

CW3E Analysis: Tropical Storm Hilary 16 August 2023

Tropical Storm Hilary Potentially Impacting Southern California Beginning Sunday 20 August

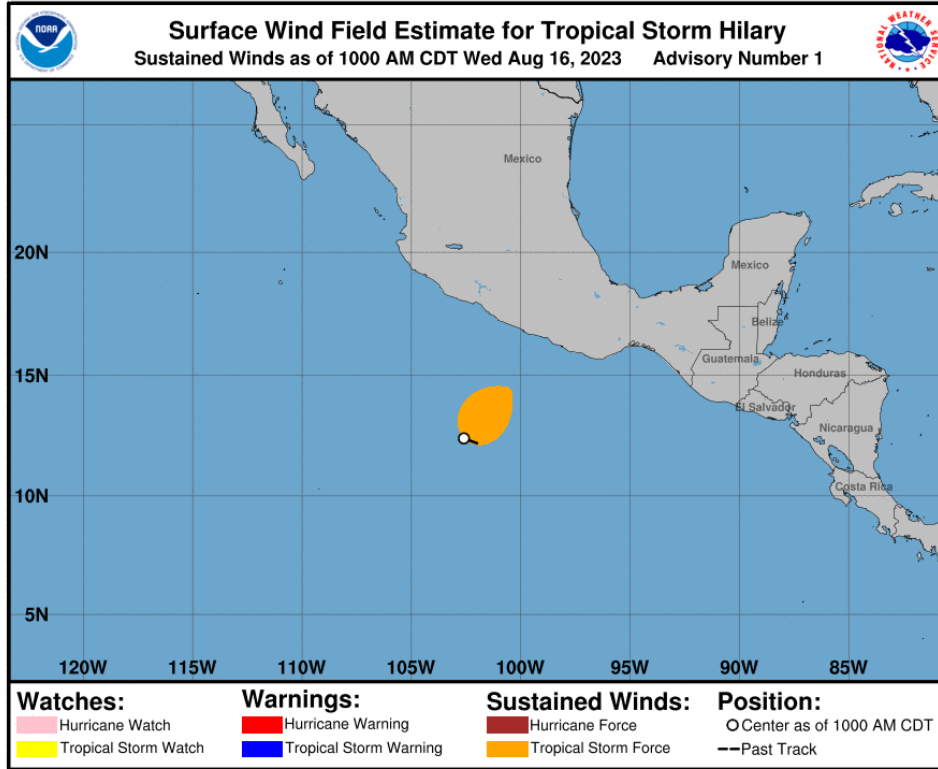
- The disturbance that was located off the coast of Southern Mexico in the Pacific was upgraded to Tropical Storm Hilary today, 16 Aug 2023
- Tropical Storm Hilary is forecast to become a hurricane tomorrow, 17 Aug 2023, and continue strengthening.
- The storm is expected to impact the Baja Peninsula and Southern California, with Tropical Storm force winds likely to reach the Baja sometime late Friday to early Saturday and reach Southern California mid to late Sunday per the most recent NHC forecast.
- There is potential for heavy precipitation accompanying the high winds across much of Southern California as a result of the elevated moisture levels forecasted to be brought into the region by Hilary
- A predecessor rain event (PRE) is forecast to occur north of Hilary on Saturday into Sunday, bringing heavy rainfall to the southwestern US that will be fed by a robust corridor of tropical moisture from Hilary

Stay alert to official NWS forecasts, watches, and warnings from the National Hurricane Center at nhc.noaa.gov, information from local NWS weather forecast offices at weather.gov, and follow guidance from local emergency management officials

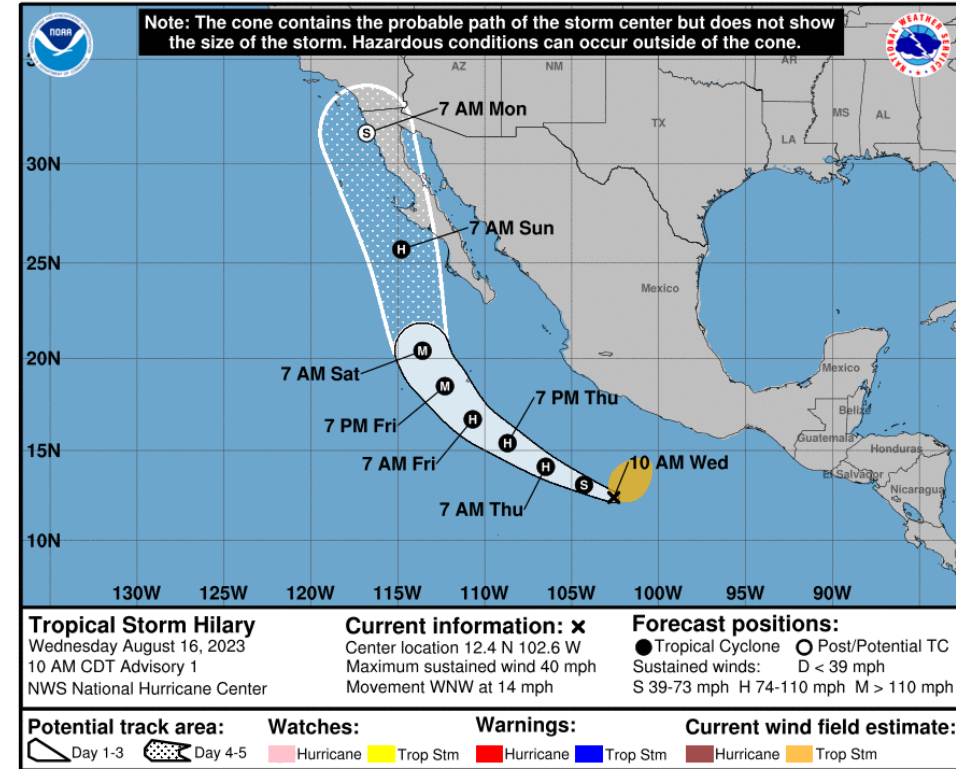
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Advisory 1 Surface Wind Field and Forecast Cone

A) Valid 10 AM CDT 16 Aug



B) Valid 10 CDT 16 Aug

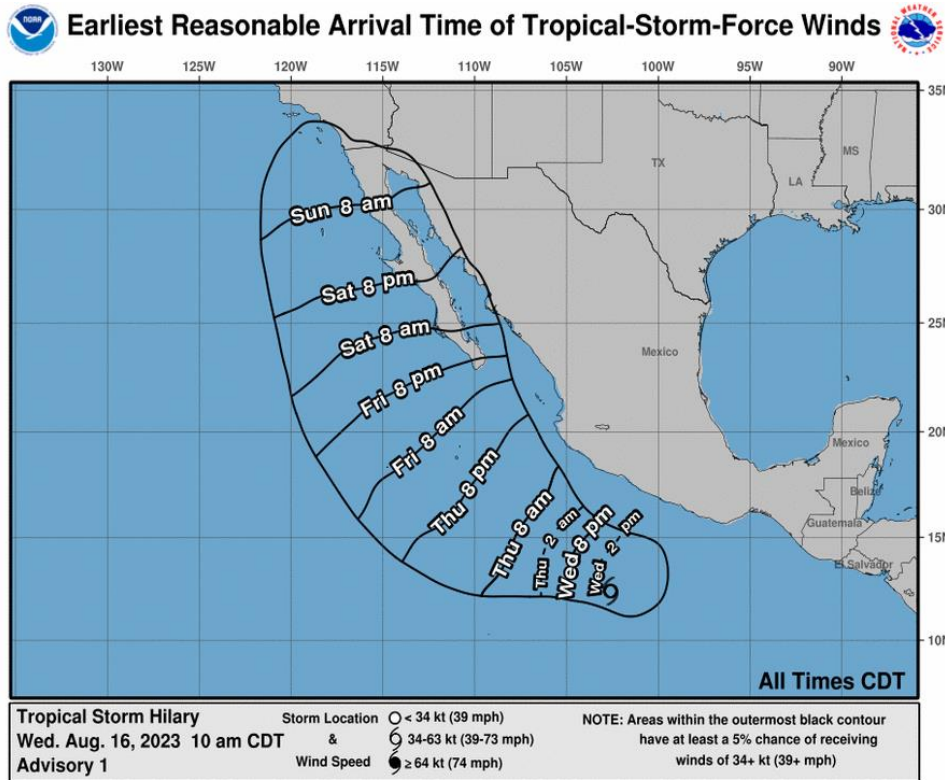


- Hilary developed into a Tropical Storm off the Southern Mexico coast on 16 Aug, with its most recent wind field shown in Figure A
- The forecast from Advisory 1 has the storm becoming a hurricane as of 7 am Thursday, 17 Aug, and a major hurricane by Friday night, 18 Aug, while still in the Pacific (Figure B)

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Tropical Storm Force Wind Forecasts

A) Valid 10 AM CDT 16 Aug



B) Valid 10 CDT 16 Aug



- The NHC produces tropical storm force wind forecast graphics for both the earliest reasonable arrival (Figure A) and most likely arrival (Figure B)
- Tropical storm force winds are forecast to arrive in Southern California sometime Sunday, midday at earliest (Figure A) and night into Monday at most reasonable (Figure B)

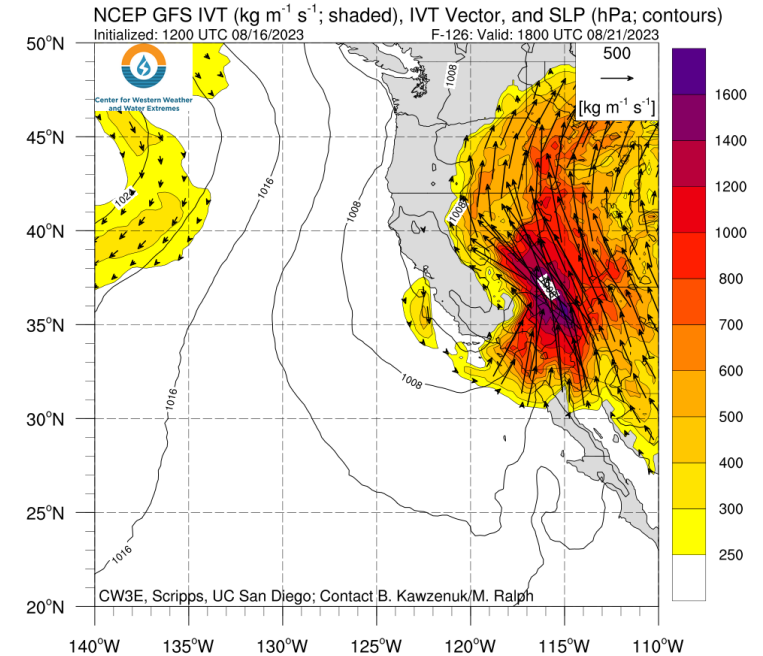
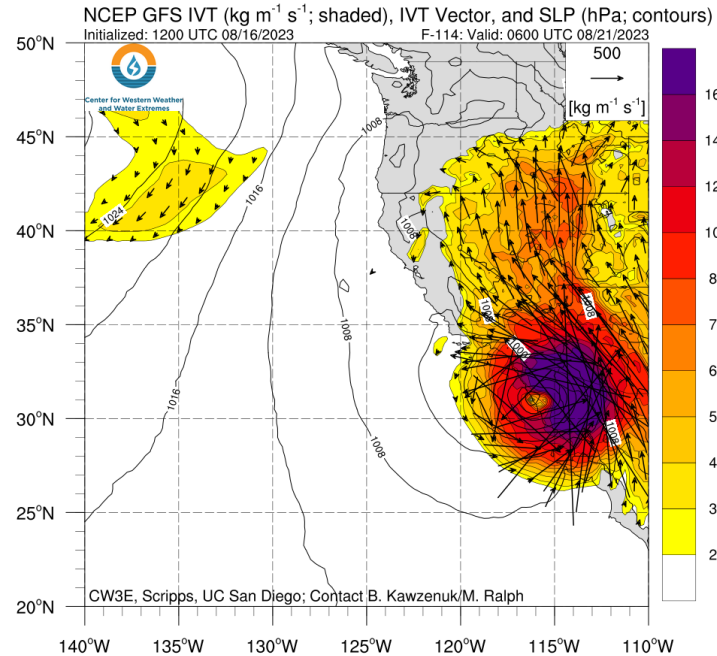
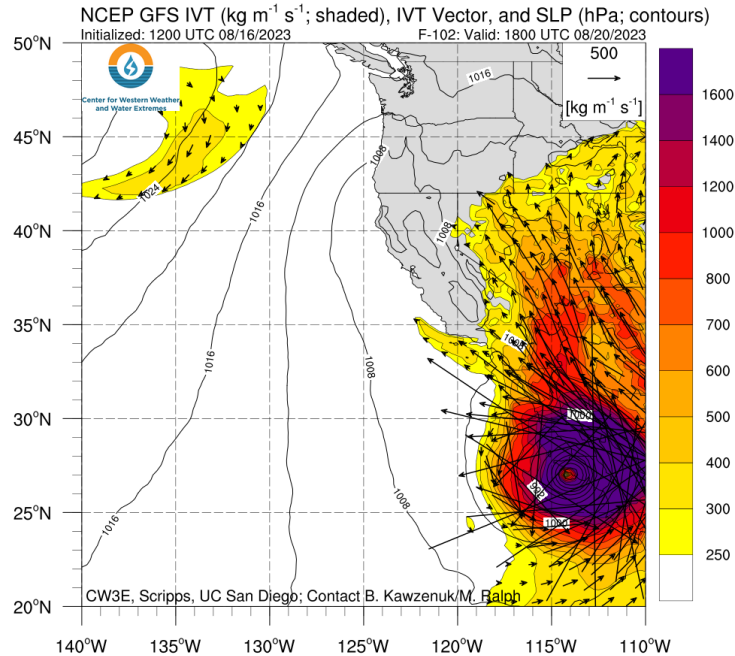
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GFS Model IVT Forecast

A) Valid: 11 AM PDT 20 Aug

B) Valid: 11 PM PDT 20 Aug

C) Valid: 11 AM PDT 21 Aug

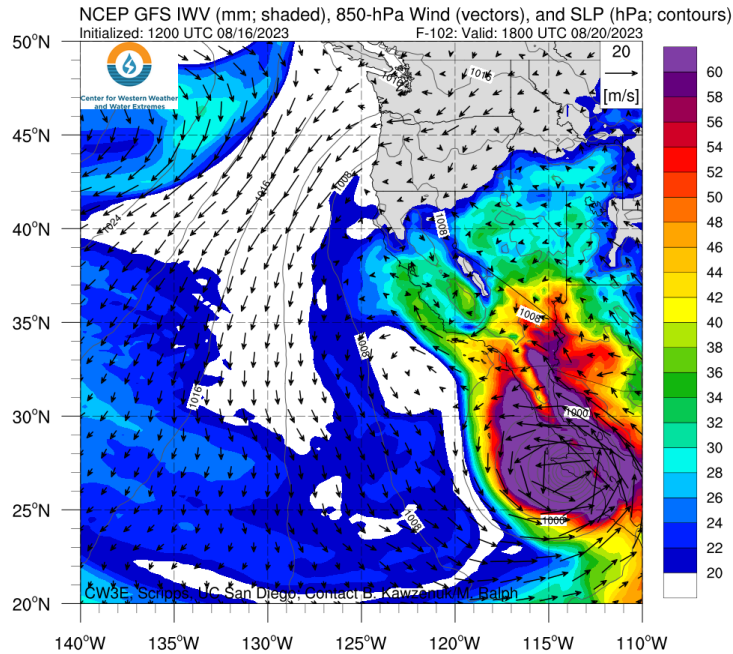


- The 12Z GFS IVT is shown for the period that Hilary is forecast to be reaching Southern California in Advisory 1
- GFS has IVT well over $1600 \text{ kg m}^{-1} \text{ s}^{-1}$ over the Baja Peninsula and moving into Southern California Sunday (Figures A and B)
- This GFS run shows the region still experiencing $\text{IVT} > 800 \text{ kg m}^{-1} \text{ s}^{-1}$ as the storm has begun to move out by midday Monday

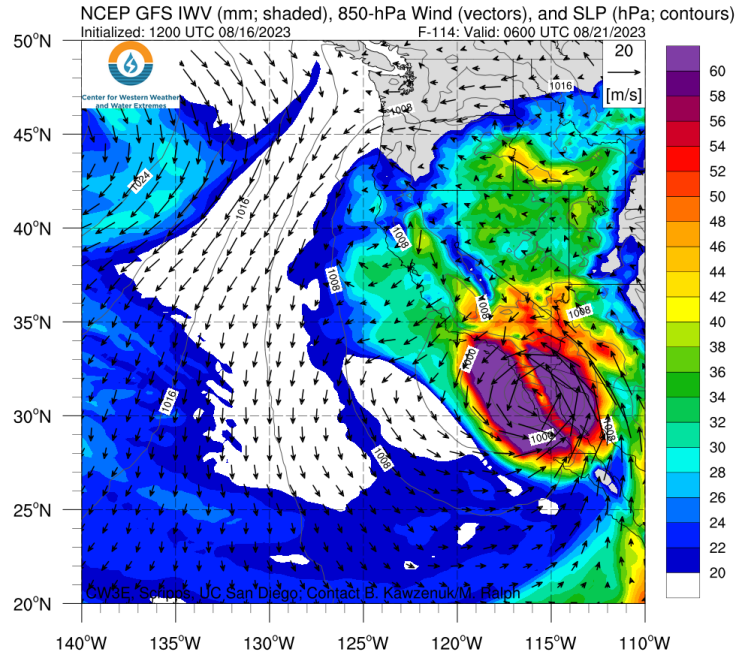
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GFS Model IWV Forecast

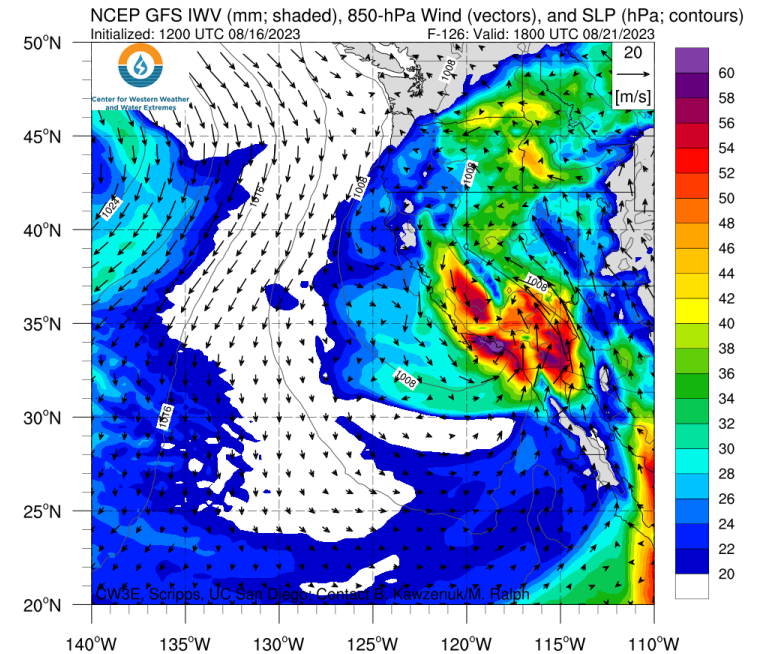
A) Valid: 11 AM PDT 20 Aug



B) Valid: 11 PM PDT 20 Aug



C) Valid: 11 AM PDT 21 Aug



- In conjunction with the extremely high IVT are regions of elevated IWV; IWV > 60 mm are forecast to overspread over Southern California midday Sunday following the storm tracking over the Baja Peninsula (Figure A)
- IWV > 60 mm begins to be forecasted over coastal San Diego County Sunday Night (Figure B)
- High values of IWV are still forecasted through much of Southern and Central California midday Monday as the storm moves inland
- Orographic enhancement of rainfall on the eastern side of the Peninsular Ranges is likely given the combination of exceptionally moist air and strong easterly low-level winds

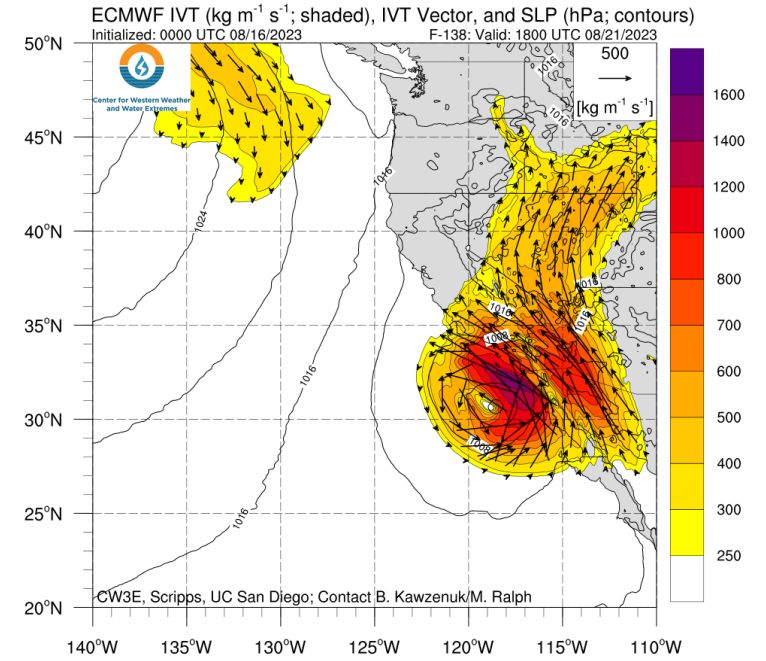
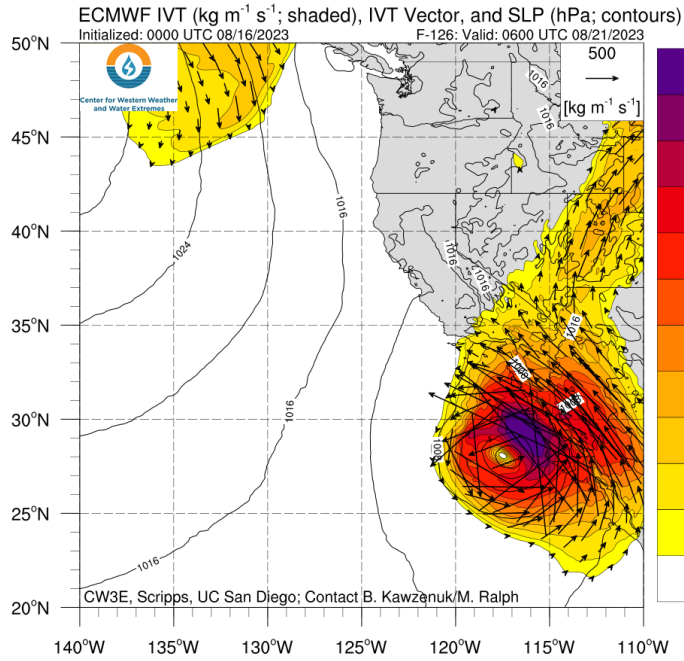
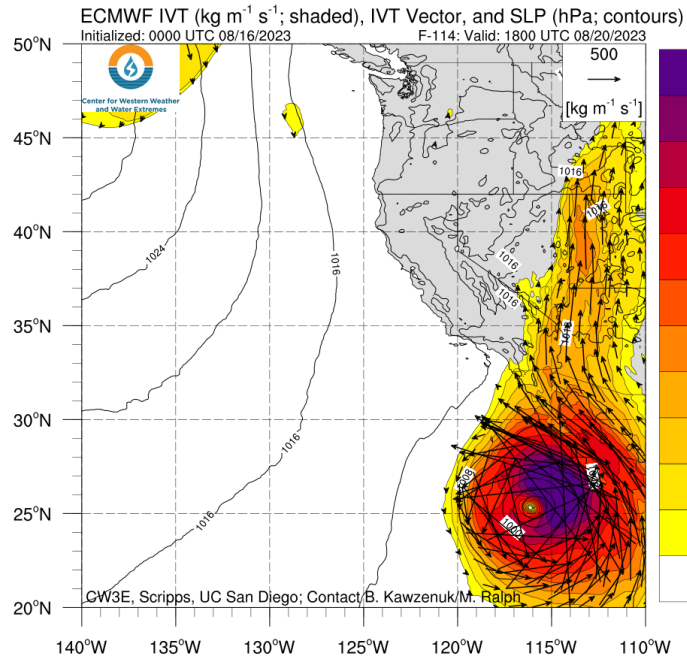
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ECMWF Model IVT Forecast

A) Valid: 11 AM PDT 20 Aug

B) Valid: 11 PM PDT 20 Aug

C) Valid: 11 AM PDT 21 Aug

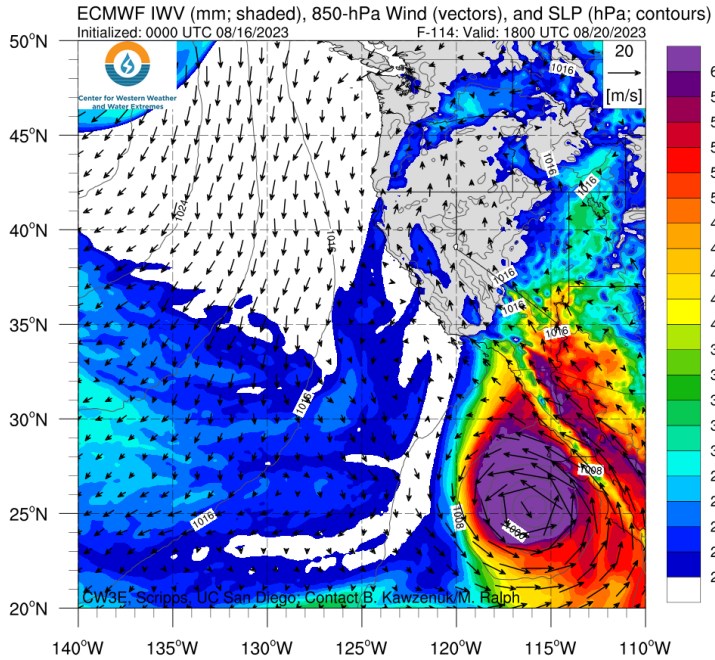


- The ECMWF 0Z run has Tropical Storm Hilary slightly weaker and further southeast compared to the GFS around midday Sunday (Figure A)
- There is still a region of IVT well over $1600 \text{ kg m}^{-1} \text{ s}^{-1}$ in the Baja Sunday night, but is much smaller in comparison, with much of the IVT around the system $> 800 \text{ kg m}^{-1} \text{ s}^{-1}$ (Figures A and B)
- ECMWF has the system moving along the California coast as opposed to further inland like the GFS

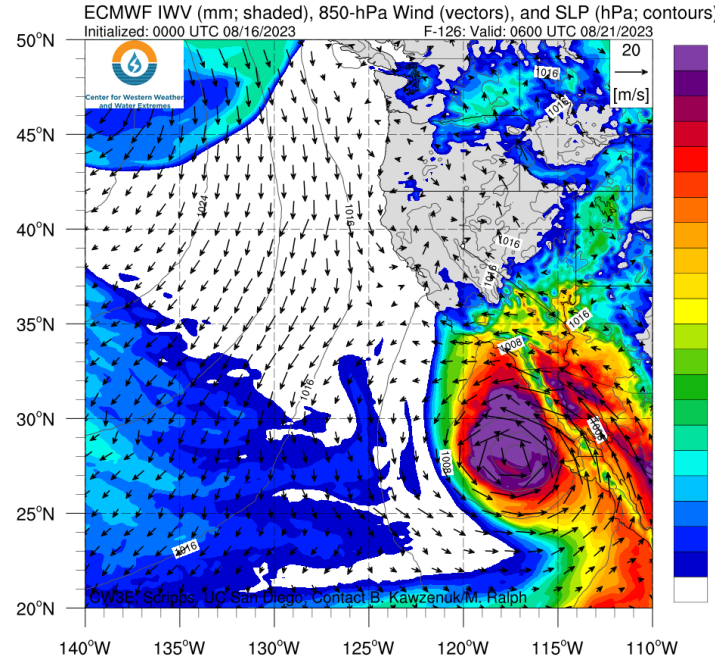
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ECMWF Model IWF Forecast

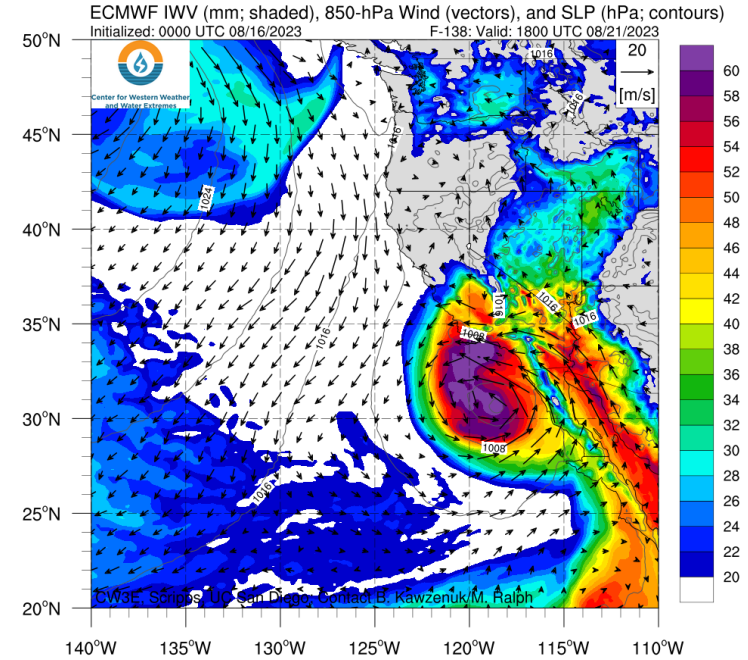
A) Valid: 11 AM PDT 20 Aug



B) Valid: 11 PM PDT 20 Aug



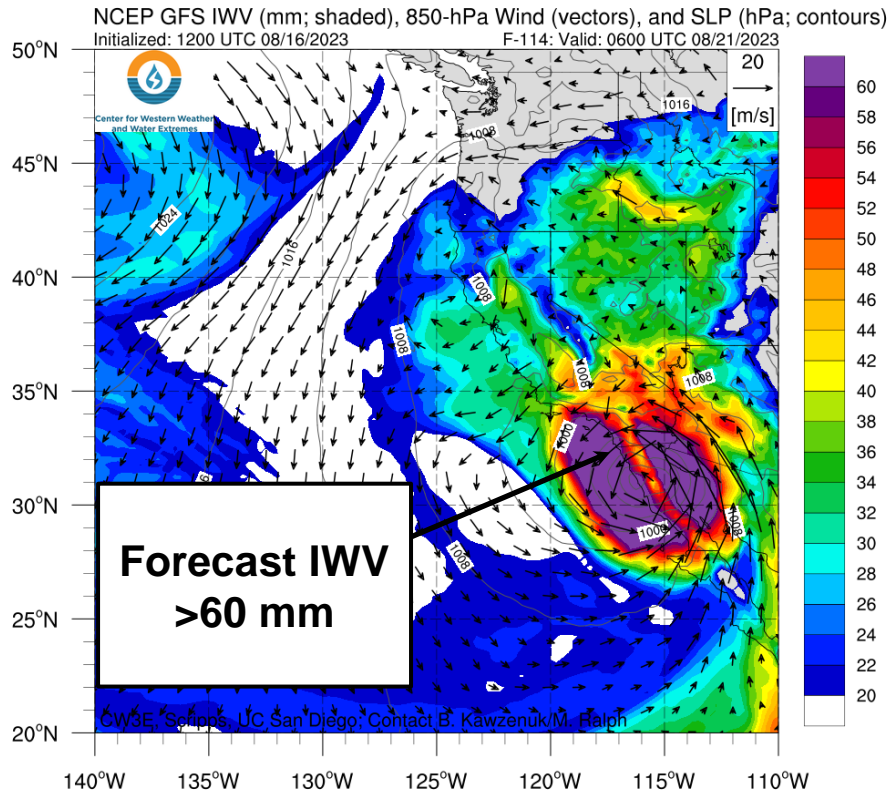
C) Valid: 11 AM PDT 21 Aug



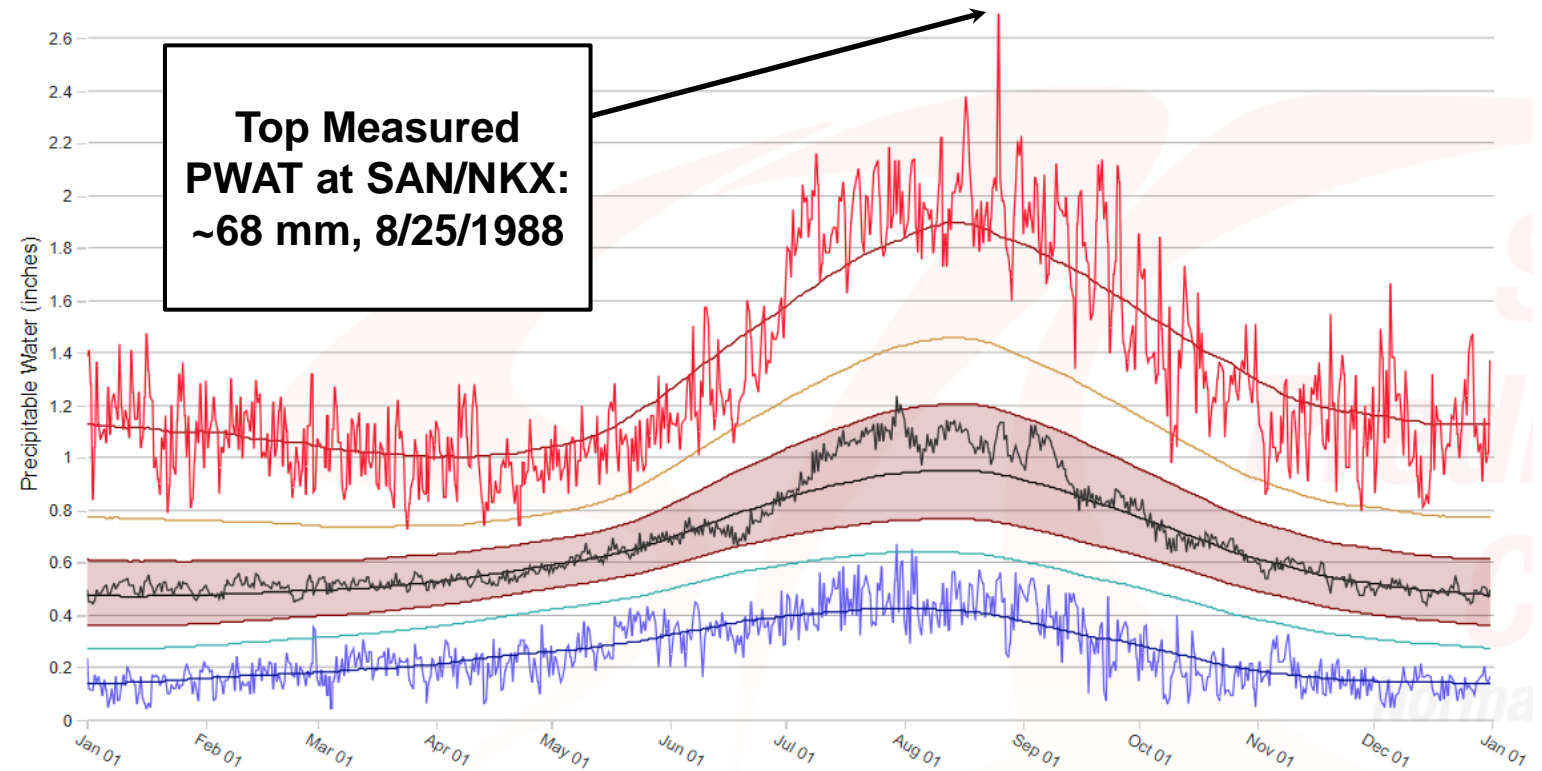
- Much like the GFS, the ECMWF is showing IWF values > 60 mm around the center of the storm
- However, due to the difference in storm track, the high IWF values are not forecast to make it as far on shore as the GFS (Figures A-C)
- The ECMWF is currently forecasting IWF values > 50 mm over Southern California throughout the duration of the storm, but it is not as prevalent as in the GFS

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Precipitable Water Sounding



ALL Soundings for NKX



Source: <https://www.spc.noaa.gov/exper/soundingclimov2/#>

- The GFS has forecasted IWV values exceeding >60 mm over parts of Southern California
- These forecast IWV values will approach and potentially exceed the record levels of IWV observed over Southern California, with the highest value on record of ~68 mm in the San Diego upper air sounding observed on 25 August 1988

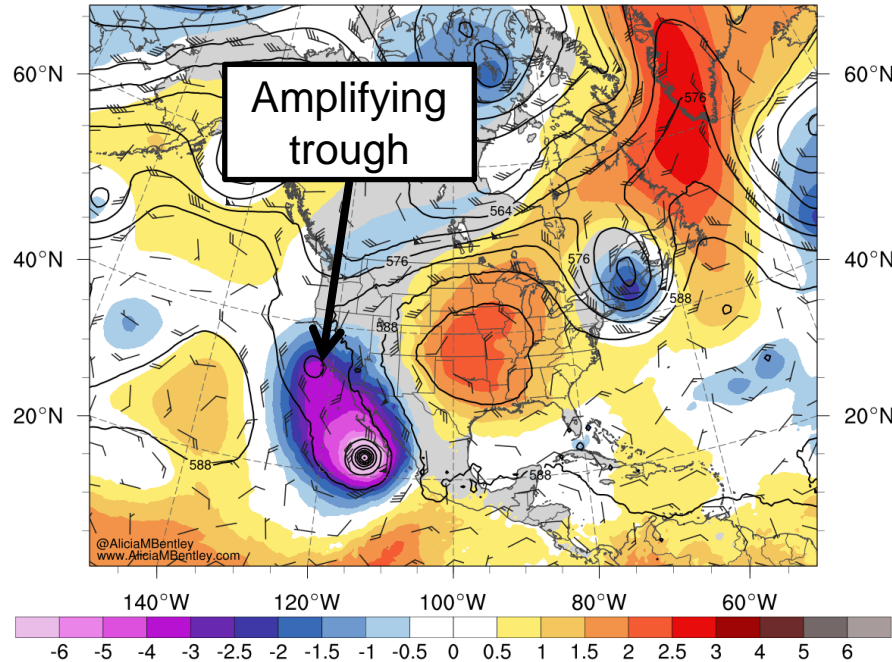
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Potential for a Predecessor Rain Event (PRE)

A) GFS 500-hPa Heights and Standardized Anomalies

Valid: 5 PM PDT 19 Aug (F-84)

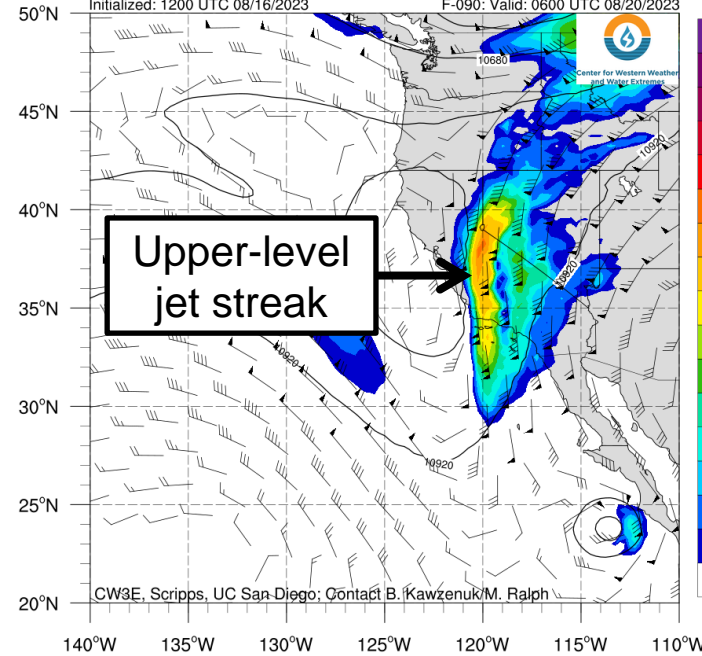
500-hPa geo. height (black, dam), wind (barbs, kt), standardized geo. height anomaly (shaded, sigma)
Initialized: 1200 UTC 16 Aug 2023 | Forecast hour: 84 | Valid: 0000 UTC 20 Aug 2023



B) GFS 250-hPa Winds and Heights

Valid: 11 PM PDT 19 Aug (F-90)

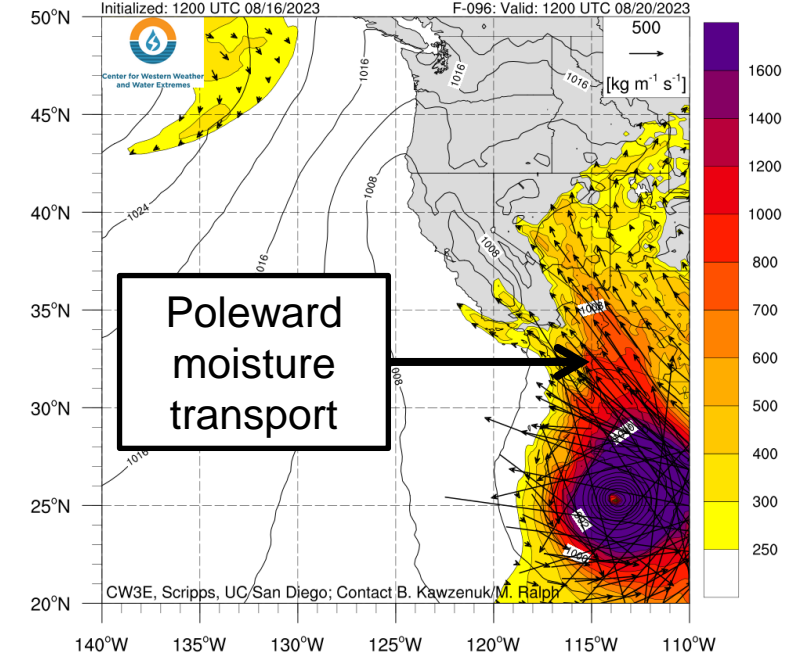
NCEP GFS 250-hPa Winds (knots) and Height (gpm)
Initialized: 1200 UTC 08/16/2023 F-090: Valid: 0600 UTC 08/20/2023



C) GFS IVT and SLP

Valid: 5 AM PDT 20 Aug (F-96)

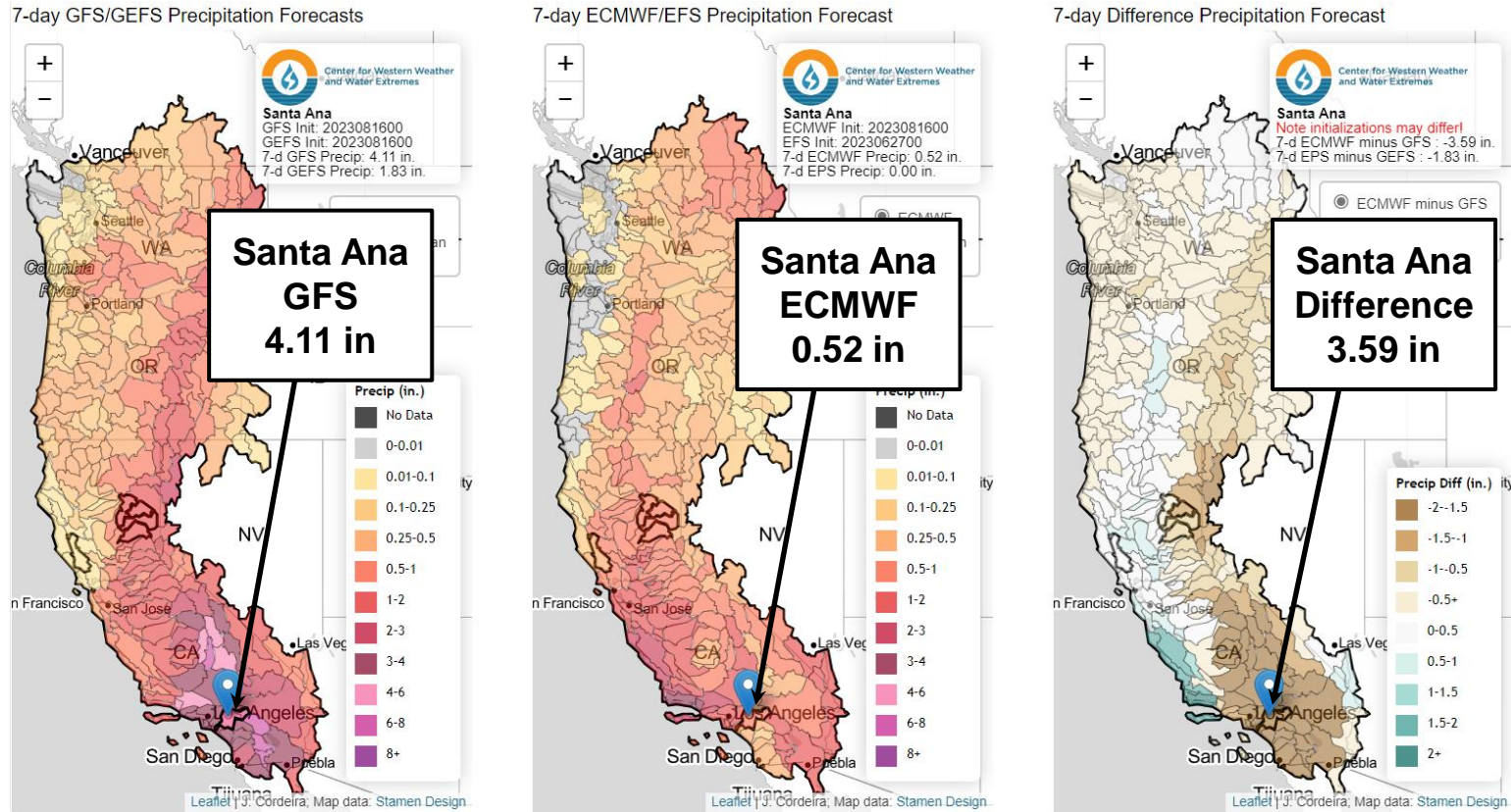
NCEP GFS IVT ($\text{kg m}^{-1} \text{s}^{-1}$; shaded), IVT Vector, and SLP (hPa; contours)
Initialized: 1200 UTC 08/16/2023 F-096: Valid: 1200 UTC 08/20/2023



- There is potential for a predecessor rain event (PRE) to occur north of Hilary on Saturday into Sunday over the southwestern US
- PREs are areas of heavy rainfall fed by moisture from a tropical cyclone that can occur as much as 1000 km away
- PREs often develop near the right entrance region of an upper-level jet streak, downstream of a mid-level trough
- The 12Z GFS is showing conditions favorable for a PRE, with strong moisture transport (Figure C) forecast to occur on the poleward side of Hilary below the right entrance region of a 250-hPa jet streak (Figure B) and east of an amplifying trough along the coast (Figure A)

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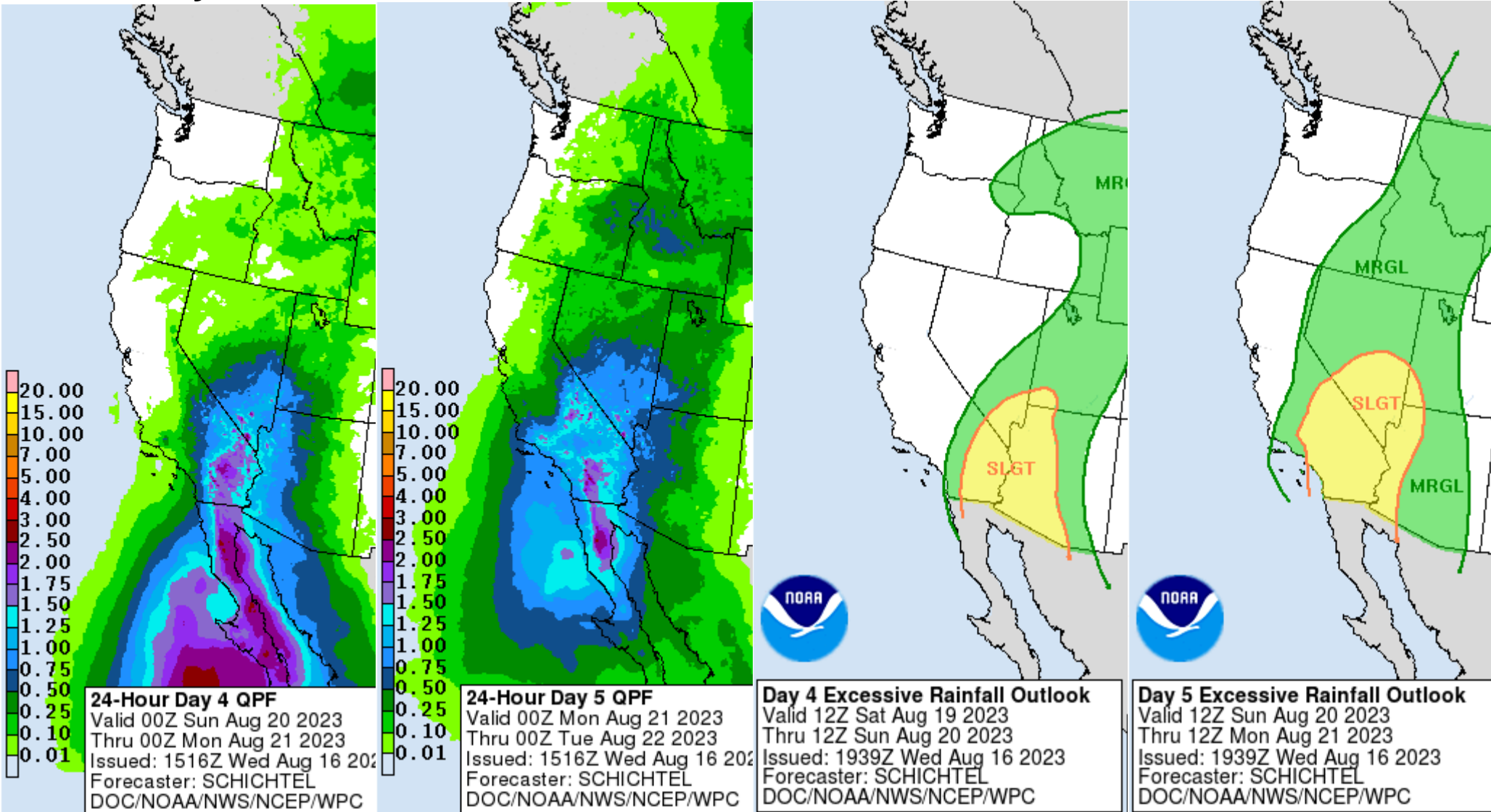
Santa Ana Watershed Precipitation



- Forecast differences in track and IVT intensity in the GFS and ECMWF are apparent in forecasted impacts
- For the Santa Ana watershed, the GFS is currently forecasting 3.59 inches more precipitation than the ECMWF
- Similar differences in precipitation are seen across much of Southern California
- The ECMWF precipitation is higher over the western Transverse Ranges and Central CA Coast Ranges due to its forecasted westerly track

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WPC Day 4 and 5 24-hour QPF and Excessive Rainfall Outlook



- WPC 24-hour QPF show elevated precipitation throughout the Baja Peninsula and Southern California for days 4 and 5
- Southern California, as well as Western Arizona and Southern Nevada, have been forecasted a slight chance of flooding associated with this heavy precipitation throughout the region

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CNRFC Daily Briefing: 16 August 2023

CNRFC Daily Briefing

California Nevada River Forecast Center

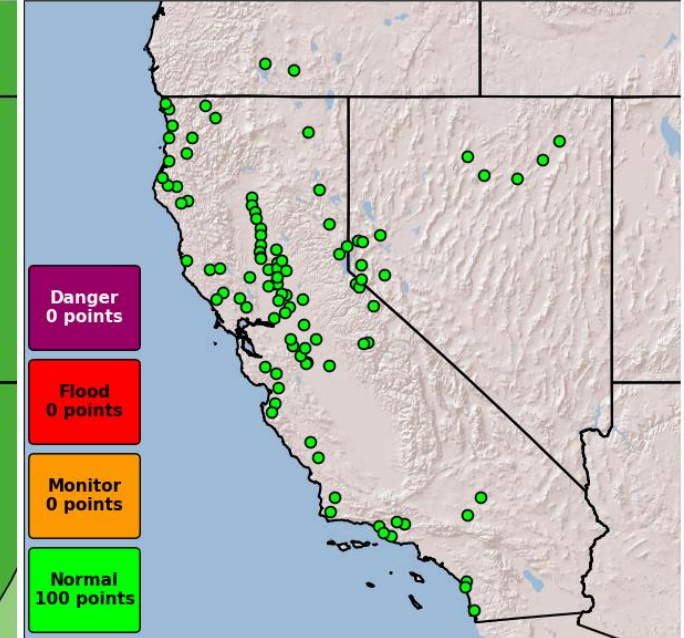
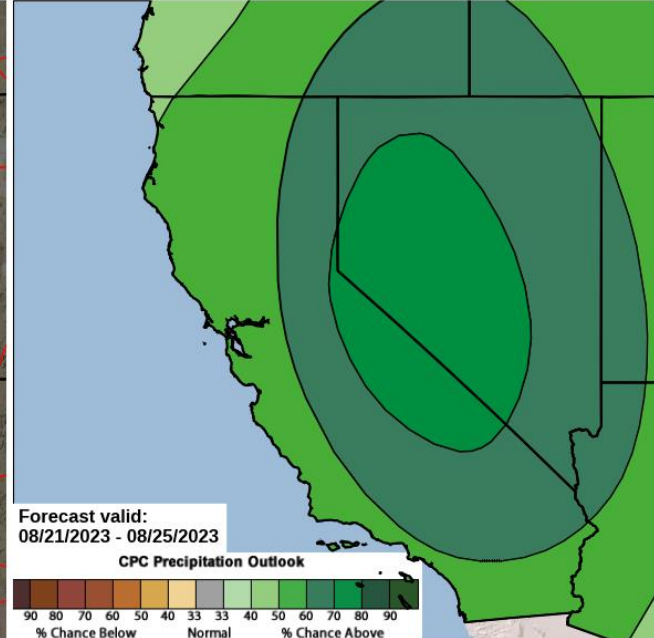
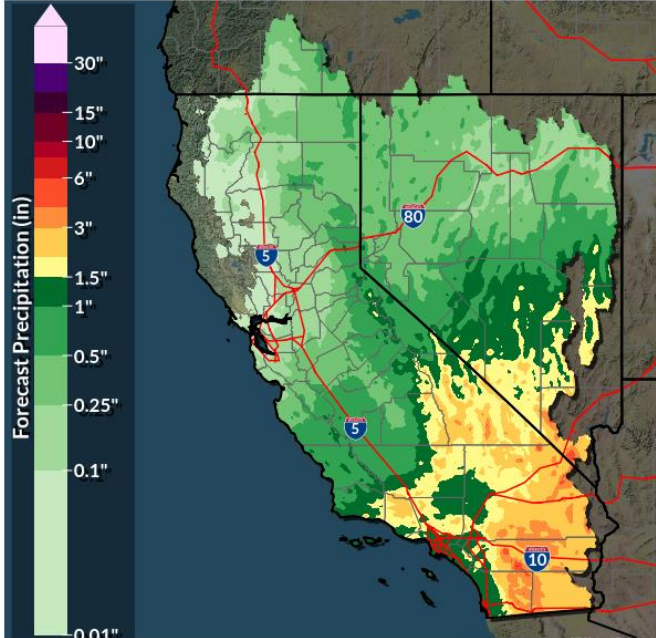


Issued: Wed Aug 16, 2023 8:18 AM PST

Fcst Precip Wed Aug 16 5 AM to Tue Aug 22 5 AM PDT

CPC 6-10 Day Precipitation Outlook

River Point Status through Mon Aug 21 at 8 AM PST



- An area of low pressure continuing to spin off the central CA coast will bring scattered showers and thunderstorms to the region over the next several days. Focus will primarily be the Cascades and Sierra along with the northern CA coastal mountains, and portions of NV.
- A surge of lower latitude moisture associated with a tropical system moving NNW along the Baja coast will bring widespread precipitation to the region beginning Saturday lasting into early next week. Best amounts will be southern CA and southern NV (1" to 4" possible).
- River rises are expected in Southern California and San Diego areas beginning Saturday night due to the potential heavy rainfall from the tropical system.
- No critical stages exceedances expected for the next couple days.

Confidence: Medium

Staffing Level: Normal

NWSCNRF

Detailed hydrometeorological discussion: cnrfc.noaa.gov/discussion

www.cnrfc.noaa.gov