WESTERN REGION TECHNICAL ATTACHMENT
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A. A FAST DEVELOPING STORM, APRIL 12 - SATELLITE PICTURES HELPFUL

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A good example of how jet cirrus cloudiness was used by LAX WSFO to forecast a rapidly developing West Coast storm occurred on April 12, 1976. A broad ridge aloft was at 150 W. A deep trough with a slight negative tilt was on the West Coast with the jet stream from the northwest on the west side of the trough, see Figure 1. The maximum isotach of 110 knots at 12Z was crossing the ridge, however, AIREPS showed winds of 140 knots or more.

The important feature illustrated in this developing storm was rapidly moving elements in the jet stream as seen on SMS-2 IR pictures (indicated by J at arrows in Figures 3 - 5). SFO SFSS TBXX6 analyses were quite useful and identified these elements as vorticity maxima. At 12Z on the 12th, a finger of cirrus came out of the ridge and headed southeastward toward an indistinctly-shaped area of clouds off the California coast (indicated by arrow "1" in Figures 2 - 5). These clouds off the California coast were indicative of vorticity advection although not very well organized. The finger of cirrus (J) to the northwest may have been propagated by a fast-moving perturbation rather than literal movement of cloud elements, since the speed of movement calculated to about 180 knots between 14Z and 17Z. In any event, as these clouds moved into the rear quadrant of PVA clouds, the cloud mass became better organized and took on a comma shape with its head off the central California coast. This cloud system continued to develop into a major storm over the western United States as it moved inland.

Southern California was virtually clear early in the morning of the 12th. During the day, thin cirrus moved in, thickened, lowered to altostratus and patchy stratocumulus increased to broken cumulus by afternoon. By 00Z rainshowers were breaking out on the coast. Rain spread inland including desert areas and lasted into the next morning. The Los Angeles area which had received only about 6 inches of rain in the past year reported one-half to one inch of rain from this storm.

In my opinion, the NWP progs did not do justice to the important details of this situation. While the PE vorticity advection pattern was better than the barotropic, both were very slow. The important point is that the jet maximum indicated by the satellite pictures was used in successfully timing the beginning of precipitation over land. We forecast a 70% PoP for the 1st period for LAX and only missed by minutes of verifying as the rain began over some parts of the city before the period ended. MOS PoPs were 10%, so we lost to MOS but still had a good forecast out to the public.

This development of cloudiness and precipitation was characteristic of what one might expect from good positive vorticity advection associated with a migratory short wave; but, the satellite pictures permitted a refinement of the timing in the forecast not given by the NWP guidance.

B. USE OF FACSIMILE SATELLITE PICTURES

Many WSOs are making good use of SMS-2 satellite pictures now being transmitted over NAFAX. Recent poor gridding of SMS-2 pictures brings up the problem that some users may not know when a fax picture is poorly gridded. Consequently, it is important that forecasters check the gridding of pictures before they are used. This discussion indicates some ways of checking for gridding accuracy and approximating correct gridding.

Unfortunately, fax pictures usually do not have enough detail in gray shades to show the difference between coastlines and the superimposed grid. Therefore, topographic references have to show up as large-scale gray shade changes. Mountain snow cover is an example of such a topographic reference at this time of year. The Sierra Nevada and Canadian Rocky mountain ranges are often good points to check against the transmitted grid.

Another quick check is to compare the picture horizon with the grid horizon. Note in Figure A that the grid extends well north of the picture horizon, thus indicating a serious gridding error. In the corresponding Datalog picture, Figure B, you can see the magnitude of this error by comparing the West Coast and Baja area with the grid.

SSD has developed a 2-piece overlay transparent grid that can be used to correct or add gridding to facsimile charts. The horizon and some topographic check point, such as snow cover of Sierras are all that is needed to locate the overlay on the picture. Since the grids on the satellite pictures normally do not extend right to the horizon when the gridding is correct, the method of comparing the grid to the horizon reveals only the gross gridding errors. The SSD 2-piece grid closely approximates the correct distance relationship from the grid to the horizon. Therefore, with the combined use of the horizon and snow cover and/or colder temperatures associated with mountain ranges, this grid should aid considerably in approximating the true grid. Any WSOs interested in obtaining copies of this overlay should contact SSD.

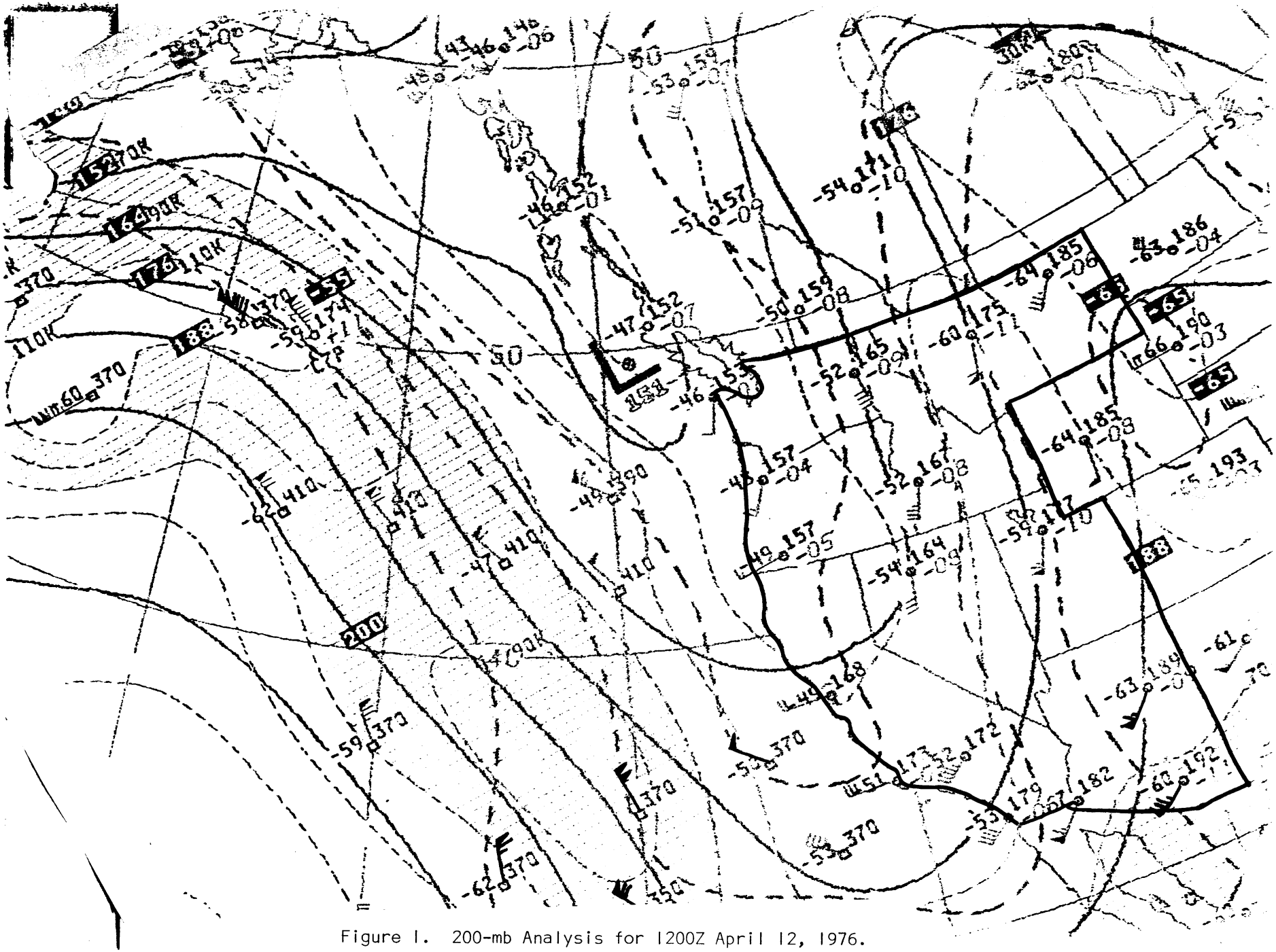

Figure 1. 200-mb Analysis for 1200Z April 12, 1976.

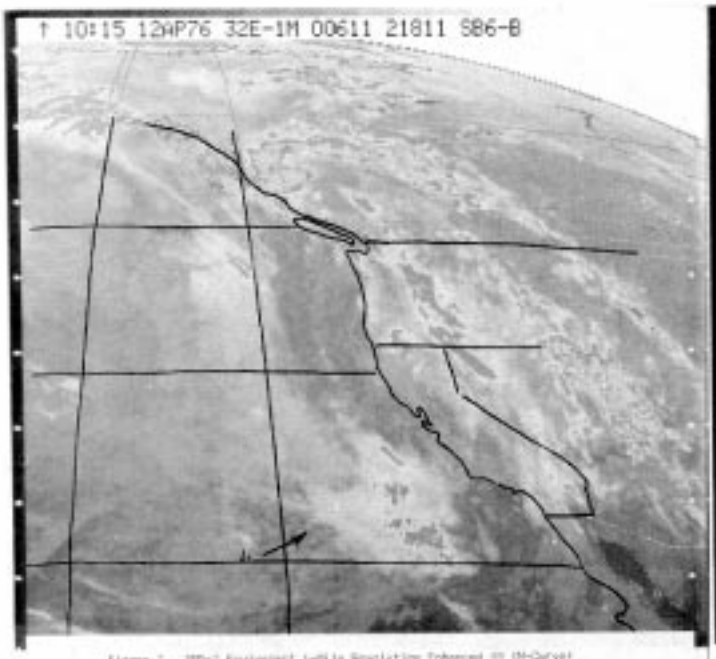

Figure 2. SMS-2 Equivalent 1-Mile Resolution Enhanced IR IN-Curve Picture for 10:15Z April 12, 1976.

Figure 3. SMS-2 Equivalent 1-Mile Resolution Enhanced IR IN-Curve Picture for 14:15Z April 12, 1976.

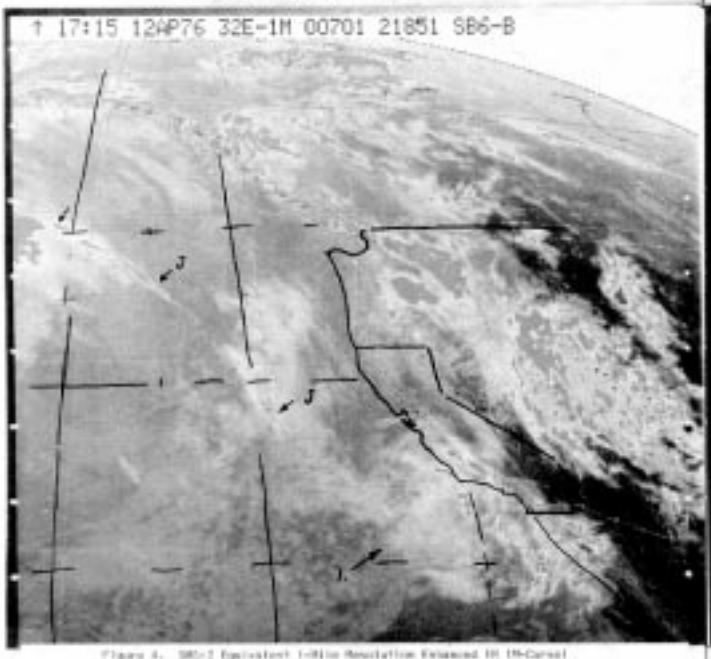

Figure 4. SMS-2 Equivalent 1-Mile Resolution Enhanced IR IN-Curve Picture for 17:15Z April 12, 1976.

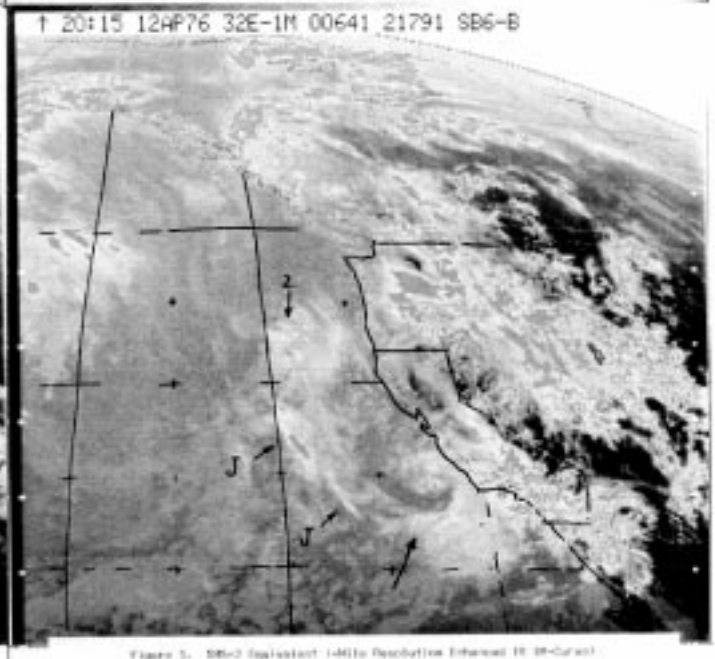

Figure 5. SMS-2 Equivalent 1-Mile Resolution Enhanced IR IN-Curve Picture for 20:15Z April 12, 1976.

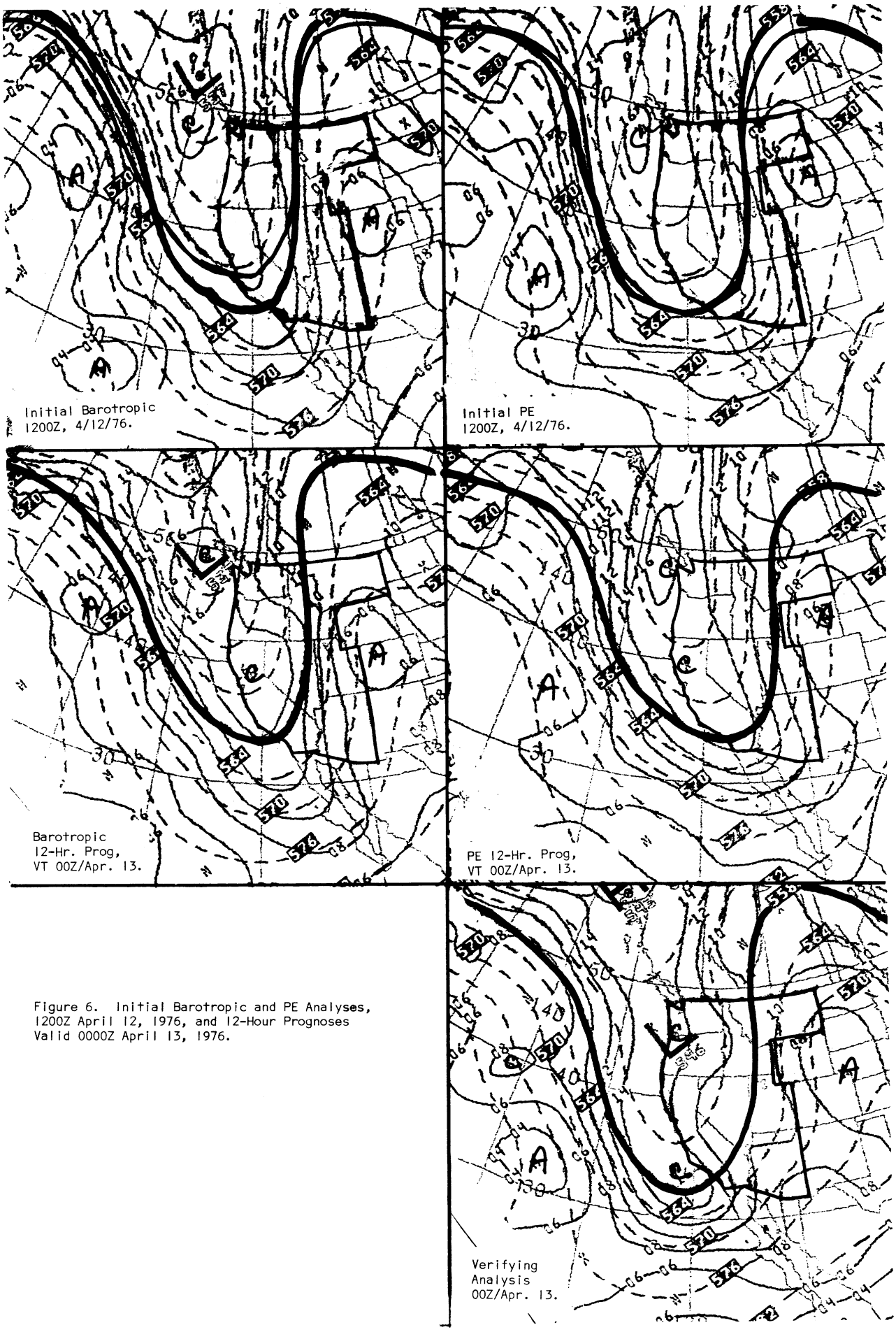

Figure 6. Initial Barotropic and PE Analyses, 1200Z April 12, 1976, and 12-Hour Prognoses Valid 0000Z April 13, 1976.

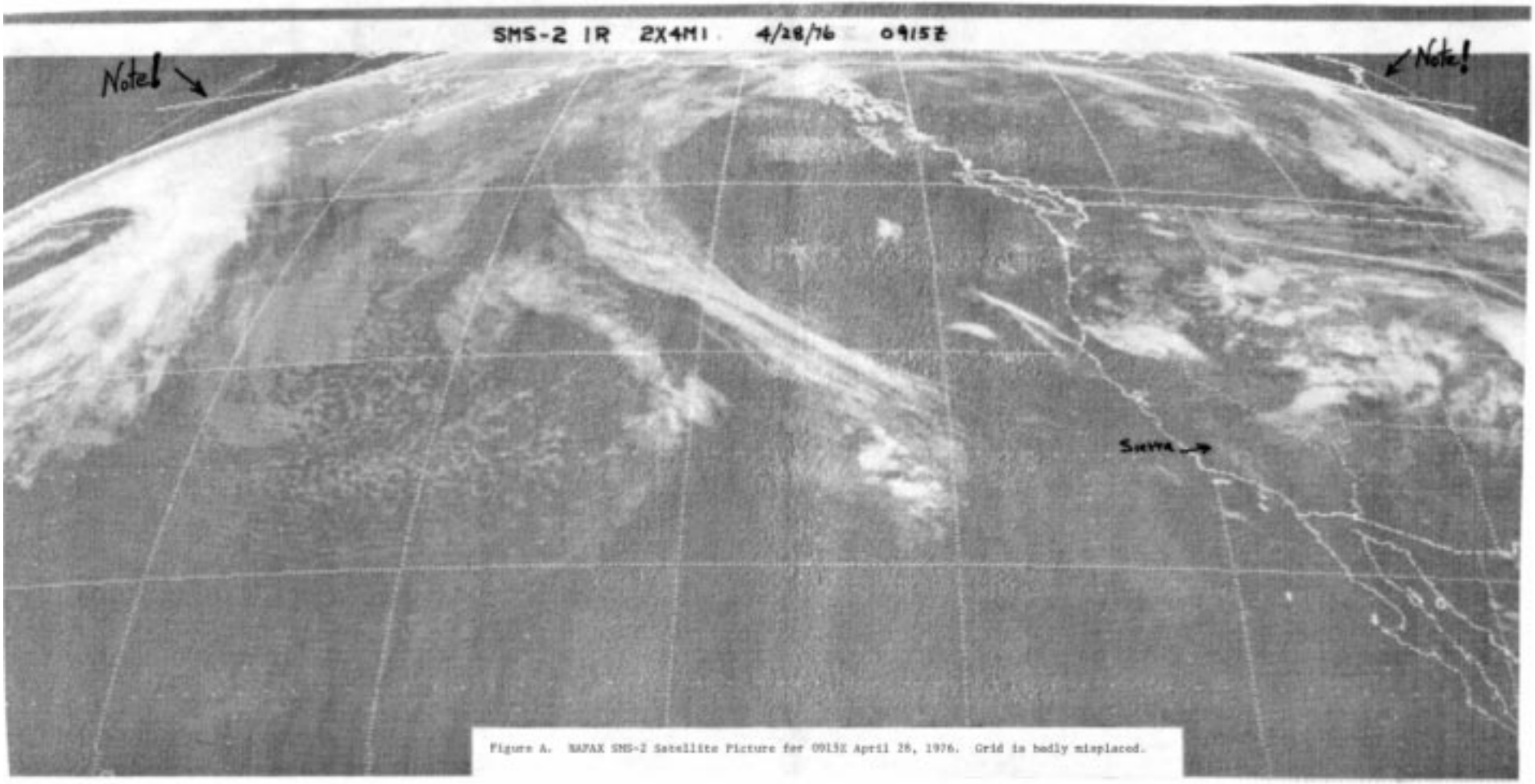

Figure A. NAFAX SMS-2 Satellite Picture for 0915Z April 28, 1976. Grid is badly misplaced.

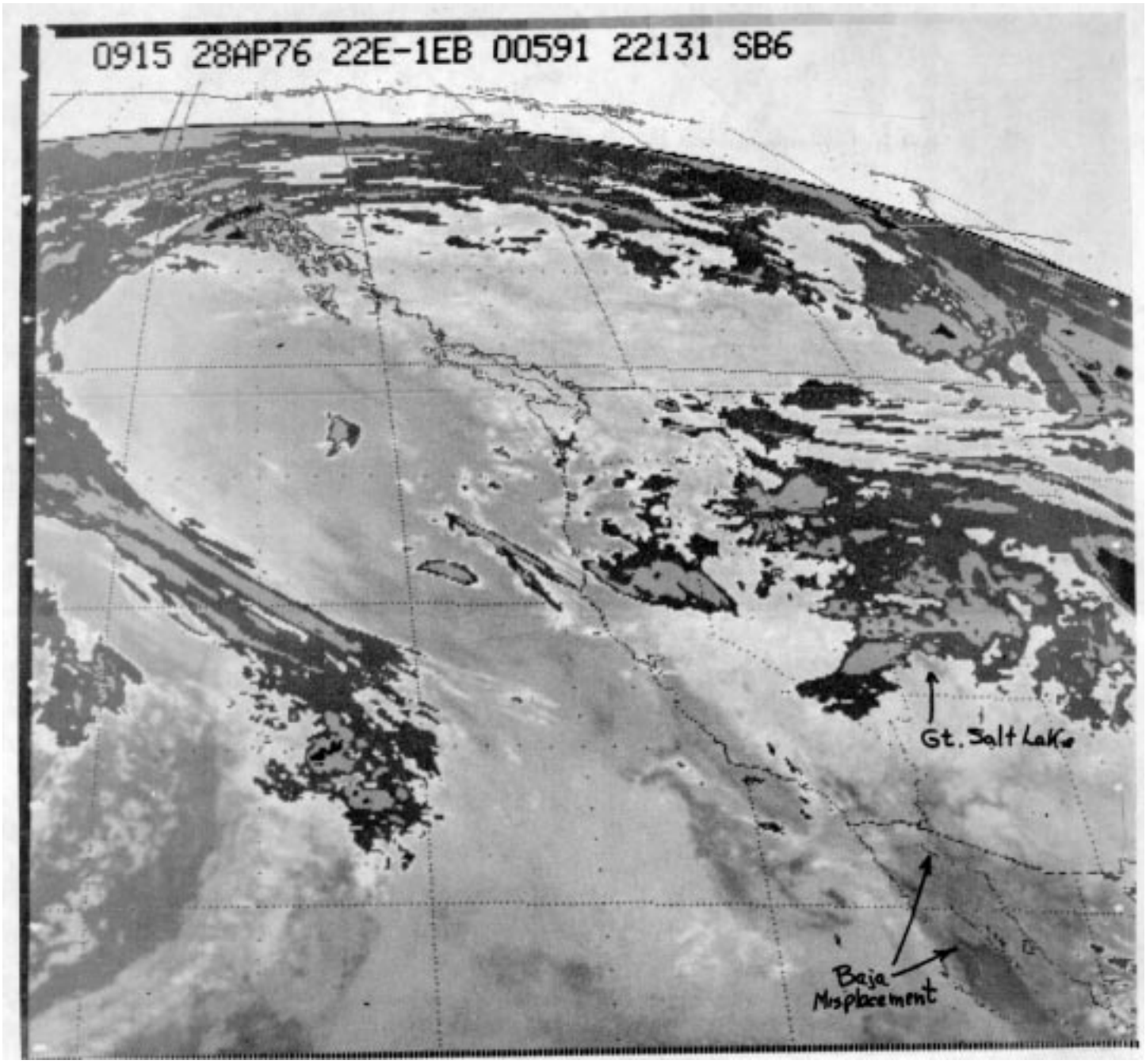

FIGURE B DATALOG SMS-2 ENHANCED (EB Curve) SATELLITE PICTURE FOR 0915Z APRIL 28, 1976. (SAME PICTURE AS FIGURE A, EXCEPT FOR ENHANCEMENT. GRID IS MISPLACED THE SAME AS IN FIGURE A.)