

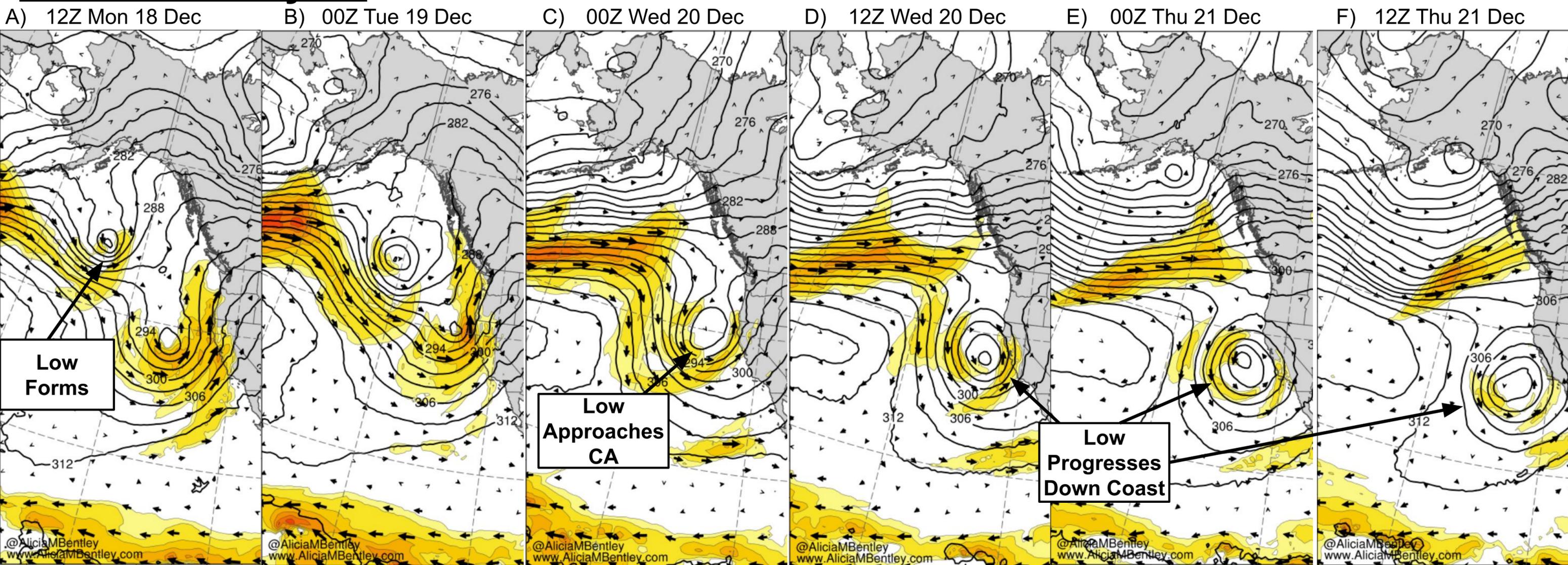
CW3E Event Summary: 21 Dec 2023

Low Pressure System Brings Heavy Precipitation to Southern California

- A low pressure system that formed in the Gulf of Alaska south of the Aleutian Islands on Mon 18 Dec progressed down the US West Coast through this week, approaching California late Tue 19 Dec
- The system brought elevated moisture levels from the southern Pacific as it propagated down the CA coast, resulting in heavy precipitation across much of Southern California on Wed 20 Dec into Thu 21 Dec
- There were numerous flood reports in both Santa Barbara and Ventura counties, including reports of multiple feet of water over roadways, inundated lanes, and mud/other debris covering streets.
- As a results of the short duration, high intensity precipitation, low lying areas became inundated with water, flooding homes and businesses in Oxnard & Port Hueneme, California requiring numerous water rescues.

CW3E Event Summary: 21 Dec 2023

GFS IVT Analysis

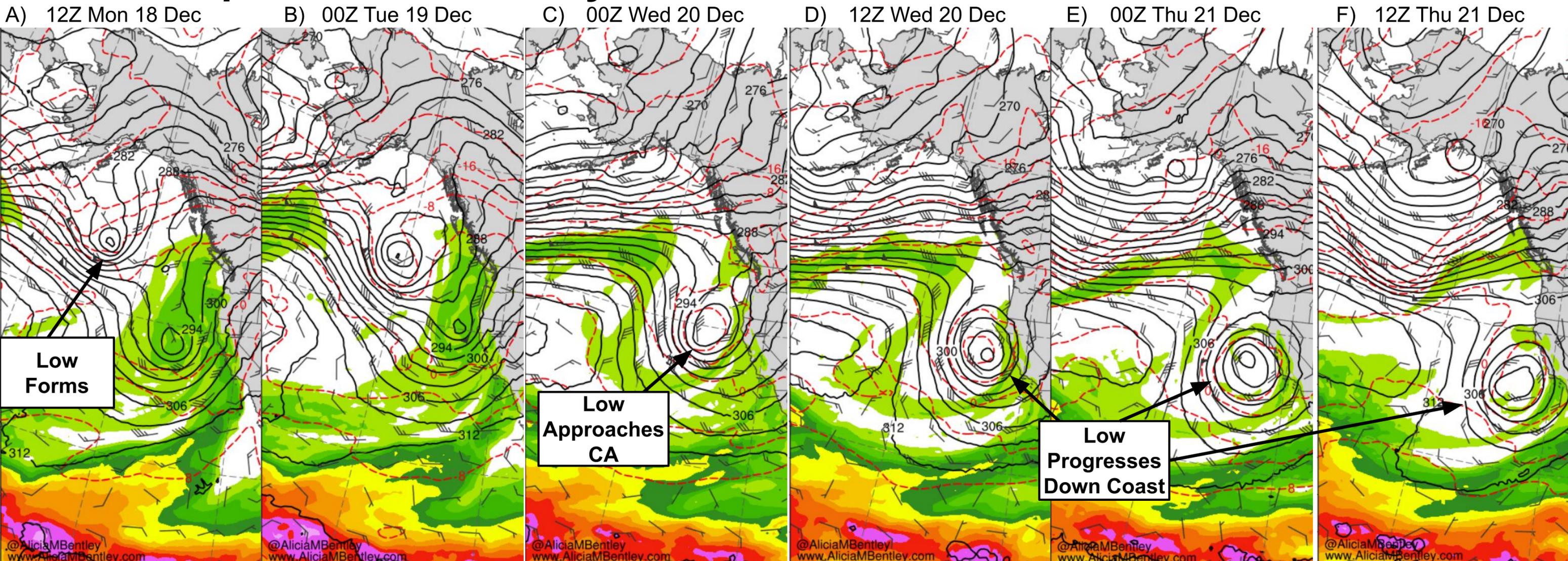


Images adapted from imagery of Dr. Alicia Bentley (https://www.atmos.albany.edu/student/abentley/realtime/standard.php?domain=northamer&variable=IVT_conv)

The low pressure system that brought extreme precipitation to Southern California initially formed to the south of the Aleutian Islands in the North Pacific early Mon 18 Dec. The system progressed down the North American West Coast Mon 18 Dec and reaching Northern California late Tue 19 Dec. Over the next day, the low pressure system slowly made its way to Southern California. Late Wed 20 Dec into early Thu 21 Dec, the low pressure funneled elevated moisture into Southern California resulting in extreme precipitation and flooding

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GFS Precipitable Water Analysis

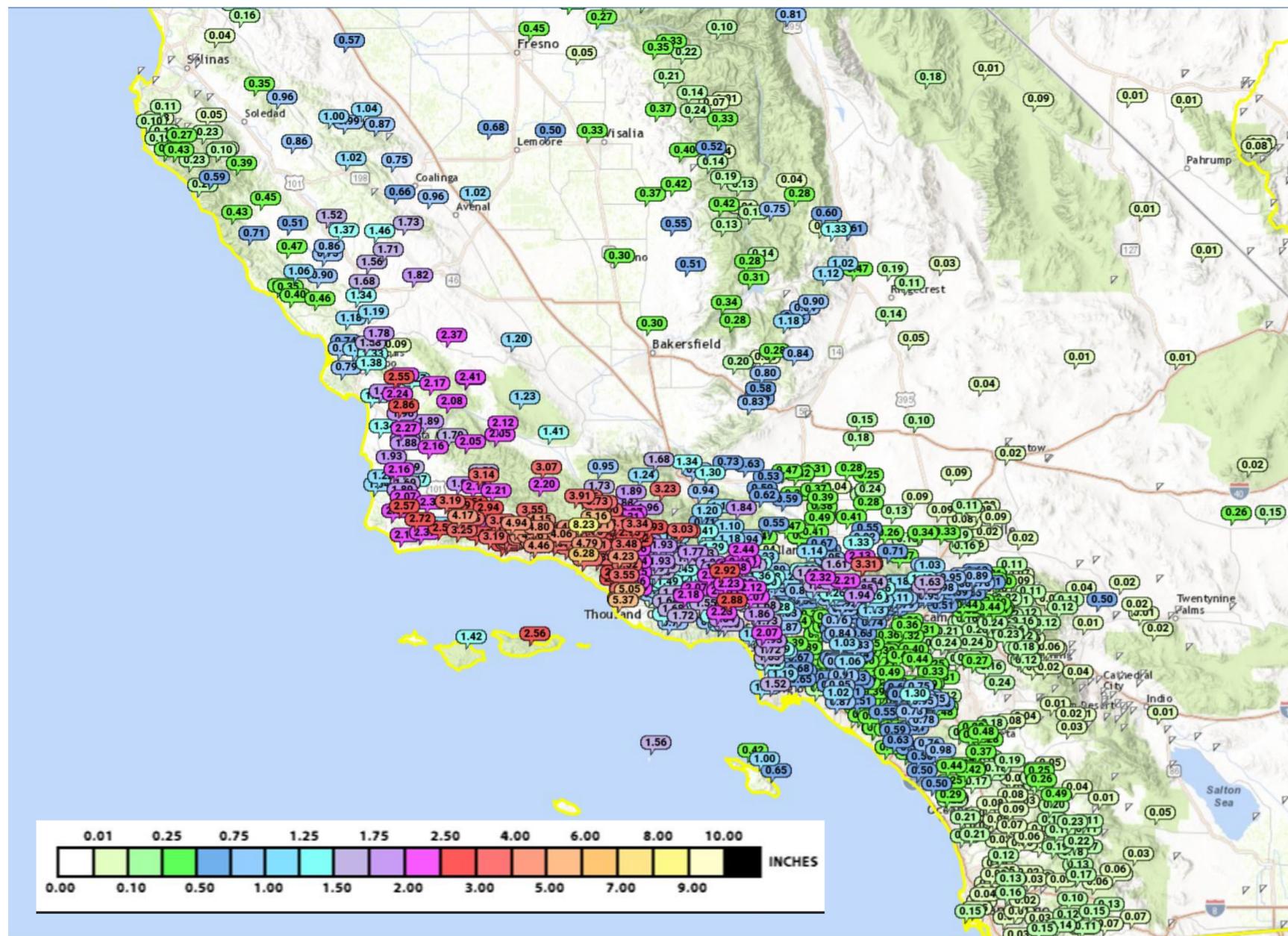


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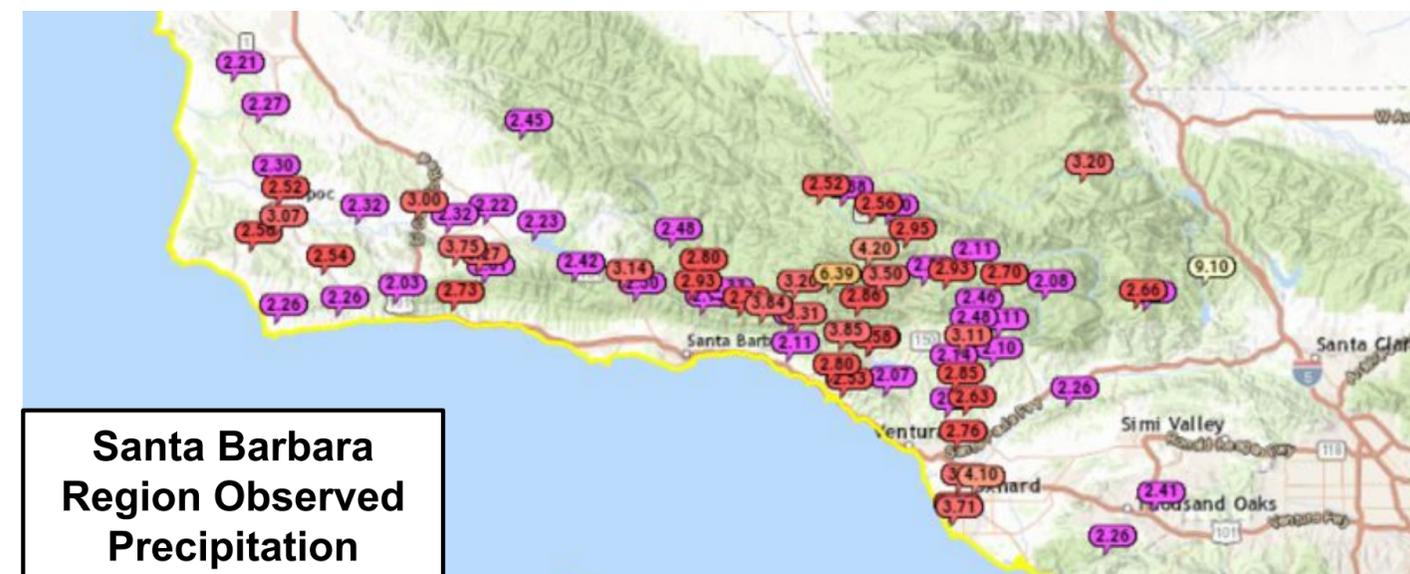
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CNRFC 24-Hour Observed QPE (Period Ending 1 PM PST 12/21)



- Widespread precipitation was measured over the 24-hour period from 1 PM PST 12/20 to 12/21 in association with the low pressure system
- Highest precipitation totals were observed throughout Santa Barbara and Ventura counties, with the highest total of 8" measured at Old Man Mountain



CNRFC - California Nevada River Forecast Center ([noaa.gov](https://www.cnrfc.noaa.gov/)):
<https://www.cnrfc.noaa.gov/?product=twentyfourhourP&zoom=8&lat=33.785&lng=-117.140>

CW3E Event Summary: 21 Dec 2023

Extreme Rainfall Rates in Southern California

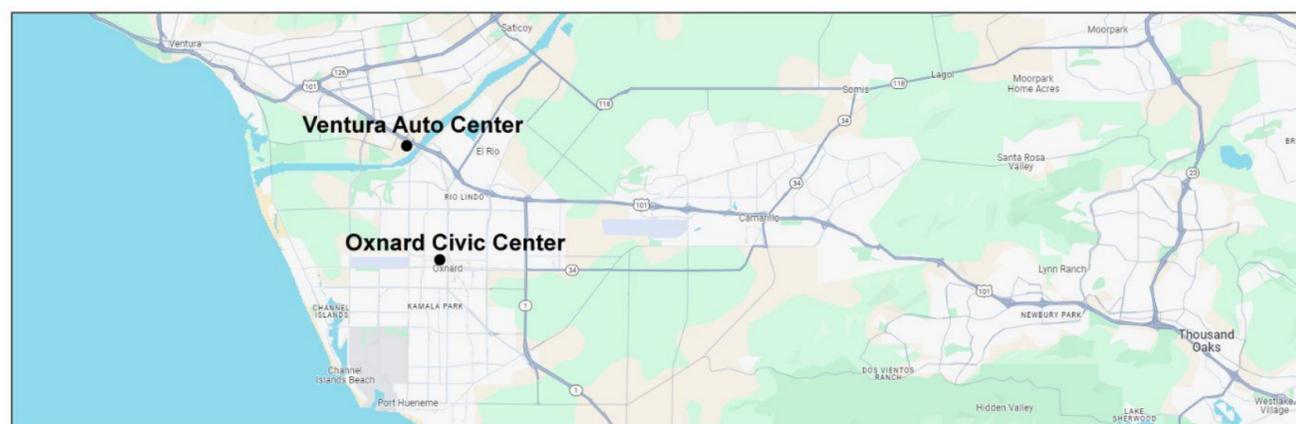



Extreme Rainfall Rates
Weather Forecast Office
Los Angeles, CA
weather.gov/LOX

From 7am Wed to 7am Thu (Dec 20-21, 2023)

These rainfall rates have a return interval of 200+ years

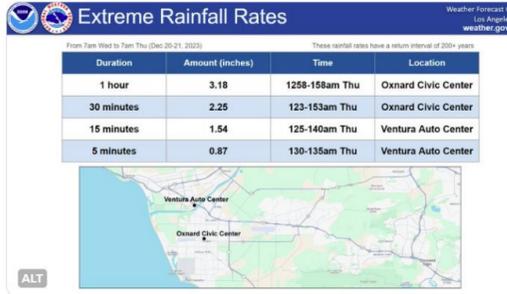
Duration	Amount (inches)	Time	Location
1 hour	3.18	1258-158am Thu	Oxnard Civic Center
30 minutes	2.25	123-153am Thu	Oxnard Civic Center
15 minutes	1.54	125-140am Thu	Ventura Auto Center
5 minutes	0.87	130-135am Thu	Ventura Auto Center



(19) NWS Los Angeles on X: <https://twitter.com/NWSLosAngeles/status/1737856258324254870>


NWS Los Angeles @NWSLosAngeles

The rainfall that occurred earlier this morning over #Oxnard #PortHueneme #Ventura was indeed EXTREME. Here are the highest rates/intensities observed. #cawx #larain



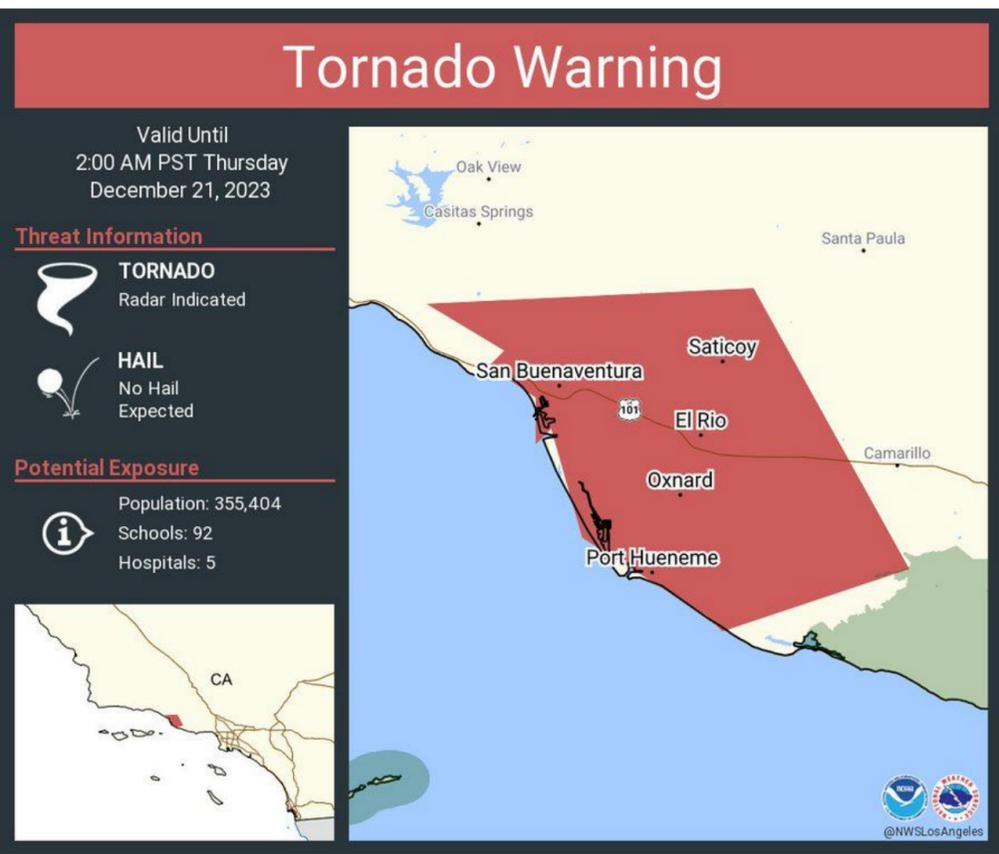
7:23 AM · Dec 21, 2023 · 19.4K Views

NWS Local Storm Reports for flooding
4 AM 20 Dec - 12 PM 21 Dec 2023
accessed via <https://www.wpc.ncep.noaa.gov/exper/lsr/lsr.php#>

- Locally intense, short-term rainfall was recorded in Oxnard, CA early Thursday morning
- Highest observed precipitation totals exceed **3 inches in one hour** (1258-158 AM PST) and **almost 1 inch in 5 minutes** (130-135 AM PST)!

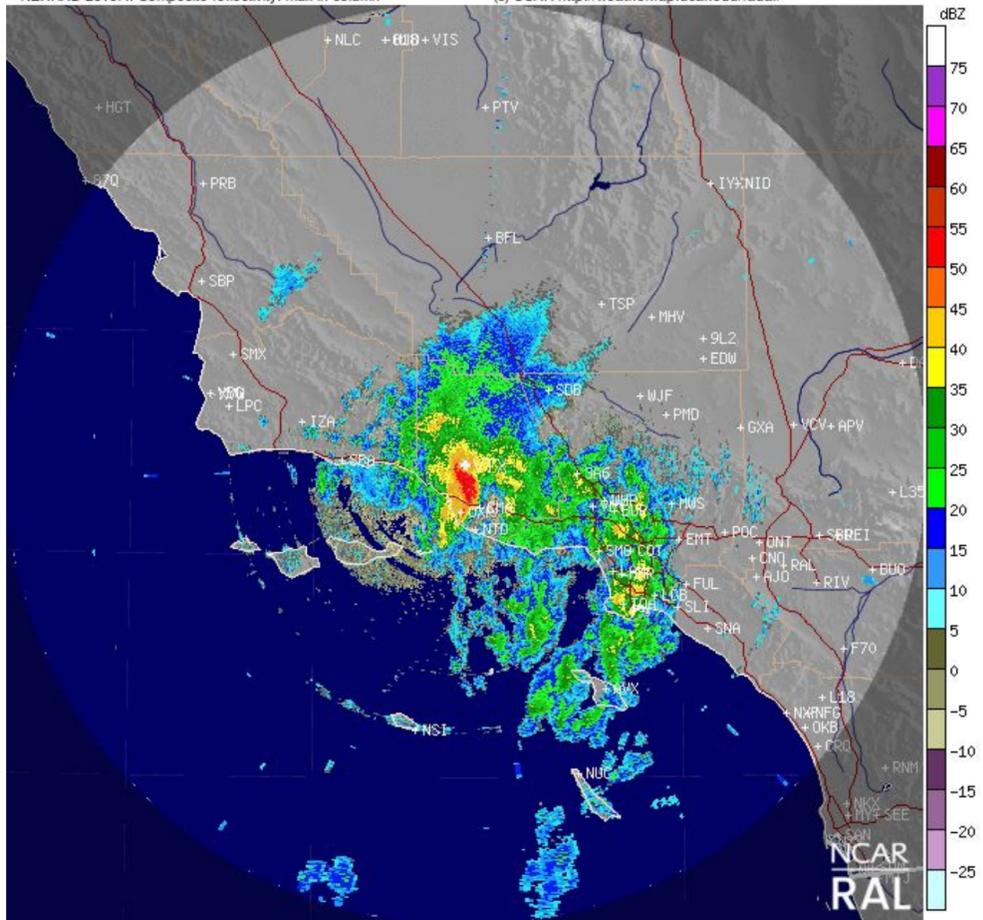
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Tornado Threat

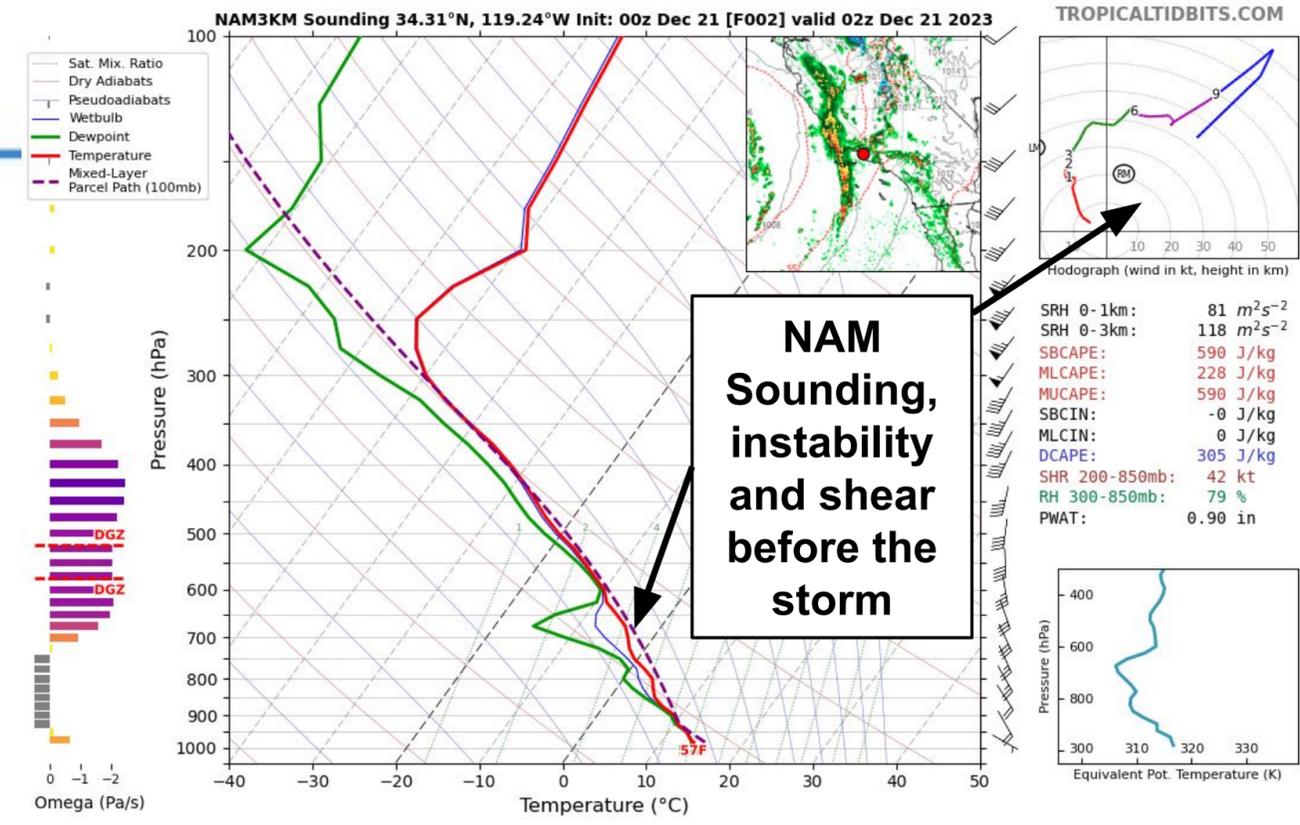


The NWS Los Angeles issued multiple tornado warnings for a storm cell over Port Hueneme and Oxnard, between 1:45–2:30 AM on 21 Dec

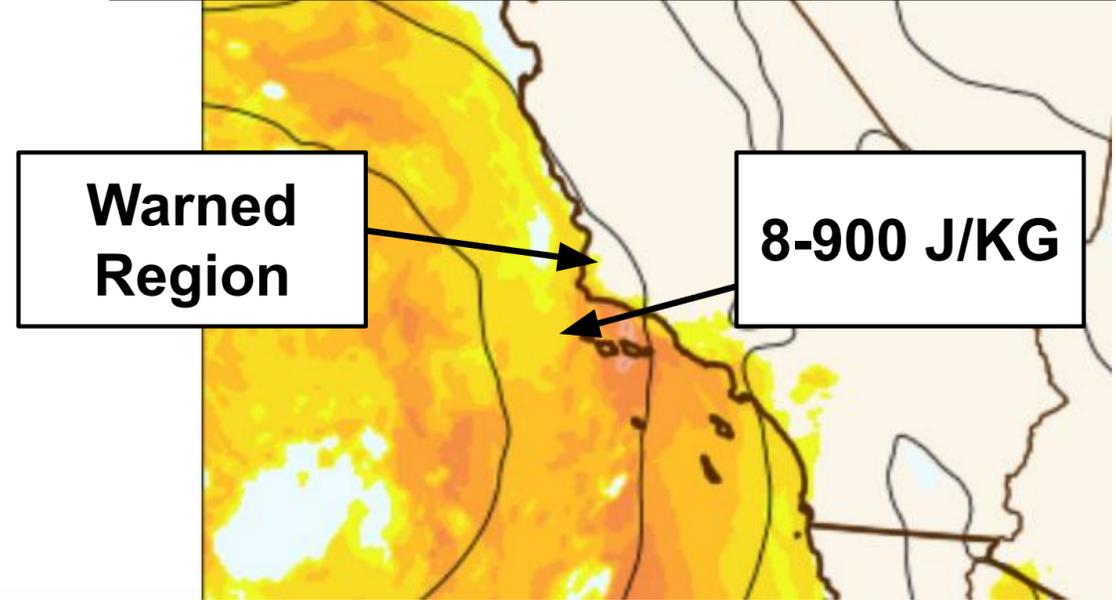
KVTV Los Angeles, CA/Ventura County 09:42:00 UTC Thu 21 December 2023
NEXRAD Level II Composite reflectivity: max in column (c) UCAR <http://weather.rap.ucar.edu/radar/>



KVTV reflectivity showing storm cell over the radar ~1:45 AM on 21 Dec



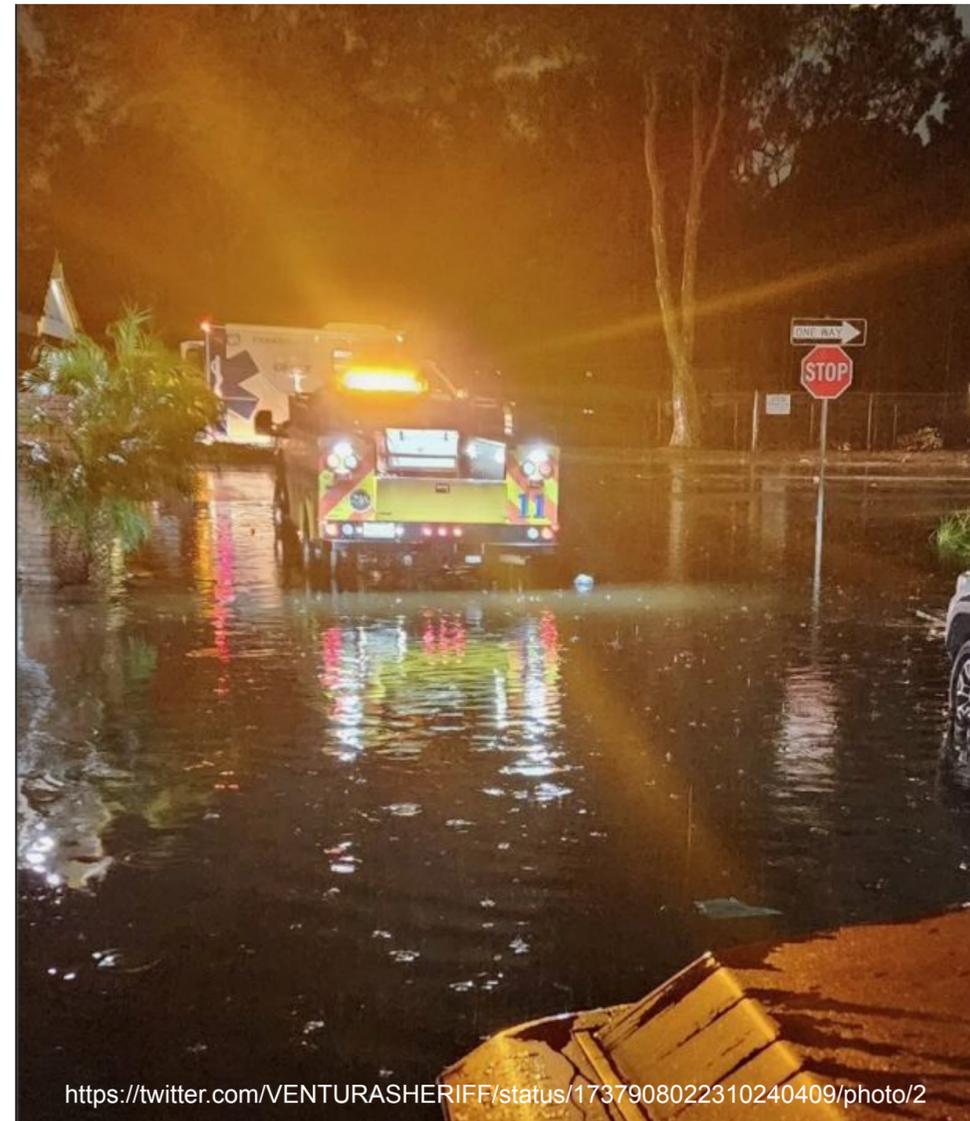
HRRR Surface-Based CAPE showing elevated levels of CAPE off-shore of the warned regions



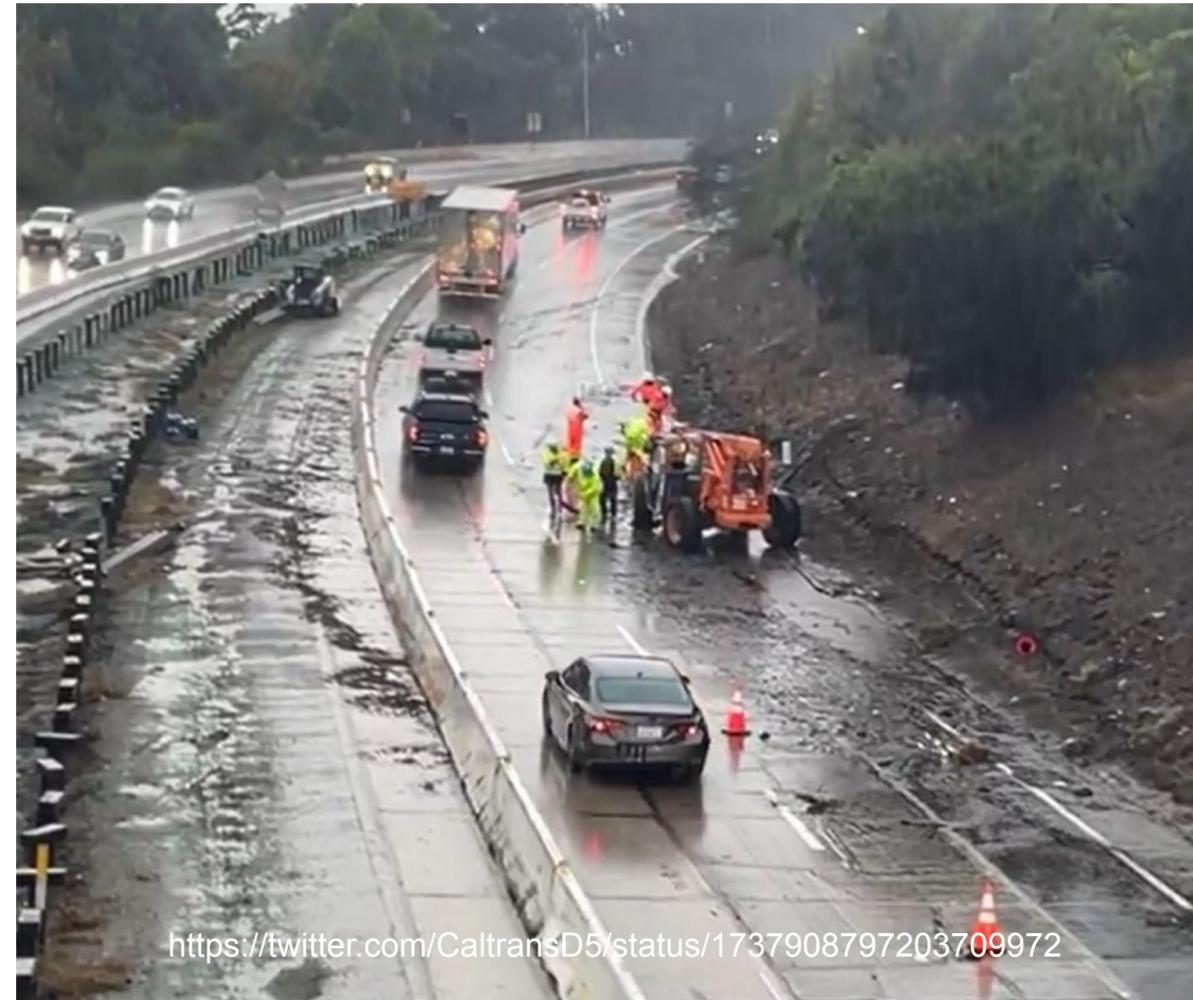
Source: <http://arctic.som.ou.edu/tburg/models/>

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Impacts



Flooded roadways in Ventura County required the use of specialized vehicles to access emergencies and complete water rescues
Ventura County Sheriff



Debris and floodwaters forced crews to close lanes along US 101 to remove hazards and clear storm drains
CalTrans District 5



A hillslope failure due to heavy rains combined with floodwaters to force roadway closures in Santa Barbara
CalTrans District 5

