

HMT-West 2008
Summary of IOP 5
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IOP5 Start 8 Jan 12UTC
IOP5 End 9 Jan 05UTC

Non-autonomous Instrument Operations Summary:

- ESRL HYDROX Radar began operations 8Jan/1530UTC, shut down 9 Jan/05UTC. Crews had the radar site plowed on 7 Jan and were able to deploy early on 8 Jan. The forecast was for primarily a snow event at the radar site with freezing levels slowly rising from 3500ft to 5000ft. Frontal passage occurred midday on 8 Jan. Snow began at 8Jan/17UTC turning heavy by 19UTC. An intense band moved through with the front about 19-20UTC. After that much of the precipitation was showery. BLU recorded about 10 inches of new snow at an estimated ratio of 5 or 6 to 1. This put the liquid equivalent between 1 and 2 inches. The snowplow driver cleared the road Tuesday night and crew was able to shut down radar after the 9 Jan 05UTC observation and return to Auburn.
- Slough House sondes and special RAOBS from OAK and RNO began at 8 Jan/12UTC at three-hour intervals. More frequent releases were warranted owing to the speed of the system, its spatial scale, and the short time period of the IOP. Sondes were launched successfully at all three sites through 9 Jan 03UTC.

Autonomous Instrument Operations Summary:

- Cazadero was out through the duration of IOP5
- BLU surface site was down for the duration of IOP5.
- All other sites appeared to remain up and operative during the event.

Weather Overview

IOP5 was brought on by a fast moving short wave trough following close on the heels of the last major trough of IOP 4. The system was a disturbance superimposed on the Gulf of Alaska low. Winds at OAK at 8 Jan 12UTC were 65kts at 500MB. This storm maintained a connection to a moisture plume or IPW river of weak to moderate intensity. This feature tracked down the coast during the approach of the trough pushing inland far enough to create a period of intense precipitation. Thicknesses were already low ahead of this storm accounting for the low freezing levels. A moderate pressure gradient along the Central Valley produced barrier jet like winds but much less intense than IOP 4. Snow began in the ARB at 8 Jan 17UTC and intensified with maximum intensity reached between 19-20UTC. BLU experienced all snow. This event was excellently predicted by NWP guidance, the HPC, NWS WFOs and the ESRL HMT forecast staff.

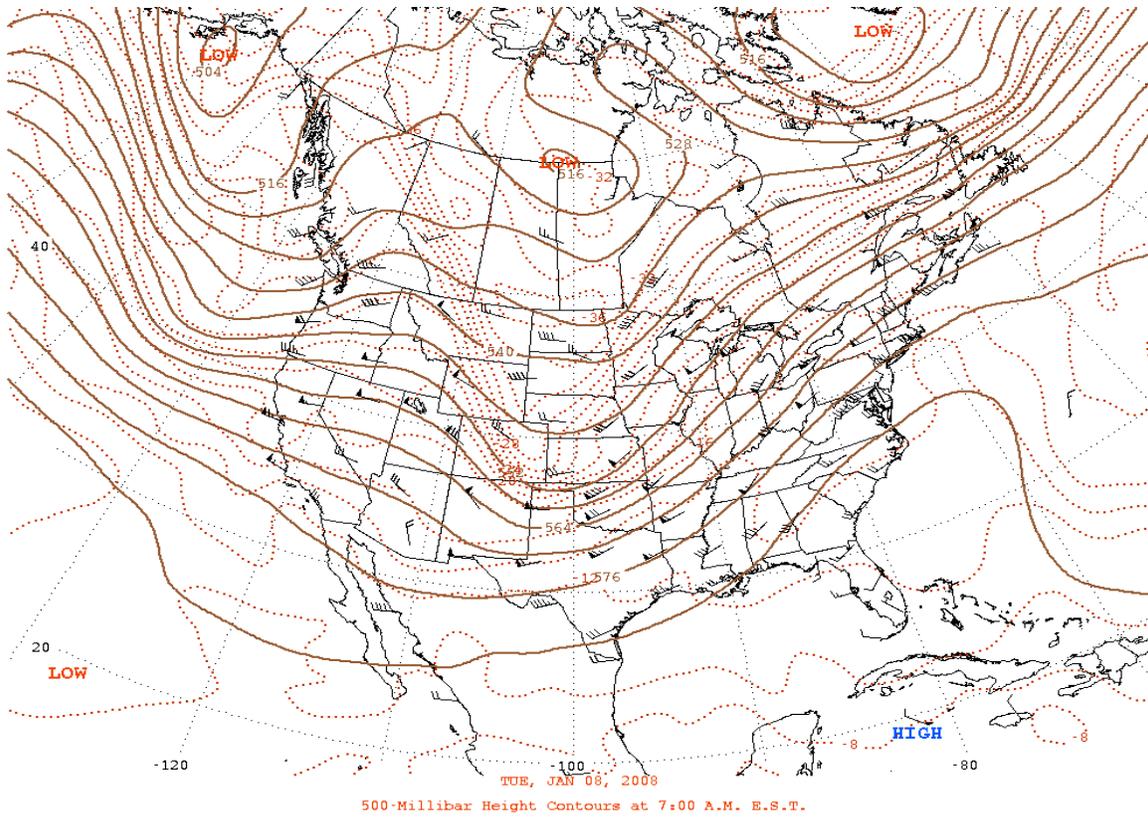


Fig 1: 500 MB analysis for 8 Jan 12UTC showing the trough that brought about IOP5. Trough was fast moving and fairly low amplitude.

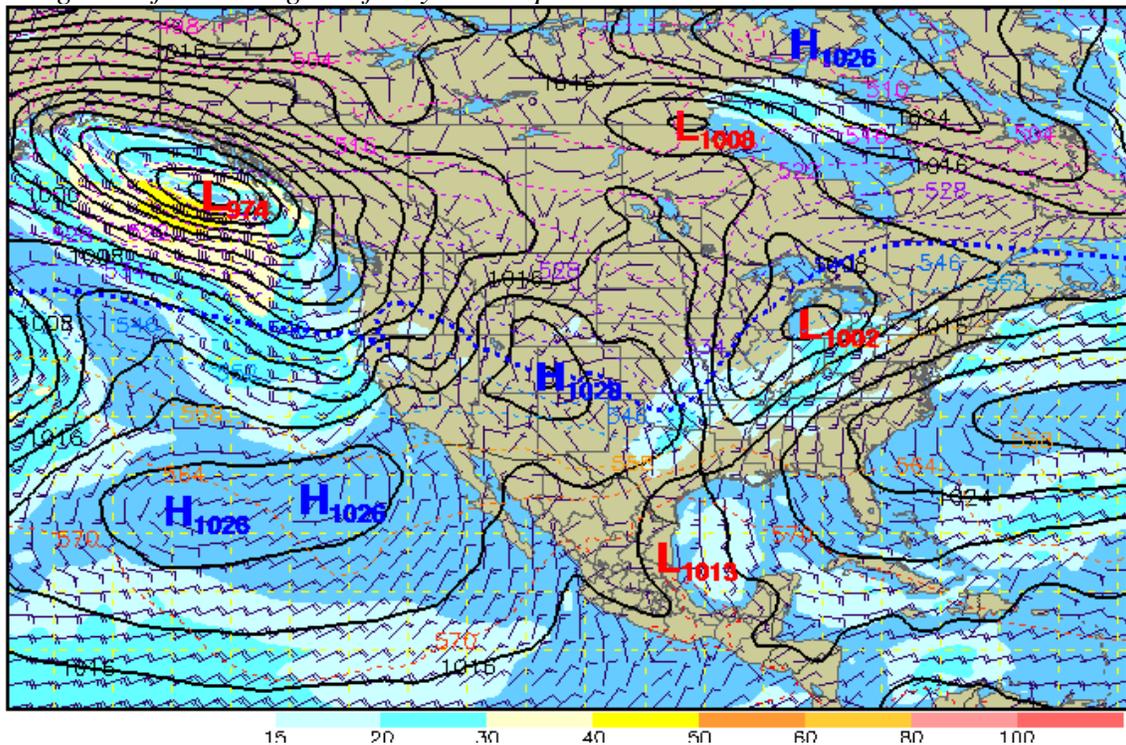


Fig 2 Surface analysis for 8 Jan 12UTC showing trough of IOP 5 associated with a deep low in the Gulf of Alaska.

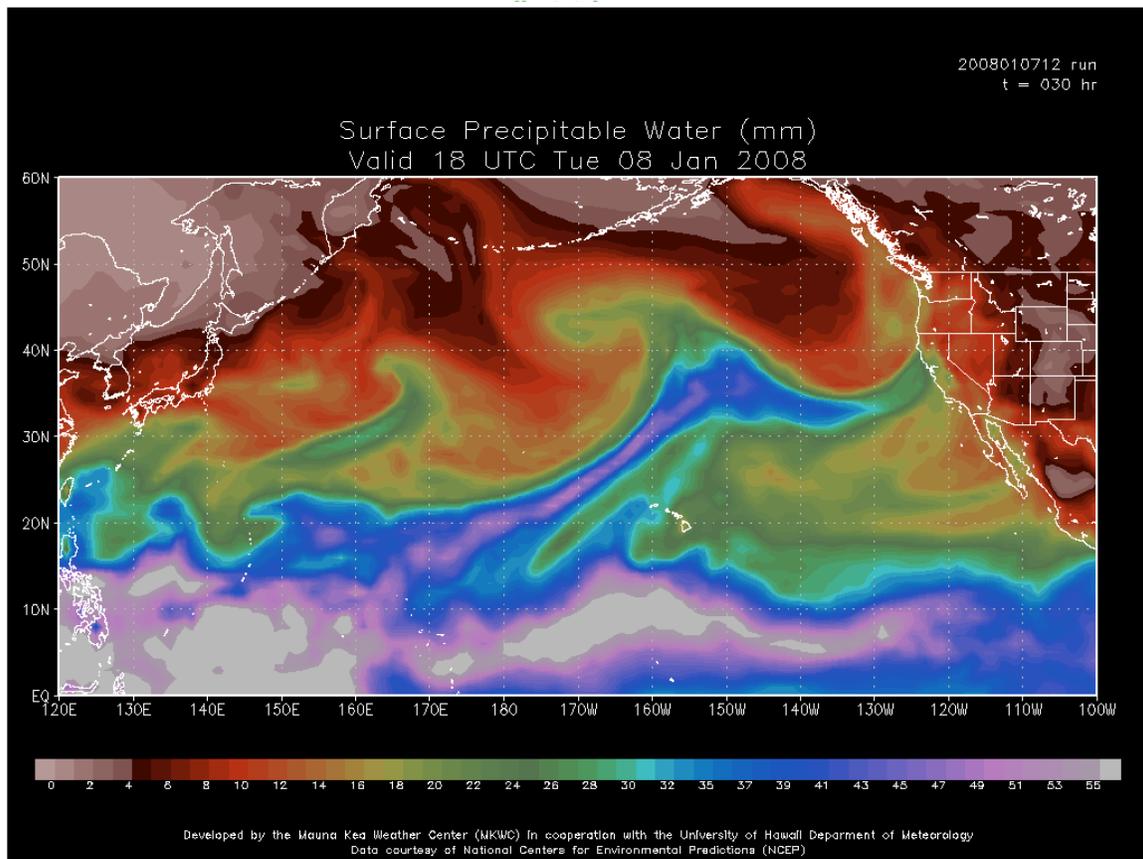


Fig. 3: 30 hour forecast of IPW for 18UTC 8 Jan to characterize the IPW river associated with the trough development. The subtropical moisture band was not directly connected to the tropics but caught up in an offshore wave at 170W. Predicted IPW values were 26mm offshore and 20mm onshore

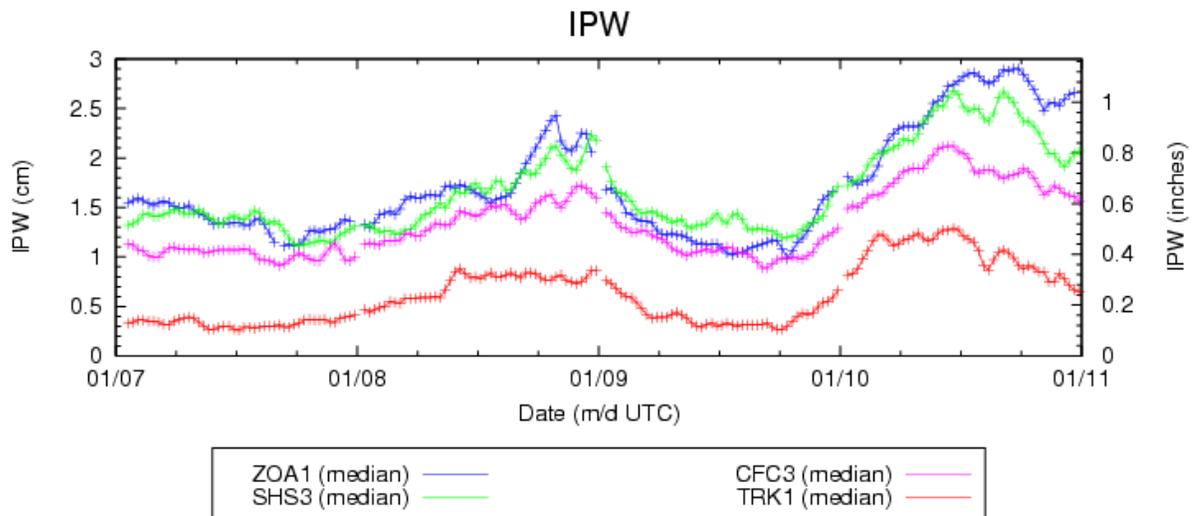
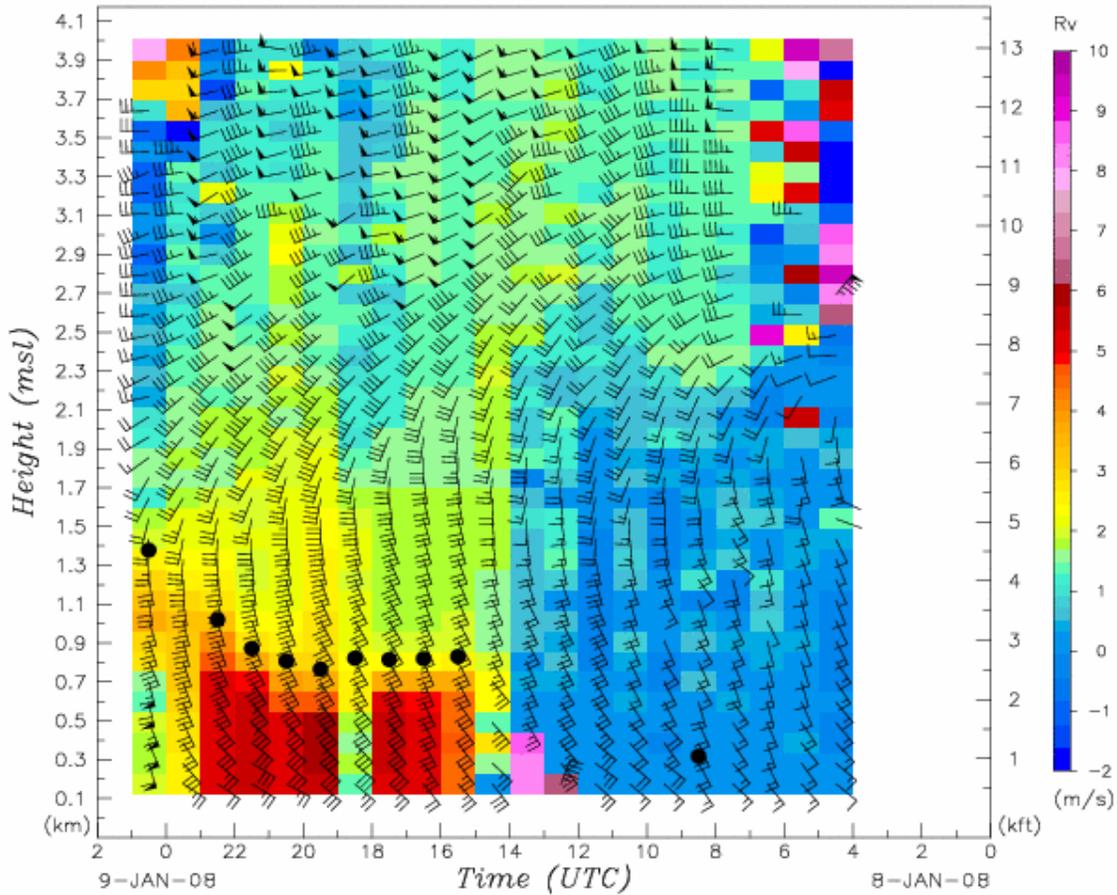


Fig 4. IPW time series from Fremont, CA (ZOA1) near Oakland, CA and three sites to the Northeast of Fremont. From West to East, these sites are Sloughouse, CA (SHS3), Colfax, CA(CFC3), and Truckee, CA (TRK1). Moisture values were 20-24mm in the

Central Valley (GFS forecast was quite good). Note that moisture had a minor increase for IOP5, but a larger increase on 10 Jan as the ridge moved in from the west. The moisture influx produced only light precipitation over the ARB on the 10-11th owing to the weakness of the wave and warm advection dynamics.

ESRL Physical Sciences Division Wind Profiling Radar



Chico, CA (CCO)
39.69 N, 121.91 W, 41 m

● SNOW LEVEL

Time (UTC)	0030	2330	2230	2130	2030	1930	1830	1730	1630	1530	1430	1330
Snow Level (m)	1378	none	1021	872	808	766	822	815	820	831	none	none
Snow Level (ft)	4519	none	3348	2860	2650	2512	2696	2673	2689	2725	none	none
Sfc Temp (C)	6.49	5.95	5.93	5.98	6.42	6.80	6.87	6.46	6.40	7.28	7.69	7.60

Time (UTC)	1230	1130	1030	0930	0830	0730	0630	0530	0430	0330	0230	0130
Snow Level (m)	none	none	none	none	318	none	none	none	none			
Snow Level (ft)	none	none	none	none	1043	none	none	none	none			
Sfc Temp (C)	7.80	8.02	7.70	7.54	7.56	7.67	7.23	6.84	6.64	6.66	5.23	5.71

Figure 5. Profiler winds and reflectivity at Chico for 8-9 Jan for IOP 5. Note sharp rise of melting layer as the front approached. It appeared that the front was more of a warm occlusion. Heaviest precipitation at Chico was between 8 Jan 19 and 20UTC.

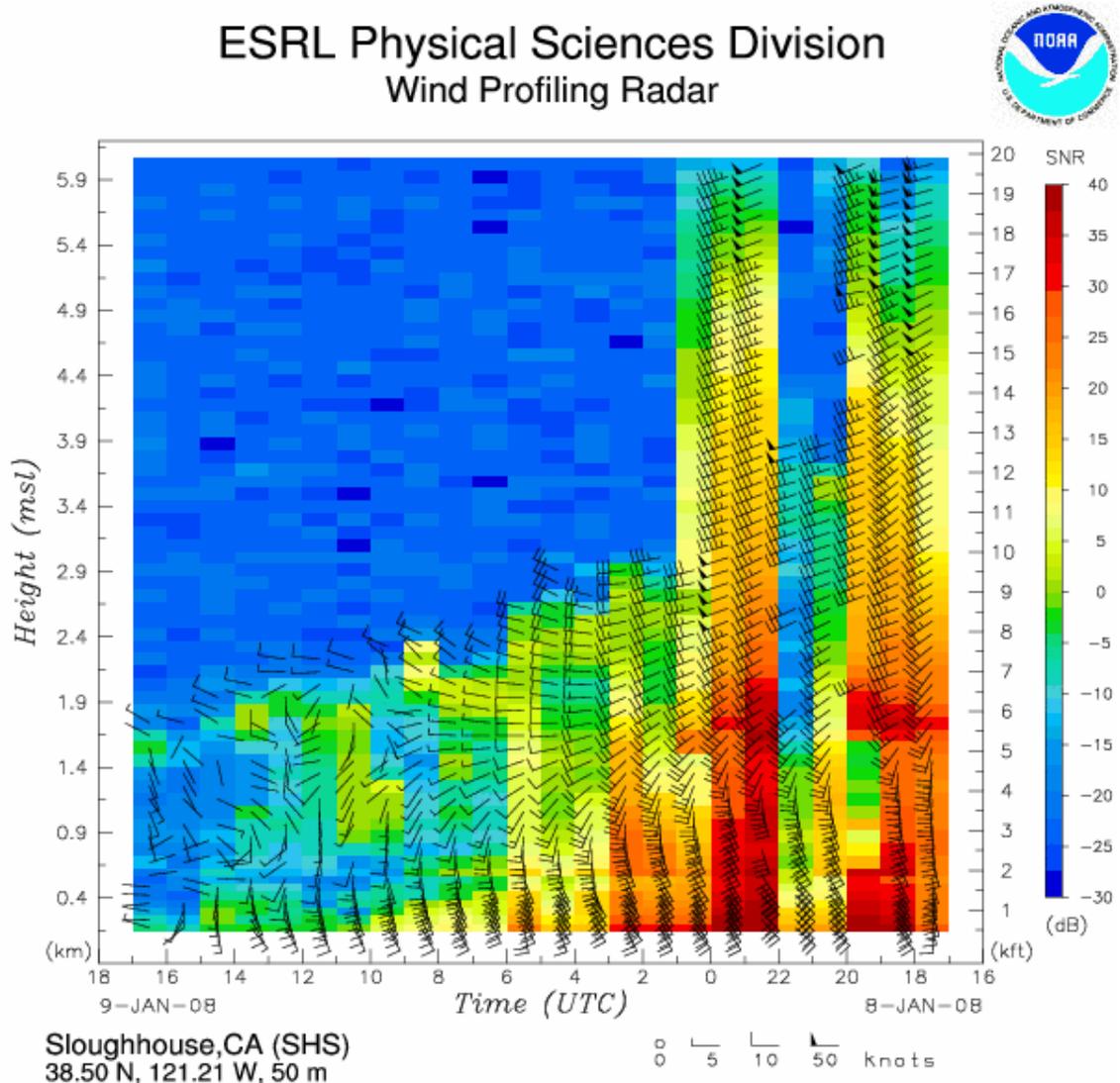


Fig 5. Time series of SHS wind profile and reflectivity. Freezing level (at gradient in reflectivity) looks to be initially 6500ft descending to about 5000ft after 9 Jan 01UTC. Winds show a moderate upslope component 20-00UTC with a barrier jet evident below 4000ft.

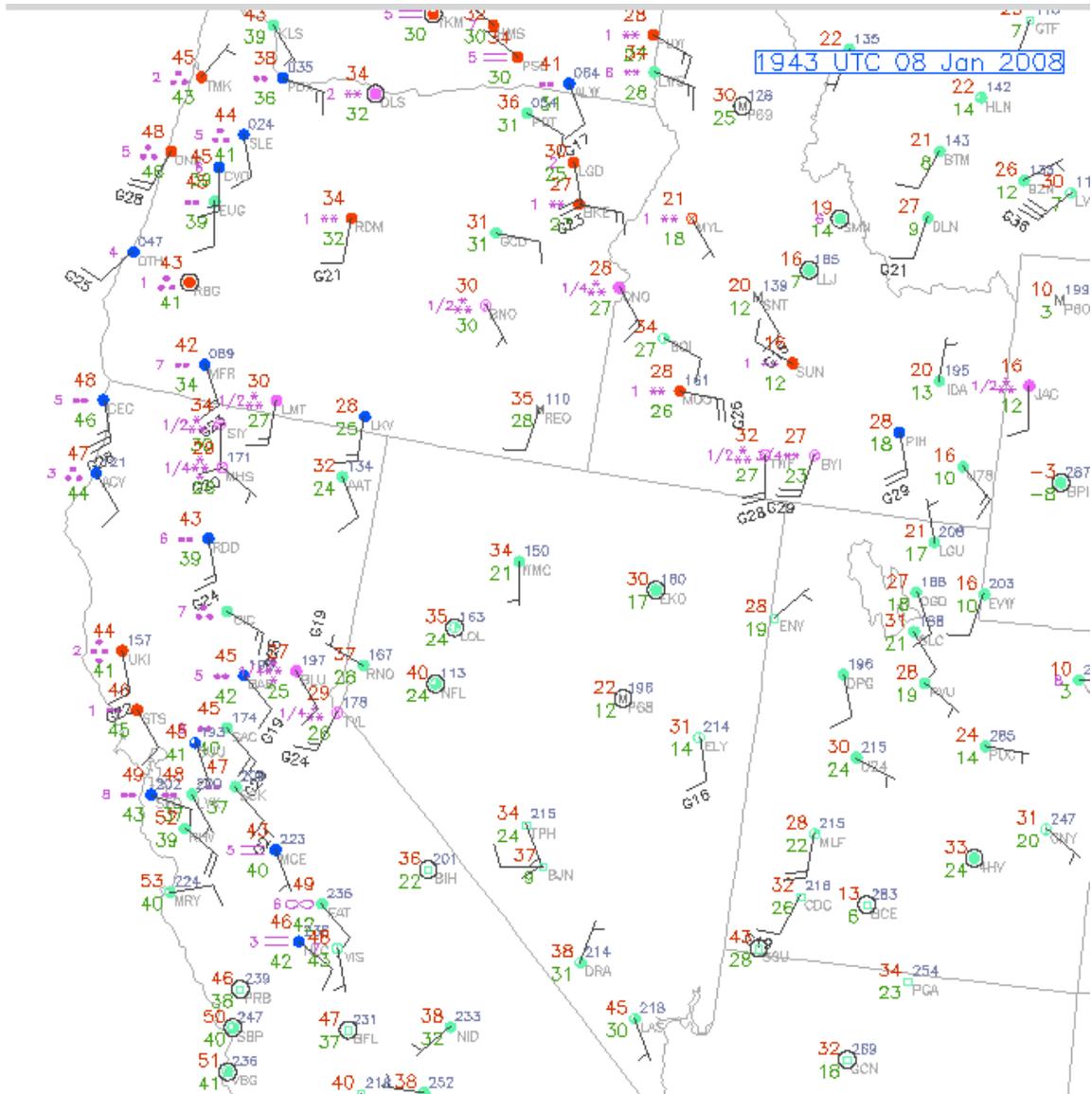


Fig 6. Surface observations at 8 Jan 1943UTC showing the period of heaviest snow in and near the ARB. Moderate valley winds were evident indicating a barrier jet. Freezing level was just below BLU at about 5000ft.

Owing to outages of the data transfer server we did not save any HYDROX radar images.

KDAX 0.5° Reflectivity (dBZ_e): 2008/01/08 19:10:29

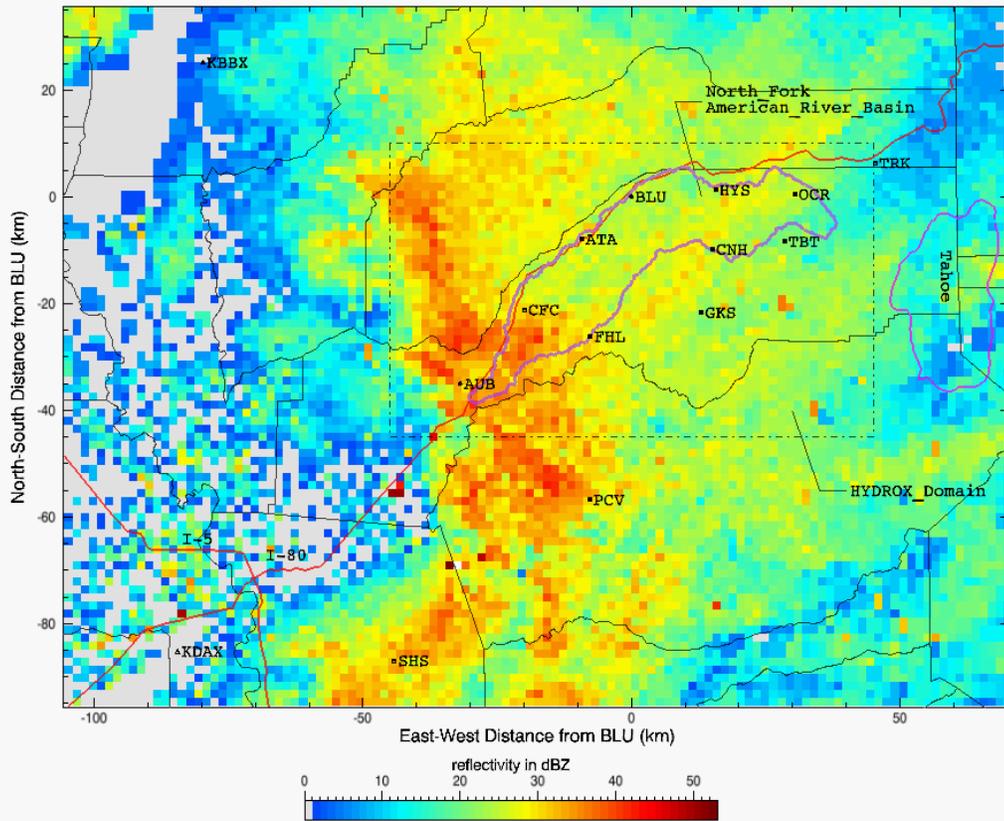
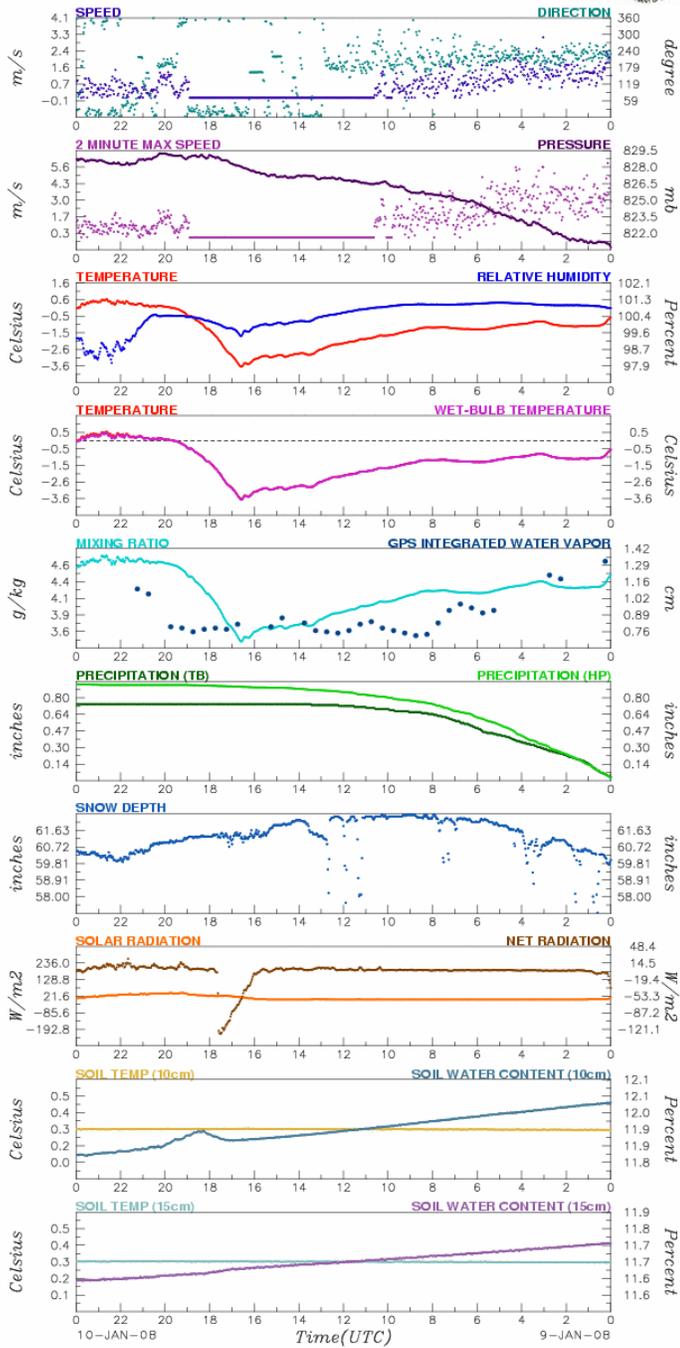


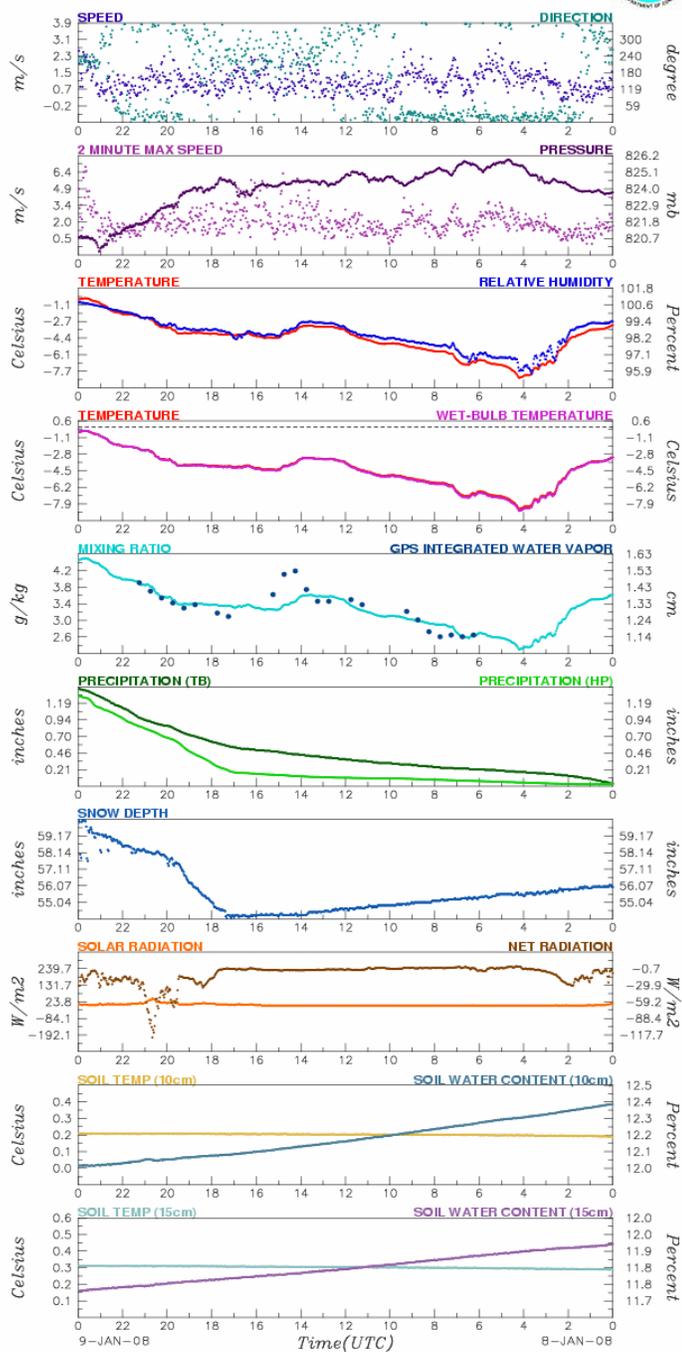
Fig 7: DAX reflectivity near the ARB at 8 Jan 1910UTC. This was just prior to the heaviest snow of IOP5 at BLU. After this band others followed with more showery activity after 9 Jan 01 UTC.

ESRL Physical Sciences Division
Surface Meteorology and Physics



Big Bend, CA (BBD)
39.30 N, 120.52 W, 1739 m

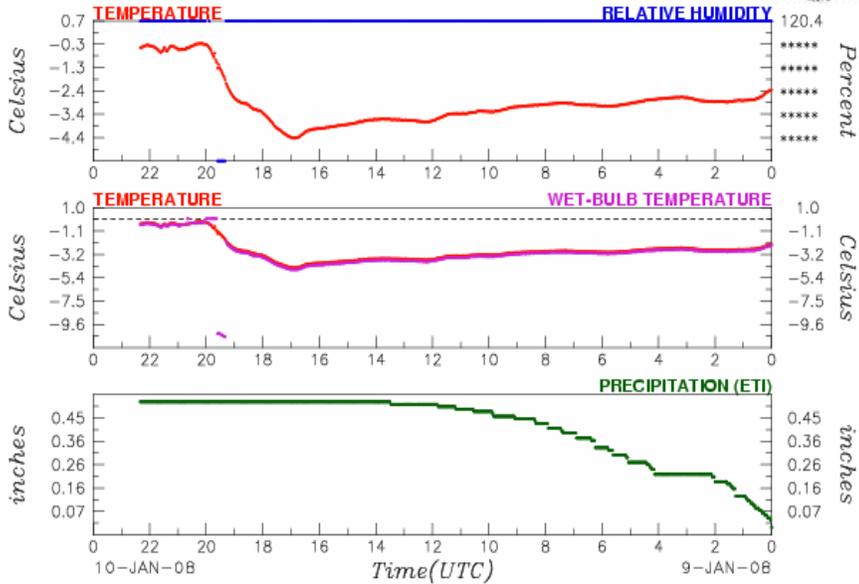
ESRL Physical Sciences Division
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Big Bend, CA (BBD)
39.30 N, 120.52 W, 1739 m

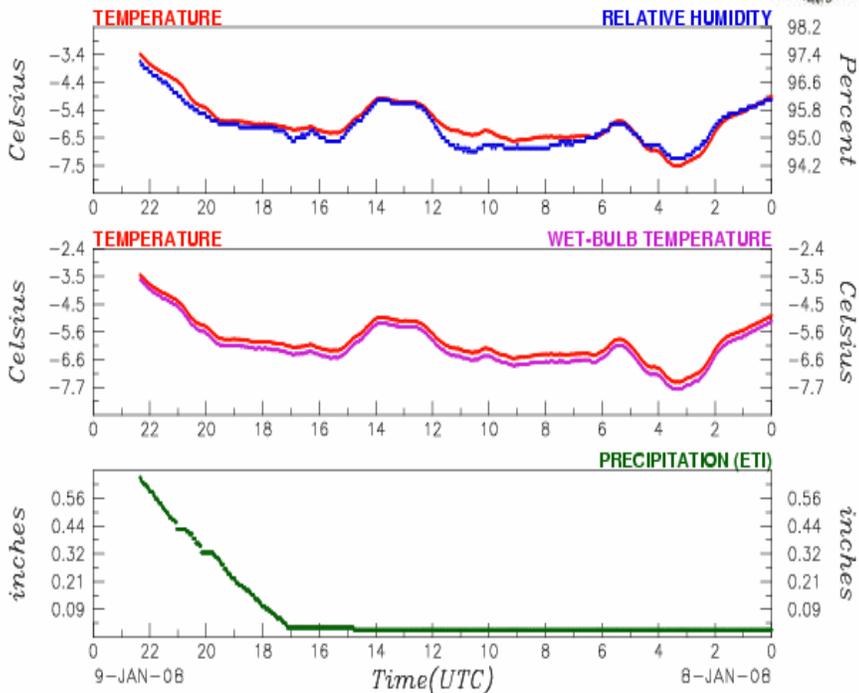
Figure 8: Time series from Big Bend (a station north of HUY) showing conditions from from 8-9 Jan 00UTC (bottom) and 9-10 Jan 00UTC top. Precipitation totaled 2.29 (hot plate) and 2.16 (tipping bucket). New snow depth was 8-9 inches.

ESRL Physical Sciences Division Surface Meteorology and Physics



Huysink,CA (HYS)
39.28 N, 120.52 W, 2011 m

ESRL Physical Sciences Division Surface Meteorology and Physics



Huysink,CA (HYS)
39.28 N, 120.52 W, 2011 m

Fig 9. Series of time plots for Huysink observing site from 8 Jan 00UTC to 9 Jan 00UTC (bottom) and 9 Jan 00UTC to 10 Jan 00UTC (top). Total amount of precipitation for the event at Huysink is 1.15 inches of liquid. The ALERT gauge recorded 1.56 inches.

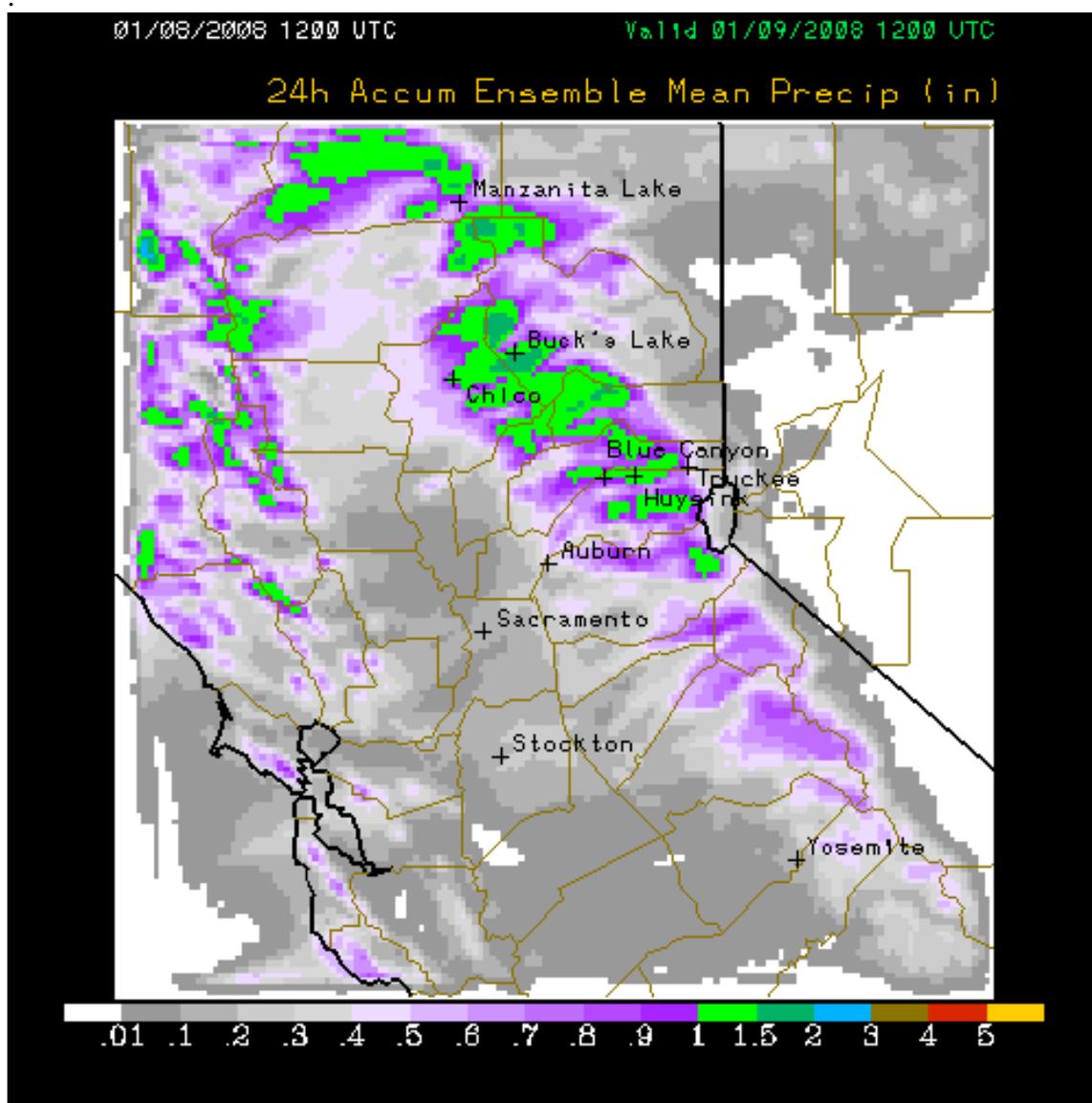


Fig.8.HMT 3-km ensemble mean total liquid precipitation for central California for 24 hours ending at 9 Jan 12UTC. Some comparative 24hr forecasts and verification (ALERT gauges): Huysink: forecast 1.40 – observed 1.56; Big Bend: forecast 1.49 – observed 2.16; Auburn: forecast 0.41 – observed 0.52; Sacramento: forecast 0.23 – observed 0.20; Chico: forecast 1.03 – observed 0.67; Manzanita Lake: forecast 0.60 – observed 0.13; Farad: forecast 0.23 – observed 0.42. Precipitation occurred from 8 Jan 17UTC to about 9 Jan 10 UTC.



Fig. ALERT Gauge Data for IOP5 capturing the entire event. Plots above show the 24-hour accumulation ending 9 Jan 15UTC. BLU was not operable for the entire event.

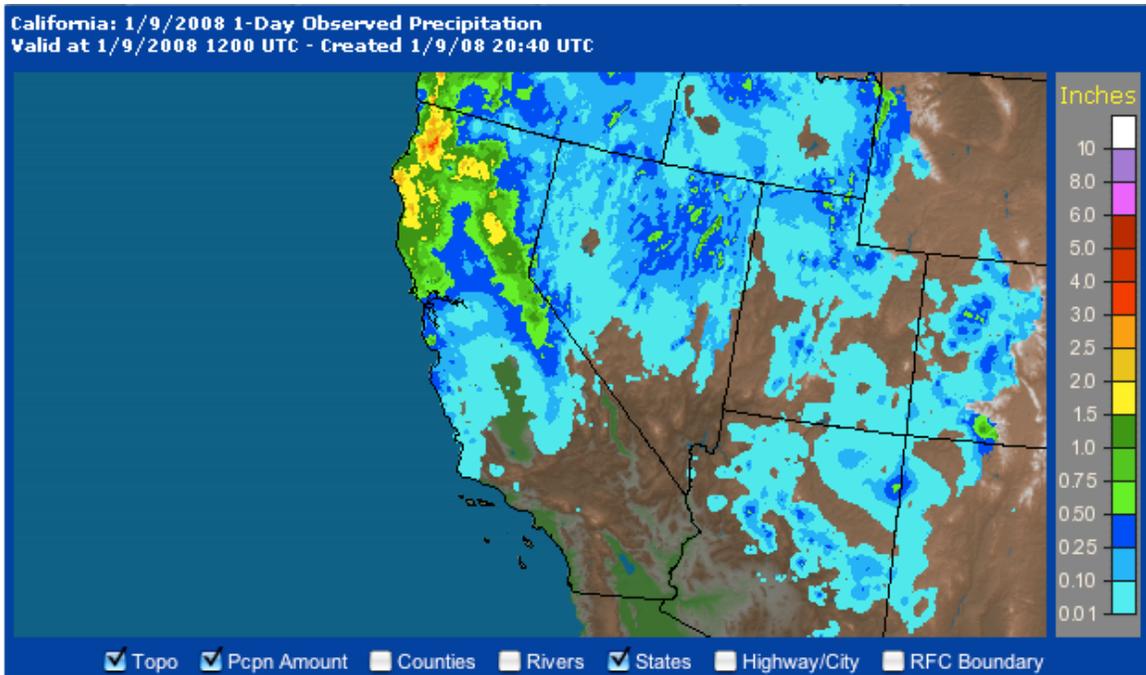


Figure 10: Total precipitation for IOP5 8-9 Jan 2008. Estimated amounts were 0.75-1.5 inches in and near the ARB. Heaviest precipitation was on Coast Range.