CGMS-XXVII
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Agenda Item: III.4
USA WP-24 (2)

Derivation of Winds using Shorter Scan Intervals (part 2)

Cloud Track Winds and Stereo Cloud Heights (Campbell, CIRA - Ft. Collins)

The essence of cloud tracking for cloud motion estimation or stereo height estimation is based upon finding the same cloud patch in several images. For cloud motion, the cloud needs to change slowly relative to the image frequency. For stereo heights, the cloud needs to be distinct and appear nearly the same from the two viewpoints (after re-mapping to the same projection). We have developed a method which adjusts for the motion of the cloud so that simultaneity is not required for the stereo height estimate (Campbell et al. 1996, Campbell and Purdom, 1998).

The recent experiment with GOES-10 5 minute imagery shows the effects of changing cloud conditions. A test analysis was performed with 5 minute interval GOES-10 data mixed with GOES-8 to estimate winds and heights. The test was repeated with data for the same area and time, but with 15 minute interval GOES-10 data.

Qualitatively, the 5 minute interval data provided a much better result. To quantify that, displays of the correlation coefficients between 5 minute and 15 minute interval results are shown in **Figure 36** and **Figure 37.** The clouds to track were selected with an automatic scheme to pick out distinct clouds.

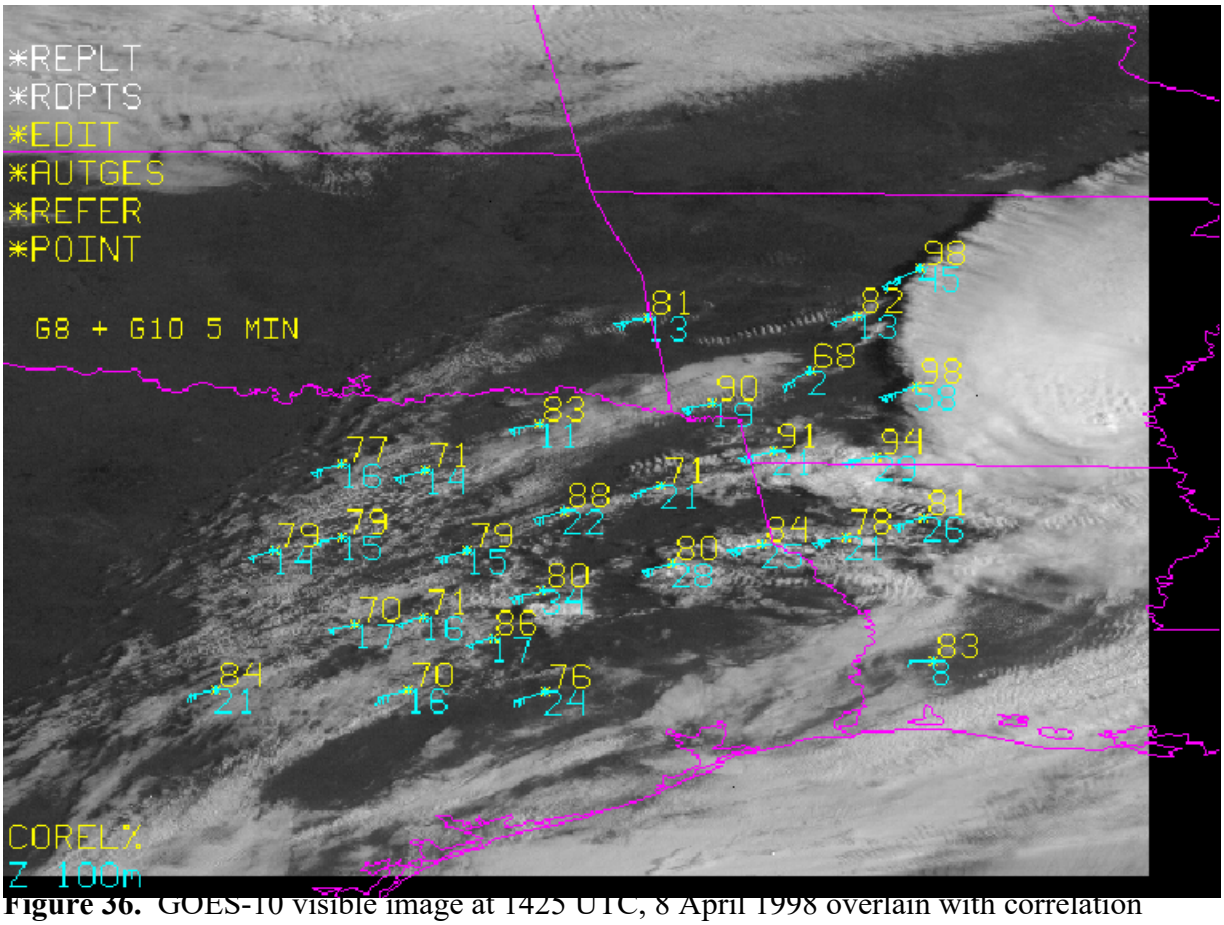

Figure 36. GOES-10 visible image at 1425 UTC, 8 April 1998 overlain with correlation coefficients (%) for wind vectors derived from 5-minute interval imagery versus 15-minute imagery. Wind vector heights (x 100 m) are also shown.

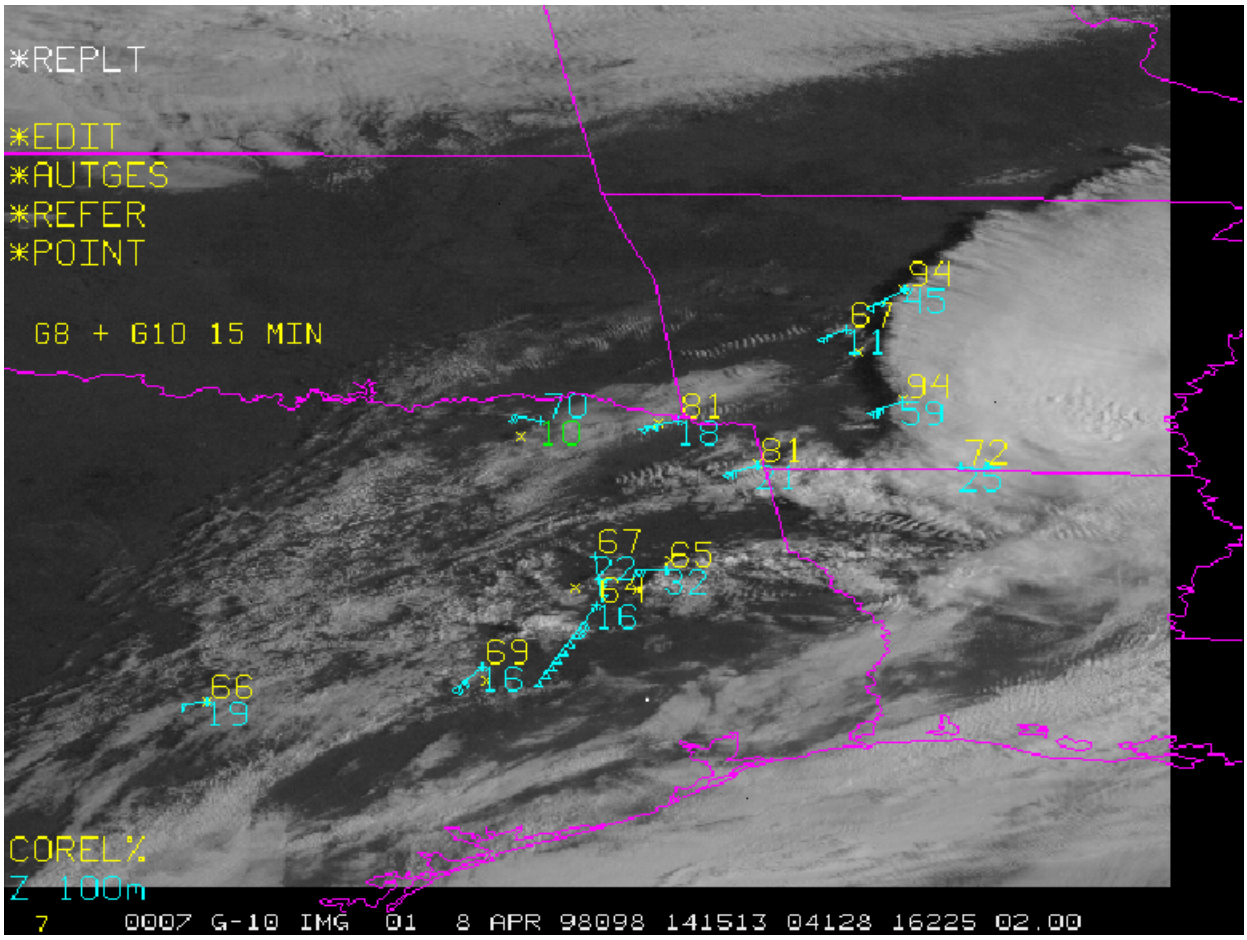

Figure 37. Same as Figure 36, except for 15-min interval GOES-10 visible imagery at 1415 UTC.

With the 5 minute interval result shown in **Figure 36**, the correlation coefficients are generally higher than 75%. Lower correlations often show un-physical motion and height results. With 15 minute imagery, the correlations were generally lower and more unphysical results appeared. These can be seen by the very high winds heading in the wrong direction in **Figure 37**. Also, with the 15 minute interval result, fewer clouds passed the coarse consistency check.

These results show the difficulty of cloud motion and height analysis with middle- and low-level scattered clouds. Since cirrus clouds change more slowly, previous analysis with 15 minute data produces good results.

Finally, this analysis was repeated with 4 km IR data which showed qualitatively similar results: The shorter the time interval, the easier it is to find the same cloud in successive images. **Figures 38 and 39** show the IR results corresponding to **Figures 36 and 37.** Again, very high wind speeds appear in the 15 minute results which would normally be filtered.

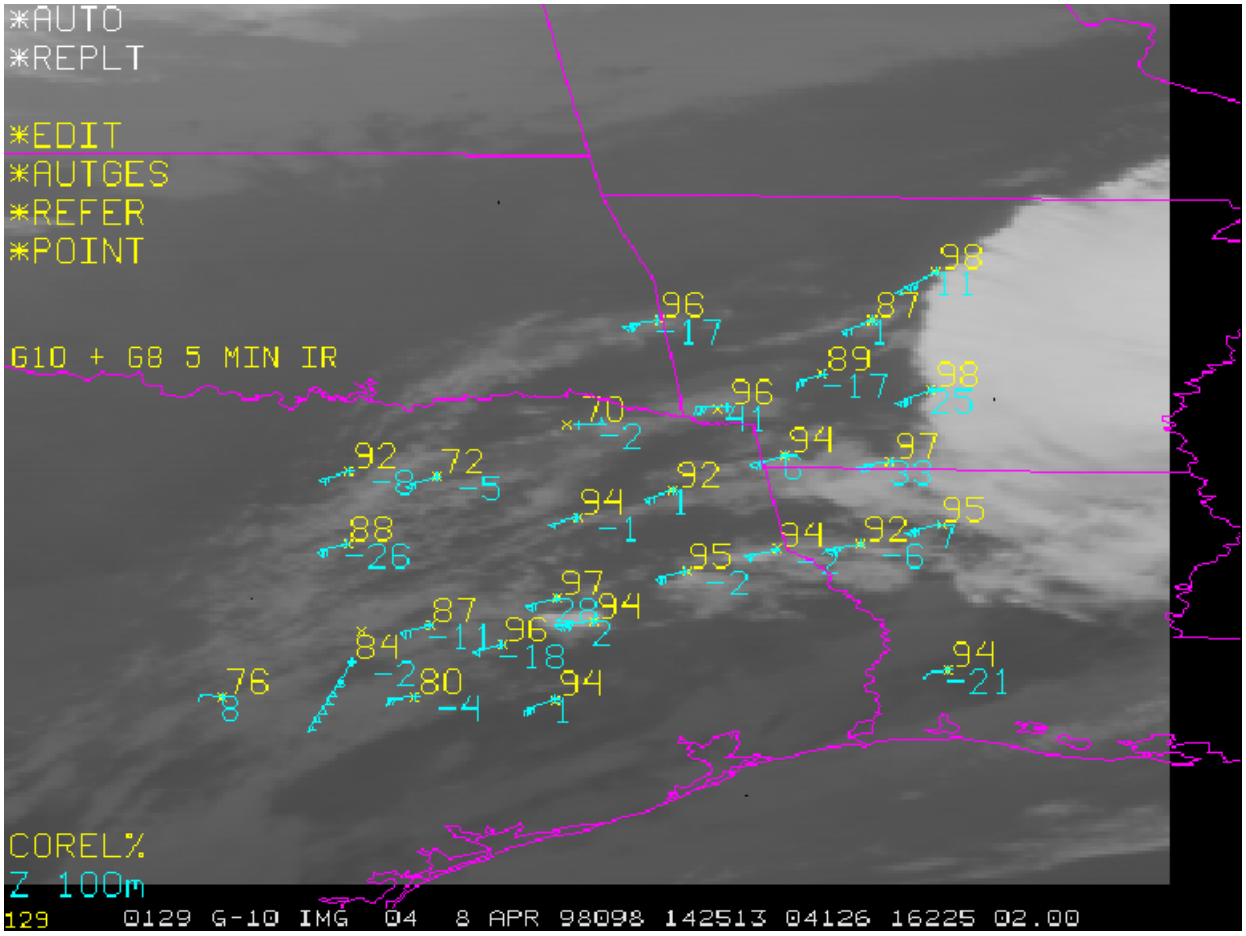

Figure 38. Same as Figure 36, except for 5-min interval GOES-10 IR imagery.

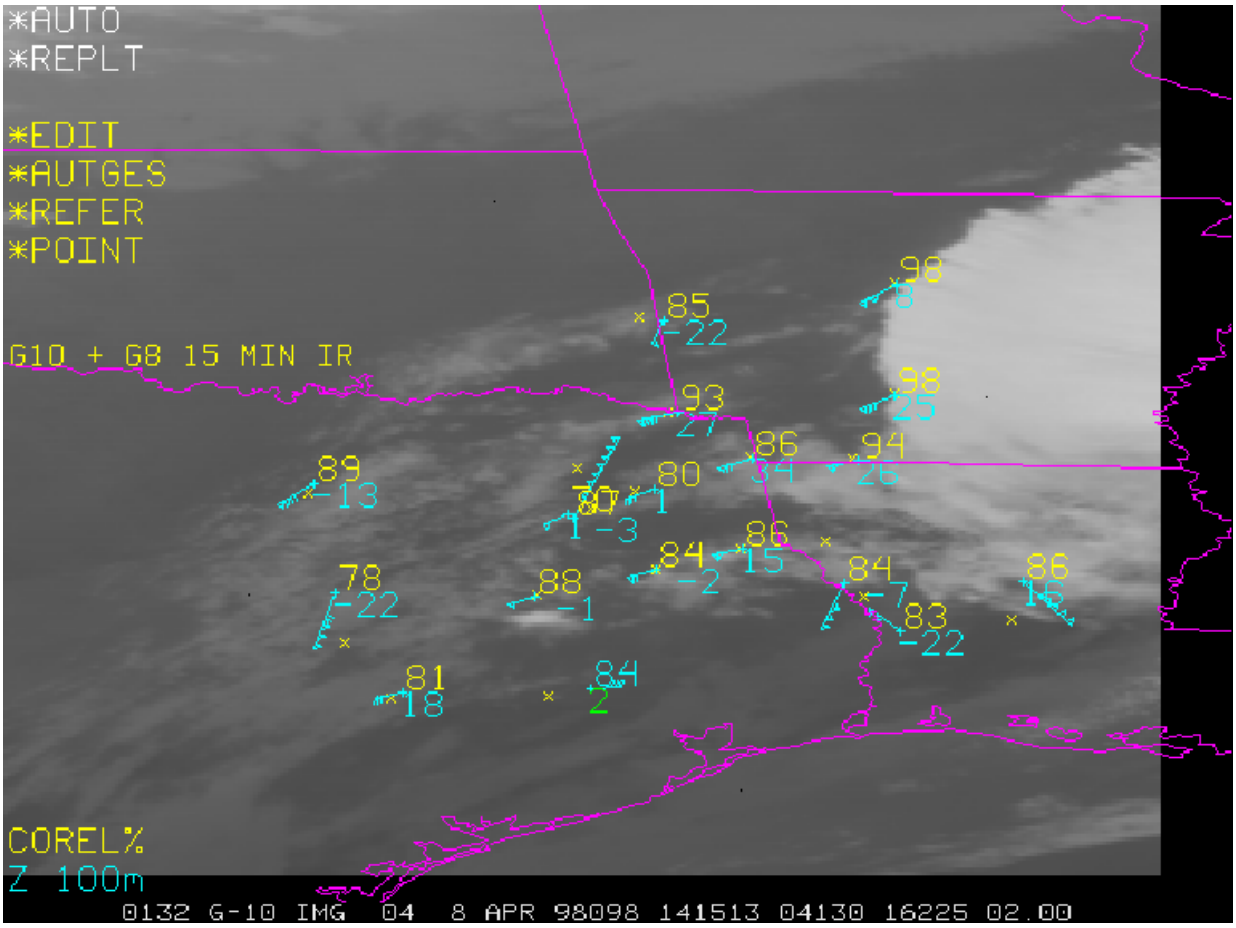

Figure 39. Same as Figure 36, except for 15-min interval GOES-10 IR imagery at 1415 UTC.

Cloud-Drift Winds (Birkenheuer, NOAA Forecast Systems Laboratory, Boulder, CO)

NOAA forecast Systems Laboratory (FSL) is interested in the effectiveness of high temporal data on the cloud-drift wind problem. If the GOES-10 high frequency data show improved cloud drift winds, archived GOES-10 and ancillary data may be used for a Local Area Prediction System (LAPS) case study. These data have not yet been analyzed.