WESTERN REGION TECHNICAL ATTACHMENT
March 11, 1975
No. 75-6

HELPFUL AIDS TO ANALYZING GOES PICTURES

The usefulness of GOES pictures is much more extensive than merely indicating the location and movement of cloud shields, GOES pictures help in interpretation of surface, radar, and radiosonde observations, In return, consideration of these other observations aids interpretation of GOES imagery. Examples of relationships among these different types of observations in determining weather conditions over sparse-data areas like the eastern Pacific and western United States are discussed in this Technical Attachment.

Figure 1 for 1400 GMT March 4, 1975 (day 063) displays an example of how surface observations can be helpful in interpreting GOES imagery. Representative surface reports corresponding to the time of the photograph are listed alongside the picture. This particular case bears out the important fact that IR pictures can be misleading if the user does not remember that it is the higher and colder clouds, and not necessarily the precipitation producers, that show up the whitest. The precipitation producing middle clouds are usually gray and easily overlooked. Figure 1 shows that although a good portion of the Western Region was under rather bright return areas, no precipitation was reported by any stations at picture time.

Figure 2 for 1600 GMT February 8, 1975 (day 039) is a second example. Although most of Oregon is under a homogeneous bright (white) cloud field, precipitation, as reported by weather stations, is confined only to the northwest portion of the state (indicated by dashes in figure).

Radar observations can be used to complement the observed cloud information on GOES pictures. Figure 3 for 1433 GMT February 10, 1975 (day 041) displays the radar reports for 1435Z superimposed on the corresponding satellite picture. Note that the areas in southern California, southern Oregon, northern Washington, and southern Utah are associated with light gray imagery which is much less bright than the cirrus cloud return in other areas. Surface reports must be used in conjunction with radar observations to help determine where precipitation is reaching the ground. Caution is advised when using radar reports, as areas of poor detection restrict what can be "seen" by radar [1]. However, the satellite can be helpful in estimating continuity of weather across areas of poor radar detection [2].

GOES pictures are useful in determining how representative a particular raob is, especially now that at least one satellite picture is available during the time the raob is rising from surface to 300 mbs. Figure 4 is the SLC raob for 1200 GMT February 14, 1975. Note the large dew-point depressions above 625 mbs. The GOES picture for the same time, day 045--Figure 5 suggests that this condition will likely be rather short lived, and should not be considered as representing conditions any farther to northwest than Utah state boundary. Another example of this nature occurred on December 20, 1974 (day 354). The major forecast problem from Oregon to Utah was whether the nearly saturated northwest flow of the past several days would continue. The Medford raob for 1200 GMT (Figure 6) suggested the possibility of a significant break in the moist flow above 670 mbs. However, the GOES picture for 1430 GMT (Figure 7--earlier pictures not available) suggests that southwestern Oregon was located in a small break in the upper-level cloudiness around 1200 GMT, and

that a new surge of moist air was rapidly approaching. The Medford raob was therefore determined not to be representative of a large area.

Although we have used IR imagery in our examples above, this is not to imply that visual pictures are not useful. In fact, visual pictures, photographed at times of low sun angle, have proven to be good indicators of active convective areas. Figure 8 for 1630 GMT December 27, 1974 (day 361) shows such an area in a narrow band off the central and northern California coast and also over southern New Mexico.

REFERENCES:

1. Technical Attachment No, 74-2, "NOW YOU SEE IT--NOW YOU DON'T (UPDATED)", January 8, 1974.

2. Technical Attachment No, 68-30, "SATELLITE OBSERVATIONS ENHANCE RAREPS", August 20, 1968.

POSTSCRIPT:

GOES SHOWS

The GOES era officially began in the Western Region at 9:35 a.m. MDT, Monday, March 10, 1975, when the first SMS-2 satellite picture was received at several WSFOs and RWCC. This signaled the start of routine operational transmissions of SMS-2 pictures. Figure A is one of the first pictures received. It is a 1-mile resolution visual picture valid at 1745Z (11:45 a.m. MDT). Rectification was done manually using an overlay grid supplied by Jack Bottoms, Manager, SFO SFSS. Computer rectification is not due for several days.

Clarity of the picture is so great that you can see the snow-capped peaks of Mt. Rainier, Mt. Hood, etc., in western Washington. Also note the thin cloud lines defining several eddies off the West Coast, details in the snow pattern on Canadian Rockies, Lake Tahoe in Sierra, and mountain-wave clouds in northern Arizona. The frontal cloud system moving across southern California and the PVA comma clouds off the coast contain many details that were lost in the SMS-1 pictures of this area due to being so far from the subsatellite point.

Now we are looking forward to getting 1/2-mile computer-rectified SMS-2 pictures.

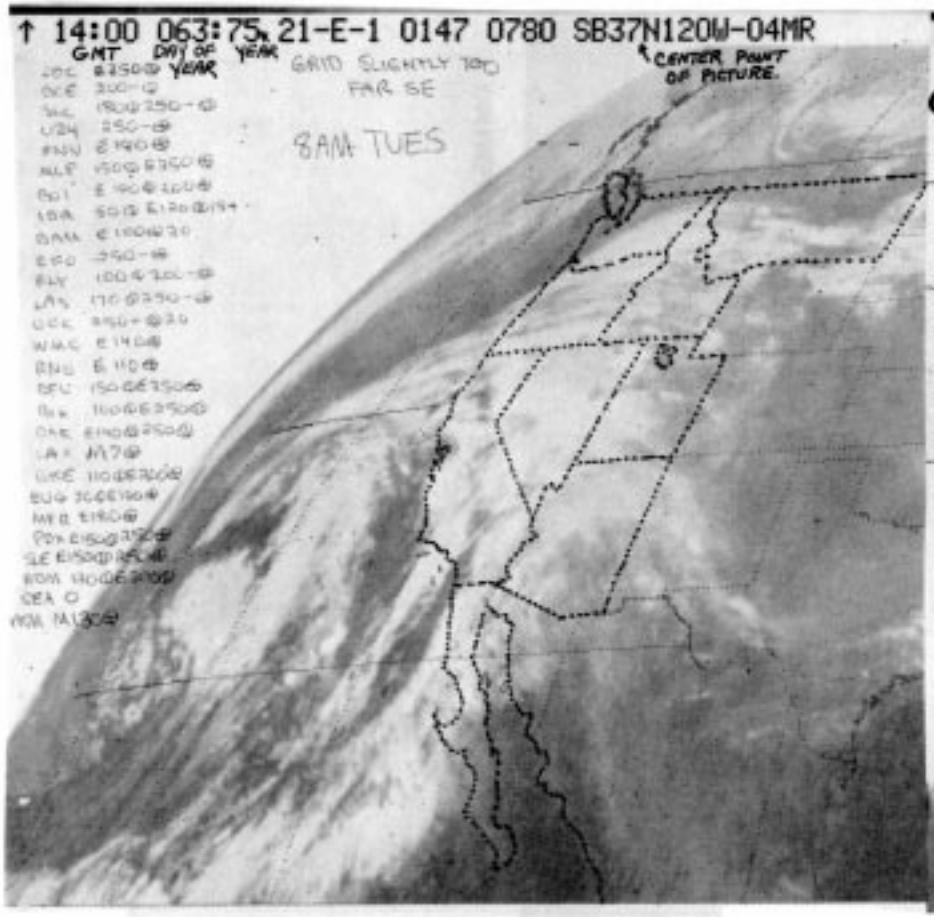

FIGURE 1. SMS-I SATELLITE PICTURE FOR 1400Z MARCH 4, 1975.

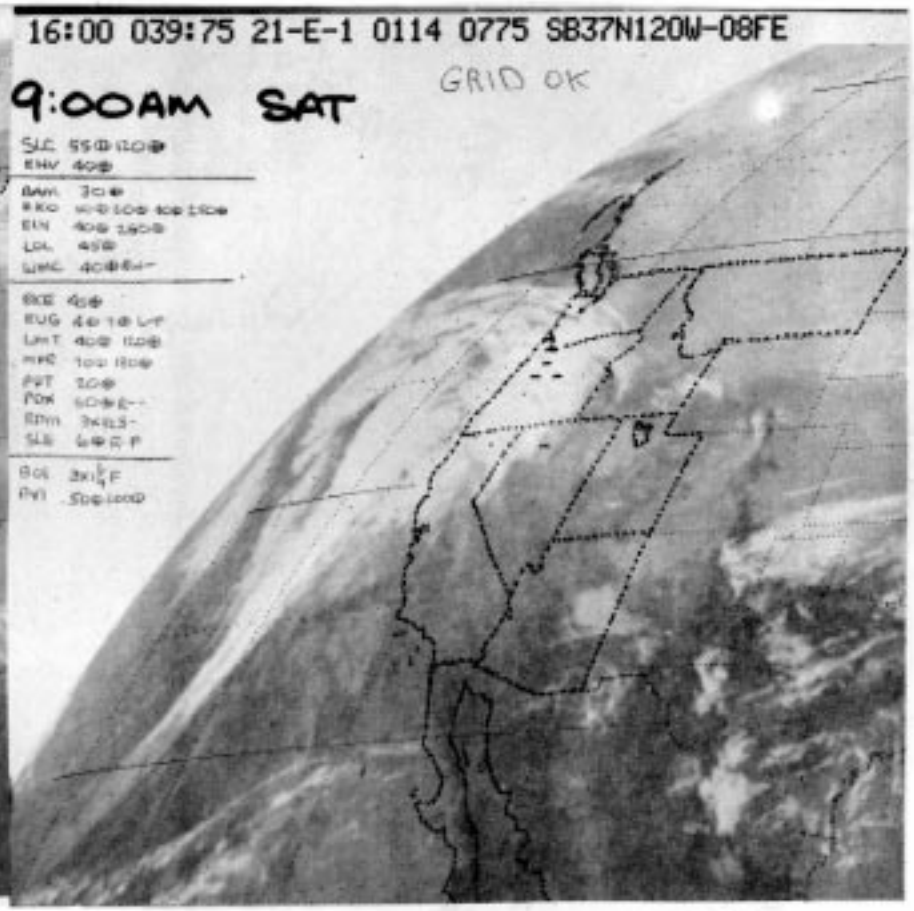

FIGURE 2. SMS-I SATELLITE PICTURE FOR 1600Z FEBRUARY 8, 1975.

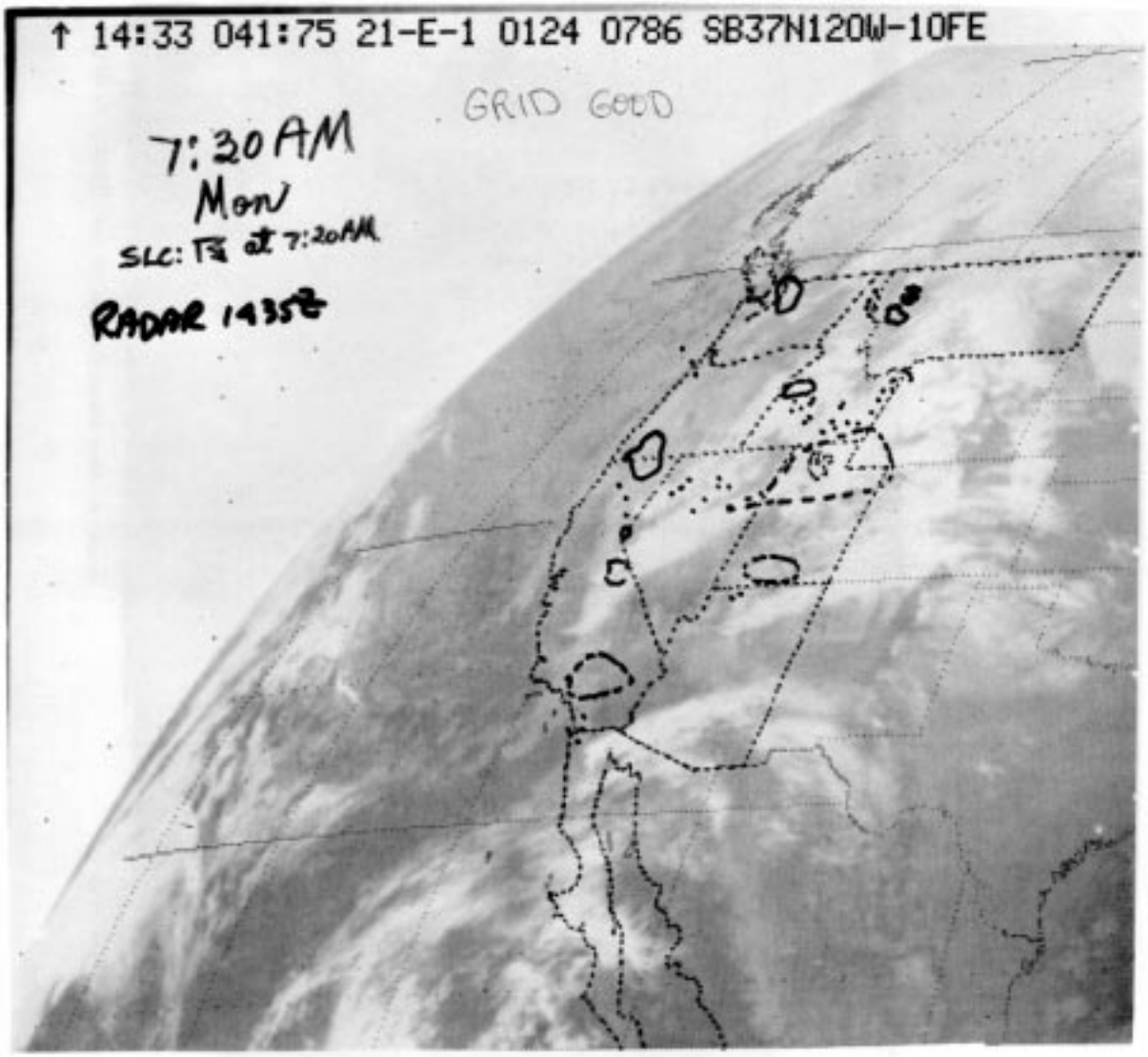

FIGURE 3. SMS-I SATELLITE PICTURE FOR 1433Z FEBRUARY 10, 1975.

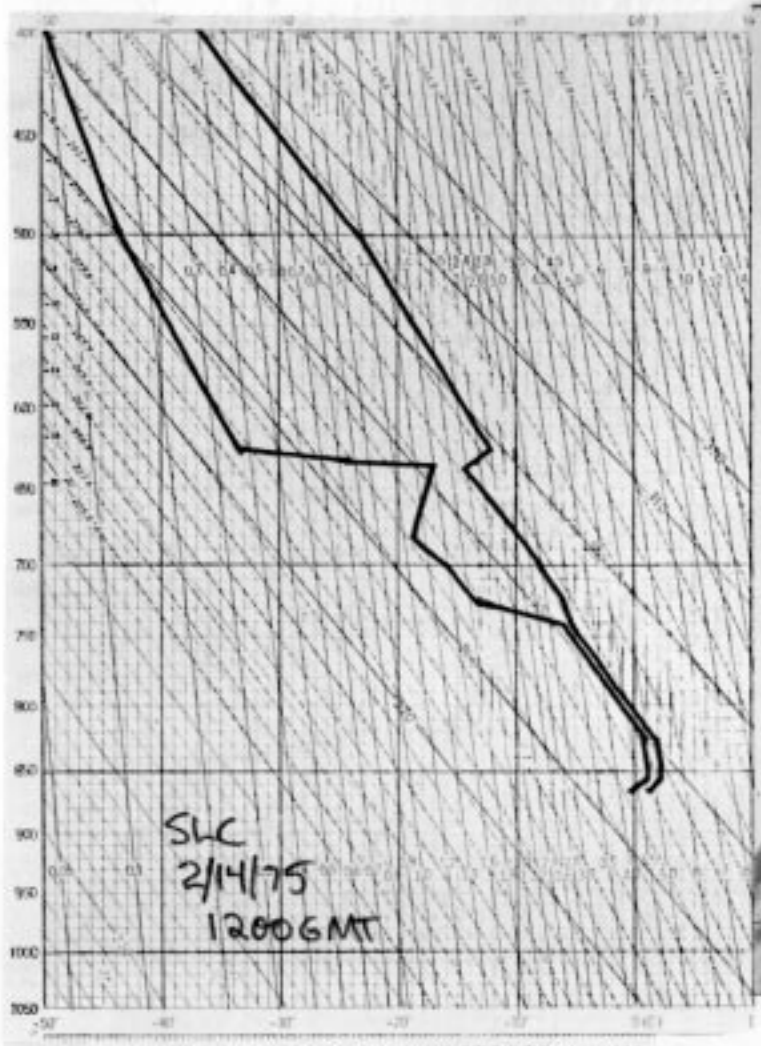

FIGURE 4. SLC RAOB FOR 1200Z FEBRUARY 14, 1975.

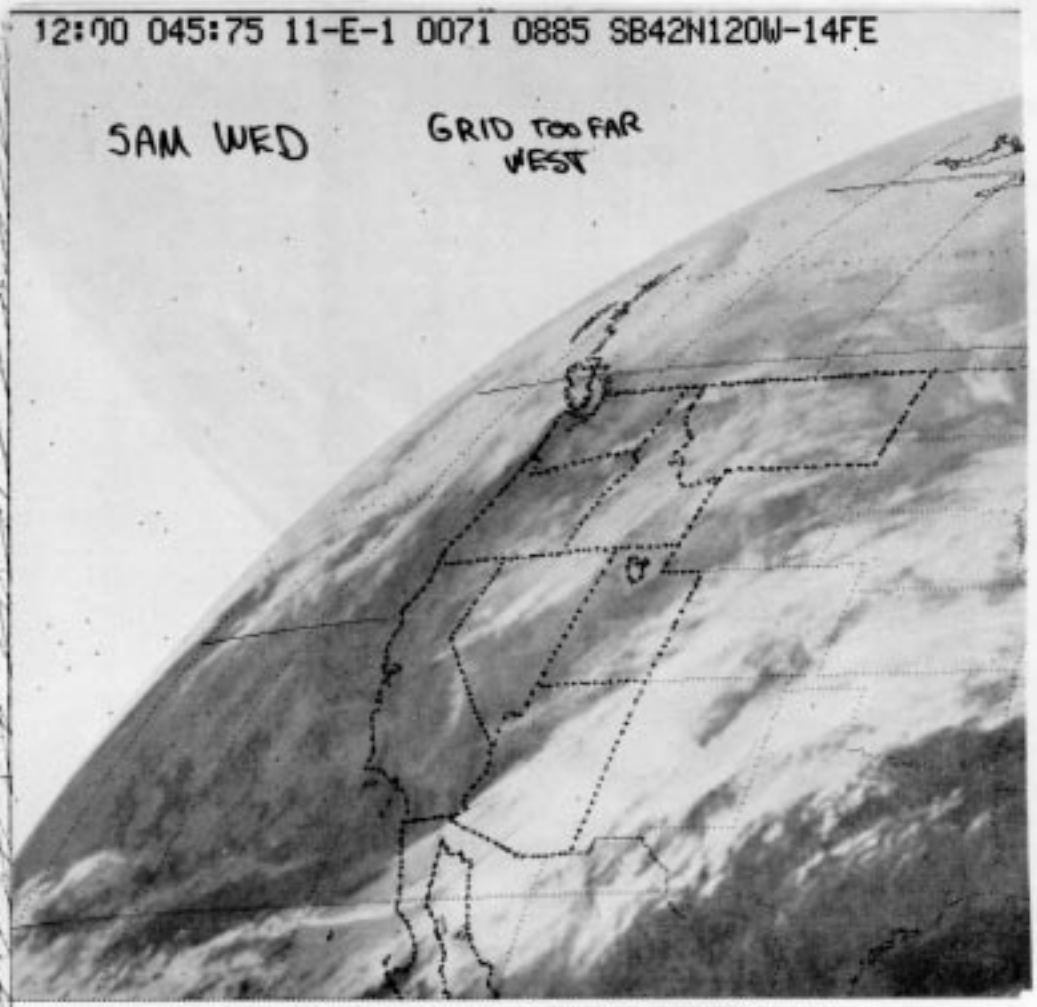

FIGURE 5. SMS-I SATELLITE PICTURE FOR 1200Z FEBRUARY 14, 1975.

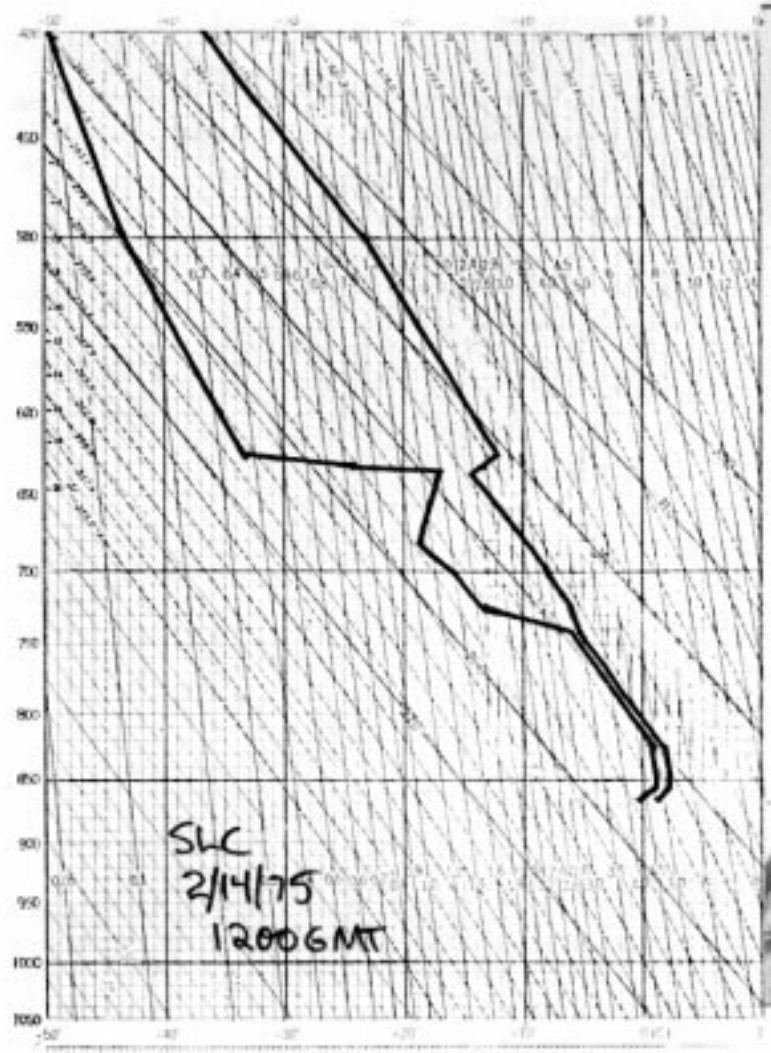

FIGURE 4. SLC RAOB FOR 1200Z FEBRUARY 14, 1975.

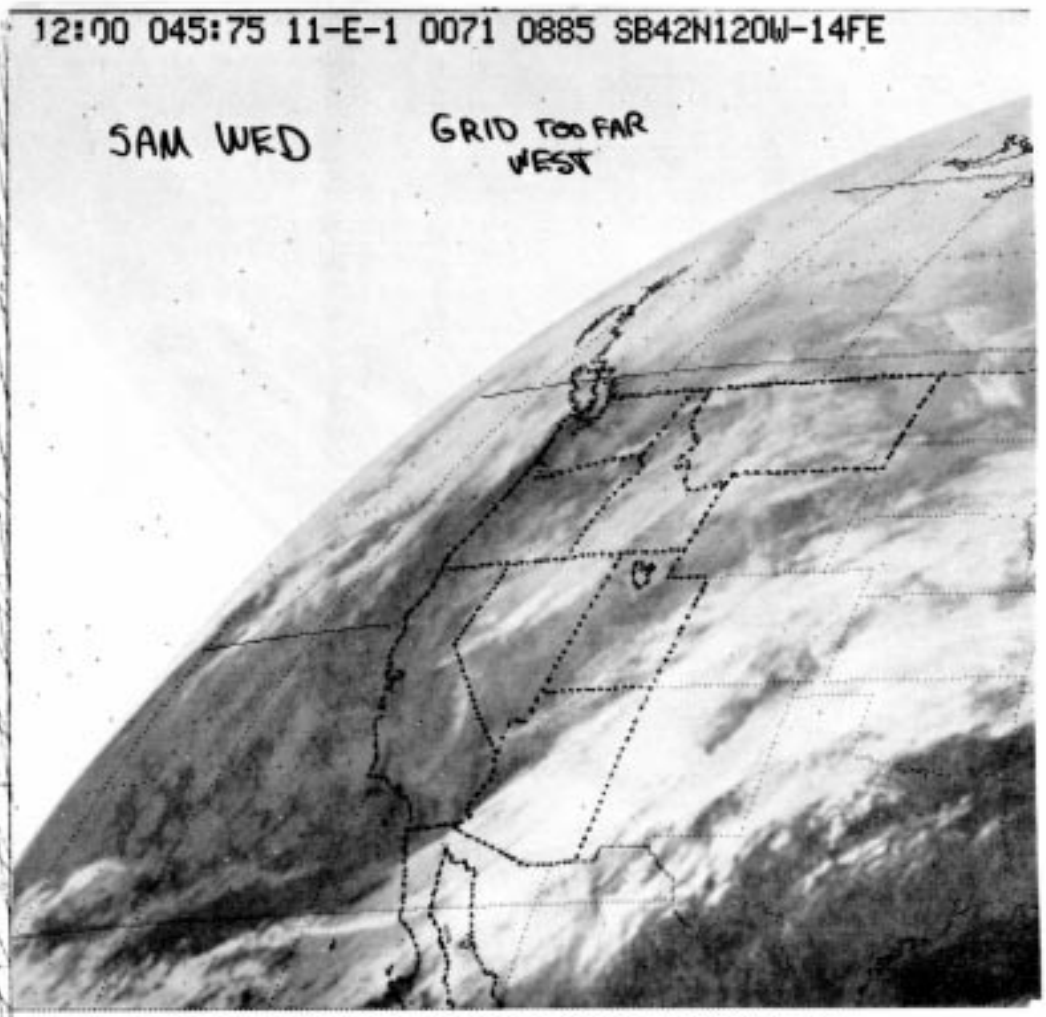

FIGURE 5. SMS-I SATELLITE PICTURE FOR 1200Z FEBRUARY 14, 1975.

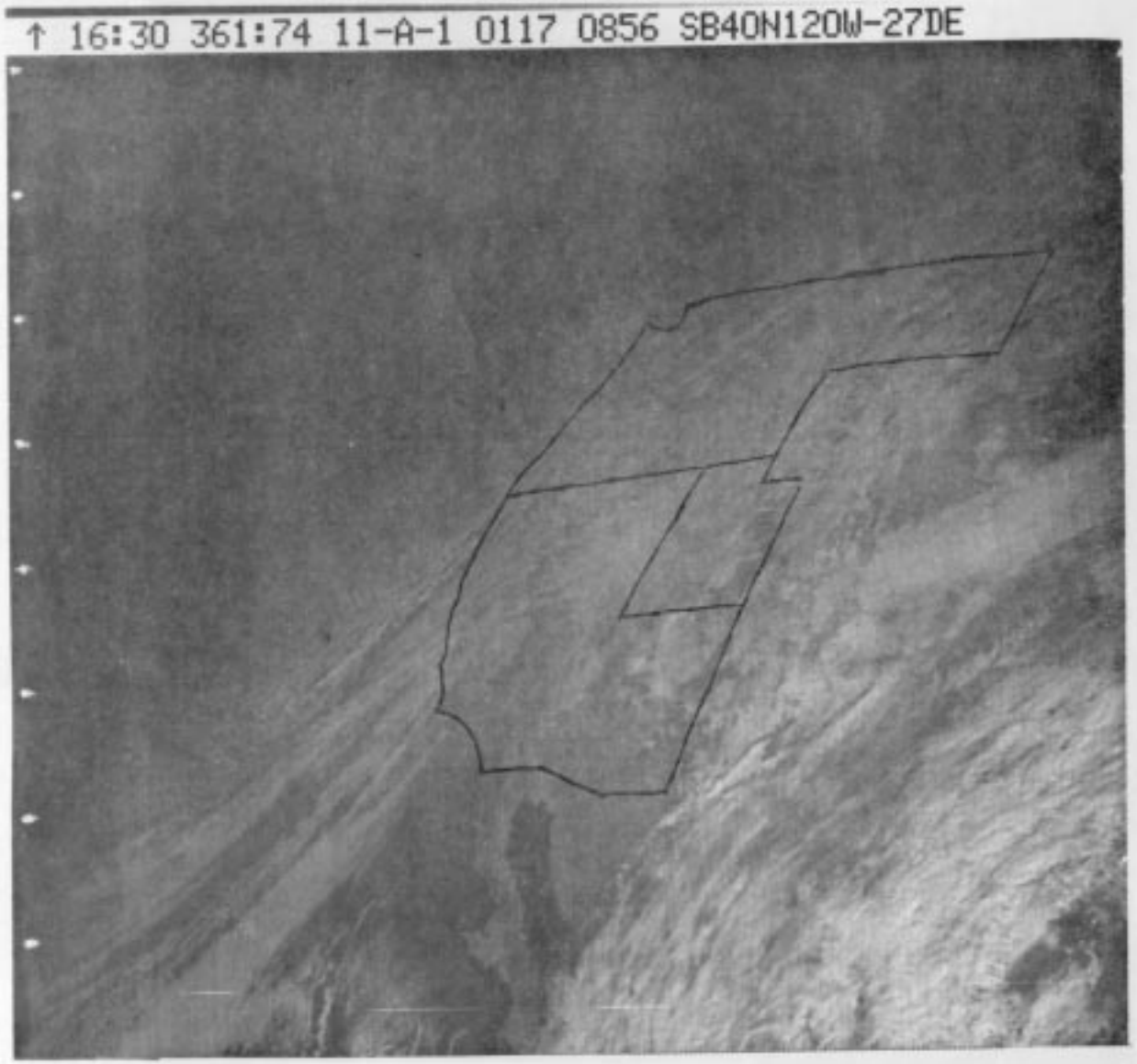

FIGURE 8. SMS-I SATELLITE PICTURE FOR 1630Z DECEMBER 27, 1974.

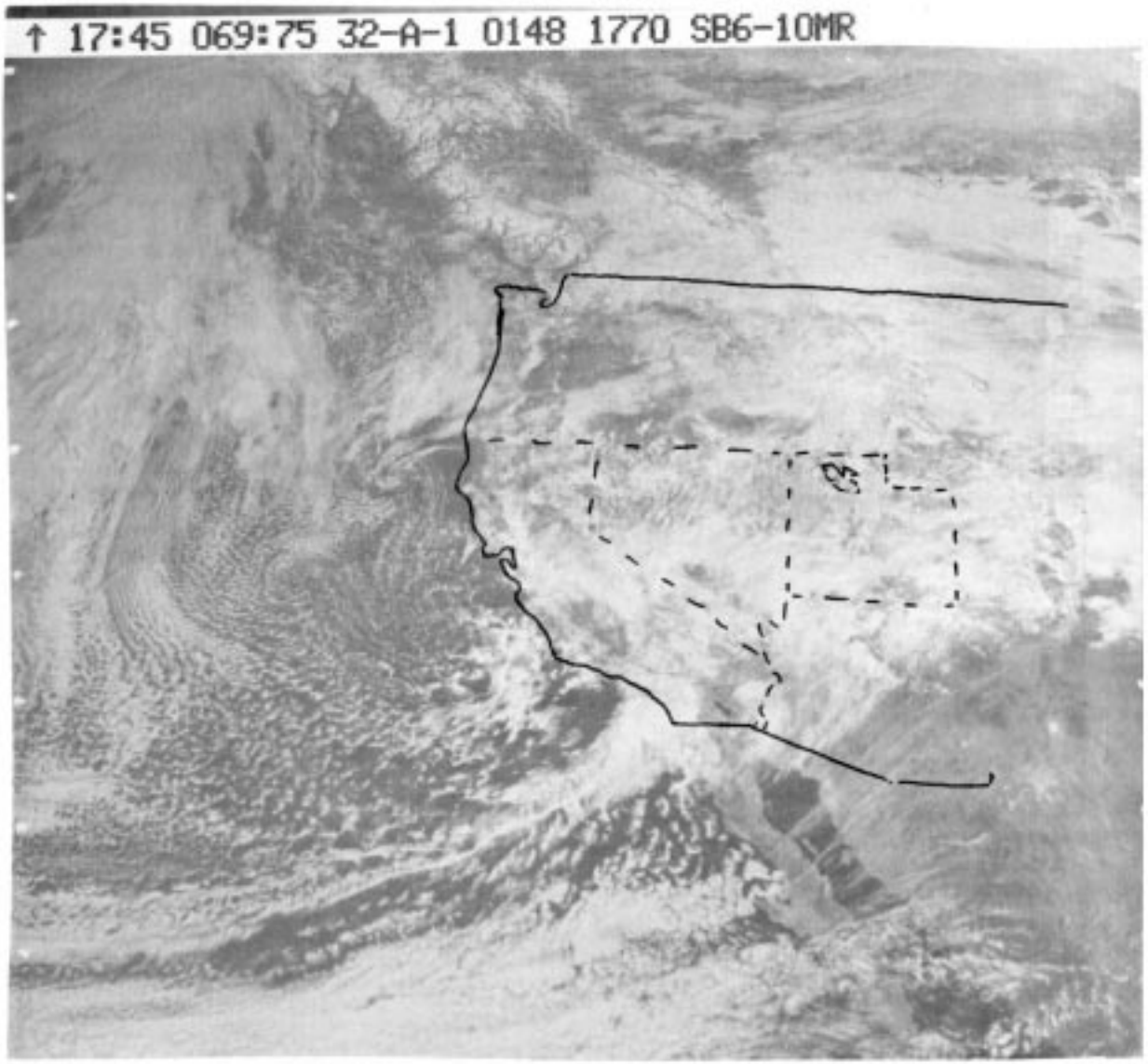

Figure A. SMS-2 visual picture valid 1745Z March 10, 1975 (day 069), subsatellite point on equator at 115° West. Resolution is 1-mile. One of first pictures received at SLC RWCC on Datalog equipment over C5 line to SLC WSFO and pony circuit to RWCC office.