ANALYSIS OF A WINTER STORM
USING THE WEATHER EVENT SIMULATOR (WES)

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Introduction

On 08 February 2002 a winter storm system moved through the Pacific Northwest and into the Intermountain region producing heavy mountain snows and very strong winds in the Snake River Plain (SRP) of southeast Idaho. This event demonstrates how synoptic and mesoscale forcing mechanisms are enhanced by moderately unstable lapse rates to generate a winter storm event. This event was also used to simulate forecast operations during a partial outage of AWIPS and limited datasets.

Synoptic and Mesoscale Features

A deepening shortwave rounded the base of an offshore Pacific Low located near the British Columbia coast and moved east through the Great Basin region along the southern Idaho border. In response, a surface Low developed in northwest Oregon and deepened as it moved northeast through the Idaho panhandle. A 120 knot jet initially nosed into northern California and then shifted east into northern Nevada with a layer of upper level 200 to 400mb) divergence centered over southern Idaho through most of the event. In addition, mid level instability was increasing during the event with 700-500mb lapse rates increasing from 6.5 C/km to 7.5 C/km. In the boundary layer, warm air advection (WAA) of 5 to 9C/12-hr persisted for nearly 12 hours prior to cold frontal passage (FROPA), which rapidly transitioned to strong cold air advection (CAA) of 10 to 20C/12-hr after FROPA. Finally, moderate to strong southwest to west flow provided orographic forcing and enhanced precipitation amounts, particularly in the west central mountains of Idaho and the highlands east of the SRP.

Discussion

Storms moving through the Pacific Northwest have a tendency to develop split fronts where the surface features become decoupled from their upper level support and weaken substantially as they move into the Intermountain region. This system remained intact with upper and lower level features remaining coupled as it moved through the region, and in fact strengthened slightly. As a result, the upper level jet dynamics, mid level instability, low level WAA and orographic forcing coincided with the location of the moisture plume (Fig. 1) on water vapor imagery producing 6 to12 inches of snowfall in the west central mountains and eastern highland region of Idaho with much lower snow amounts in the SRP.

Snow amounts in the SRP are somewhat suspect as very strong winds caused extensive blowing and drifting snow which closed numerous roads due to ice, strong crosswinds, and low visibility. A surface pressure gradient of 4mb/100km and downward mixing of winds aloft by strong CAA behind the front, combined to generate sustained wind speeds of 25 to 50 mph in the SRP (Fig. 2) from 08/10Z through 09/01Z with wind gusts reaching nearly 60 mph.

Figure 1

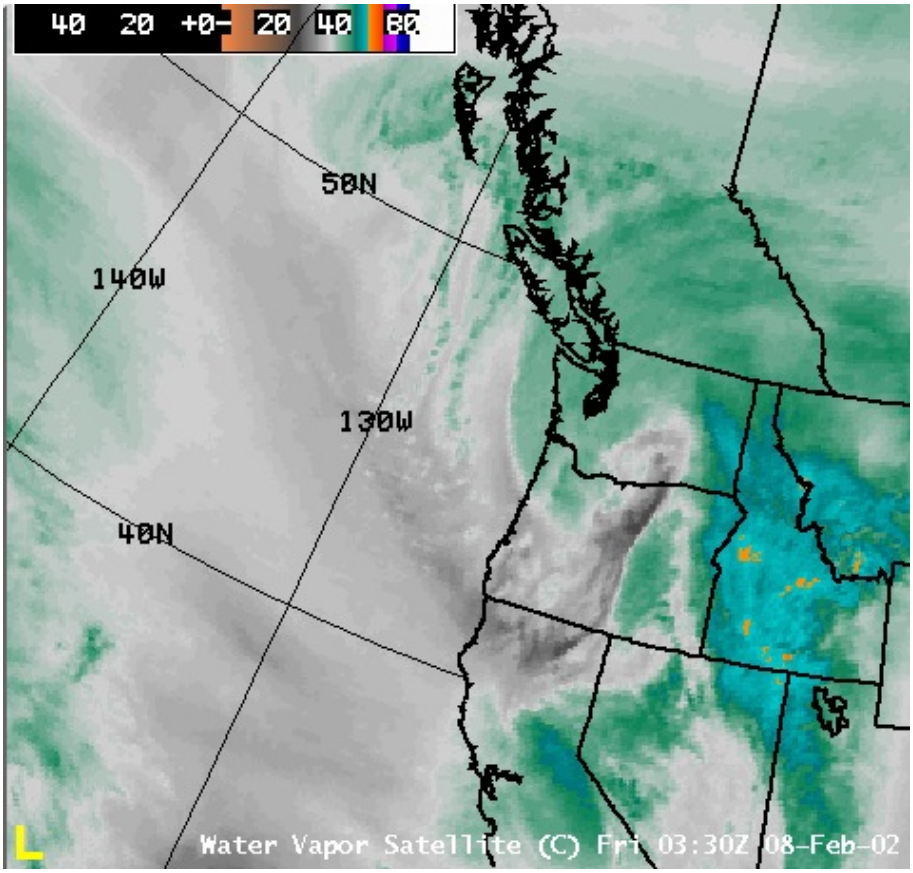
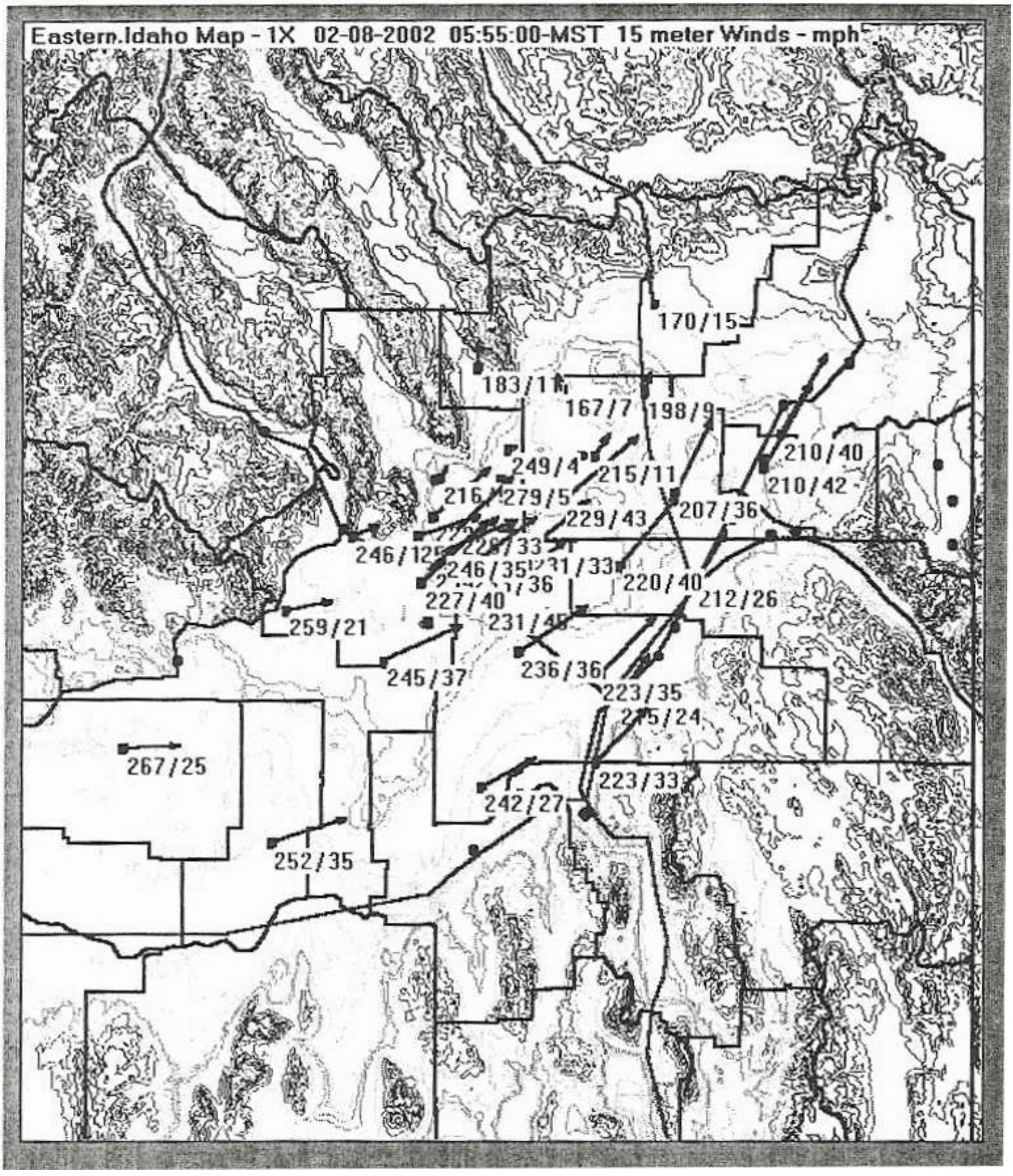

40 20 +0- 20 40 60
50N
140W
130W
40N
Water Vapor Satellite (C) Fri 03:30Z 08-Feb-02

Figure 2


Eastern.Idaho Map - 1X 02-08-2002 05:55:00-MST 15 meter Winds - mph
170/15
183/11
167/7
198/9
210/40
210/42
249/4
215/11
216
279/5
229/43
207/36
246/125
246/35
227/40
220/40
212/26
259/21
245/37
236/36
223/35
223/33
242/27
267/25
252/35