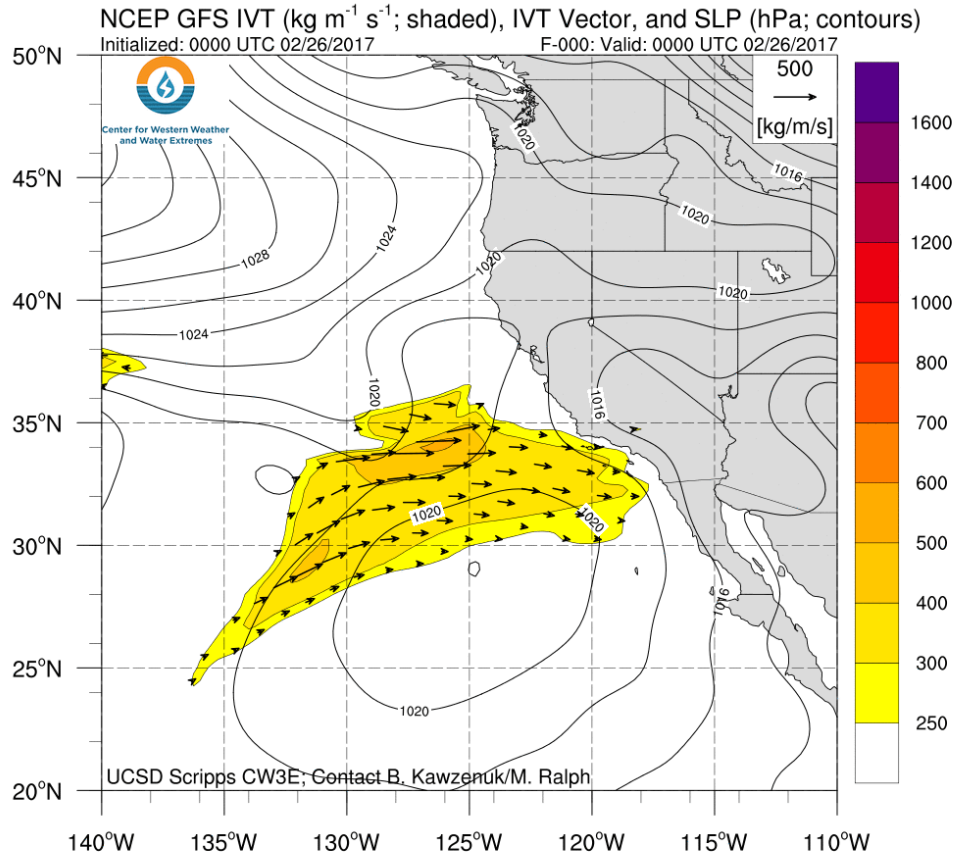
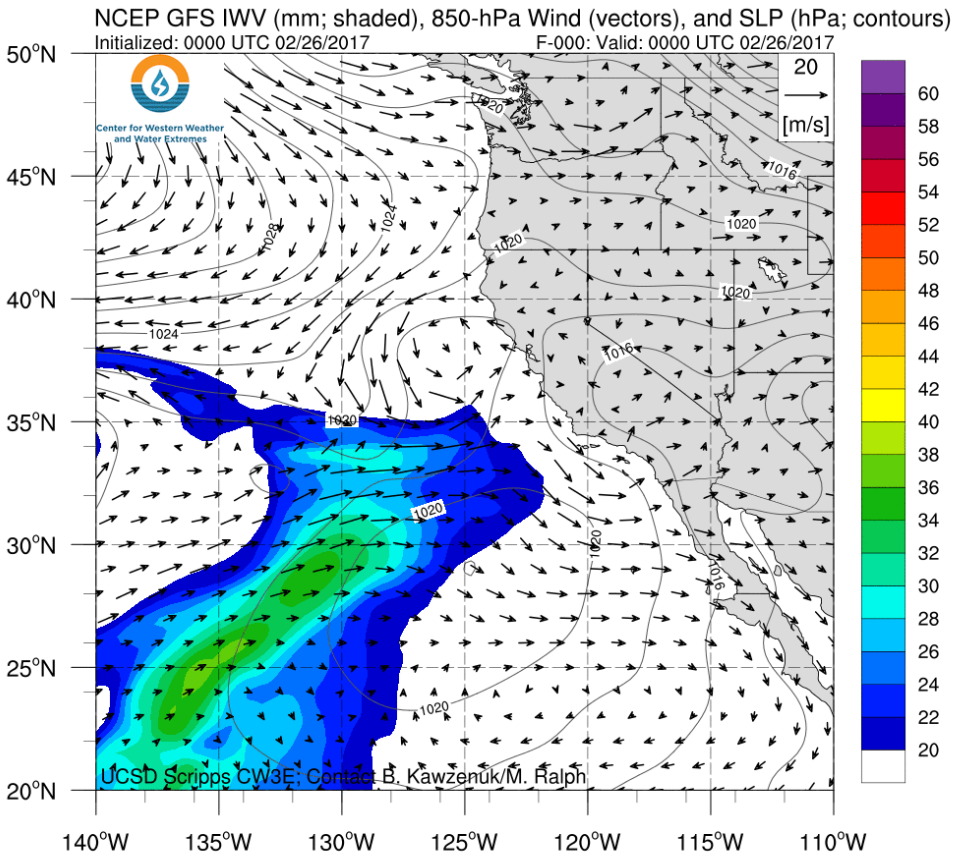
CW3E Update: Post Event Summary and Outlook

Center for Western Weather and Water Extremes
SCRIPPS INSTITUTION OF OCEANOGRAPHY AT UC SAN DIEGO

Summary of the ARs that impacted the West Coast over the Past Week

- Landfalling AR brought weak-to-moderate AR conditions to portions of Southern CA for ~24 hours between 27 and 28 February
- >6 inches of precipitation fell over the high elevations of San Diego County with lower elevations receiving 1.5–4 in.
- The San Diego River rose to ~14.15 feet at 2 am 28 Feb, 2.8 feet above flood stage, and the 3rd highest peak all time
- The heavy precipitation led to several road closures, multiple mudslides, hotel evacuations, and flooded businesses





AR Summary: 28 February 2017

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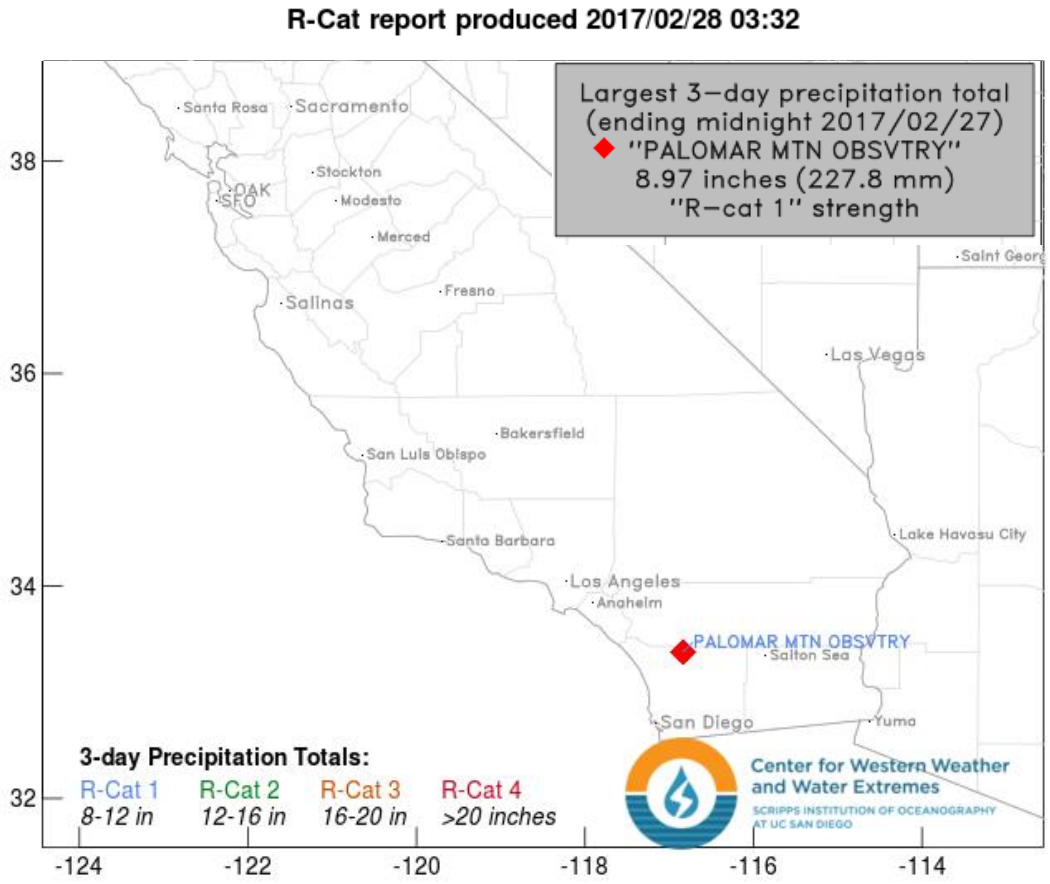

Rainfall Category (R-Cat) was developed to identify and compare extreme precipitation using 3-day precipitation accumulations from rain gauges across the U.S. (Ralph and Dettinger 2012)

R-Cat 1: 200-299 mm (roughly 8-12 inches) / 3 days
R-Cat 2: 300-399 mm (roughly 12-16 inches) / 3 days
R-Cat 3: 400-499 mm (roughly 16-20 inches) / 3 days
R-Cat 4: >500 mm (more than roughly 20 inches) / 3 days

From 12 AM PST 26 to 12 AM PST 28 February, the rain gauge at Palomar Mountain Observatory experienced an extreme precipitation event of R-Cat 1 magnitude, receiving 227.8 mm (~9 inches), which fell mostly during the past 24 hours

To subscribe to this automated CW3E R-Cat Extreme Precipitation Alert via email: just email a message with subject "subscribe" to rcatalert@cirrus.ucsd.edu.

Summary by C. Hecht 1 PM PT Thursday 9 Feb. 2017

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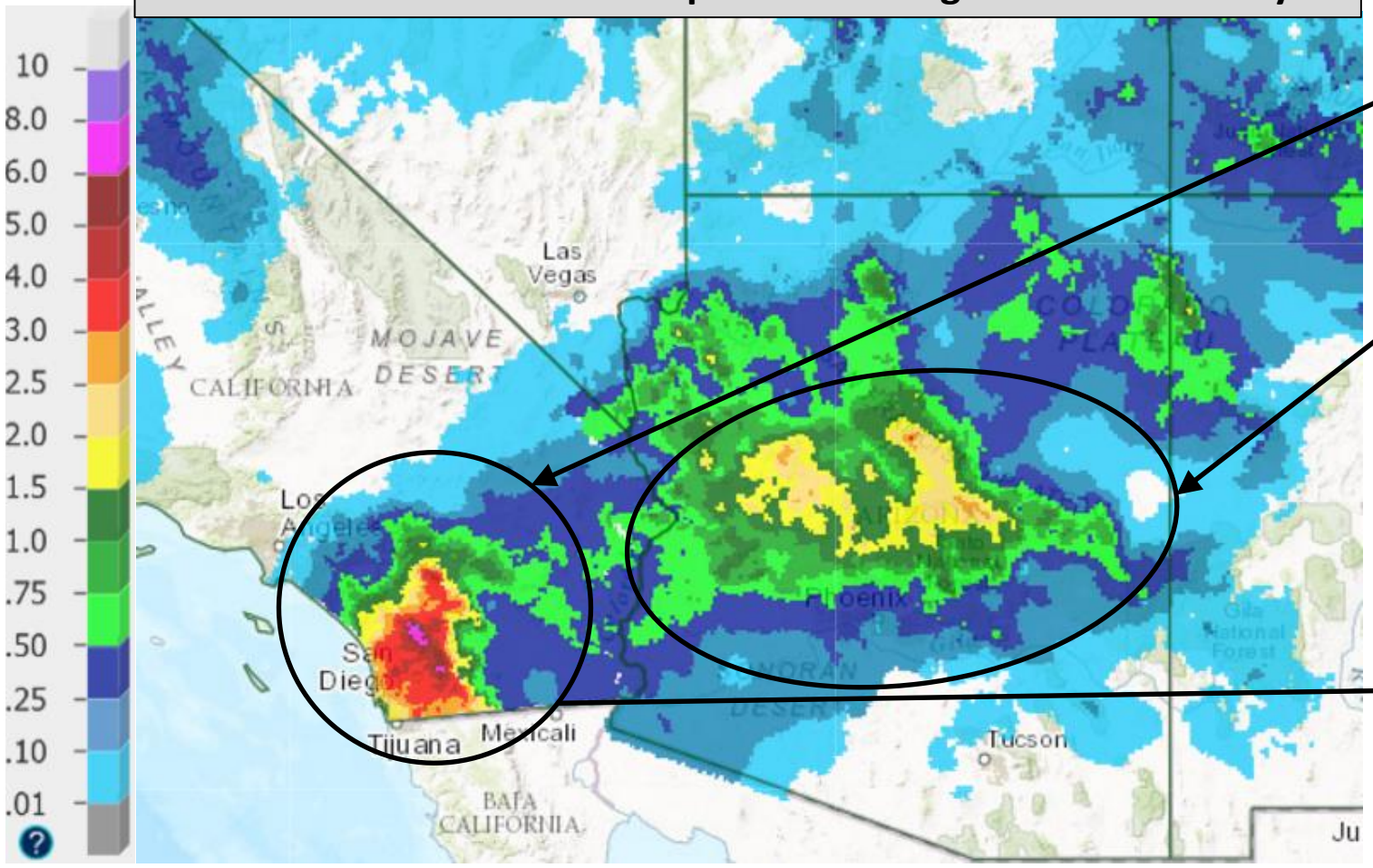
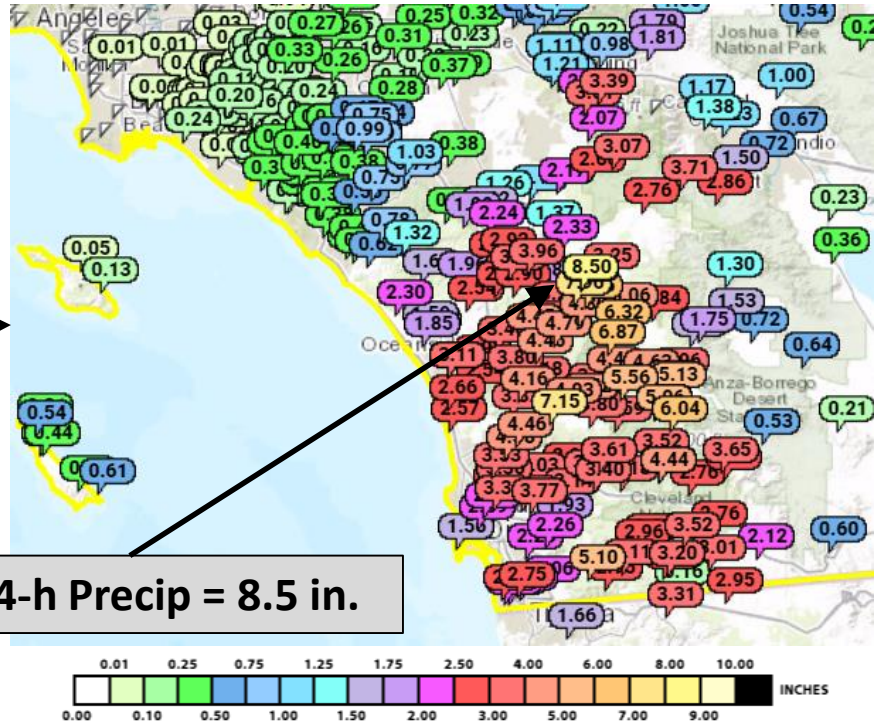
24 hour Accumulated Precipitation Ending 4 AM 28 February



Over the last 24 hours, the high elevations of Southern CA received >6 inches of precipitation, while lower elevations received 1.5–4 inches

Further inland, portions of Arizona received .5–4 inches of 24 hour accumulated precipitation



Maximum Observed 24-h Precip = 8.5 in.

For official NOAA-NWS observed precipitation see water.weather.gov or cnrfc.noaa.gov

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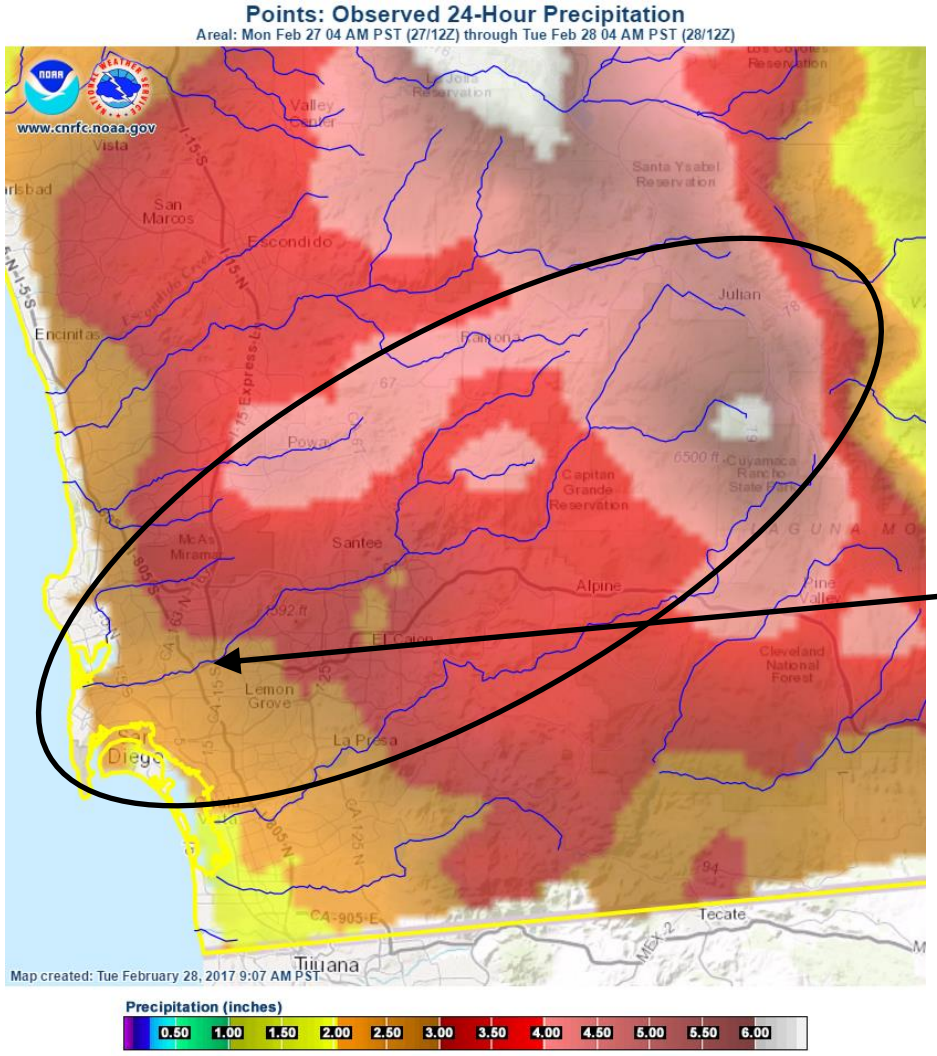
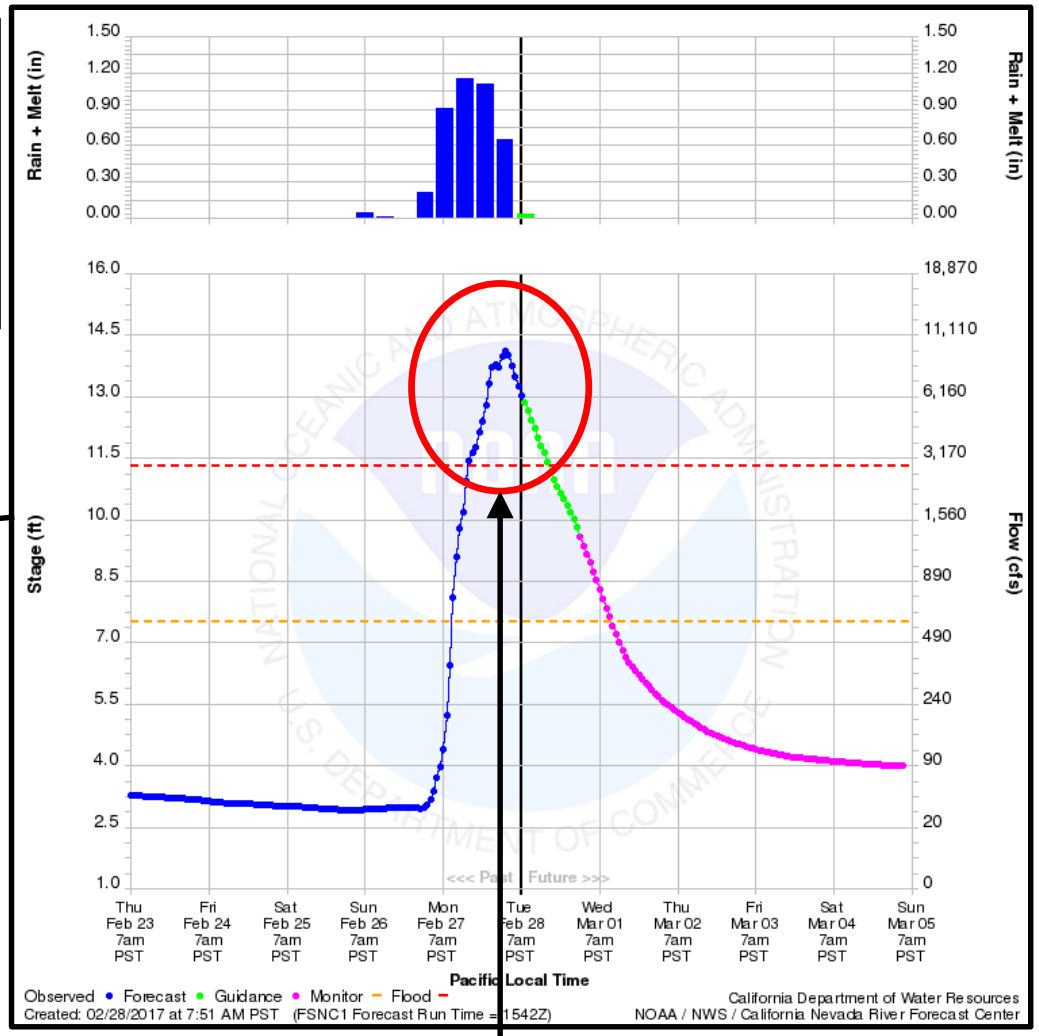


For official NOAA-NWS CNRFC Streamflow Forecasts see cnrfc.noaa.gov/rfc_guidance.php



The San Diego River Watershed received precipitation accumulations ranging from 2.3–6.4 inches over the last 24-hours causing the San Diego River at Fashion Valley to rise to 14.1 feet at 2 AM on 28 Feb (2.8 ft above flood stage)

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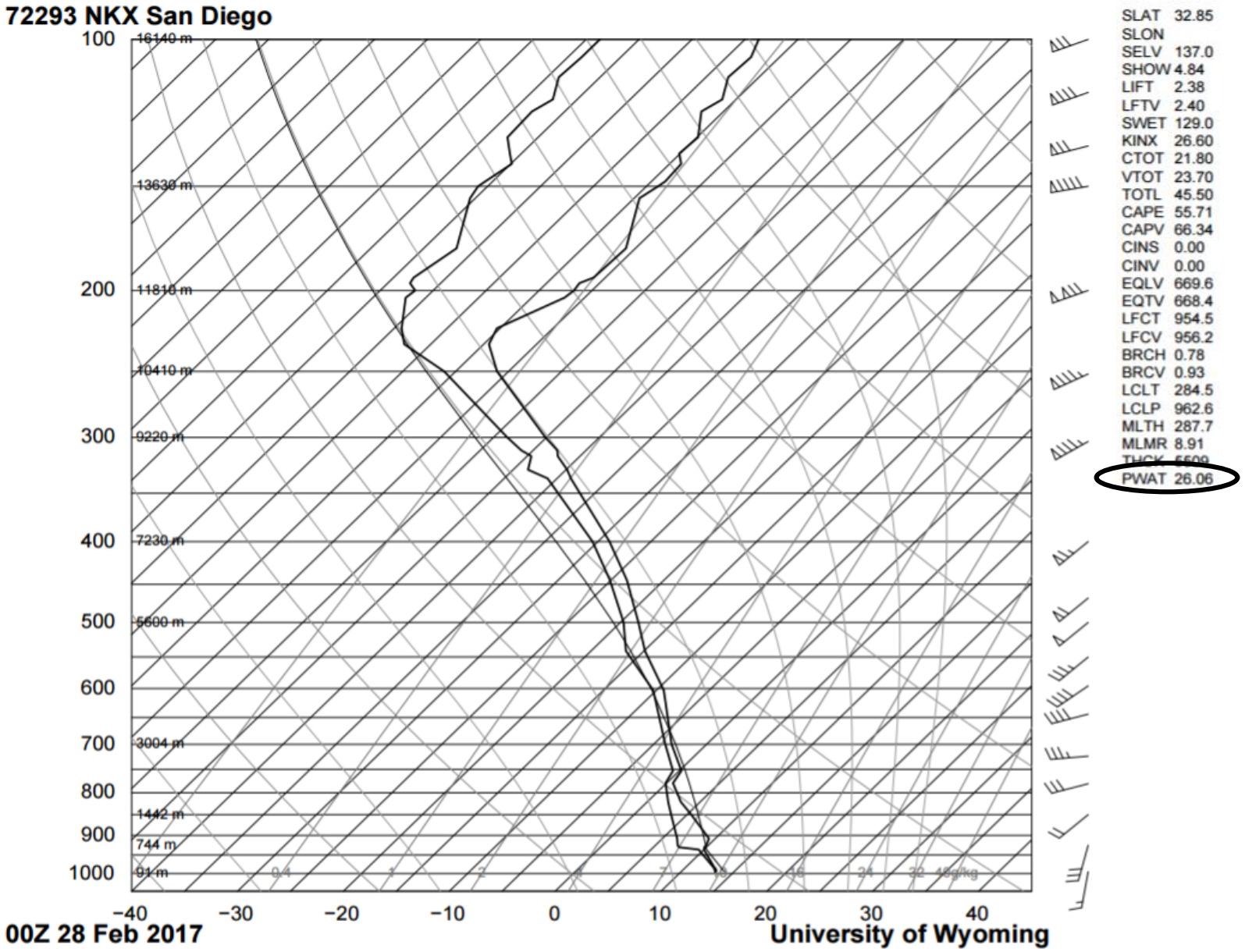

0000 UTC 28 Feb sounding in San Diego shows a well saturated atmosphere throughout the majority of the troposphere

IWV = 26.06 mm

IVT = 361 kg m^{-1} s^{-1}
-Weak AR strength

Veering winds indicate warm air advection below 600 hPa

Low level SSW jet >30 knots

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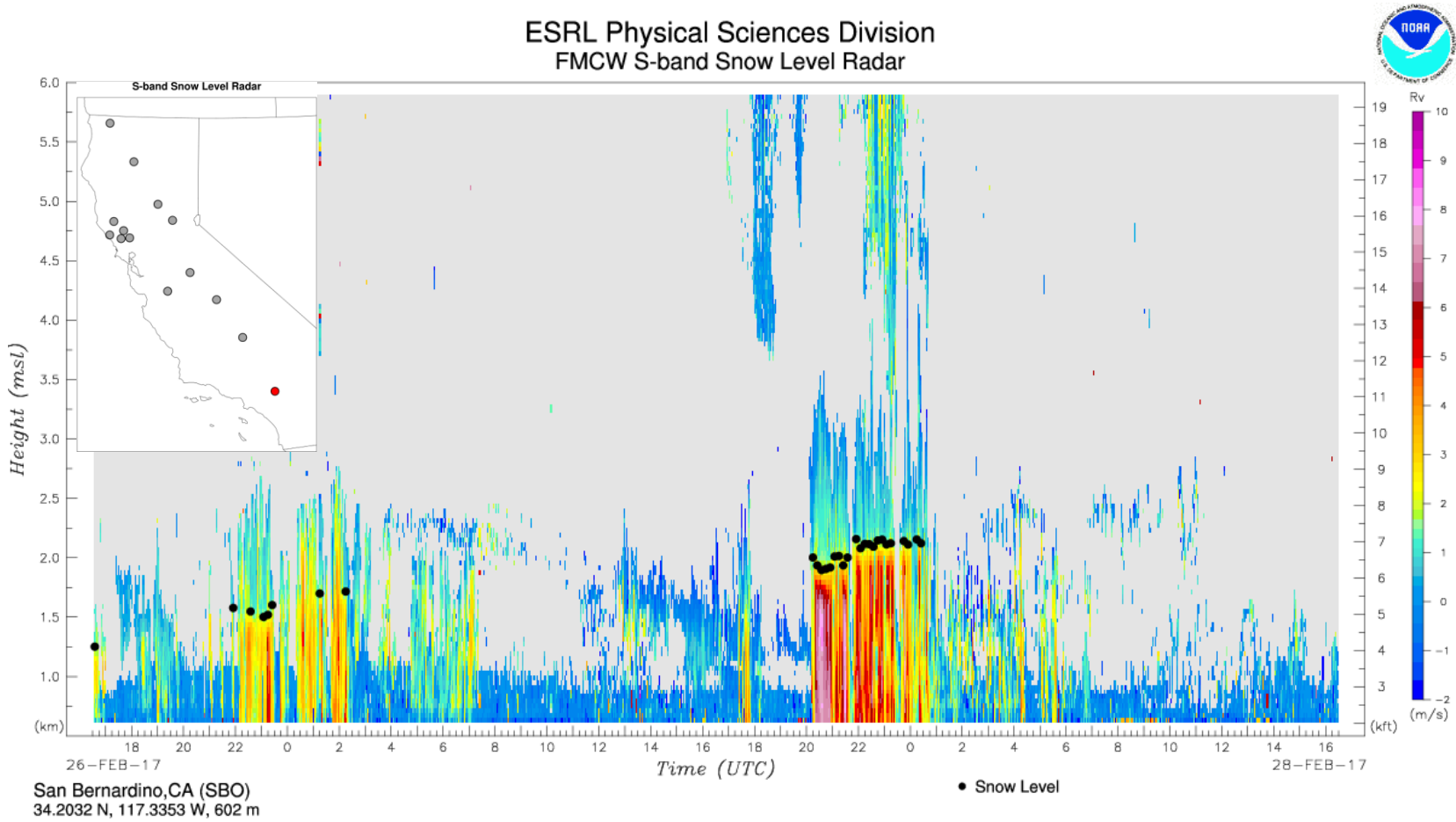
The S-Band Snow Level Radar at San Bernardino, CA indicated that snow levels were ~7,000 feet during the ~24 hours of precipitation

Most of the topography around San Diego is below 7,000 feet, indicating that most of the precipitation that fell over the last 24 hours fell as rain

*San Bernardino experienced ~4 hours of bright band precipitation but the majority of precipitation during this event was south of San Bernadino



Time (UTC)	1700	1800	1900	2000	2100	2200	2300	00 0	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600
Snow Level (m)	1252	none	none	none	none	1578	1534	none	1699	1716	none	none	none	none	none	none	none	none	none	none	none	none	none	none
Snow Level (ft)	4106	none	none	none	none	5175	5031	none	5572	5628	none	none	none	none	none	none	none	none	none	none	none	none	none	none
Sfc Temp (C)	6.19	7.34	8.52	9.12	9.46	9.94	8.90	8.77	8.16	7.68	6.93	6.93	6.61	6.38	6.31	6.07	5.89	5.98	6.07	6.09	6.57	7.05	7.22	7.47

Time (UTC)	1700	1800	1900	2000	2100	2200	2300	00 0	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600
Snow Level (m)	none	none	none	1969	1927	2115	2122	2131	none	none	none	none	none	none	none	none	none	none	none	none	none	none	none	none
Snow Level (ft)	none	none	none	6458	6320	6937	6960	6991	none	none	none	none	none	none	none	none	none	none	none	none	none	none	none	none
Sfc Temp (C)	7.70	7.91	8.92	9.42	8.87	9.56	9.34	9.14	9.00	9.01	8.92	8.81	8.68	8.39	7.96	7.78	7.78	7.43	7.22	7.02	6.93	6.52	5.75	5.97

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The heavy precipitation resulted in flooding, mudslides, and road closures across San Diego County

Courtesy of @SDLifeguards

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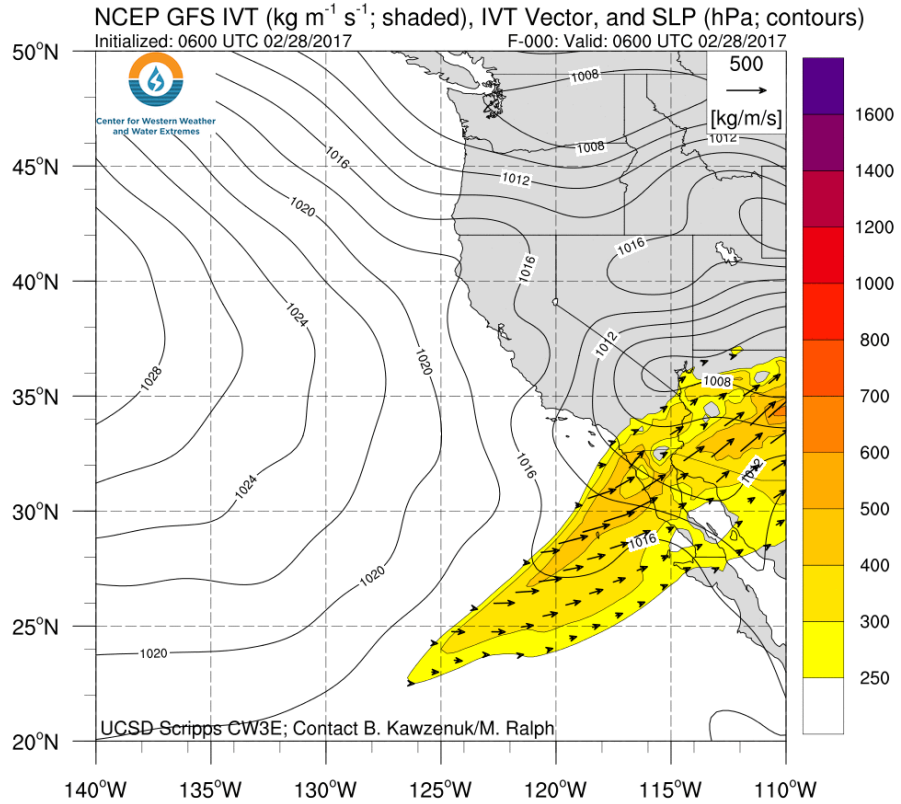
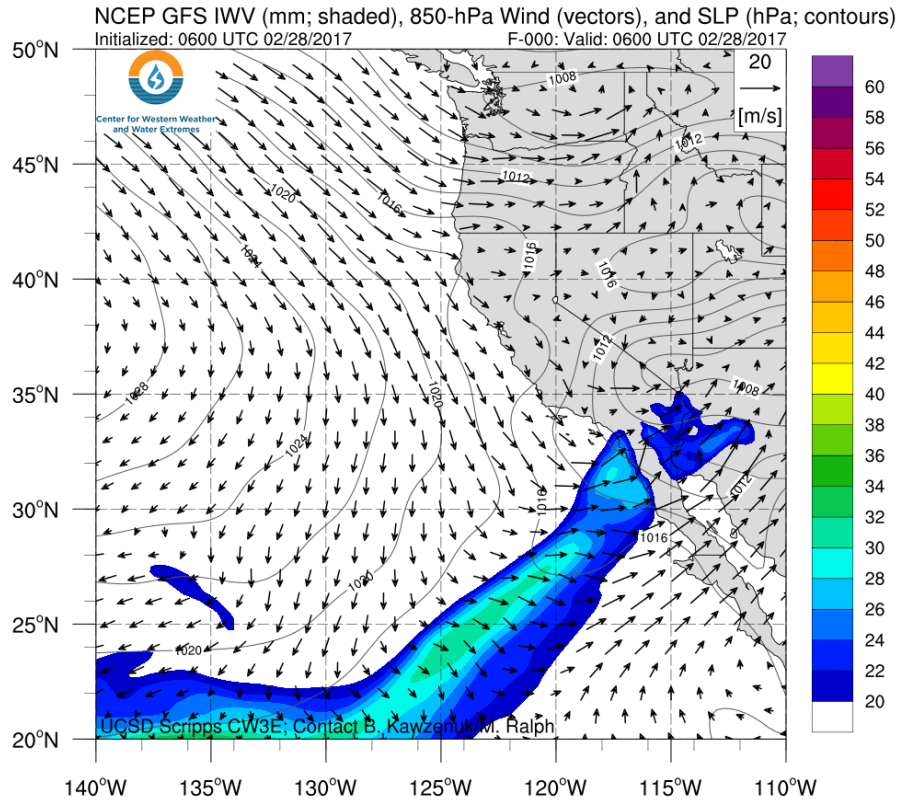
Three ARs expected to make landfall over the U.S. West Coast over the next ten days

- The first AR is expected to make landfall over the Pac NW ~1800 UTC 2 March 2017 with weak strength (IVT=250–500 kg $m^{-1}s^{-1}$). Weak AR conditions may propagate over N CA. prior to dissipation.
- A second AR is expected to make landfall over N CA. at ~0000 UTC 5 March 2017. Coastal areas of N CA may see several hours of moderate strength AR conditions.
- Long range forecasts indicate the potential for a third weak AR during 8-10 March 2017, however there is large uncertainty in the models beyond forecast day 5.
- Large scale pattern beyond forecast day 9 indicates the potential for a return to active AR landfall conditions over the Pac NW
- Highest precipitation and impacts from these events is predicted to be over the Olympic and Cascade Mtns. in WA and Coastal Mtns. In NW CA.





AR Outlook: 28 February 2017

For California DWR's AR Program

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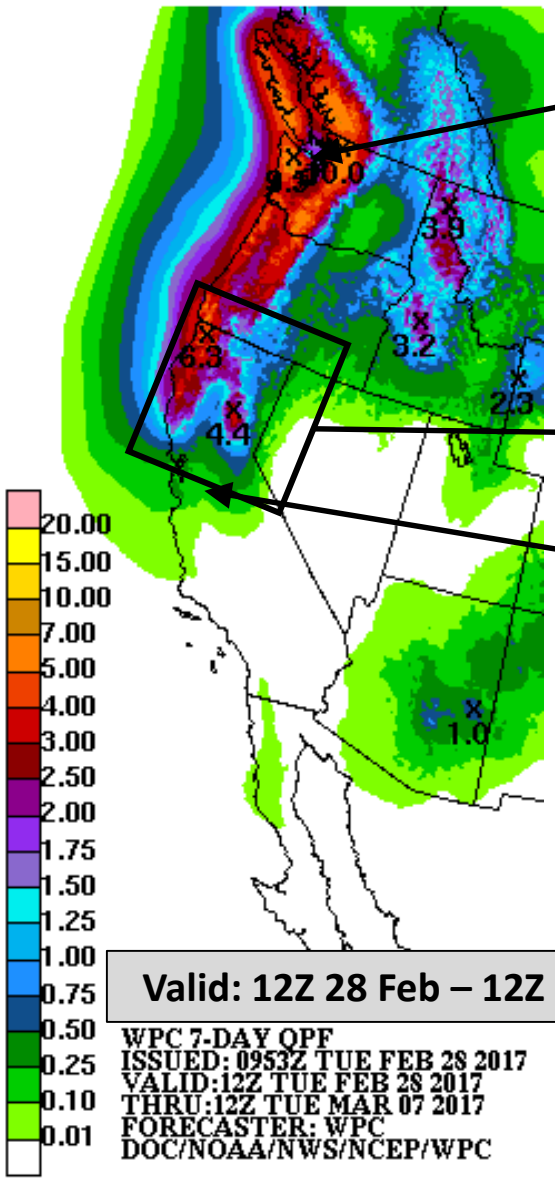
WPC Days 1-7 QPF



Valid: 12Z 28 Feb – 12Z 7 Mar

Maximum precipitation up to 10 in. predicted over WA Cascade and Olympic Mountains

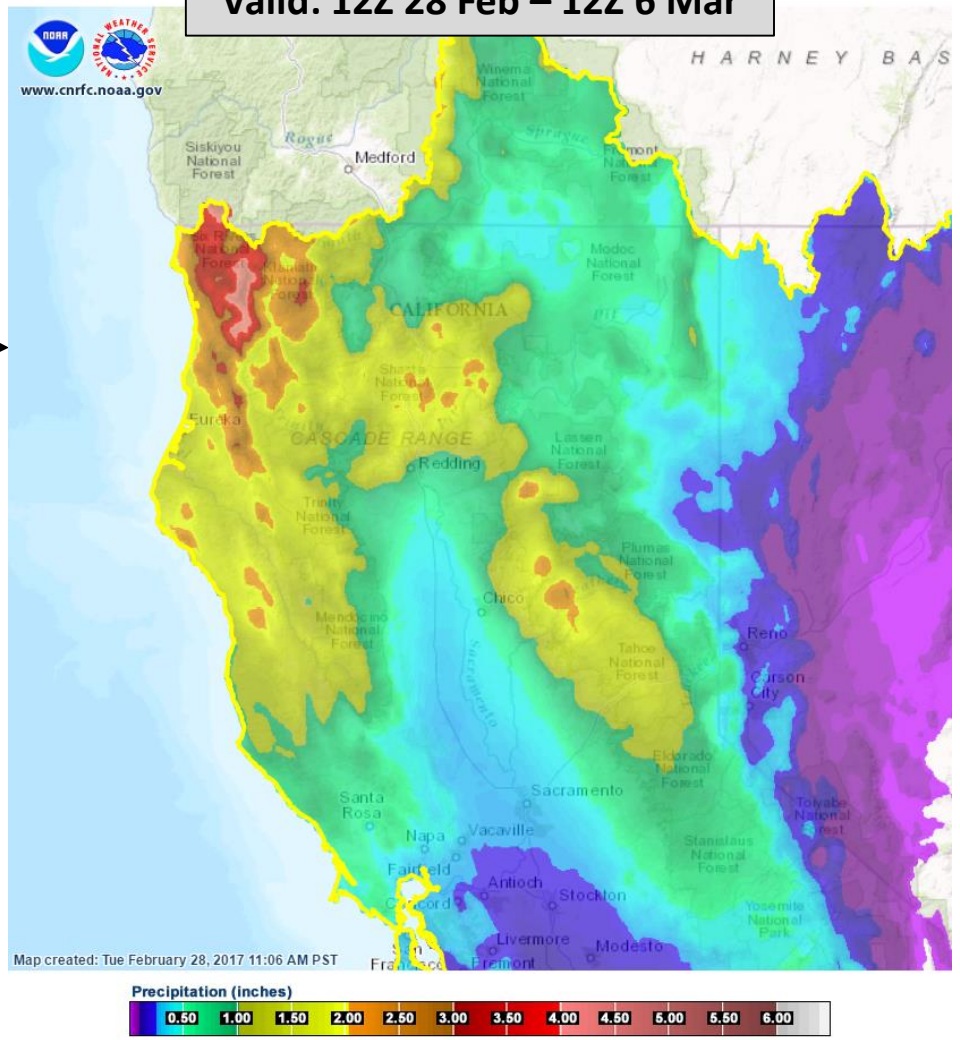
NW CA expected to receive over 6 inches of precipitation over the next 7 days

Tuolumne River: <0.25 in.

For Official NOAA-NWS and CNRFC Precipitation Forecasts see
wpc.ncep.noaa.gov/qpf/qpf2.shtml
Or
cnrfc.noaa.gov/rfc_guidance.php

CNRFC Days 1-6 QPF

Valid: 12Z 28 Feb – 12Z 6 Mar



Summary by C. Hecht & B. Kawzenuk 1 PM PT Tuesday 28 Feb. 2017

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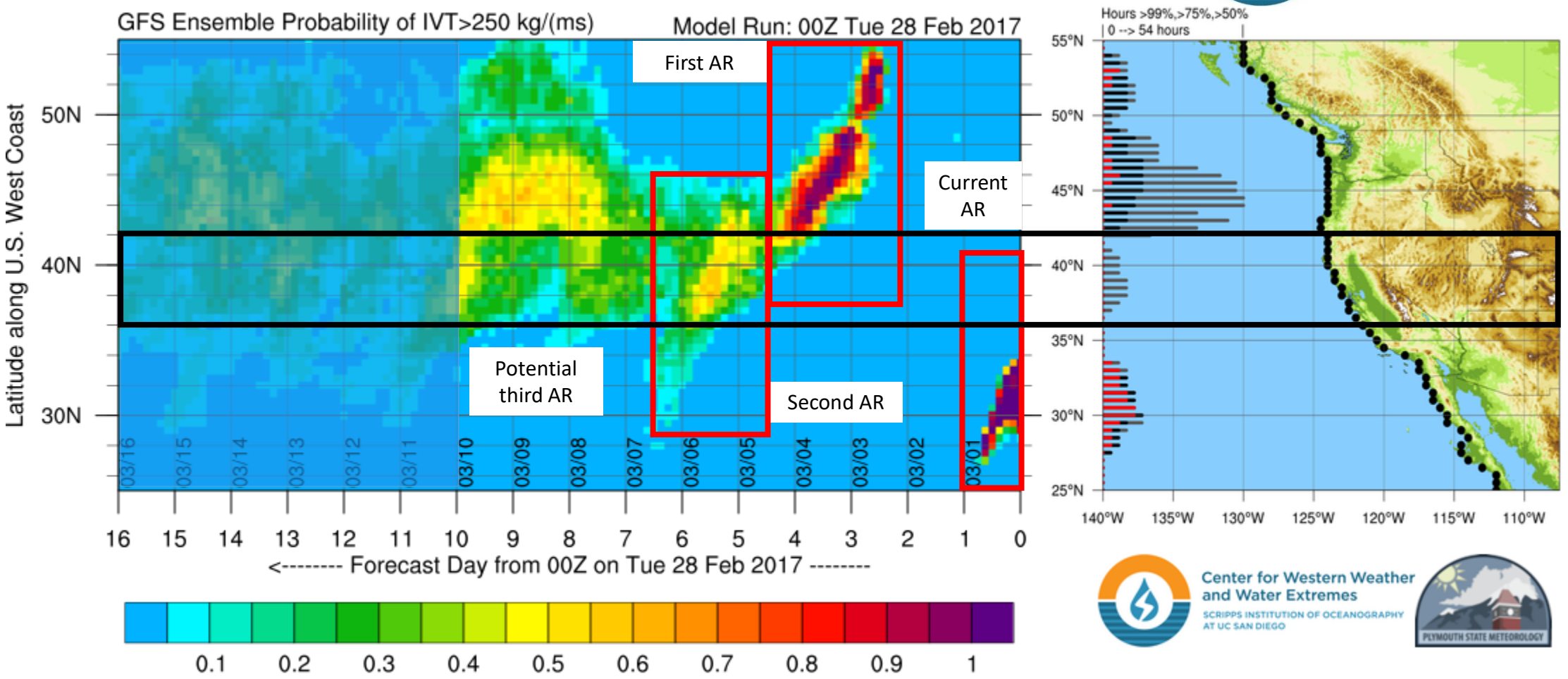

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PLYMOUTH STATE METEOROLOGY

- **Probability of reaching AR conditions (IVT >250 kg m^{-1} s^{-1}) of 90–100% over Pac NW in association with first AR, slight chance AR conditions are met over N. CA. prior to dissipation**
- **Moderate confidence (~60%) that second AR could make landfall over N. CA. on 5 March 2017**
- **Moderate confidence (~60%) that third AR could make landfall over N. CA. on 8 March 2017**

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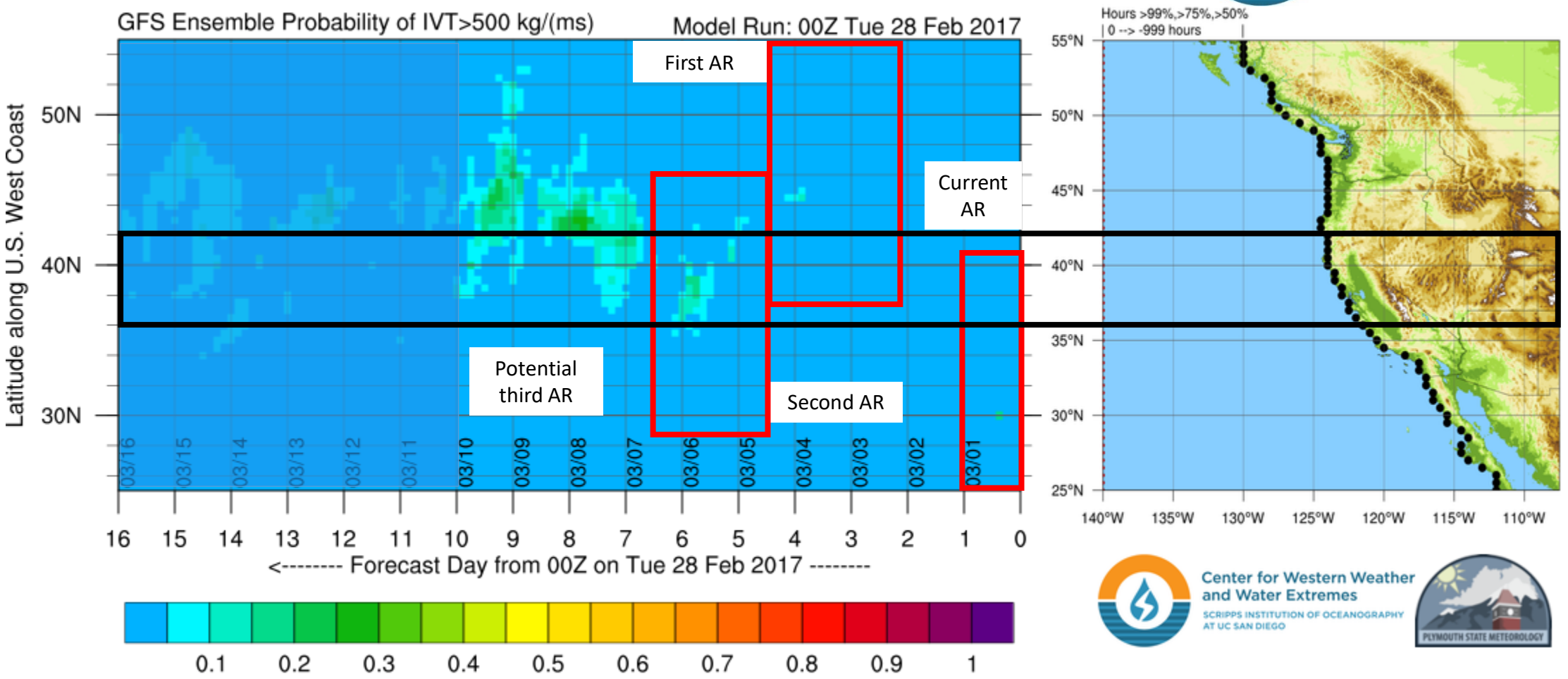

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PLYMOUTH STATE METEOROLOGY

- **All three ARs are unlikely to produce moderate AR conditions (IVT >500 kg m^{-1} s^{-1}) over N. CA.**
- **Third AR predicted to be the strongest (~25% confidence in moderate strength)**

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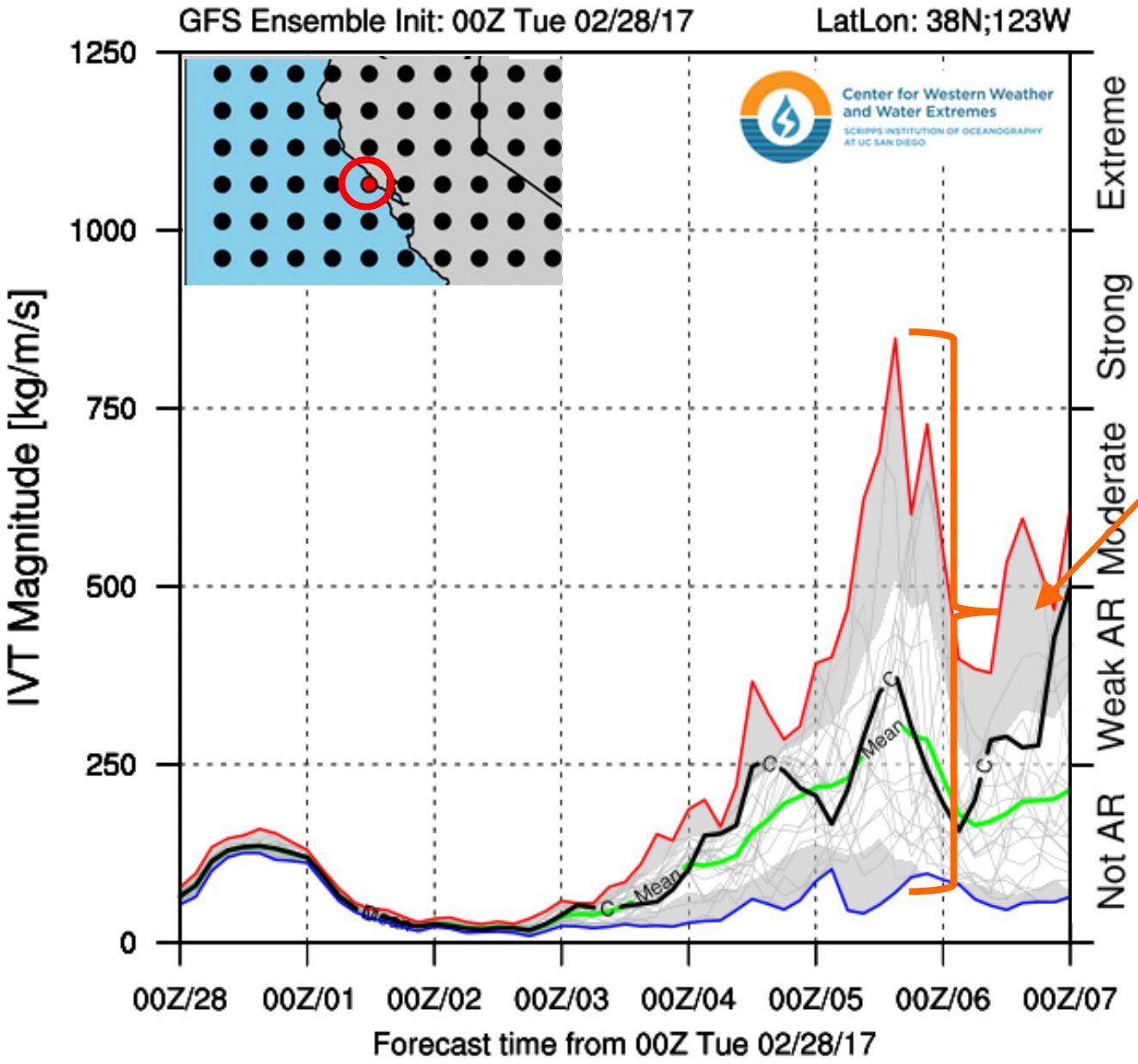

First AR (2-3 Mar) is not expected to produce AR conditions over Russian River watershed

Second AR (5 Mar) expected to produce weak AR conditions, however there is large uncertainty

- Maximum possible IVT ~ 850 kg m^{-1} s^{-1}
- Mean IVT ~ 300 kg m^{-1} s^{-1}
- Uncertainty shows potential for weak to strong AR

Third AR expected to make landfall on 6 Mar 2017. Large uncertainty in strength and timing of AR. Several ensemble members indicate no break in AR conditions between events.

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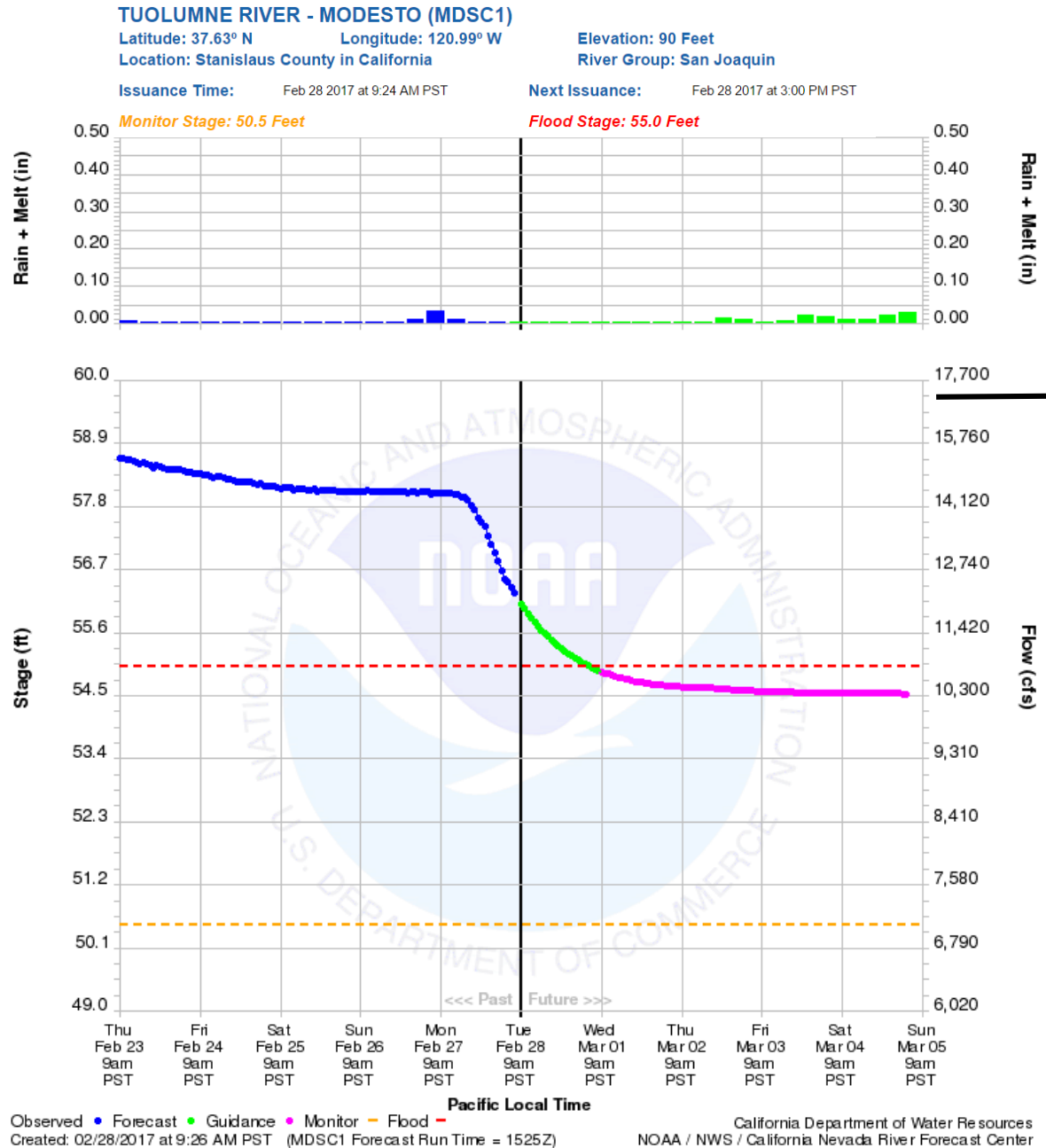

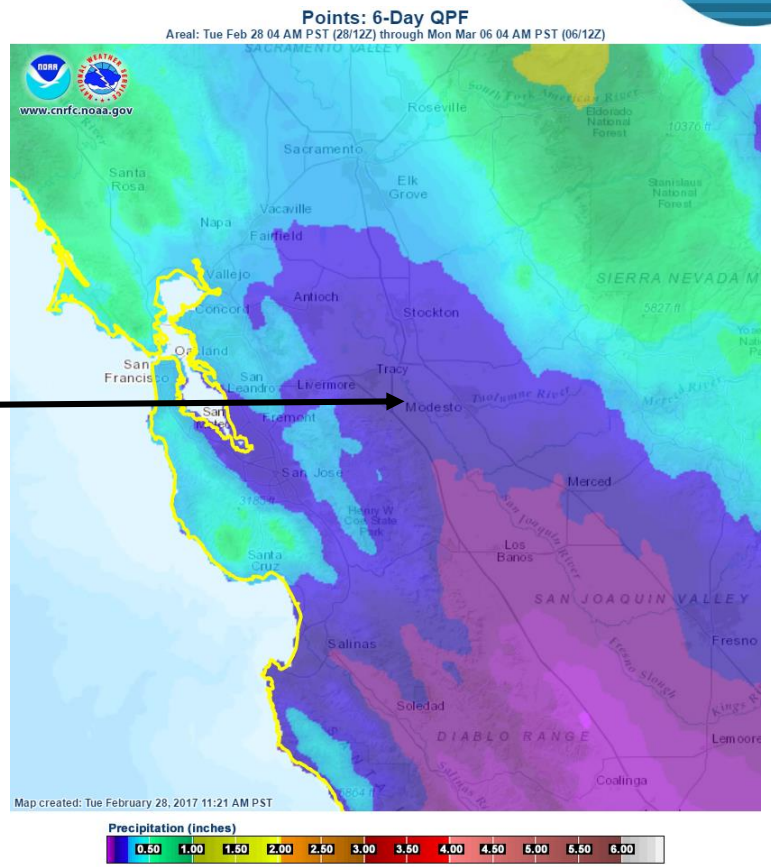

For Official CNRFC River Forecasts see http://www.cnrfc.noaa.gov/

The Tuolumne River is predicted to drop below flood stage in the next 24 hours, and does not show a large increase in stage over the next five days as precipitation is expected to be ~0.1 in. during that period

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