IOP-3 Summary of Operations
26 February 2009, 1800 UTC – 27 February 2009 0000 UTC

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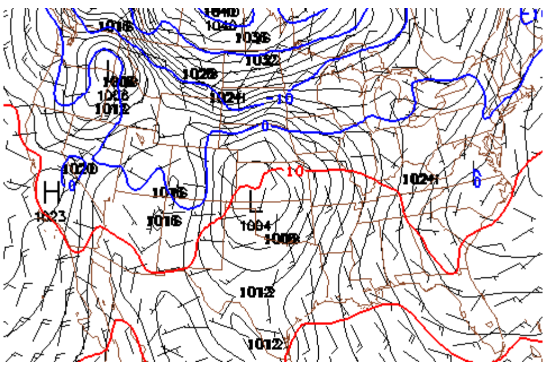
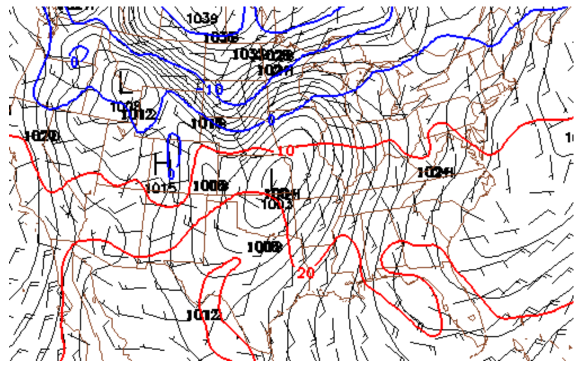
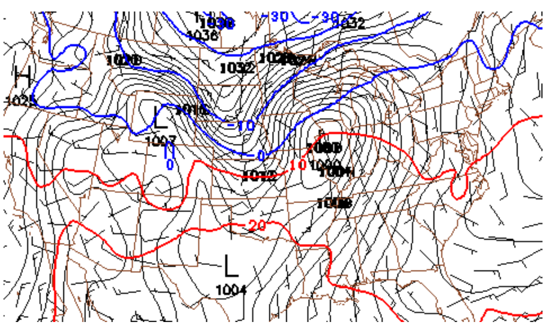
IOP-3 focused on a cyclone that developed in Southeast Colorado and tracked northeastward, with the central low pressure center passing over the northeast tip of Illinois on Thursday 26 February at 0000 UTC, moving on into Southern Michigan on 26 February at 0600 UTC (Fig. 1). It was anticipated that deployment sites in Wisconsin would only receive precipitation from the leading front, but not the wrap-around deformation zone. The NAM and GFS depicted no precipitation in the wrap around region of the storm at all—all precipitation was predicted to be along the primary front and within the storm's warm sector. The cyclone was stronger that predicted and did develop snow in the deformation zone west of the cyclone, but the zone was over Minnesota and northern Wisconsin, missing the deployment sites at KARX and KMKX.


A. 1200 UTC Feb 26 Surface Press/Temp


B. 1800 UTC Feb 26 Surface Press/Temp


C 0000 UTC Feb 27 Surface Press/Temp

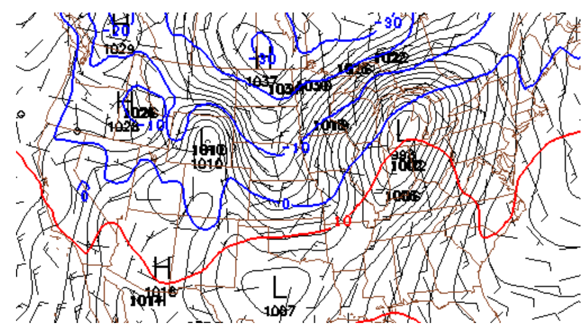

D. 0600 UTC Feb 27 Surface Press/Temp

Figure 1A-D Evolution of surface cyclone during IOP-3 from 1200 UTC 26 Feb-0600 UTC 27 Feb 2009.

MISS arrived in Champaign on 21 Feb 2009 and will remain until 15 March 2009. Despite the forecast, we deployed MISS on this storm to obtain a good data set to test our algorithm to process vertical air motion, particularly since they only have a three week deployment and the GFS is not showing much activity. We decided not to deploy UAH to conserve resources for future events. We chose a special deployment site in Wisconsin since coordination with a WSR-88D site was not necessary. We anticipated correctly that the site would only receive precipitation from the leading front, but not the wrap-around deformation zone. MISS was deployed to Tomah, WI, along I-94 N of Madison. The exact site was at 44° 01' 17.5" N 90° 29' 34.4"W, altitude 300 m.

The cyclone at 1200 UTC on 26 February produced precipitation over the Dakotas and Minnesota (Fig. 2). By 1700, a complicated pattern of convection developed (Fig. 3) with one band along the upper level front extending from the northeast tip of Iowa to central Indiana, a second band along the surface cold front extending from central Iowa into Minnesota, and snow in the deformation zone in northern Wisconsin and Minnesota. A bow echo was also evident in the warm sector over central Illinois. The band of precipitation along an upper level frontal boundary east of the cyclone center was just approaching the MISS site in Wisconsin. At 1800, the northern boundary of the band reached the MISS site (fig. 4). The profiler was activated at 1910 UTC, about 70 minutes after the echo shield began moving south the site (Fig. 5). The northern boundary of the band passed the site by 1930 UTC (Fig. 6). The band of precipitation associated with the surface cold front arrived at the site at 2000 UTC (Figs. 5 and 7), passing by 2300 UTC (Figs. 8-11). Initially graupel was observed, changing to heavy snow. Snow fell for about two hours, with about 1.5 inches of accumulation. The dry slot moved over the site at that time. Profiler operations were terminated at 2300 UTC, since the snow associated with the deformation zone over Minnesota was not expected to pass over the site. During the passage of the cold frontal band, several small embedded bands were observed by the profiler. Peak vertical velocities were observed at the upper regions of each of the bands.

Soundings were launched at 1900 UTC, 2100 UTC and 0000 UTC across the cold front (Fig. 12-14). The first sounding lost signal at 650mb for reasons unclear (may have been a mechanical issue with the ties holding the balloon). The second sounding went up into heavy snow and actually dropped for a brief period due to icing, but eventually went to 100mb. The third sounding launched soon after the snow finished, and ascended to 100 mb. The 2100soundings showed an atmosphere with a frontal inversion from 900-780 mb, saturated with respect to ice to 200 mb with neutral stability. The 0000 UTC sounding had a frontal inversion between 900 and 800 mb with a saturated layer to 700 mb and dry air above that level.

The complete MISS record from the profiler for SNR and W is shown in Fig. 15.

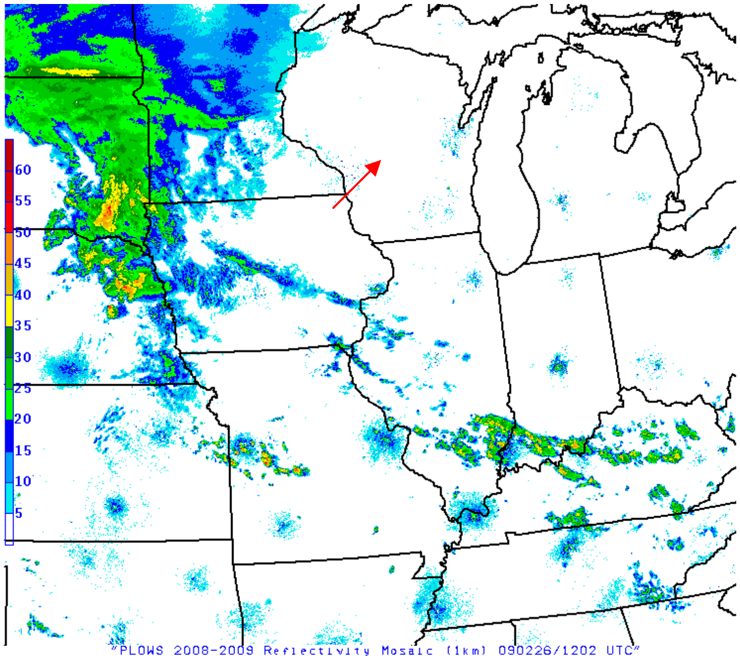


Figure 2: Composite reflectivity from WSR-88D radars at 26 Feb, 1202 UTC

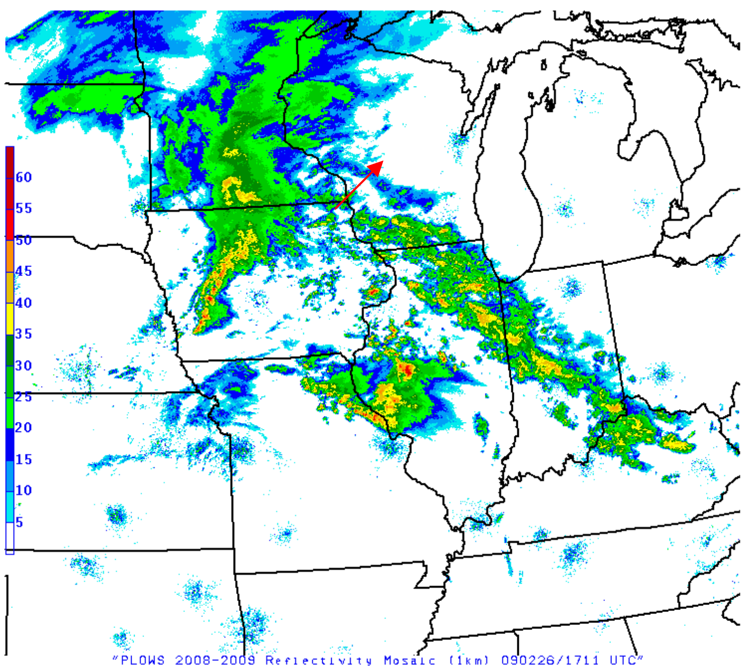


Figure 3: Composite reflectivity from WSR-88D radars at 26 Feb, 1711 UTC

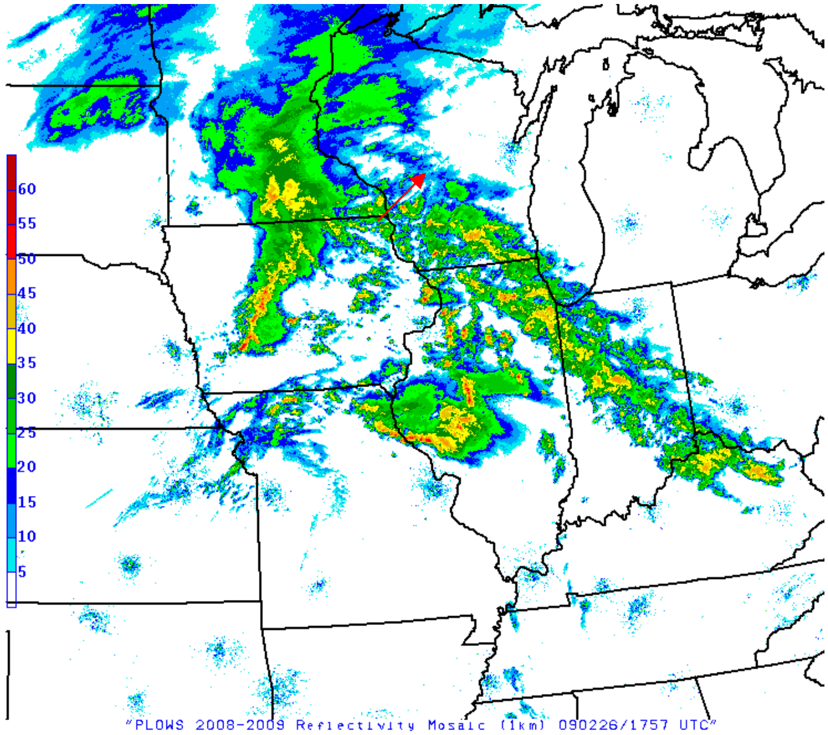


Figure 4: Composite reflectivity from WSR-88D radars at 18 Feb, 1757 UTC

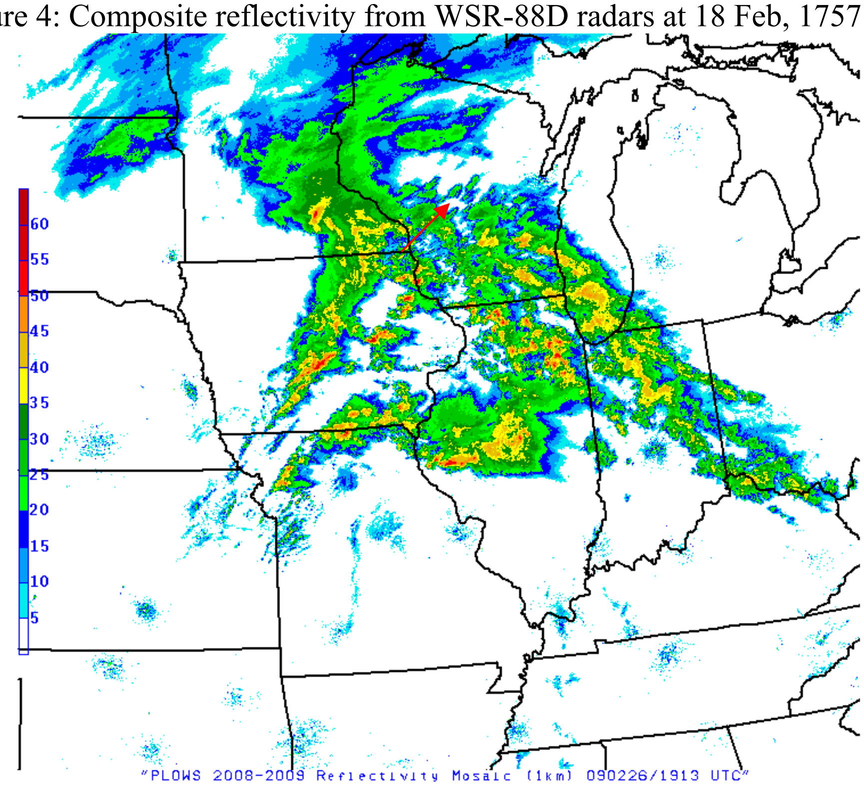


Figure 5: Composite reflectivity from WSR-88D radars at 18 Feb, 1913 UTC

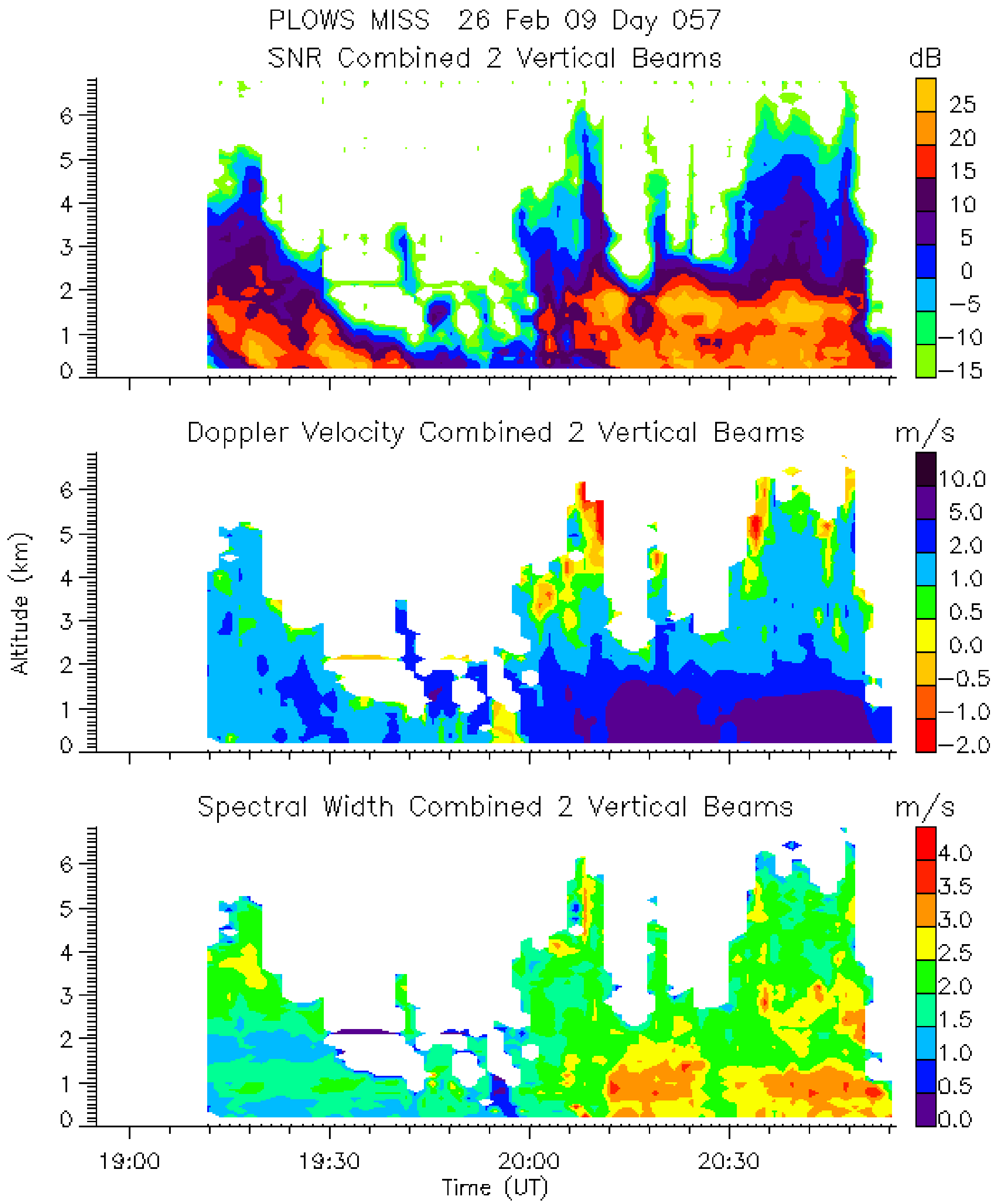


Figure 6: Profiles of SNR, W, and SW from the 915 MHz MISS Profiler

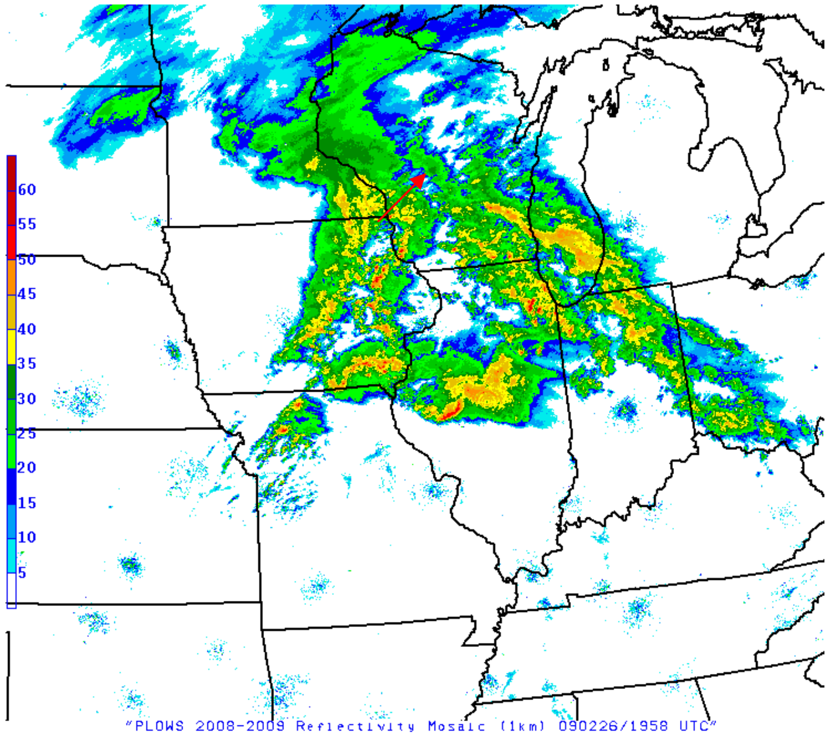


Figure 7: Composite reflectivity from WSR-88D radars at 18 Feb, 1958 UTC

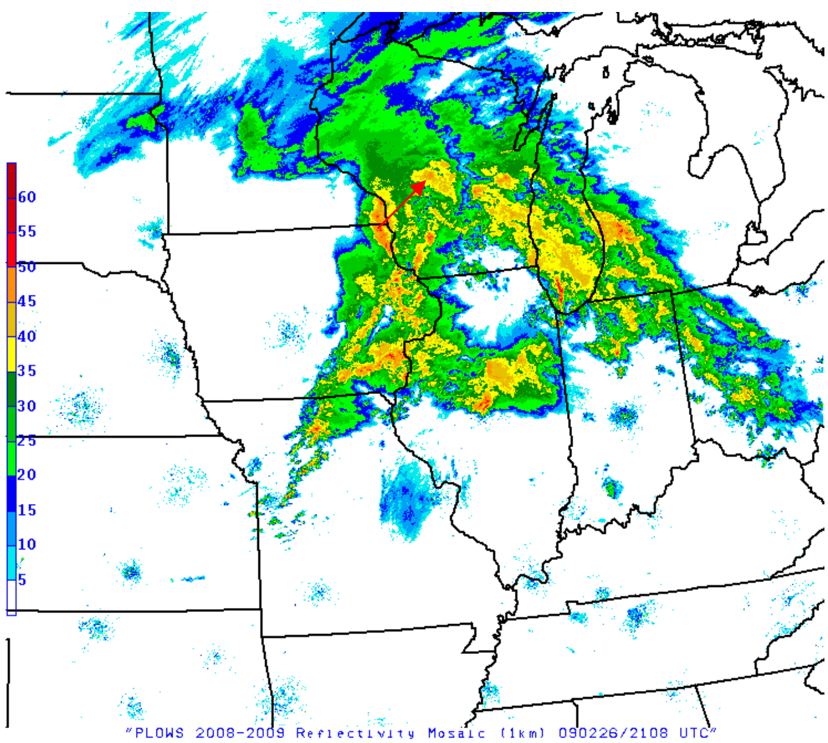


Figure 8: Composite reflectivity from WSR-88D radars at 18 Feb, 2108 UTC

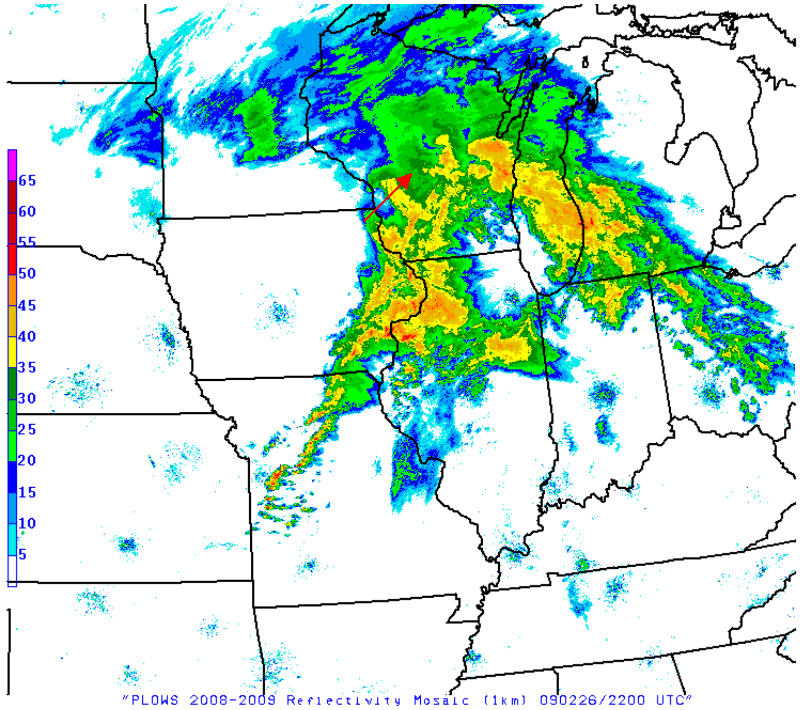


Figure 9: Composite reflectivity from WSR-88D radars at 18 Feb, 2200 UTC

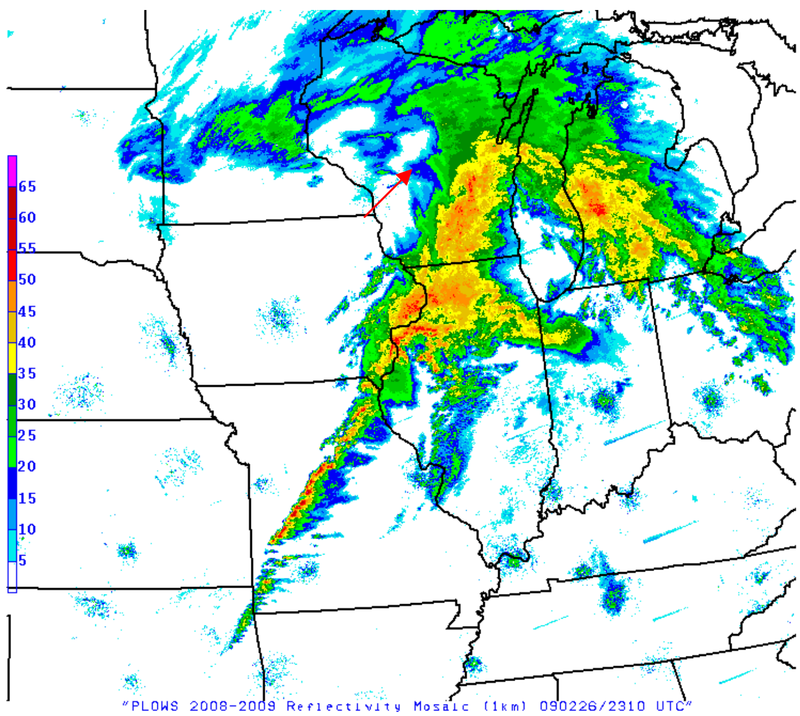


Figure 10: Composite reflectivity from WSR-88D radars at 18 Feb, 2310 UTC

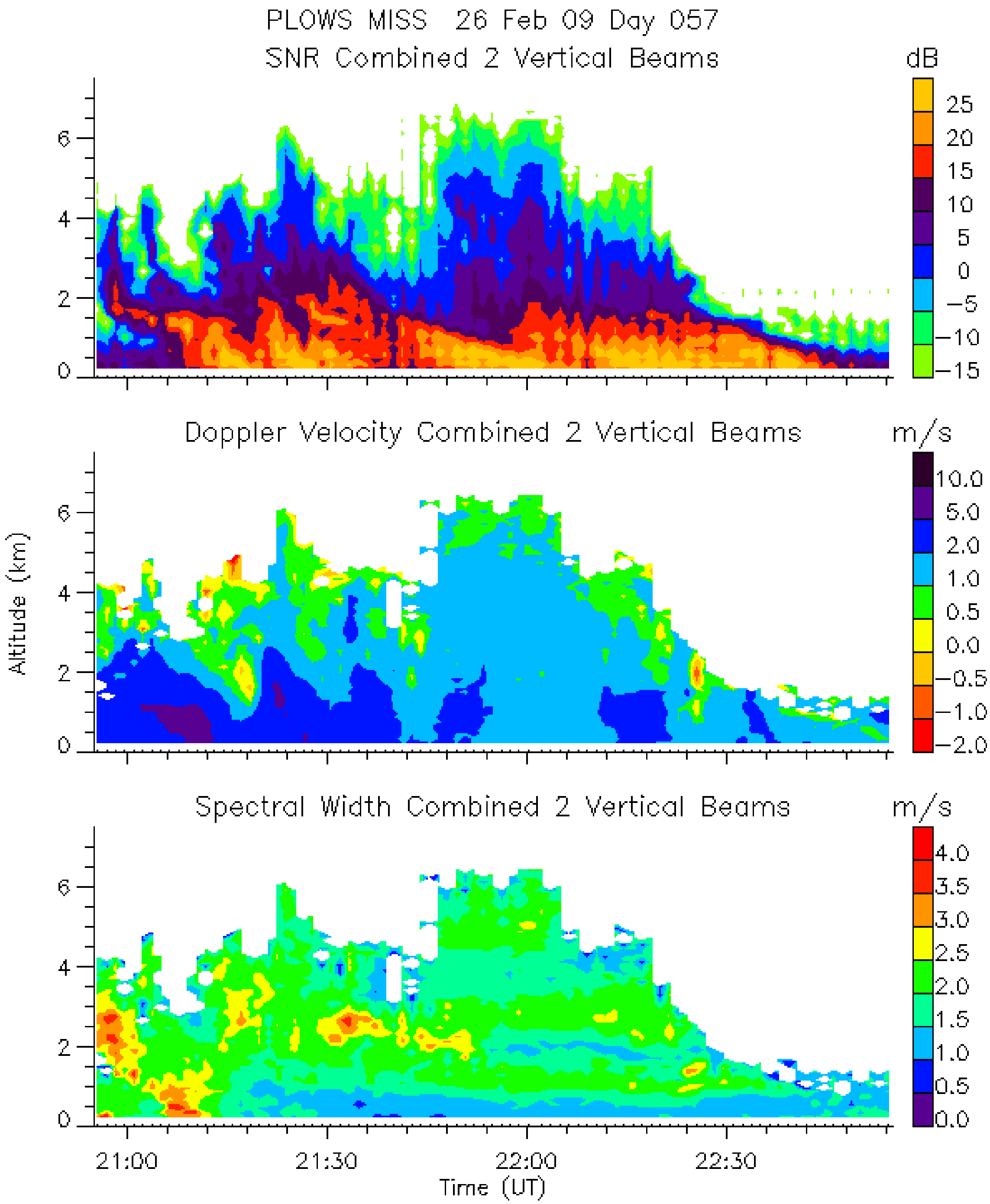


Figure 11: Profiles of SNR, W, and SW from the 915 MHz MISS Profiler

MISS Radiosonde Flights

Launch History - 3 launches, indicated by release time.

26 February 2009 1907 UTC

26 February 2009 0740 UTC
18 February 2009 0929 UTC

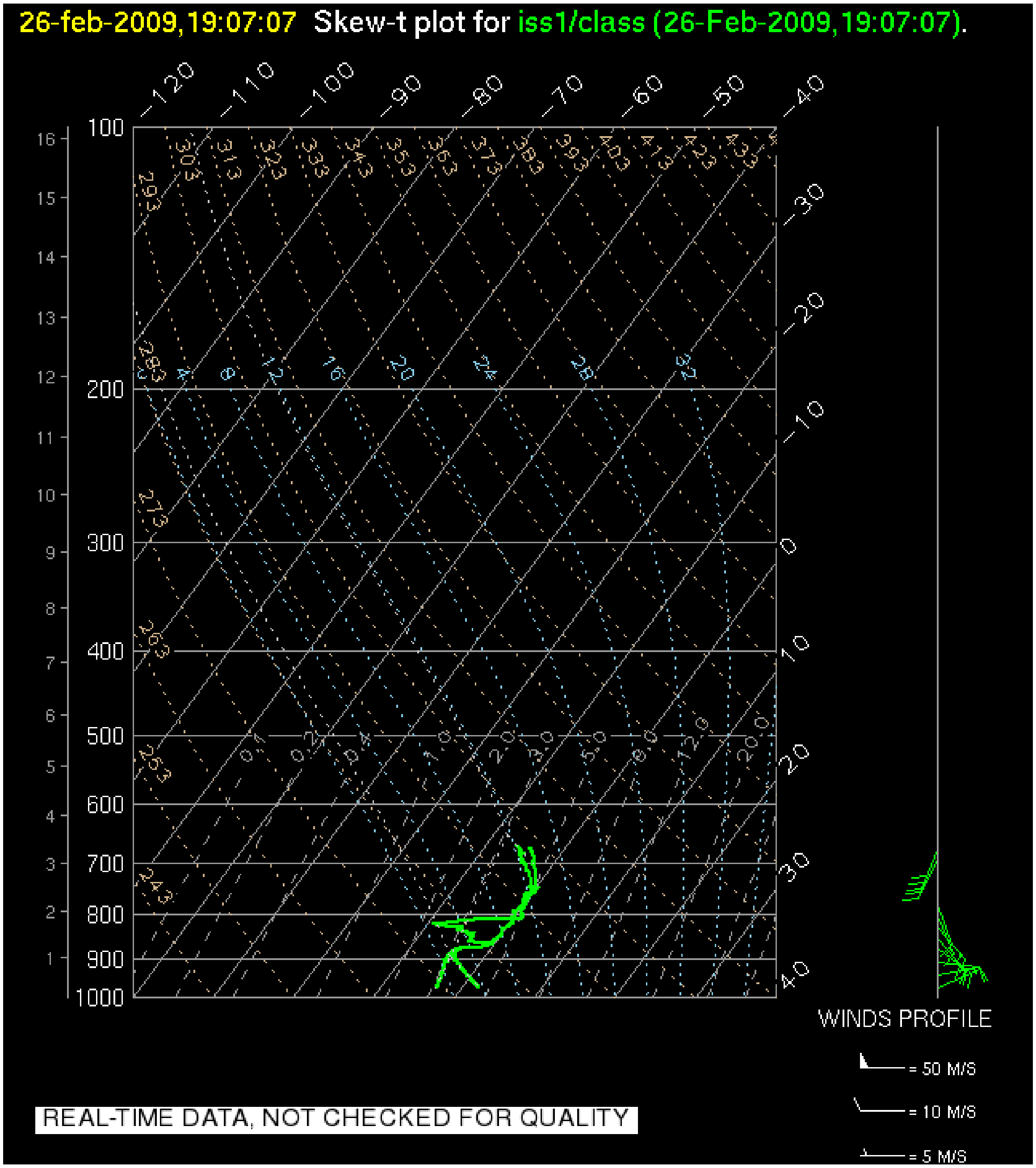


Fig. 12: MISS Flight 3.1 26 February 2009 1907 UTC

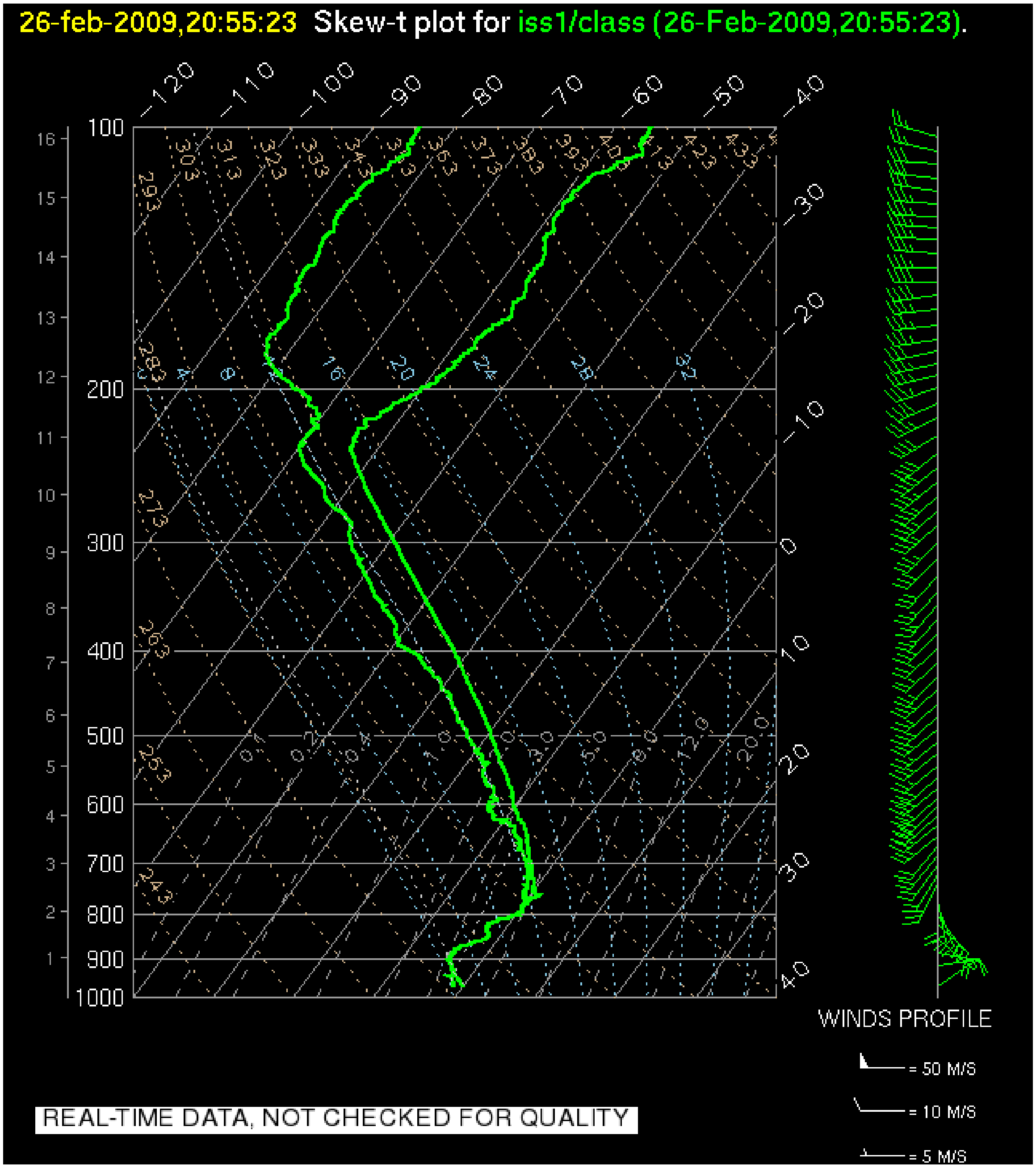


Fig. 12: MISS Flight 3.2 26 February 2009 2055 UTC

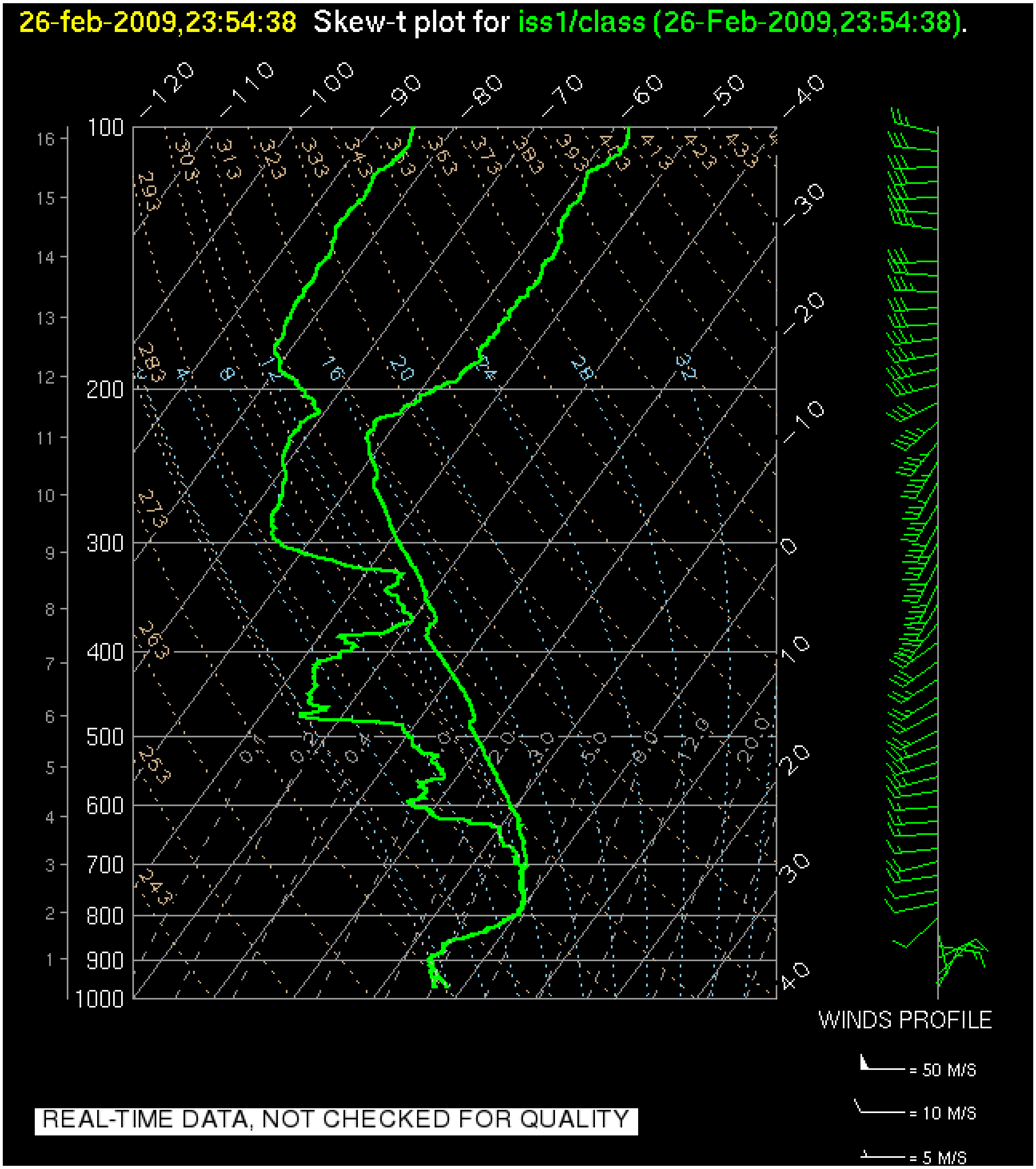


Fig. 12: MISS Flight 3.3 26 February 2009 2354 UTC

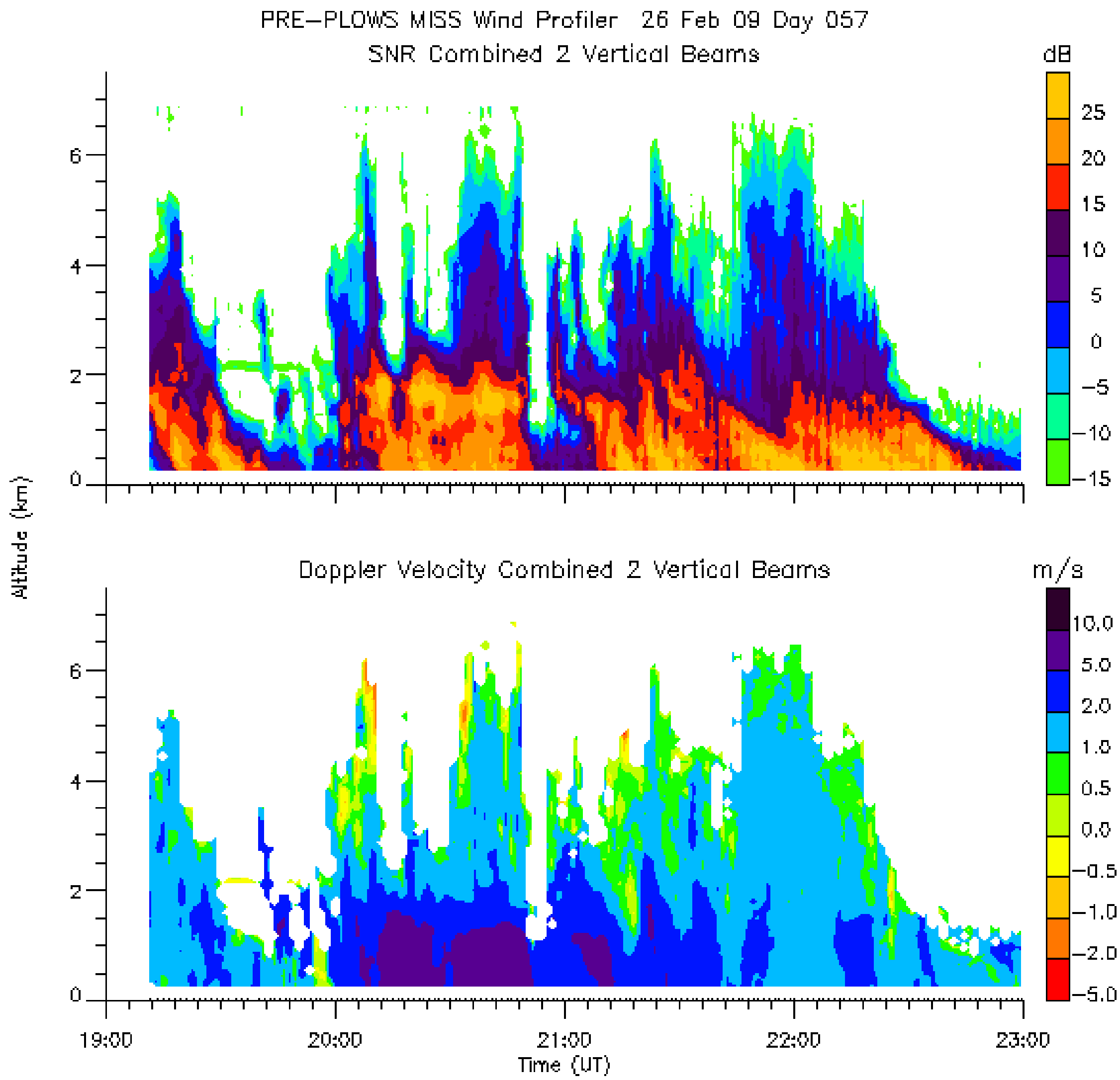


Figure 13: Complete MISS profiler data for IOP-3 for SNR and W.