

HMT-West 2008
Summary of IOP6
Chief Scientist: Dave Kingsmill

IOP6 Start: 06 UTC 27 January 2008
IOP6 End: 09 UTC 28 January 2008

Non-autonomous instrument operation summary:

- ESRL HYDROX radar: 01 UTC 27 January to 00 UTC 28 January

Precipitation at Blue Canyon turned over to snow around 19-20 UTC 27 January. Shortly thereafter, snow started sticking to the antenna. Although the antenna was brushed off about every hour, over time a thin layer of ice formed on the front of the antenna, which led to a gradual loss in radar sensitivity, an effect that became obvious after around 21 UTC 27 January. Radar operations were terminated around 00 UTC, both because of compromised data collection and so that the crew could leave the site safely.

- Sloughhouse Soundings were launched at 00, 06, 09, 12, 15, 18, 21 UTC 27 January and 00, 03 and 06 UTC 28 January.

Autonomous instrument operation problems:

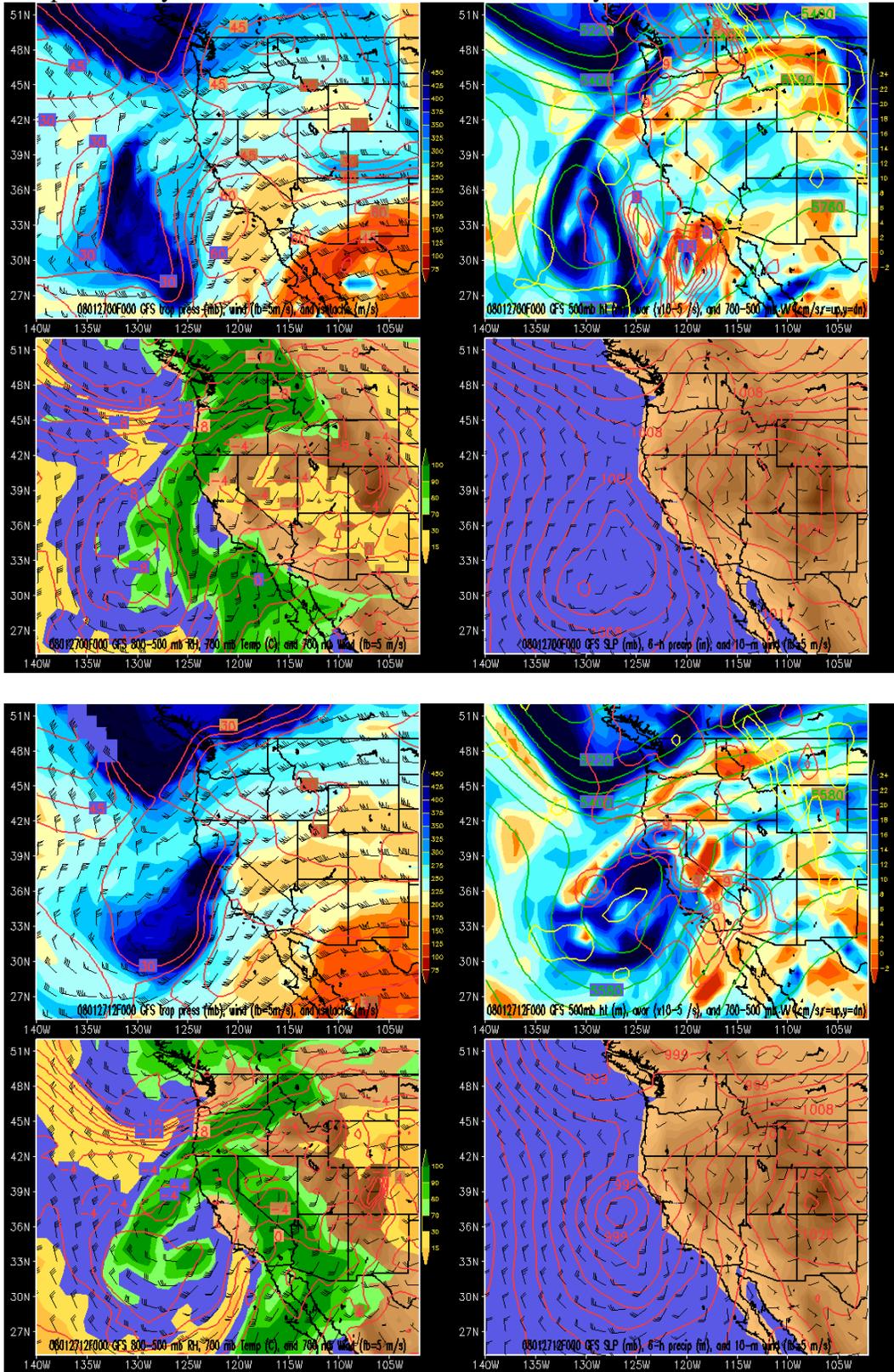
- Hotplate precipitation gauge at Blue Canyon (BLU) malfunctioned during this IOP..
- Intermittent data communication issues from Cazadero (CZC); data is fully recoverable.
- Data from the Hotplate precipitation gauge at Big Bend (BBD) may be biased due to an accumulation drift that is obvious during clear-air, dry conditions.

Overview

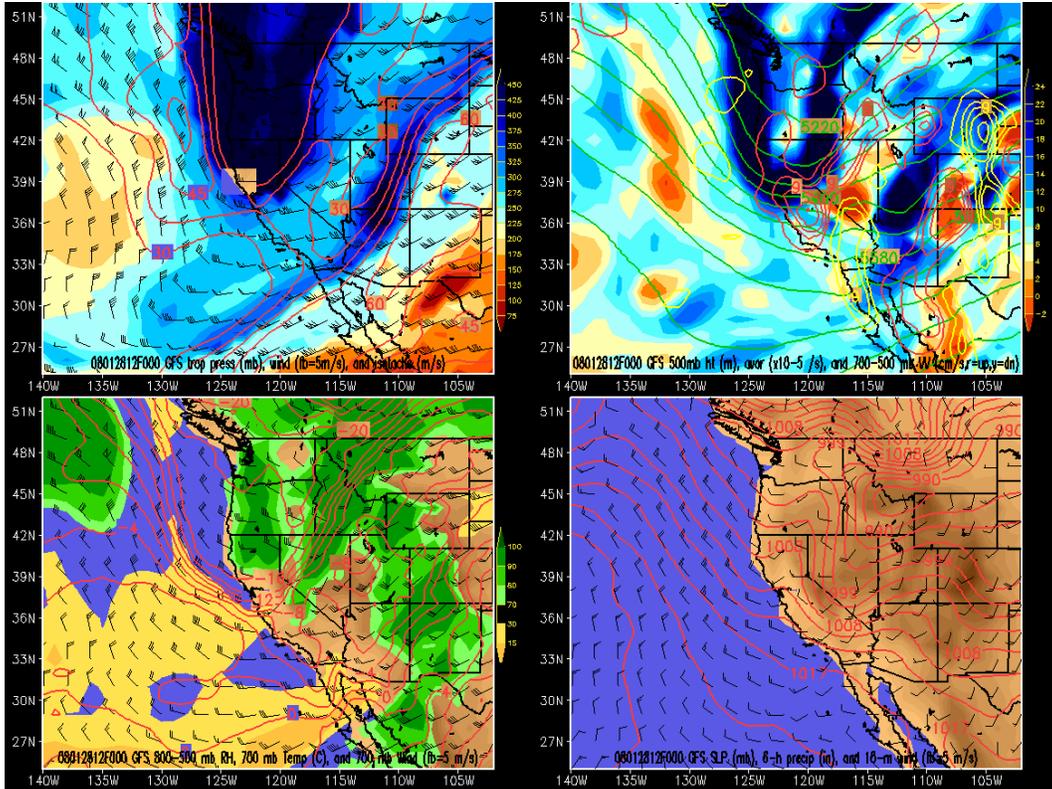
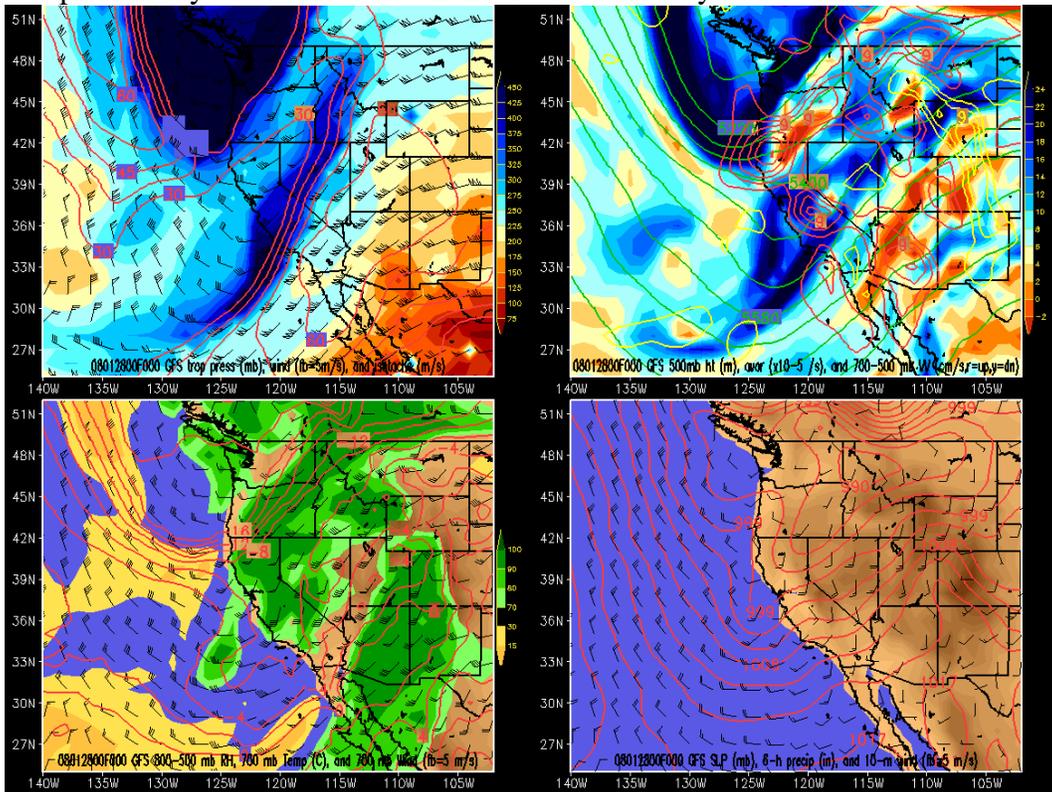
The synoptic evolution of this IOP involved a complicated interplay between a cutoff low offshore of southern California and a shortwave trough diving down from the Pacific Northwest. There was a reasonable amount of moisture associated with the southern cutoff, but the configuration of the flow fields did not allow much of this moisture to make its way north into the American River Basin. In the hours before the start of the IOP, a warm advection pattern was in place, with snow levels ultimately rising to about 1.9-2.1 km. The initial burst of precipitation between about 10-15 UTC 27 January fell as rain at the Blue Canyon HYDROX radar site, adding up to about 0.3"-0.6". The next batch of precipitation started around 18-19 UTC 27 January and was associated with an initial cool surge from the shortwave diving down from the northwest. When this precipitation started, snow levels were about 1.6-1.7 km, but then lowered a little to 1.4-1.5 km. Therefore, precipitation at the Blue Canyon HYDROX radar site fell in the form of wet, dense snow. This precipitation continued in the American River Basin for the next 12-15 hours. Winds were fairly strong, creating near white-out conditions, which contributed to Interstate 80 closing during the overnight hours. The primary cold front associated with the diving trough passed through the area between about 08-09 UTC 28 January, dropping temperatures 5 to 6 C. Shortly thereafter, the precipitation transitioned from widespread, steady to showery. Liquid equivalent precipitation accumulations for the IOP were ~0.5" at Sloughhouse and Truckee, ~1.7" at Colfax, ~2.2" at Alta and Norden and ~3" at Big Bend. Snow depths increased about 8-12" throughout the basin above about 1.5 km.

The images in the following pages provide some additional context for the event.

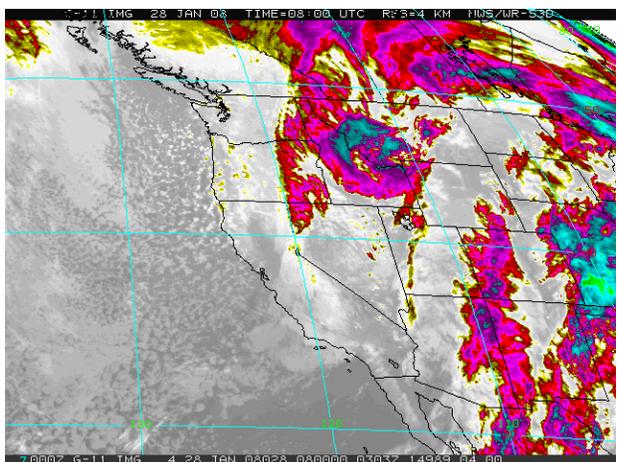
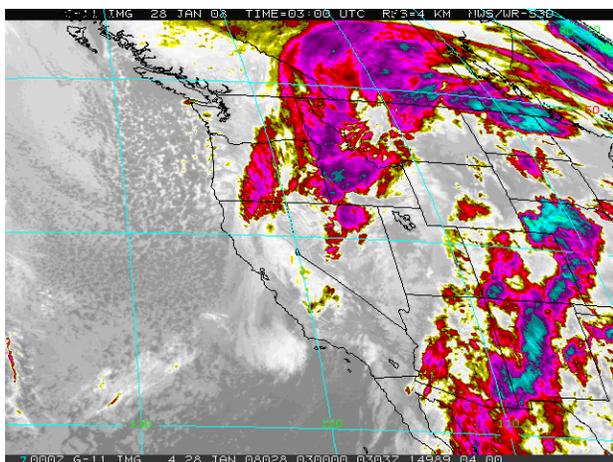
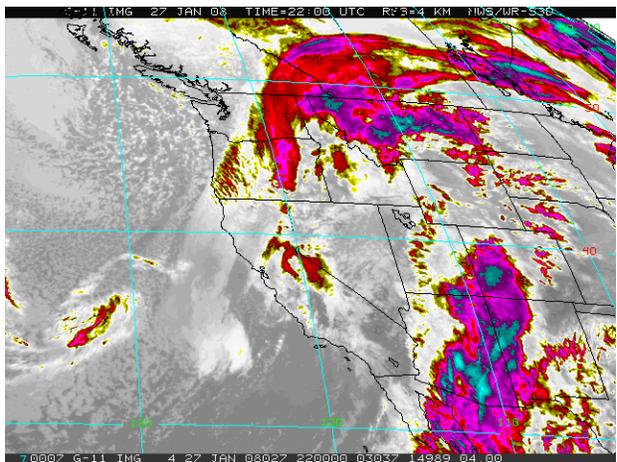
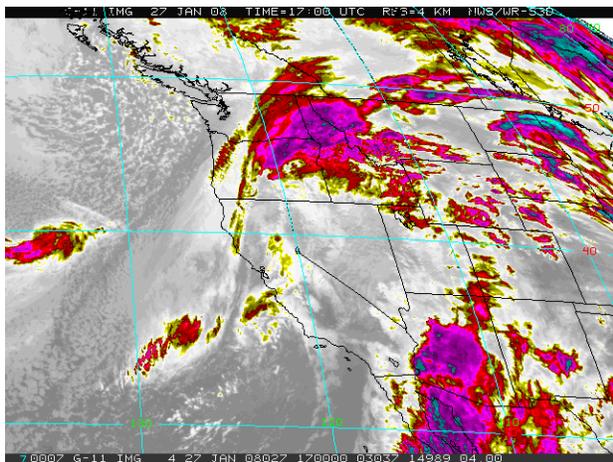
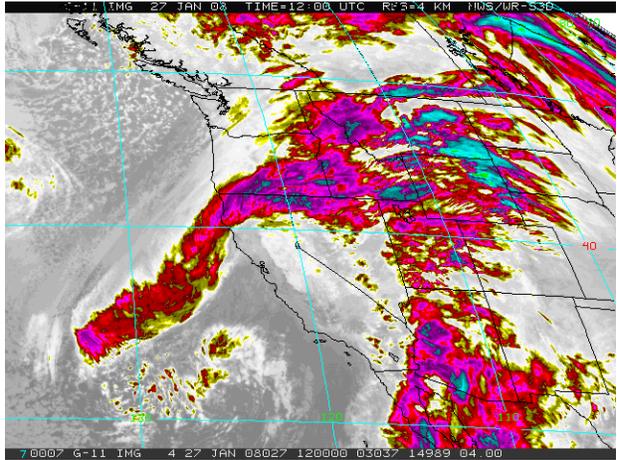
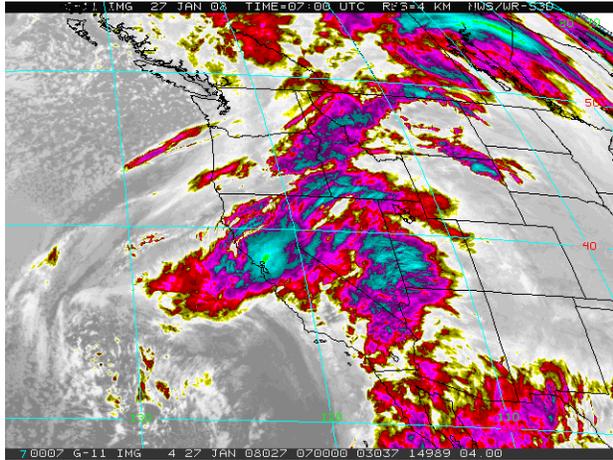
Synoptic 4-panel analyses for 00 UTC and 12 UTC 27 January.



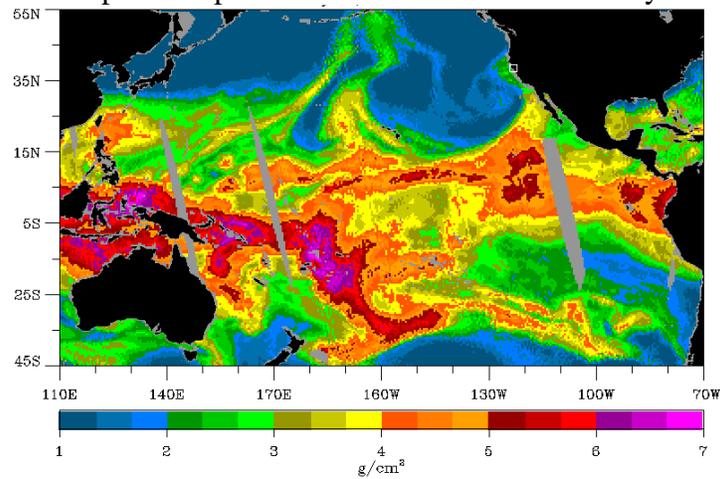
Synoptic 4-panel analyses for 00 UTC and 12 UTC 28 January.



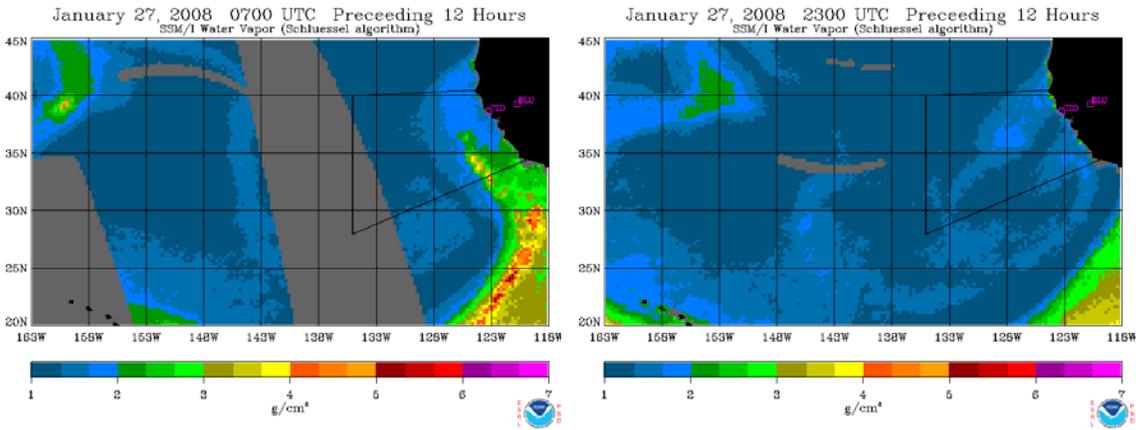
GOES IR Imagery for 07, 12, 17, 22 UTC 27 January and 03, 08 UTC 28 January



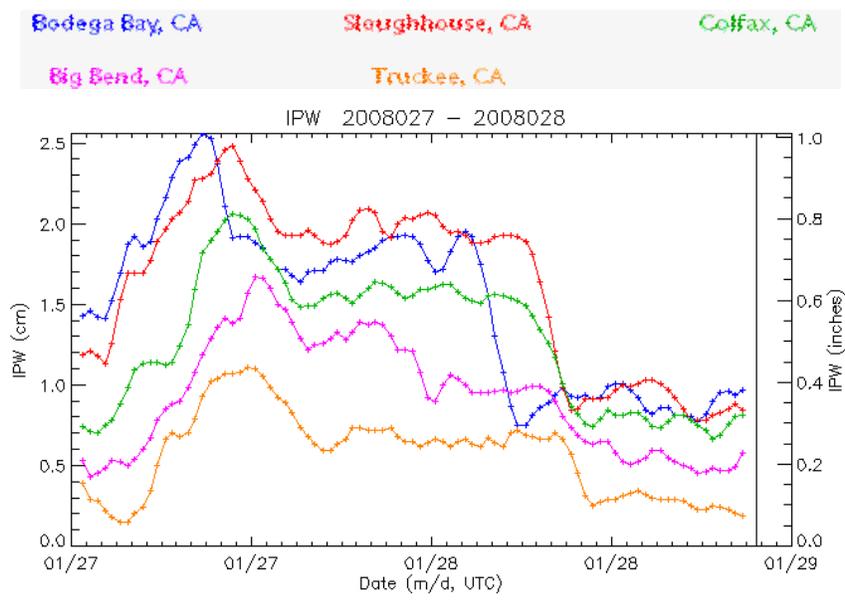
AMSU Integrated Water Vapor Composite from 00-12 UTC 27 January



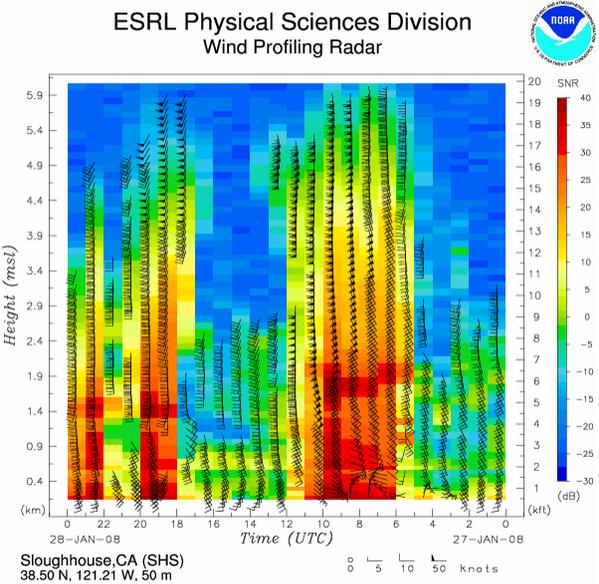
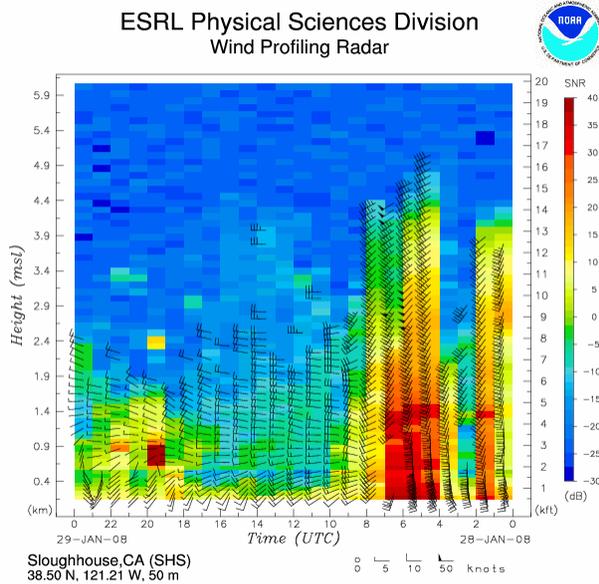
SSM/I Integrated Water Vapor Composites at 07 and 23 UTC 27 January



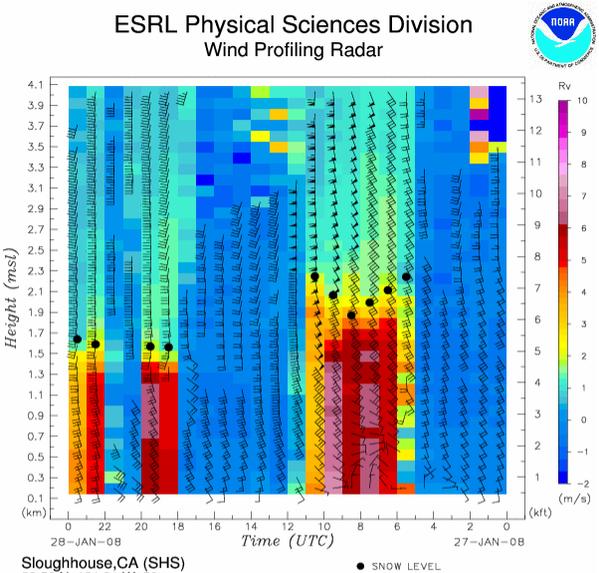
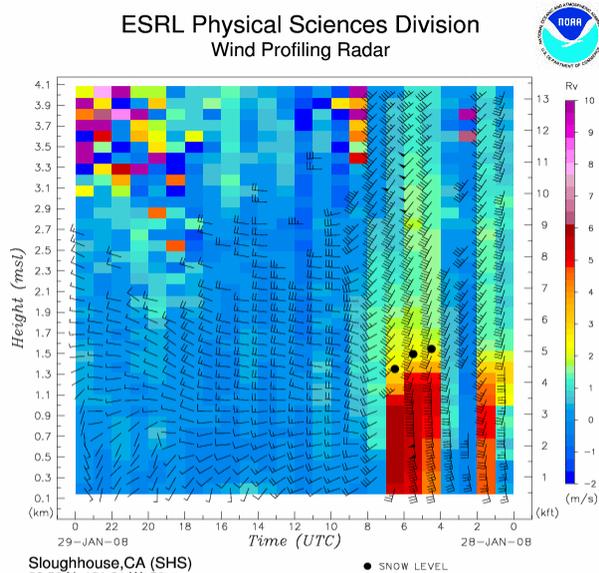
GPS Integrated Water Vapor time series from Bodega Bay (blue, along the coast), Sloughhouse (red, in the Central Valley), Colfax (green, lower Sierra windward slope), Big Bend (purple, upper Sierra windward slope) and Truckee (orange, in the lee of the Sierra crest)



Sloughhouse 915 MHz profiler time-height series of winds and SNR for 27-28 January



Sloughhouse 915 MHz profiler time-height series of Doppler vertical velocity and snow level for 27-28 January



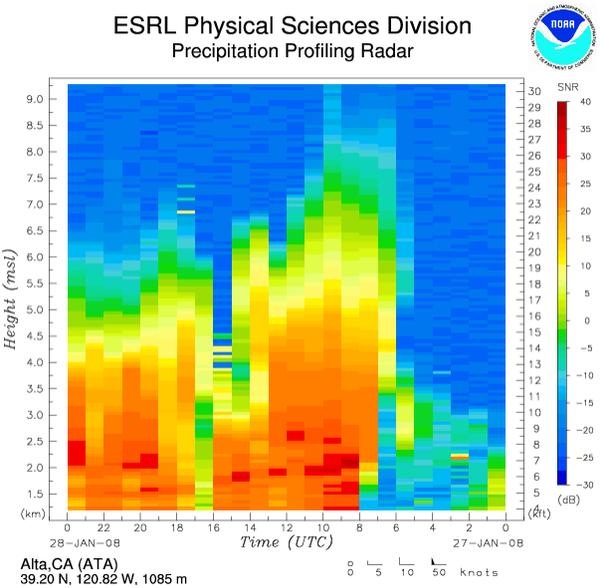
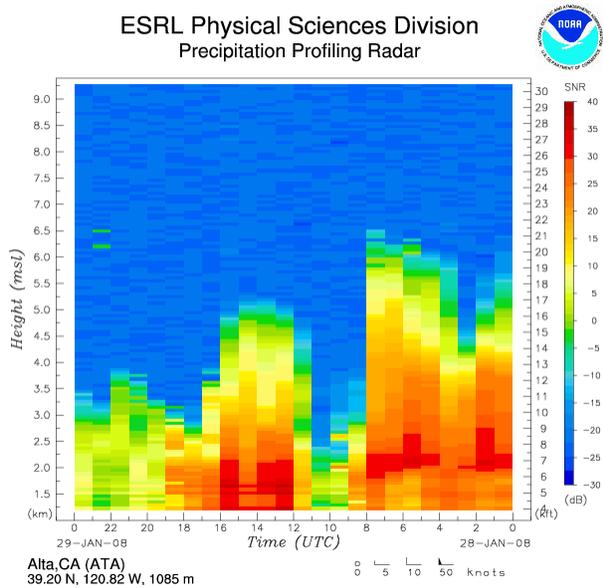
Time (UTC)	2330	2230	2130	2030	1930	1830	1730	1630	1530	1430	1330	1230
Snow Level (m)	none	none	none	none	none	none	none	none	none	none	none	none
Snow Level (ft)	none	none	none	none	none	none	none	none	none	none	none	none
Sfc Temp (C)	10.05	9.92	9.51	9.47	8.37	7.15	5.98	4.32	4.12	4.04	3.94	3.16

Time (UTC)	1130	1030	0930	0830	0730	0630	0530	0430	0330	0230	0130	0030
Snow Level (m)	none	none	none	none	none	1351	1495	1545	none	none	none	none
Snow Level (ft)	none	none	none	none	none	4431	4903	5067	none	none	none	none
Sfc Temp (C)	4.02	4.17	4.67	5.75	6.92	9.20	10.12	10.73	10.64	10.22	10.35	11.03

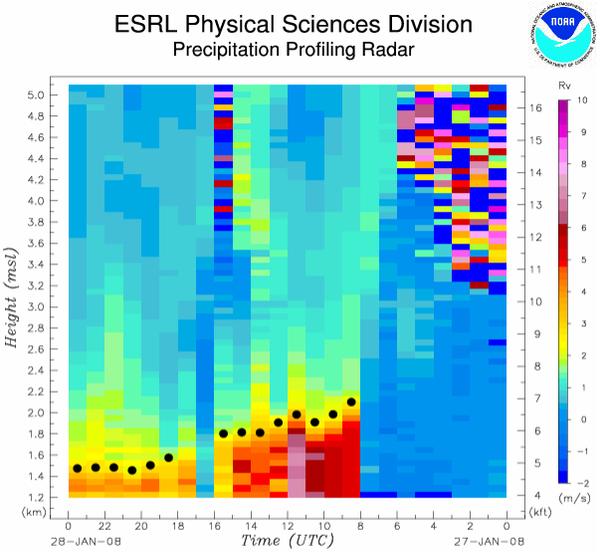
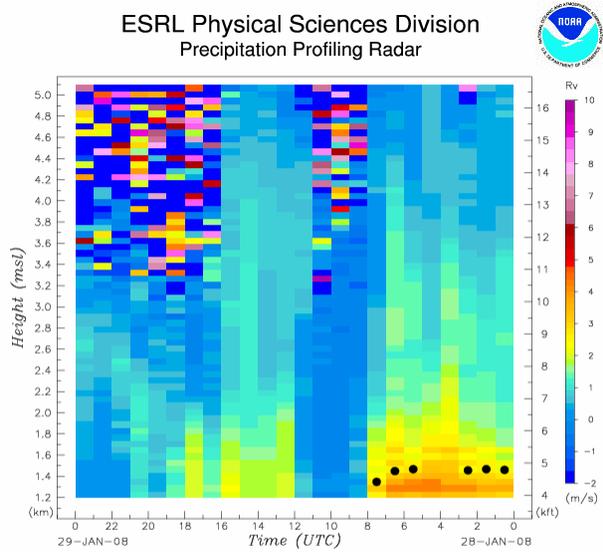
Time (UTC)	2330	2230	2130	2030	1930	1830	1730	1630	1530	1430	1330	1230
Snow Level (m)	1638	1590	none	none	1567	1561	none	none	none	none	none	none
Snow Level (ft)	5372	5215	none	none	5139	5120	none	none	none	none	none	none
Sfc Temp (C)	11.29	11.38	12.80	12.34	11.22	11.83	11.85	9.12	9.34	9.15	8.77	9.07

Time (UTC)	1130	1030	0930	0830	0730	0630	0530	0430	0330	0230	0130	0030
Snow Level (m)	none	2248	2065	1869	1993	2113	2242	none	none	none	none	none
Snow Level (ft)	none	7373	6773	6130	6537	6930	7353	none	none	none	none	none
Sfc Temp (C)	8.35	8.38	8.37	9.45	10.06	11.25	11.29	12.35	12.53	12.49	13.76	14.83

Alta S-band profiler time-height series of reflectivity for 27-28 January



Alta S-band profiler time-height series of Doppler vertical velocity and snow level for 27-28 January



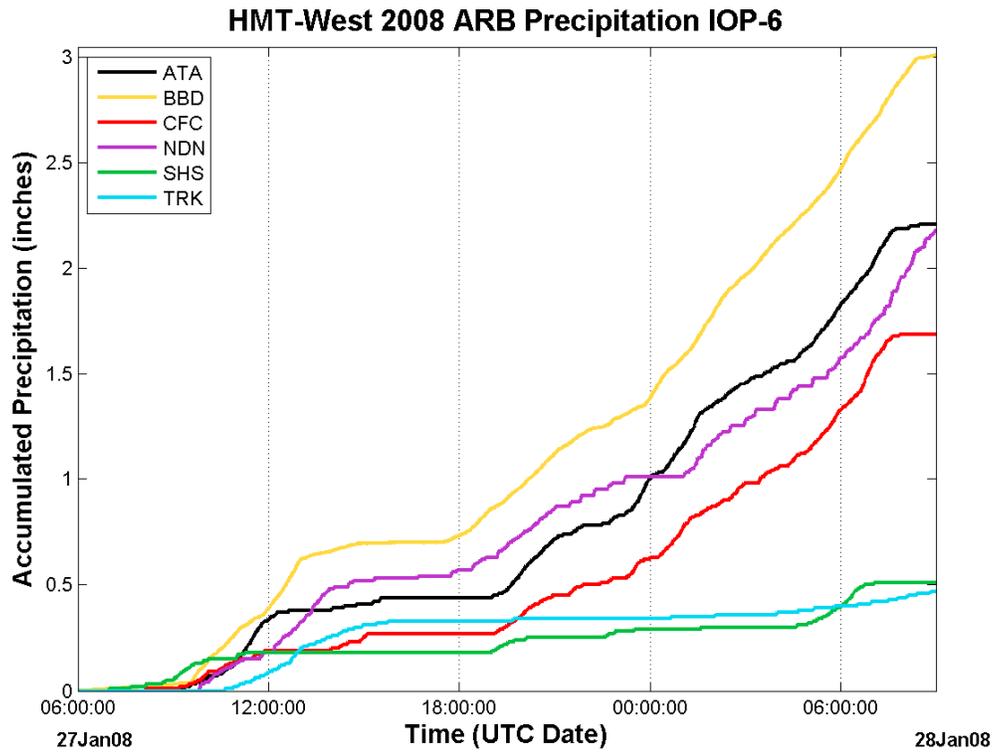
Time (UTC)	2330	2230	2130	2030	1930	1830	1730	1630	1530	1430	1330	1230
Snow Level (m)	none											
Snow Level (ft)	none											
Sfc Temp (C)	-0.54	-0.52	-0.46	-0.94	-1.70	-2.39	-2.62	-2.55	-2.73	-2.55	-2.52	-2.77

Time (UTC)	2330	2230	2130	2030	1930	1830	1730	1630	1530	1430	1330	1230
Snow Level (m)	1474	1482	1483	1456	1504	1575	none	none	1802	1815	1811	1907
Snow Level (ft)	4834	4860	4864	4775	4933	5165	none	none	5910	5953	5940	6254
Sfc Temp (C)	4.17	4.35	4.29	3.68	4.84	5.82	5.51	5.70	5.90	6.19	6.67	6.74

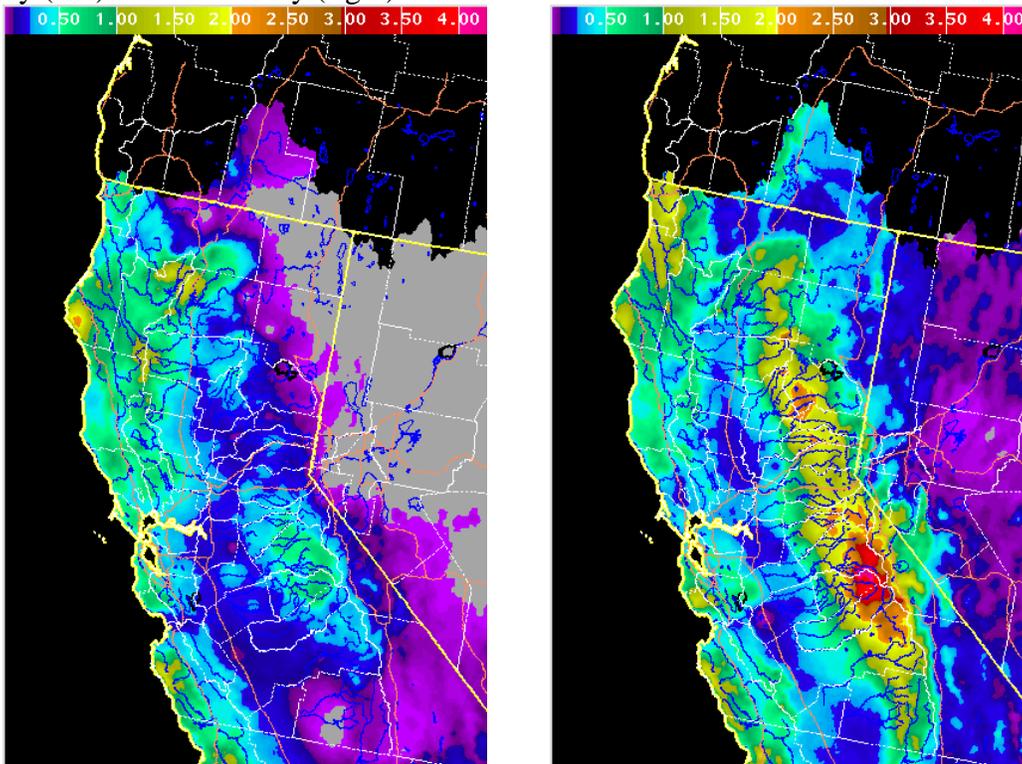
Time (UTC)	1130	1030	0930	0830	0730	0630	0530	0430	0330	0230	0130	0030
Snow Level (m)	none	none	none	none	1347	1449	1467	none	none	1456	1467	1460
Snow Level (ft)	none	none	none	none	4418	4752	4811	none	none	4775	4811	4788
Sfc Temp (C)	-2.60	-2.36	-1.78	-0.98	2.64	3.18	3.85	3.94	3.72	3.51	3.11	3.71

Time (UTC)	1130	1030	0930	0830	0730	0630	0530	0430	0330	0230	0130	0030
Snow Level (m)	1983	1910	1985	2101	none							
Snow Level (ft)	6504	6264	6510	6891	none							
Sfc Temp (C)	5.46	3.44	3.02	2.66	3.57	3.39	3.47	2.88	2.18	2.30	3.30	5.33

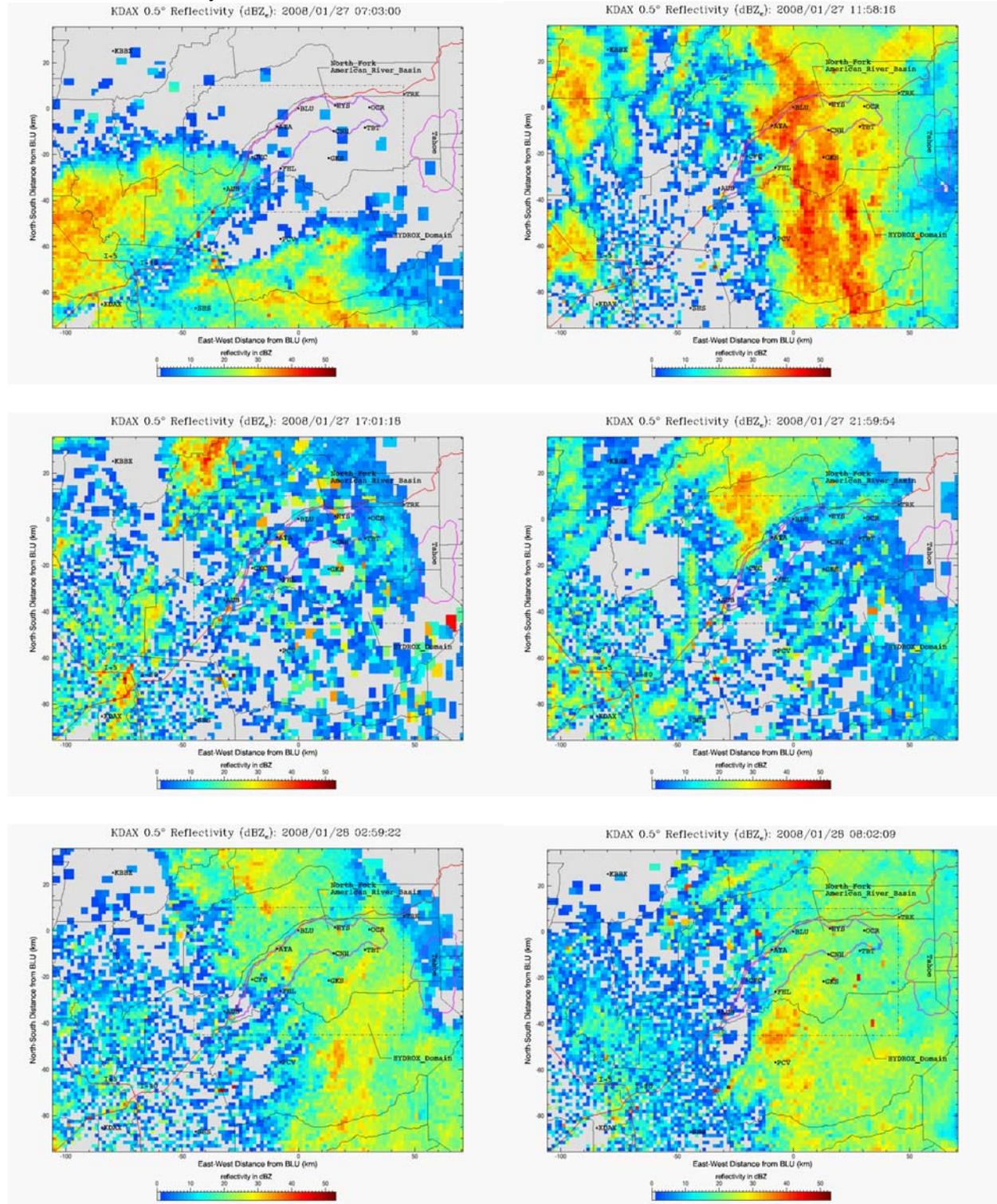
Time series of precipitation accumulation (liquid equivalent) from Sloughouse (SHS), Colfax (CFC), Alta (ATA), Big Bend (BBD), Norden (NDN) and Truckee (TRK).



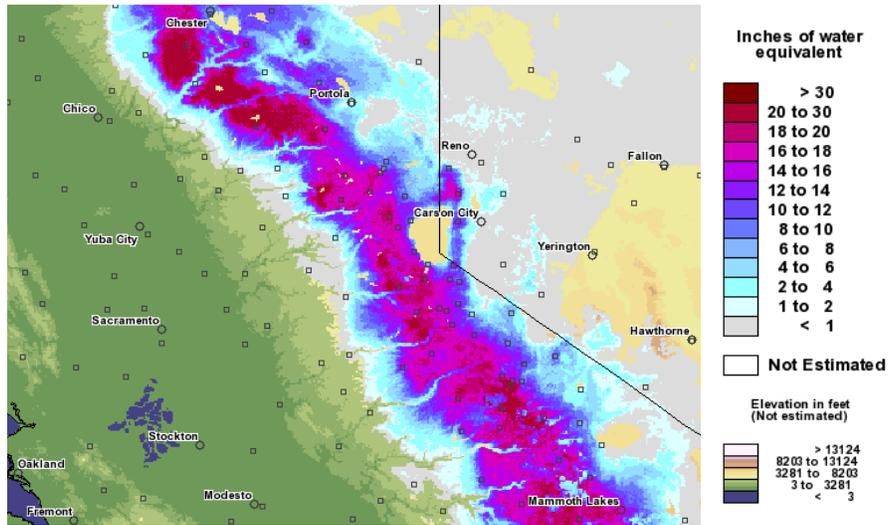
24-hour observed precipitation analysis from the CNRFC ending at 12 UTC for 27 January (left) and 28 January (right).



Radar reflectivity from KDAX at ~07, ~12, ~17 and ~22 UTC 27 January and ~03 and ~08 UTC 28 January



Map of snow water equivalent in our study area just before IOP6 (00 UTC 27 January)



Map of snow water equivalent in our study area just after IOP6 (00 UTC 29 January)

