

CW3E Event Summary: 23–25 Sep 2019



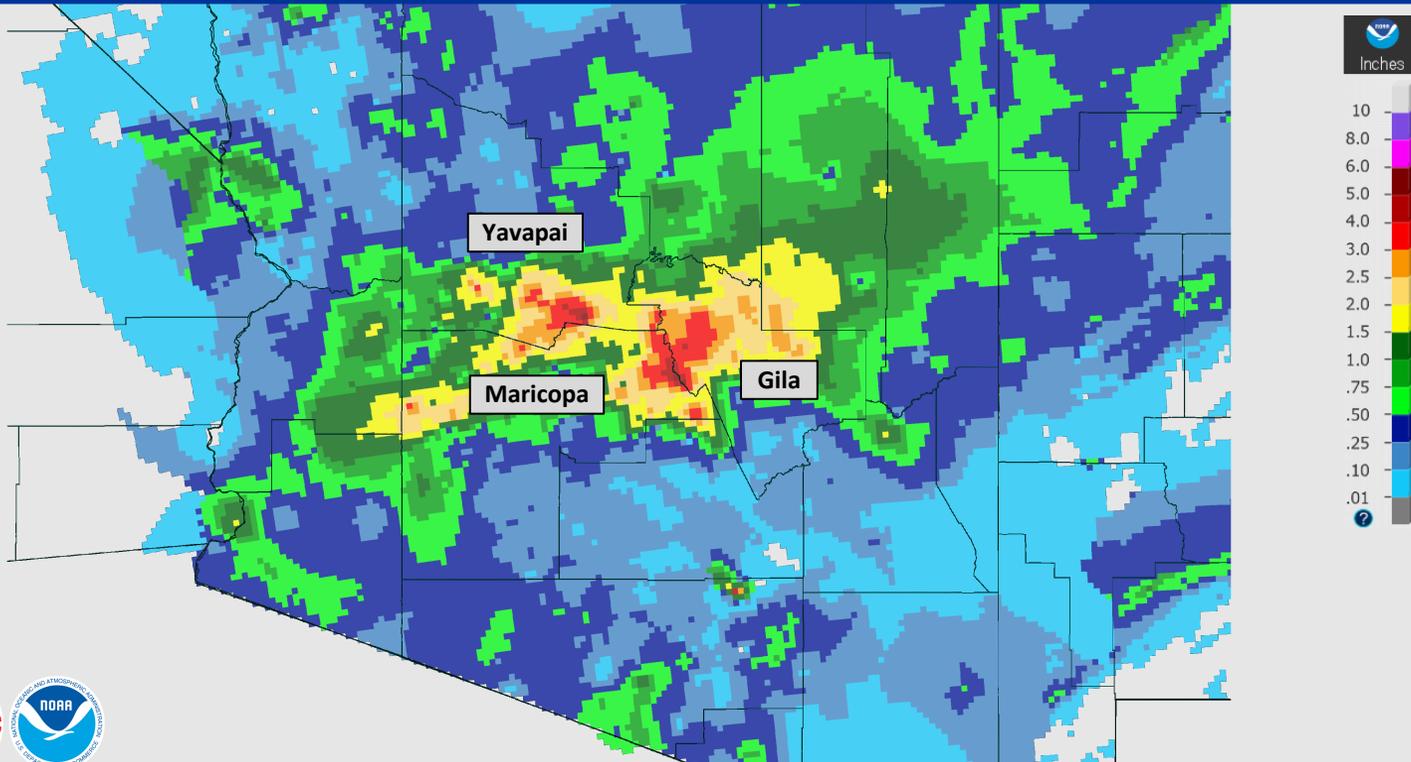
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AT UC SAN DIEGO

Active synoptic pattern brings heavy rainfall to central and southeastern Arizona

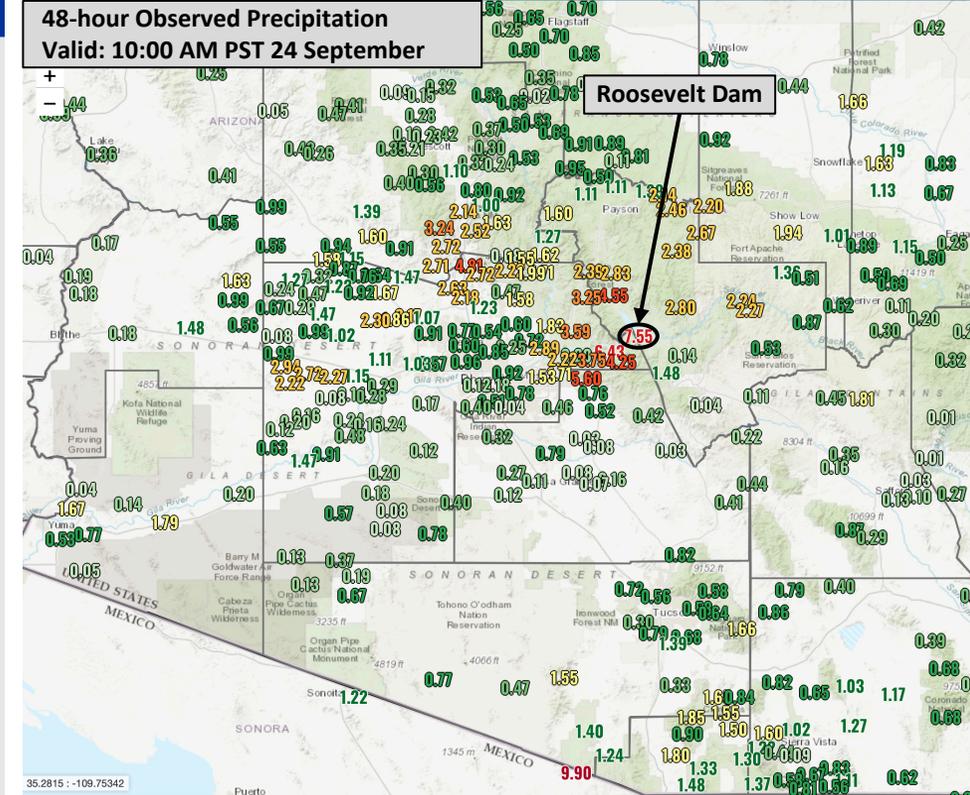
- A large swath of central AZ received over 1.5 inches of rainfall during the 24-hour period ending 12 UTC (5 AM PST) 24 Sep
- The highest rainfall amounts (> 3 inches) occurred over the elevated terrain in Maricopa, Gila, and Yavapai Counties
- Roosevelt Dam (Gila County) recorded 7.55 inches during the 48-hour period ending 17 UTC (10 AM PST) 24 Sep
- Localized flash flooding, hail, and damaging winds were also reported during the evening of 23 September
- Additional heavy rainfall and thunderstorms are expected over the next couple of days, primarily in southeastern Arizona
- Strong synoptic-dynamic forcing and moisture from the remnants of Tropical Storm Mario both played important roles in this event

September 24, 2019 1-Day Observed Precipitation

Created on: September 24, 2019 - 17:29 UTC
Valid on: September 24, 2019 12:00 UTC



48-hour Observed Precipitation Valid: 10:00 AM PST 24 September

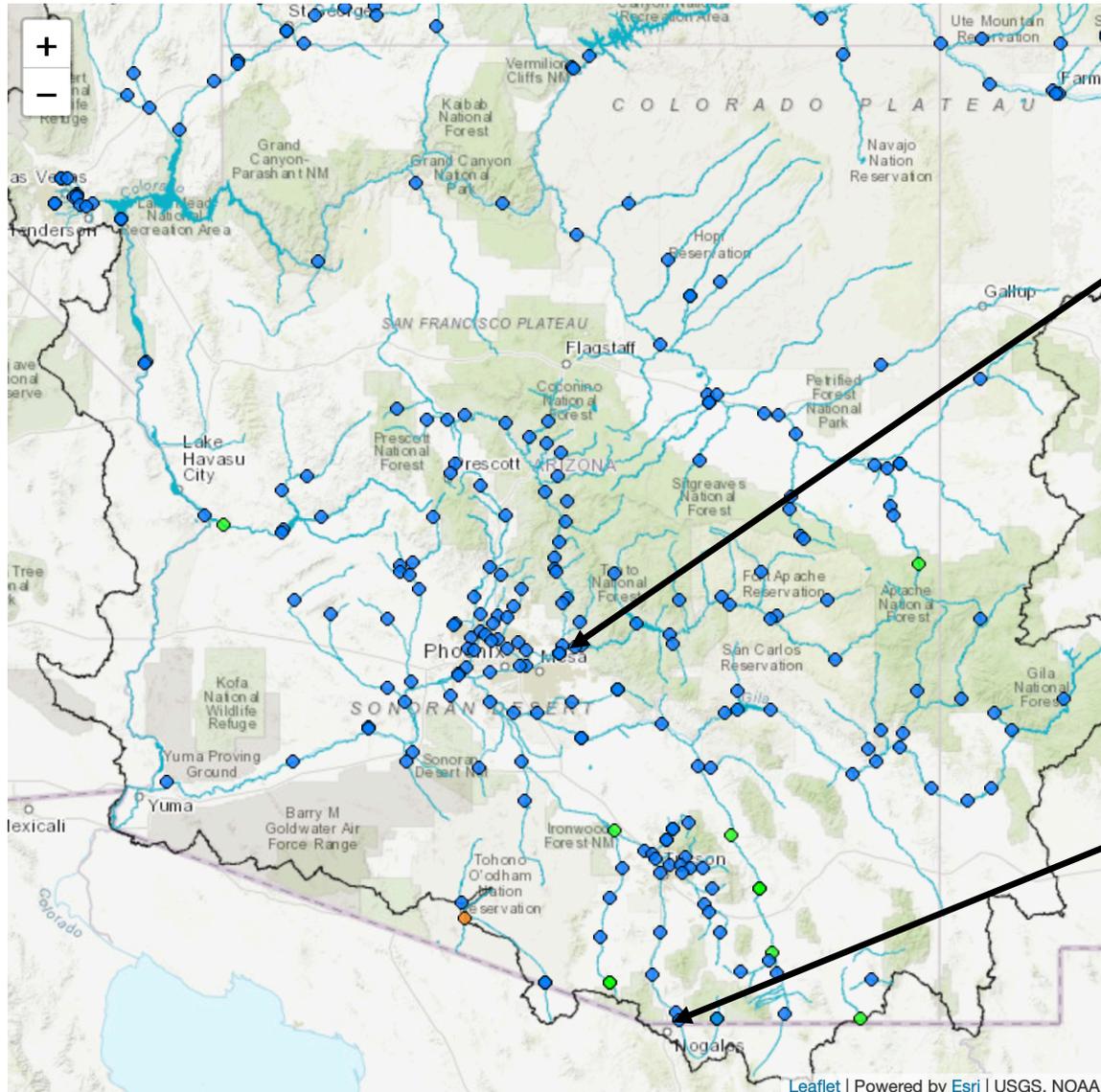


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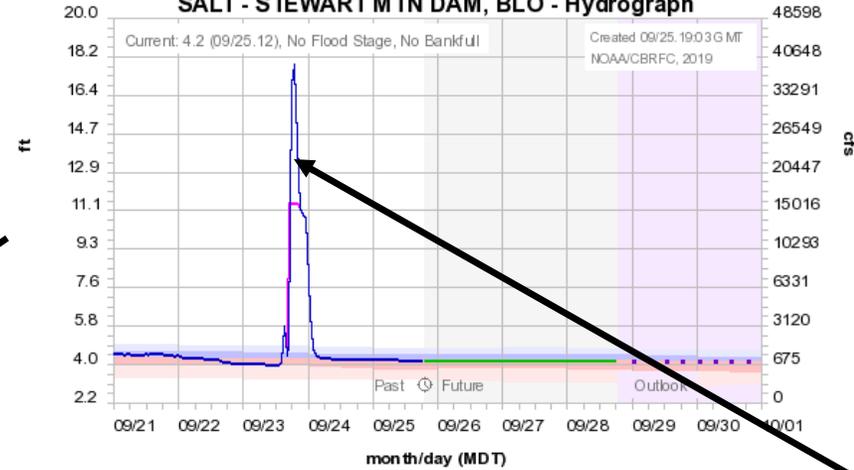
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Colorado Basin River Forecast Center

SALT - STEWART MTN DAM, BLO - Hydrograph



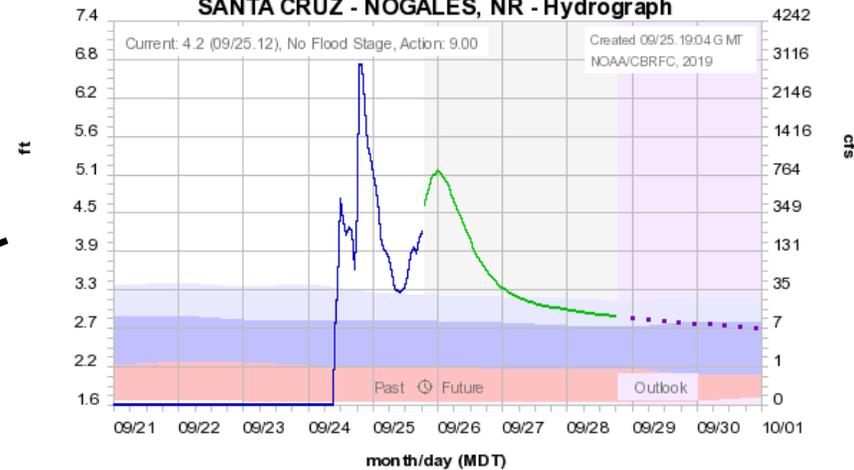
Peak Discharge: 37000 ft³ s⁻¹
Peak Gage Height: 17.95 ft

Intense rainfall on 23 September led to a rapid response in streamflow the Salt River east of Phoenix, AZ. Gage height at Stewart Mountain Dam increased more than 13 ft in less than 2 hours.

Simulated — Observed — Forecast (09/25.15:00) — Outlook (increasing uncertainty) - - -
Historical Exceedance Probability (USGS): 90-75% 75-50% 50-25% 25-10%

Colorado Basin River Forecast Center

SANTA CRUZ - NOGALES, NR - Hydrograph



Peak Discharge: 2960 ft³ s⁻¹
Peak Gage Height: 6.72 ft

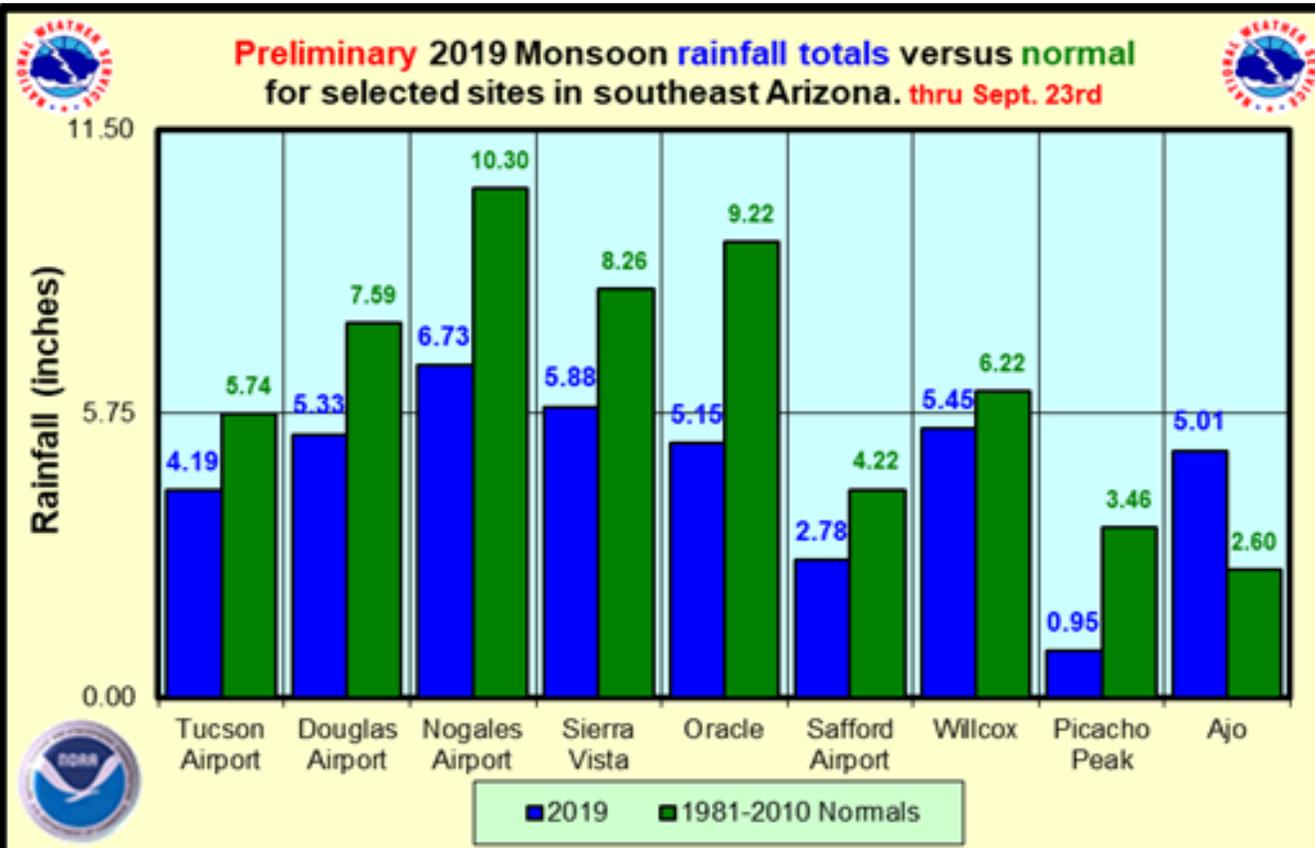
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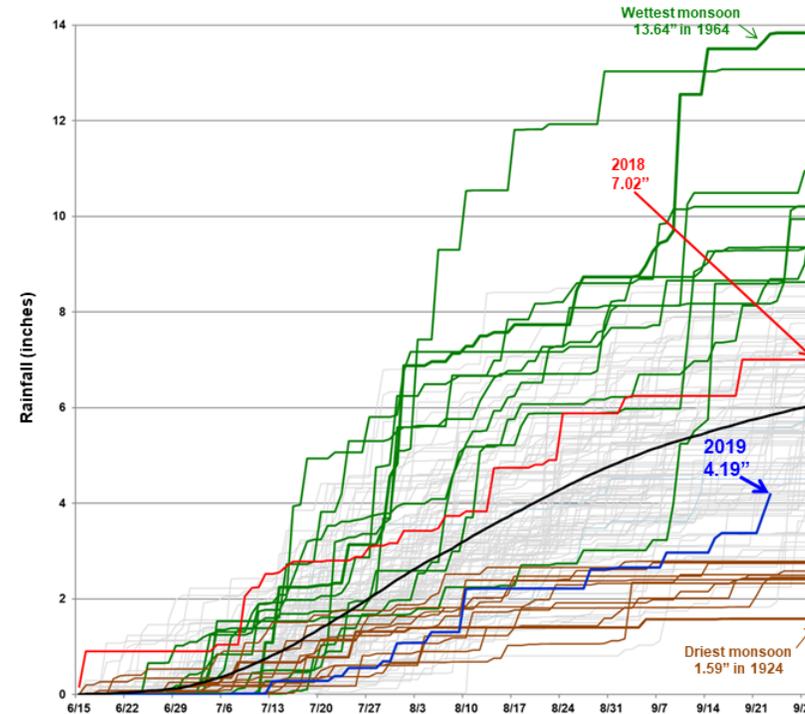


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Heavy rainfall in southeastern Arizona will help erase rainfall deficits in what has otherwise been an anomalously dry summer monsoon. As of 24 September, many locations in southeastern Arizona were running seasonal monsoon (June–September) rainfall deficits between 2 and 4 inches. Prior to September, 2019 was on pace for one of the 10 driest monsoon seasons in Tucson since 1895. For comparison, the total monsoon rainfall in Tucson was about 3 inches greater at this point in 2018.



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 23rd – 4.19”

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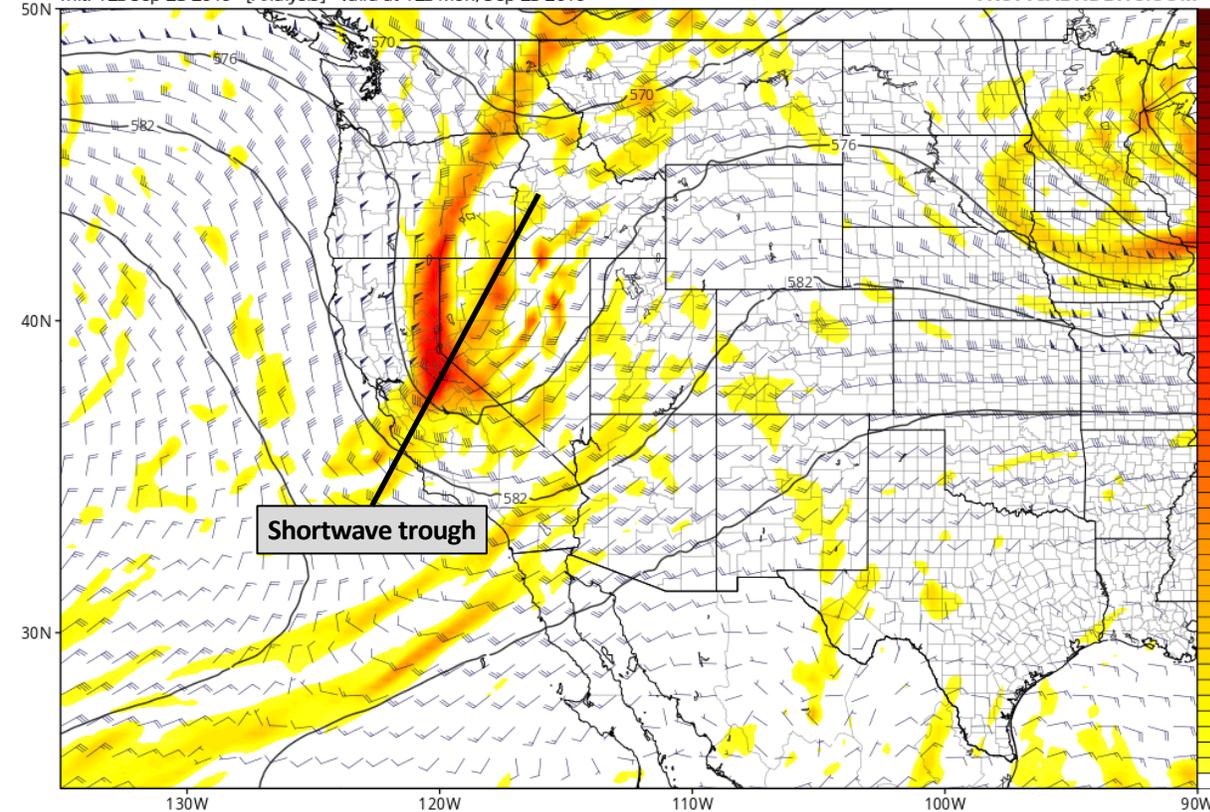
Unusually strong synoptic-dynamic forcing, coupled with moist, unstable conditions set the stage for heavy rainfall in central and southeastern Arizona on 23–25 September.

At 1200 UTC 23 September, a vigorous 500-hPa shortwave trough was located near Reno, NV. By 1200 UTC 24 September, a cutoff low had formed over the California–Arizona border.

At 1200 UTC 23 September, central Arizona was situated beneath the equatorward entrance region of a 250-hPa jet, a favorable region for quasi-geostrophic forcing for ascent.

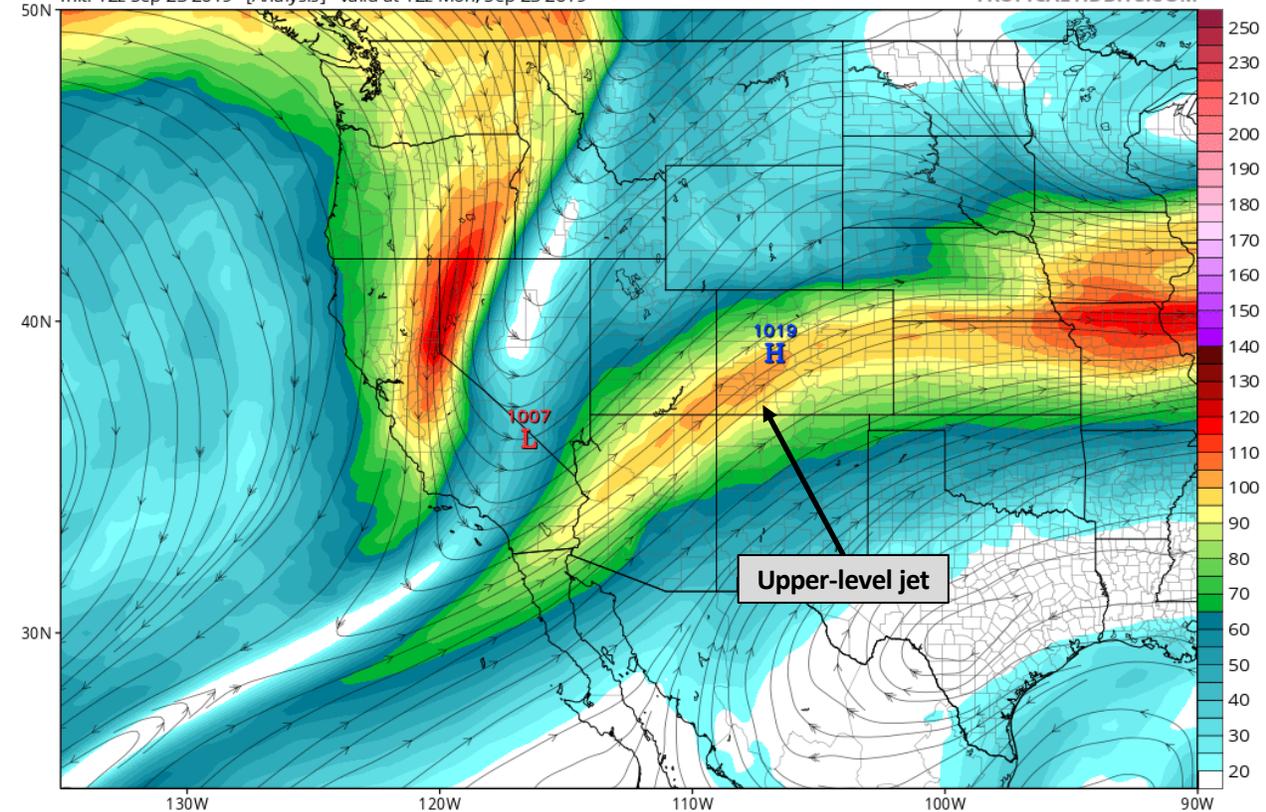
GFS 500mb Geopotential Height (dam), Cyclonic Vorticity (10^{-5} s^{-1} , shaded), and Wind (kt)
Init: 12z Sep 23 2019 [Analysis] valid at 12z Mon, Sep 23 2019

TROPICALTIDBITS.COM



GFS 250mb Wind Speed/Streamlines (kt) & MSLP Extrema (mb)
Init: 12z Sep 23 2019 [Analysis] valid at 12z Mon, Sep 23 2019

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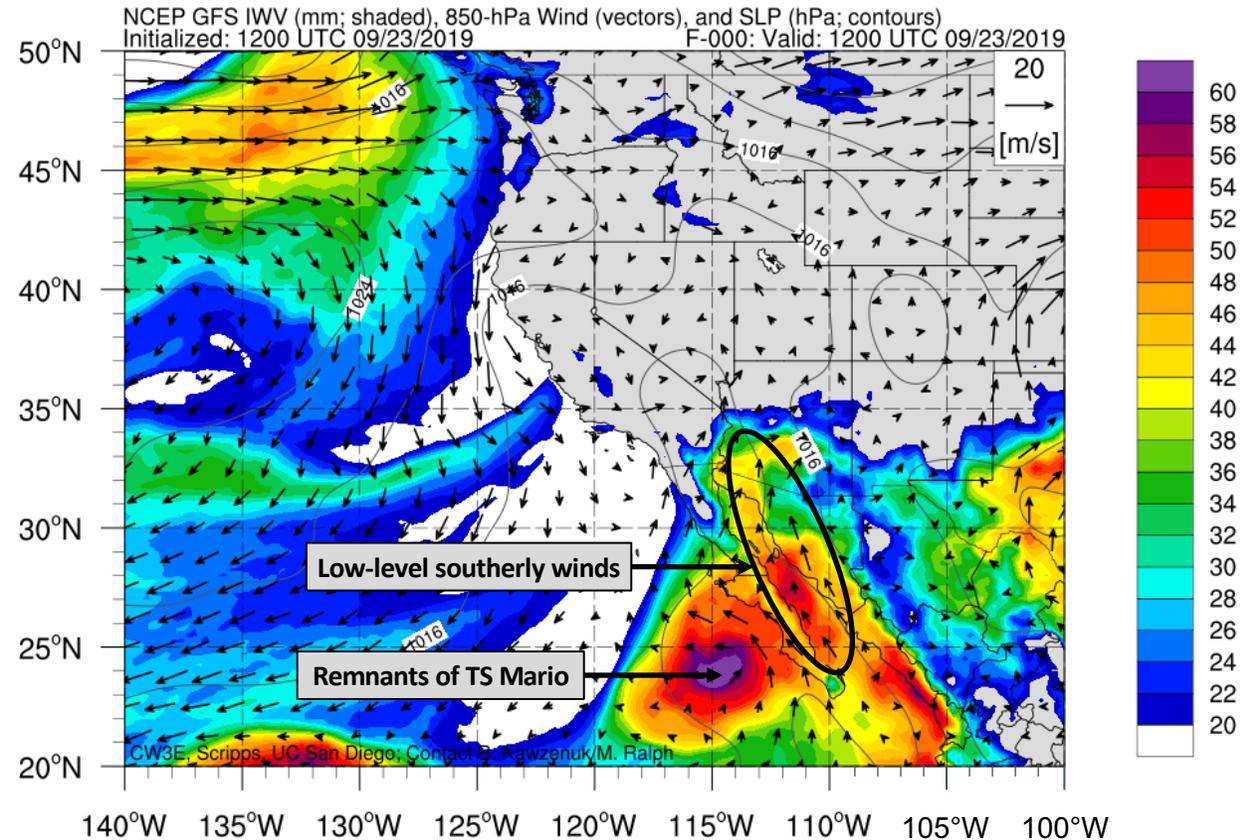
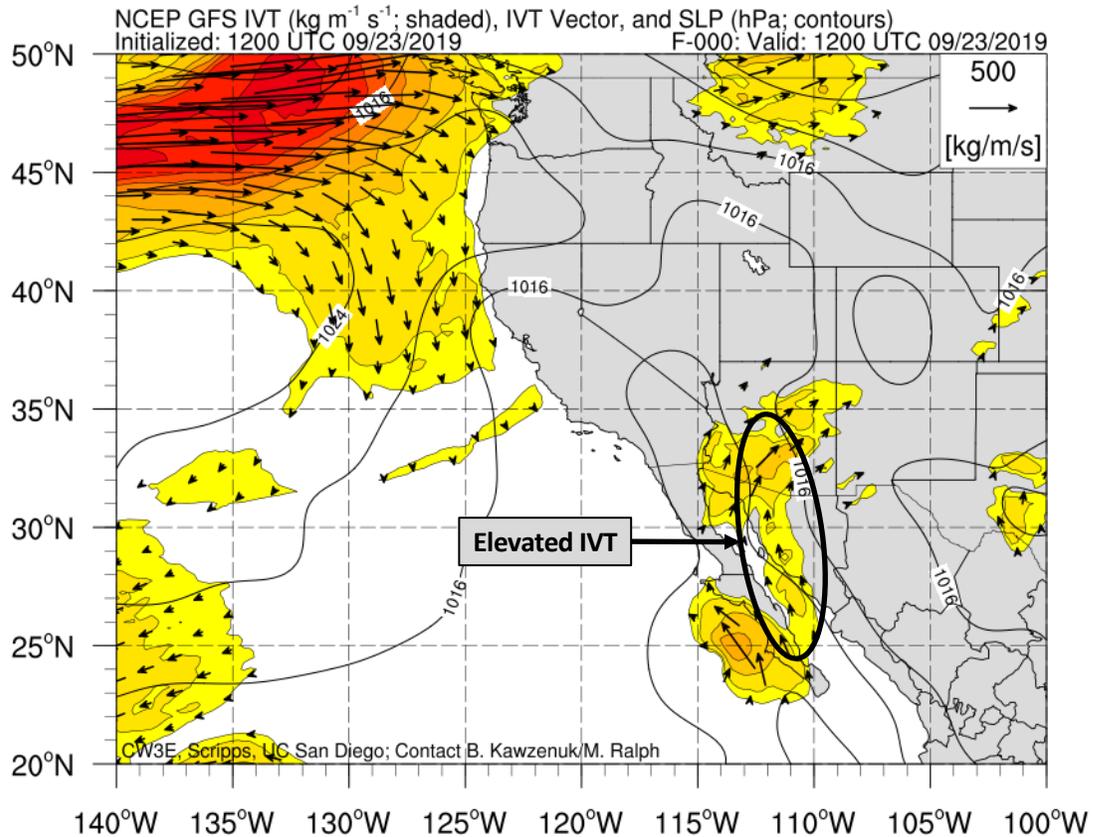


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At 1200 UTC 23 September, a narrow corridor of elevated IVT extended from the southern tip of Baja California to central Arizona. Elevated IVT values resulted from enhanced low-level southerly flow over the Gulf of California and a plume of very moist air (IVW > 40 mm) extending northward from the remnants of Tropical Storm Mario.



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The cutoff low will help focus the unsettled weather over southeastern Arizona on 24 and 25 September. Persistent cyclonic flow around the cutoff low will maintain poleward moisture transport over the impacted region. The highest rainfall amounts (2–3 inches) are expected near the Mexico–U.S. border, with lighter amounts (1–2 inches) in the Tucson metro area.

