IOP-21 Summary of Operations
21 February 2010, 1200 UTC – 22 February 2010 1200 UTC

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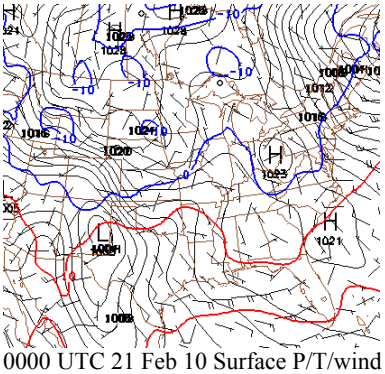
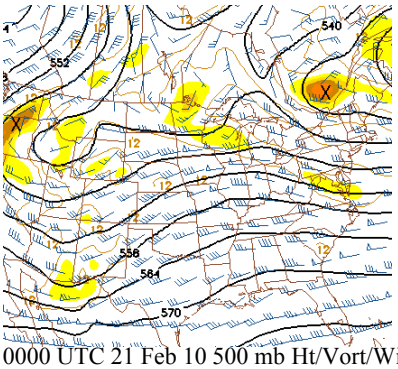
1. Summary of storm evolution

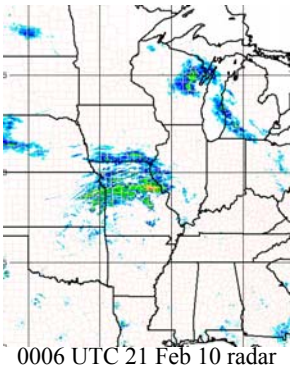
The IOP-21 storm formed as a weak wave moved out of the Rockies and over the plains. The low pressure system over the Plains evolved from an inverted trough at 0000 UTC on 22 Feb 10 (Fig. 1) to a closed low over the Ohio Valley (Fig. 2) . Through 1800 UTC on 21 February, the precipitation within the storm's developing circulation was not well organized. Wrap-around precipitation started to develop around 0000 UTC over Iowa and Missouri. The flight was launched as the wrap-around was developing. The cyclone moved rapidly eastward during the time of the flight so that the wrap-around propagated eastward over central Illinois. The last half of the flight was over central Illinois within the wrap-around. The decision was made earlier to deploy around the Lincoln IL WSR-88D. The precipitation region moved rapidly eastward over this region, and across the Ohio Valley, and cleared the research area in Illinois by 1200 UTC.

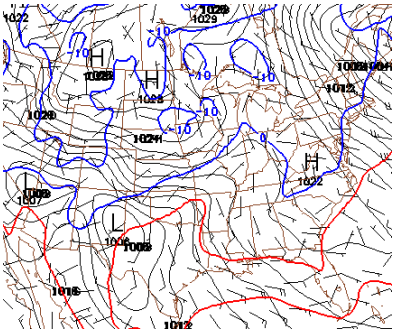
2. Locations of instrumentation platforms

MIPS Location: 40º 11' 11.32" N 89º 11' 3.67" W
MIPS Time of Operation: 1900 UTC 2/21/10 to 1000 UTC 2/22/10
MAX Location: 40º 24' 17.40" N 89º 11' 21.05" W
MAX Time of Operation: 2200 UTC 2/21/10 to 0910 UTC 2/22/10
MISS Location: 40º 44' 11.39" N, Lon 89º 37' 30.63" W
Profiler Time of Operation: 1800 UTC 2/21/10 to 1000 UTC 2/22/10
UM Location: 40º 15' 31.06" N 89º 13' 23.89"
RF-14 Flight operations: 1924 UTC 21 Feb 10 to 0404 UTC 22 Feb 10


0000 UTC 21 Feb 10 Surface P/T/wind


0000 UTC 21 Feb 10 500 mb Ht/Vort/Wind


0006 UTC 21 Feb 10 radar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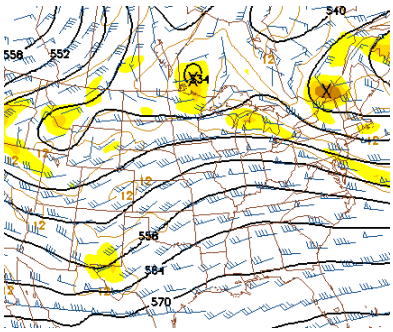
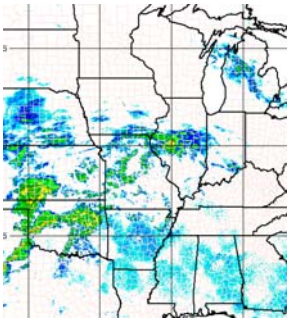
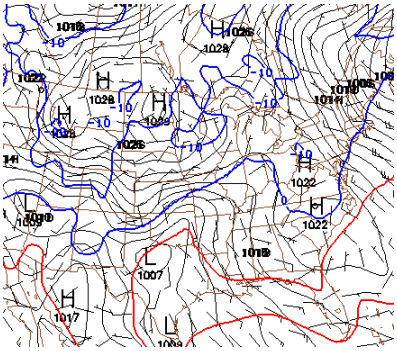
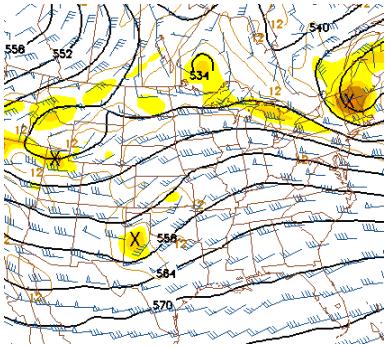
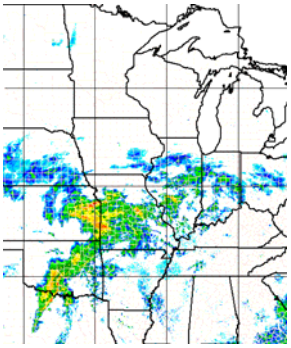
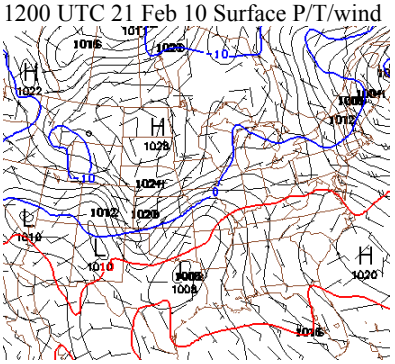

0600 UTC 21 Feb 10 500 mb Ht/Vort/Wind

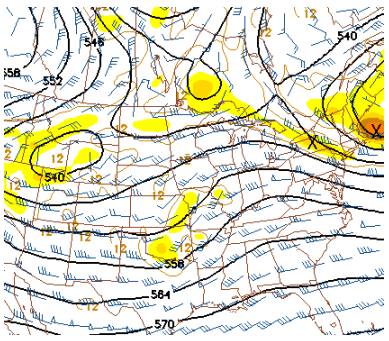

0559 UTC 21 Feb 10 radar


1200 UTC 21 Feb 10 Surface P/T/wind


1200 UTC 21 Feb 10 500 mb Ht/Vort/Wind


1207 UTC 21 Feb 10 radar


1800 UTC 21 Feb 10 Surface P/T/wind


1800 UTC 21 Feb 10 500 mb Ht/Vort/Wind

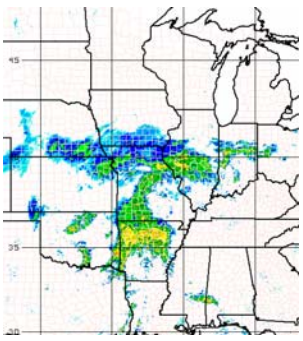
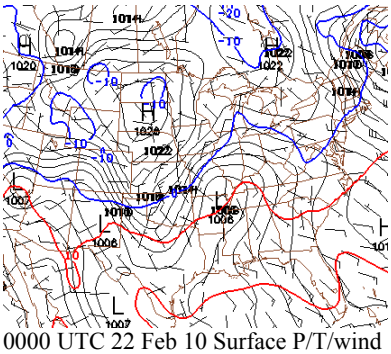
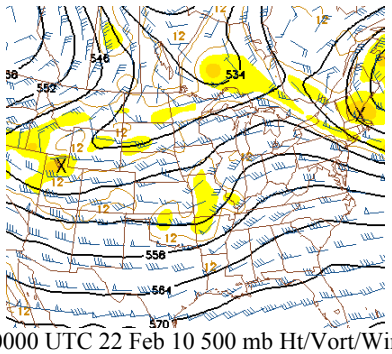

1807 UTC 21 Feb 10 radar

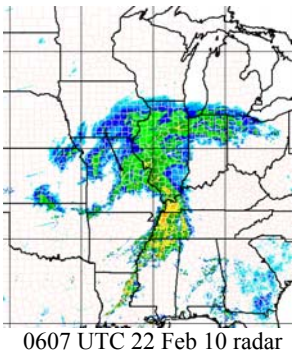
Figure 1: Evolution of the IOP-21 storm at the surface, 500 mb, and radar echoes from 0000 UTC 21 Feb 10 through 1800 UTC 21 Feb 10.



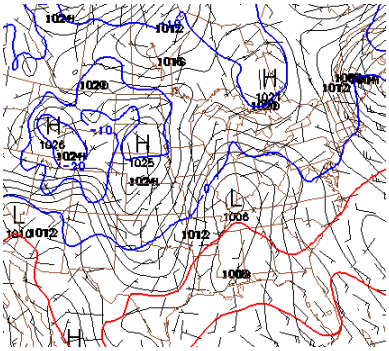
0000 UTC 22 Feb 10 Surface P/T/wind



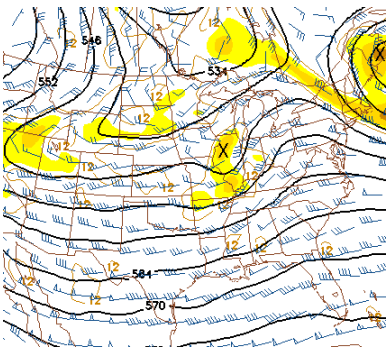
0000 UTC 22 Feb 10 500 mb Ht/Vort/Wind



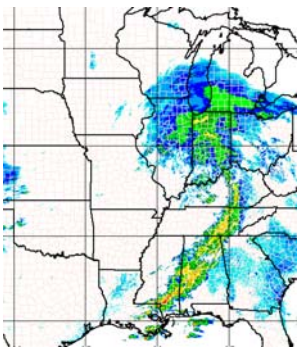
0607 UTC 22 Feb 10 radar



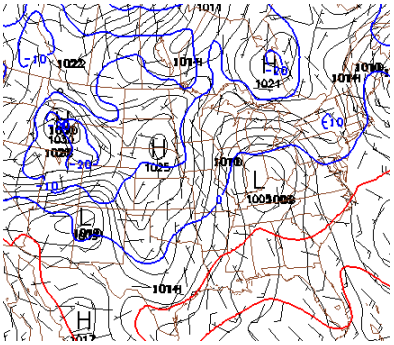
0600 UTC 22 Feb 10 Surface P/T/wind



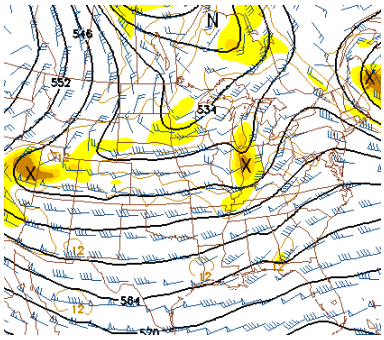
0600 UTC 22 Feb 10 500 mb Ht/Vort/Wind



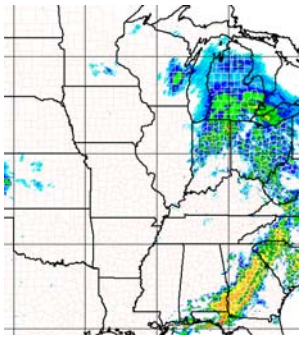
0607 UTC 22 Feb 10 radar



1200 UTC 22 Feb 10 Surface P/T/wind



1200 UTC 22 Feb 10 500 mb Ht/Vort/Wind



1207 UTC 22 Feb 10 radar

Figure 2: Evolution of the IOP-21 storm at the surface, 500 mb, and radar echoes from 0000 UTC 22 Feb 10 through 1200 UTC 22 Feb 10.

3. Precipitation over research area

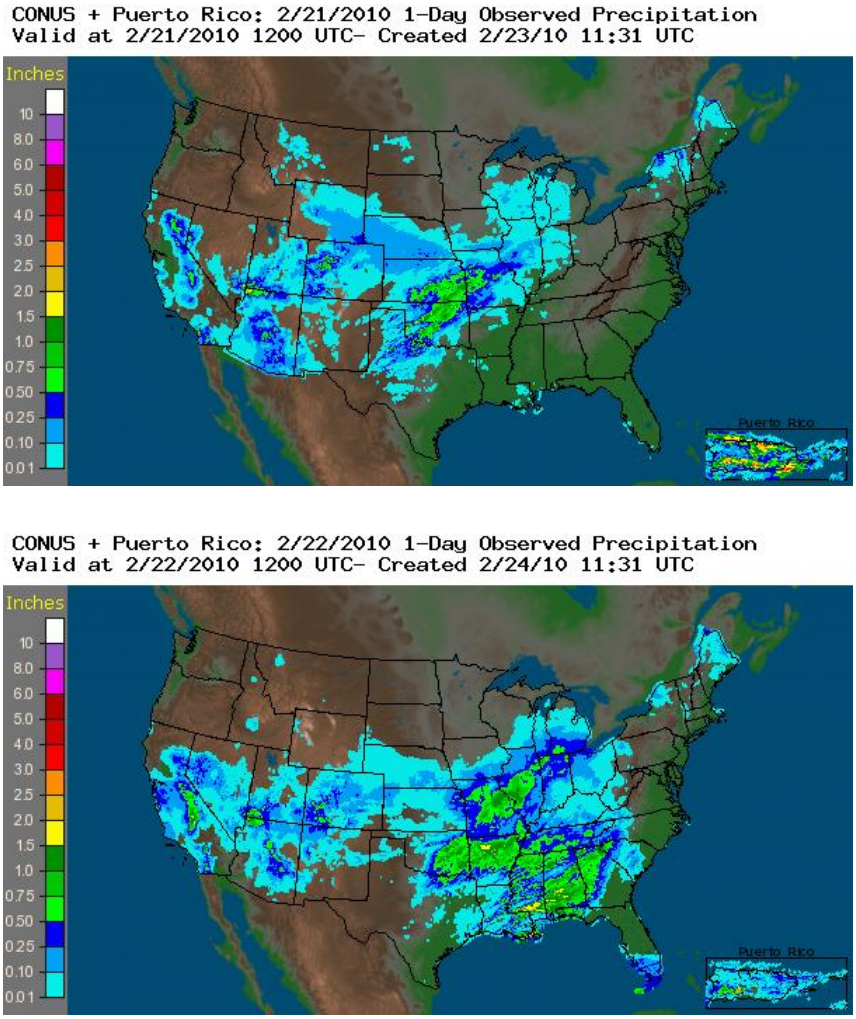


Fig. 3: 24 Hour precipitation ending at 1200 UTC 2/21/10 and 1200 UTC 2/22/10 over the United States

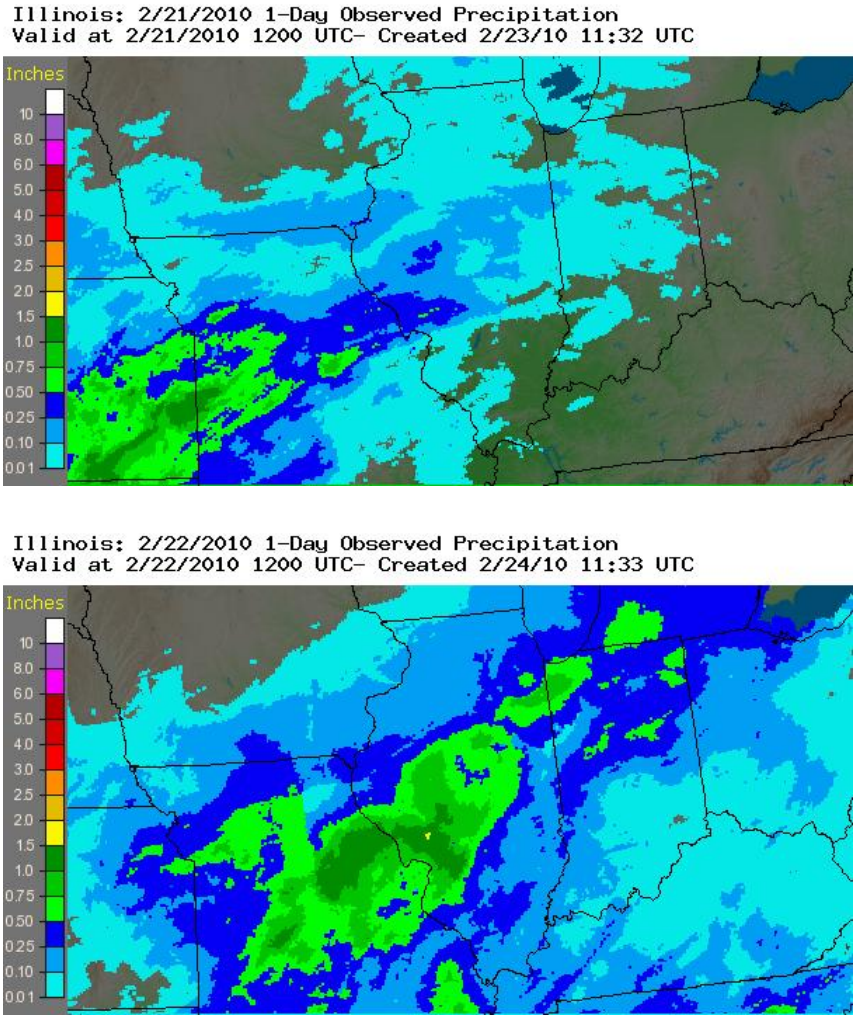


Fig. 4: 24 Hour precipitation ending at 1200 UTC 2/21/10 and 1200 UTC 2/22/10 over Illinois.

4. Flight Summary

The C-130 took off at approximately 1935 UTC. The aircraft first targeted the wraparound region over the border of Iowa and Missouri flying a stacked pattern. This pattern lasted until just after 0000 UTC when the aircraft ferried to Illinois. The remainder of the flight was between two VORs at Bradford and Decator (BDF and DEC) directly over the MIPS, MAX and MISS. The aircraft flew a stacked pattern during this time. Following the stack, the C-130 flew southwest to the dry slot boundary, and then continued southwest to land at Little Rock, AK since Peoria was snowed in. The C-130 flew back to Peoria on 22 February in the afternoon after the storm cleared the area.

C-130 Flight RF-12 Flight track

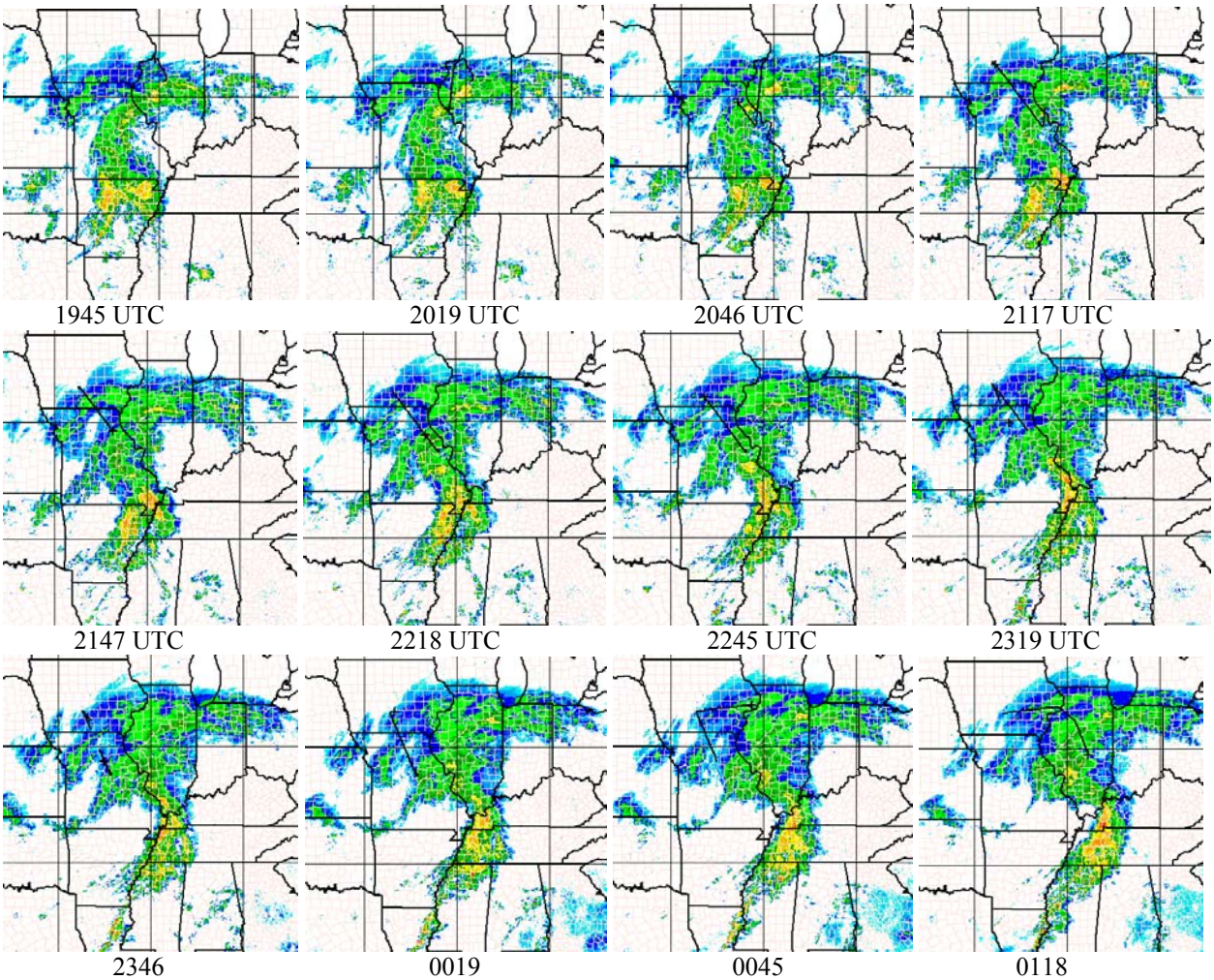
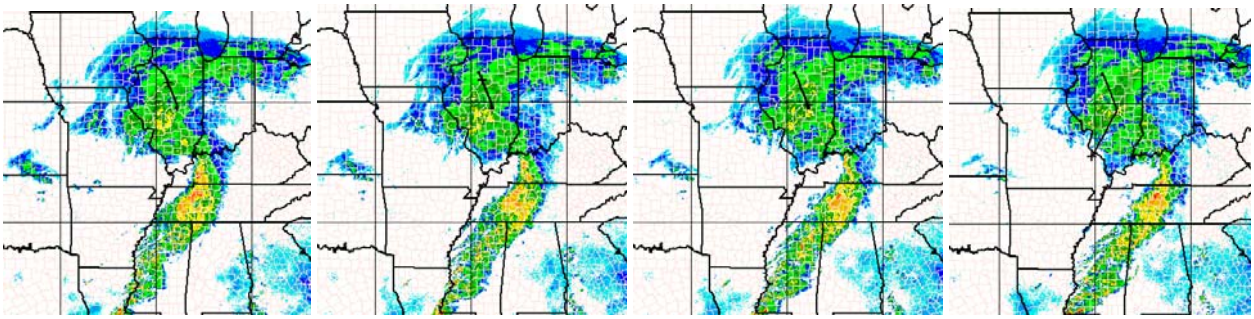
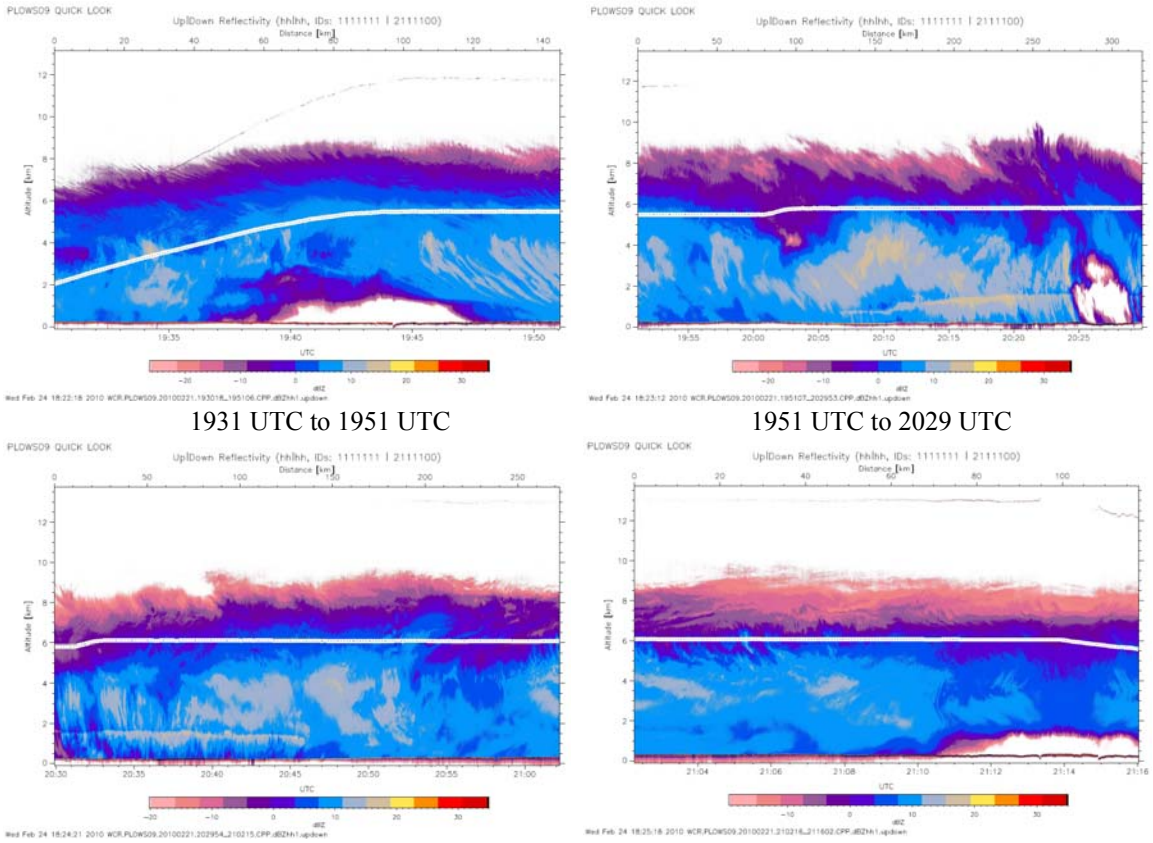


Figure 5: Flight track (top) and radar images during the period of the C-130 flight from 1940 UTC 21 Feb 10 through 0118 UTC 22 Feb 10.



0146 0219 0246 0319

Figure 6: Flight track (top) and radar images during the period of the C-130 flight from 0118 UTC 21 Feb 10 through 0319 UTC 22 Feb 10. Following 0319 UTC the aircraft continued to Little Rock, AK and landed. The aircraft ferried back to Peoria the following day.



1931 UTC to 1951 UTC 1951 UTC to 2029 UTC

2030 UTC to 2102 UTC 2102 UTC to 2116 UTC

Fig. 7: Wyoming Cloud Radar Quicklook of radar reflectivity between 1931 UTC 21 Feb 10 and 2116 UTC 21 Feb 10.

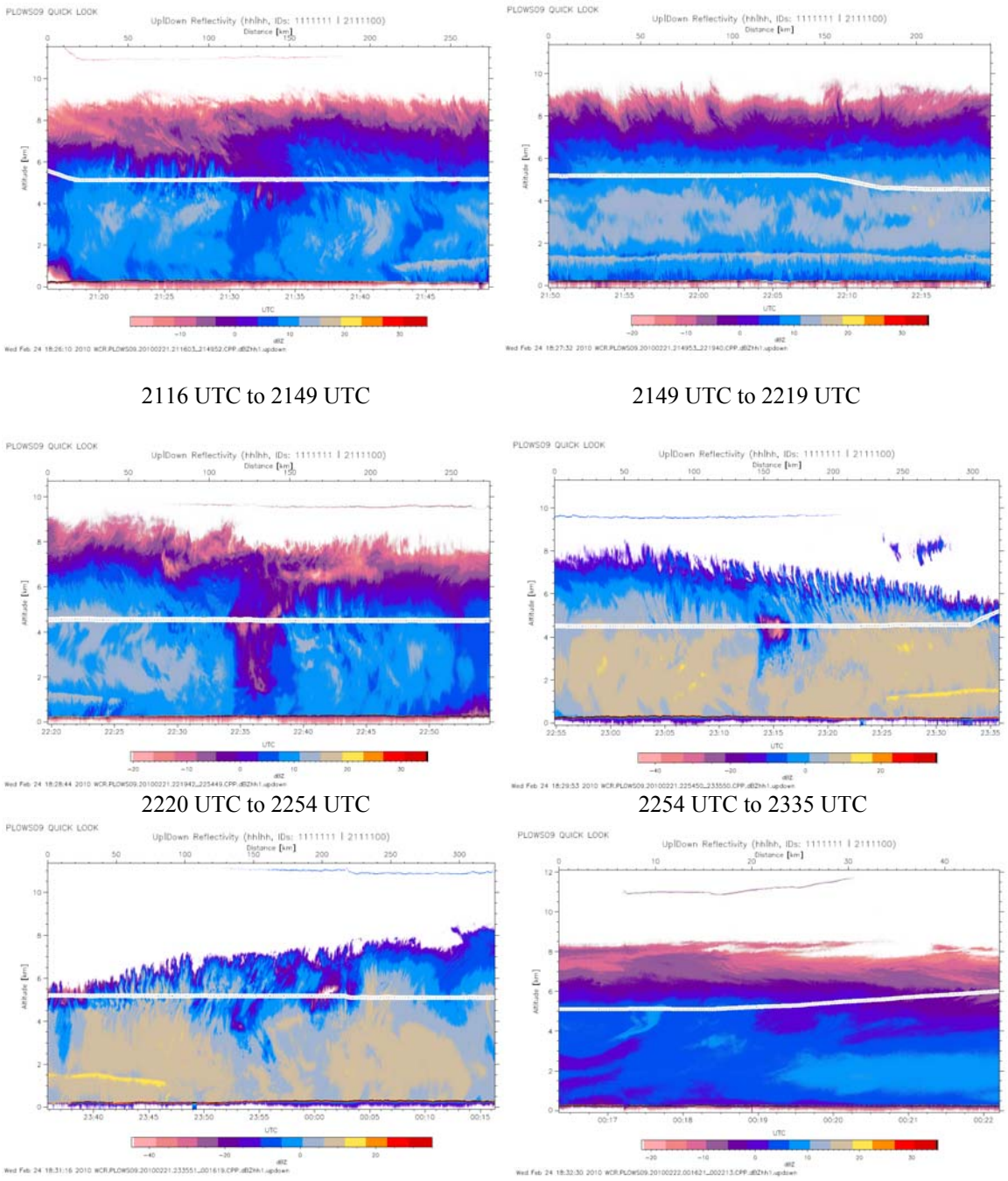


Fig. 8: Wyoming Cloud Radar Quicklook of radar reflectivity between 21161 UTC 21 Feb 10 and 0022 UTC 22 Feb 10.

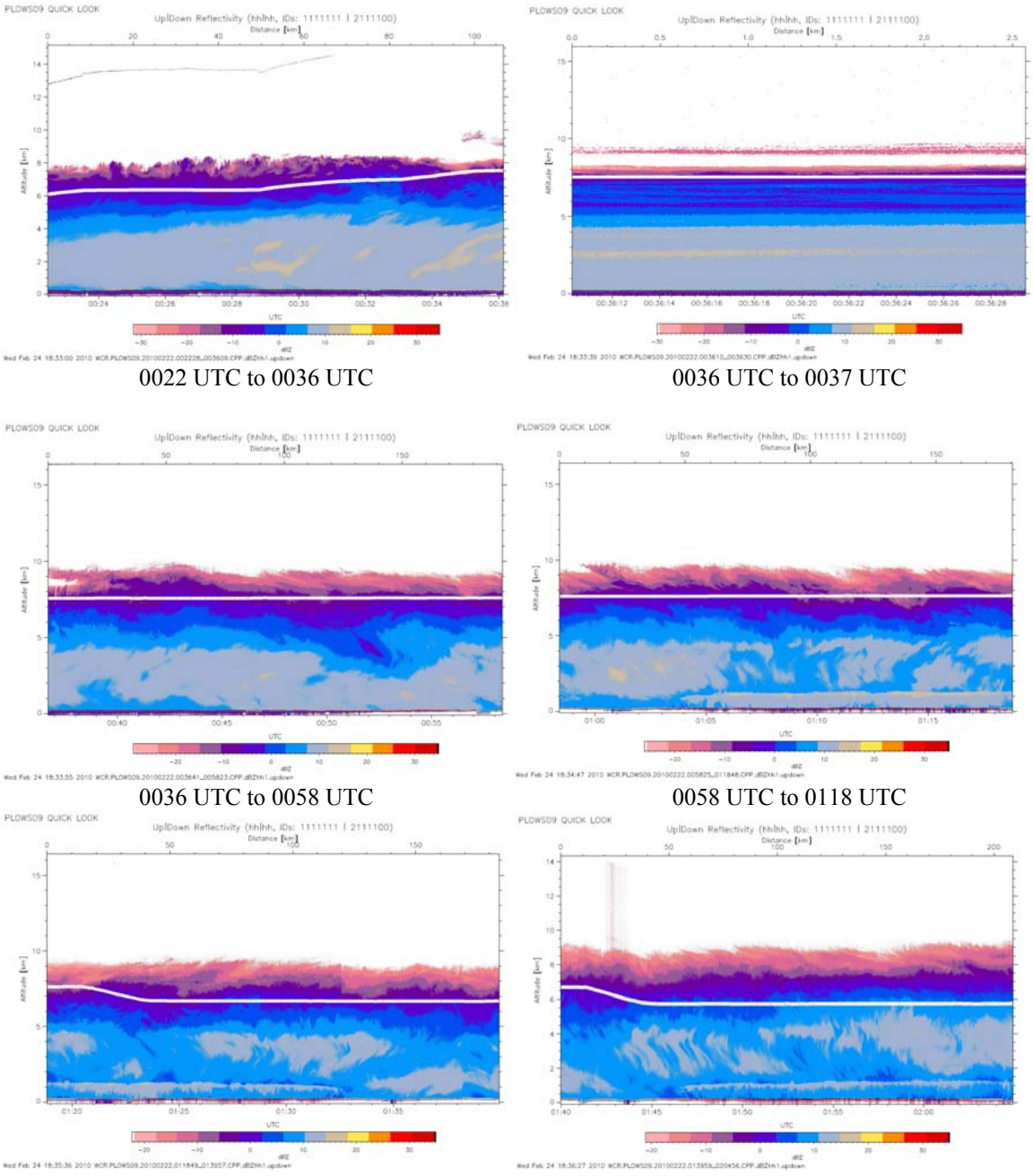


Fig. 9: Wyoming Cloud Radar Quicklook of radar reflectivity between 0022 UTC 22 Feb 10 and 0204 UTC 22 Feb 10.

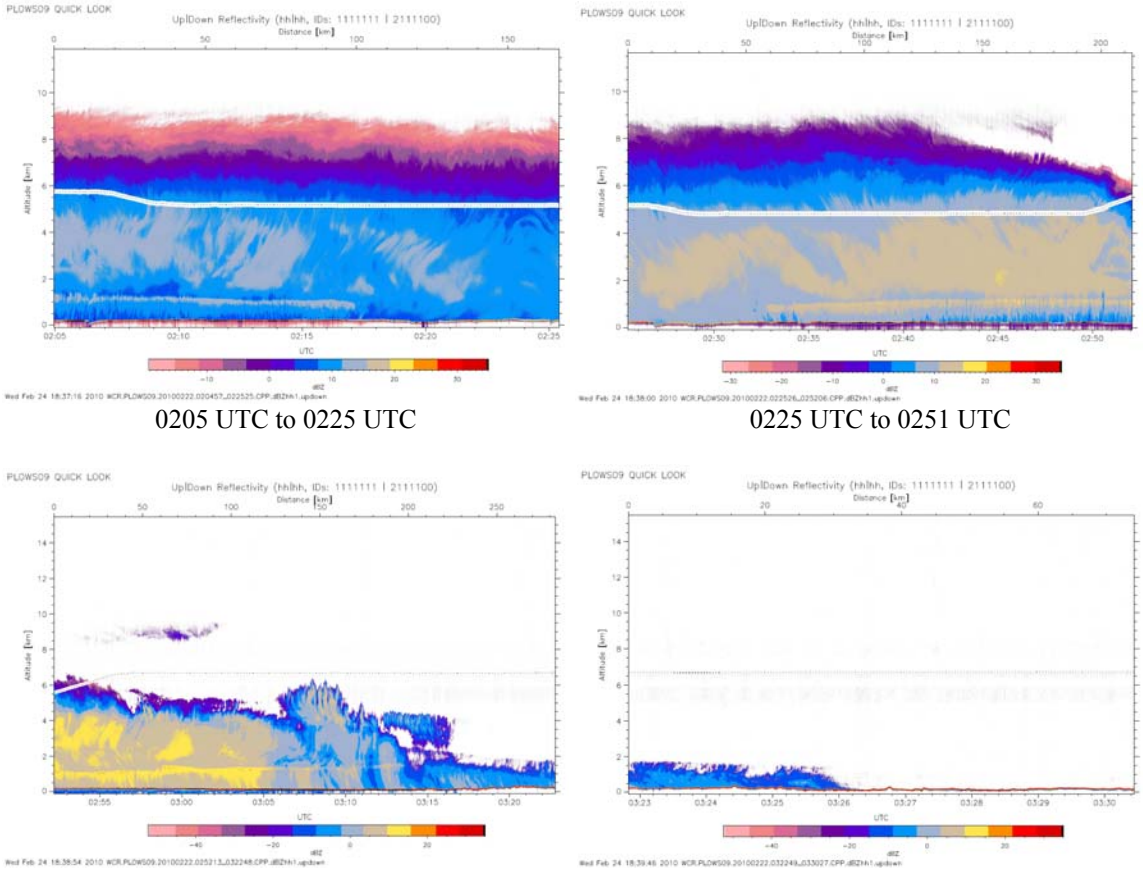


Fig. 10: Wyoming Cloud Radar Quicklook of radar reflectivity between 0205 UTC 22 Feb 10 and 0331 UTC 22 Feb 10.

5. MIPS operations:

The MIPS operated in a remote location away from a hotel during this IOP. All systems functioned well. The MIPS, MAX, and MISS were aligned approximately along a track between two VORs, BDF and DEC, and were involved in a coordinated flight sampling between 0100 and 0300 UTC. Otherwise, the MAX performed dual Doppler volume scans with the Lincoln radar.

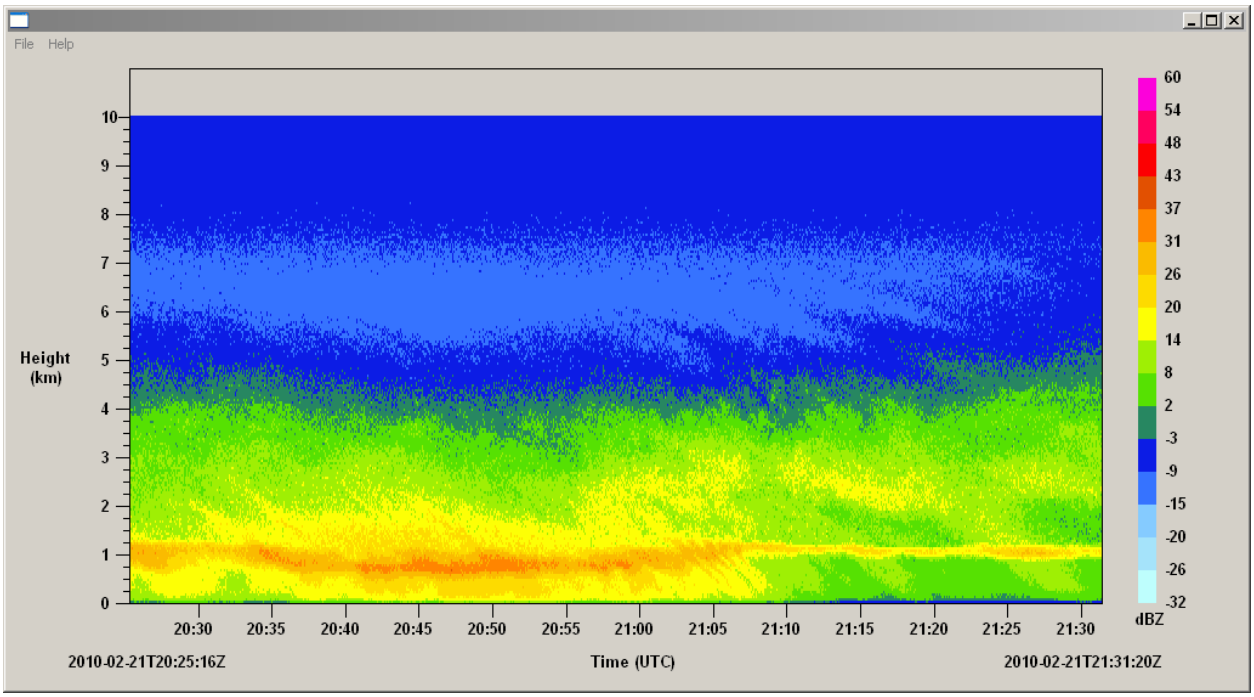


Fig. 11: MIPS XPR reflectivity from 2030 UTC to 2130 UTC on 21 Feb 10

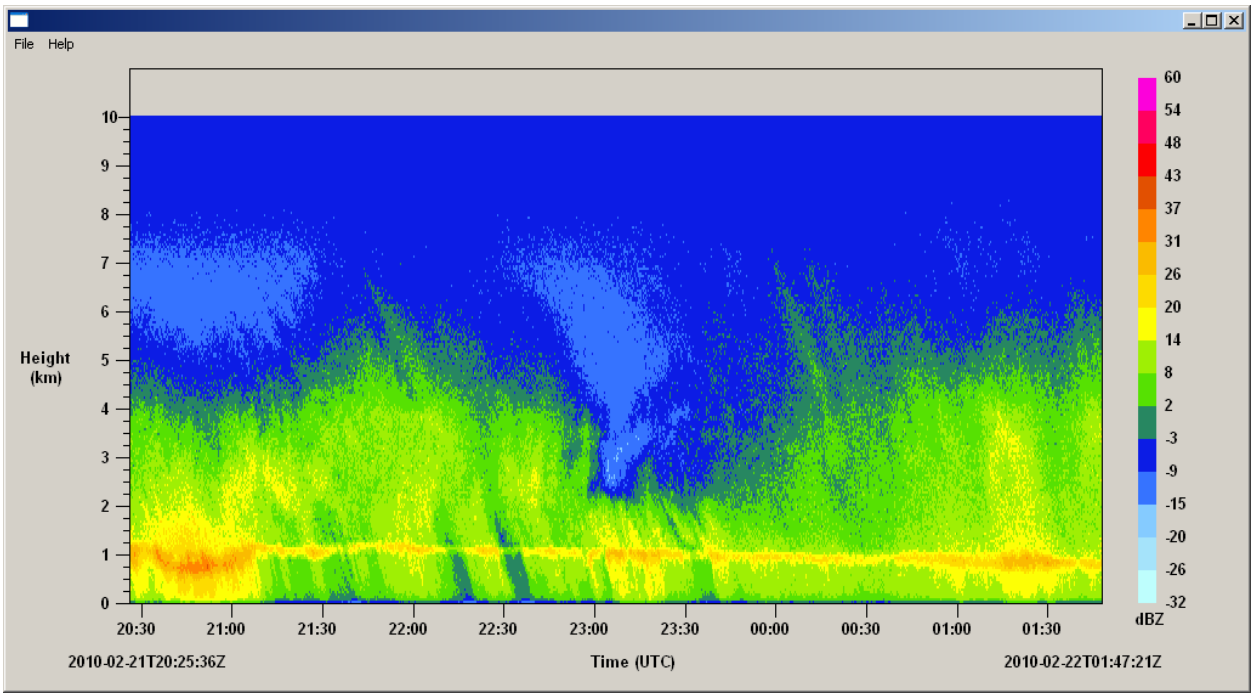


Fig. 12: MIPS XPR reflectivity from 2030 UTC 21 Feb 10 to 0140 UTC 22 Feb 10

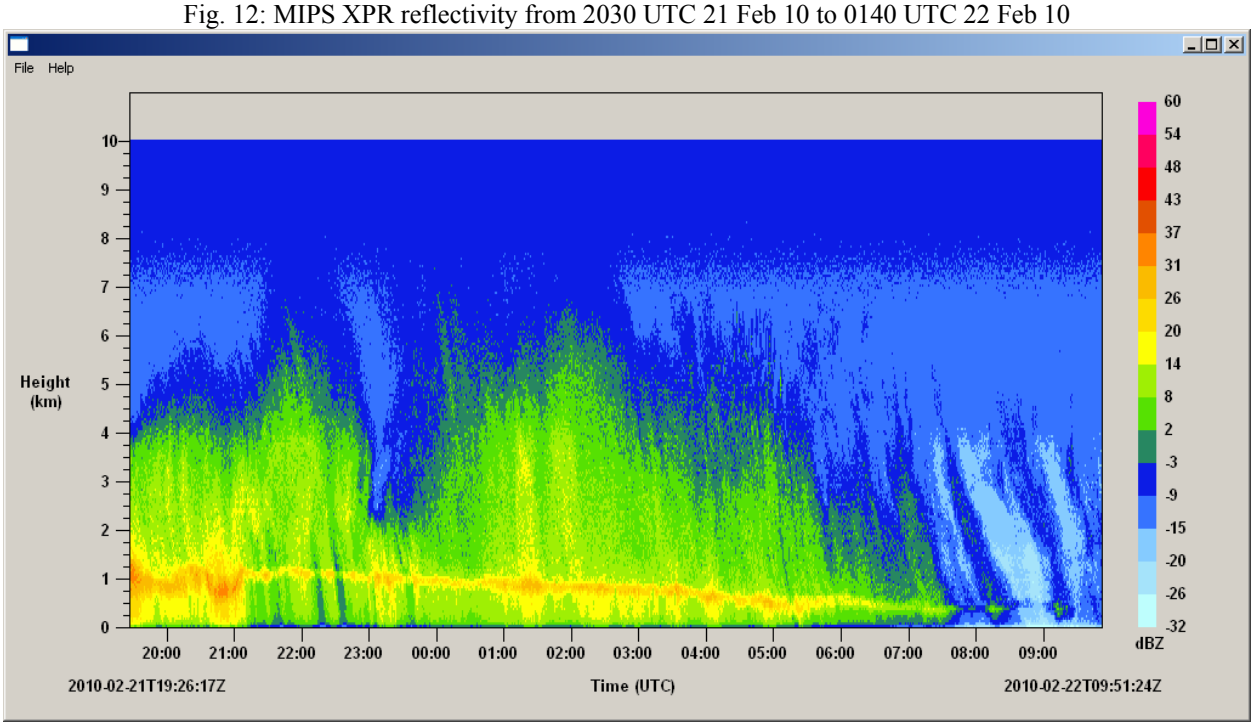


Fig. 13: MIPS XPR reflectivity from 1930 UTC on 21 Feb 10 to 1000 UTC 22 Feb 10.

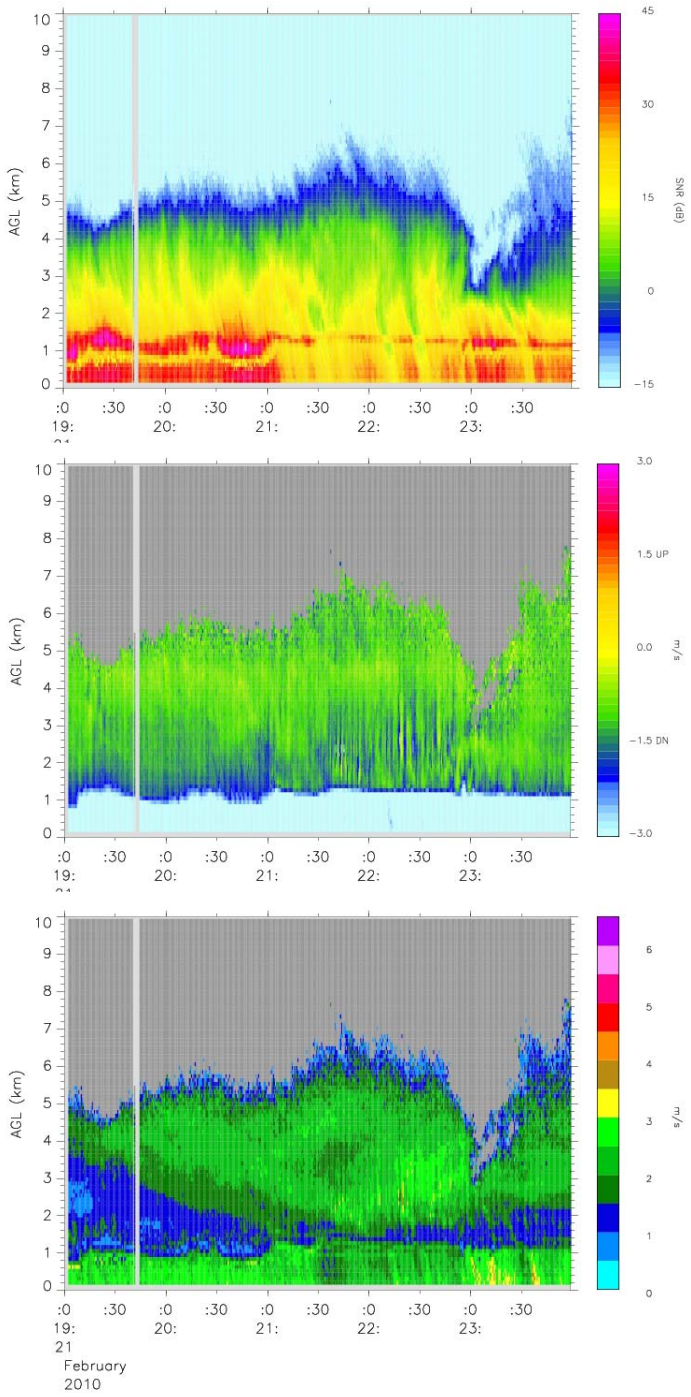


Fig. 14: MIPS 915 MHz Profiler SNR, W, and Spectral Width from 0000 UTC 21 Feb 2010 to 0000 UTC 22 Feb 2010.

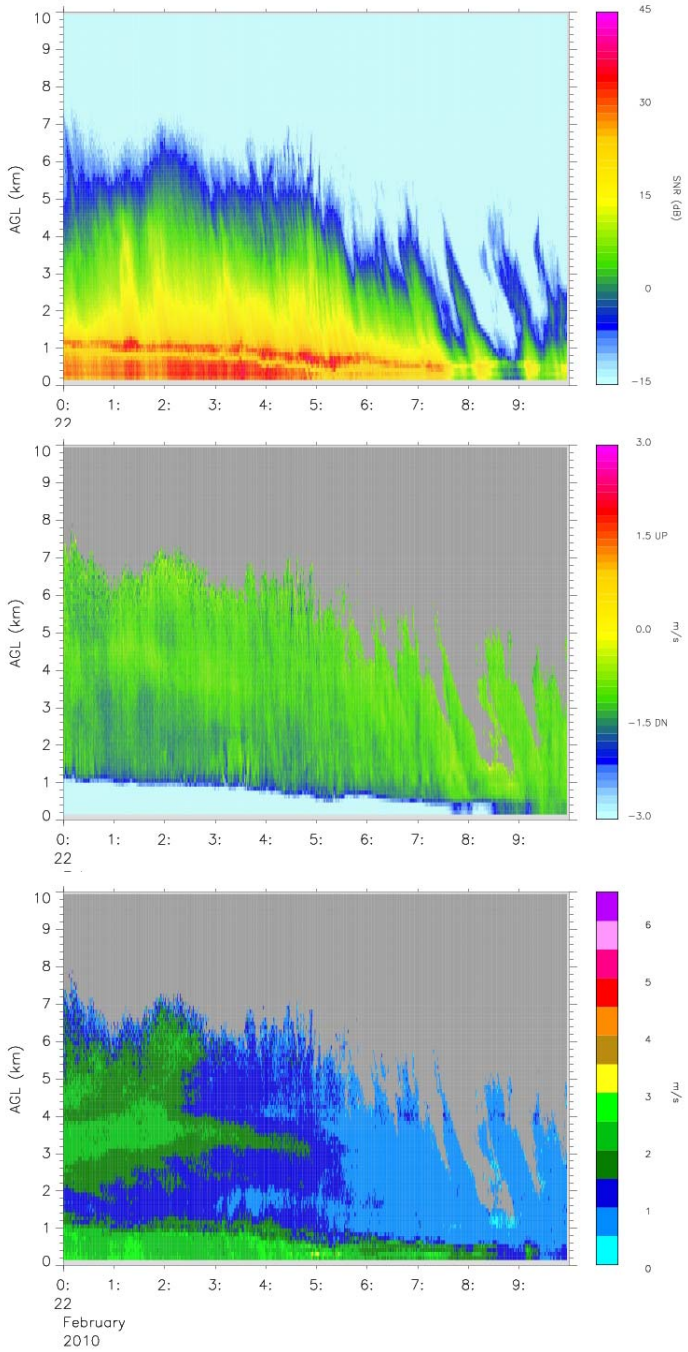


Fig. 15: MIPS 915 MHz Profiler SNR, W, and Spectral Width from 0000 UTC 21 Feb 2010 to 1000 UTC 22 Feb 2010.

6. MAX operations:

The MAX operated with no problems with the RHI scan strategy during the aircraft coordination period and using dual Doppler volume scans and RHIs during the time that the aircraft was not in the area,

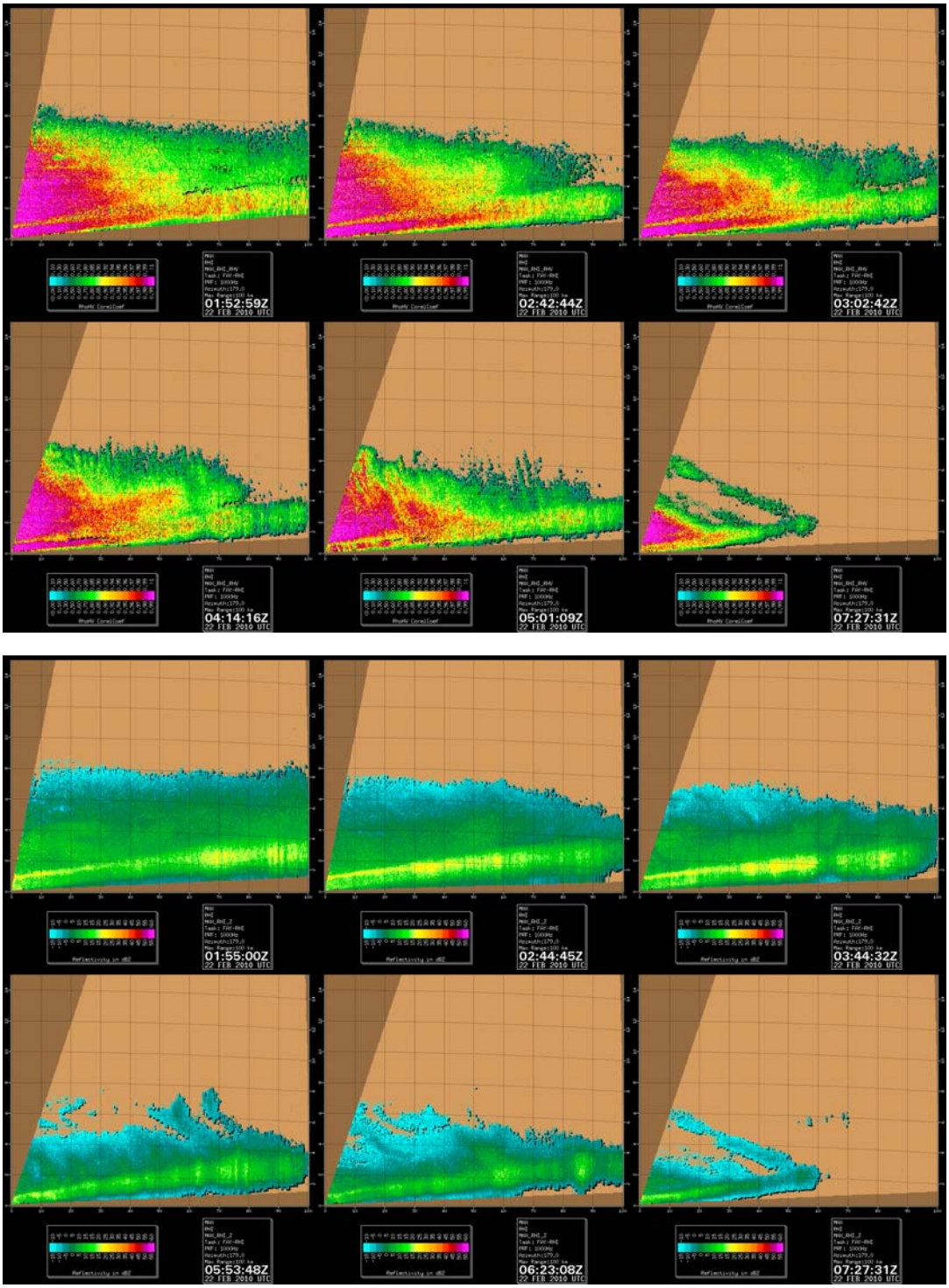


Fig. 16: Series of MAX radar RHI scans of ρ_{hv} (top) and Z_h (bottom) through the system at 179º between 0152 and 0727 UTC on 22 February 10.

7. MISS 915 MHz Profiler

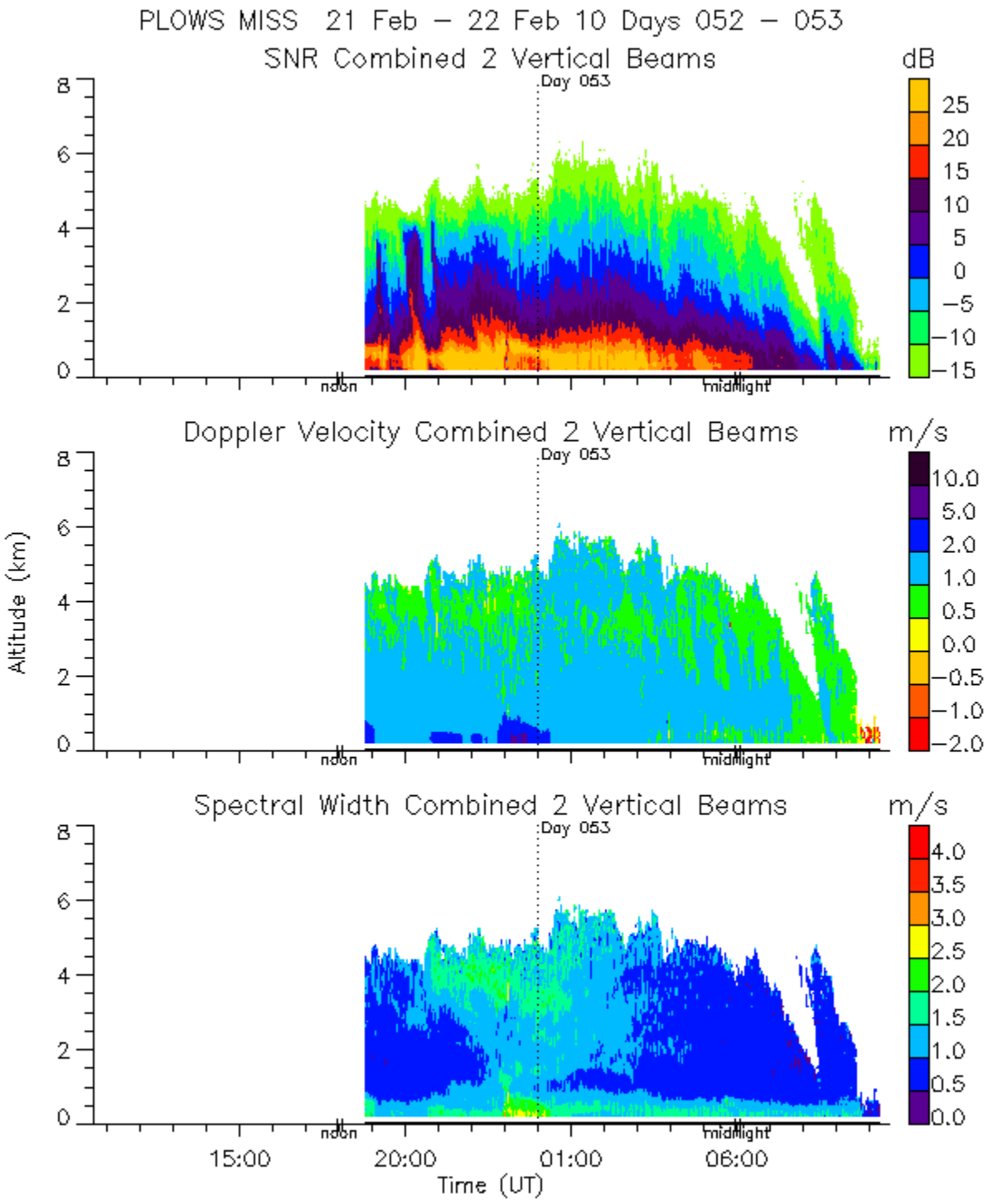


Figure 17: MISS 915 MHz Profiler SNR, W, and Spectral Width
for the period of operation 1900 UTC 21 Feb 10 through 1000 UTC 22 Feb 10

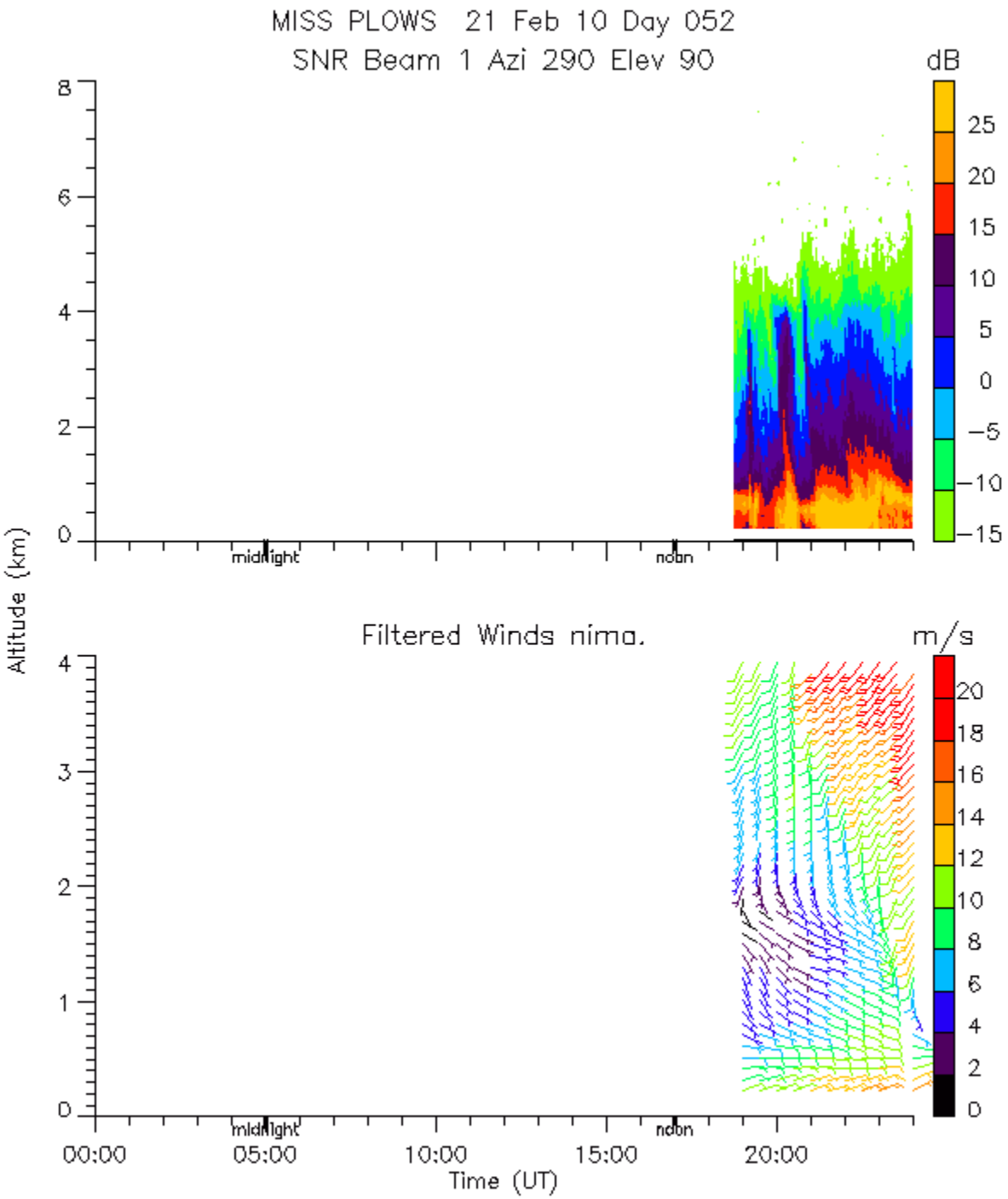


Figure 18: MISS 915 MHz Profiler SNR and winds
for the period of operation 1900 UTC 21 Feb 10 through 0000 UTC 22 Feb 10

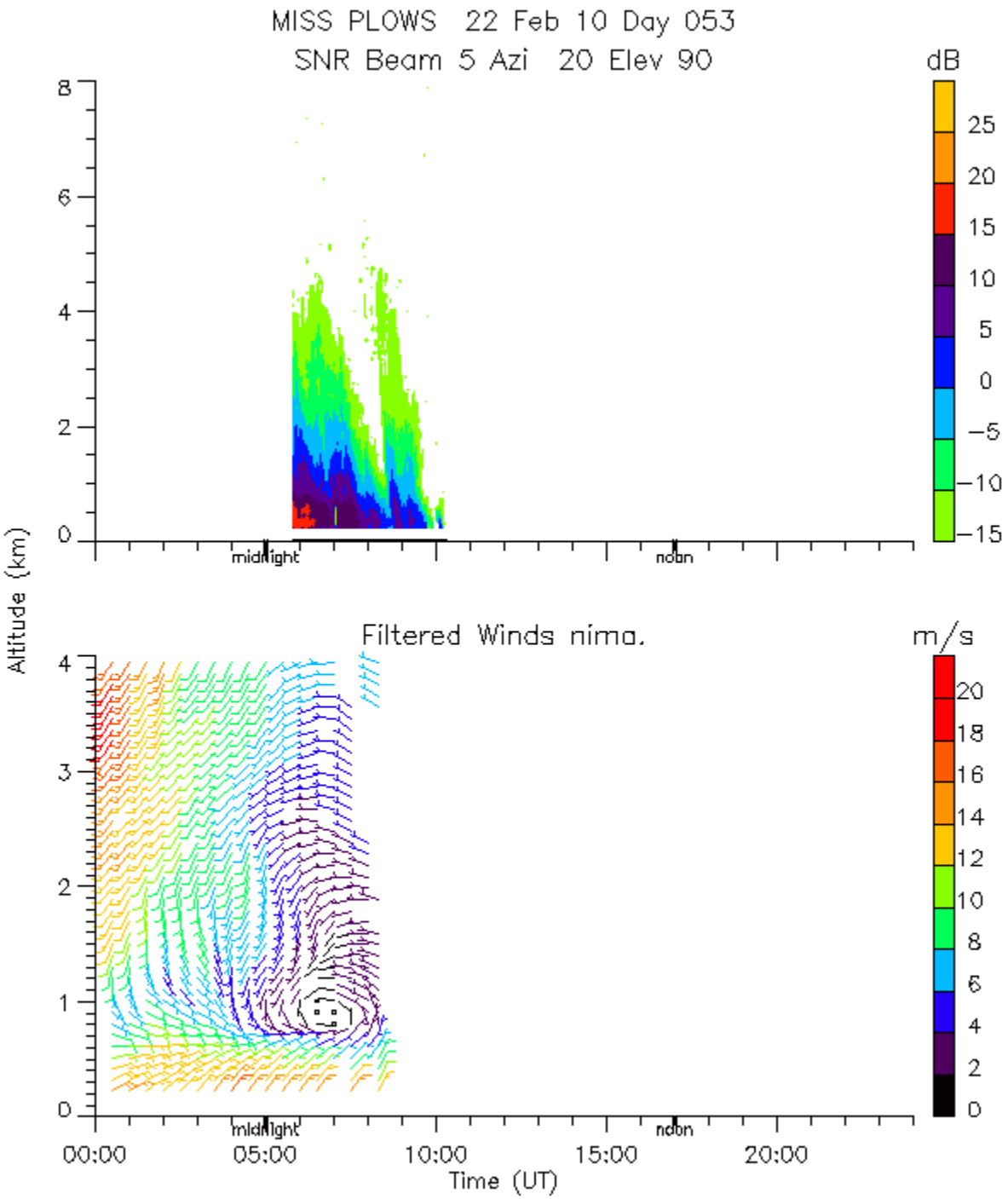


Figure 18: MISS 915 MHz Profiler SNR and winds
for the period of operation 0000 UTC 22 Feb 10 through 0800 UTC 22 Feb 10

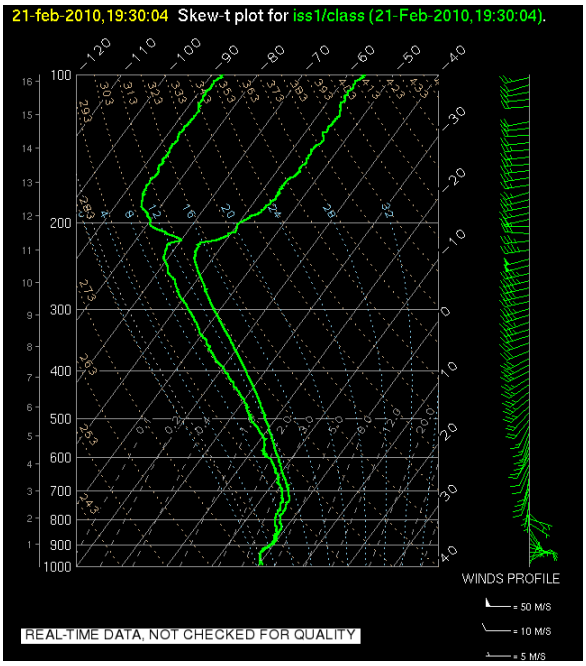
8. Rawinsondes

Rawinsondes were launched at the MISS site in Peoria, IL on a 2-3 hourly schedule. The following soundings were launched

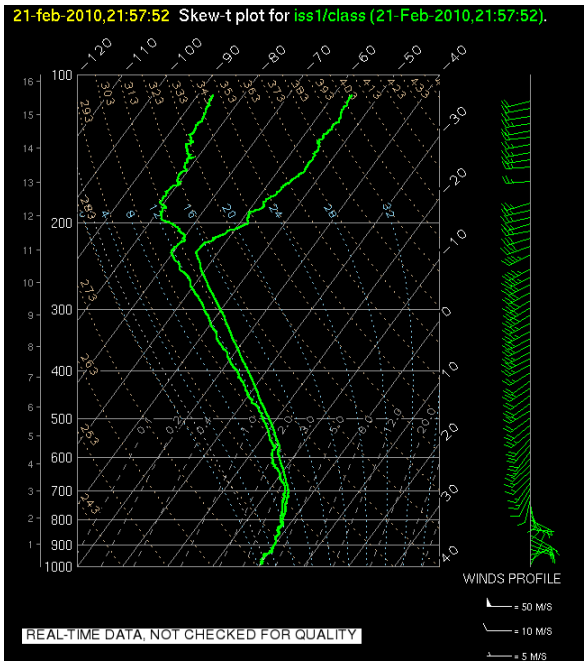
DATE	Launch	Nominal Date and time		Status
2010 02 21	**1939 UTC**	**2010 02 21**	**2000 UTC**	**Good**
2010 02 21	**2157 UTC**	**2010 02 21**	**2200 UTC**	**Good**
2010 02 21	**2326 UTC**	**2010 02 22**	**0000 UTC**	**Good**
2010 02 22	**0236 UTC**	**2010 02 22**	**0300 UTC**	**Good**
2010 02 22	**0531 UTC**	**2010 02 22**	**0600 UTC**	**Good**
2010 02 22	**0821 UTC**	**2010 02 22**	**0900 UTC**	**Good**

Rawinsondes were launched at the Missouri site in Atlanta, IL on a 3 hourly schedule. The following soundings were launched

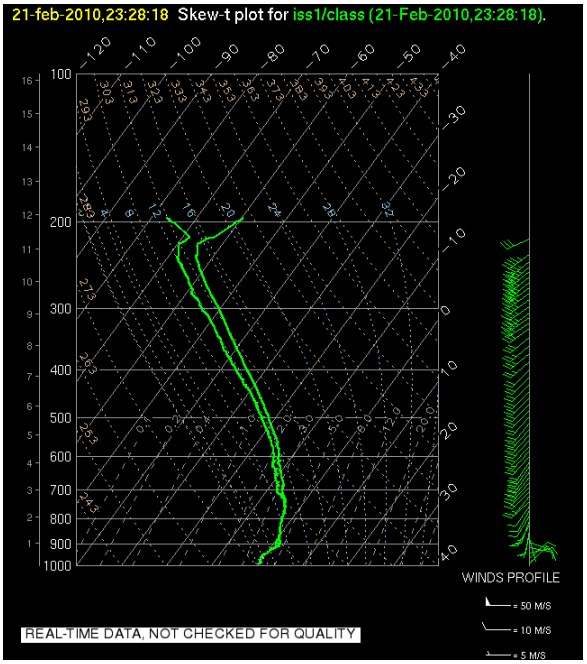
DATE	Launch	Nominal Date and time		Status
2010 02 22	**0011 UTC**	**2010 02 22**	**0030 UTC**	**Good**
2010 02 22	**0309 UTC**	**2010 02 22**	**0330 UTC**	**Good**
2010 02 22	**0608 UTC**	**2010 02 22**	**0630 UTC**	**Good**
2010 02 22	**1008 UTC**	**2010 02 22**	**1030 UTC**	**Good**



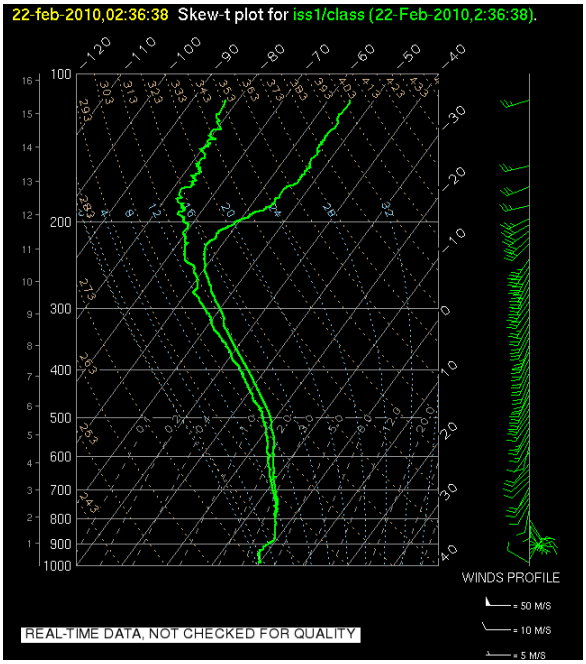
MISS Sounding 2000 UTC 214 Feb 10



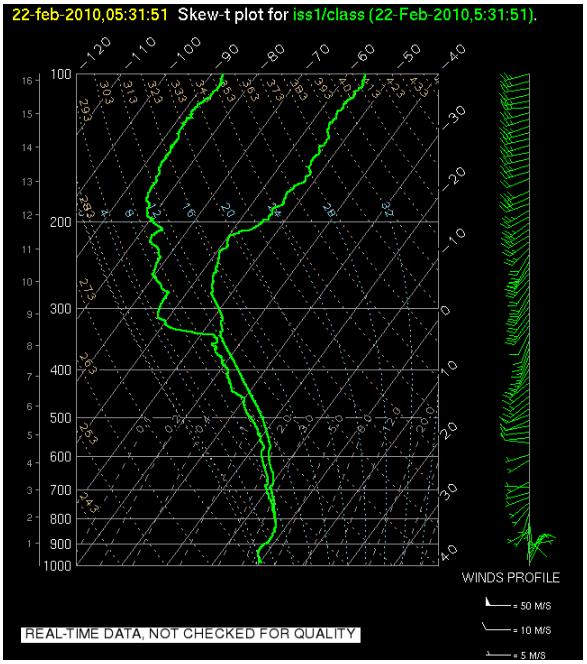
MISS Sounding 2200 UTC 21 Feb 10



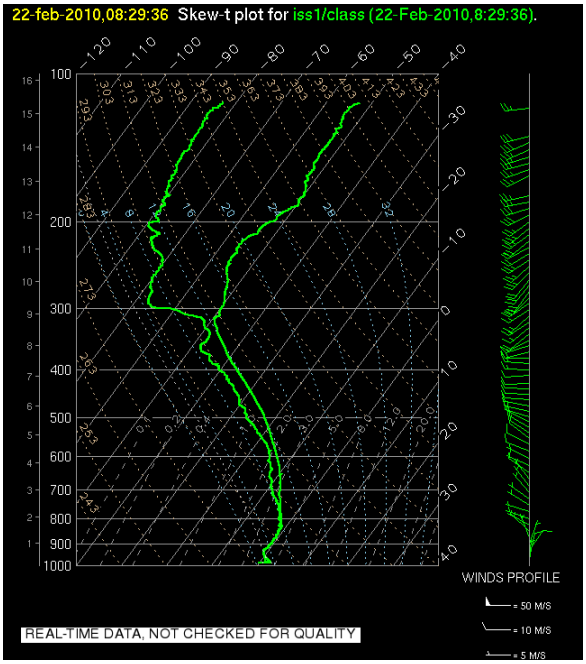
MISS Sounding 0000 UTC 22 Feb 10



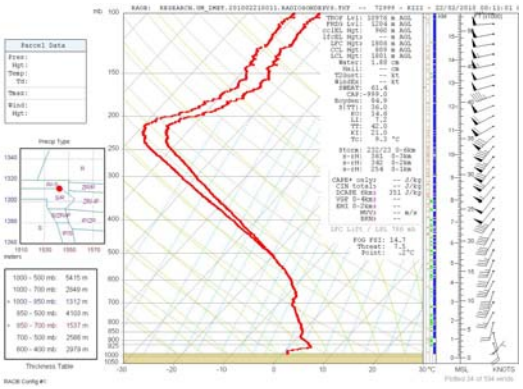
MISS Sounding 0300 UTC 15 Feb 10



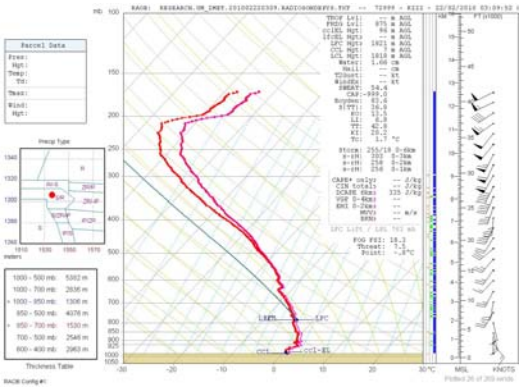
MISS Sounding 0600 UTC 22 Feb 10



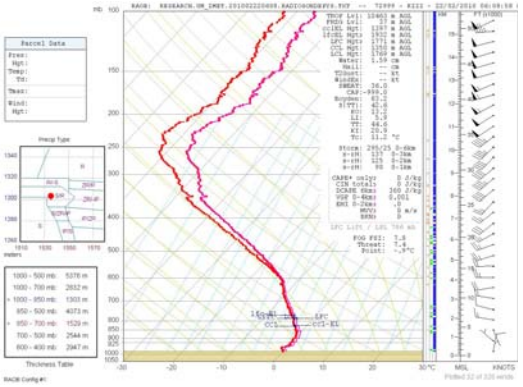
MISS Sounding 0900 UTC 22 Feb 10



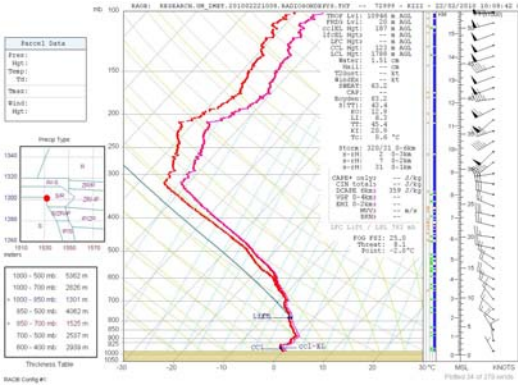
UM sounding 0030 UTC 22 Feb 2010



UM sounding 0330 UTC 22 Feb 2010



UM sounding 0630 UTC 22 Feb 2010



UM sounding 1030 UTC 22 Feb 2010