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JET STREAK INTERACTION - ANOTHER GOOD CLUE

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In a recent Western Region Technical Attachment, "A Revealing Isentropic Analysis" (WRTA 86-01), it was stated that there appeared to be a lack of dynamics during a significant precipitation episode, December 30, 1985, in the Great Basin. As described in WRTA 86-01, the conventional analyses failed to show any 500-mb PVA or frontal boundaries over the area receiving precipitation. Additionally, soundings over the Great Basin were stable, and there was only weak temperature advection at 700 mb.

This paper goes on to successfully describe the many advantages of isentropic analyses and its applications. Unfortunately, the use of isentropic analyses is limited along the West Coast because of the lack of upstream data. Another disadvantage of the isentropic analysis is that it is diagnostic; there are no graphic forecasts of this product available. However, there are other tools the forecasters can use to infer dynamic forcing and to complement the isentropic analyses.

Although not addressed in WRTA 86-01, there was other evidence of dynamic forcing on the constant pressure charts. At ØØZ December 29 (Figure 1), the NMC 200-mb analysis showed a jet streak approaching the Baja California coast. By ØØZ December 30 (Figure 2), several jet aircraft reports on the NMC 250-mb analysis indicated that a jet streak was now just off the southern California coast. The 300-mb analysis (Figure 3) for ØØZ December 30, also showed the jet streak approaching southern California, as well as the appearance of a second jet streak moving into southwest Montana. By 12Z December 30, NMC's 250-mb analysis (Figure 4) depicted the southern jet streak moving across southern California, while the trailing edge of the northern jet streak remained over the northern Rockies.

Figure 5 shows an example of the E.R. Reiter model of convergence/divergence patterns aloft associated with a jet streak in nearly straight flow. Notice that the area of precipitation from WRTA 86-01 (Figure 6) was under the influence of the left front divergent quadrant of the southern jet streak and the right rear divergent quadrant of the northern jet streak. This combination (and resulting intensification) of divergence aloft over the Great Basin led to the strong synoptic scale upward vertical motion as revealed in the isentropic analysis.

An advantage of utilizing jet streaks as a forecasting tool is that a continuity of the jet streak pattern can usually be inferred. Using upper level analyses and prognostic graphics, a short term projection of jet streak patterns and related divergence/convergence areas can be made. This is usually most successful in areas distant from strong diabatic heating, such as the central and eastern Pacific Ocean and away from the eastern coasts of Asia or North America. Instead of limiting upper air analyses to only every 12 hours, field forecasters can quantitatively monitor disturbances over the eastern Pacific, as frequently as every hour, by utilizing the airep plotting procedures of AFOS. These observed winds can be compared with model initial analyses and forecasts to infer jet streak dynamics and translation.

In summary, jet streak dynamics is another forecast tool that can be used to complement the more conventional methods of meteorological analyses. With all the advantages of jet streak meteorology, a quick review of such revealing data should be part of every forecasters's routine.

References:

[1] Reiter, E.R., "Jet-Stream Meteorology", pp. 136-137, University of Chicago Press, 1963.

[2] Western Region Technical Attachment 86-01, "A Revealing Isentropic Analysis", January 7, 1986.

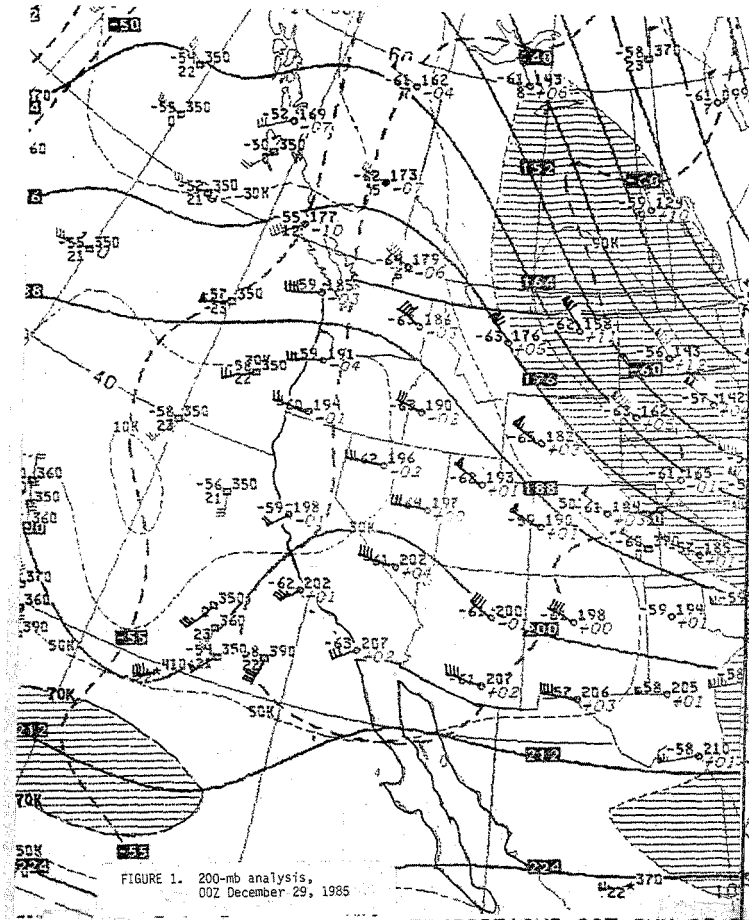

FIGURE 1. 200-mb analysis, 00Z December 29, 1985

D166 .. 200MB ANALYSIS HEIGHTS/ISOTACHS 00Z SUN 29

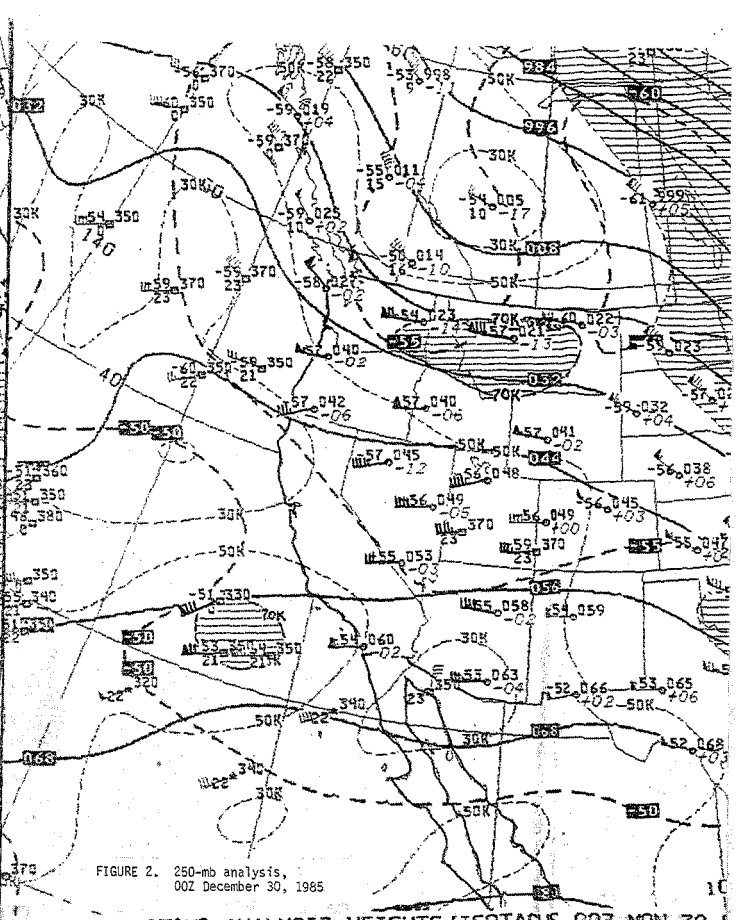

FIGURE 2. 250-mb analysis, 00Z December 30, 1985

D053 .. 250MB ANALYSIS HEIGHTS/ISOTACHS 00Z MON 30

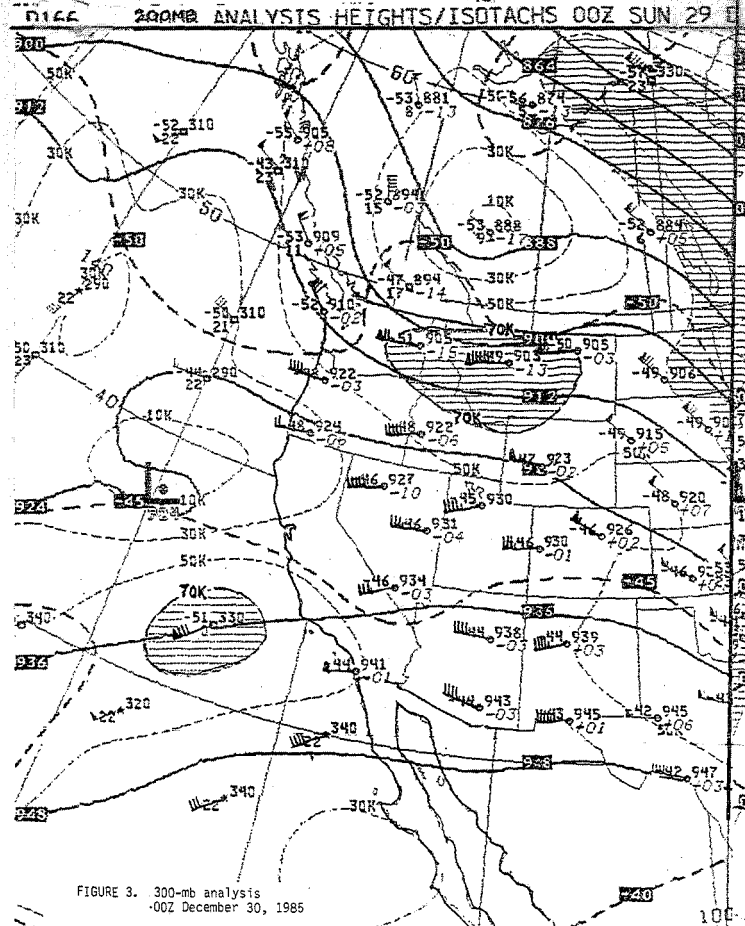

FIGURE 3. 300-mb analysis 00Z December 30, 1985

D049 .. 300MB ANALYSIS HEIGHTS/ISOTACHS 00Z MON 30

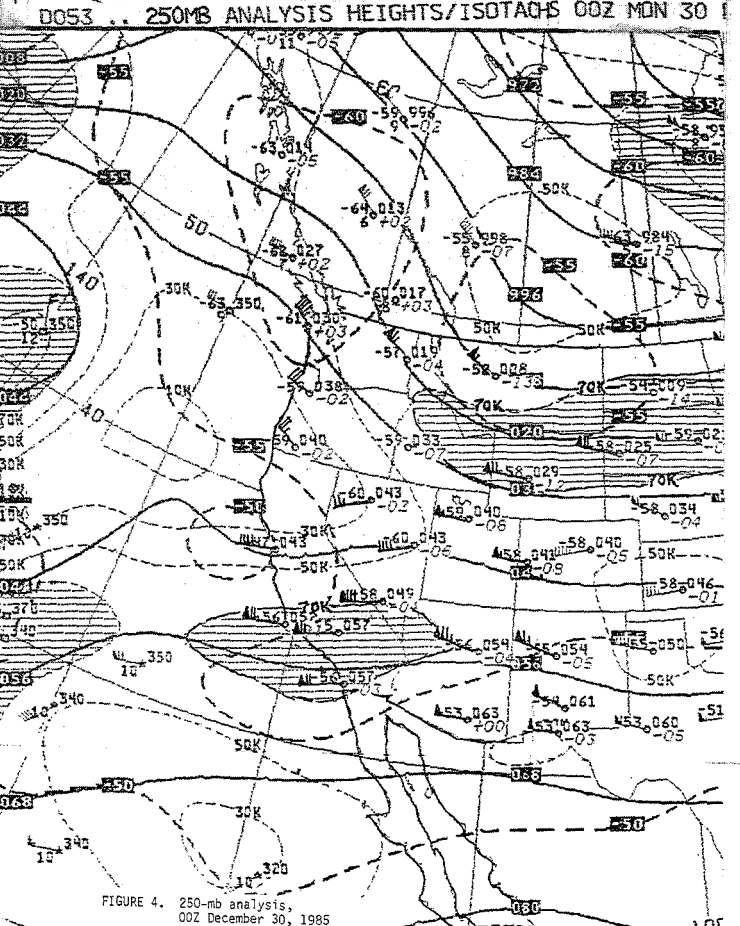

FIGURE 4. 250-mb analysis, 00Z December 30, 1985

D160 .. 250MB ANALYSIS HEIGHTS/ISOTACHS 12Z MON 30

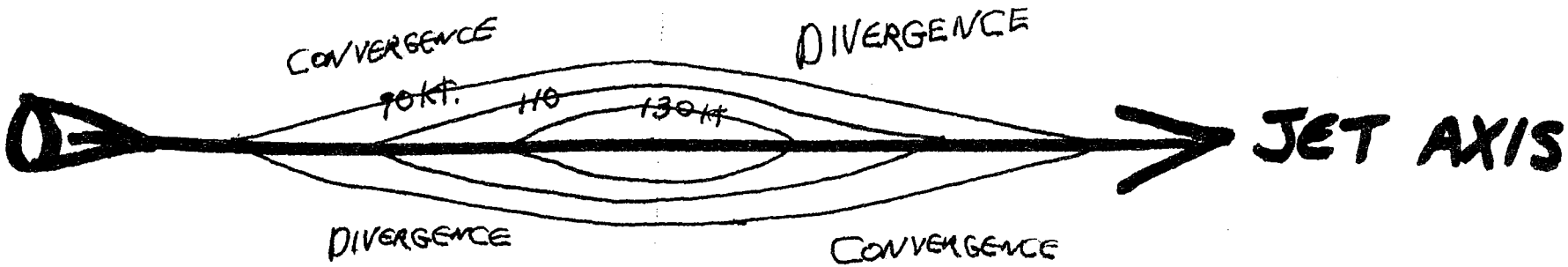
CONVERGENCE
DIVERGENCE
90kt.
110
130kt
JET AXIS
DIVERGENCE
CONVERGENCE

FIGURE 5.