

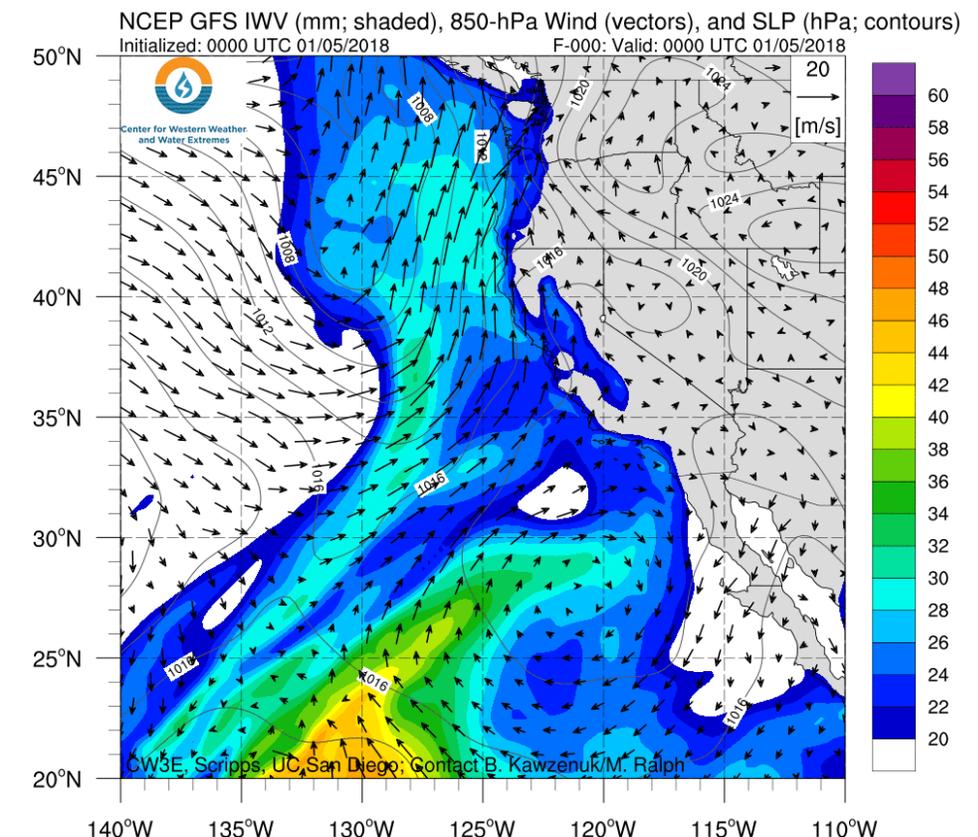
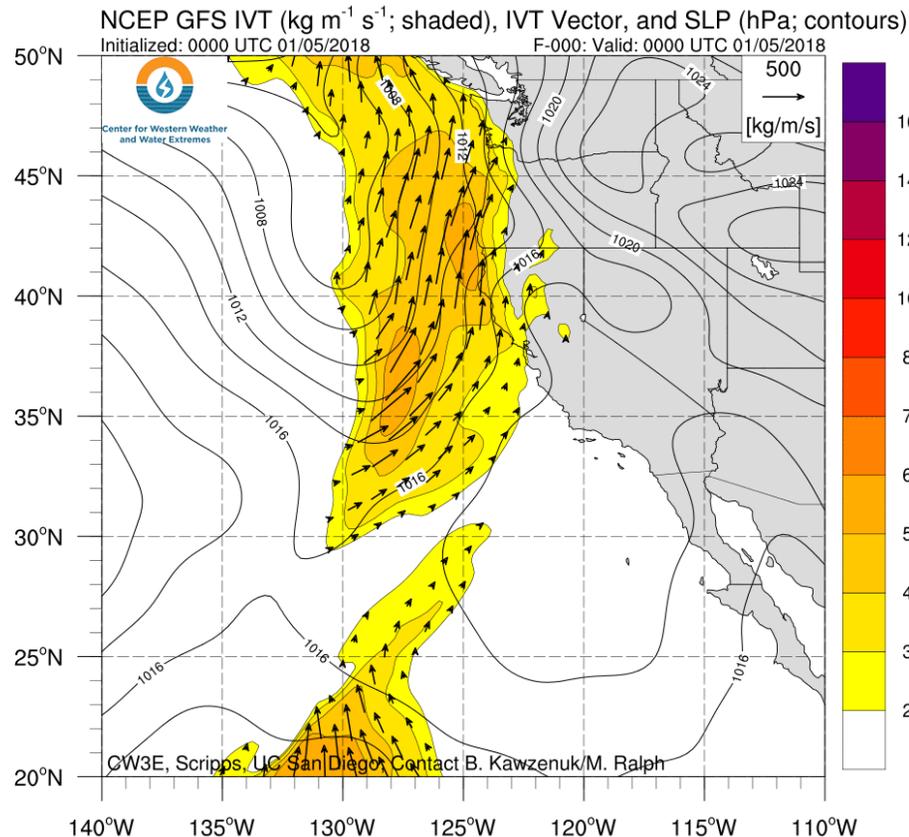
CW3E Atmospheric River Update – Post Event Summary



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

Atmospheric river conditions brought widespread precipitation throughout California

- A low pressure system developed off the CA coast on 7 January and interacted with tropical moisture to produce heavy precipitation over nearly all of CA
- Nearly all of CA experienced AR conditions (IVT $>250 \text{ kg m}^{-1} \text{ s}^{-1}$ and IWV $>20 \text{ mm}$) for ~ 24 hours
- The highest precipitation amounts were observed over the Coastal and Transverse Ranges, with some locations receiving over 200 mm of precipitation, making this an R-Cat 1 event



AR Summary: 8–10 January 2018

For California DWR's AR Program

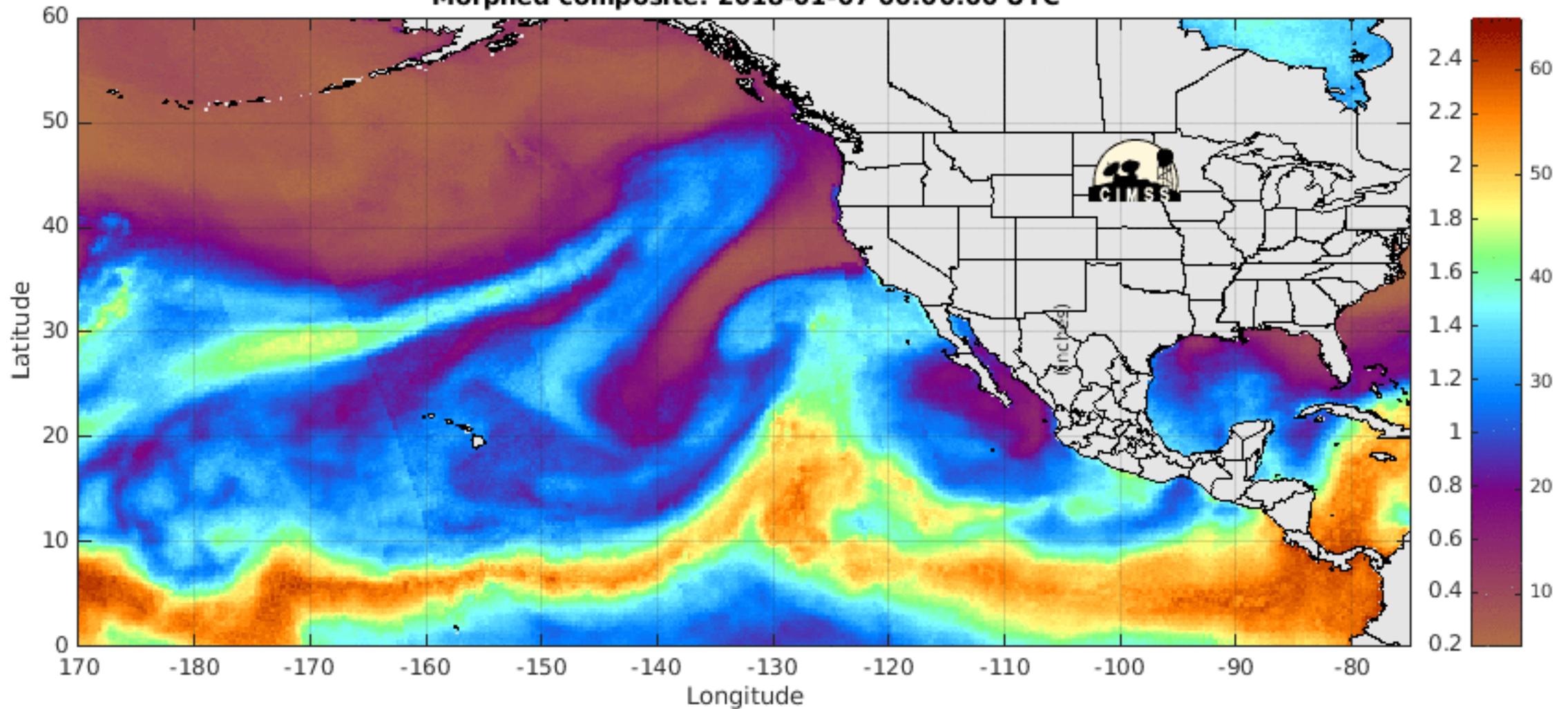


Center for Western Weather
and Water Extremes

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AT UC SAN DIEGO

SSMI/SSMIS/ARMSR2-Derived Integrated Water Vapor (I WV)
0000 UTC 7 Jan – 1200 UTC 10 Jan 2018

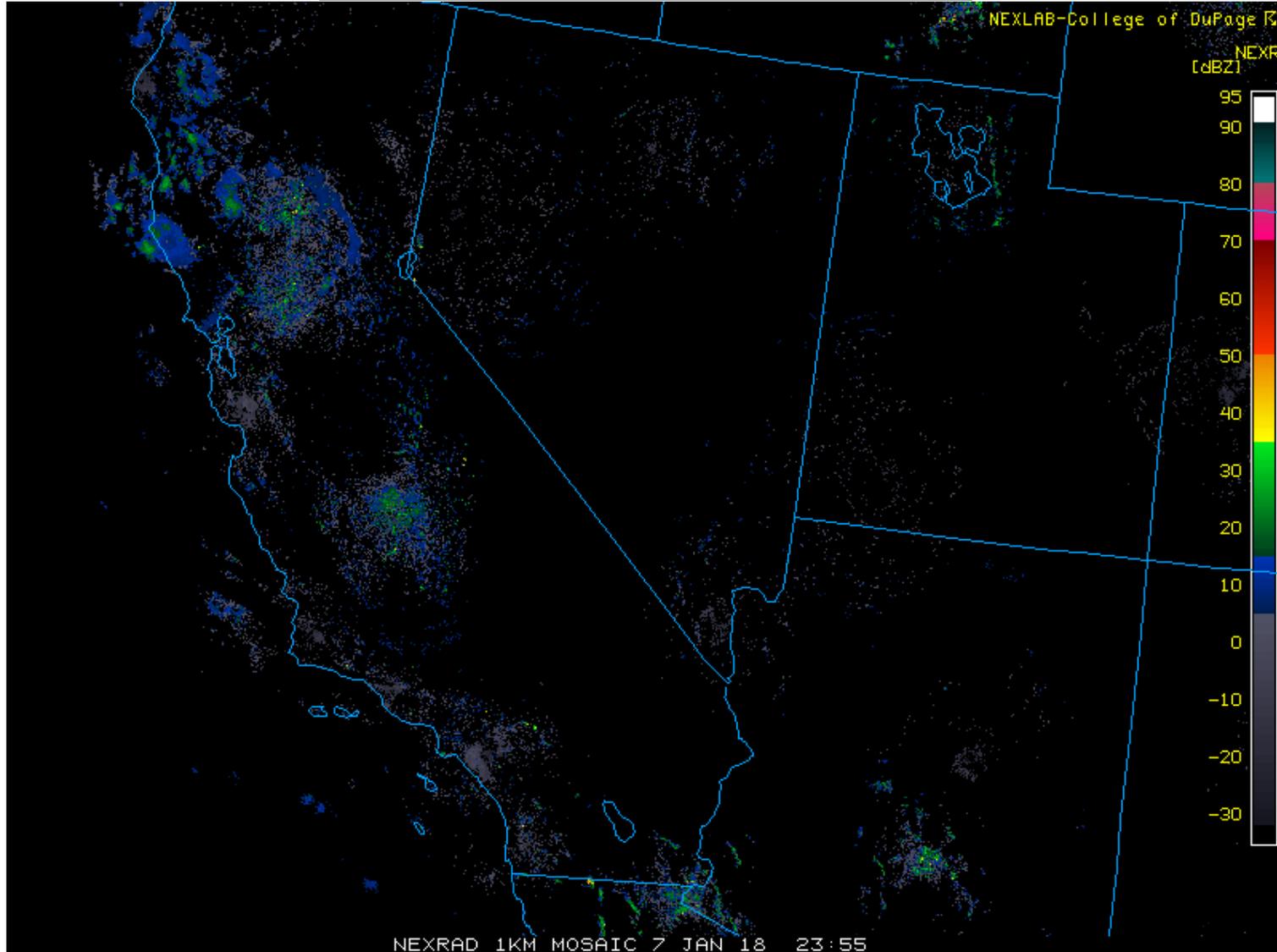
Morphed composite: 2018-01-07 00:00:00 UTC



AR Summary: 8–10 January 2018

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NEXRAD Radar Imagery
0000 UTC 8 Jan – 1200 UTC 10 Jan 2018



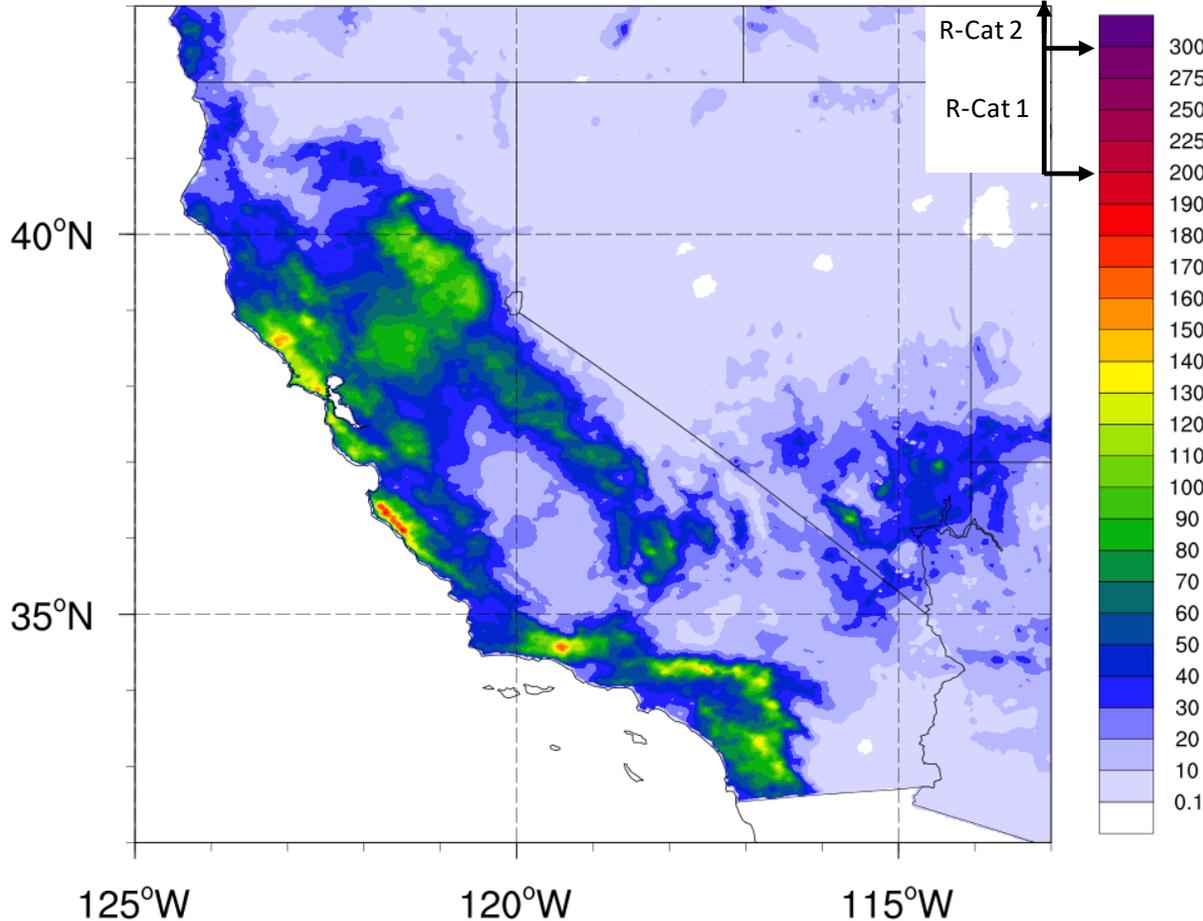
Precipitation began over CA
around 0400 UTC 8 January and
lasted until early 10 January

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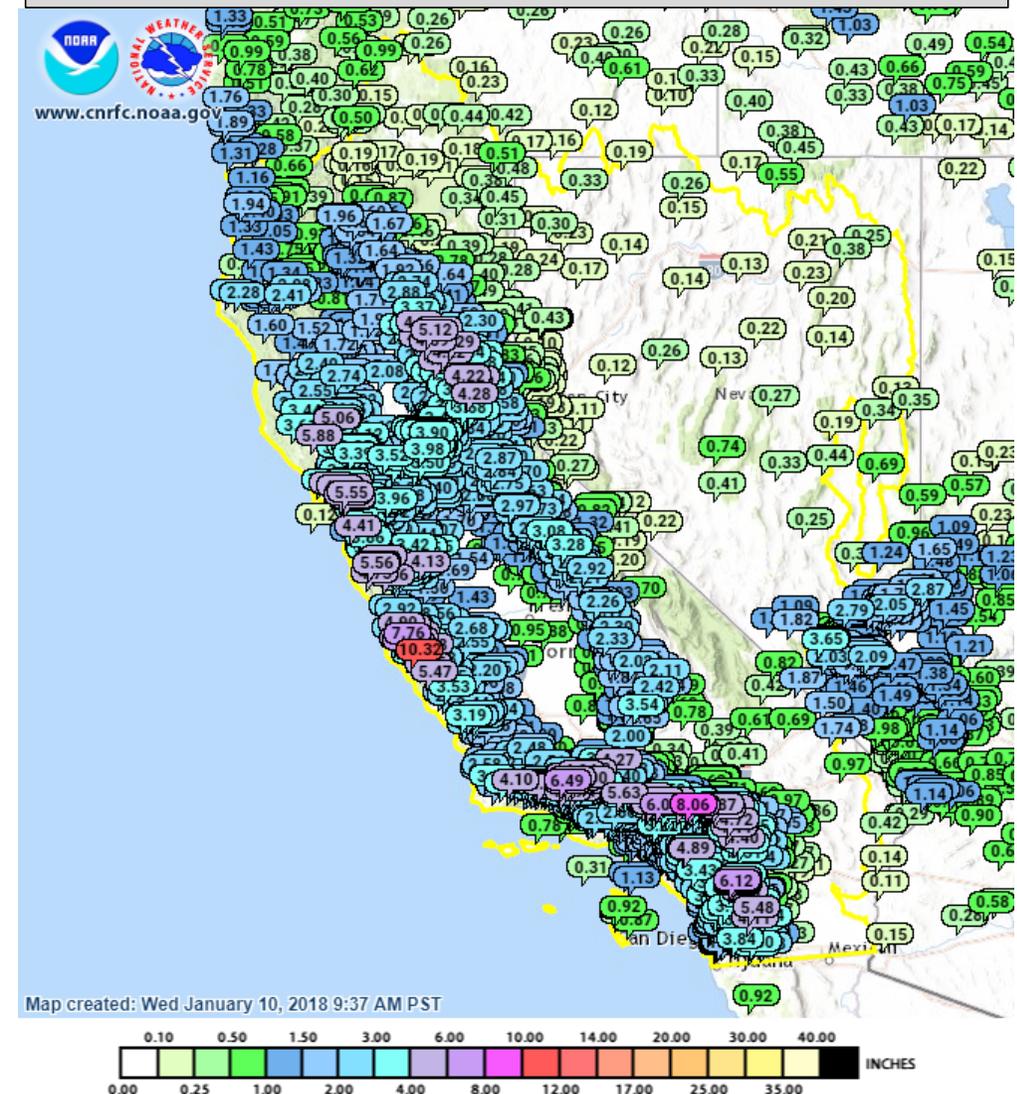
NCEP Stage IV 72-h Accumulated Precipitation (mm)

1200 UTC 07-10 Jan 2018



- Over 5 inches of precipitation was observed at multiple stations throughout CA
- Over 200 mm (~7.8 in) was observed at two locations in CA, making this an R-Cat 1 event

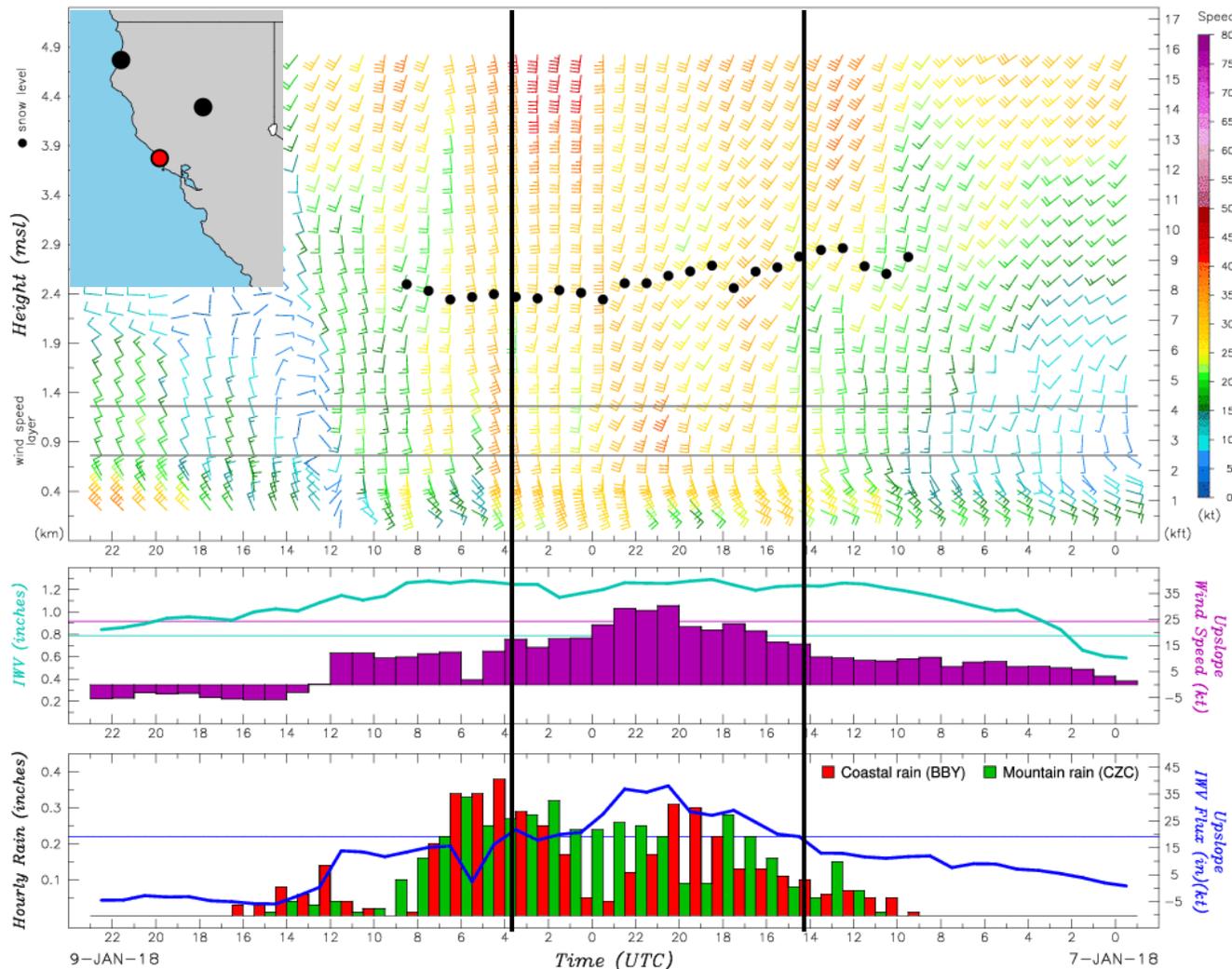
CNRFC 72-hr Observed Precipitation
Raw Data: 1700 UTC 7 January – 1700 UTC 10 January



AR Summary: 8–10 January 2018

For California DWR's AR Program

ESRL Physical Sciences Division
Coastal Atmospheric River Monitoring and Early Warning System



Bodega Bay, CA (BBY)
38.3191 N, 123.0728 W, 15 m
Cazadero, CA (CZC)
38.6107 N, 123.2152 W, 478 m

Upslope Direction = 230 deg
BBY 48-hr precip: 4.30 in
CZC 48-hr precip: 4.49 in

The Atmospheric River Observatory (ARO) at Bodega Bay experienced AR conditions from ~14 UTC 8 Jan – ~4 UTC 9 Jan

Over 1 inch of IWV was observed for ~36 hours with controlling layer winds >25 knots out of the south southwest and south

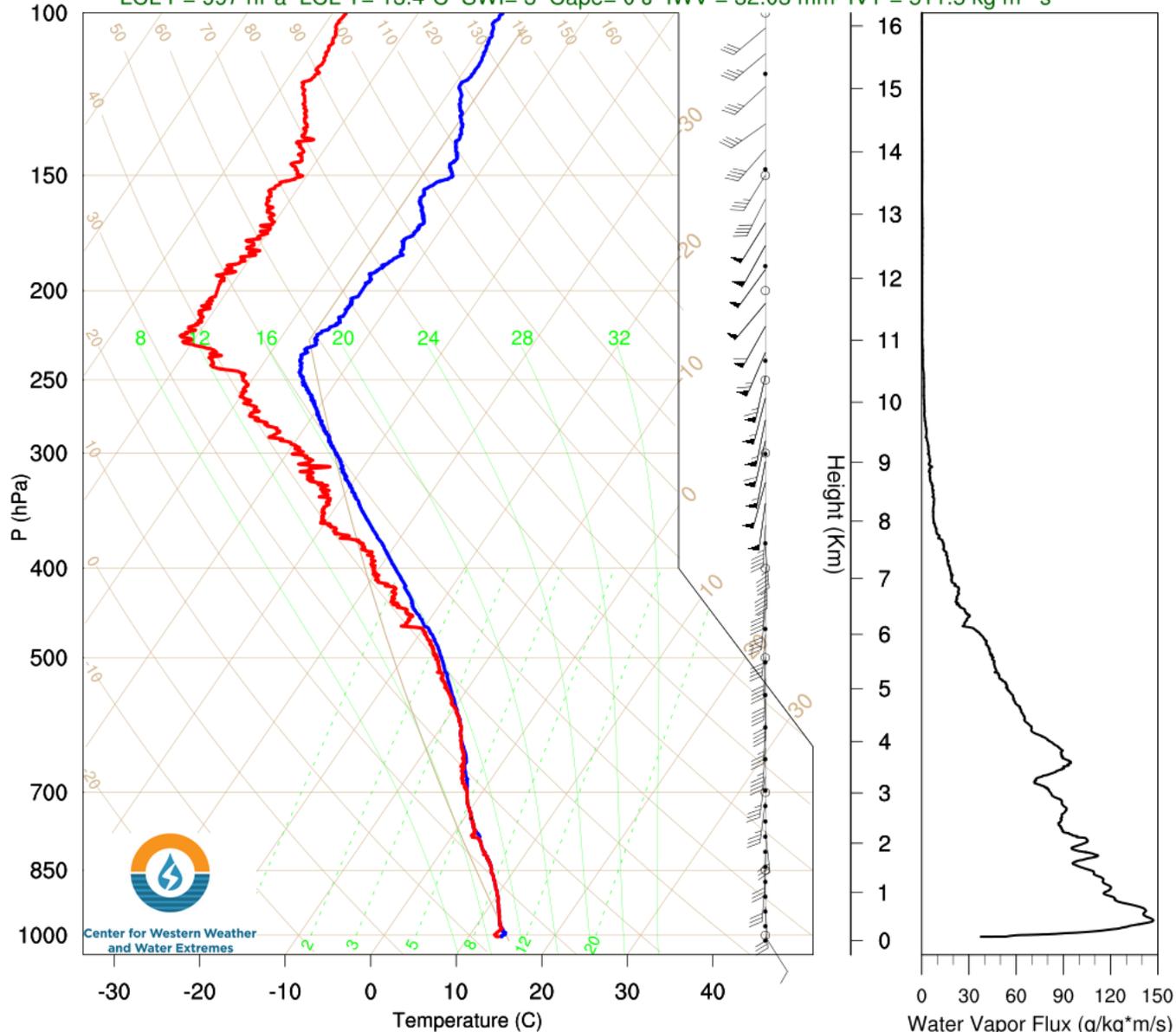
- 4.30 inches (109.2 mm) of precipitation was observed at Bodega Bay and 4.49 inches (114.1 mm) was observed at Cazadero, a nearby mountain location
- These close accumulation amounts indicate that topography did not play a large role enhancing precipitation amounts in this region. This is most likely due to low level winds being primarily out of the south and existing atmospheric ascent associated with the low pressure system.

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For California DWR's AR Program

BBY: 00:00 UTC 01/09/2018

LCL P= 997 hPa LCL T= 13.4°C SWI= 3 Cape= 0 J IWV = 32.03 mm IVT = 511.5 $\text{kg m}^{-1} \text{s}^{-1}$



A team of CW3E staff, students, and postdocs were in Bodega Bay and Ukiah, CA performing radiosonde launches are part of the CW3E winter field campaign.

The highest IVT observed by the launches was observed at 0000 UTC 9 January with a value of $511.5 \text{ km m}^{-1} \text{ s}^{-1}$ and IWV of 32.03 mm.

The atmosphere was saturated from the surface up to above 500 hPa with lapse rates near the moist adiabatic lapse rate

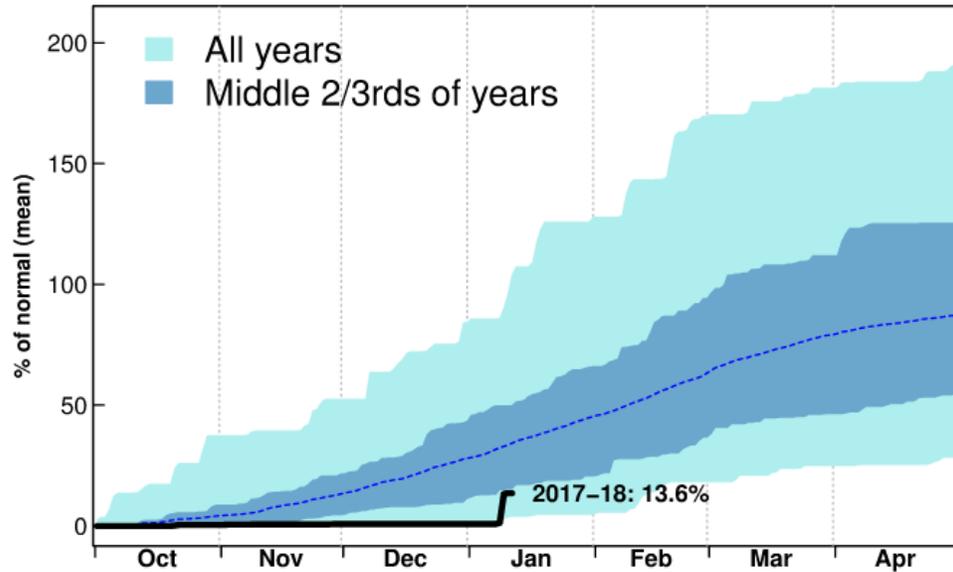
Winds were strong (>30 knots) at all levels and mostly southerly

AR Summary: 8–10 January 2018

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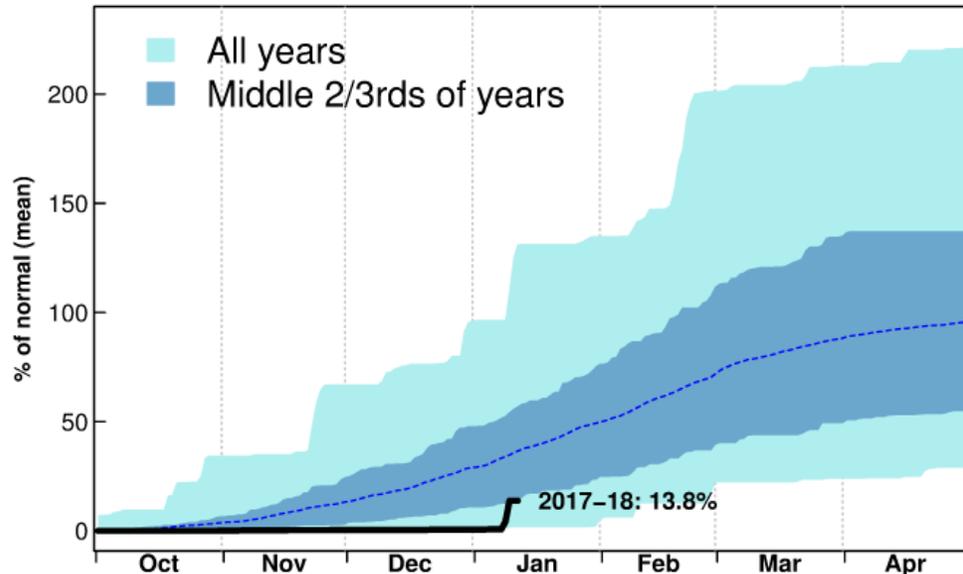


SD_county precip for all years, data through 2018/01/11



San Diego County received 12% of its average annual precipitation in 24 hours (9 Jan), which corresponds to a >99th percentile event.

LA_basin precip for all years, data through 2018/01/11



The Greater Los Angeles Region received 10% of its average annual precipitation in 24 hours (9 Jan), and 14% in 48 hours (8-9 Jan), which both correspond to a >95th percentile event.

This tool available at <http://cirrus.ucsd.edu/~pierce/sdprecip>

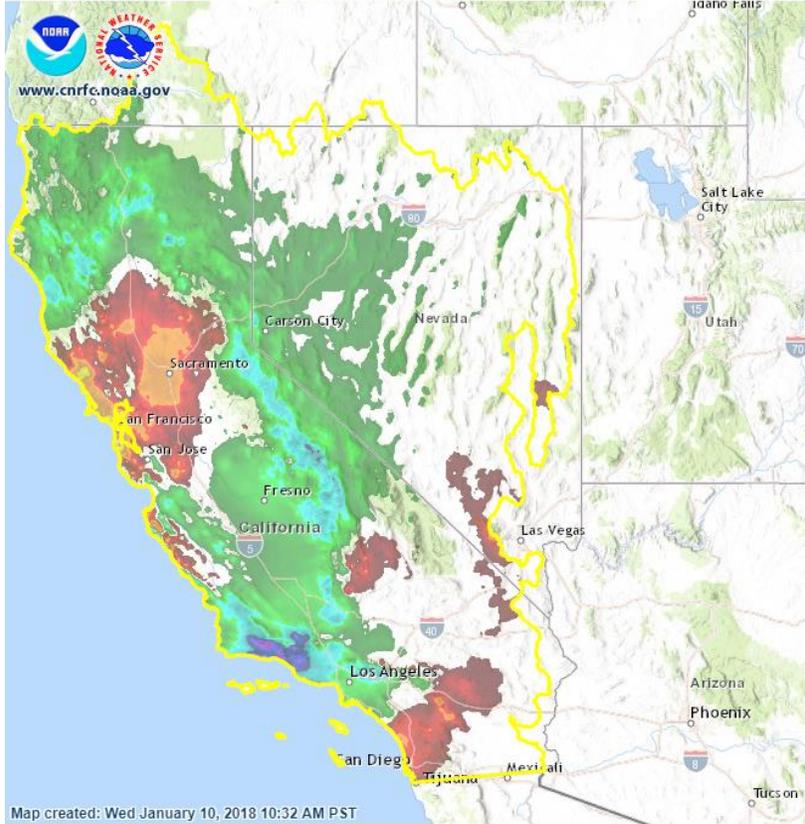
AR Summary: 8–10 January 2018

For California DWR's AR Program

CNRFC Forecast Verification - 24-hr period 1200 UTC 8–9 Jan 2018

QPF Verification (QPF - QPE)

Date: 01/09/2018 - Day 1 forecast created Mon Jan 8, 2018

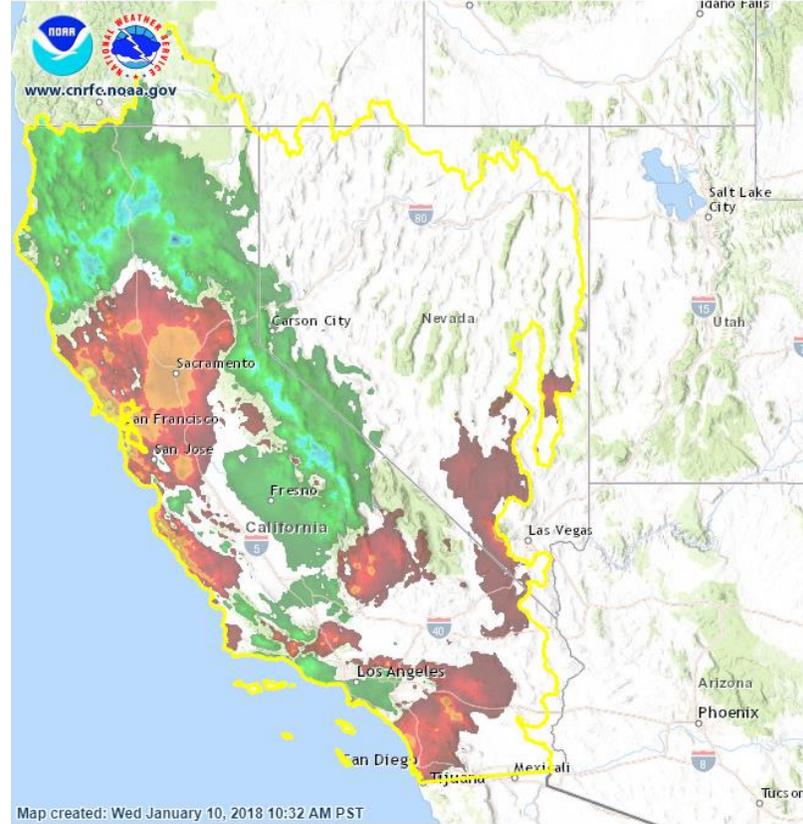


Precipitation Verification (inches) (forecast - observed)



QPF Verification (QPF - QPE)

Date: 01/09/2018 - Day 3 forecast created Sat Jan 6, 2018

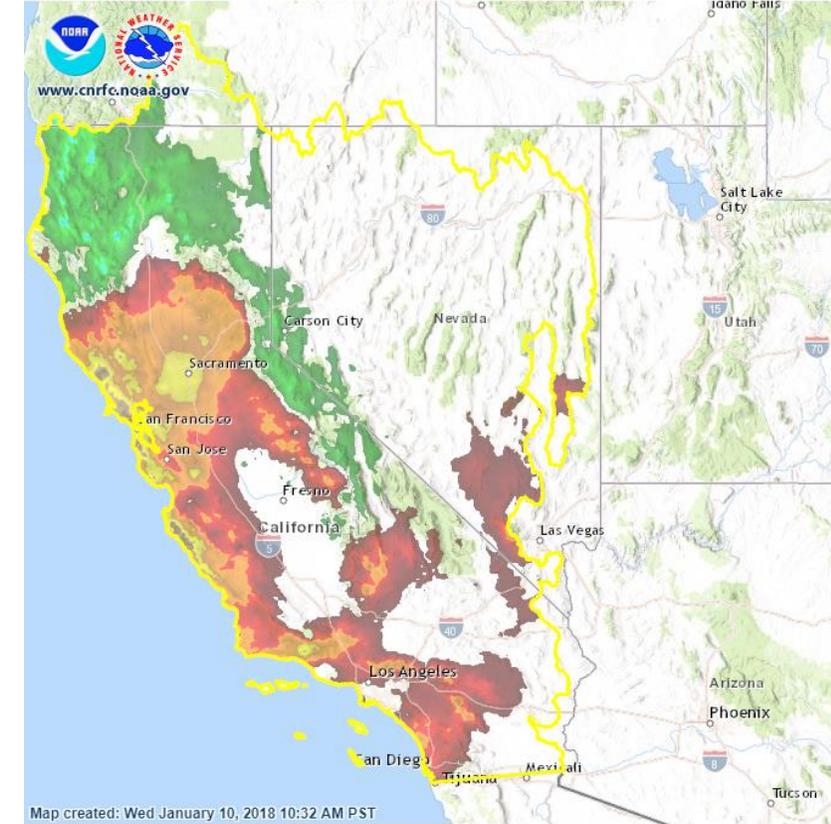


Precipitation Verification (inches) (forecast - observed)



QPF Verification (QPF - QPE)

Date: 01/09/2018 - Day 5 forecast created Thu Jan 4, 2018



Precipitation Verification (inches) (forecast - observed)



- Overall this event was under forecasted in most locations where the heaviest precipitation occurred
- The bay area, where the highest precipitation occurred on this day was under forecasted by up to 2 inches in some locations
- Precipitation over the transverse ranges and the Sierra Nevada was over forecasted

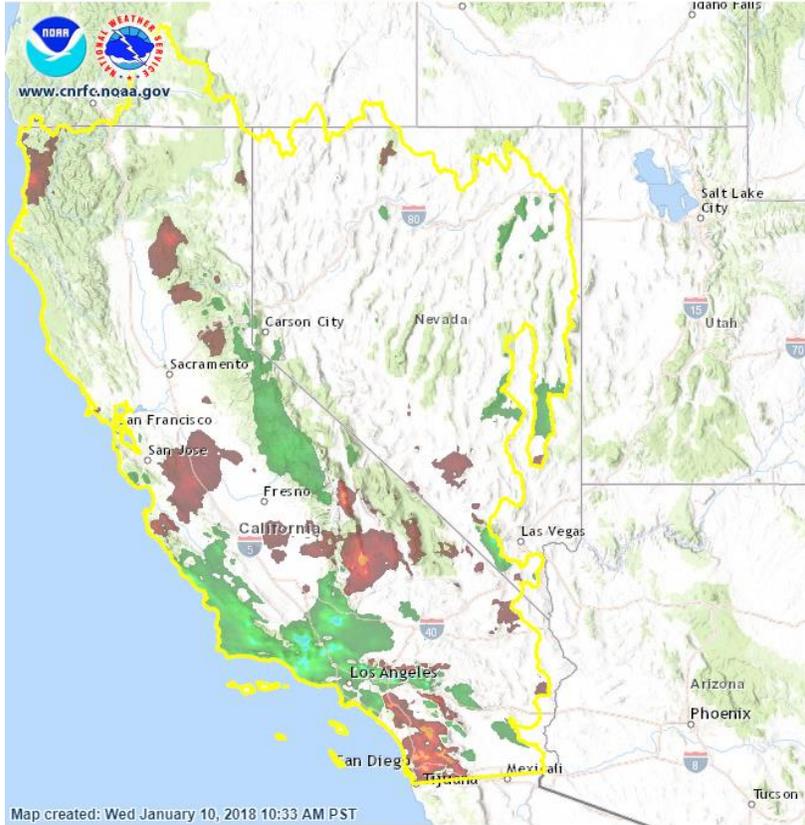
AR Summary: 8–10 January 2018

For California DWR's AR Program

CNRF C Forecast Verification - 24-hr period 1200 UTC 9–10 Jan 2018

QPF Verification (QPF - QPE)

Date: 01/10/2018 - Day 1 forecast created Tue Jan 9, 2018

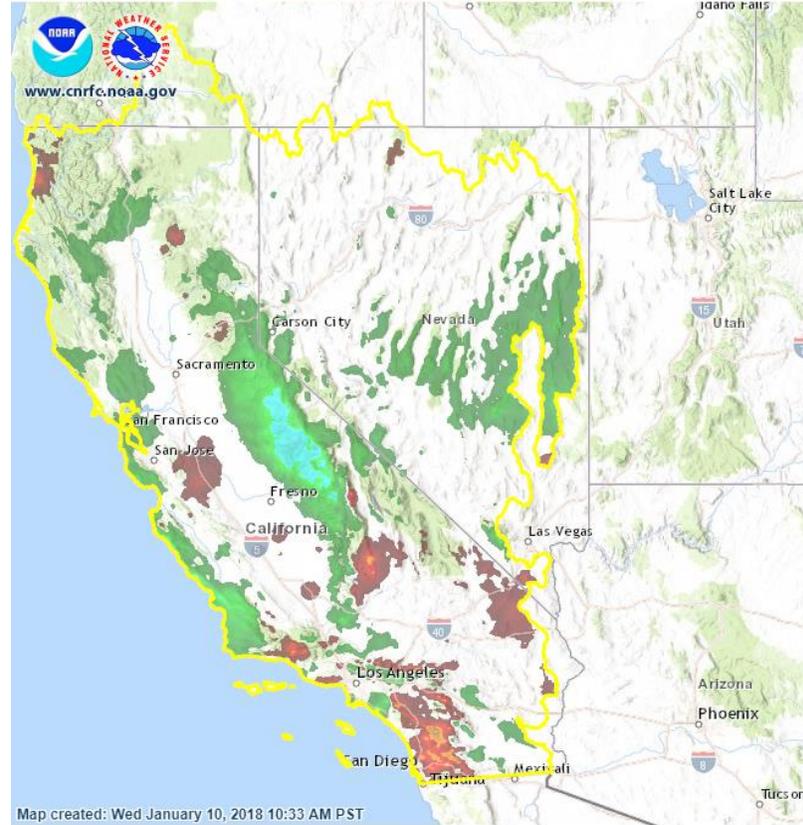


Precipitation Verification (inches) (forecast - observed)



QPF Verification (QPF - QPE)

Date: 01/10/2018 - Day 3 forecast created Sun Jan 7, 2018

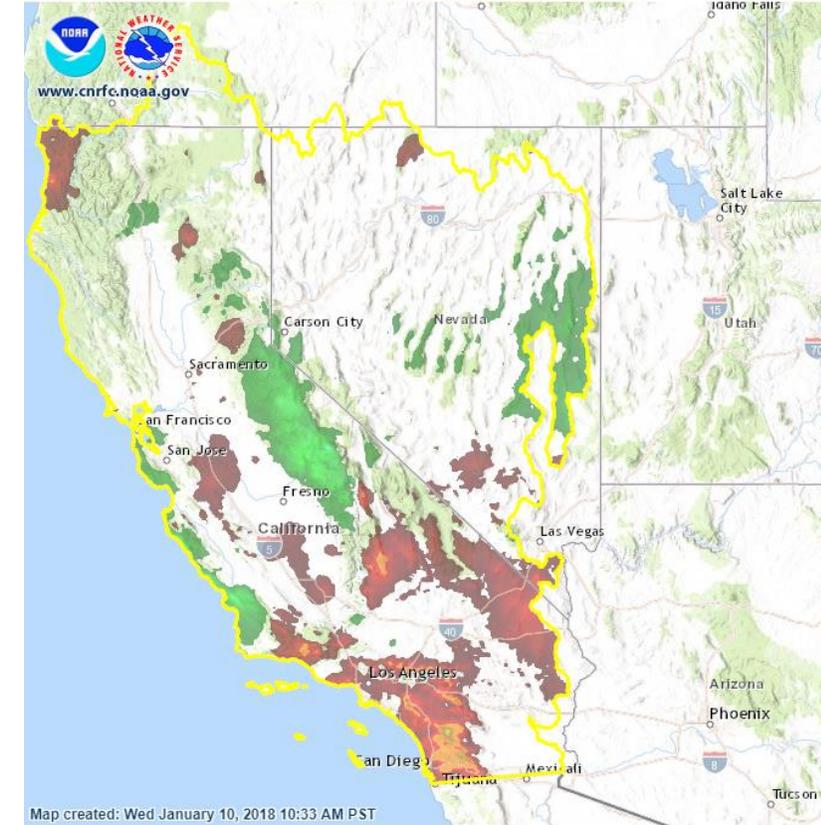


Precipitation Verification (inches) (forecast - observed)



QPF Verification (QPF - QPE)

Date: 01/10/2018 - Day 5 forecast created Fri Jan 5, 2018



Precipitation Verification (inches) (forecast - observed)



- The heaviest precipitation during this period occurred in southern CA over the eastern Transverse Ranges and Peninsular Ranges
- Nearly all of San Diego County was under forecasted, with some locations receiving double the precipitation that was forecasted
- The Transverse Ranges were over forecasted, some locations by over 1 inch.

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Impacts

- Three swift water rescues in San Bernadino County
- One river rescue in Anaheim, CA
- Rock/mudslides on HWY 330, Cajon Pass, and HWY 138 all resulting in road closures
- Massive mudslides in Montecito resulting in fatalities and destruction of over 100 homes
- Damage from high winds



Sandia Road and Santa Margarita River – Jan 9



Lytle Creek

ABC7 Eyewitness News @ABC7 · 15m

Heavy rain triggers road closures, rescues in Inland Empire abc7.la/2EshWvH

SR 138 between I-15 and Summit Valley Rd,



AR Summary: 8–10 January 2018

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Impacts

SAN DIEGO RIVER - FASHION VALLEY (FSNC1)

Latitude: 32.77° N

Longitude: 117.17° W

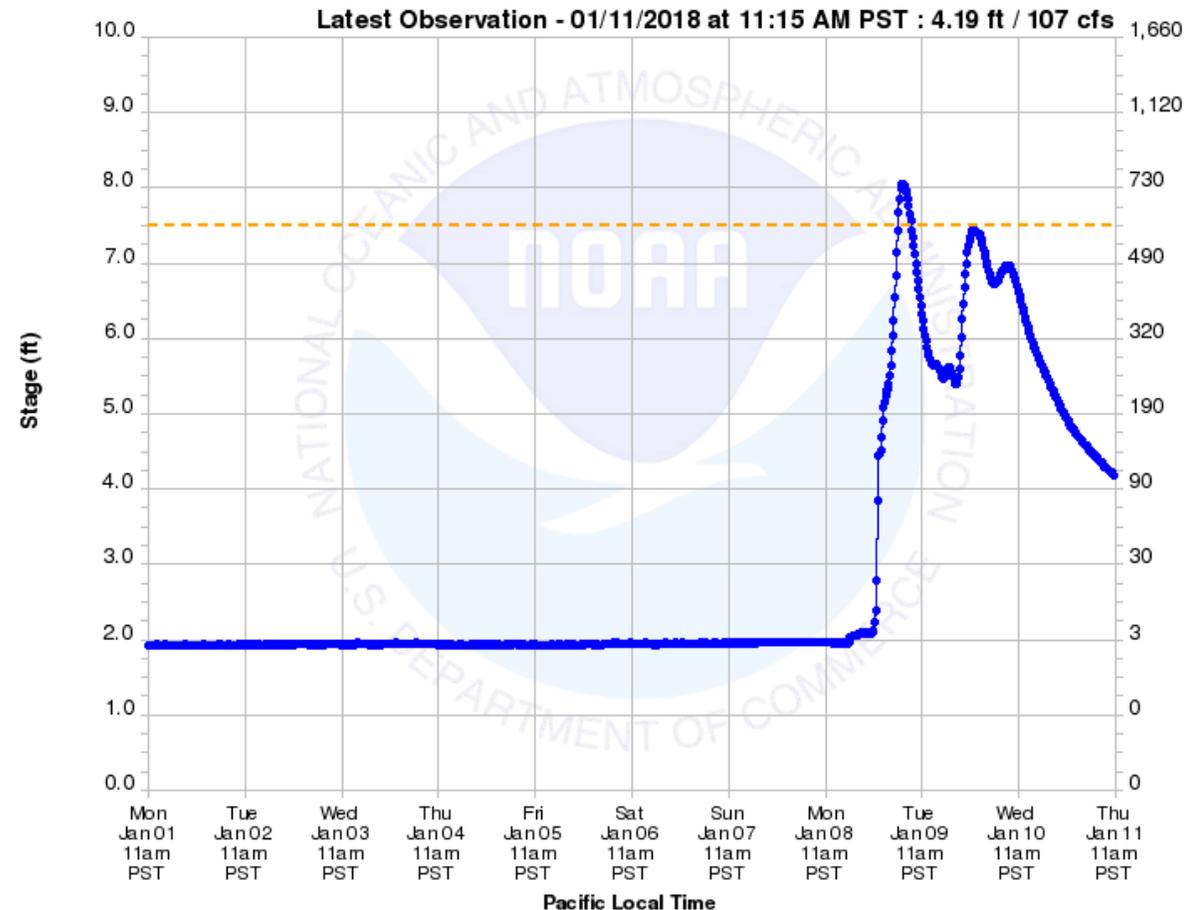
Elevation: 20 Feet

Location: San Diego County in California

River Group: Southern California

Monitor Stage: 7.5 Feet

Flood Stage: 11.3 Feet



The San Diego River as Fashion Valley reached 8.0 feet, which is above monitor stage, resulting in the flooding of one street.

