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SATELLITE PICTURES DISPLAYED ON FUJITASCOPE LEAD TO IMPORTANT FORECAST CHANGES

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On November 24, 1975, WSFO Portland, Me., was able to make excellent use of satellite pictures to monitor the performance of NMC guidance products. Based on information in the satellite pictures, the NMC products were modified and important changes were made in information released to the public.

At 1200Z, November 24, 1975, a deepening surface low pressure center was located near 35.5°N, 73.0°W (Figure 1). NMC guidance received earlier, from 0000Z, November 24 data, indicated the storm would move northeast. The NMC 36-hour surface prog, valid 1200Z, November 25, placed the center at about 42.5°N, 65.0°W. Following the NMC guidance, the early morning forecasts issued by WSFO Portland, Me., at 0930Z, November 24, called for rain beginning tonight along the coastal sections of Maine and New Hampshire...light snow mixed with rain tonight in southern interior sections of these states...light snow likely tonight in the mountains...and a chance of snow in the far northern reaches of Maine late at night.

A satellite information message (TBXX6 KWBC) received in the morning from the Satellite Field Services Station (SFSS) at Washington, stated in discussing the deepening Low, that during the past few hours "The center was very well marked and moving ENE at 20 to 25 knots." The 1400Z SMS-1 visible one-mile resolution picture (Figure 2) received at Portland showed an apparent center of cloud circulation located at about 34.5°N, 72.5°W (after correcting for small grid error). This position is actually farther south than NMC's 1200Z position, but not inconsistent with available ship reports. Also, the position determined from clouds is at some level above the surface. If the Low continued to move ENE, it would be farther east by 1200Z tomorrow than indicated on the previously mentioned NMC 36-hour surface prog. The farther east position would be associated with a shorter than thought earlier duration of precipitation in Maine and New Hampshire. Most important, colder air coming in behind a Low farther east would result in a higher probability of snow rather than rain, or mixed precipitation, as called for in the early morning WSFO Portland forecast release. Accordingly, the WSFO Portland forecasts released at 1530Z began to hedge by leaning more towards snow than rain as the precipitation type to be expected tonight.

The forecast office at Portland paid close attention to the satellite pictures as they were received every 30 minutes. This could be a significant snow storm. The pictures were assembled on the Fujitascope device to determine any apparent cloud motion associated with the storm.

In the early afternoon the LFM guidance from 1200Z, November 24 data, showed the Low would be moving NNE. It would be located at about 36°N, 71°W at 0000Z, and about 42°N, 67°W at 1200Z, tomorrow (November 25) (Figure 3). The NMC surface progs, based on 1200Z data, accepted the LFM direction for

movement of the Low, but moved the system somewhat faster than shown by the LFM. NMC guidance indicated the precipitation type along the coast of Southern Maine and New Hampshire would be rain throughout the night, with precipitation continuing through tomorrow. Inland the precipitation type would be snow. The MOS probability of frozen precipitation (POFP) also indicated rain for the coastal sections. The POFP for Portland was 40% at 0000Z decreasing to 20% by 1200Z, November 25.

Portland forecasters were still concerned about the possibility of significant snow along the coast. They paid close attention to the location and direction of movement of the Low pressure center. The system was centered at sea, and they had to rely heavily on the satellite pictures for information. By 2000Z, they were convinced that the system was moving in a more easterly direction than indicated by the guidance products prepared from 1200Z data. The Fujitascope presentation clearly showed the center of rotation of the clouds, and the east-northeast direction of movement of the center. The 1900Z picture (Figure 4) showed the center at about $35^{o}N$ $71^{o}W$ (after allowing for a slight error in gridding). They were also able to see the eastward movement of the back edge of the cirrus clouds associated with the storm. Examination of surface weather reports revealed that precipitation ended as this back edge of cirrus clouds passed over reporting stations. From the apparent motion of the cirrus clouds, estimates were made of the ending time of significant precipitation in New Hampshire and southern Maine.

Based mainly on the information in the satellite pictures, important adjustments were made in the short range to the NMC guidance products mentioned above, and the earlier forecasts issued to the public were revised. The forecast released at 2130Z by WSFO Portland called for snow tonight, tapering off by midnight in southwestern Maine and by daybreak in eastern Maine. Accumulations mentioned were two to four inches in coastal sections with lesser amounts elsewhere. They also issued a gale warning, with northeast winds 30 to 45 knots tonight. The forecasts verified well. The precipitation was all snow, lasting 6 to 8 hours, with heaviest amounts along the coast. At 1200Z, November 25, five inches of new snow was on the ground at Portsmouth, New Hampshire, and four inches was at Portland, Maine. The surface map for 1200Z, November 25, and the tra ck of the Low is shown in Figure 5.

Satellite pictures, together with the cloud motion apparent on the Fujitascope display, enabled WSFO portland to make timely and correct important changes in the public forecast. They were able to see that the direction of the storm was at least initially different than the latest guidance available indicated it would be. The difference was not much, but it was nevertheless very significant. It is of interest to note here that as an after-the-fact experiment in showing how clear and obvious the satellite information was, non-meteorological employees asked to examine the Fujitascope display were able to correctly point to the center of rotation of the clouds and indicate the direction of movement of this center.

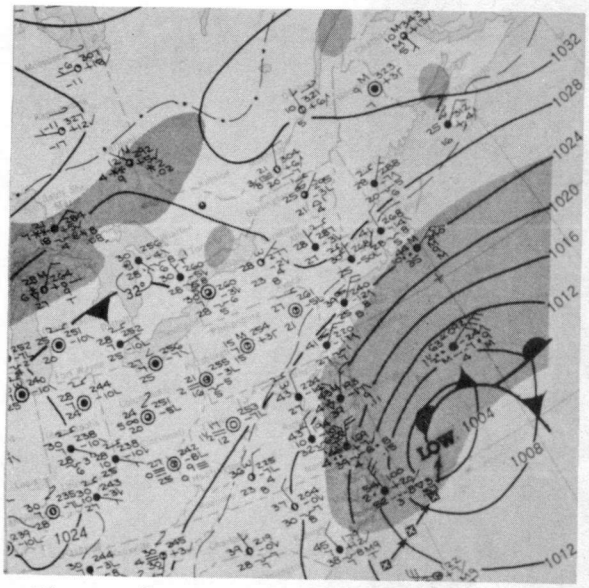

Figure 1. NMC surface analysis for 1200Z, November 24, 1975.

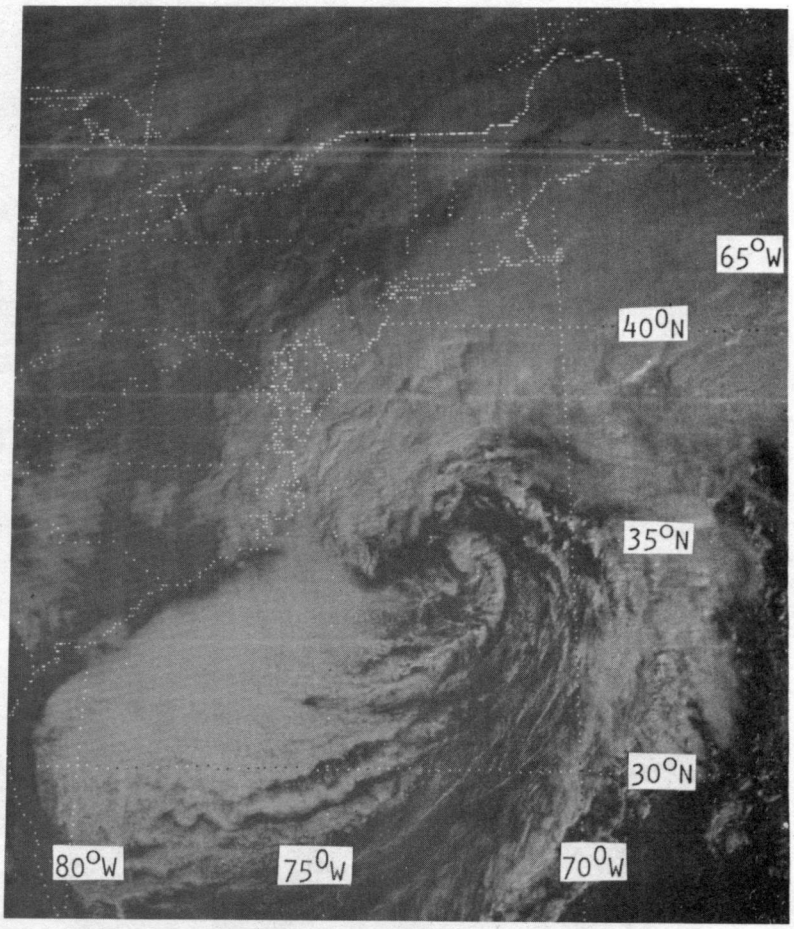

Figure 2. SMS-1 visible 1 n mi resolution picture for 1400Z, November 24, 1975.

Figure 3. 24-hour LFM surface (solid lines), and 1000-500 mb thickness prog (dashed lines), valid 1200Z, November 25, 1975.

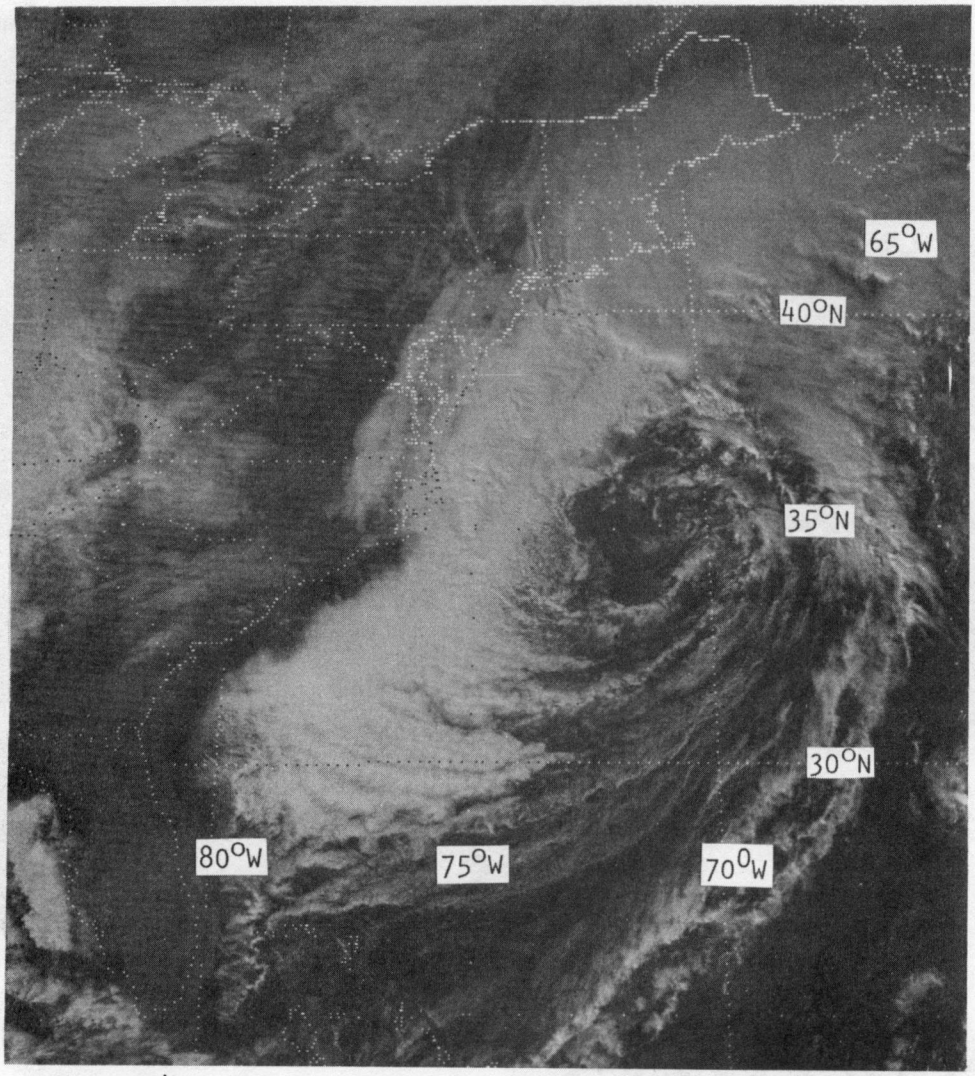

Figure 4. SMS-1 visible 1 n mi resolution picture for 1900Z, November 24, 1975.

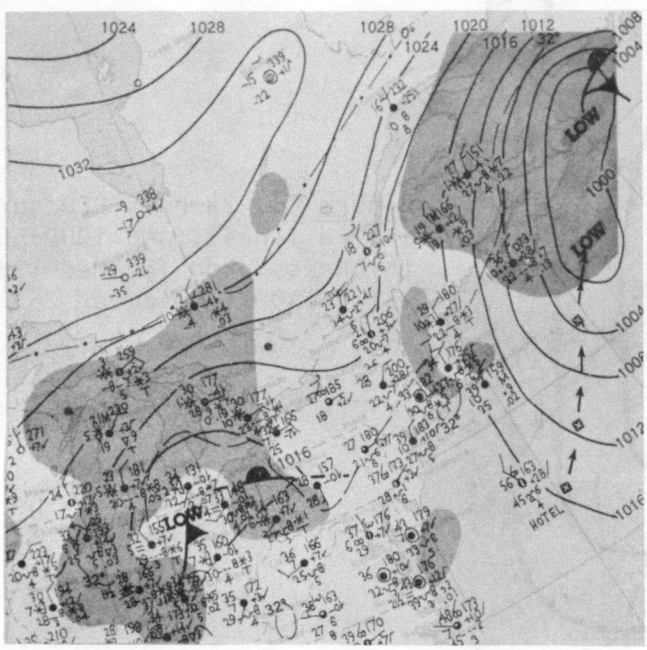

Figure 5. NMC surface analysis for 1200Z, November 25, 1975.

SCIENTIFIC SERVICES DIVISION
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