Western Region Technical Attachment
No. 90-02
January 16, 1990

BEWARE OF THE INITIAL ANALYSIS

At 12Z, January 4, 1990, the large-scale situation showed a broad ridge positioned near 132W, with a long-wave trough downstream through the central U.S. Of immediate concern to the forecasters in the Western Region was a short-wave trough riding over the top of the ridge and approaching the Pacific Northwest coast, as shown in the 1201Z water vapor image in Figure 1. It was already raining in the western portions of British Columbia and Washington. The question was, what effect would this system have on the remainder of the region during the next 24 hours?

A comparison of the 12Z NGM initial analysis (Figure 2) and the water vapor imagery in Figure 1 shows that the vorticity maximum near 133W/54N on the analysis agrees well with the imagery. Note the small dark (warm) area at 135W/54N on the imagery, indicative of strong subsidence, just to the west of the vorticity maximum. This also agreed well with the IR imagery which showed an enhancement to the clouds downstream from this dark area (not shown). So far so good!

However, the baroclinic band associated with this short wave appears much more organized on the water vapor imagery than on the NGM initial analysis. The initial analysis shows a weak trough extending south southwestward form the vorticity maximum, to about 140W/40N. The analyzed trough is too far west and much too weak. But, perhaps the short-wave trough is weakening as it is moving through the ridge and maybe the model isn't too far off. However, there are two hints on the water vapor imagery (best observed in animation) that point to a potential problem.

1. Note the dark band behind the short wave, extending from 127W/48N to 126W/42N (see arrows). In the preceding images, this band was darkening with time, indicative of increased cold air advection (subsidence) and development along this band.

2. Upstream, along 142W, a vigorous short wave was moving up the back side of the ridge. Note the enhanced cloud shield ahead of it (again, best observed in animation), which suggested fairly strong warm air advection into the ridge.

From points 1 and 2 above, the implication is that the short wave approaching the Pacific Northwest coast is much better organized than the initial analysis shows. Furthermore, with strong, warm air advection upstream, a sharpening of the ridge would be likely, with more subsequent veering of the flow across the western U.S. This, in turn, would drive the short wave through the northern sections of the region.

The 12 and 24 hour forecasts from the 12Z NGM are shown in Figures 3 and 4. Indeed, the NGM forecasts a veering of the flow, but only a weak short wave through the northern tier states, brushing northern Utah by the next morning. The verifying analyses for 00Z and 12Z, January 5, are given in Figures 5 and 6. The flow veered much more sharply than in the progs and note the strong short-wave trough that sliced through Oregon, Idaho, and into northern Utah. Additionally, the IR imagery, valid 2101Z, January 4, in Figure 8, shows a well-organized trough extending from western Montana to northwestern Nevada. Eighteen hour precipitation values (January 4, 12Z-January 5, 06Z), obtained from the DCS platform data, are shown in Figure 7. Note the significant values in Oregon and Idaho. This particular plot does not show results for Nevada and Utah, however, widespread rain and snow were registered in the northern portions of these two states. Ski resorts in Utah reported 6-18 inches of new snowfall.

The point of this Technical Attachment is that an evaluation of a forecast model must begin with the initial analysis. Most of the time the models do an excellent job. However, forecasters must be on guard for cases when the initial analysis is in error and adjust their forecasts accordingly.

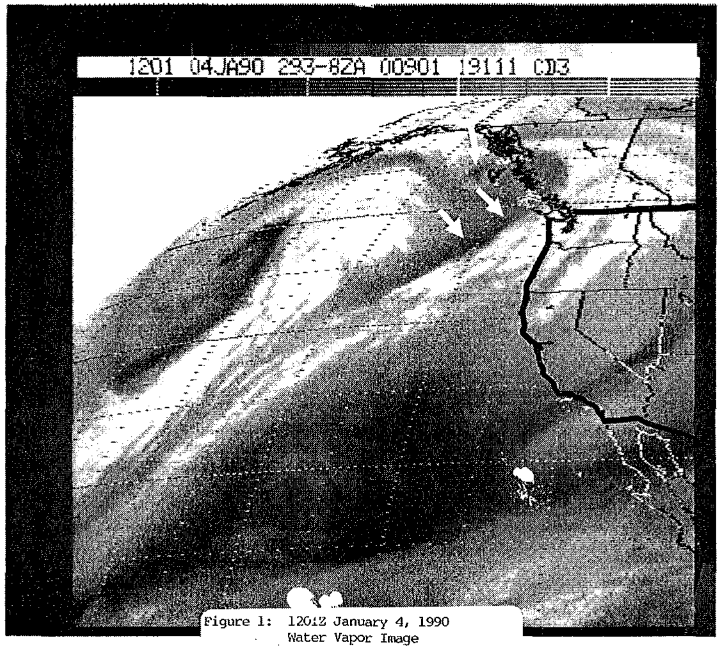

Figure 1: 1201Z January 4, 1990
Water Vapor Image

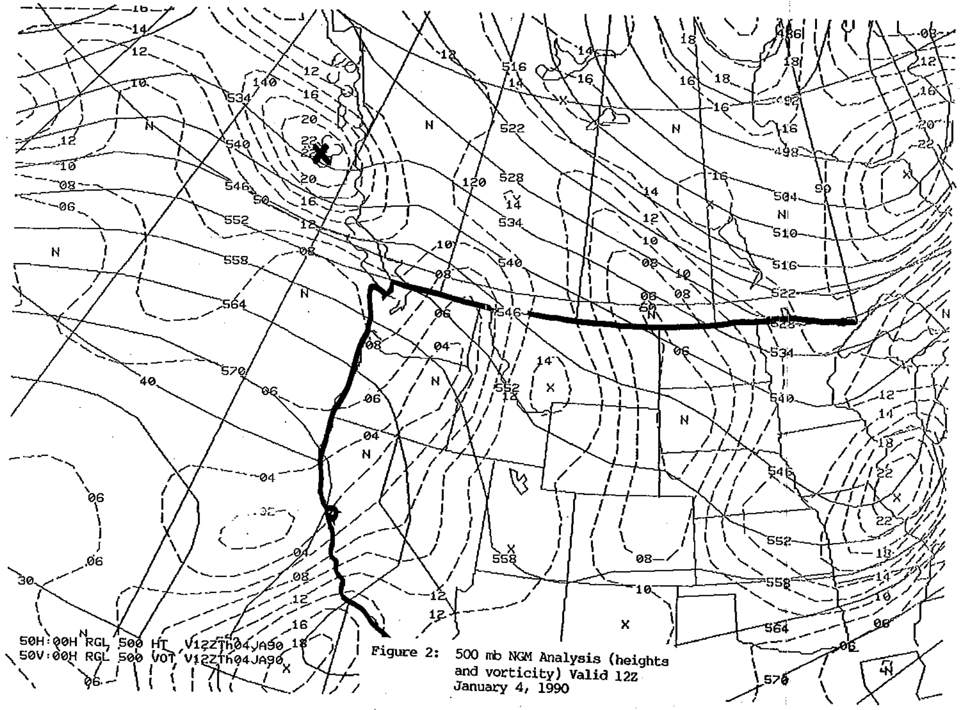

Figure 2: 500 mb NGM Analysis (heights and vorticity) Valid 12Z January 4, 1990

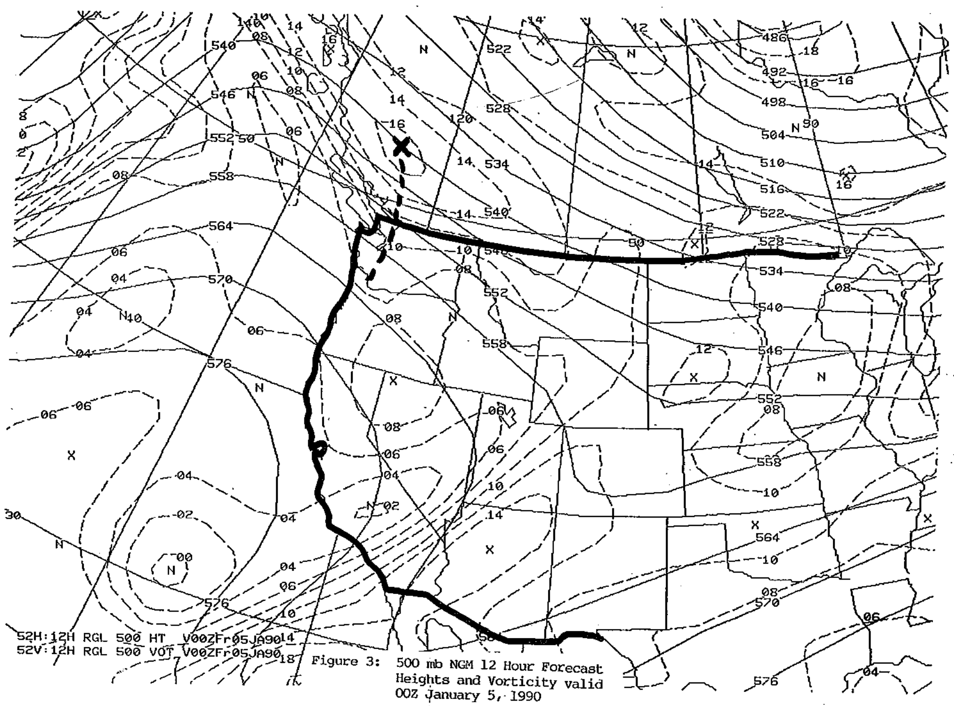

Figure 3: 500 mb NGM 12 Hour Forecast Heights and Vorticity valid 00Z January 5, 1990

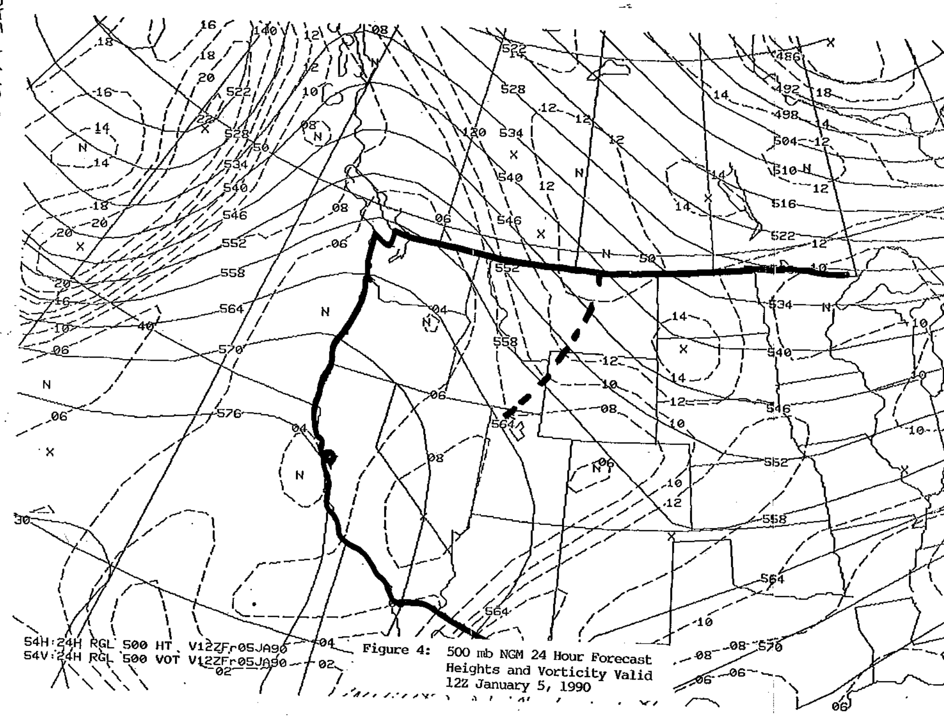

Figure 4: 500 mb NGM 24 Hour Forecast Heights and Vorticity Valid 12Z January 5, 1990

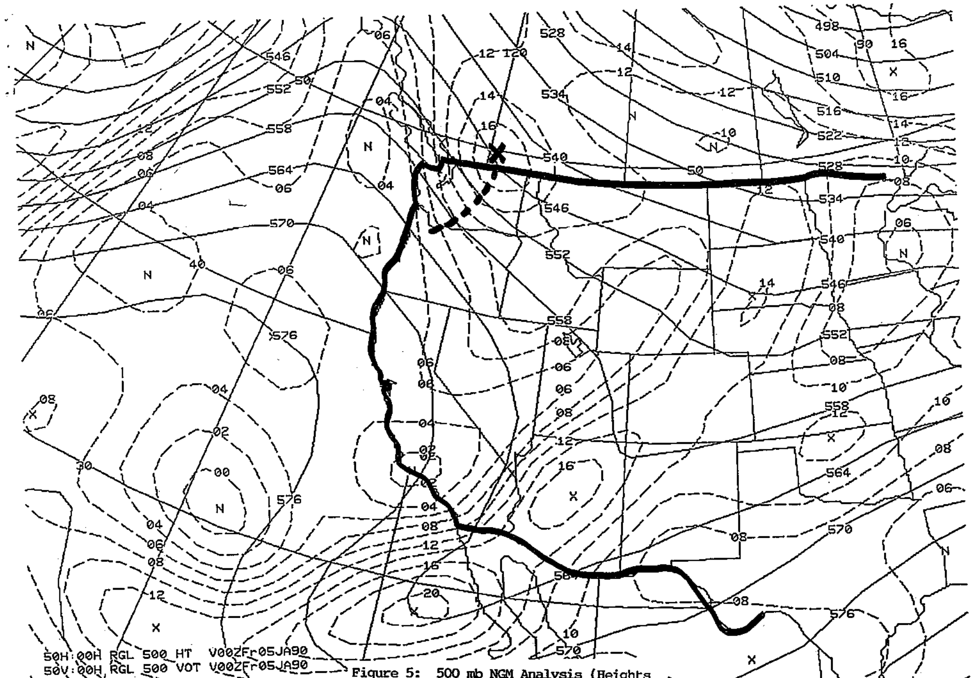

Figure 5: 500 mb NGM Analysis (Heights and Vorticity) Valid 00Z January 5, 1990

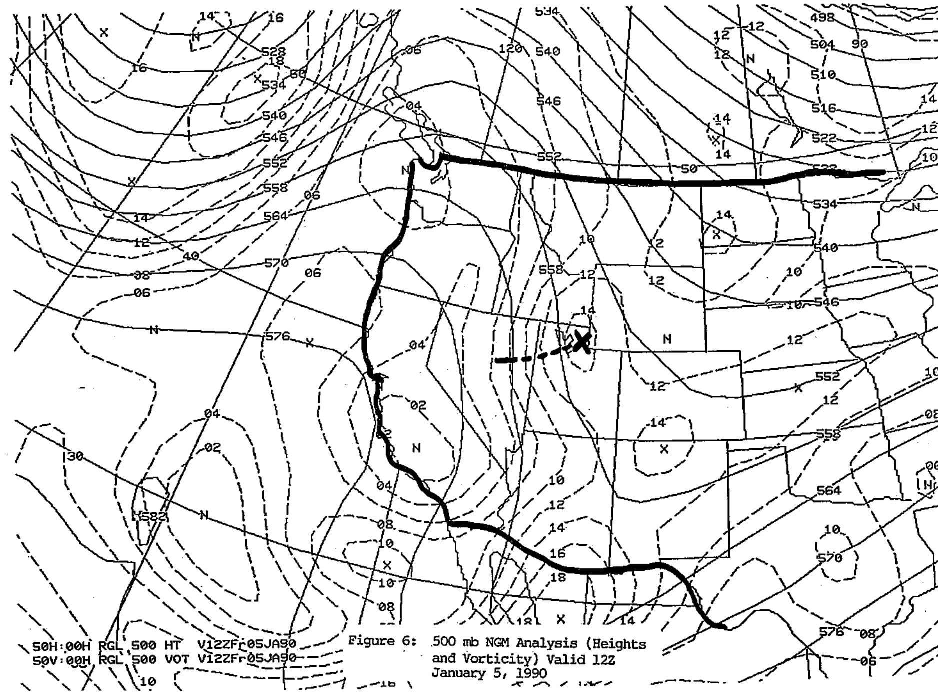

Figure 6: 500 mb NGM Analysis (Heights and Vorticity) Valid 12Z January 5, 1990

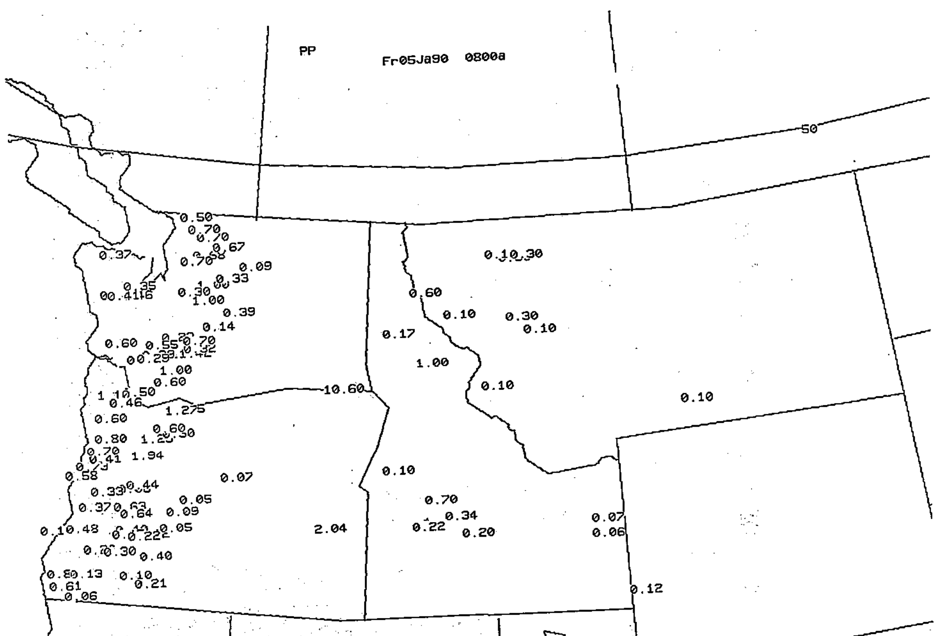

Figure 7

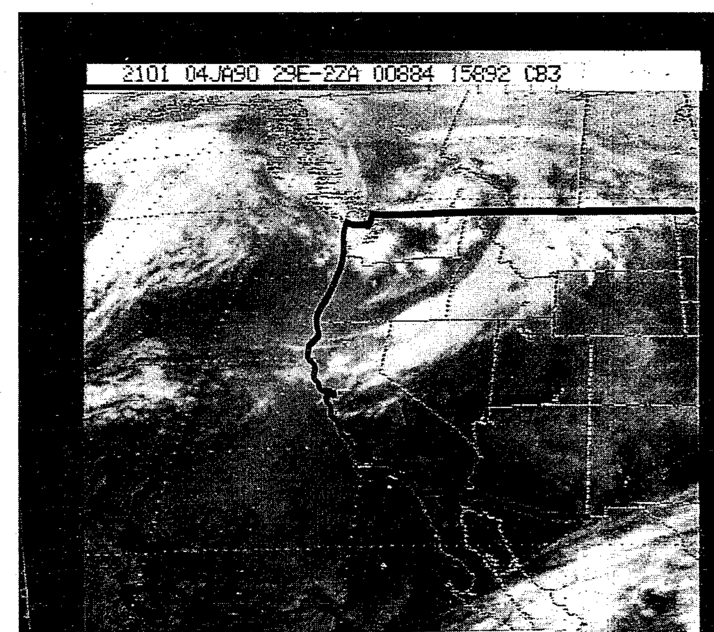

Figure 8: 21012 January 4, 1990 Infrared Image