GOES-9: THE USE OF MULTISPECTRAL IMAGERY DURING DAYTIME (6 FEB 96 CA

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This short case study will show the advantages of using GOES-9 multispectral imagery. The case is from 6 Feb 96 and concerns fog in the Salt Lake Valley. Thick fog developed during the early morning hours of the 6th in the Salt Lake Valley. During the daytime the challenge was to distinguish between snow on the ground, fog, and other clouds in the region. This determination is best made using the multispectral data that is available from GOES-9. Figure 1 shows the full resolution VIS imagery centered on SLC. It is obvious from this imagery that the fog is not extremely thick (at least over the Great Salt Lake) since the outline of the Great Salt Lake can be seen through the fog. It is, however, difficult to distinguish between the fog and snow on the ground. Even the time sequence in the VIS does little to help since the fog is almost stationary. Figures 4 and 5 can be used to see what standard surface observations reveal about the fog extent and density.

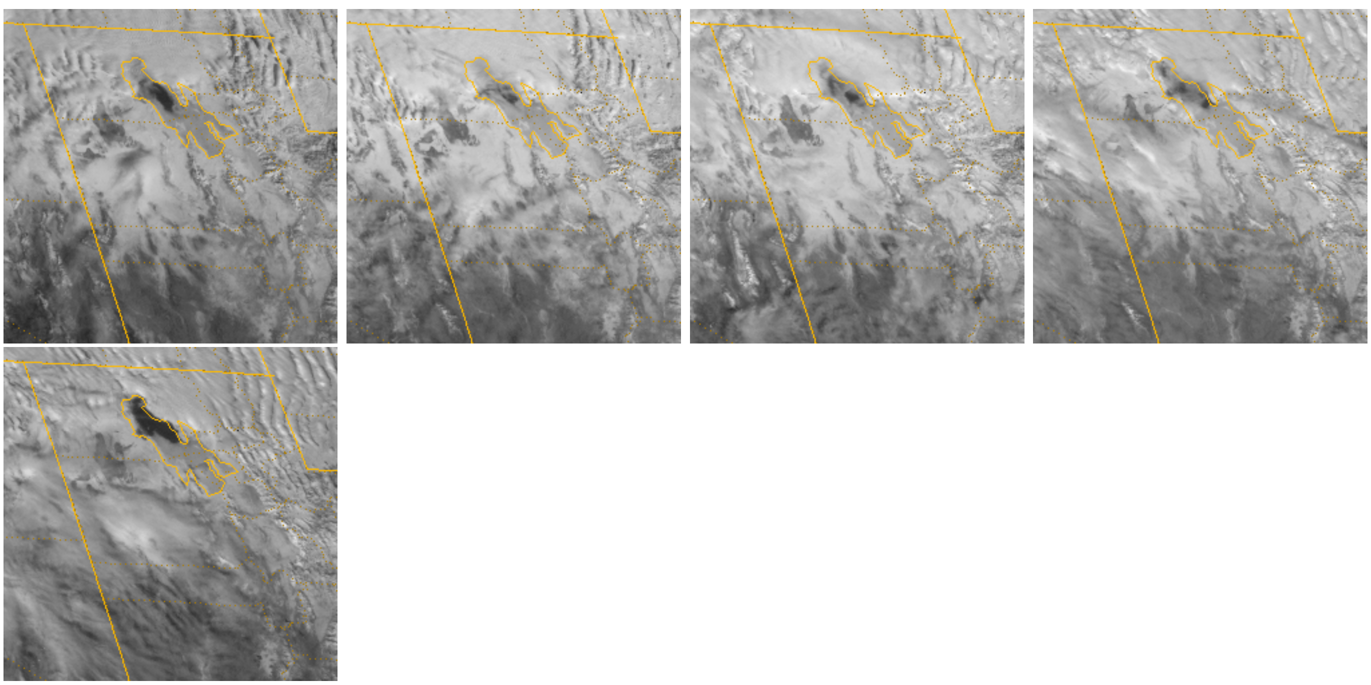
Figure 2 shows the 3.9um imagery for the same time period. The imagery is magnified so that the display resolution is the same as the VIS imagery (click here to find out how to do this on your RAMSDIS). The 3.9um imagery is enhanced (with an inverted gray scale) so that during the day reflective surfaces show up bright and less reflective surfaces show up dark. Since water clouds are quite reflective at 3.9um and ice clouds and snow cover are poorly reflective at 3.9um, the 3.9um imagery can be used to distinguish between the fog (water droplets) and snow cover or ice clouds. It is apparent that the areal extent of the fog can be easily determined using the 3.9um imagery. The extent of the fog can be seen to decrease in the later images (2100 UTC and 2200 UTC).

The IR (11um) imagery can be used to help identify other clouds that may be masking the surface (and any fog that may be beneath). Figure 3 shows that high clouds (enhanced with yellow and red) begin to increase to the west of the Salt Lake Valley between 1800 UTC and 2200 UTC. Comparing the IR images to the 3.9um images it is apparent that these enhanced clouds are poorly reflective. This indicates that they are ice clouds. By 2200 UTC these ice clouds are starting to obscure some of the fog signature in the 3.9um imagery. It is important to note this feature since the fog is not dissipating, but is merely being masked by the high clouds that are beginning to stream into the region.

The WV imagery in Figure 4 can be used to make sure that the feature seen in the 3.9um imagery is not an upper level feature. The WV channel on GOES-9 receives most of its response from above 500mb.

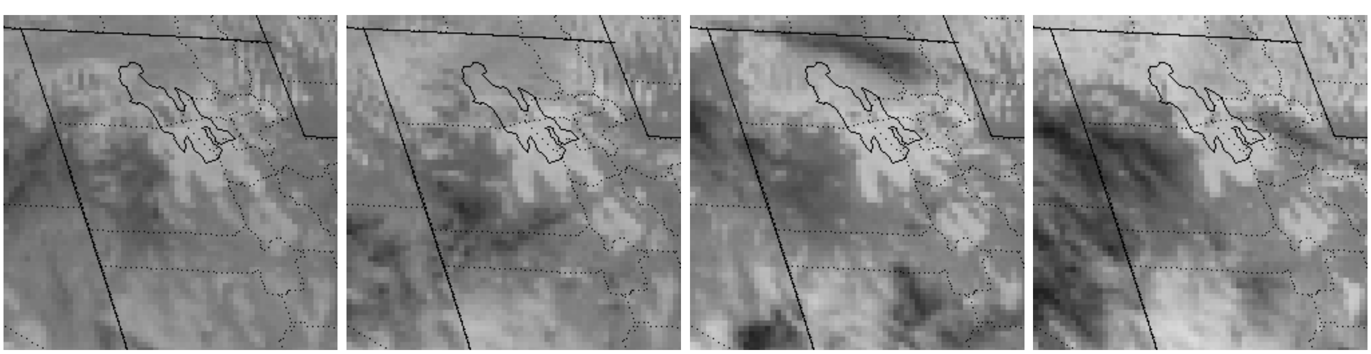
This is another example of how to use the new 3.9um imagery to its full advantage. The ability to detect fog extent and dissipation over snow cover during daylight is greatly enhanced using the 3.9um imagery in conjunction with the other imager channels.

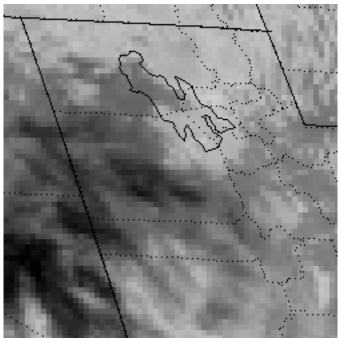
FIGURE 1. 1 km VIS imagery on 6 Feb 96



1800 UTC   1900 UTC   2000 UTC   2100 UTC   2

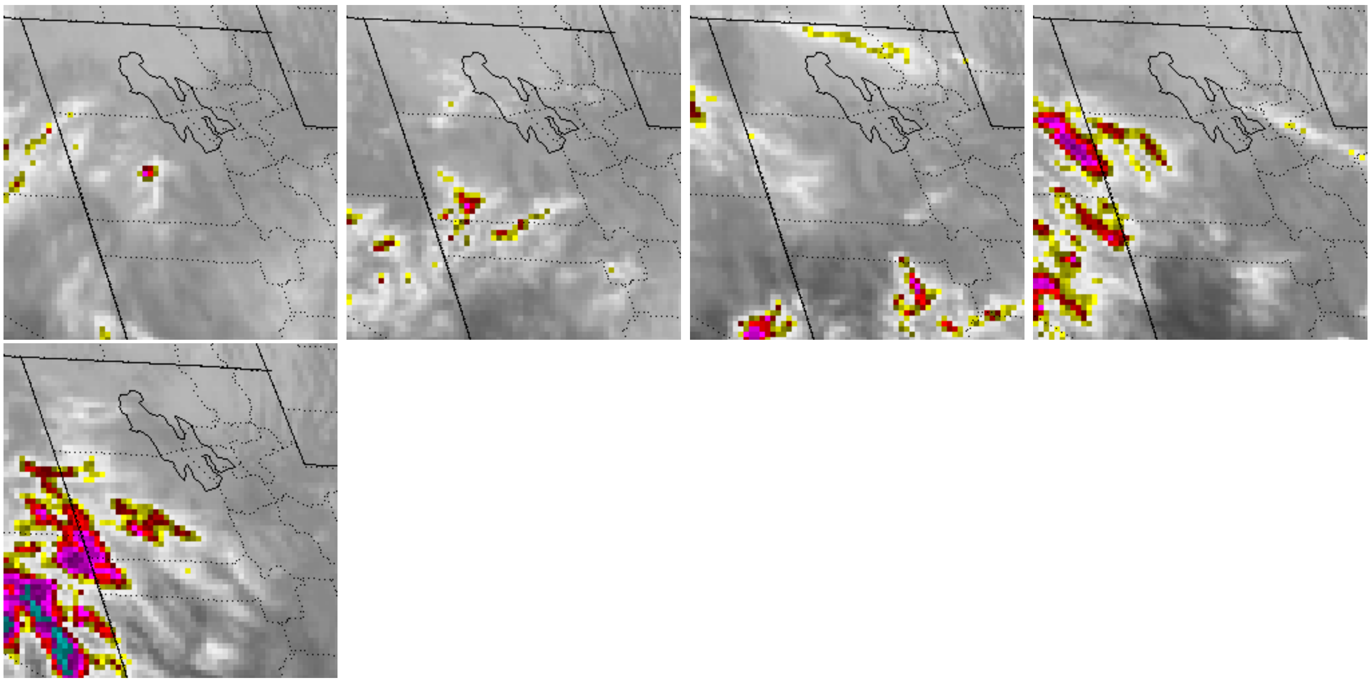
FIGURE 2. 4 km 3.9um imagery on 6 Feb 96 displayed at 1 km resolution





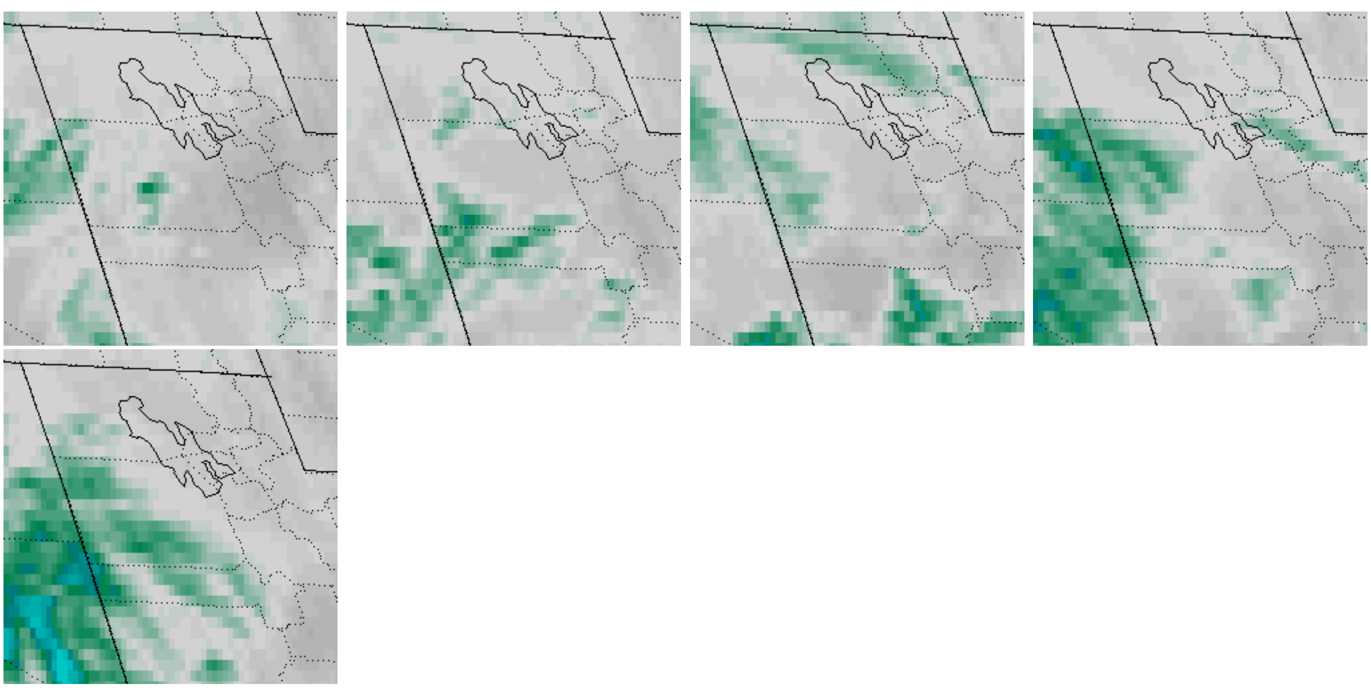
1800 UTC 1900 UTC 2000 UTC 2100 UTC 2

FIGURE 3. 4 km 11um (IR) imagery on 6 Feb 96 displayed at 1 km resolution



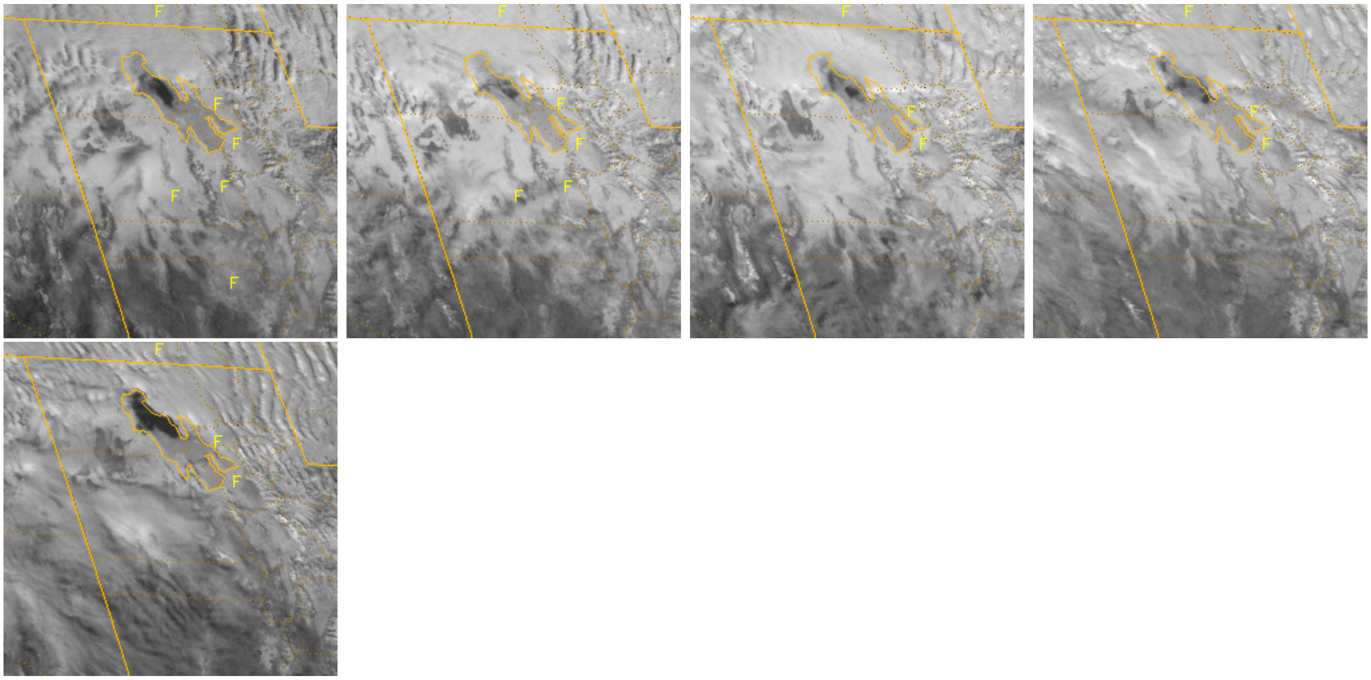
1800 UTC 1900 UTC 2000 UTC 2100 UTC 2

FIGURE 4. 4 km 6.7um (WV) imagery on 6 Feb 96 displayed at 1 km resolution



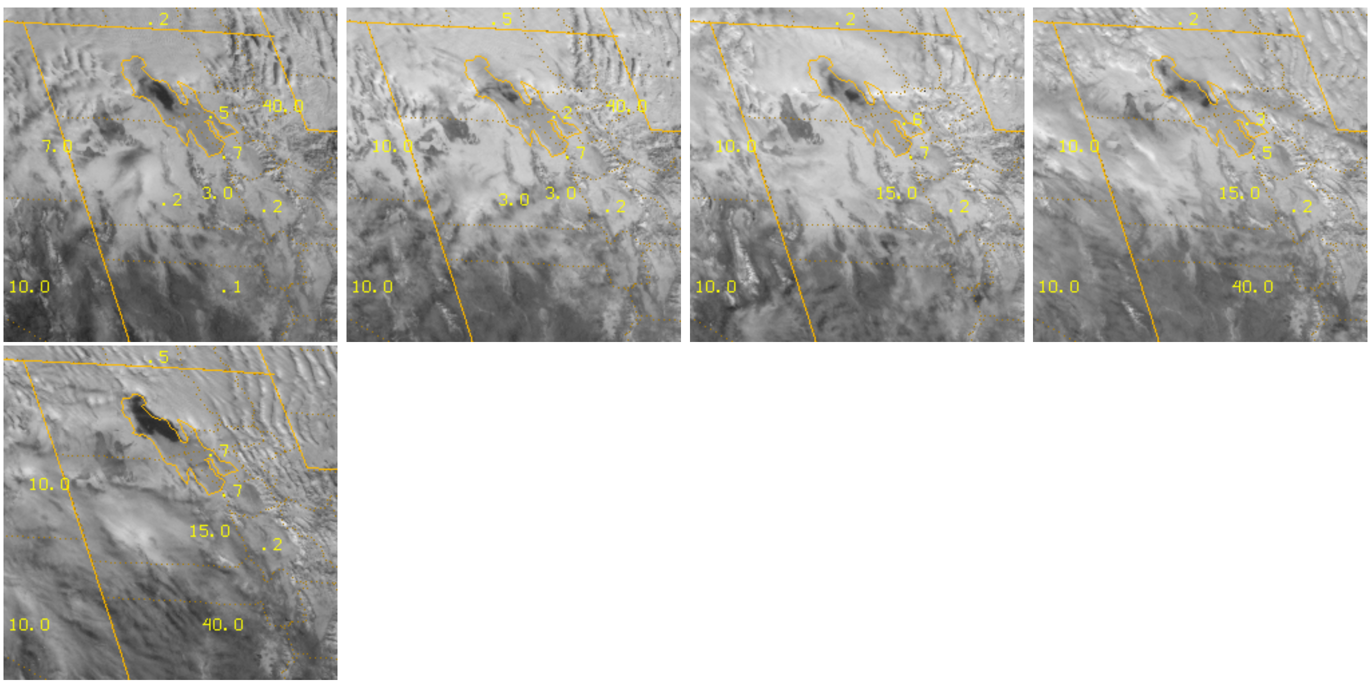
1800 UTC 1900 UTC 2000 UTC 2100 UTC 2

FIGURE 5. 1 km VIS imagery on 6 Feb 96 with surface weather observations



1800 UTC 1900 UTC 2000 UTC 2100 UTC 2

FIGURE 6. 1 km VIS imagery on 6 Feb 96 with reported visibilities (miles)



1800 UTC 1900 UTC 2000 UTC 2100 UTC 2

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