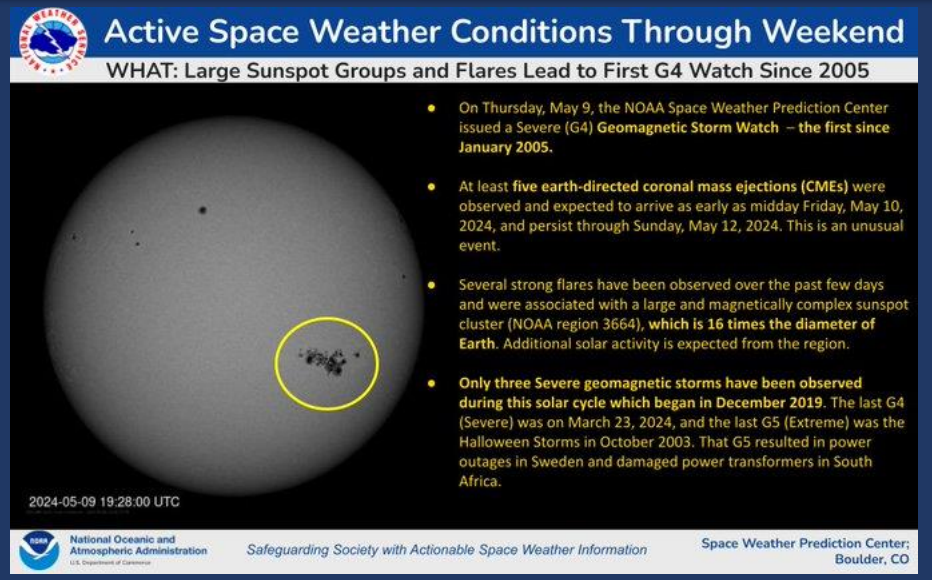
For additional changes happening at NCO this week, see the NCO Request for Change (RFC) Memo

For the week of May 13, we have 27 new RFCs scheduled for implementation.

Impacts – Space Weather

Geomagnetic Storms

- On Friday, the Space Weather Prediction Center issued the first G4 (Severe) geomagnetic watch since 2005.
  - Severe (G4) to Extreme (G5) conditions were observed Friday through the weekend.
- The aurora become visible over much of the northern half of the country late Friday night, and even as far south as Florida to northern California.
- An additional Geomagnetic Storm Watch was issued for Sunday.
- There have been preliminary reports of power grid irregularities, and degradation to high-frequency communications and GPS as a result of the G5 geomagnetic storm.
  - In southwest Nebraska, several farmers reported that their GPS systems used for operating planters malfunctioned due to Friday's G5 geomagnetic storm.



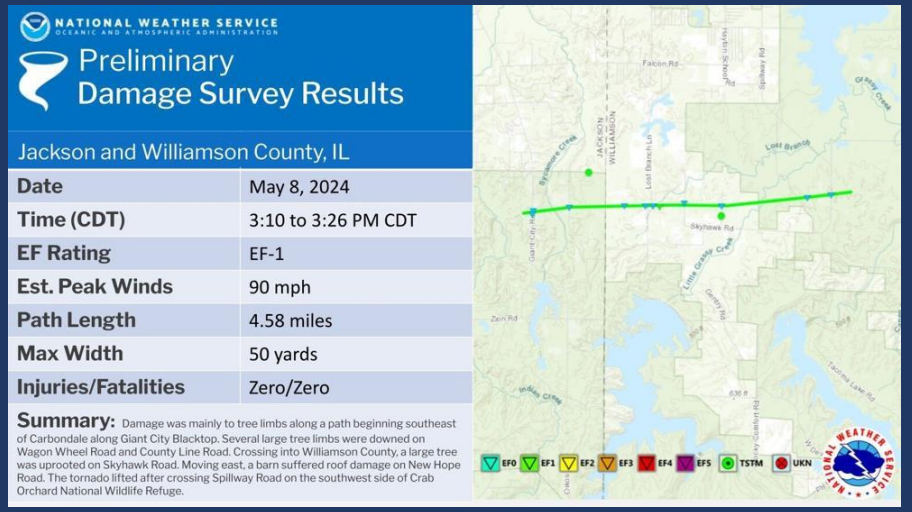
Impacts – Tornadoes

Southern Region

- Additional storm surveys continued this past weekend from the events of May 8th.
- Eight tornadoes were confirmed by WFO Huntsville.
  - Of the eight, two were EF-3 with peak winds of 136 and 140 mph.
    - Seven injuries have been reported in Jackson County, Alabama.
  - Tornado Warnings were in effect with an average preliminary lead time just under 20 minutes.
- Four additional tornadoes were confirmed across Georgia, Florida and Oklahoma.
  - 3 EF-1 and 1 EF-2.
- Two EF-2 tornadoes were confirmed by WFO Tallahassee from storms that occurred on May 10th.

Central Region

- WFO Paducah provided a recap of the widespread severe storms with large hail, damaging winds, tornadoes, and flash flooding that occurred on Wednesday May 8th.
  - Numerous school districts closed early.
- One injury was reported with the EF-1 Tornado in Cora, western Jackson County, Illinois.
- Surveys have found 7 tornado tracks across southern Illinois and west Kentucky (4 EF-1, 3 EF-0).
- There are still a few other locations to be surveyed this week.


NATIONAL WEATHER SERVICE
OCEANIC AND ATMOSPHERIC ADMINISTRATION

Preliminary
Damage Survey Results

Jackson and Williamson County, IL

Date	May 8, 2024
Time (CDT)	3:10 to 3:26 PM CDT
EF Rating	EF-1
Est. Peak Winds	90 mph
Path Length	4.58 miles
Max Width	50 yards
Injuries/Fatalities	Zero/Zero

Summary: Damage was mainly to tree limbs along a path beginning southeast of Carbondale along Giant City Blacktop. Several large tree limbs were downed on Wagon Wheel Road and County Line Road. Crossing into Williamson County, a large tree was uprooted on Skyhawk Road. Moving east, a barn suffered roof damage on New Hope Road. The tornado lifted after crossing Spillway Road on the southwest side of Crab Orchard National Wildlife Refuge.

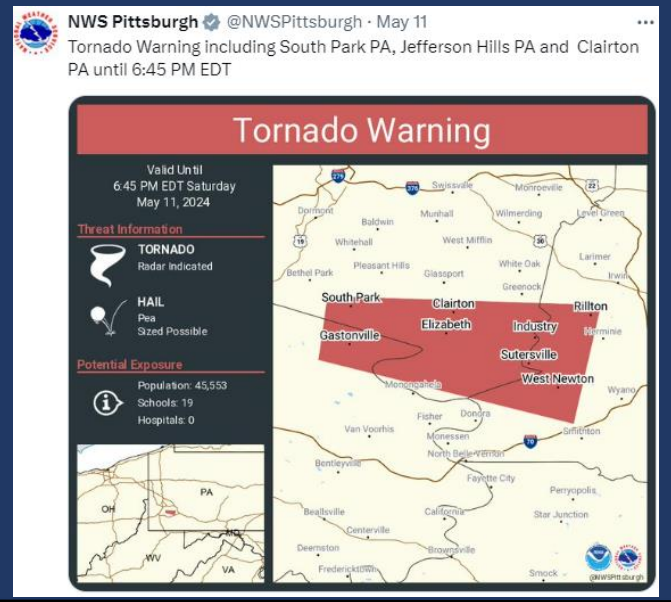
Impacts – Tornadoes

Eastern Region

- A line of severe thunderstorms moved across portions of the Central Appalachians Saturday afternoon.
- WFO Pittsburgh confirmed an EF-2 Tornado in Finleyville, Pennsylvania.
  - This tornado damaged a church and had peak winds of 118 mph.
  - Around 100 people were inside the church but no injuries were reported.
- Two additional EF-0 Tornadoes were confirmed in Brimfield, Ohio and Fayette County, Pennsylvania.

WFO Pittsburgh

- Initially issued a Severe Thunderstorm Warning for the storm.
- A Tornado Warning was issued after with approximately five minutes of lead time.
- Additional storm survey results will follow over the next few days.



Impacts – Thunderstorms

Mendota, Illinois

- WFO Chicago learned that an Amtrak train hit downed trees along the tracks in Mendota early Thursday morning.
- As the train made impact with the trees, broken glass injured three people onboard.

WFO Chicago

- There was a gusty thunderstorm that moved across Mendota several hours earlier at about 4 AM that may have been responsible for the downed trees.
- Nearby locations measured wind gusts of 30 to 40 mph.

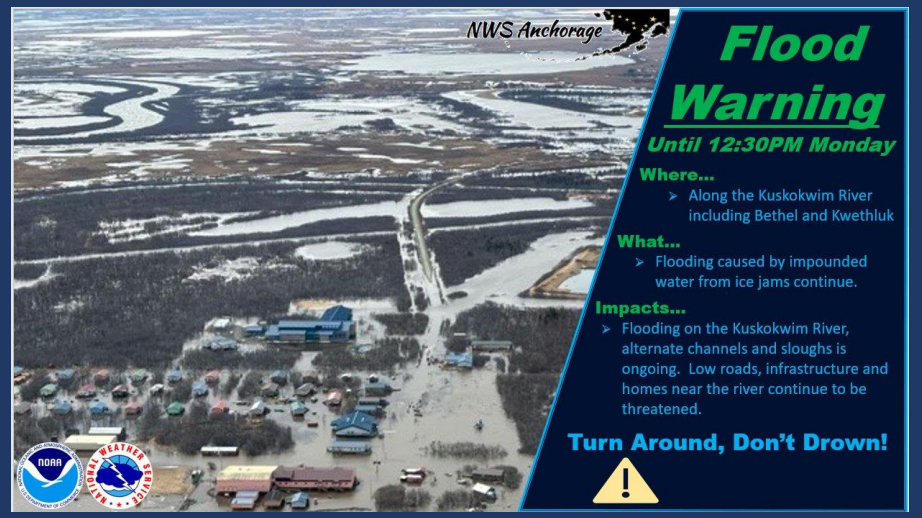
Impacts – Alaska Riverwatch

Alaska

- Water levels dropped significantly during the day Sunday from Napakiak up to Bethel.
  - Flooding is no longer occurring in Napakiak, Napaskiak, and Oscarville.
- Minor flooding is still occurring in Bethel around Brown's Slough while moderate flooding is still occurring in Kwethluk.
  - The small jam on the Kwethluk flushed out overnight, and the river is free and open. Still over bank well upstream and flooding in the village.
  - Water has dropped by 1 - 1.5 ft since yesterday.
- There are currently no noteworthy ice jams on the Kuskokwim and the river is nearly completely open upstream of Napakiak.
- Areas of localized breakup with no defined breakup front were observed from Russian Mission to Galena.
- Circle's jam has fully released and everything is moving downstream.

WFO Anchorage

- Extended the Flood Warning for the Kuskokwim River near Kwethluk through Tuesday morning and extended the Flood Warning for Bethel through noon Monday.
- The Flood Watch for ice jam flooding along the lower Kuskokwim River was extended through Monday afternoon.



IDSS

Central Region

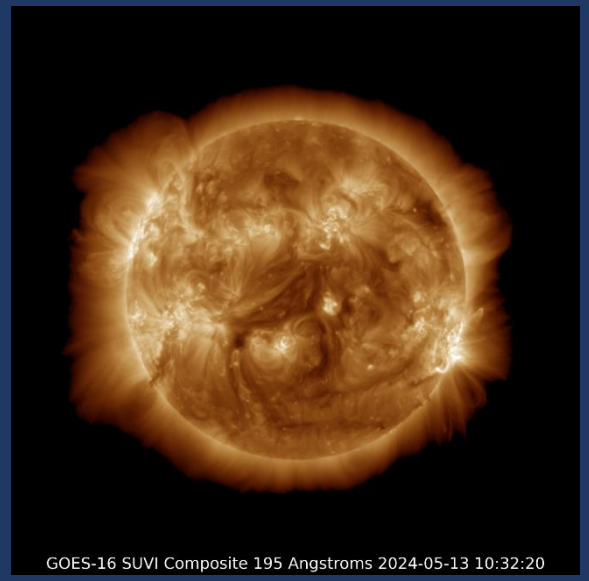
- WFO Duluth received a call from the St. Louis County Rescue Squad wanting a spot forecast for Lake Agnes in northeast St. Louis County in the Boundary Waters Canoe Area Wilderness. Someone reported seeing a body in the lake and the canoe that was found was registered to two people. Local first responders are in recovery mode for the other person. It is unknown if weather played a role, but there were showers/thunderstorms that have affected that region on Saturday with strong gusts reported of 35 to around 45 mph.

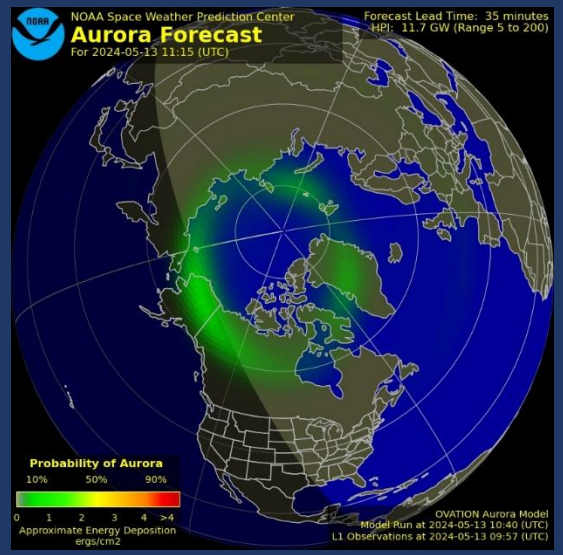
IDSS - NOAA Corps Visit

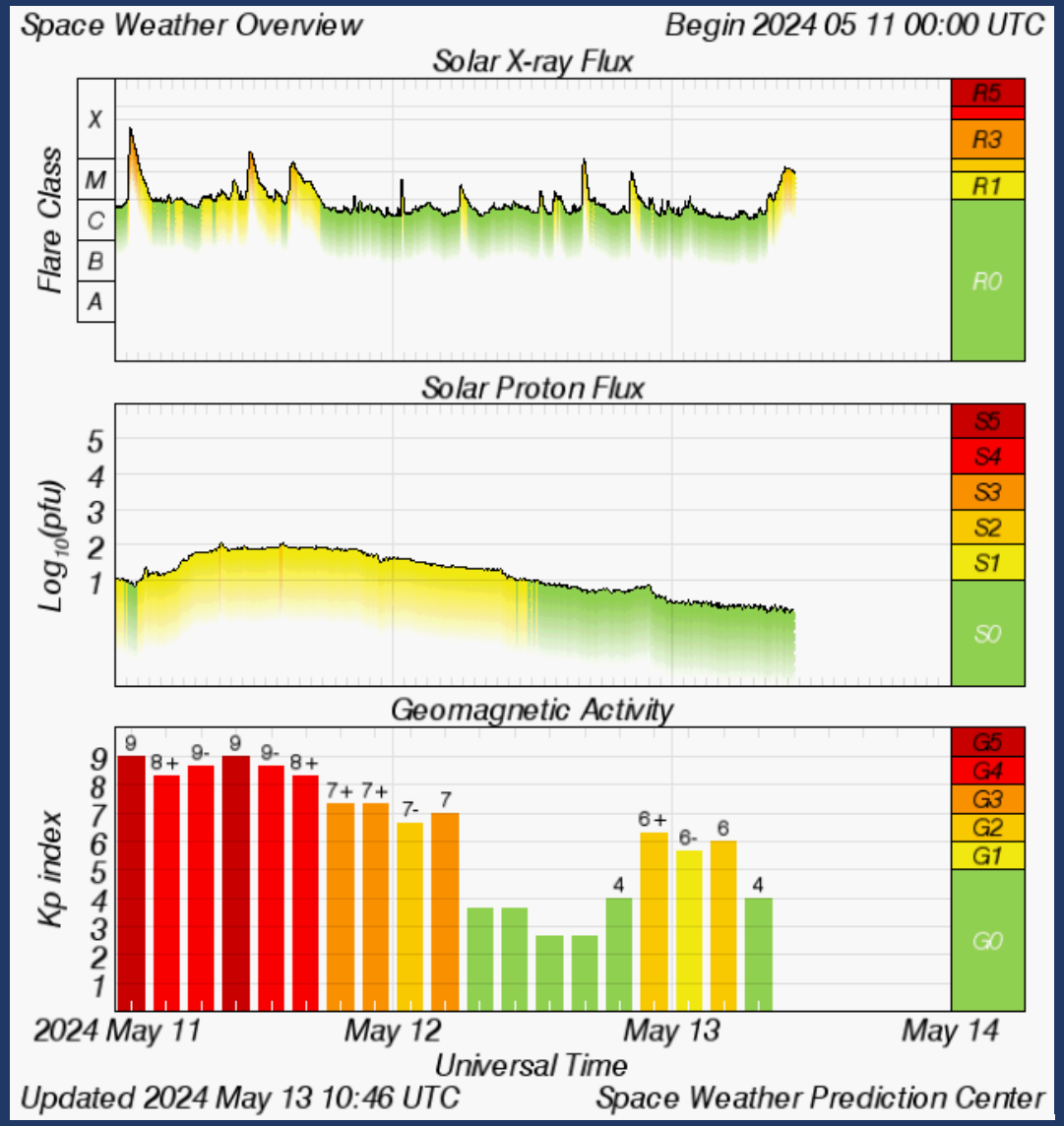
Western Region

- On Saturday, May 11th, NOAA Corps CAPT Jason "Mongoose" Mansour visited WFO Oxnard/Los Angeles to talk to them about NOAA / OMAO hurricane hunter flight operations, and atmospheric river flight operations.

Space Weather Overview







Radio Blackouts

- R5 Extreme
- R4 Severe
- R3 Strong
- R2 Moderate
- R1 Minor

Solar Radiation Storms

- S5 Extreme
- S4 Severe
- S3 Strong
- S2 Moderate
- S1 Minor

Geomagnetic Storms

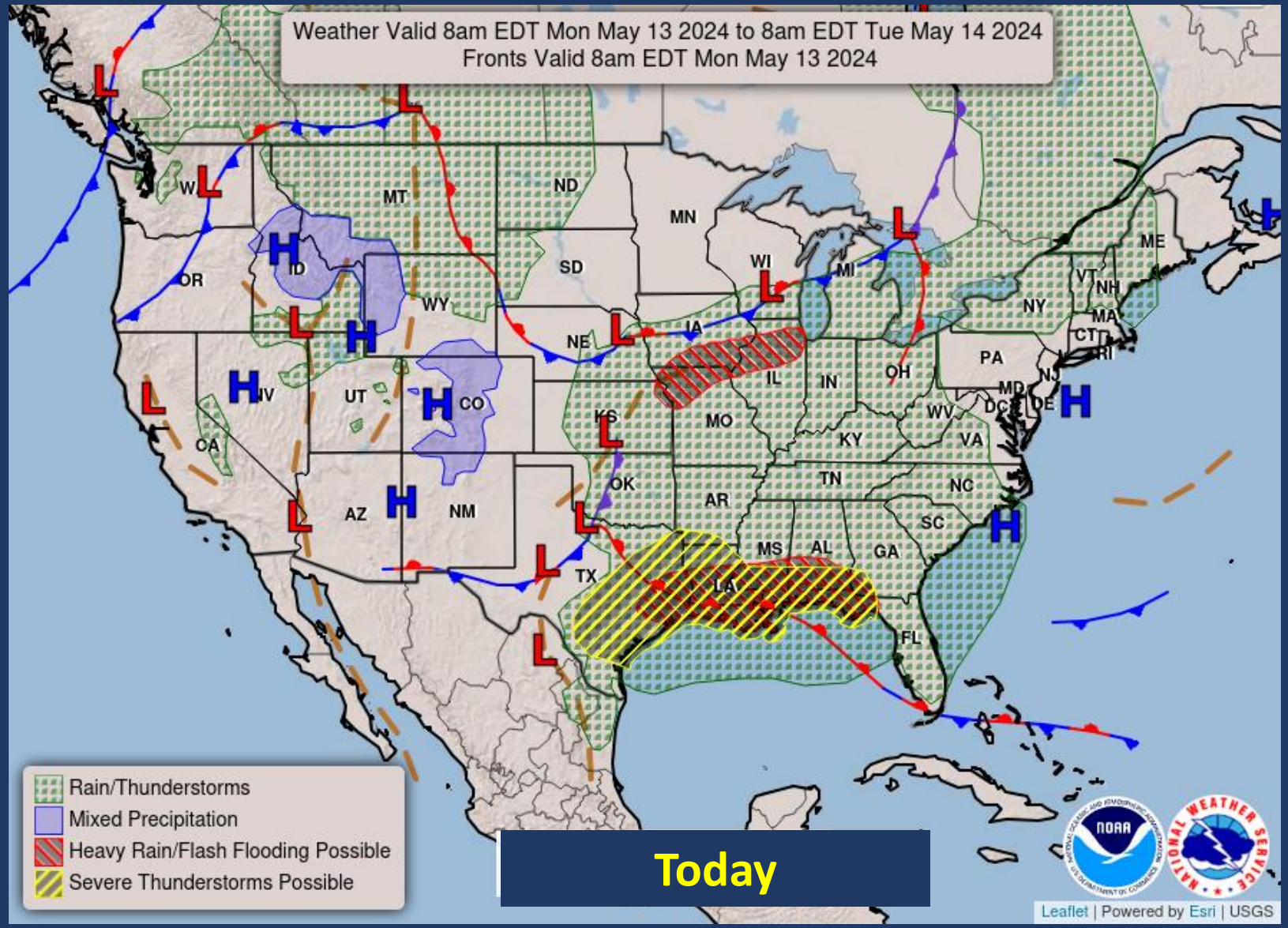
- G5 Extreme
- G4 Severe
- G3 Strong
- G2 Moderate
- G1 Minor

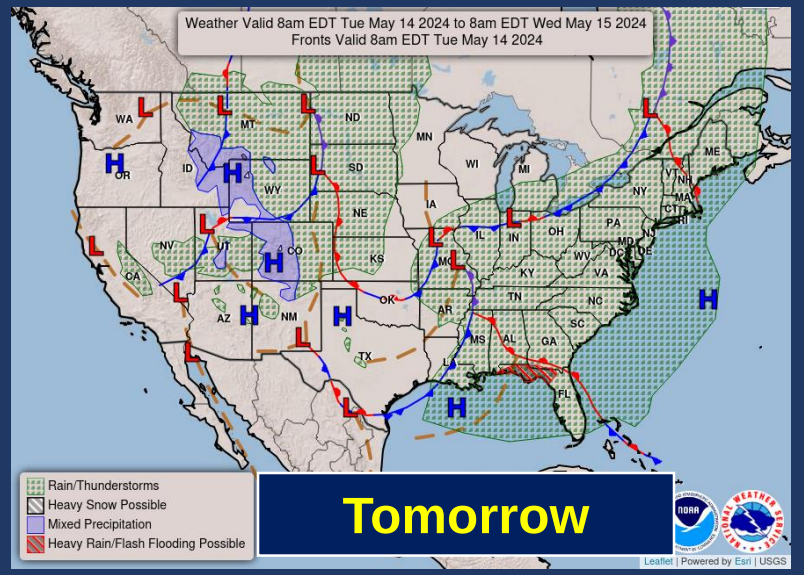
Space Weather Key Messages

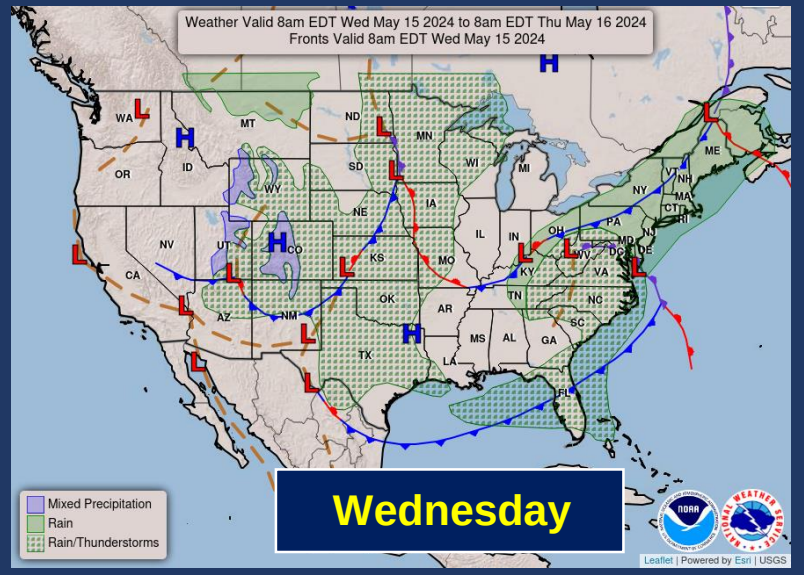
Central Region

- The sunspot region associated with this weekend's historic extreme geomagnetic storm (NOAA Active Region 3664), while still very active, has begun to rotate out of view. Once it fully rotates off the sun's visible disk it will no longer influence conditions on Earth.
- Geomagnetic storm conditions waned overnight and moderate geomagnetic storm conditions were observed.
- Active to minor conditions are expected for the remainder of today and the following two days.
- The sun is currently undergoing the maximum phase of its regular 11-year solar cycle when solar activity is the greatest.

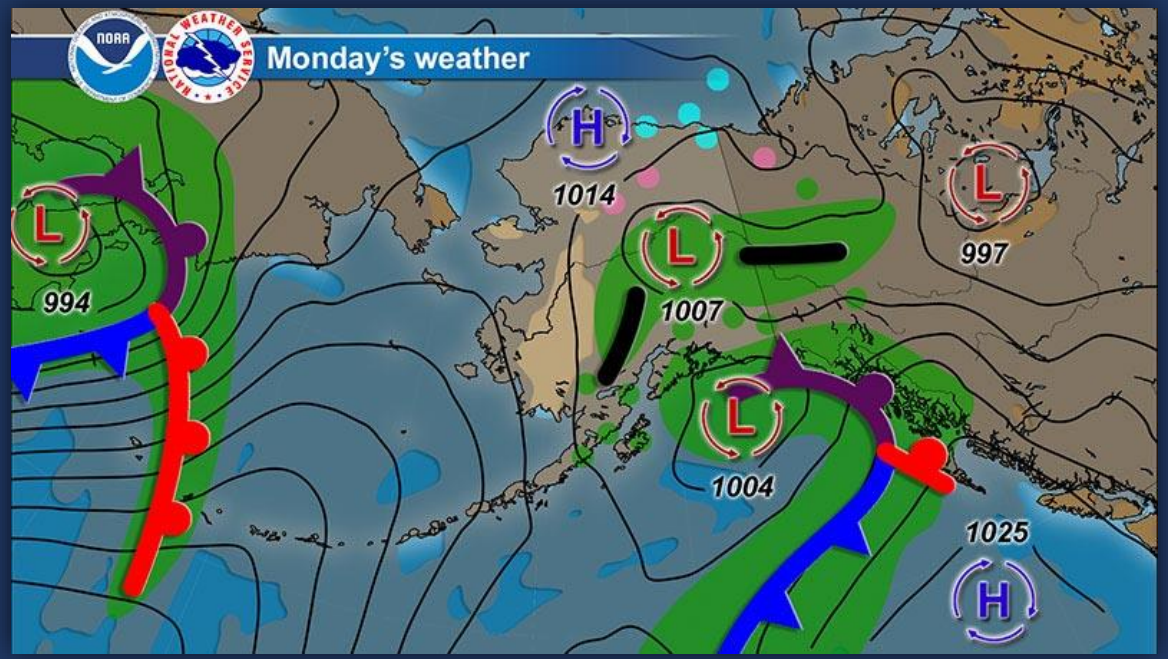
National Forecast Charts

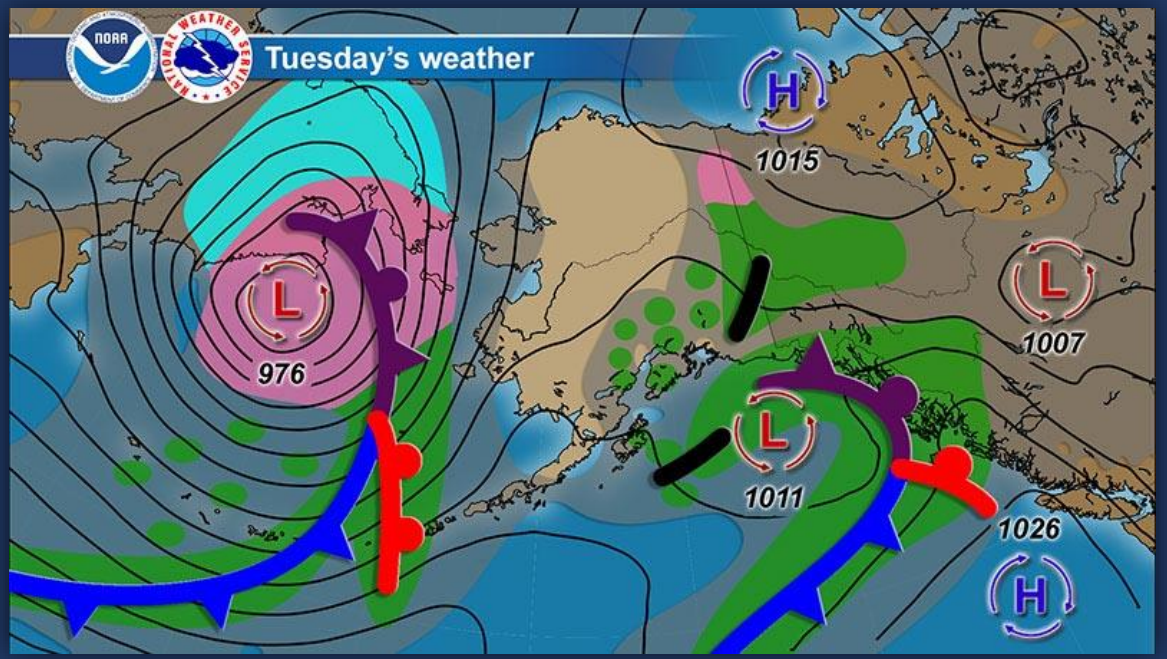




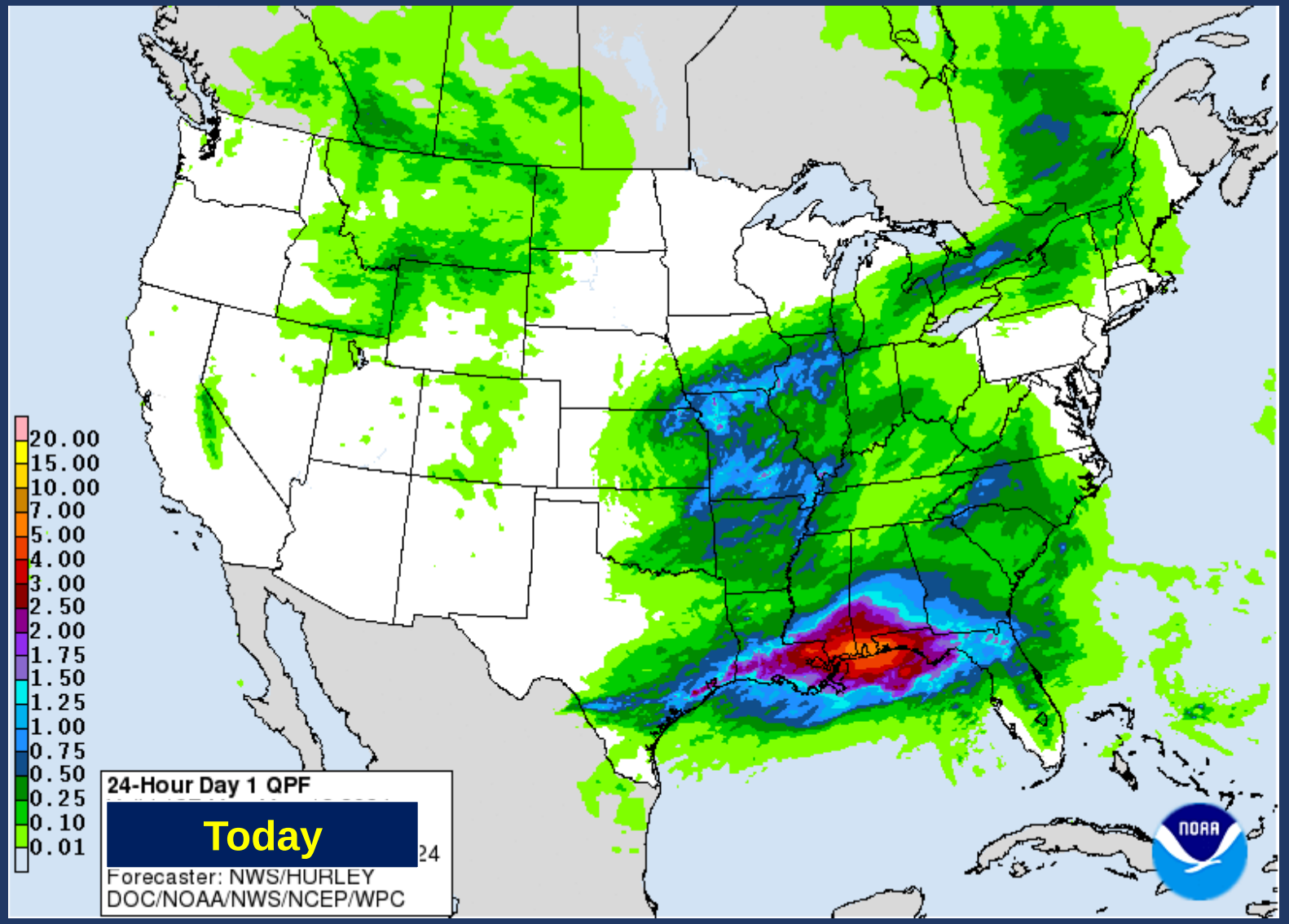


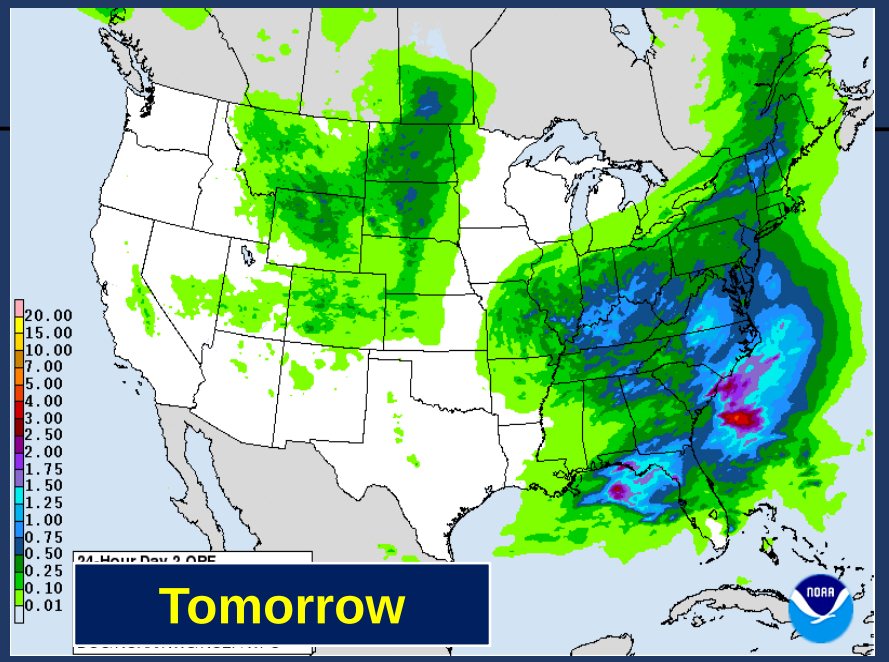
Alaska Weather Maps

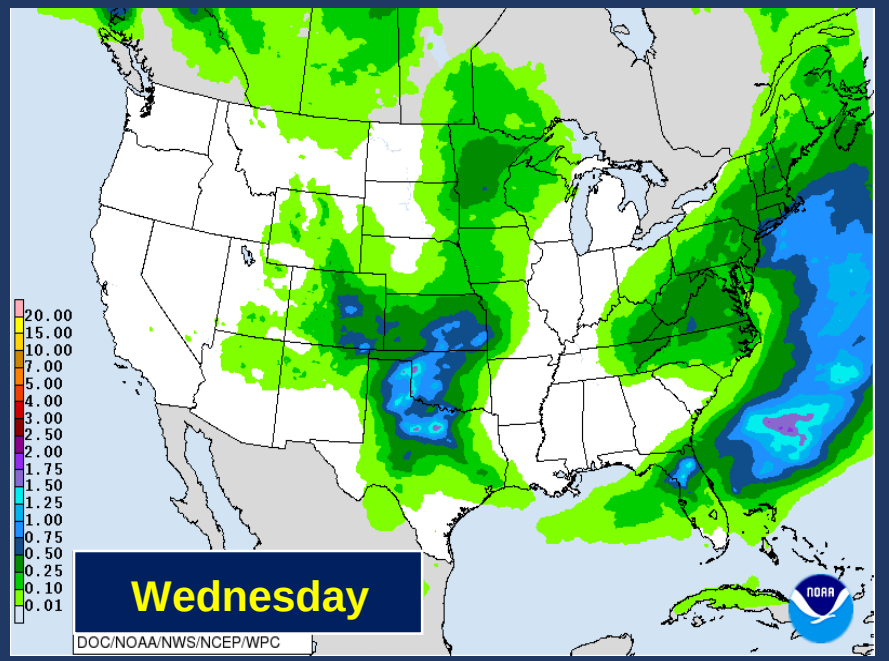




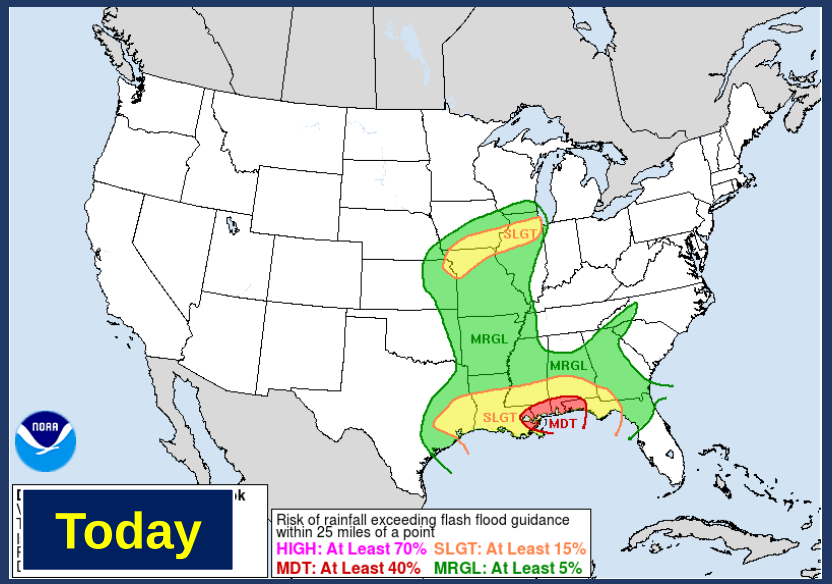
Precipitation Forecast

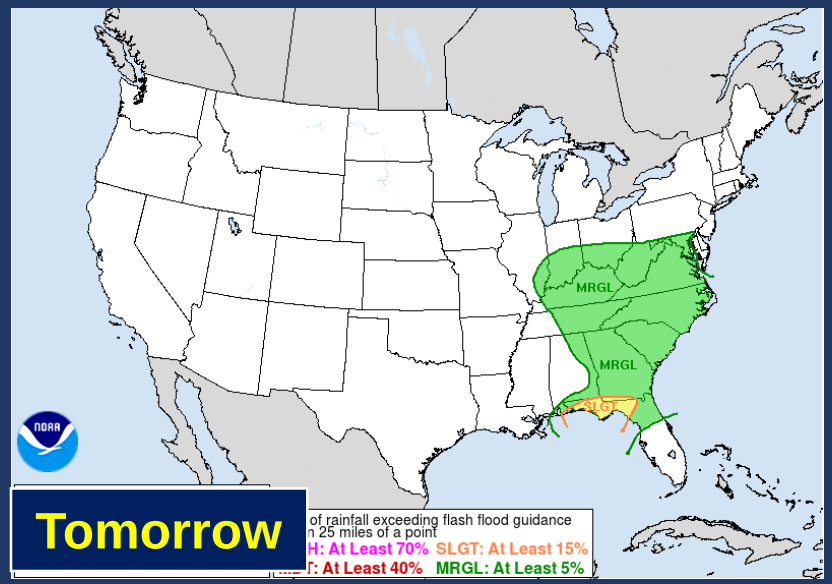


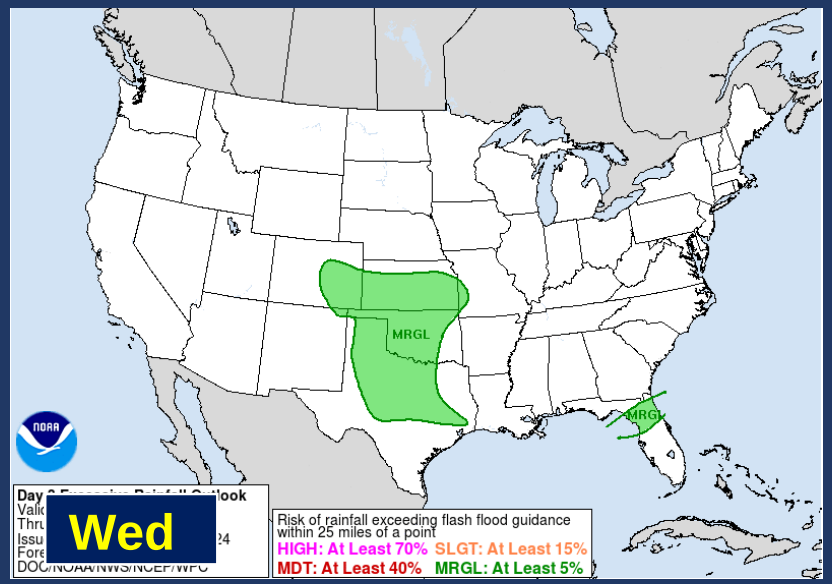


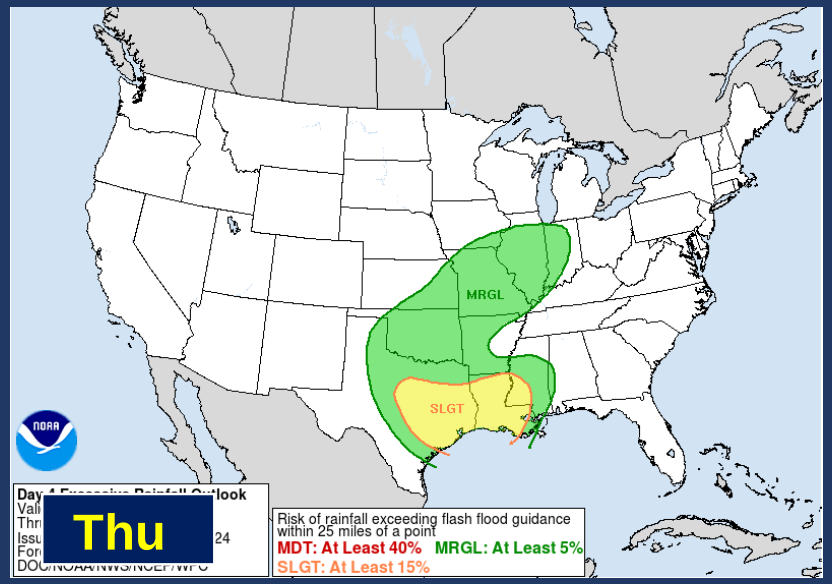


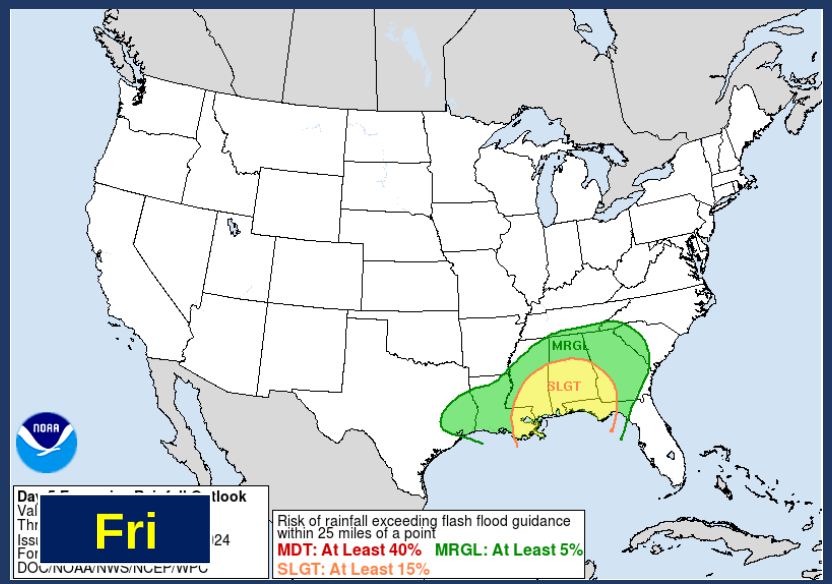
Excessive Rainfall Outlooks











Today's SPC Convective Outlook

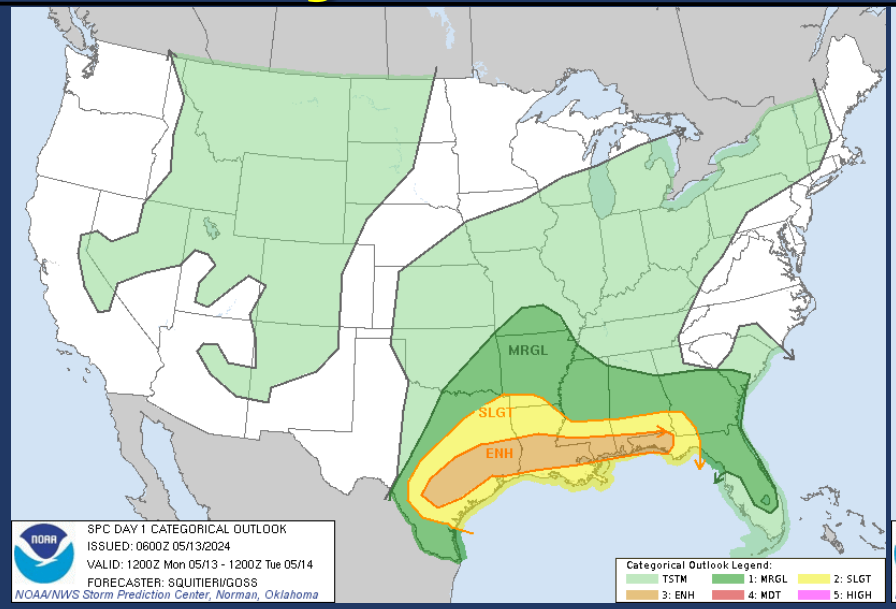
Categorical

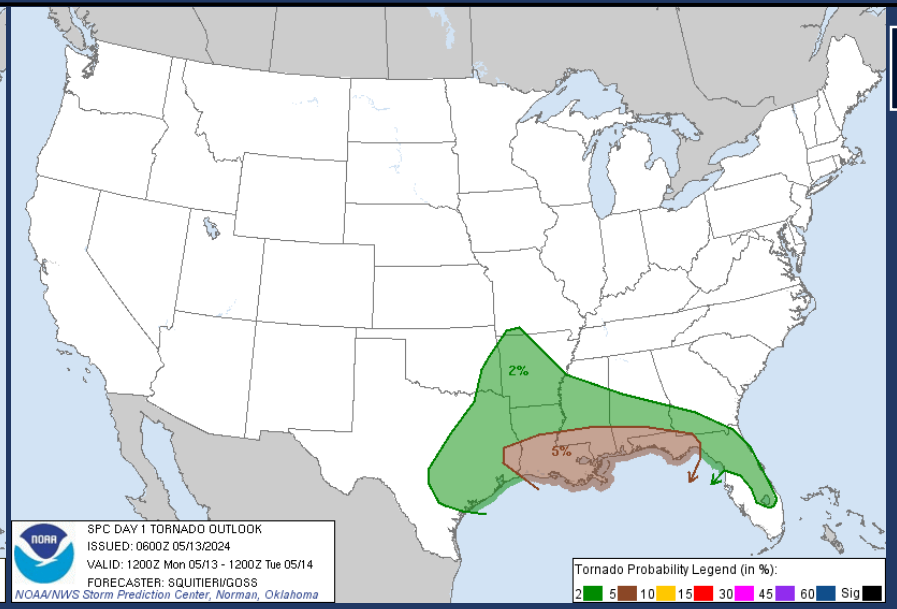
- Thunderstorms
- Marginal Risk
- Slight Risk
- Enhanced Risk
- Moderate Risk
- High Risk

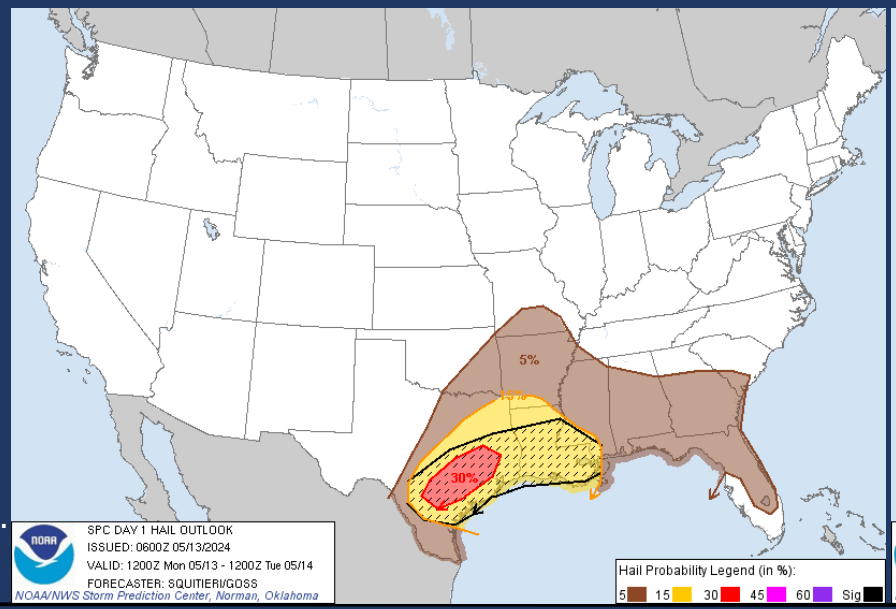
Large Hail

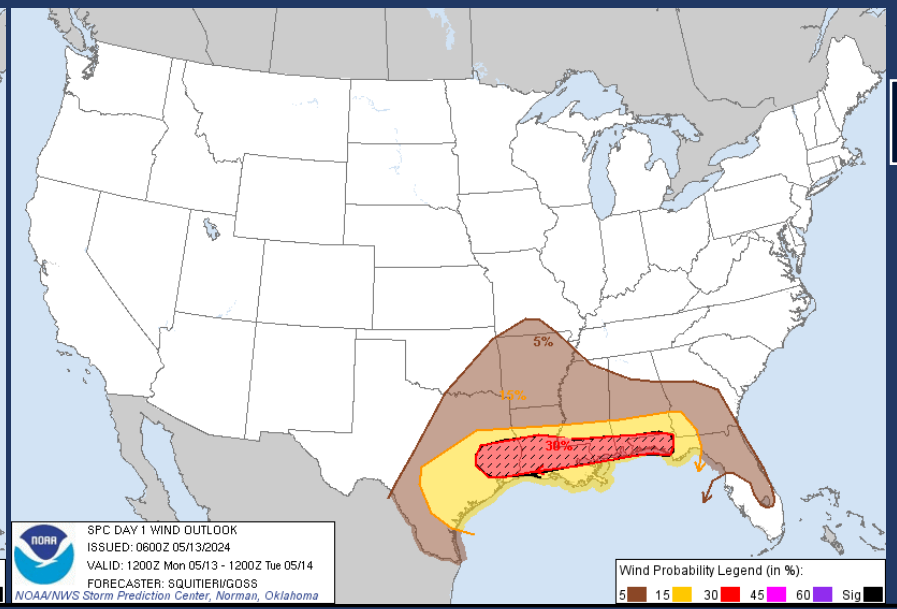
within 25 mi. of a point

- 5% 1+ in. dia.
- 15%
- 30%
- 45%
- 60%
- 10% 2+ inch dia.









Tornado

within 25 mi. of a point

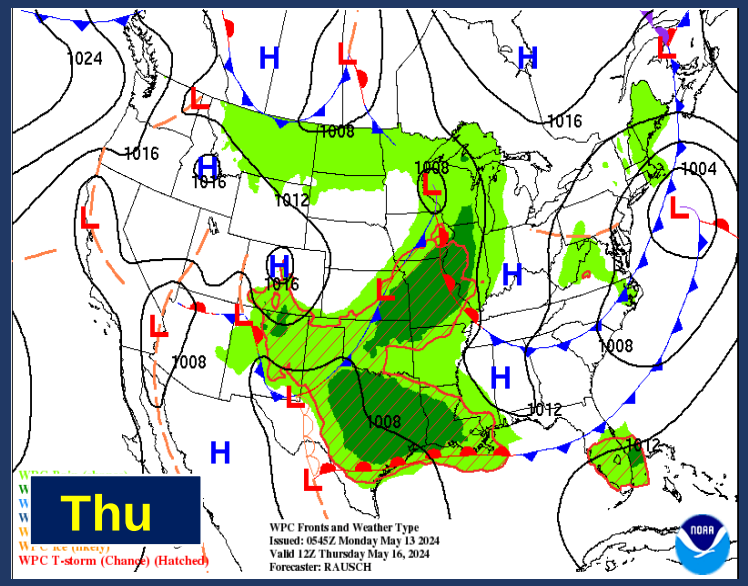
- 2% any tornado
- 5%
- 10%
- 15%
- 30%
- 45%
- 60%
- 10% EF2+ tornado

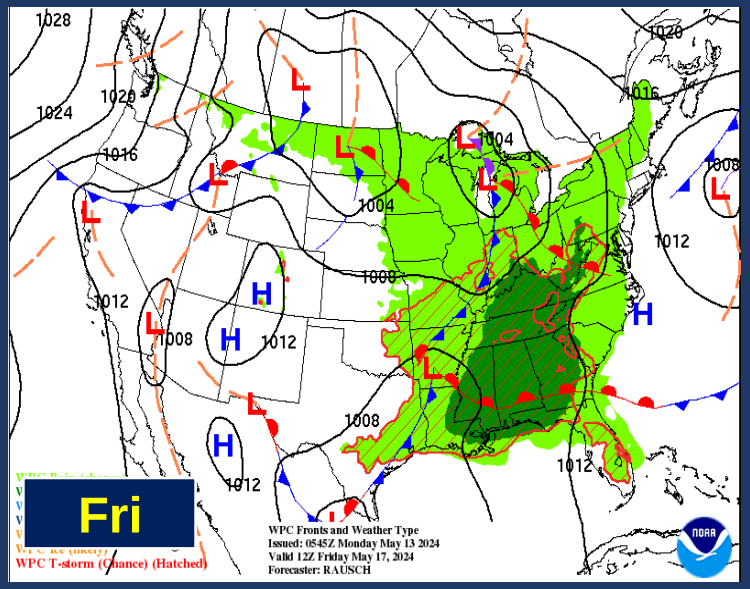
Damaging Wind

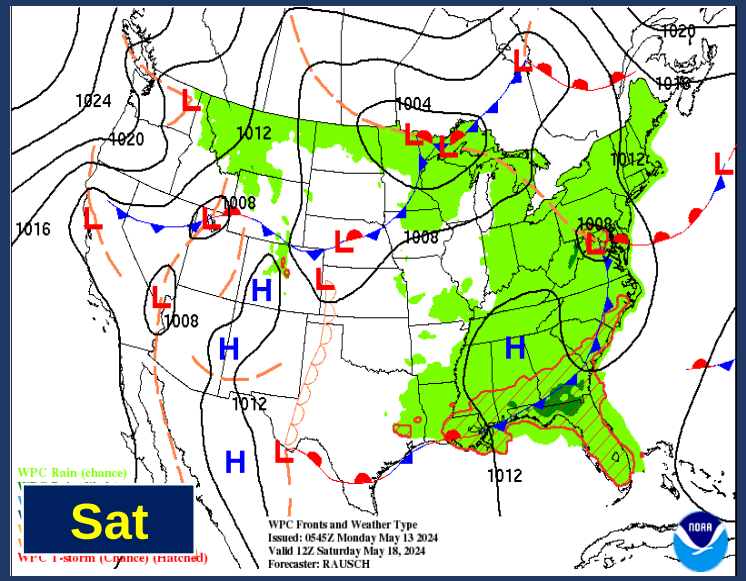
within 25 mi. of a point

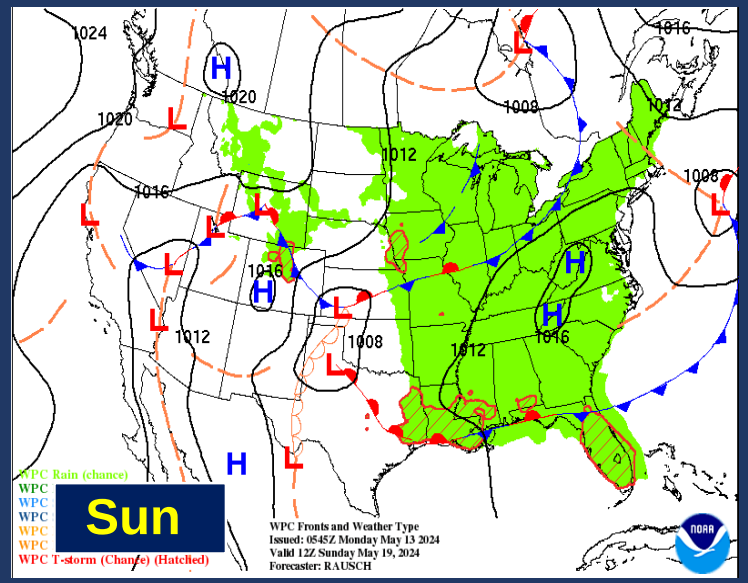
- 5% 50+ kts
- 15%
- 30%
- 45%
- 60%
- 10% 65+ kts

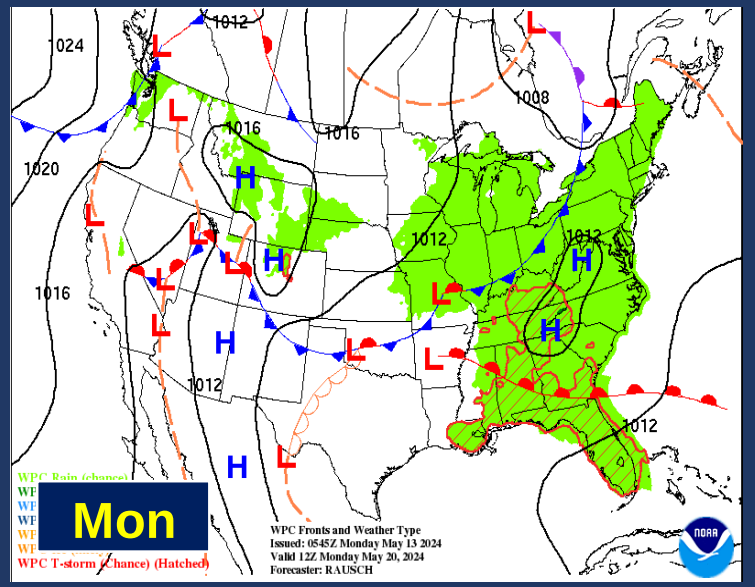
WPC Medium Range: Fronts and Weather Type



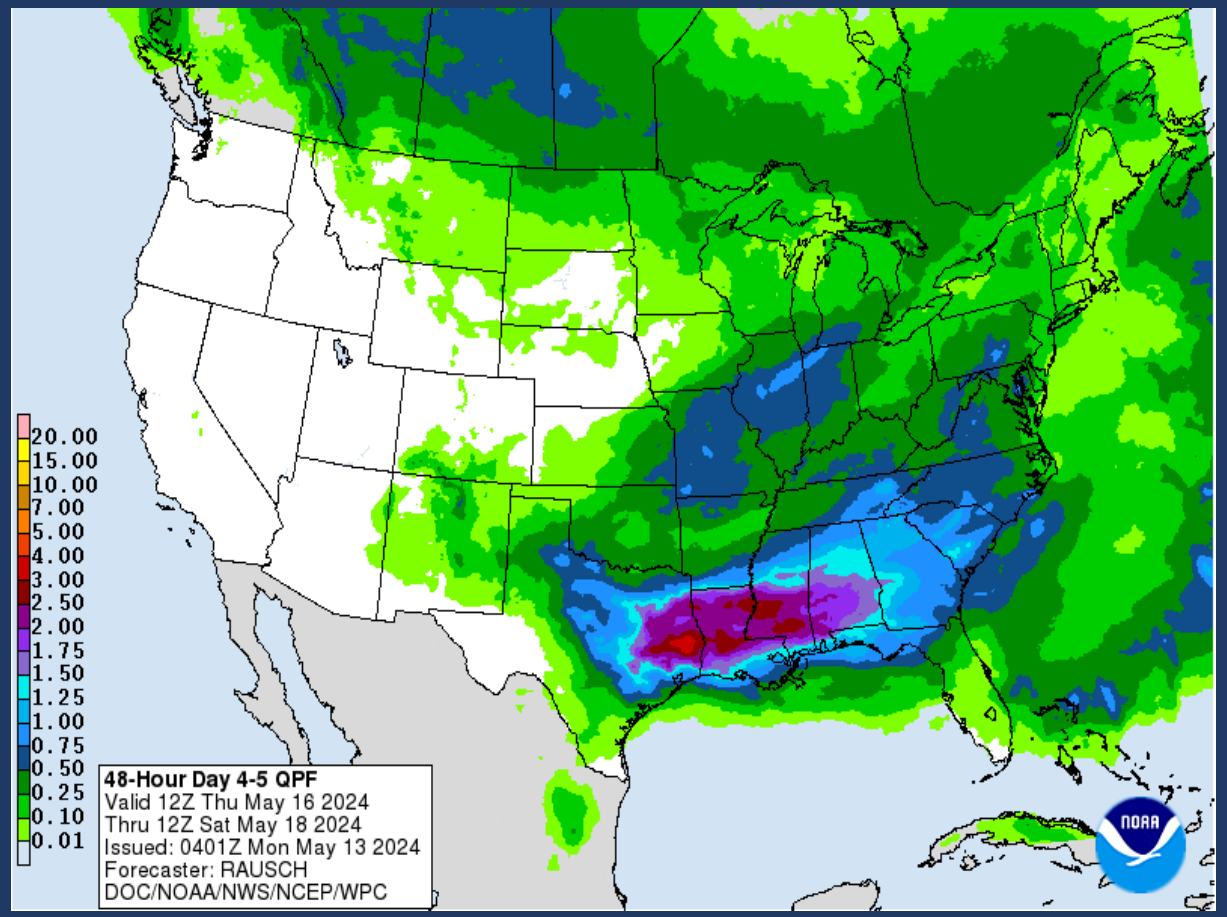




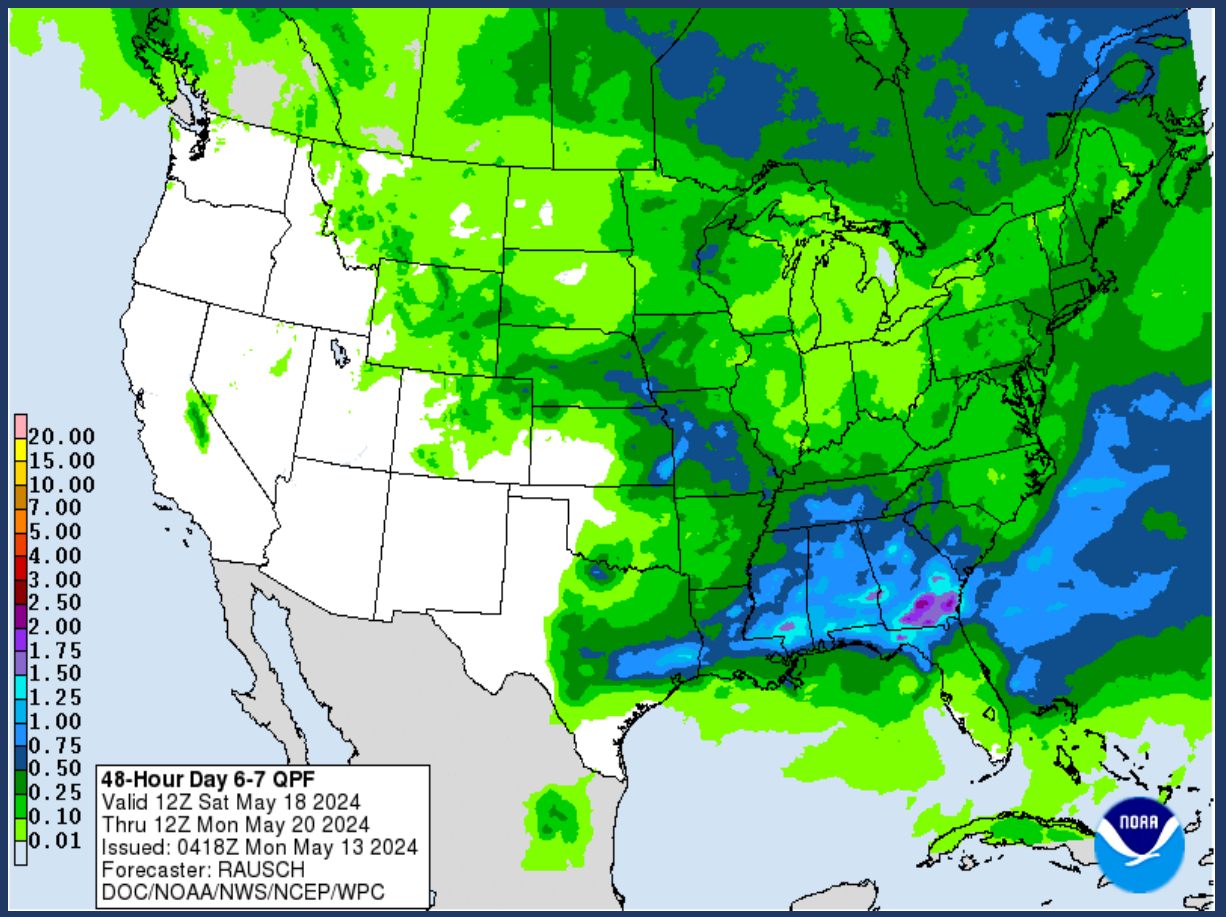




Precipitation Forecast



Thu - Fri



Sat - Sun

National Water Center - Flood Hazard Outlook

Flood Hazard Outlook (Experimental)

Issued: 05-13-2024 07:00 AM CDT valid through 05-20-2024 07:00 AM CDT | Next Issuance: 05-13-2024 04:00 PM CDT

NWC National Water Center

Flood Hazard Messages

East Texas

- Heavy rainfall will bring the potential for considerable river and flash flooding in eastern Texas today through mid-week.
- New and renewed rises and river flooding, along with flash and urban flooding, will be possible through Monday.

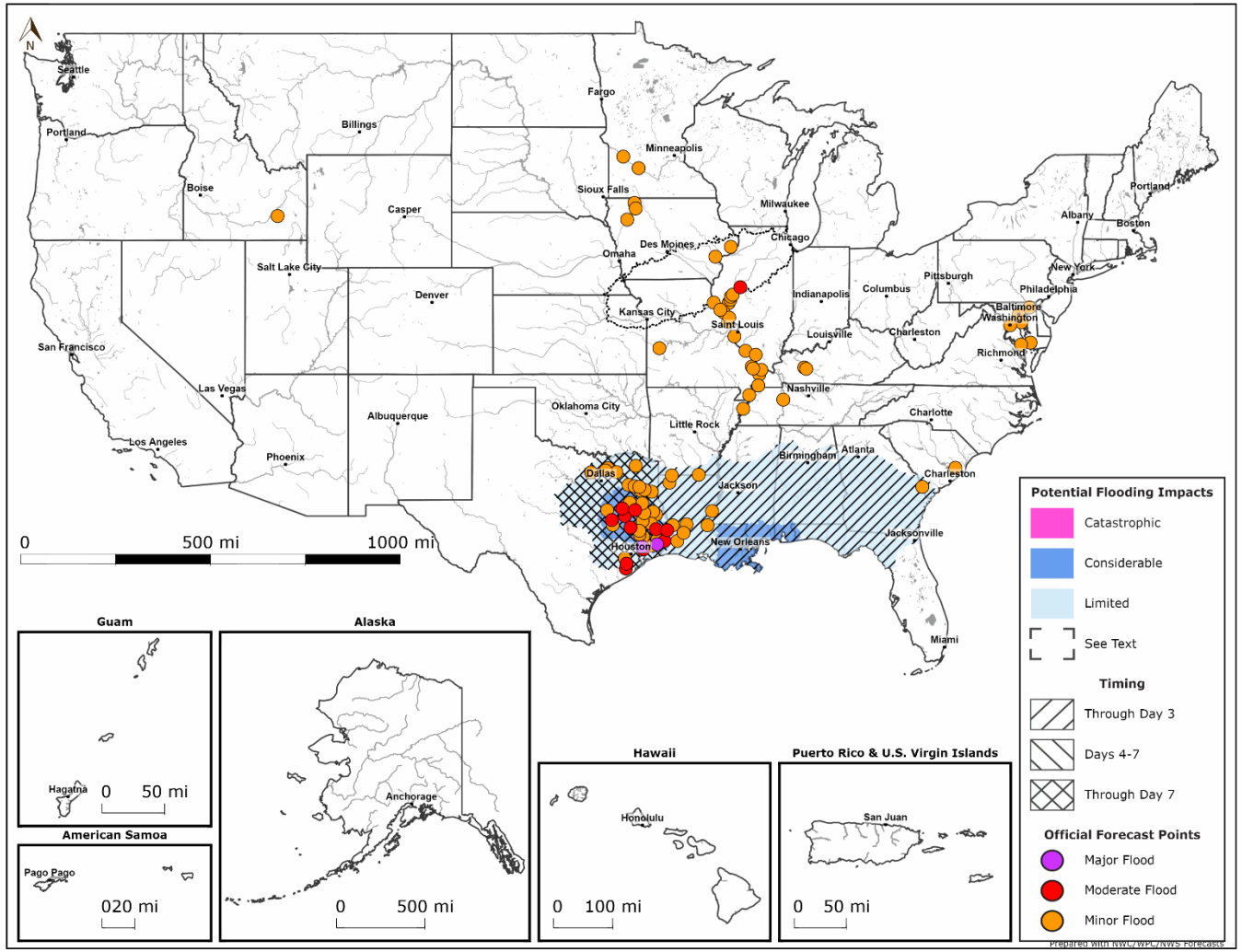
Lower Mississippi Valley into the Southeast

- Considerable flash and urban flooding impacts are likely across the Gulf Coast on Monday into Tuesday due to multiple rounds of heavy rainfall. Urban areas will be particularly vulnerable.
- Elsewhere, flash and urban flooding, as well as new and renewed river flooding, is possible through mid week.

Mid-Mississippi Valley

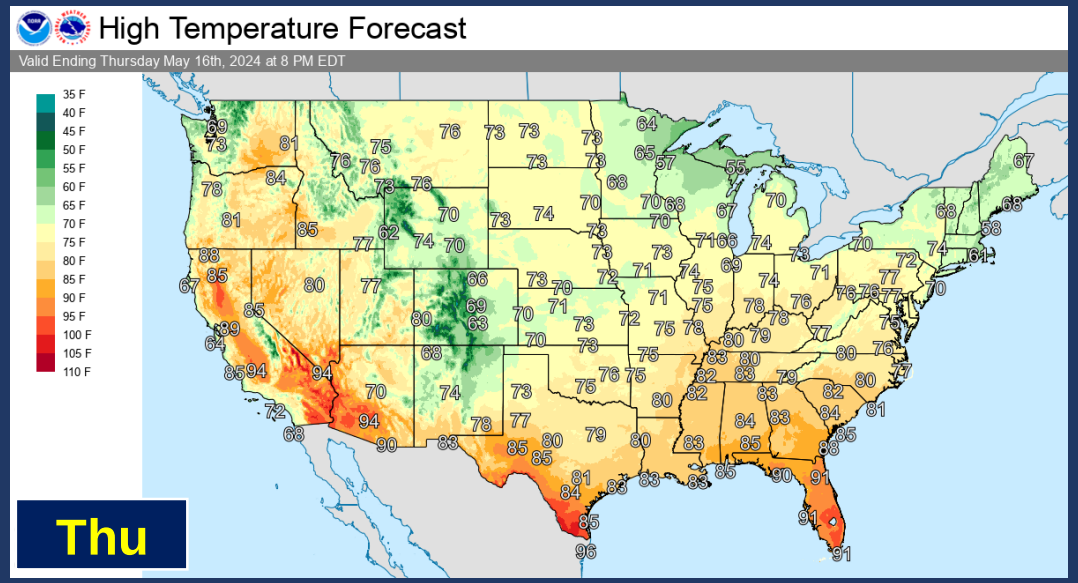
- Isolated flash and urban flooding impacts are possible through early Tuesday.

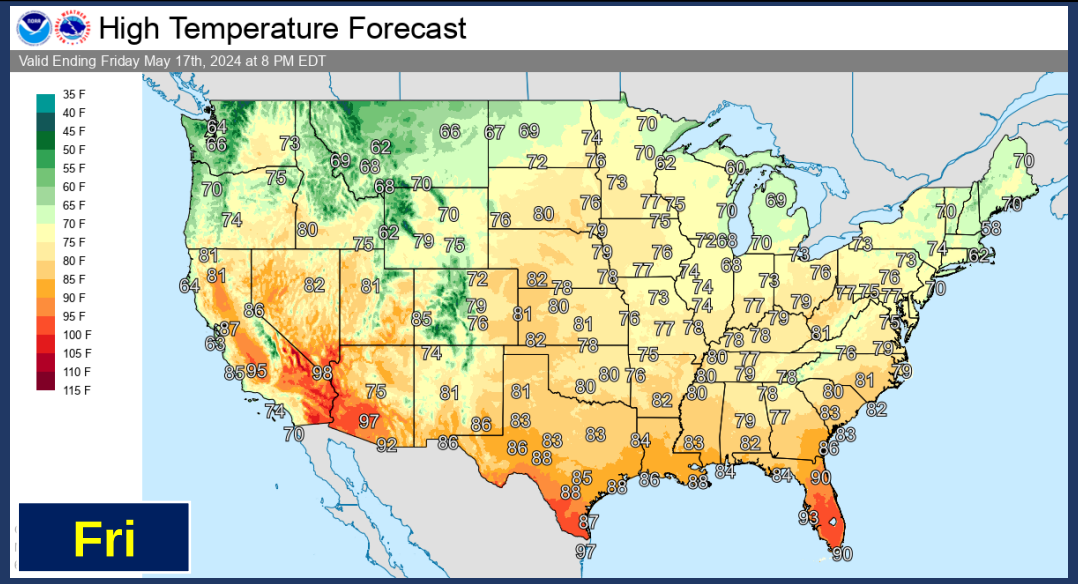
Disclaimer: This 7-day outlook provides an overview of potential flash, river and tidal flood hazards. Please refer to detailed products issued by local National Weather Service offices for official forecasts and warnings. (www.weather.gov)

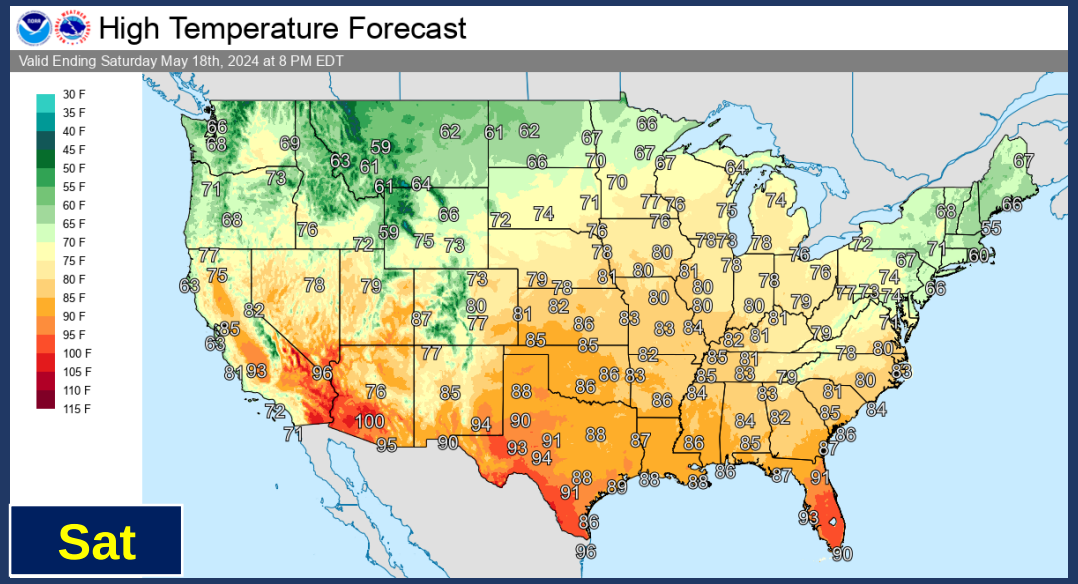


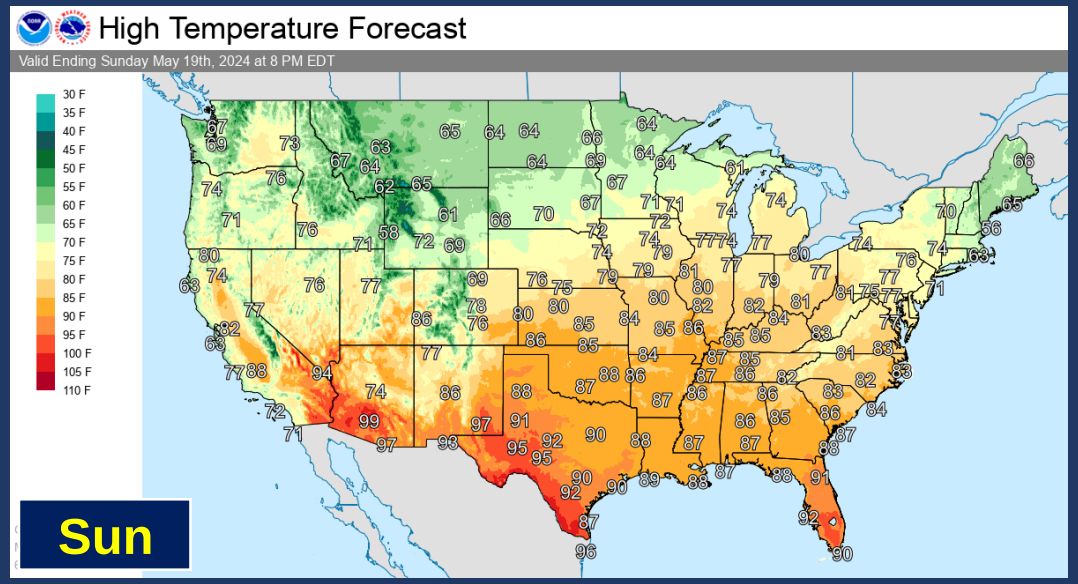
To learn more or provide feedback, visit: https://www.weather.gov/owp/operations

NDFD Medium Range: High Temperature Forecast









Thu, May 9, 2024 at 1:58 PM

WATCH: Geomagnetic Storm Category G4 or Greater Predicted on Saturday

Key Points

- The NWS Space Weather Prediction Center issued a Geomagnetic Storm WATCH is in effect for Saturday, May 11
- Area of impact primarily poleward of 45 degrees Geomagnetic Latitude.
- Possible widespread voltage control problems and some protective systems may mistakenly trip out key assets from the power grid. Induced pipeline currents intensify.
- Satellite navigation (GPS) degraded or inoperable for hours.
- HF (high frequency) radio propagation sporadic or blacked out.
- Aurora may be seen as low as Alabama and northern California.

Links

- NWS Space Weather Prediction Center

Graphics

Information in this report was provided by the NWS Space Weather Prediction Center.

Please note that some of the information contained in this report may be administratively sensitive, please limit forwarding to additional parties.

NWSOC Mission: *The NWS Operations Center provides timely Impact-Based Decision Support Services to meet the evolving needs of NWS partners and stakeholders and supports agency readiness by proactively collaborating and facilitating the exchange of critical information, setting operational posture, and briefing leadership.*

NWSOC Vision: *A Weather-Ready Nation that makes informed and timely decisions based upon the best environmental and situational awareness information achieved through continuous and effective collaboration.*

Sat, May 11, 2:56 PM

WATCH: Geomagnetic Storm Category G4 or Greater Predicted on Sunday

Key Points

- A G4 or Greater Geomagnetic Storm Watch was issued by the NWS Space Weather Prediction Center for Sunday, May 12, which will be followed by possible G3 conditions into Monday.
- Area of impact primarily poleward of 45 degrees Geomagnetic Latitude.
- Possible widespread voltage control problems and some protective systems may mistakenly trip out key assets from the power grid. Induced pipeline currents intensify.
- Satellite navigation (GPS) degraded or inoperable for hours.
- HF (high frequency) radio propagation sporadic or blacked out.
- Aurora may be seen as low as Alabama and northern California.

Links

- NWS Space Weather Prediction Center

Graphics

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Severe Geomagnetic Storm LIKELY

Updated
2024-May-10
1130 EDT

WHAT: SWPC's First G4 Watch Since Jan. 2005

KEY MESSAGES: A Severe (G4) Geomagnetic Storm is *LIKELY* – possibly as early as later today and continuing through the weekend; exact timing remains somewhat uncertain. At least *seven* earth-directed Coronal Mass Ejections (CMEs) are in transit.

IMPACTS: **HF communication, GPS, power grids (voltage control), spacecraft, satellite navigation, and other technologies may be affected.** ***Critical infrastructure operators have been notified.***

CONTEXT: **Only three Severe (G4) geomagnetic storms have occurred so far this solar cycle (since 2019); the last was a brief occurrence on March 23. This is SWPC's first G4 Watch since 2005. The last Extreme (G5) event occurred with the Halloween Storms in 2003.**

CAUSE: **The source has been a large, complex sunspot cluster (NOAA Region 3664) that is 17 times the diameter of Earth. Additional activity from this Region is still expected.**