

# HMT-West/CalWater 2011: IOP 5 Summary

- Operations director: Gary Wick
- Duration
  - Start: 1800 UTC Thursday 24 February 2011
  - End: 1800 UTC Saturday 26 February 2011
- Activities at Lincoln (LHM) field site
  - Skywater Doppler radar operated from 1829 UTC 24 Feb through the end of the IOP. Operations were started at 1800 UTC, but some processes were not updating and a restart was required
  - 4 GPS balloon soundings (using 5 sondes) were conducted at the following times:
    - 25 February at 00, 06, 12, and 18 (twice due to failure) UTC
- NWS rawinsonde activities
  - No supplemental soundings were requested

# HMT-West/CalWater 2011: IOP 5 Summary

- Autonomous instrument operations
  - Shasta dam: Communications problems prevented data receipt from the start of the IOP through resolution at ~01 UTC on 26 Feb. Intermittent data were received between 19-20 UTC and 21-23 UTC on 25 Feb.
  - Sugar Pine: Data lost between 07 UTC on 25 Feb through 01 UTC on 26 Feb due to heavy snowfall and likely power outage
  - Colfax: Brief outage between 16-17 UTC on 25 Feb likely due to snow accumulation on the antenna

# HMT-West/CalWater 2011: IOP 5 Summary

- Water collection
  - Cazadero: started 1530 UTC on 24 Feb
  - Sugar Pine and Lincoln: started 1800 UTC on 24 Feb
- G-1 Aircraft operations
  - Morning flight on 24 Feb observing stratiform/altostratus clouds with some cap clouds and snow
  - Morning and afternoon flights on 25 Feb: Viewed to be an excellent combination of sampling clouds and aerosols associated with the Sierra Barrier Jet.

# HMT-West/CalWater 2011: IOP 5 Summary

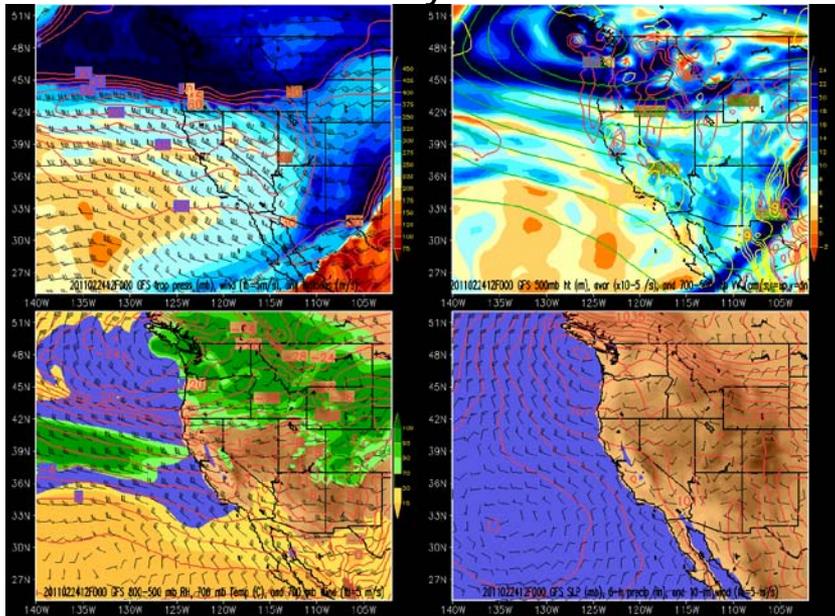
- Overview

This 48 hour IOP coincided with a frontal passage, strong westerly flow bringing orographic precipitation, and vigorous dynamics. The strong westerly flow enabled the tap of subtropical moisture from a dying system in the western Pacific giving rise to an atmospheric river signature. A barrier jet did develop which was observed at Sloughouse between about 300-900 m. Heavy precipitation occurred in the bay area at the outset of the event. Overall temperatures were quite cold for this event and significant snowfall was observed at Sugar Pine and in the Sierra. The frontal passage occurred at Lincoln just after the 18 UTC sounding on 25 Feb and coincided well with the morning G-1 flight. During the event a tornado was reported NE of Sacramento at ~23 UTC on 25 Feb in an isolated, but severe convective cell. Orographic precipitation ended as strong southwesterly flow from the evening of 25 Feb became southerly, then weak easterly. Little precipitation was observed after ~08 UTC on 26 Feb

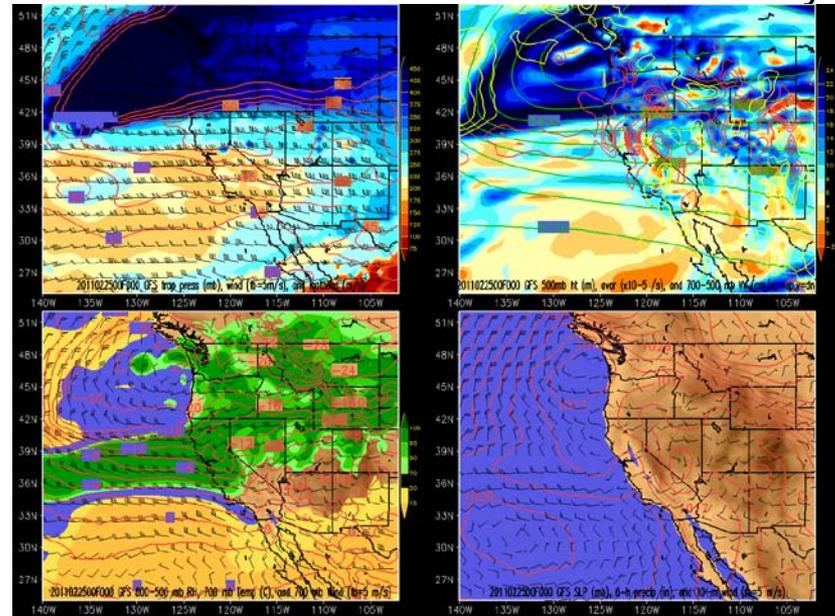
The images in the following slides provide additional context for the IOP.

# Synoptic Evolution

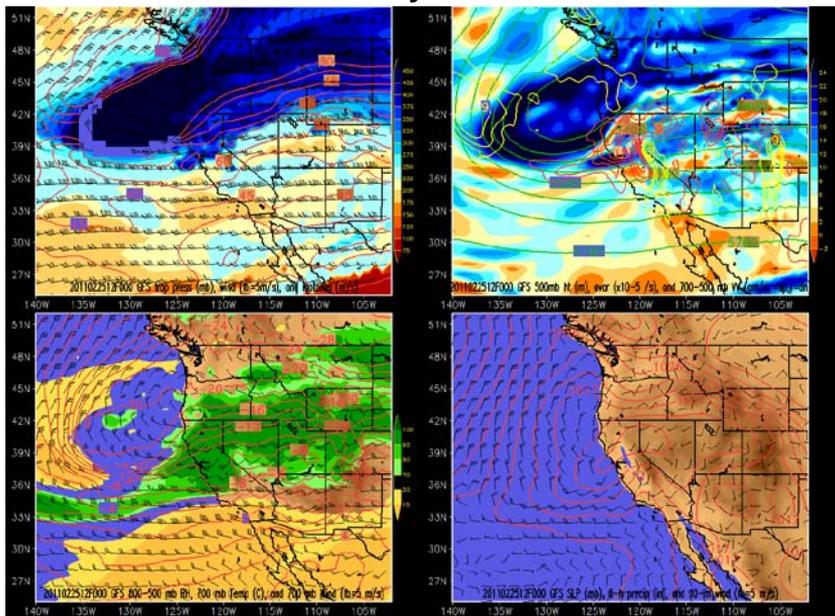
12 UTC 24 February



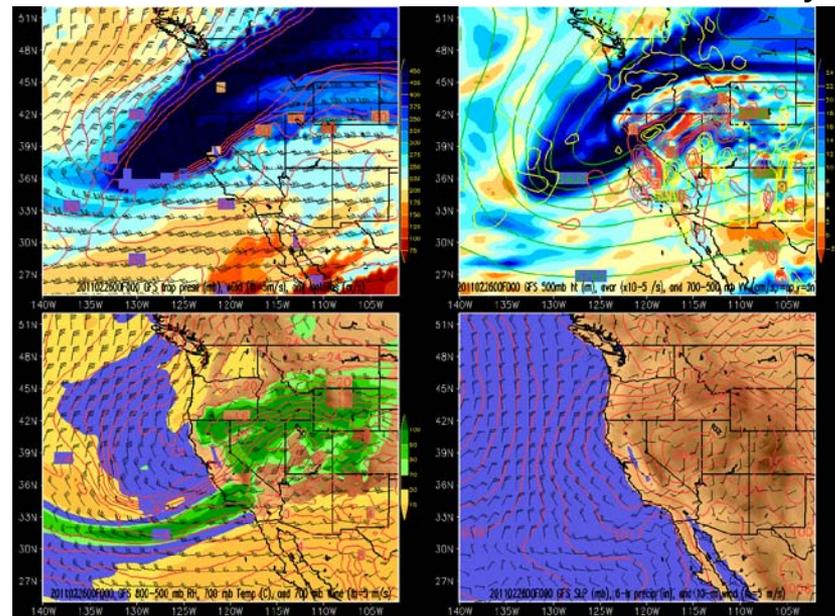
00 UTC 25 February



12 UTC 25 February

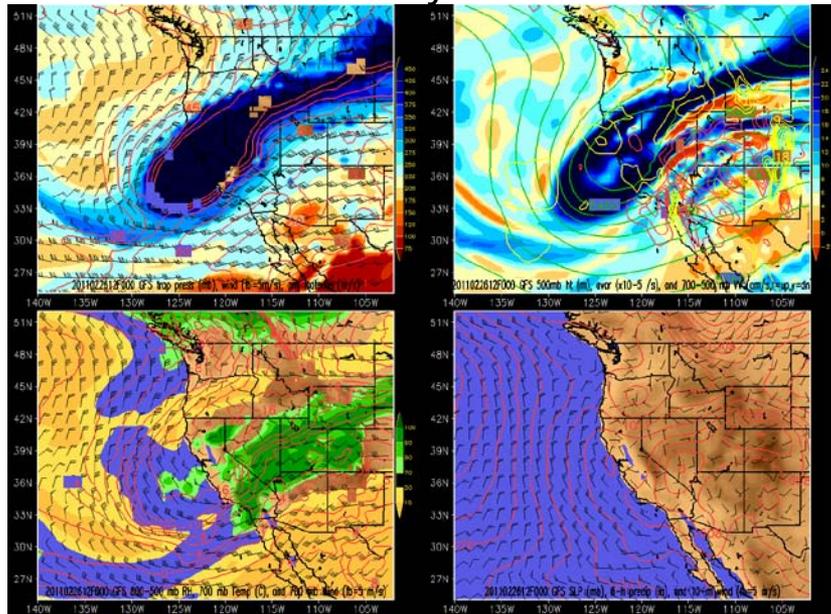


00 UTC 26 February

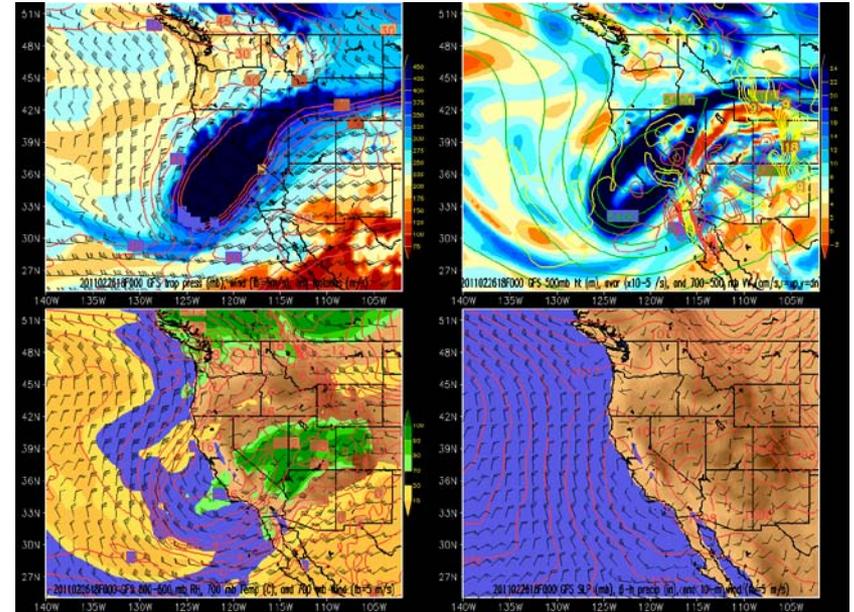


# Synoptic Evolution

12 UTC 26 February

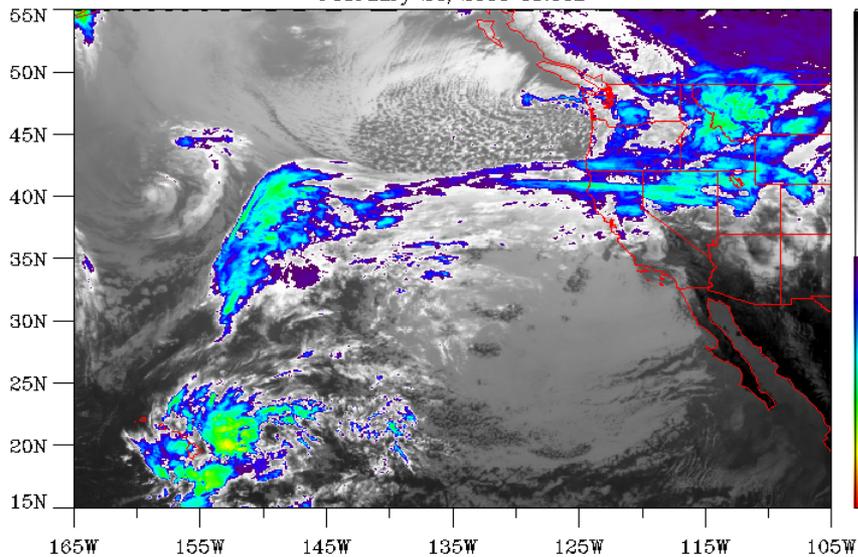


18 UTC 26 February

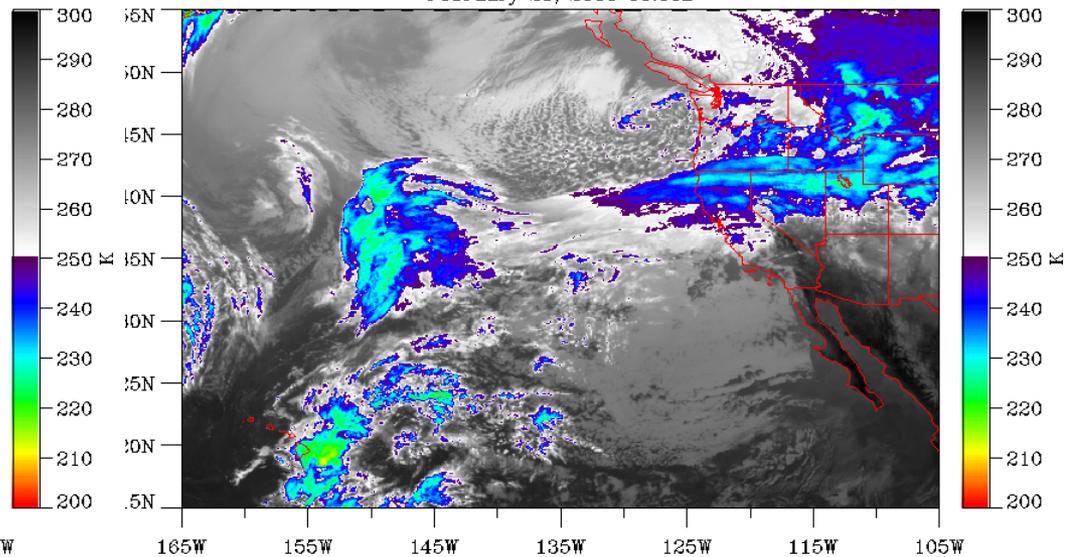


# IR Satellite Evolution

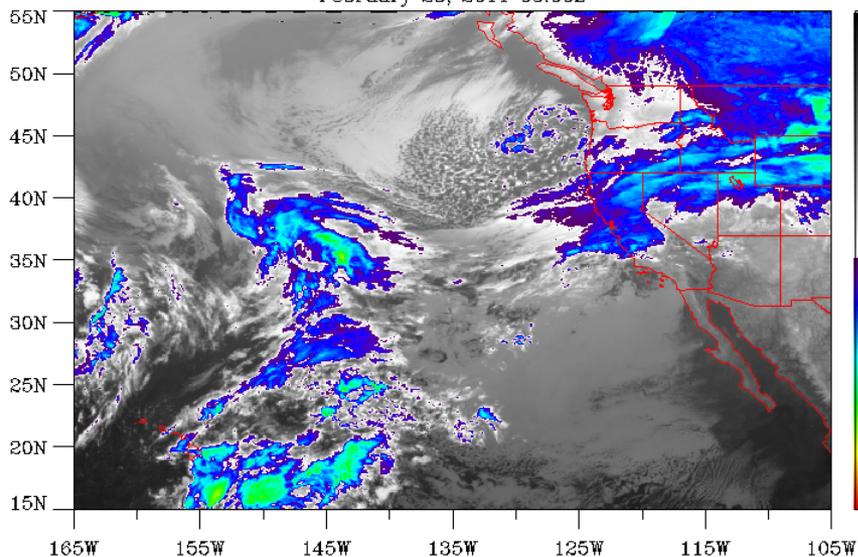
GOES-11 10.7 $\mu$ m Infrared Channel  
February 24, 2011 18:00Z



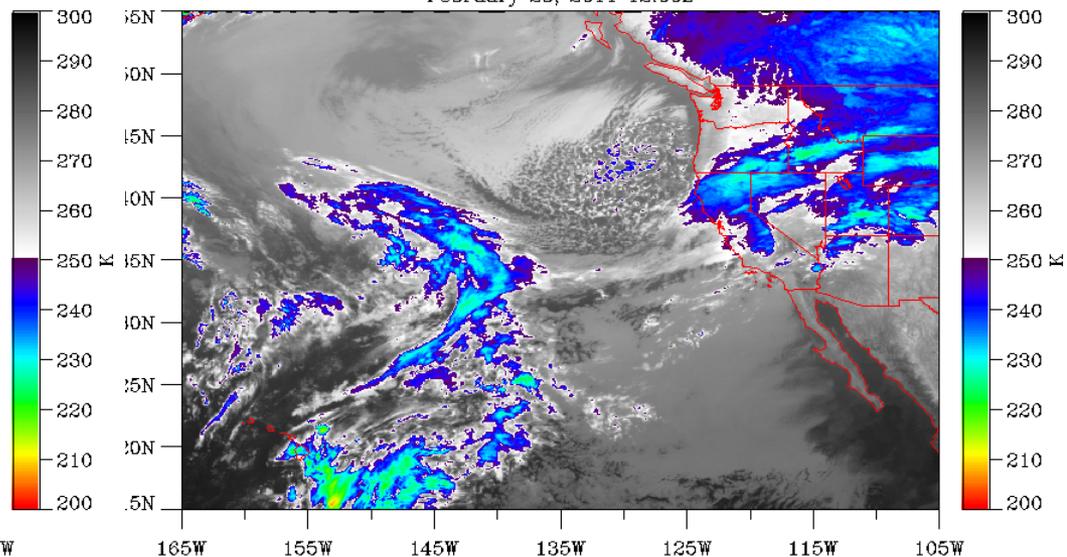
GOES-11 10.7 $\mu$ m Infrared Channel  
February 25, 2011 00:00Z



GOES-11 10.7 $\mu$ m Infrared Channel  
February 25, 2011 06:00Z

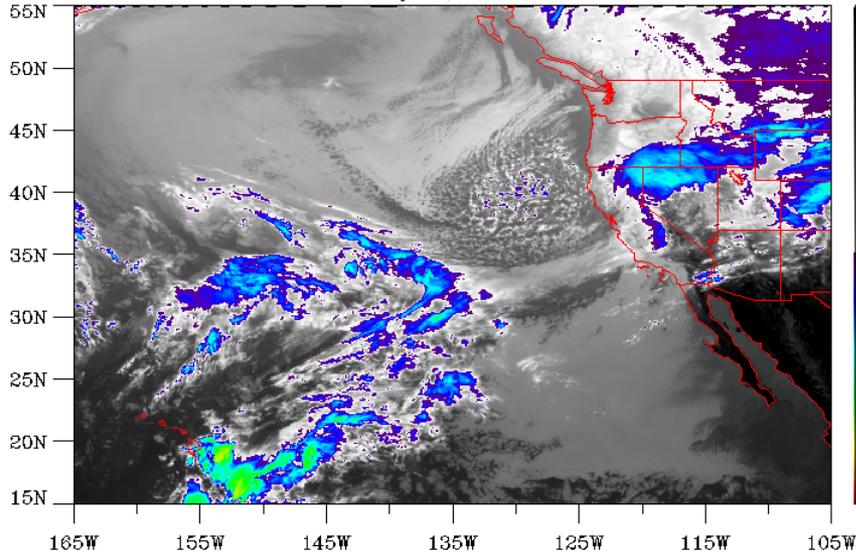


GOES-11 10.7 $\mu$ m Infrared Channel  
February 25, 2011 12:00Z

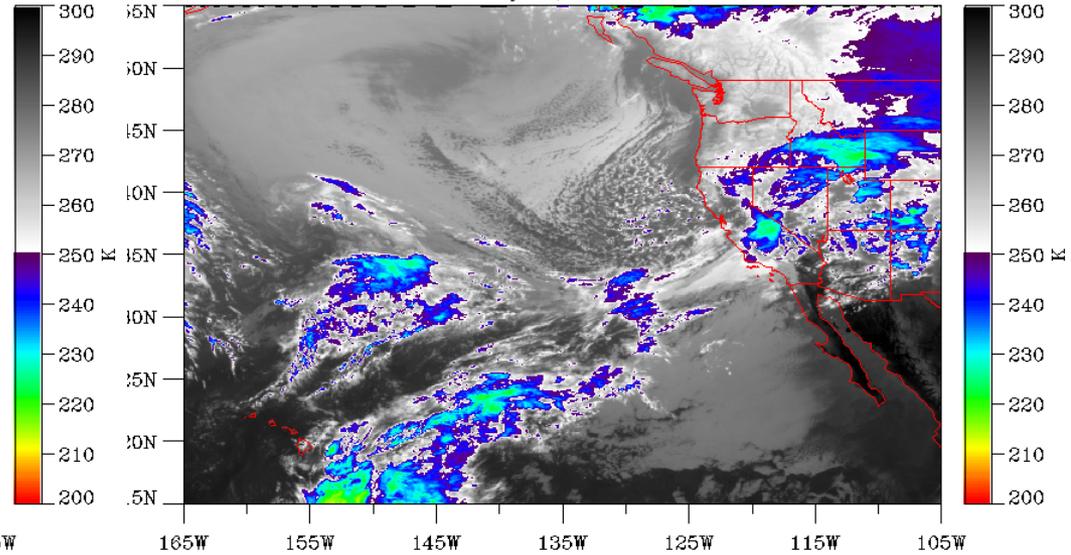


# IR Satellite Evolution

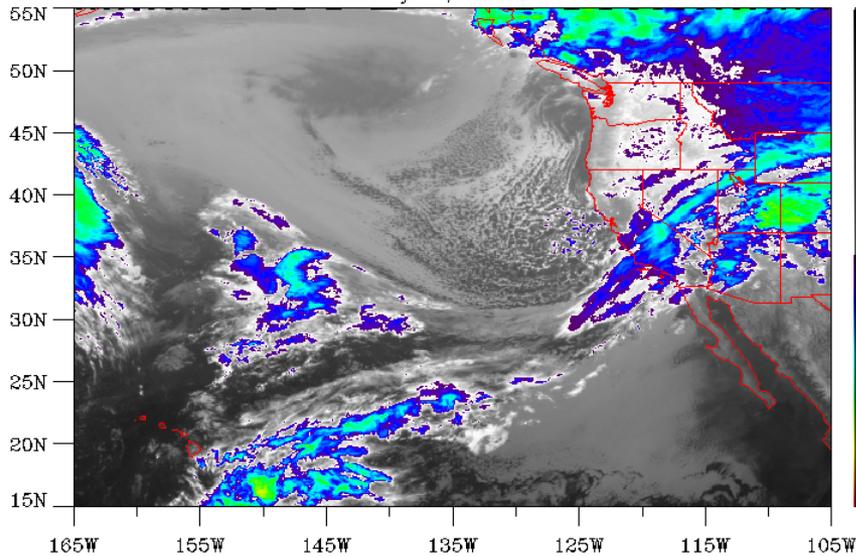
GOES-11 10.7 $\mu\text{m}$  Infrared Channel  
February 25, 2011 18:00Z



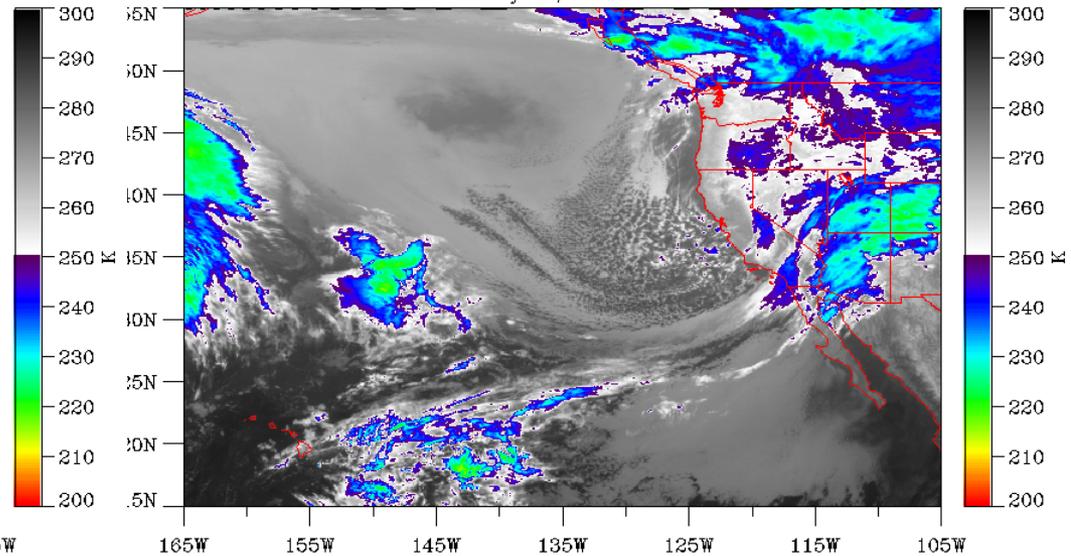
GOES-11 10.7 $\mu\text{m}$  Infrared Channel  
February 26, 2011 00:00Z



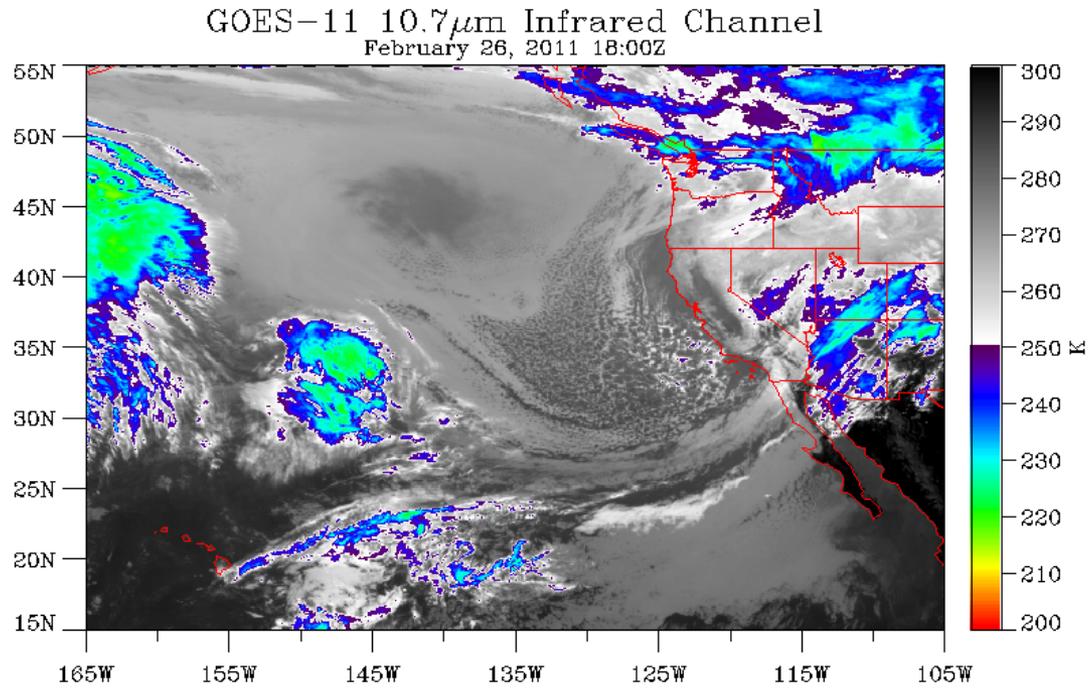
GOES-11 10.7 $\mu\text{m}$  Infrared Channel  
February 26, 2011 06:00Z



GOES-11 10.7 $\mu\text{m}$  Infrared Channel  
February 26, 2011 12:00Z

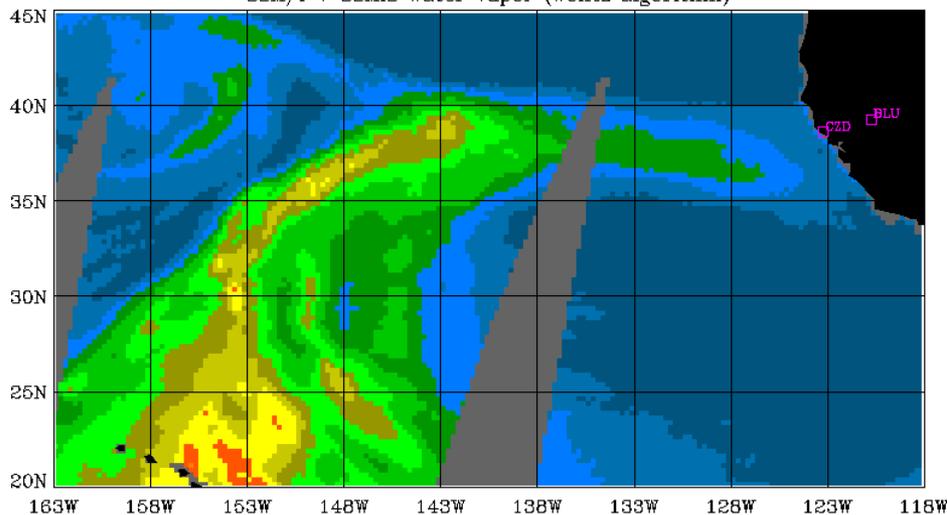


# IR Satellite Evolution

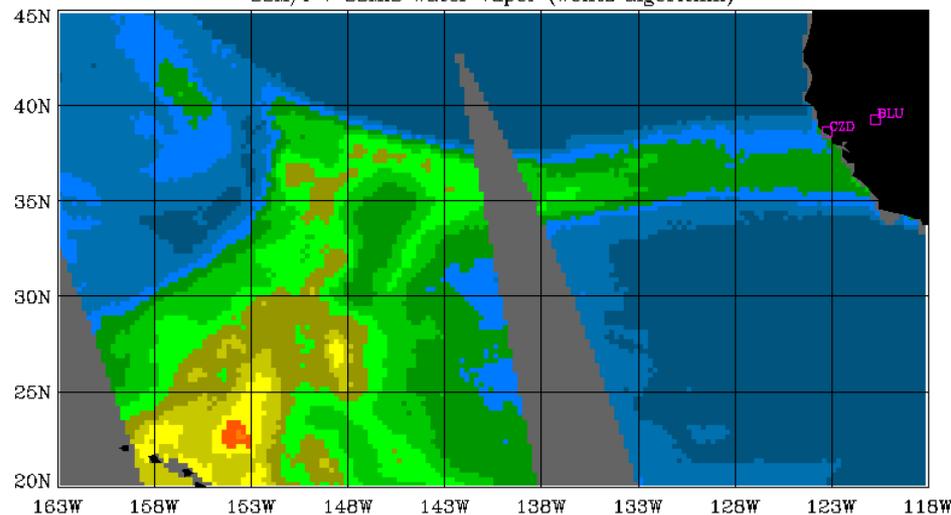


# SSMIS Satellite Evolution

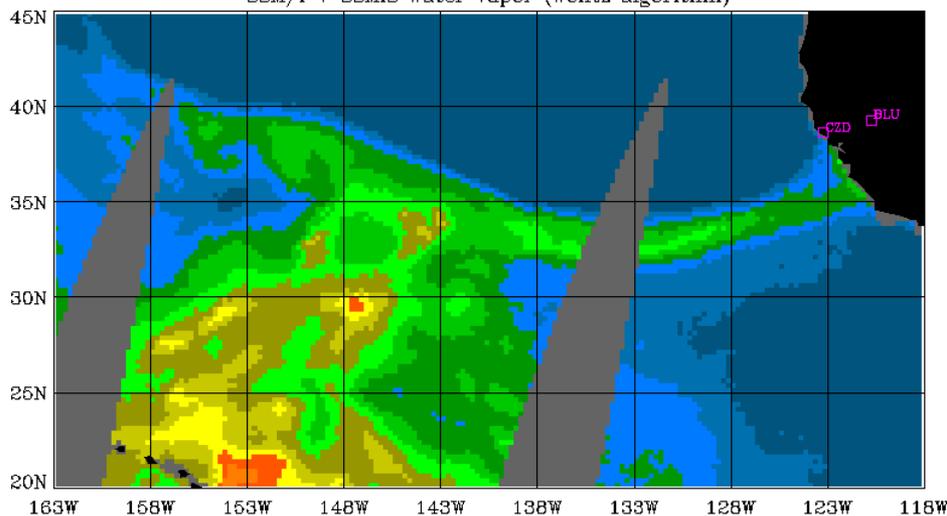
February 24, 2011 2100 UTC Preceding 12 Hours  
SSM/I + SSMIS Water Vapor (Wentz algorithm)



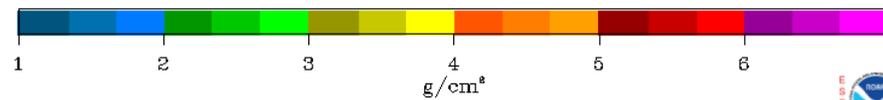
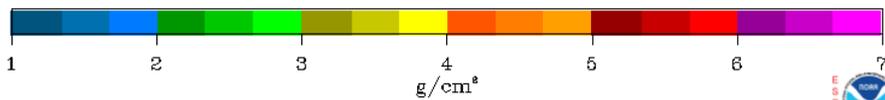
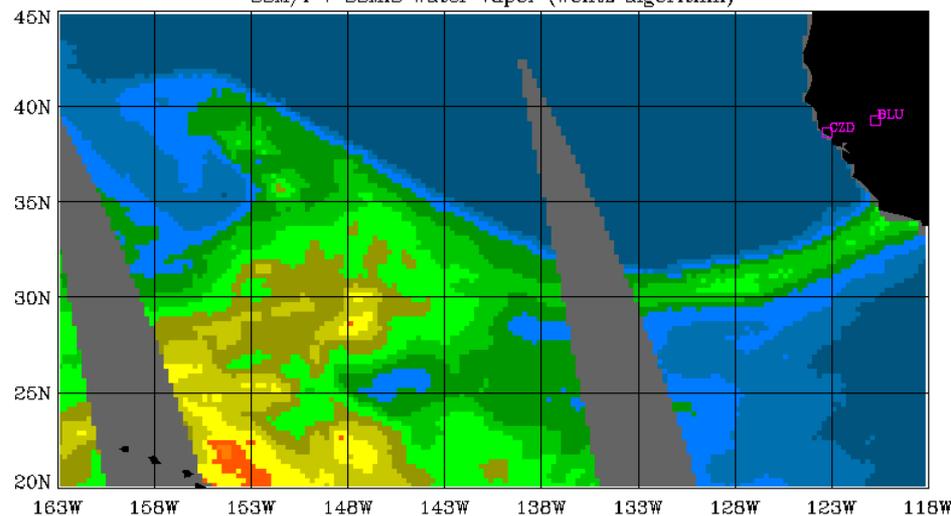
February 25, 2011 0900 UTC Preceding 12 Hours  
SSM/I + SSMIS Water Vapor (Wentz algorithm)



February 25, 2011 2100 UTC Preceding 12 Hours  
SSM/I + SSMIS Water Vapor (Wentz algorithm)

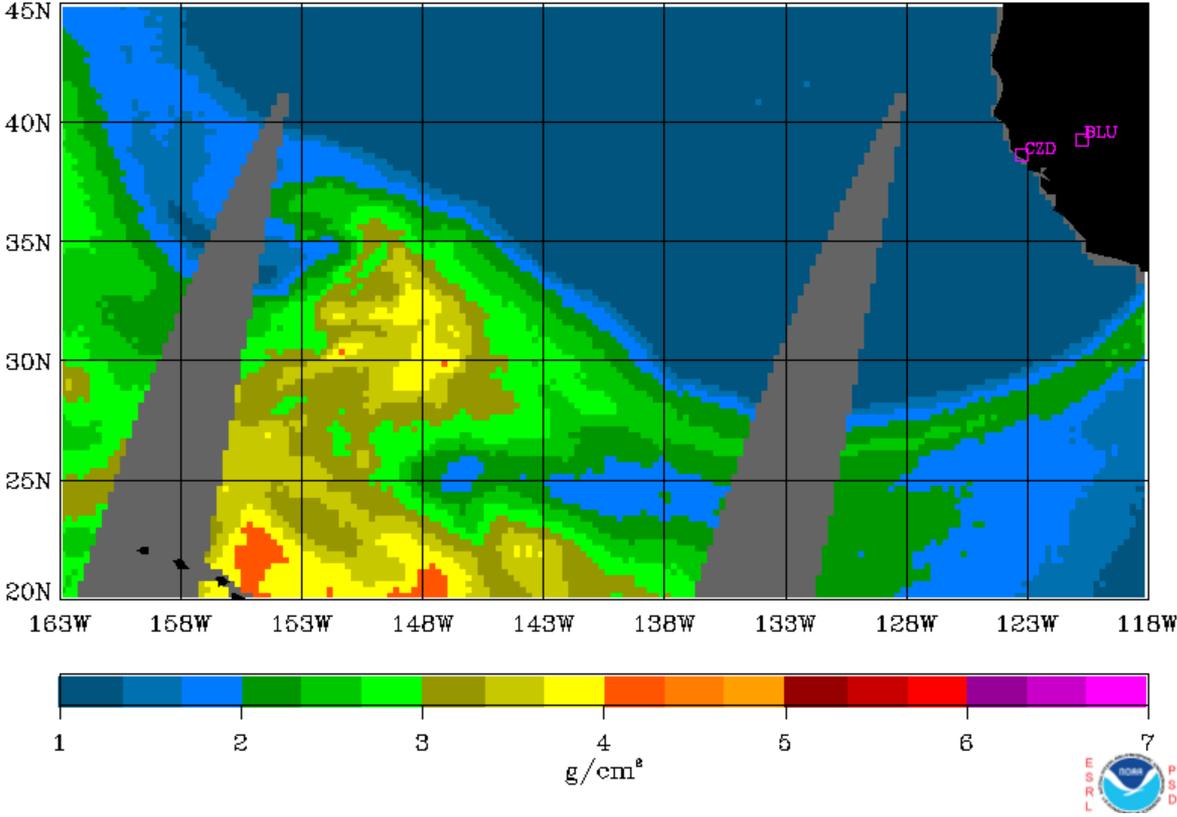


February 26, 2011 0900 UTC Preceding 12 Hours  
SSM/I + SSMIS Water Vapor (Wentz algorithm)



# SSMIS Satellite Evolution

February 26, 2011 2100 UTC Preceding 12 Hours  
SSM/I + SSMIS Water Vapor (Wentz algorithm)



# Winds and Water Vapor Flux @ Bodega Bay

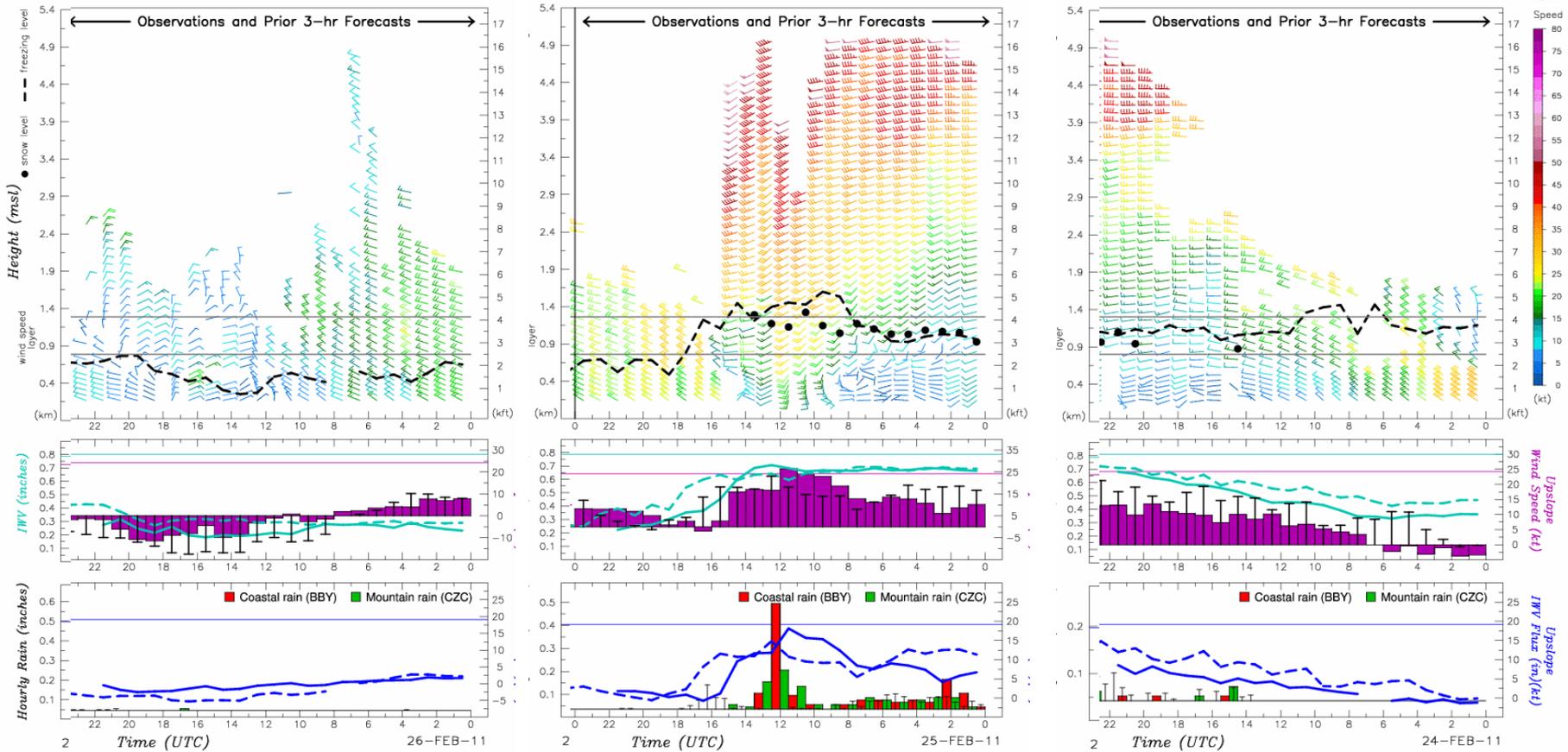
ESRL Physical Sciences Division  
 Coastal Atmospheric River Monitoring and Early Warning System  
 Model forecast provided by the ESRL Global Systems Division



26 February

25 February

24 February



Bodega Bay, CA (BBY)  
 38.32 N, 123.07 W, 12 m  
 Cazadero, CA (CZC)  
 38.61 N, 123.22 W, 475 m

Upslope Wind Direction = 230 deg.

# Winds and Water Vapor Flux @ Sloughouse

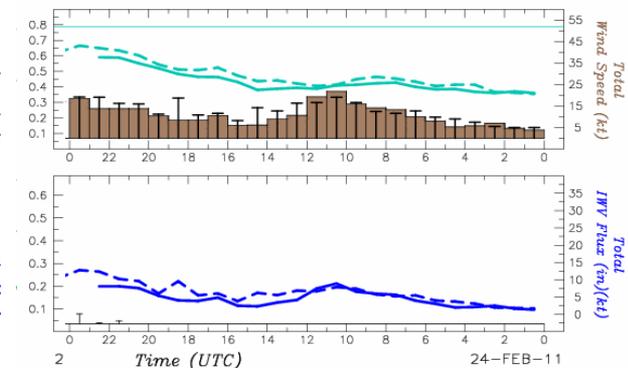
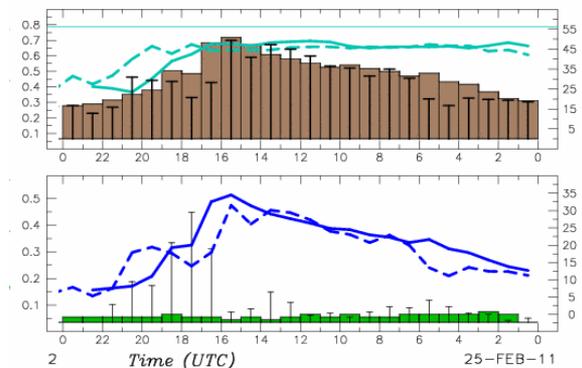
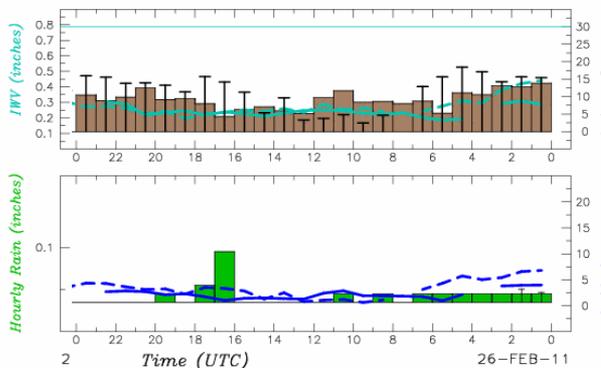
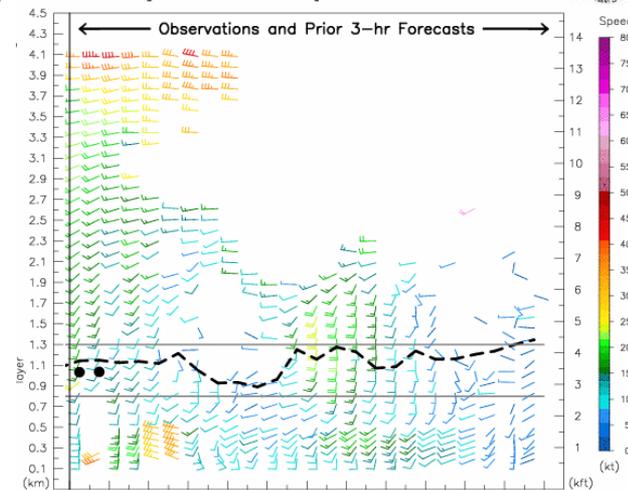
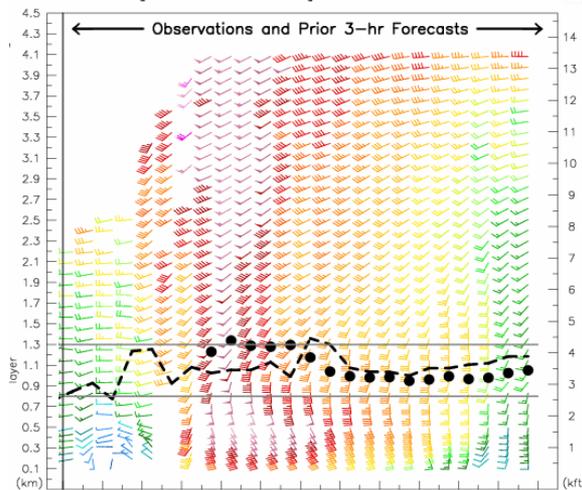
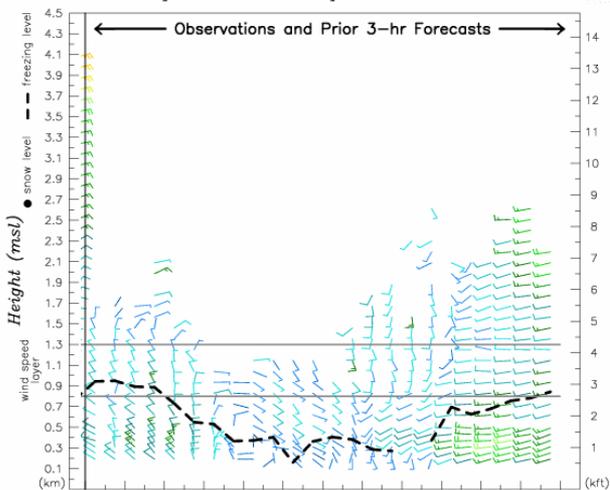
ESRL Physical Sciences Division  
 Coastal Atmospheric River Monitoring and Early Warning System  
 Model forecast provided by the ESRL Global Systems Division



26 February

25 February

24 February



Sloughouse, CA (SHS)  
 38.50 N, 121.21 W, 50 m

# Vertical Precipitation Structure @ Cazadero

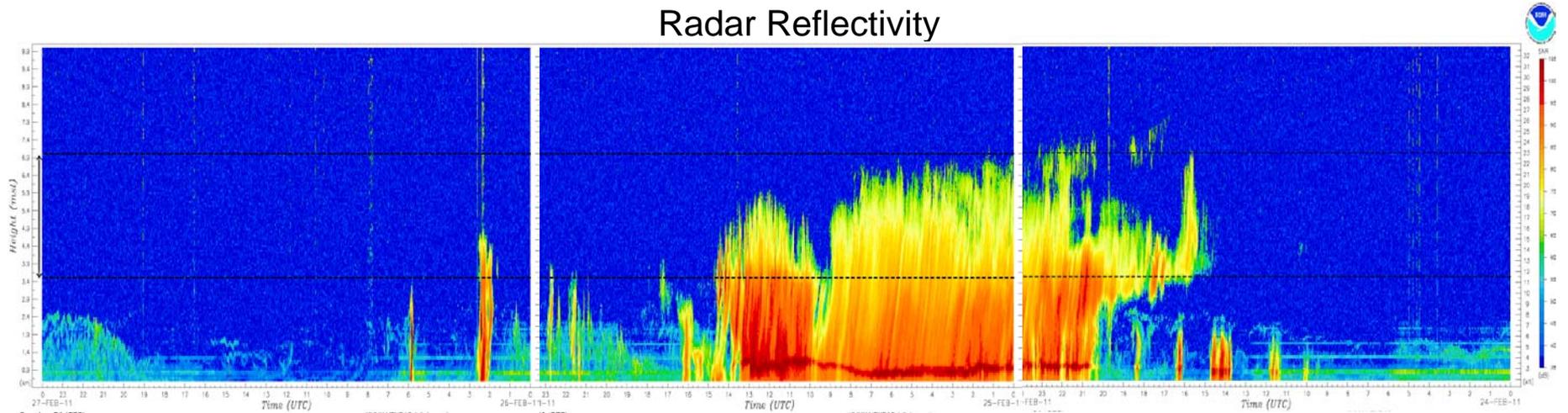
ESRL Physical Sciences Division  
Precipitation Profiling Radar

26 February

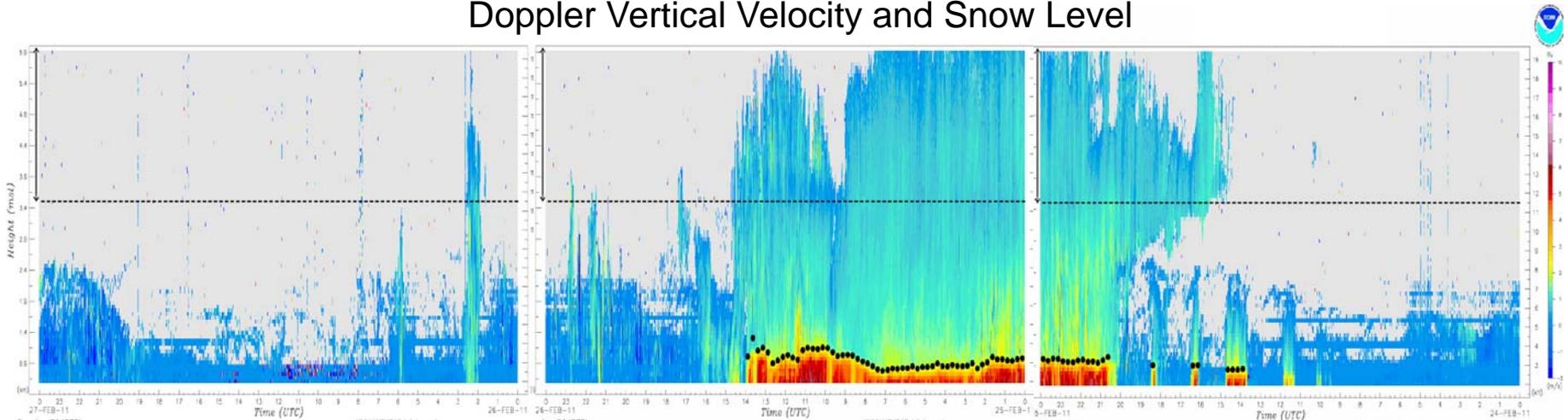
25 February

24 February

Radar Reflectivity



Doppler Vertical Velocity and Snow Level



Cazadero, CA (CZC)  
38 61 N 123 22 W 475 m

--- KMUX NEXRAD 0.5 degree beam  
● Snow Level

# Vertical Precipitation Structure @ Sugar Pine

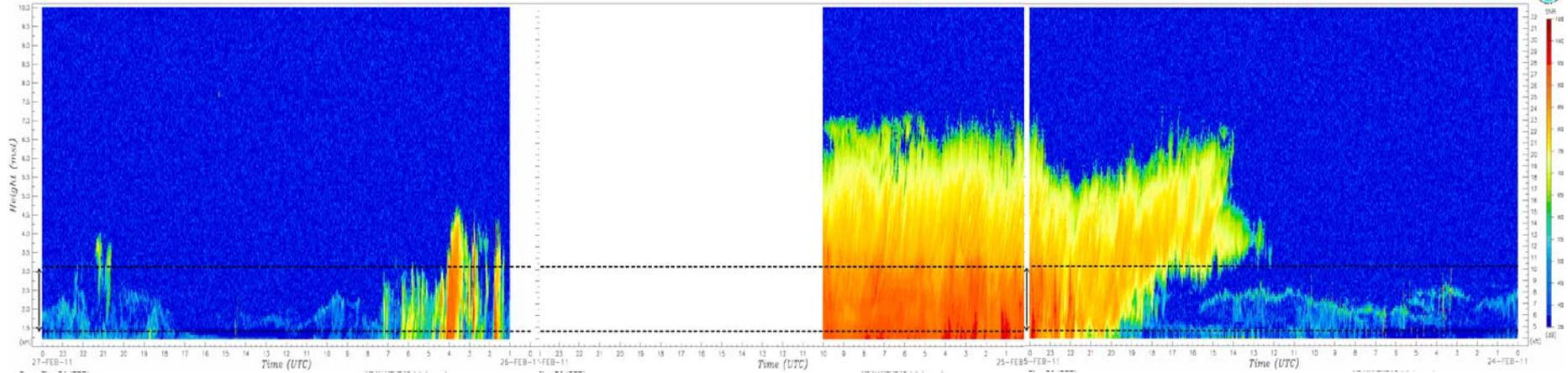
ESRL Physical Sciences Division  
Precipitation Profiling Radar

26 February

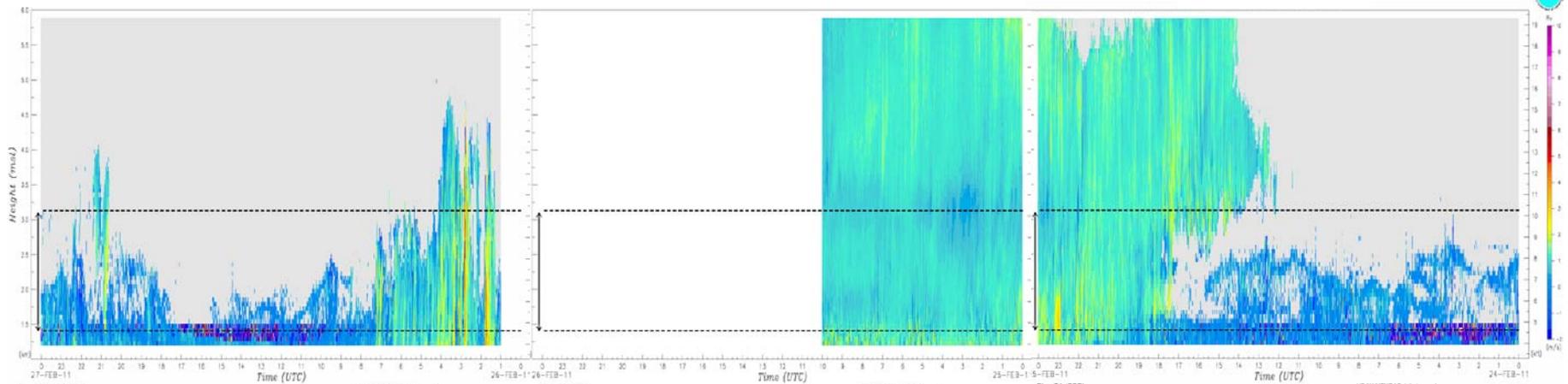
25 February

24 February

Radar Reflectivity



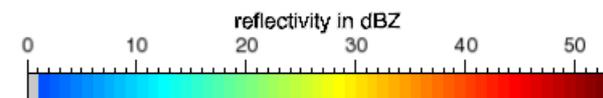
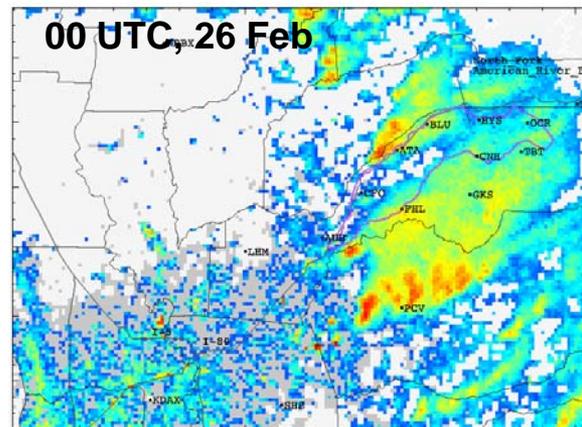
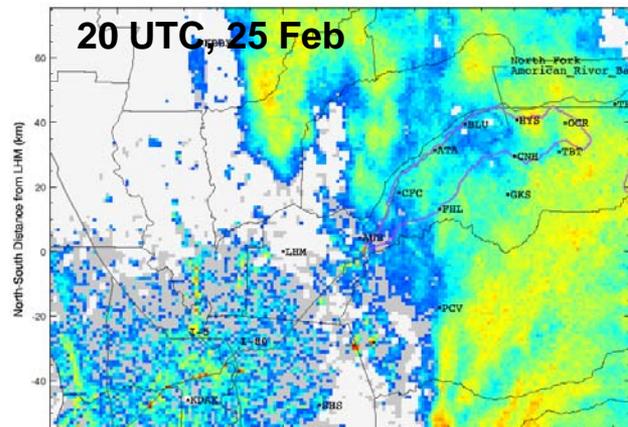
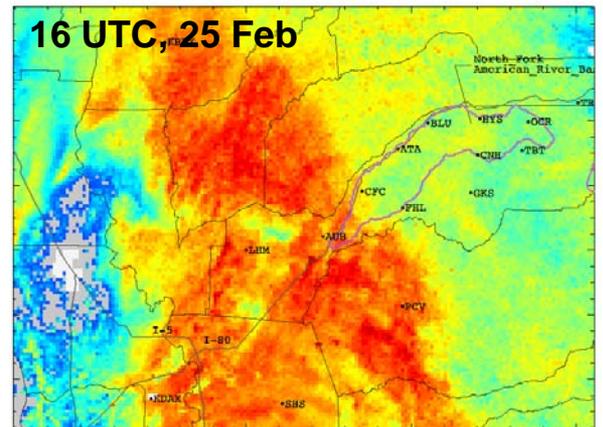
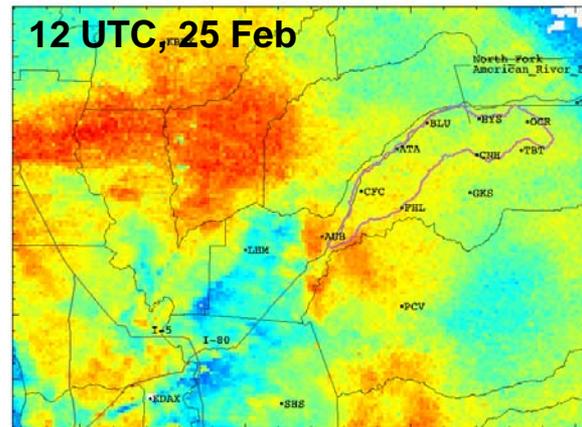
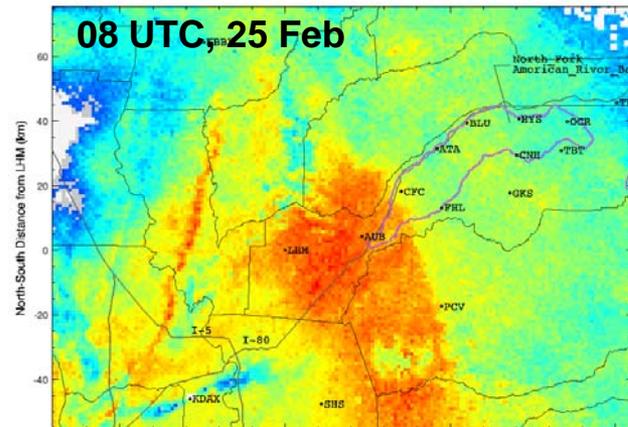
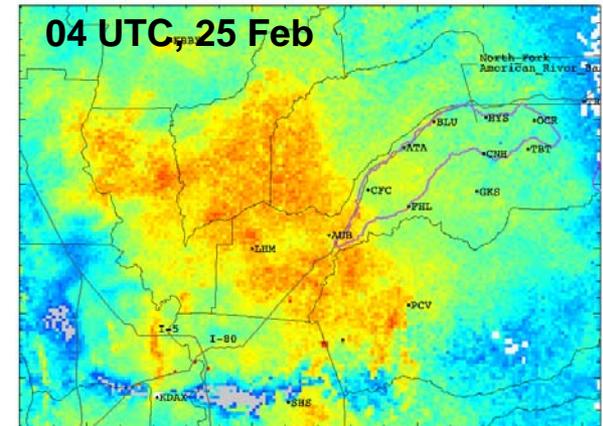
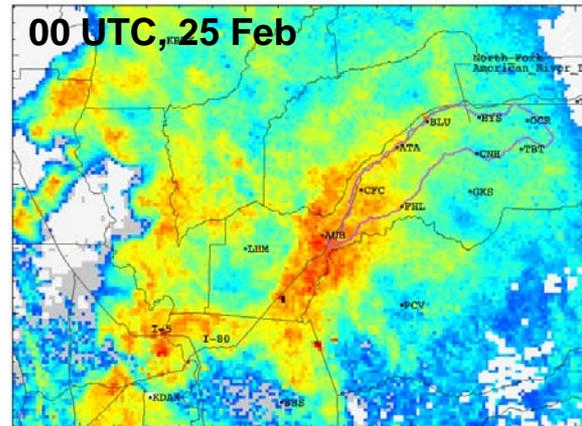
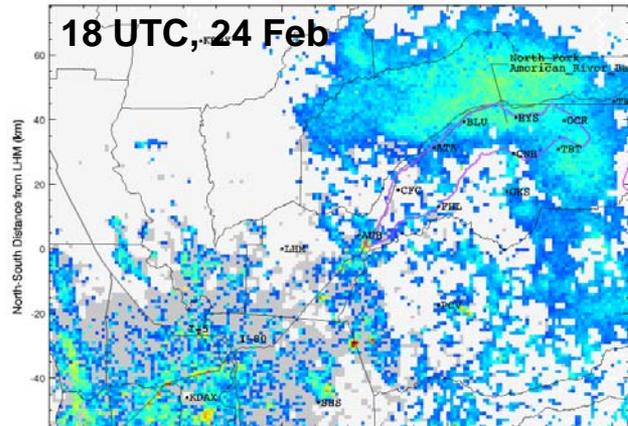
Doppler Vertical Velocity and Snow Level



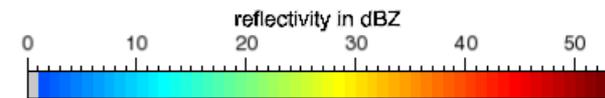
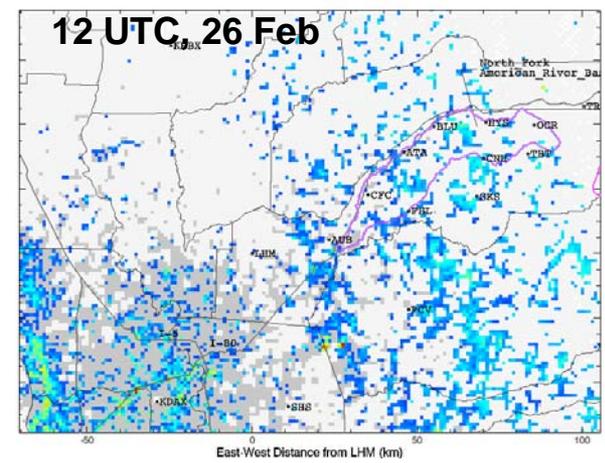
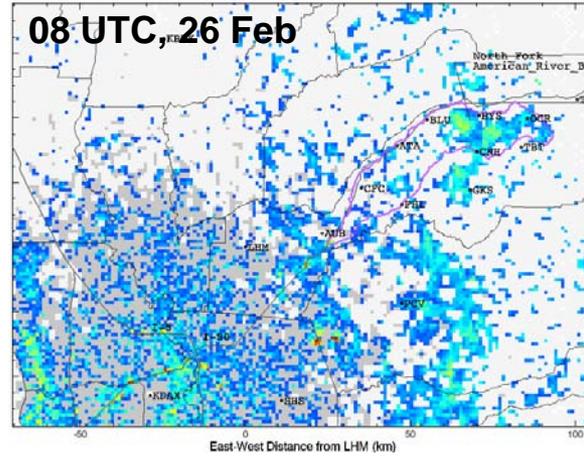
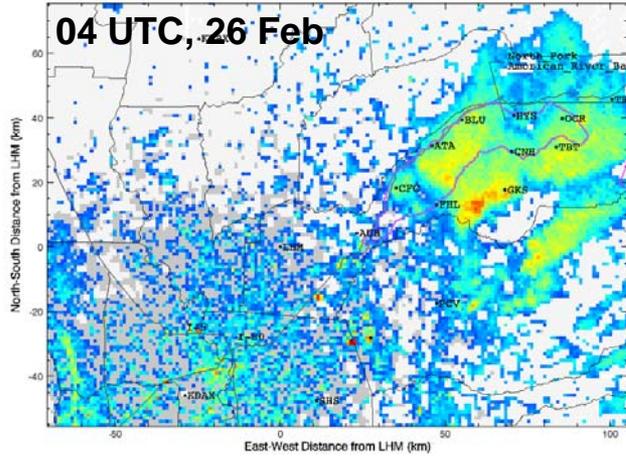
Sugar Pine, CA (SPD)  
39.13 N, 120.80 W, 1066 m

--- KDEX NEXRAD 0.9 degree beam  
● Snow Level

# KDAX Radar Reflectivity Evolution

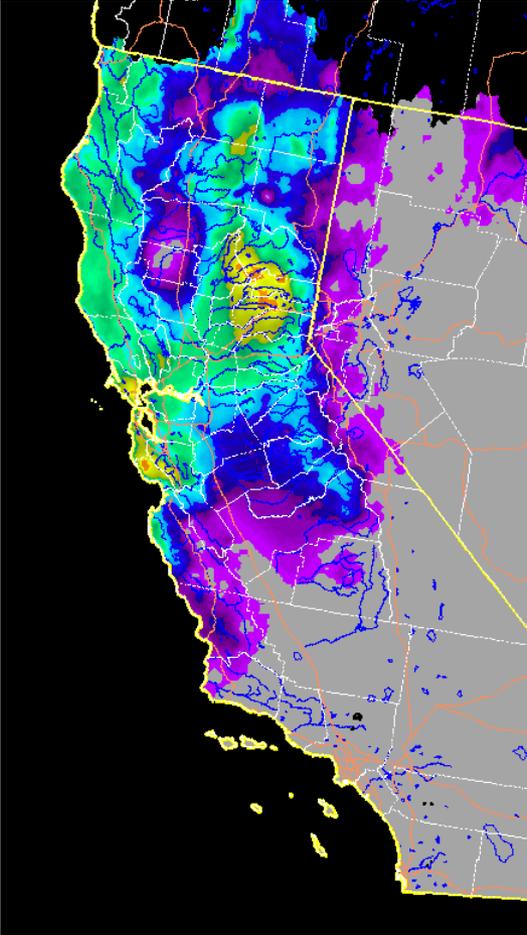


# KDAX Radar Reflectivity Evolution

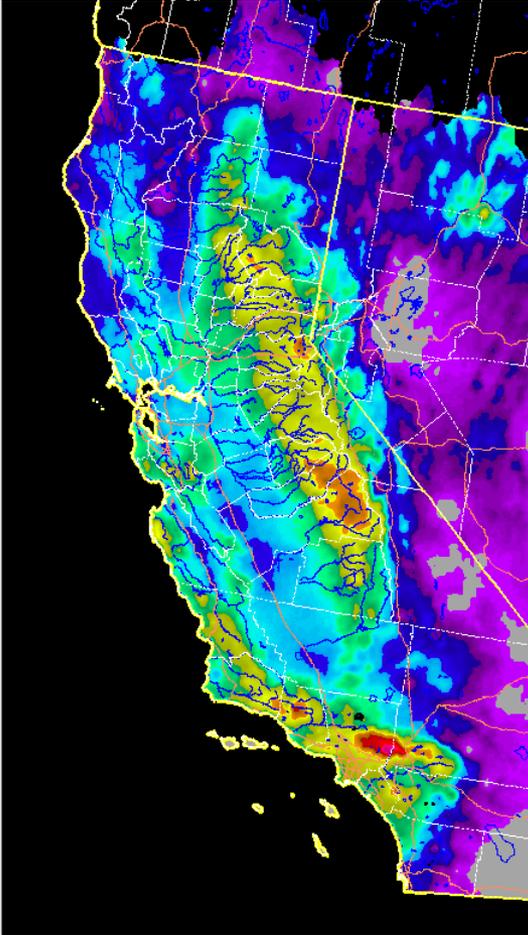


# CNRFC Precipitation Gauge + Mtn. Mapper QPE

24 h ending  
12 UTC 25 Feb



24 h ending  
12 UTC 26 Feb



24 h ending  
12 UTC 27 Feb

