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# *A Blue Mountain Downslope Windstorm*

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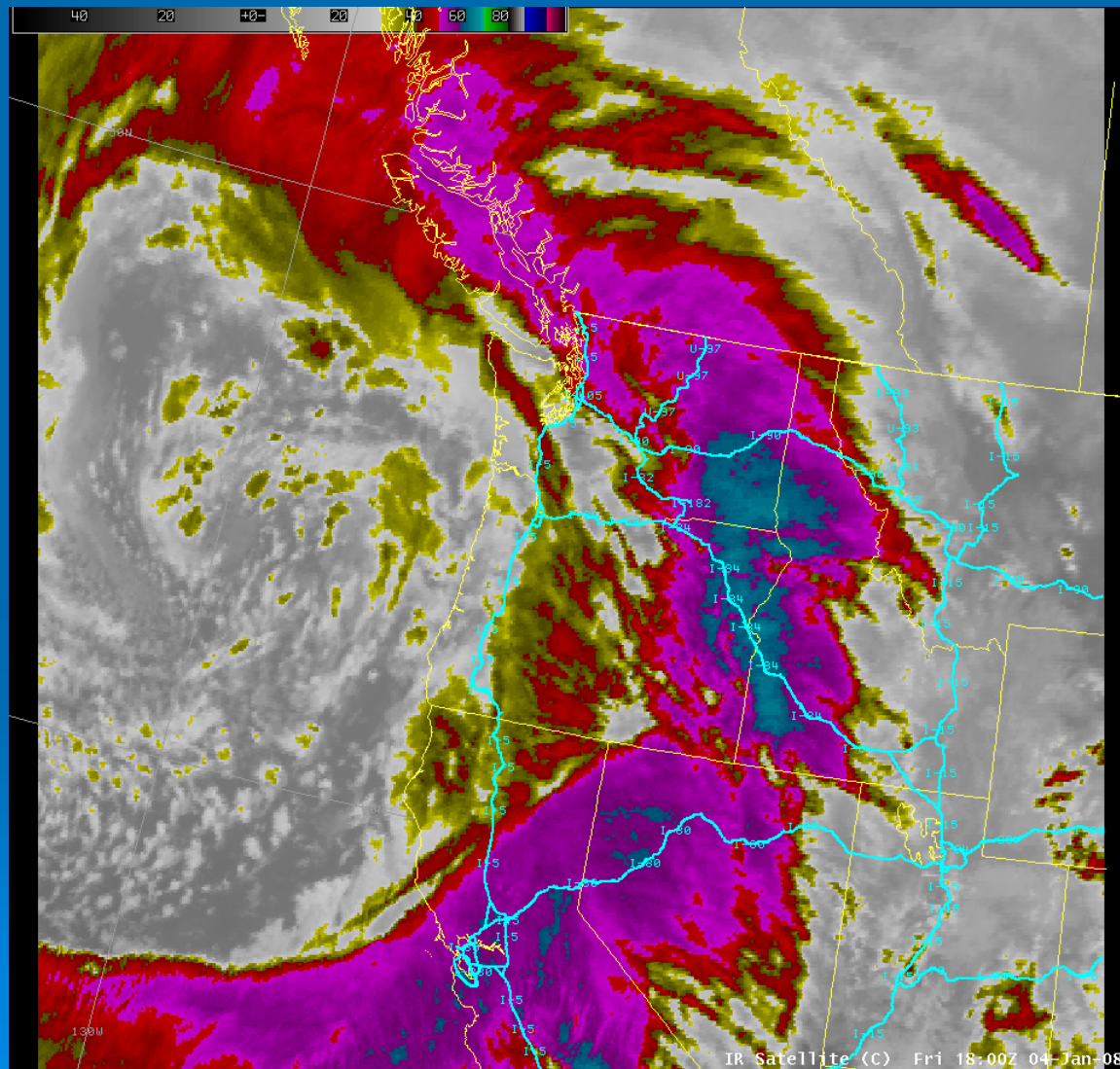
***Jon Mittelstadt***

**Pendleton, OR**

**NOAA / National Weather Service**

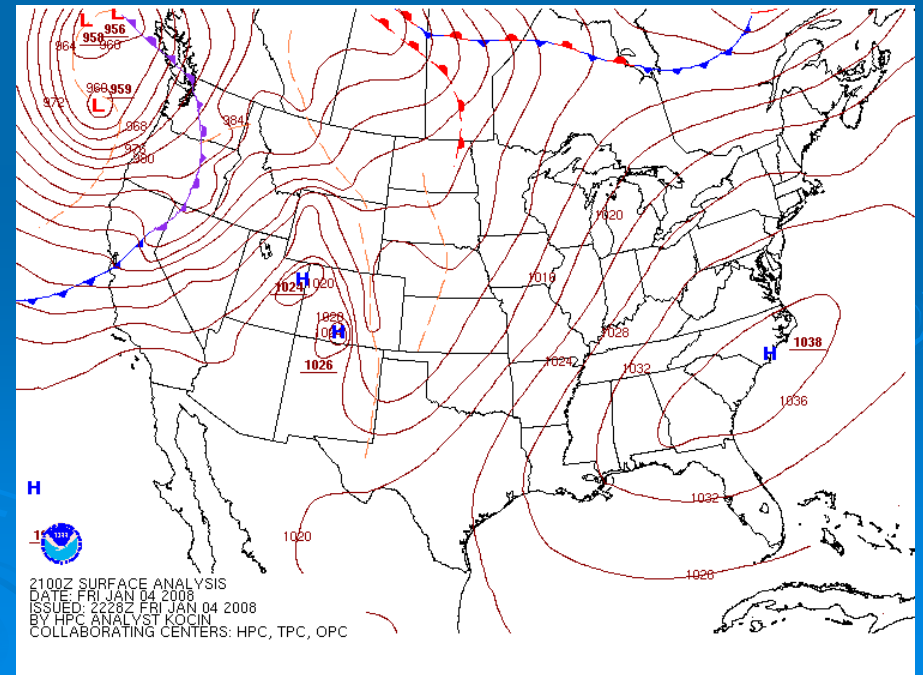
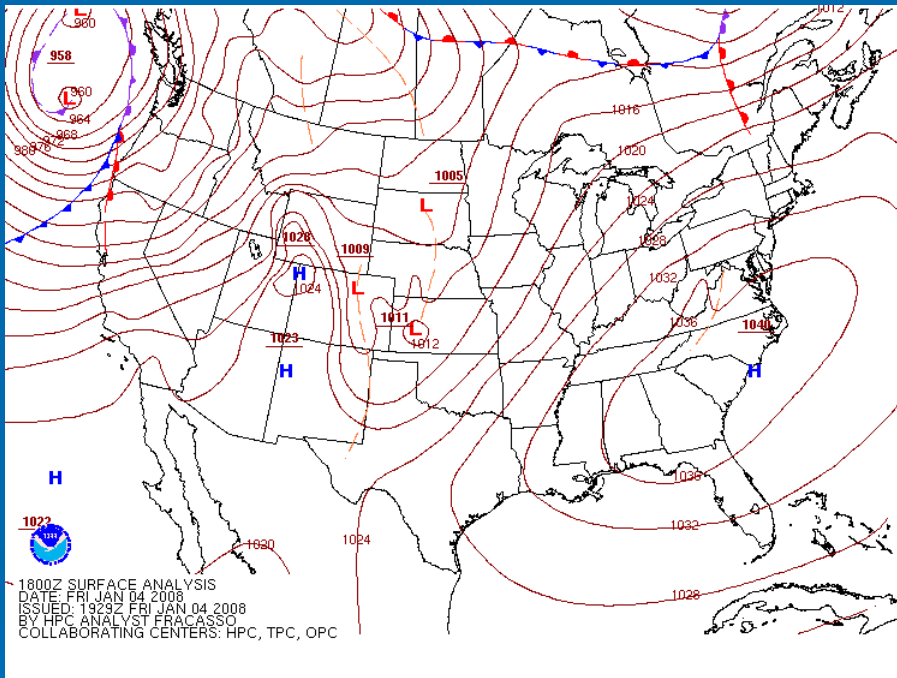
# Infrared Satellite

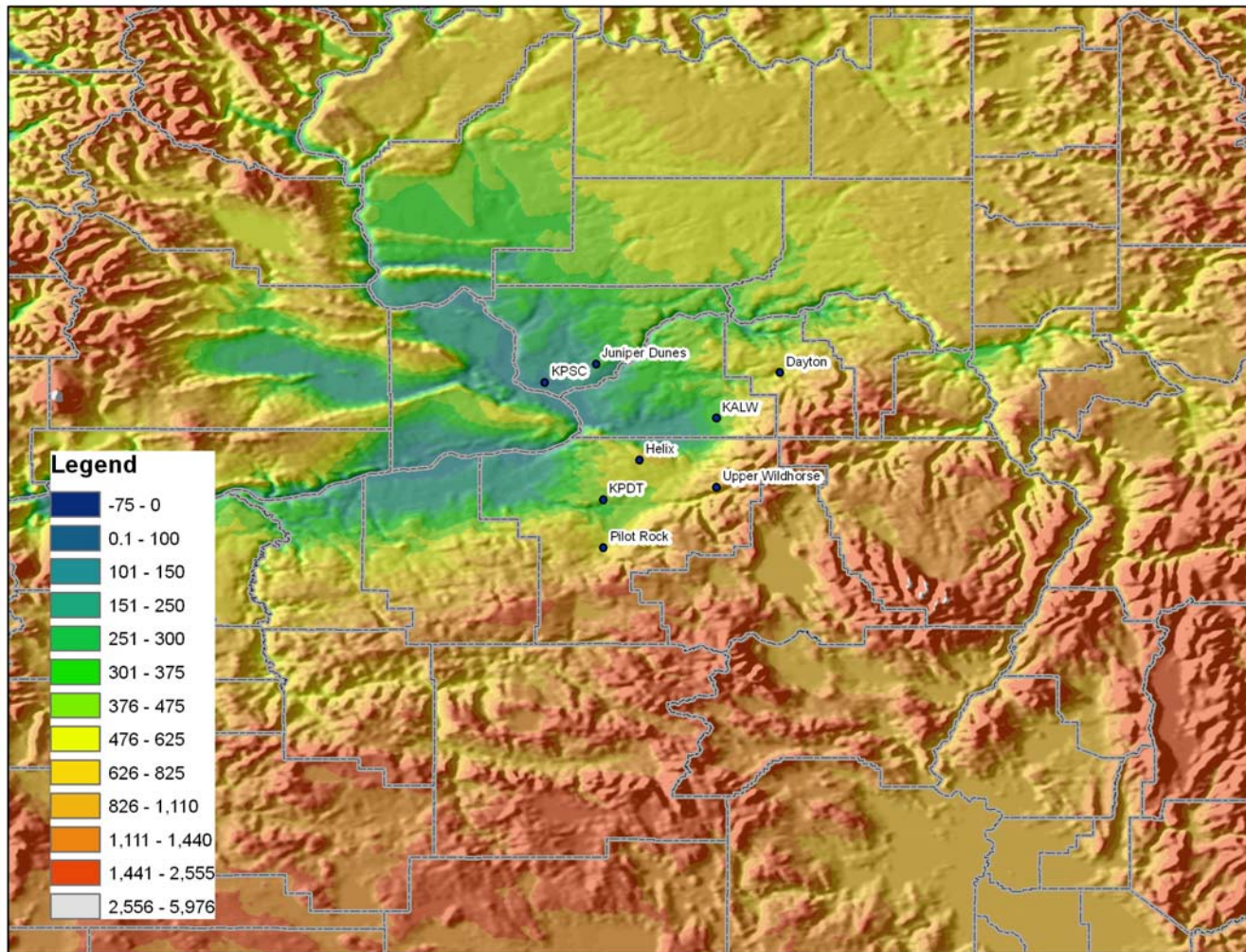
## Fri 18:00Z 04-Jan-08



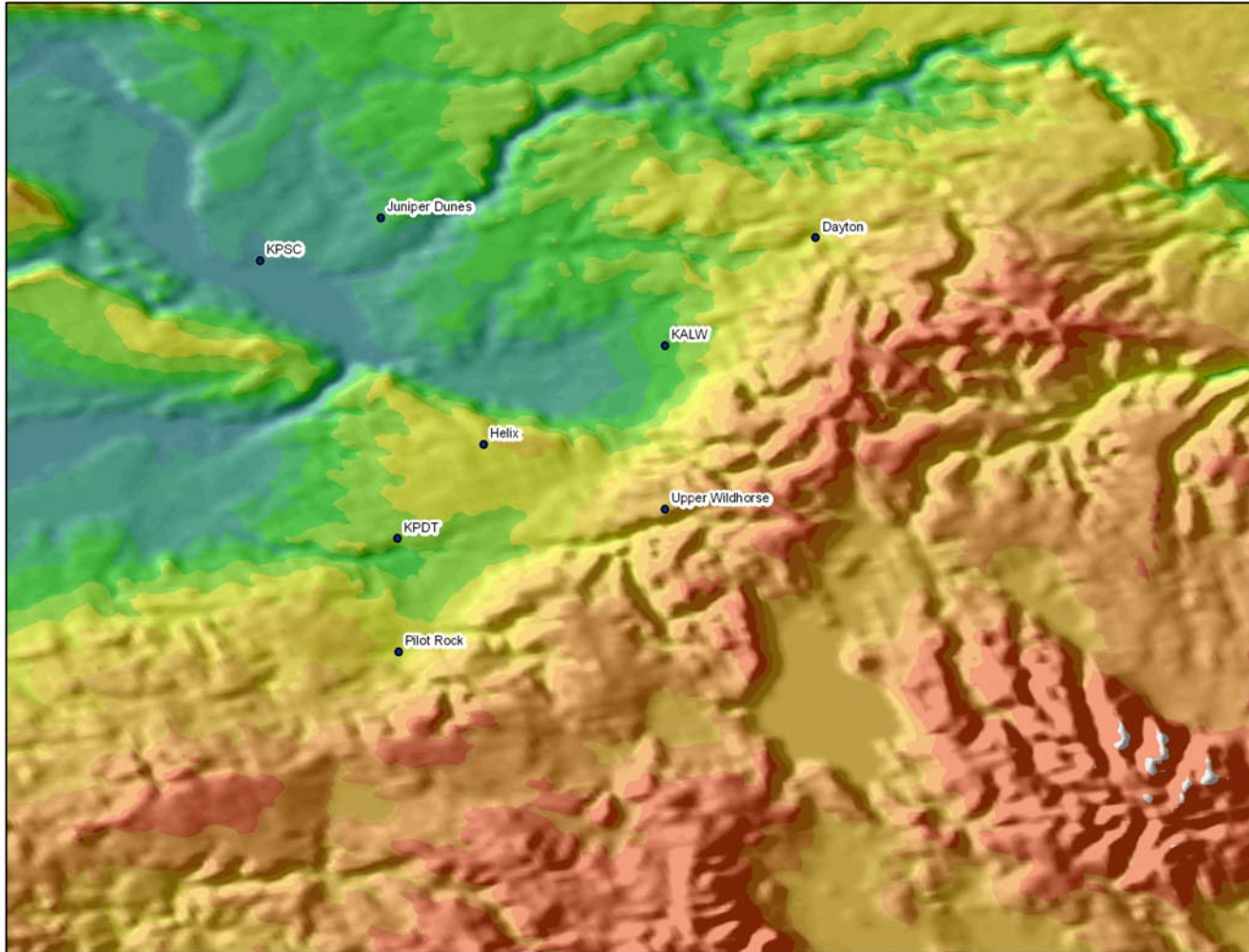
# HPC Surface Analysis

## 18z and 21z Fri. 04-Jan-08





<b>Location</b>	<b>Strongest Gust (mph)</b>	<b>Strongest Sustained Wind (mph)</b>	<b>Direction of Strongest Sustained Wind</b>	<b>Elevation (feet)</b>
<b>Walla Walla, WA Airport</b>	<b>78</b>	<b>55</b>	<b>South-Southeast</b>	<b>1204</b>
<b>La Grande, OR Airport</b>	<b>61</b>	<b>49</b>	<b>South</b>	<b>2717</b>
<b>Joseph, OR</b>	<b>85</b>	<b>47</b>	<b>South-Southeast</b>	<b>3984</b>
<b>Helix, OR</b>	<b>72</b>	<b>52</b>	<b>East</b>	<b>1896</b>
<b>Pendleton, OR Airport</b>	<b>53</b>	<b>35</b>	<b>Southeast</b>	<b>1493</b>
<b>John Day, OR Airport</b>	<b>71</b>	<b>48</b>	<b>South-Southeast</b>	<b>3697</b>
<b>Upper Wildhorse (9 miles west of Tollgate, OR)</b>	<b>80</b>	<b>40</b>	<b>Southeast</b>	<b>3581</b>



<i>Station</i>	<i>4 am</i>	<i>5 am</i>	<i>6 am</i>	<i>7 am</i>	<i>8 am</i>	<i>9 am</i>	<i>10 am</i>	<i>11 am</i>
<b>KALW</b>								
Gust (MPH) Direction	39 SSE	45 SSE	55 SSE	36 SSE	55 SSE	55 SSE	78 SSE	75 SSE
Temp (degF)	56	58	59	56	58	59	61	55
<b>Juniper Dunes</b>								
Gust (MPH) Direction	21 ESE	17 ESE	22 ESE	23 ESE	28 SE	34 SSE	34 SSE	44 S
Temp (degF)	46	48	47	47	52	53	55	51
<b>KPSC</b>								
Gust (MPH) Direction	12 W	10 W	9 WSW	7 W	8 WNW	17 W	10 NW	14 NW
Temp (degF)	30	30	31	31	31	32	34	37

# Damage Reports

- Trees down and power outages in
  - Grant, Umatilla, Union and Wallowa Counties
- Truck roll-overs
  - 5 on I-84 on Cabbage Hill
  - 2 on Highway 11 in OR along foothills of Blue Mountains
  - I-84 closed from Exit 188 (Stanfield) to Idaho border (over 170 miles) during the morning hours due to wind and blowing dust









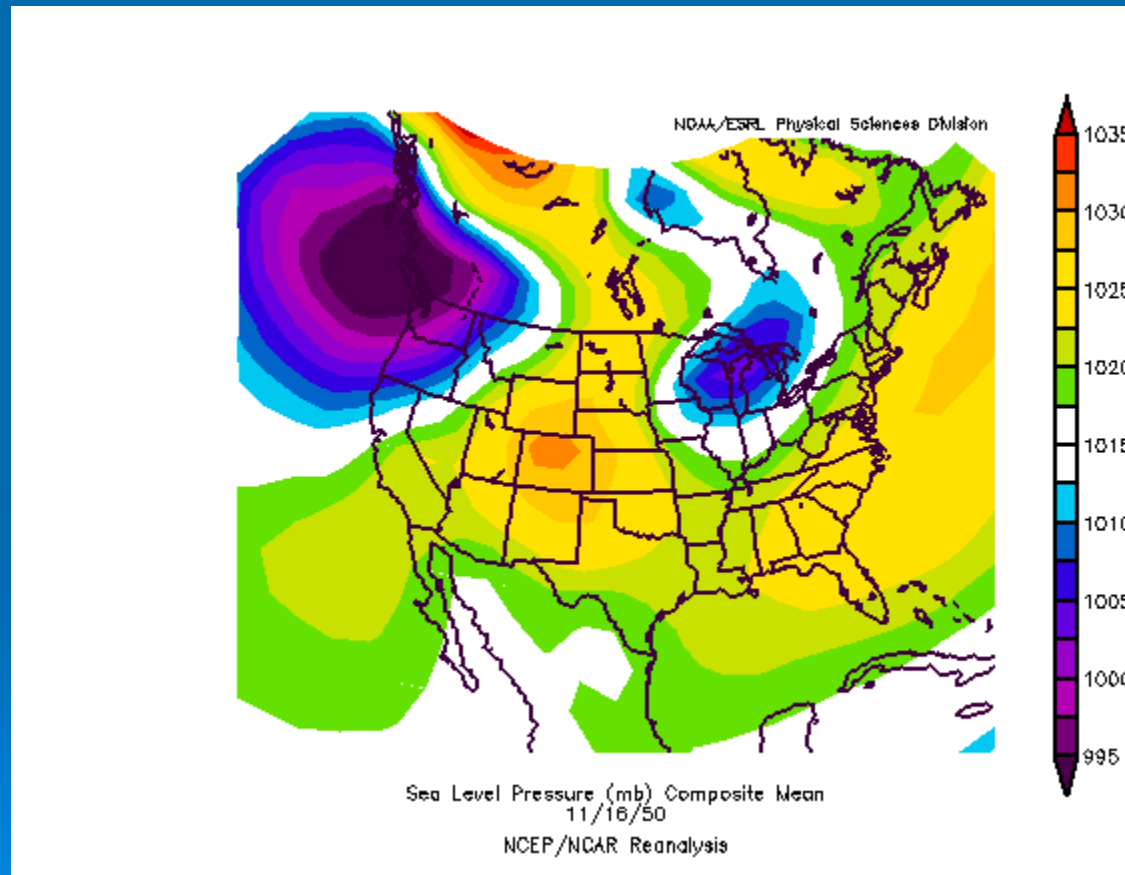
# Damage Totals

- Umatilla County reported 3.6 million dollars in damage.
- Walla Walla County 4.9 million.
  - EM estimates 4 in 10 Walla Walla homes received damage
- On the Walla Walla VA medical campus
  - 28 structures damaged
  - 50 trees damaged
  - 4 vehicles damaged by falling trees

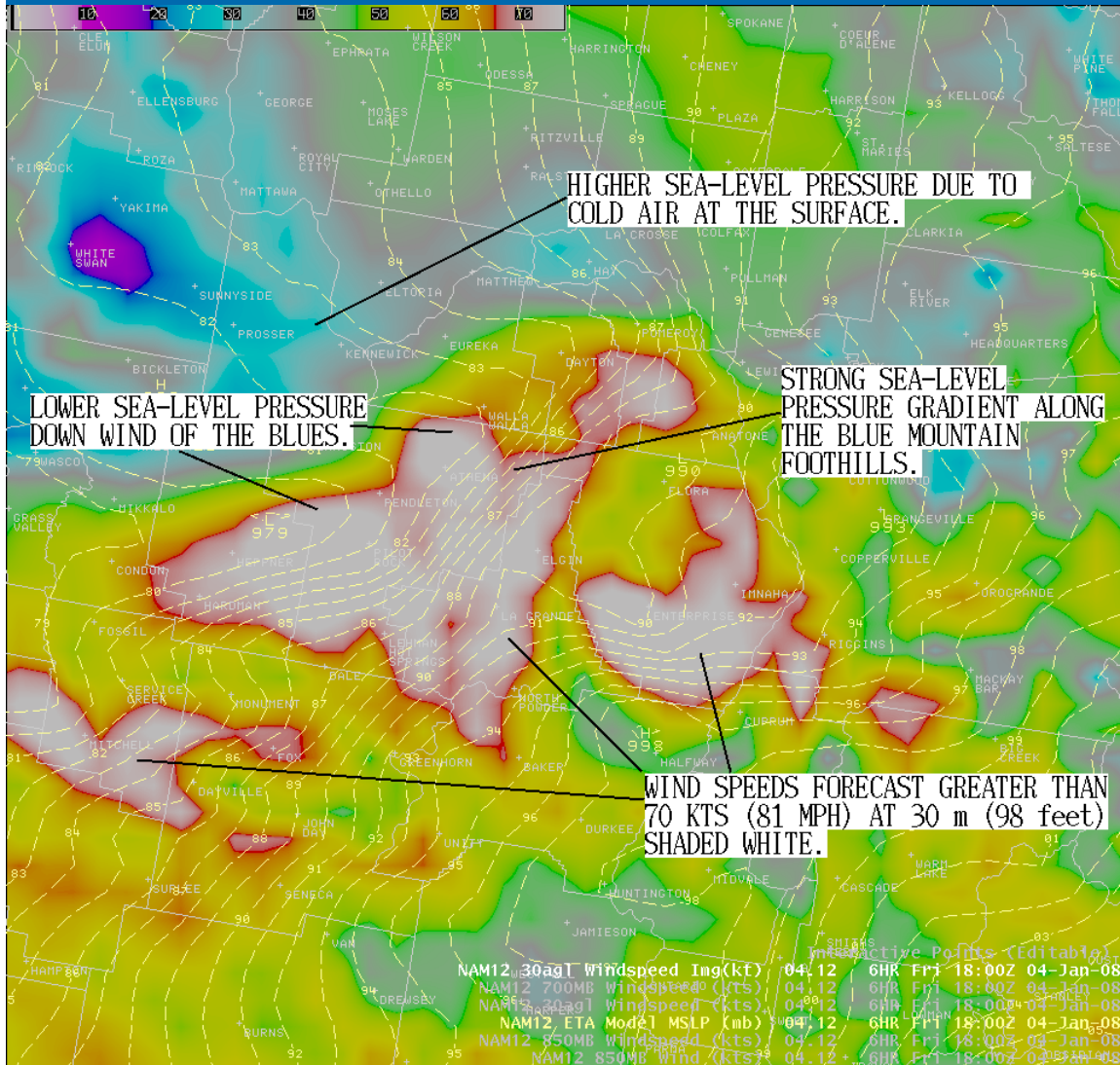
# Historical Perspective

- Search KALW obs back to 1950
  - Sustained wind must be greater than 45 knots
  - Must be at least two hours with sustained winds greater than 35 knots
- Result: Nov. 16, 1950
  - KALW 161000Z 14048KT (55 mph) 10SM CLR 12/M06 SLP939
- Since 2000 (ASOS era) search KALW
  - Sustained winds greater than 35 knots
    - May 9, 2000 092053Z 27036KT
    - Dec. 15, 2000 150246Z 28041KT

# SLP Nov. 16 1950

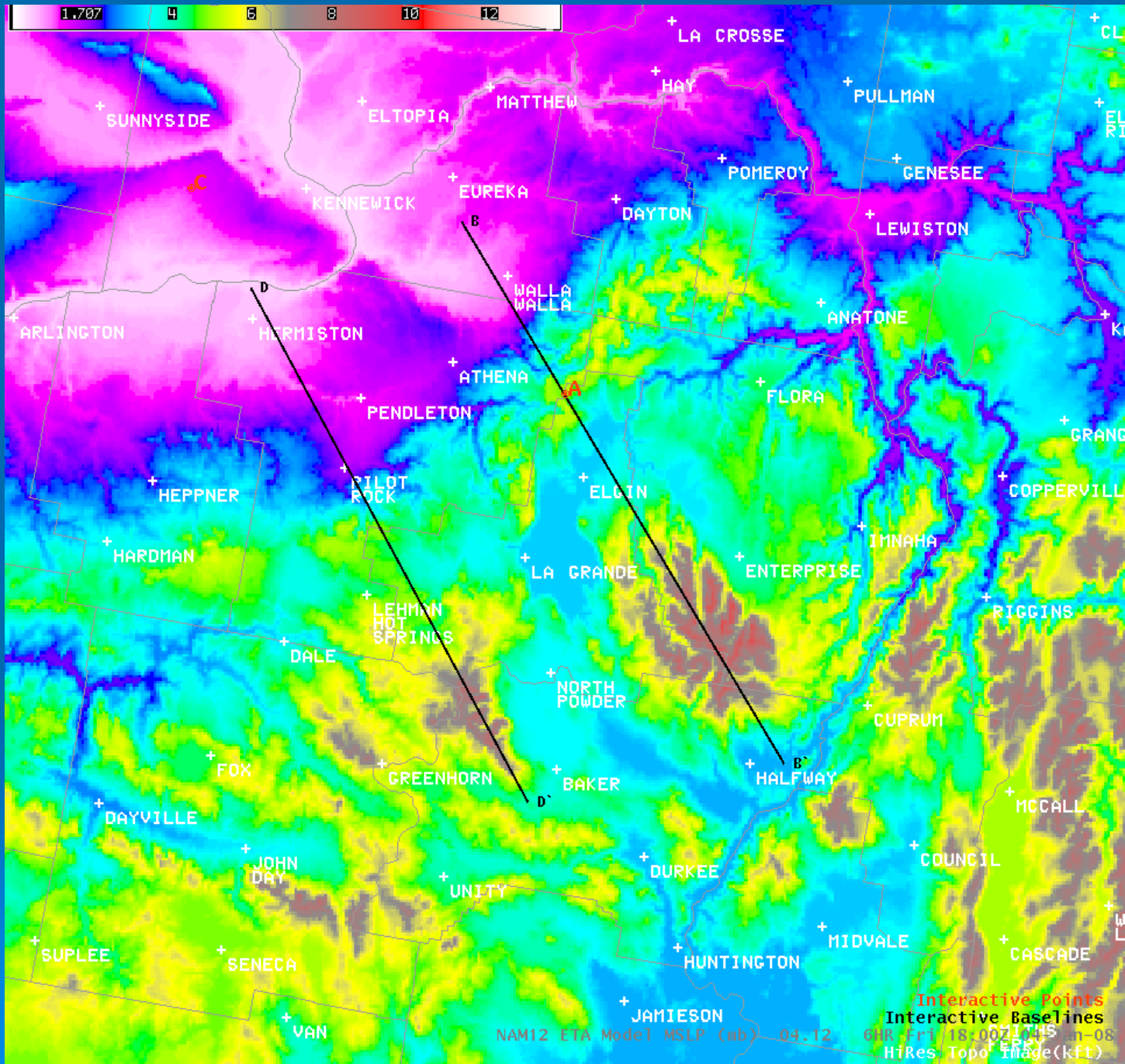


# 30 m AGL Winds

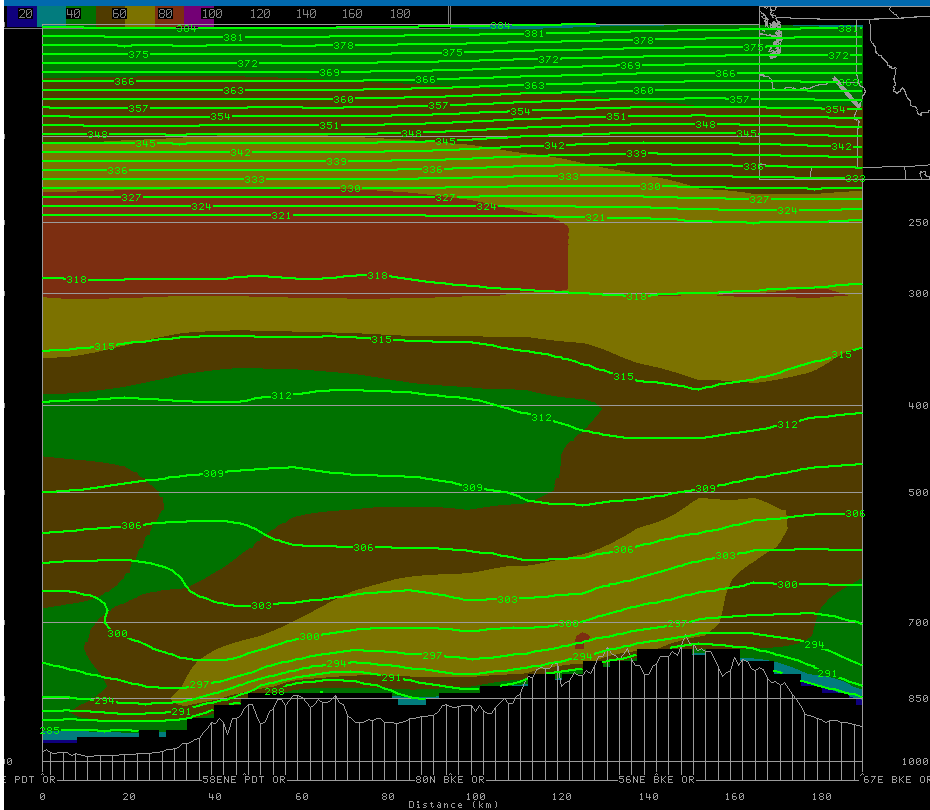


KALW MSLP record set at 9:43 am (979.5 mb or 28.93 in. mercury).

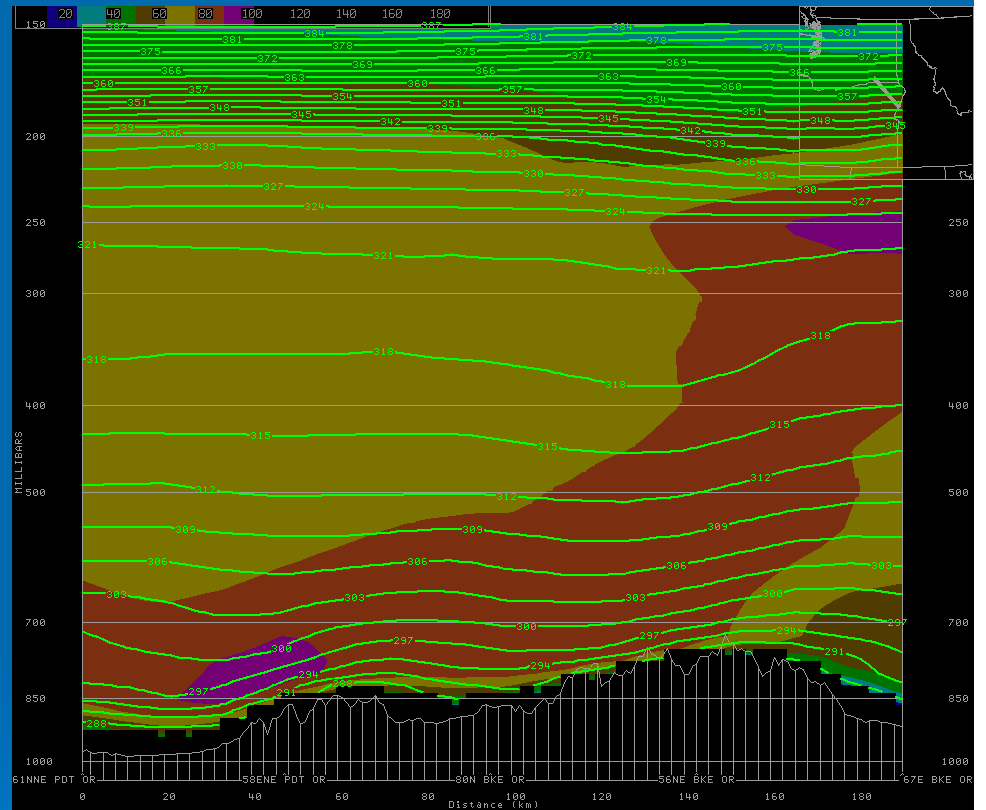
The MSLP at KALW fell 26 mb over the previous 24 hours and 9.5 mb over the previous 3 hours.



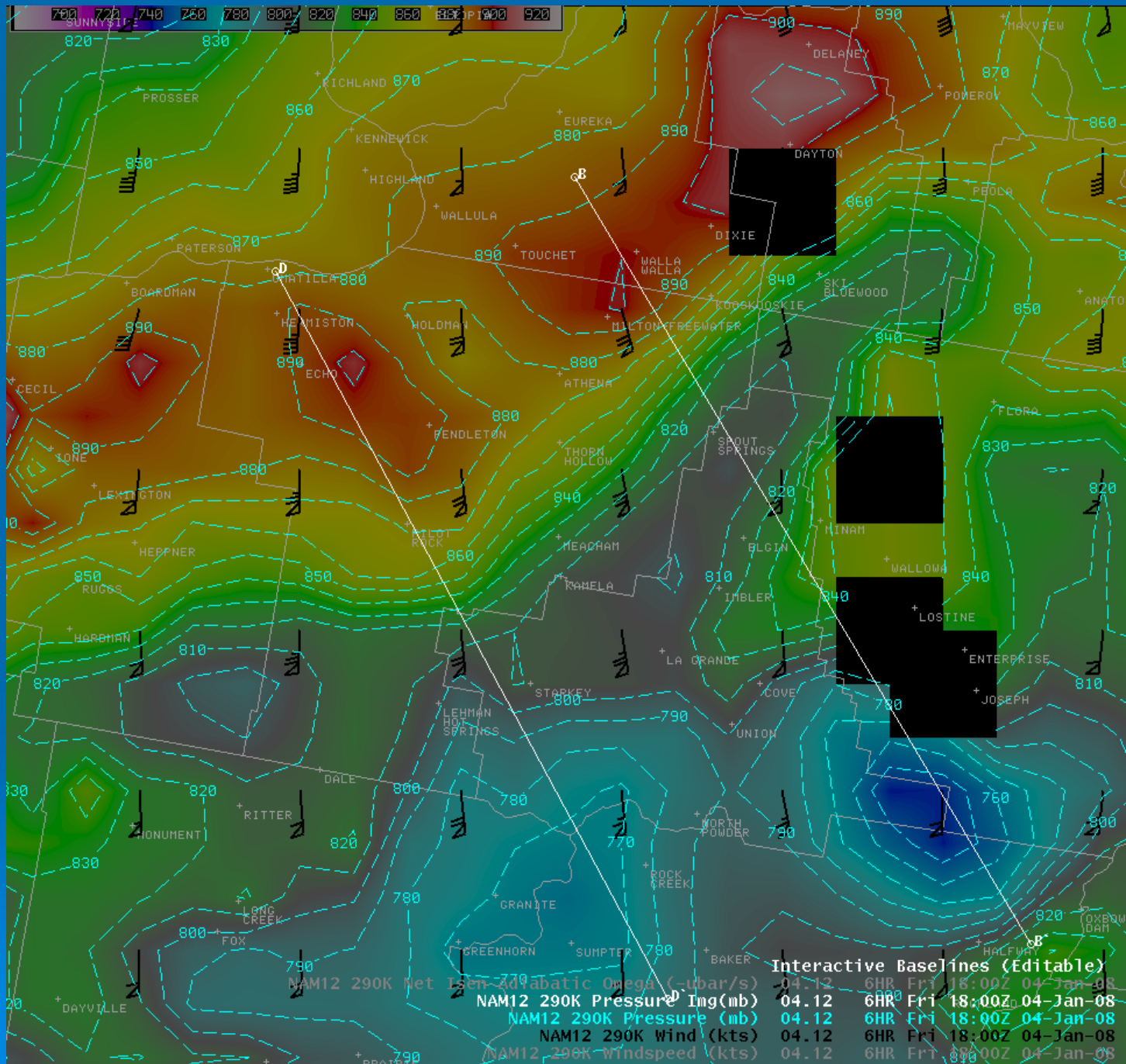


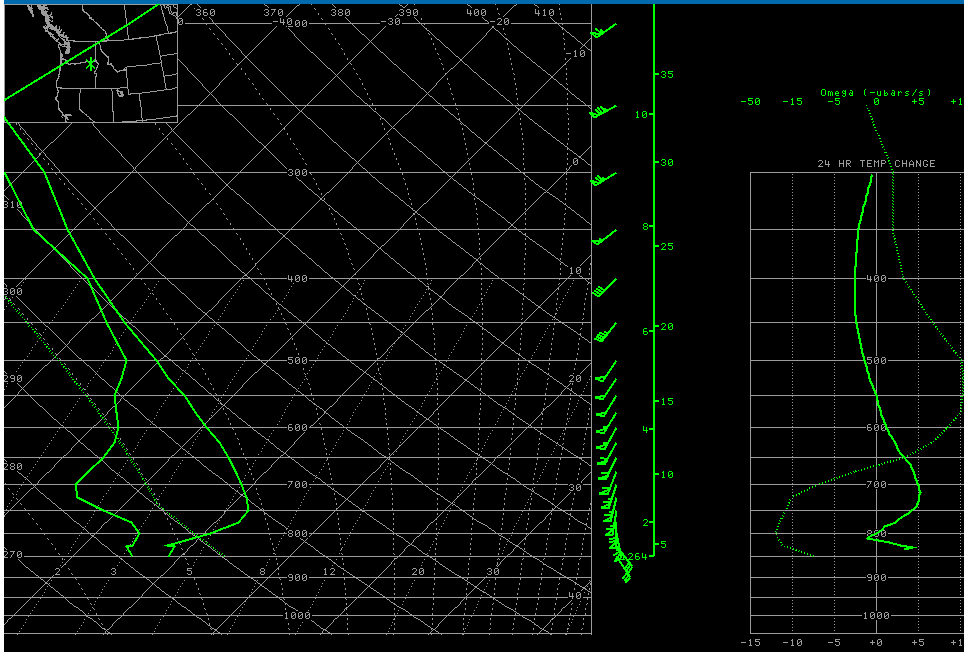


NAM12 lineB	Net Isen Adiabatic Omega (-ubar/s)	04.12	3HR	Fri	15:00Z	04-Jan-08
NAM12 lineB	Windspeed Img(kt)	04.12	3HR	Fri	15:00Z	04-Jan-08
GFS40 lineB	Windspeed (kts)	03.18	24HR	Fri	18:00Z	04-Jan-08
NAM12 lineB	Windspeed (kts)	04.12	3HR	Fri	15:00Z	04-Jan-08
GFS40 lineB	Potential Temp (K)	03.18	24HR	Fri	18:00Z	04-Jan-08
NAM12 lineB	Potential Temp (K)	04.12	3HR	Fri	15:00Z	04-Jan-08

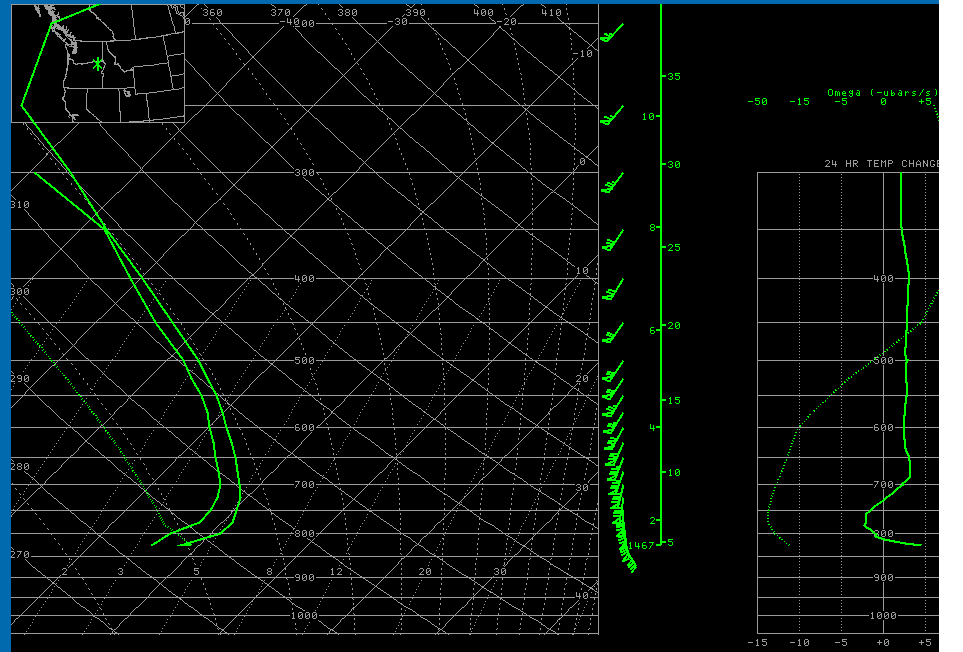


NAM12 lineB	Net Isen Adiabatic Omega (-ubar/s)	04.12	6HR	Fri	18:00Z	04-Jan-08
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PRECIP WATER= 0.31 in \* -PARCEL- T=FCST MAXTd=50 mb MEAN  
 K-INDEX= -1 \* MOD PARCEL P= 850 mb  
 TOTALS INDEX= 35 \* MOD PARCEL T/Td= 39/22° F/3/-5° C  
 SWEAT INDEX= 293 \* CONVECTIVE TEMP= 65° F  
 DRY MICROBURST POT=21; CST < 30 kt \* LIFTED INDEX= 9.2  
 FREEZING LEVEL= 5556 ft ASL \* CCL= 13307 ft ASL/ 598 mb  
 WET-BULB ZERO HGT= 4148 ft ASL \* LCL= 7832 ft ASL/ 738 mb  
 0-6 KH AVG WIND= 211°/51 kts LFC=NA  
 0-6 KH STM HTN (30R75)= 241°/38 kts \* MAX HAILSIZE=NA  
 0-3 KH STM REL HELICITY= 989 m<sup>2</sup>/s<sup>2</sup> \* MAX VERTICAL VELOCITY=NA  
 FORECAST MAX TEMP= 39° F EQUILIBRIUM LEVEL=NA  
 TRIGGER TEMP= 13° C/55° F APPROX CLOUD TOP=NA  
 SOARING INDEX=NA POSITIVE ENERGY ABV LFC=NA  
 NDPI/WINDEX = -0.07/NA NEGATIVE ENERGY BLW LFC=NA  
 NAM12 pta 45 3N 118 W Soundings 04.12 3HR Fri 15:00Z 04-Jan-08



PRECIP WATER= 0.51 in -PARCEL- T=SFC Td=SFC  
 K-INDEX= 12 INIT PARCEL P= 825 30 24 ° mb  
 TOTALS INDEX= 31 INIT PARCEL T/Td= 30/24° F/0/-4° C  
 SWEAT INDEX= 354 CONVECTIVE TEMP= 63° F  
 DRY MICROBURST POT=21; CST < 30 kt \* LIFTED INDEX= 13.5  
 FREEZING LEVEL= 5349 ft ASL \* CCL= 13369 ft ASL/ 593 mb  
 WET-BULB ZERO HGT= 4813 ft ASL \* LCL= 6315 ft ASL/ 779 mb  
 0-6 KH AVG WIND= 210°/73 kts LFC=NA  
 0-6 KH STM HTN (30R75)= 240°/55 kts \* MAX HAILSIZE=NA  
 0-3 KH STM REL HELICITY= 1536 m<sup>2</sup>/s<sup>2</sup> \* MAX VERTICAL VELOCITY=NA  
 FORECAST MAX TEMP=NA EQUILIBRIUM LEVEL=NA  
 TRIGGER TEMP= 10° C/51° F APPROX CLOUD TOP=NA  
 SOARING INDEX=NA POSITIVE ENERGY ABV LFC=NA  
 NDPI/WINDEX = -0.02/NA NEGATIVE ENERGY BLW LFC=NA  
 NAM12 pta 45 3N 118 W Soundings 04.12 6HR Fri 18:00Z 04-Jan-08

# Summary

- A rare, pre-frontal, southeasterly, high wind event Walla Walla Valley
  - May have occurred last in November 1950?
  - Record low SLP at KALW
- Mountain Wave characteristics
  - Strong cross-barrier flow
  - Southwest to Northeast orientation of Northern Blues
    - May explain weaker winds at Pendleton
  - Stability at Ridge Top
  - Flow reversal aloft – critical level?
- 6 hour forecast of NAM12 captures mountain wave
  - 24-hour NAM12 forecast mountain wave in lee of Blues not nearly as pronounced (not shown)