

CW3E Atmospheric River Summary



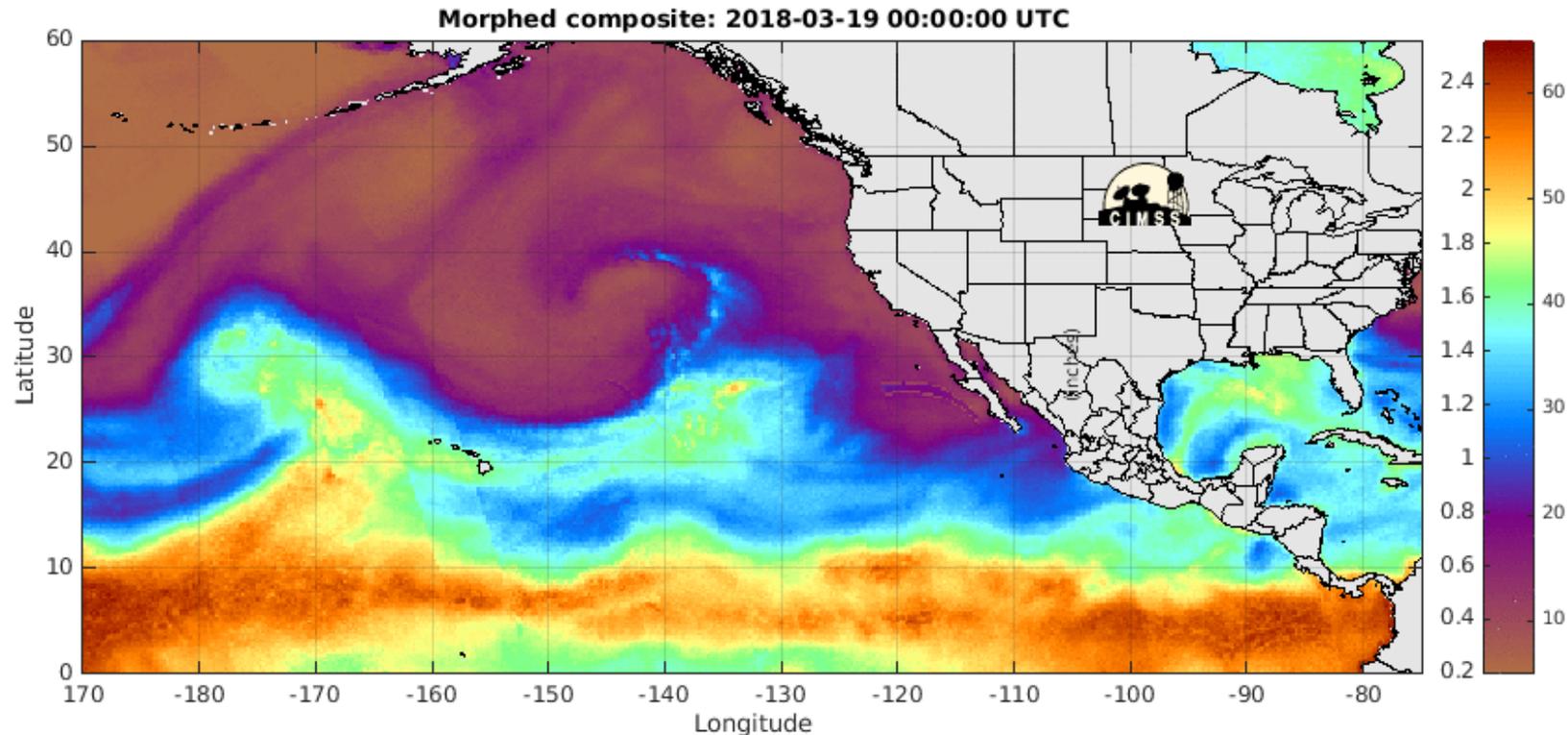
Center for Western Weather
and Water Extremes
SCRIPPS INSTITUTION OF OCEANOGRAPHY
AT UC SAN DIEGO

A strong AR made landfall over southern California this week

- The atmospheric river made initial landfall over Big Sur around 1800 UTC Wednesday, 20 March 2018
- AR conditions were present over southern California about ~1200 UTC Friday, 23 March 2018
- This was an R-Cat 1 event as over 200 mm of precipitation was observed just south of Big Sur and over the northern Sierra Nevada over 72 hours
- This event produced nearly 7 percent of normal annual precipitation over all of California and the Northern Sierra 8 Station Index

SSMI/SSMIS/AMSR2-derived Integrated Water Vapor (IWV)

Valid 00 UTC 19 March – 12 UTC 23 March 2018



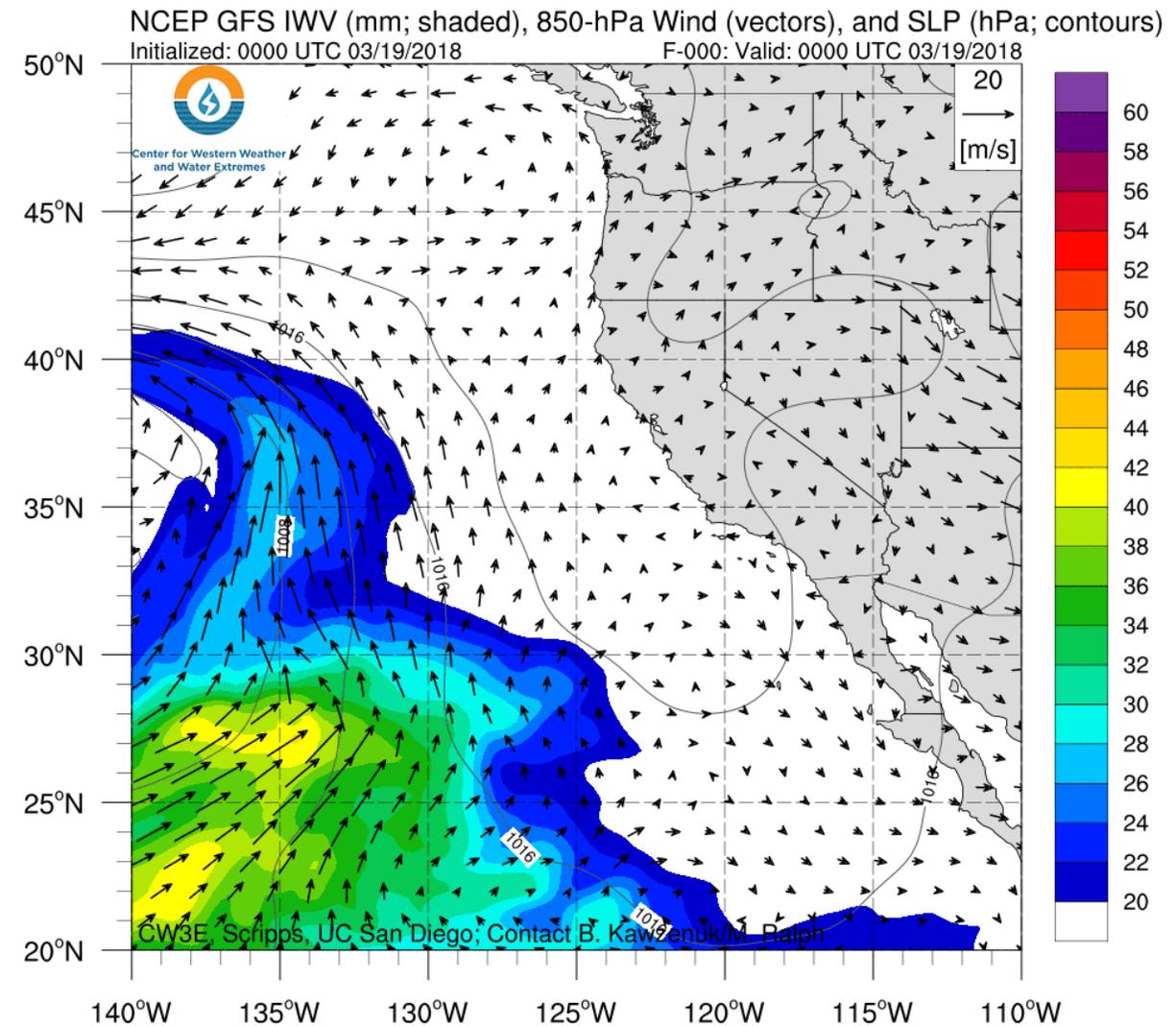
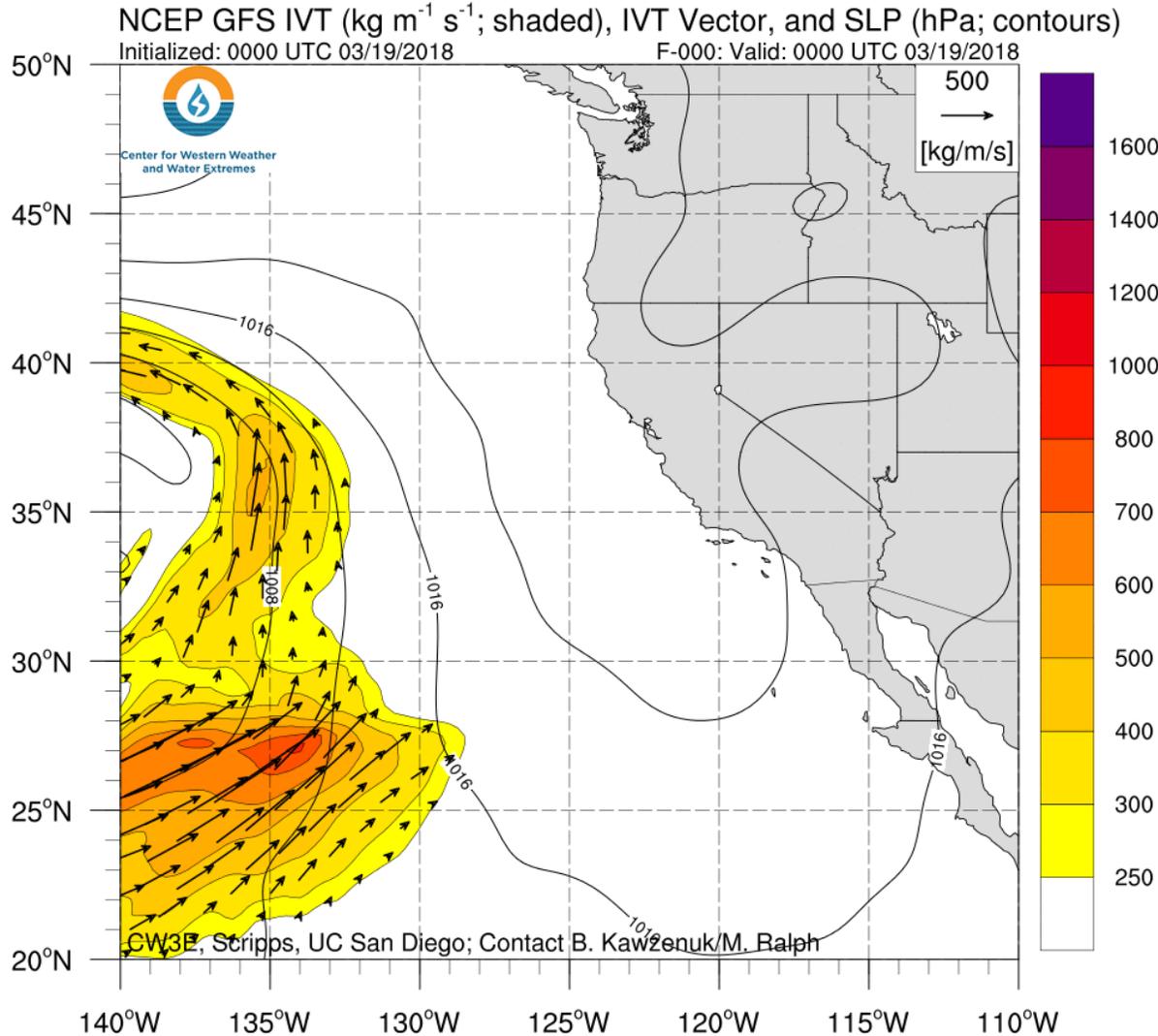
AR Summary: 23 March 2018



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GFS 0-hr Analysis: Valid 0000 UTC 19 March – 0600 UTC 23 March 2018



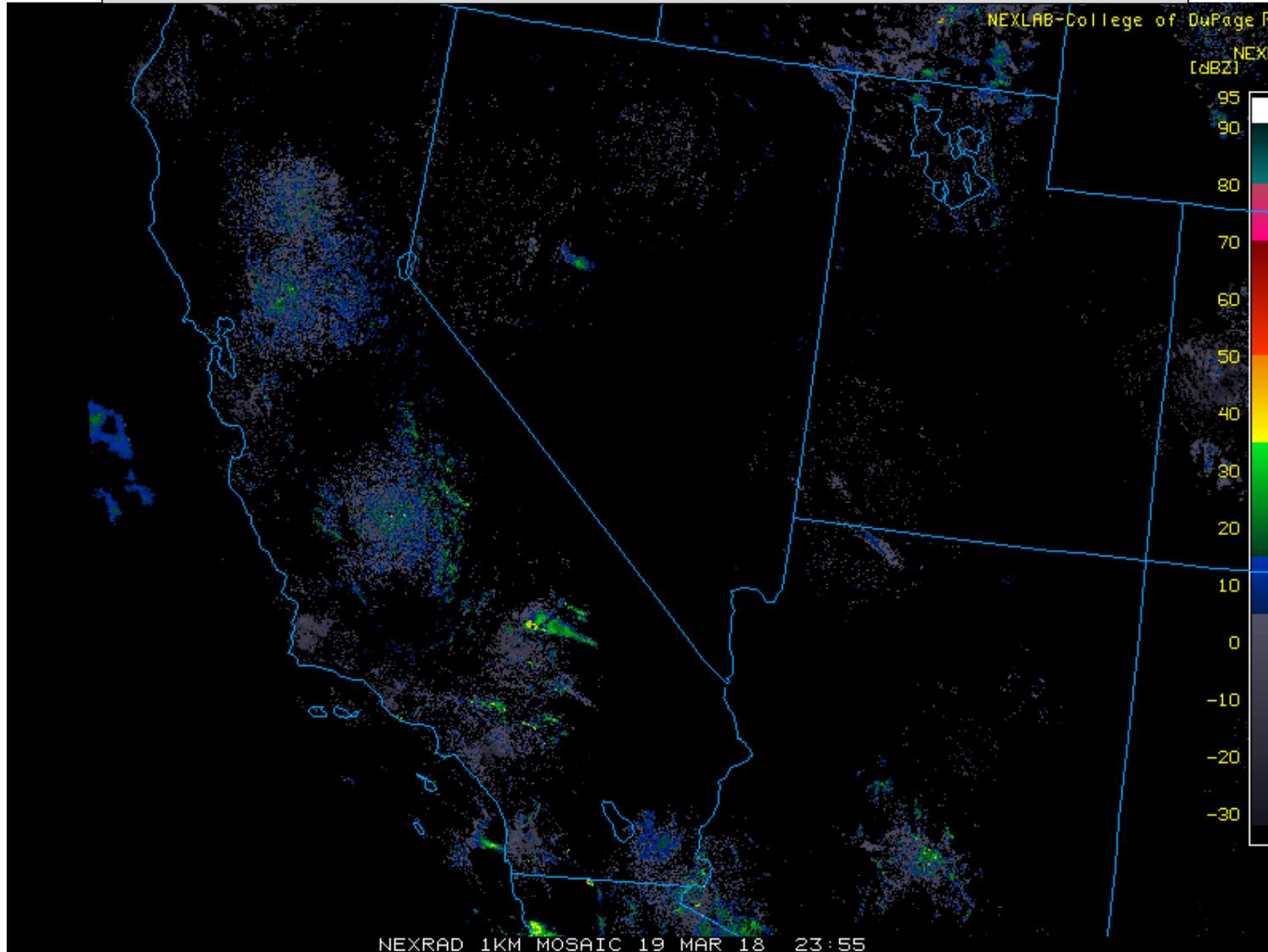
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NEXRAD Radar Reflectivity

Valid 00 UTC 20 March – 12 UTC 23 March 2018



**Precipitation began over central CA
early morning on 20 March 2018**

**Moderate to heavy precipitation
occurred over central and Southern
CA for nearly 72 hours during 20–23
March**

**The highest precipitation amounts
occurred over the Coastal Mts.
between Santa Barbara and Big Sur
and over the southern Sierra Nevada**

**Several thunderstorms also occurred
during this event on 22 and 23 March
as evident by the highest reflectivity
values observed by radar**

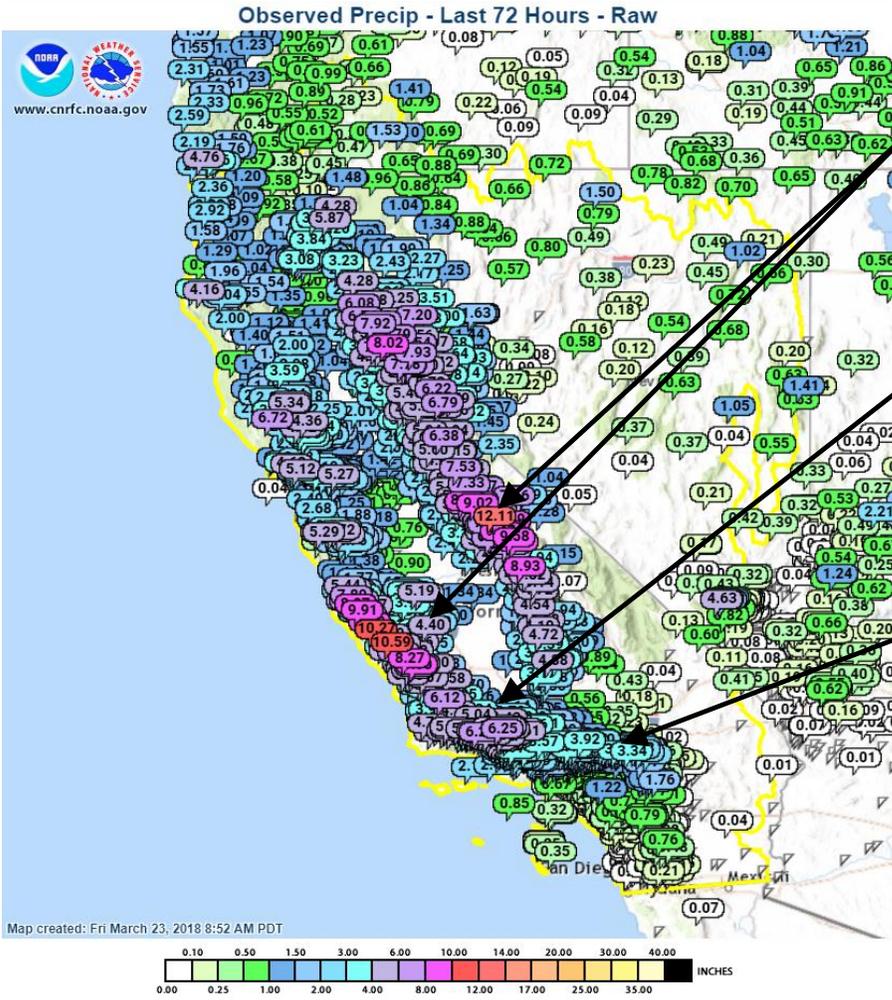
AR Summary: 23 March 2018



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72-hr QPE ending 8 AM PDT 23 March
Raw Data not QC'd

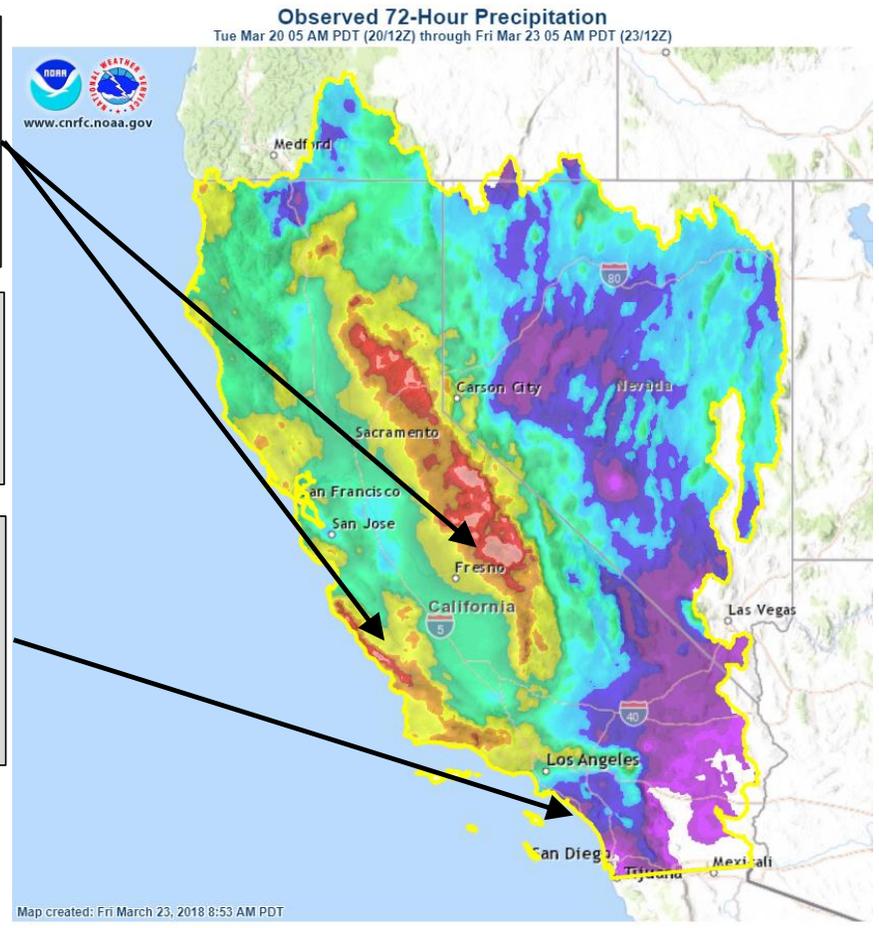
72-hr QPE ending 5 AM PDT 23 March



10+ inches of precipitation fell over the higher elevations of Big Sur and the Southern Sierra during a 72-hr period of the event

5–6.25 inches of precipitation fell over Santa Barbara and Ventura County during that same period

The Los Angeles Basin and the High Elevations of Orange and San Diego County received .75 to 3.9 inches



For official CNRFC Products: cnrfc.noaa.gov

AR Summary: 23 March 2018

The entire state of California received 6.99% of normal water year precipitation over the past three days

Current:	56.8%	1-day Δ :	0.10%	2-day Δ :	4.27%	3-day Δ :	6.99%

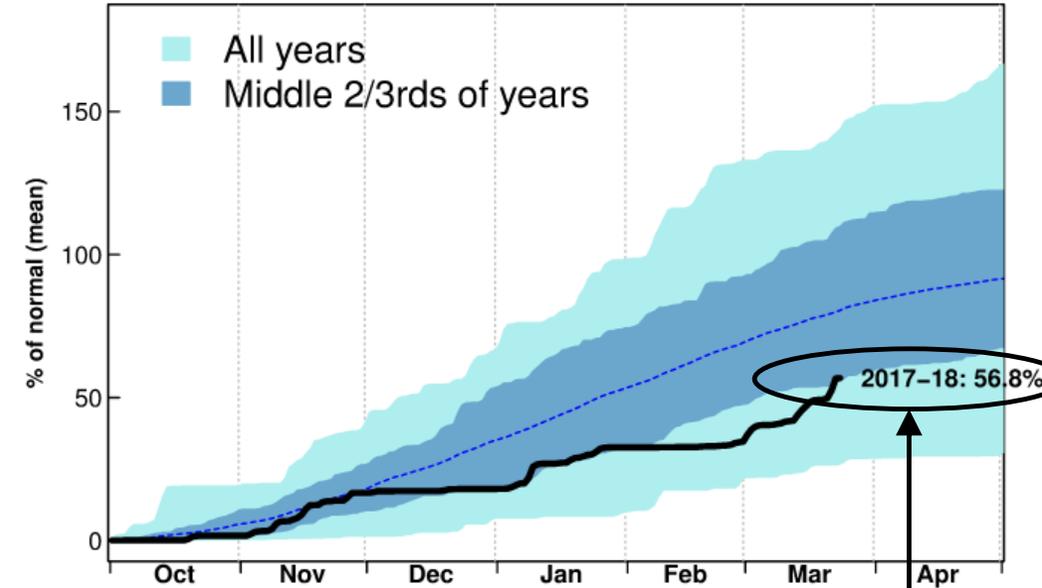
	(1977/03/23)						
Rec_low:	26.6%	50-ptile:	0.16%	50-ptile:	0.31%	50-ptile:	0.53%
Typ_low:	55.9%	90-ptile:	1.48%	90-ptile:	2.60%	90-ptile:	3.62%
Mean:	80.5%	95-ptile:	2.15%	95-ptile:	3.75%	95-ptile:	5.06%
Typ_high:	110.0%	99-ptile:	3.64%	99-ptile:	6.26%	99-ptile:	8.42%
Rec_high:	144.0%	Record:	6.80%	Record:	11.95%	Record:	16.70%
	(1983/03/23)		(1986/02/17)		(1986/02/18)		(1995/03/11)

A 3-day change of 6.99% is in the top 5% (95th percentile) of all 3-day changes on record

This brings the WY precipitation to date to 56.8% of the normal total water year precipitation for the state (October to September)

Products from cirrus.ucsd.edu/~pierce/sdprecip/

all_CA precip for all years, data through 2018/03/23



56.8% of total water year precipitation is within 2/3^{rds} of Water Year Precipitation to date for all years on record

AR Summary: 23 March 2018

The Northern Sierra 8-Station index (an import index for water supply) received 6.89% of normal water year precipitation over the past three days

Current:	61.4%	1-day Δ :	0.00%	2-day Δ :	4.39%	3-day Δ :	6.89%

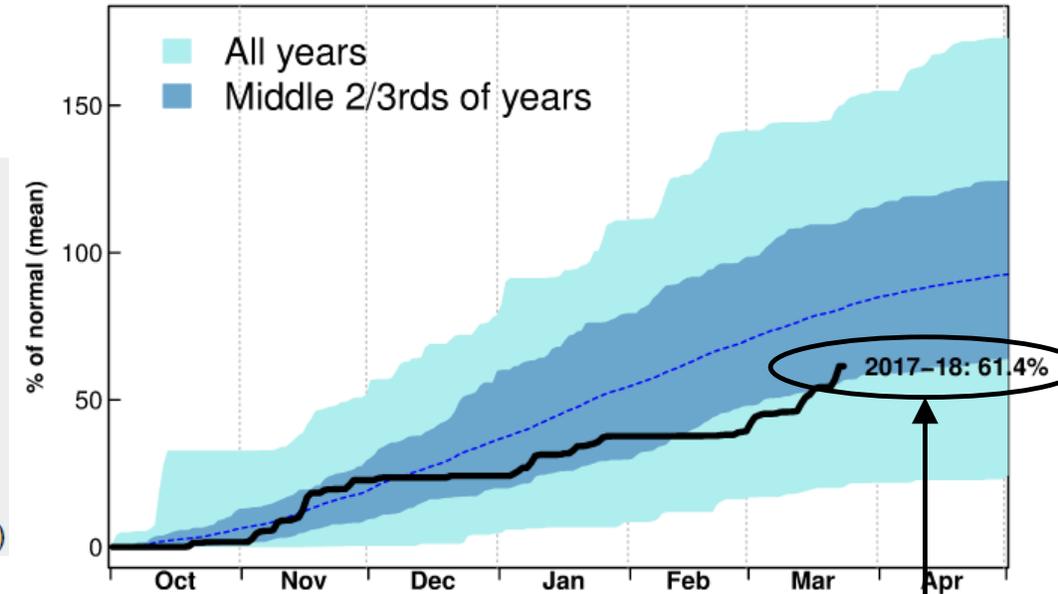
	(1977/03/23)						
Rec_low:	20.4%	50-ptile:	0.25%	50-ptile:	0.46%	50-ptile:	0.70%
Typ_low:	56.7%	90-ptile:	1.87%	90-ptile:	3.10%	90-ptile:	4.16%
Mean:	81.1%	95-ptile:	2.72%	95-ptile:	4.63%	95-ptile:	5.96%
Typ_high:	110.5%	99-ptile:	4.77%	99-ptile:	7.68%	99-ptile:	10.27%
Rec_high:	150.2%	Record:	9.08%	Record:	16.16%	Record:	21.59%
	(2017/03/23)		(1986/02/17)		(1986/02/18)		(1986/02/19)

A 3-day change of 6.89% is also in the top 5% (95th percentile) of all 3-day changes on record

This brings the water year precipitation to date to 61.4% of the average total water year precipitation for the state (October to September)

Products from cirrus.ucsd.edu/~pierce/sdprecip/

8_sta_index precip for all years, data through 2018/03/23



61.4% of total water year precipitation is within 2/3^{rds} of Water Year Precipitation to date for all years on record

AR Summary: 23 March 2018

R-Cat report produced 2018/03/23 03:32



The largest 3-day precipitation accumulation of 10.24 inches (260.1 mm) was measured at Three Peaks over Big Sur, making this event R-Cat 1 Strength

Five other stations, three over Big Sur, one in San Luis Obispo and one over the Northern Sierra, also experienced R-Cat 1 precipitation

The "Rainfall Category" or "R-Cat" 3-day precipitation classification of *Ralph and Dettinger (2012)* is a simple, effective measure of strong precipitation events, which can have a large impact on the Western U.S.

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: more than 500 mm (more than roughly 20 inches)/ 3 days

You can subscribe to receive near real-time updates of R-Cat events by sending a message with the subject line "subscribe" to rcatalert@cirrus.ucsd.edu

More information at cw3e.ucsd.edu/cw3e-r-cat-alerts/

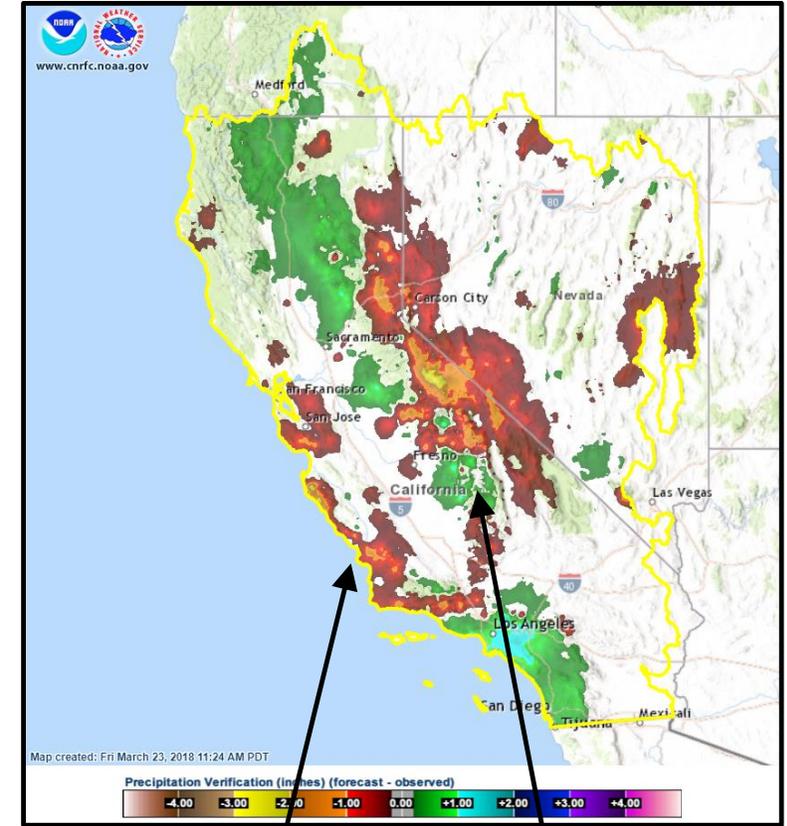
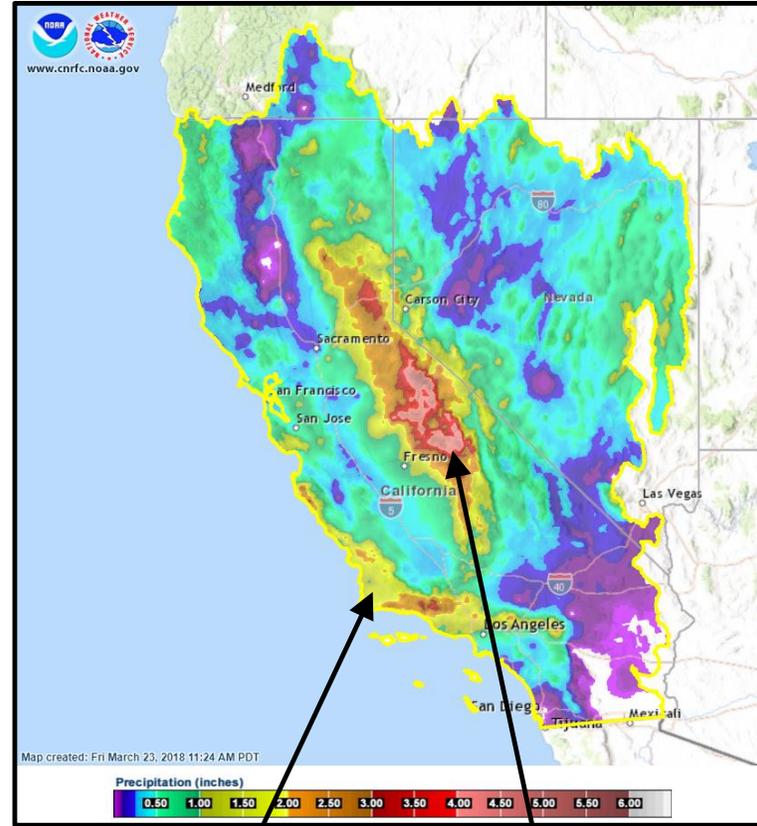
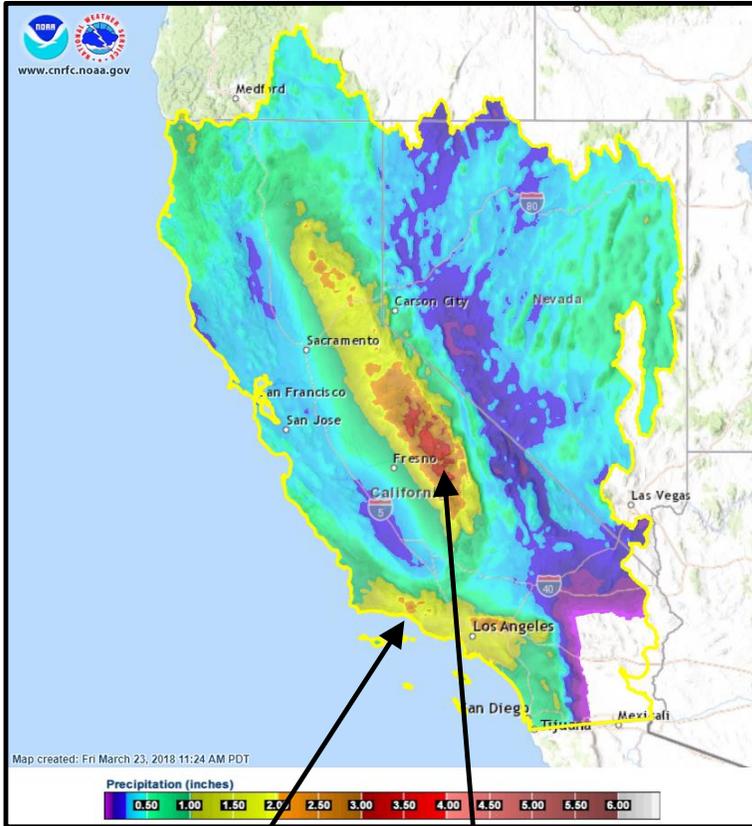
AR Summary: 23 March 2018



CNRF 24-hr QPF issued 20 March valid 5 AM PDT
22 to 5 AM 23 March 2018

CNRF 24-hr QPE valid 5 AM PDT 22 to 5 AM 23
March 2018

CNRF 24-hr Verification (QPF-QPE)
Valid 5 AM PDT 22 to 23 March 2018



The 24-hr accumulated precipitation forecast for the period ending at 5 am PDT 23 March predicted up to ~2.3 inches over the Santa Ynez Mts. and ~3.5 inches over the Sierra Nevada

The 24-hr quantitative precipitation estimate (QPE) indicated that >2.5 inches fell along the Coastal and Santa Ynez Mts. and up to 5 inches fell over the Sierra Nevada

The QPE accumulations resulted in an under forecast of up to 2.5 inches over the Coastal Mts. between Santa Barbara and Big Sur. The highest accumulations in the southern Sierra were under forecasted by up to 2.5 inches while the most of the rest of the Sierra Nevada was over forecasted

For 22 March QPF verification refer to 22 March CW3E AR Update

AR Summary: 23 March 2018



GFS 0-hr Analysis (Top: IVT, bottom: IWW)

12 UTC 21 Mar

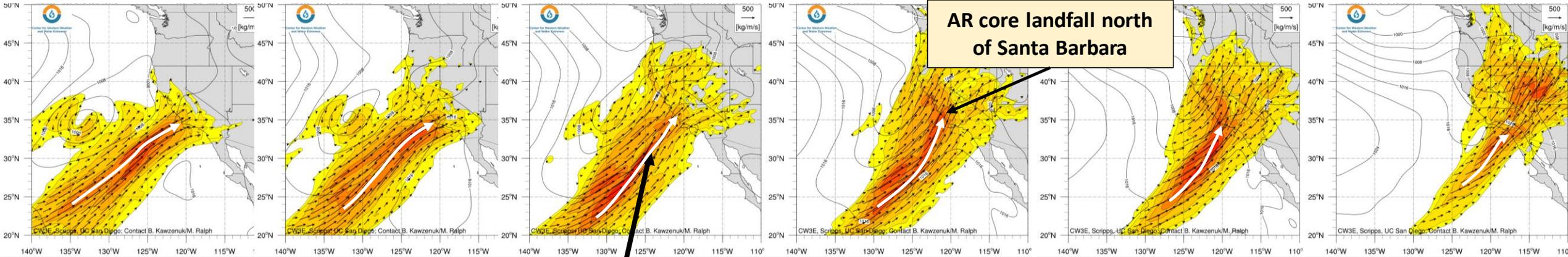
18 UTC 21 Mar

00 UTC 22 Mar

06 UTC 22 Mar

12 UTC 22 Mar

18 UTC 22 Mar



Around 00 UTC 22 March a wave occurred in the AR which changed the orientation to be more southerly and propagated the IWW and IVT further north than expected.

This wave was not well forecasted and resulted in the AR core making landfall about 200-250 km further north than expected. This most likely lead to the precipitation forecast errors over Santa Barbara and Big Sur shown in yesterday's update.

