IOP-24 Summary of Operations
8 March 2010 1800 UTC – 9 March 2010 2100 UTC

Authors: Rauber, Knupp

1. Summary of storm evolution

The IOP-24 storm was associated with a negatively tilted trough that moved across the Rockies and deepened as it moved over the Plains. The aircraft sampled the early development stage of the storm around 0000 UTC 9 March, when the wrap-around region was just forming and confined to central Nebraska and South Dakota. The precipitation at this time was relatively light in the region sampled, although convective precipitation fell along the leading line to the east of the sampling area. As the trough moved eastward, the line of precipitation extending from the SE United States northwestward around the storm back to the Rockies underwent continuous deformation and became thinner and thinner. The thin band passed over central Iowa, where the ground based equipment was sited, between 1000 UTC 9 March and 1600 UTC 9 March. Unfortunately, the MAX radar developed a leak in the waveguide system, and was down during the band passage. After the narrow band passed, no further precipitation fell during operations. A second flight was attempted, but mechanical problems (a flat tire) grounded the plane. Since precipitation was no longer falling at the ground sites, and the aircraft was grounded, we decided to end the IOP and with it, the PLOWS field phase.

2. Locations of instrumentation platforms

MIPS Location:	41° 57' 0.67"N 93° 21' 12.84"W
Profiler Time of Operation MIPS:	03/9/10 0400 UTC to 03/9/10 1800 UTC
MAX Location:	42° 4' 7.41"N 93° 31' 17.11"W
Radar Time of Operation MAX:	03/9/10 0540-0820 UTC and 03/9/10 1400-1600 UTC
MISS Location:	42° 11' 0.11"N 93° 34' 27.54"W
Profiler Time of Operation	03/09/10 0500 UTC to 03/09/10 1900 UTC
MO Location:	Not used
RF-18 Flight operations:	03/08/10 2040 UTC to 03/09/10 0428 UTC

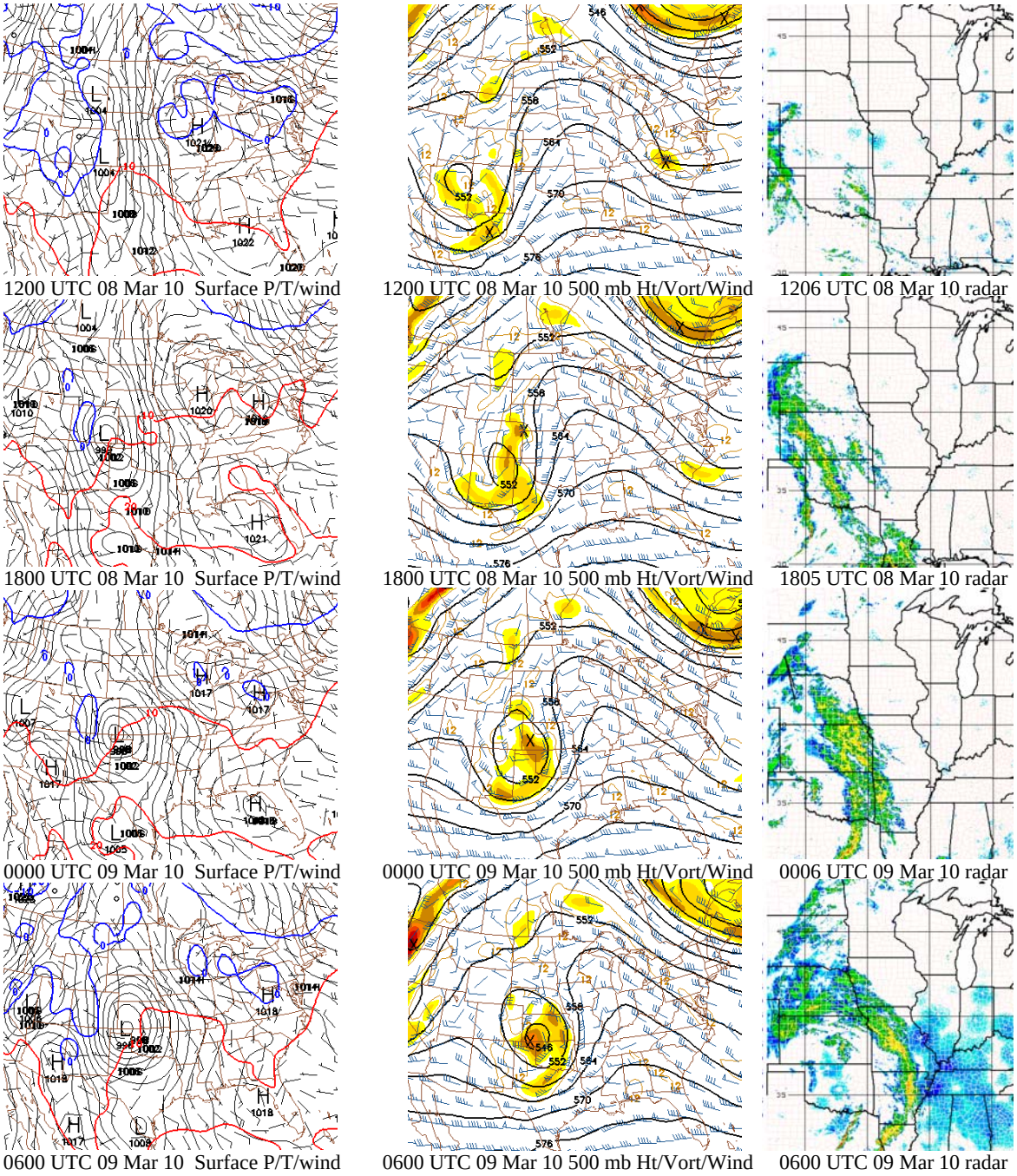
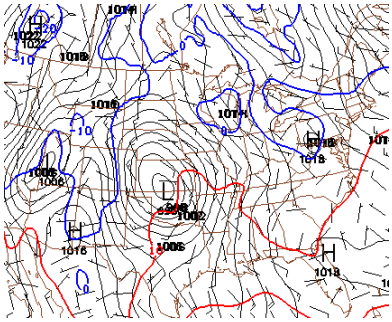
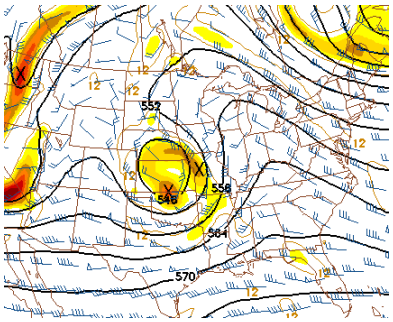


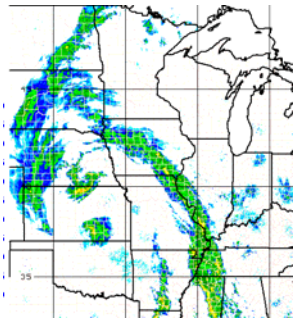
Figure 1: Early evolution of the IOP-24 storm at the surface, 500 mb, and radar echoes from 1200 UTC 08 Mar 10 through 0600 UTC 09 Mar 10.



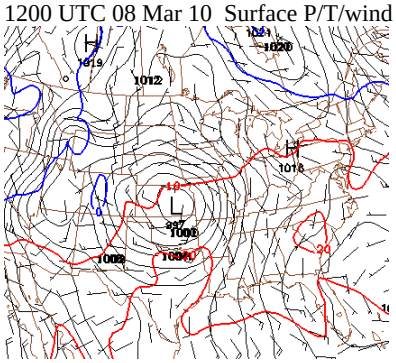
1200 UTC 08 Mar 10 Surface P/T/wind



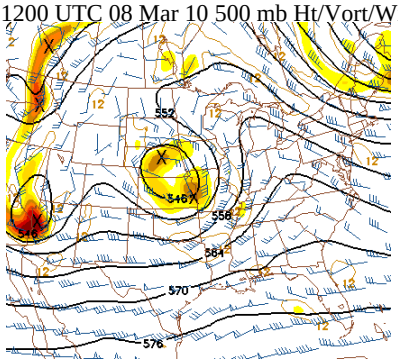
1200 UTC 08 Mar 10 500 mb Ht/Vort/Wind



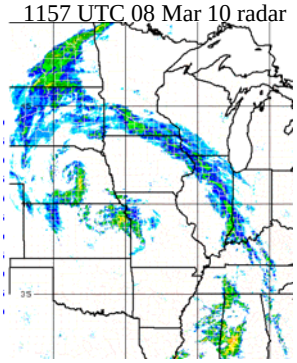
1157 UTC 08 Mar 10 radar



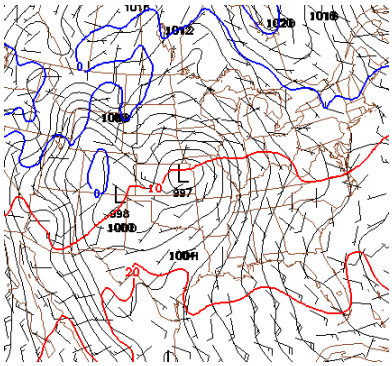
1800 UTC 08 Mar 10 Surface P/T/wind



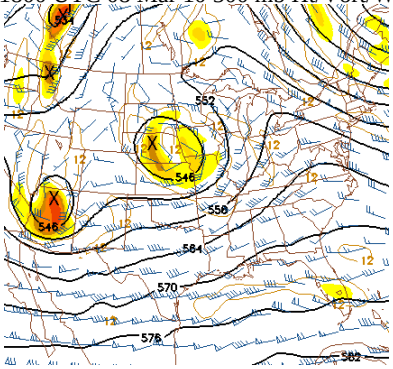
1800 UTC 08 Mar 10 500 mb Ht/Vort/Wind



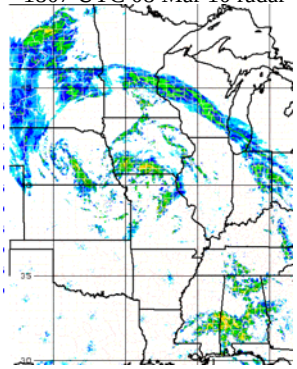
1807 UTC 08 Mar 10 radar



0000 UTC 09 Mar 10 Surface P/T/wind



0000 UTC 09 Mar 10 500 mb Ht/Vort/Wind



0000 UTC 09 Mar 10 radar

Figure 2: Evolution of the IOP-24 storm at the surface, 500 mb, and radar echoes from 1200 UTC 09 Mar 10 through 0000 UTC 10 Mar 10.

3. Precipitation over research area

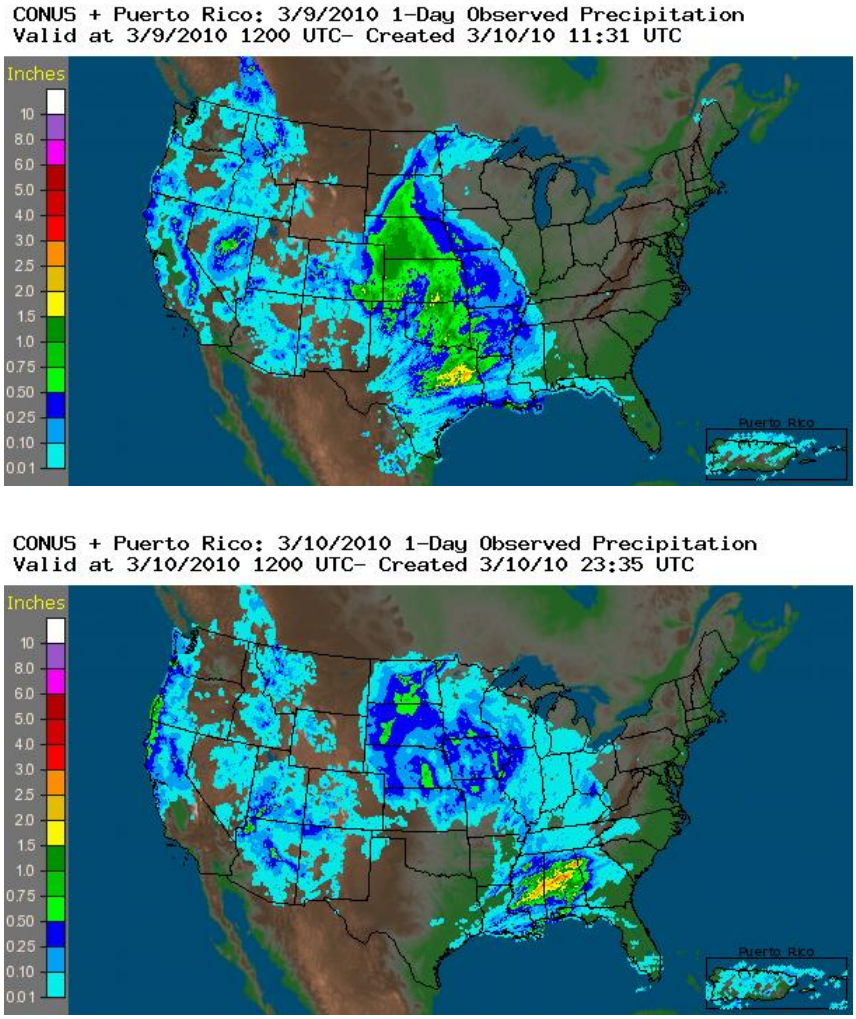


Fig. 3: 24 Hour precipitation ending at 1200 UTC 03/09/10 and 03/10/10 over the United States

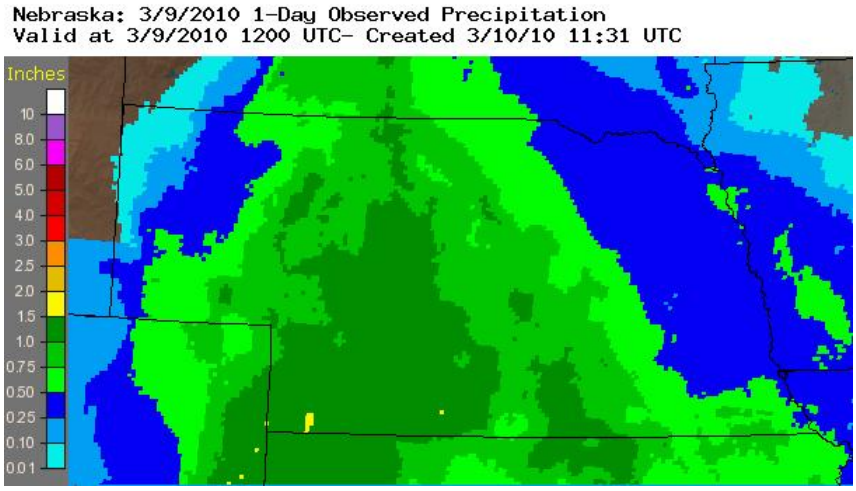


Fig. 4: 24 Hour precipitation ending at 1200 UTC 03/09/10 over Nebraska

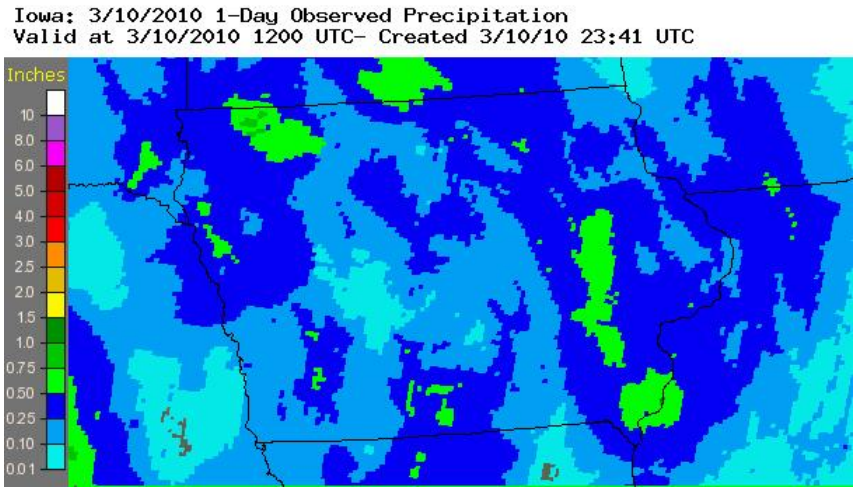


Fig. 5: 24 Hour precipitation ending at 1200 UTC 03/10/10 over Iowa

4. Flight Summary

C-130 Flight RF-18

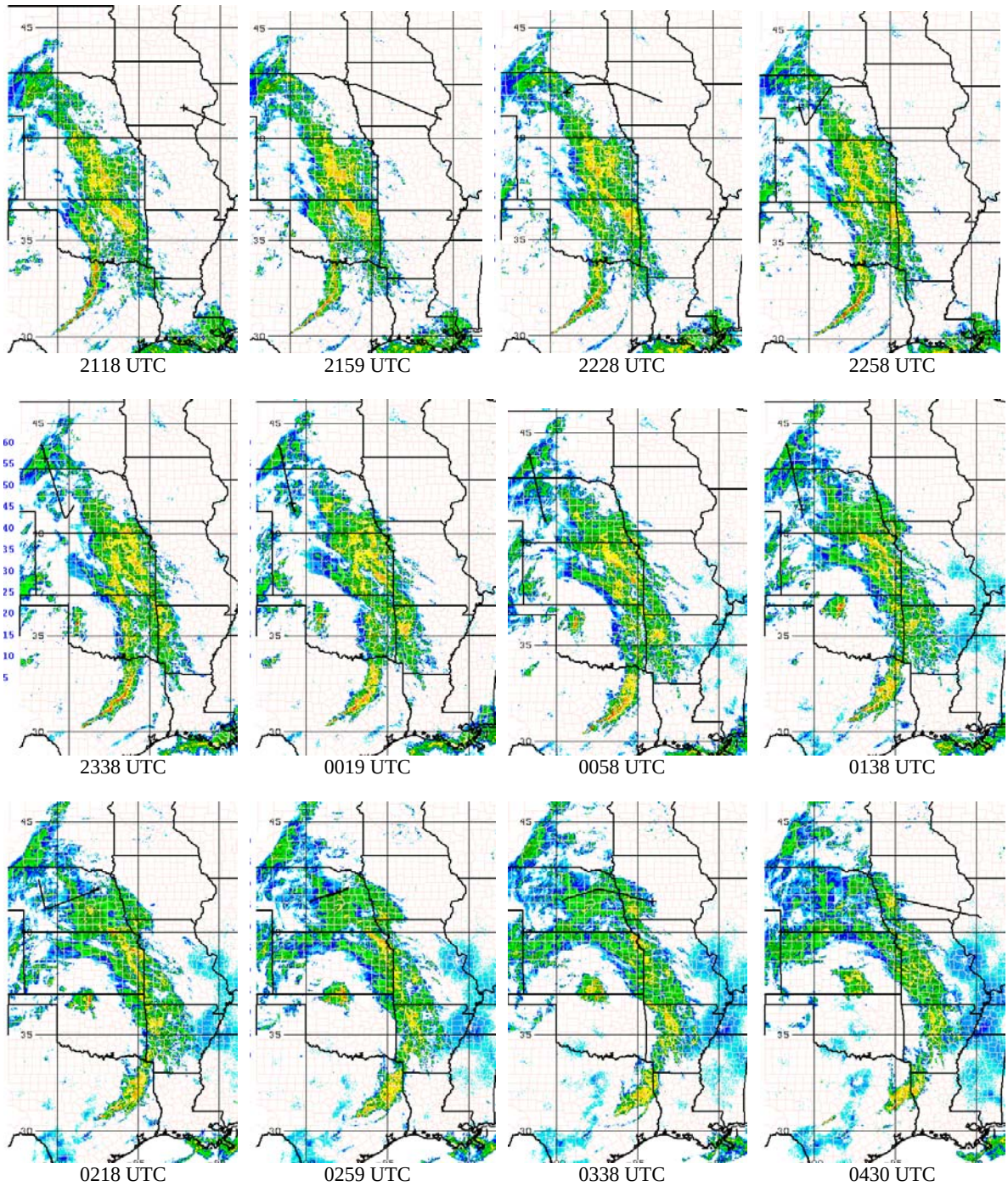
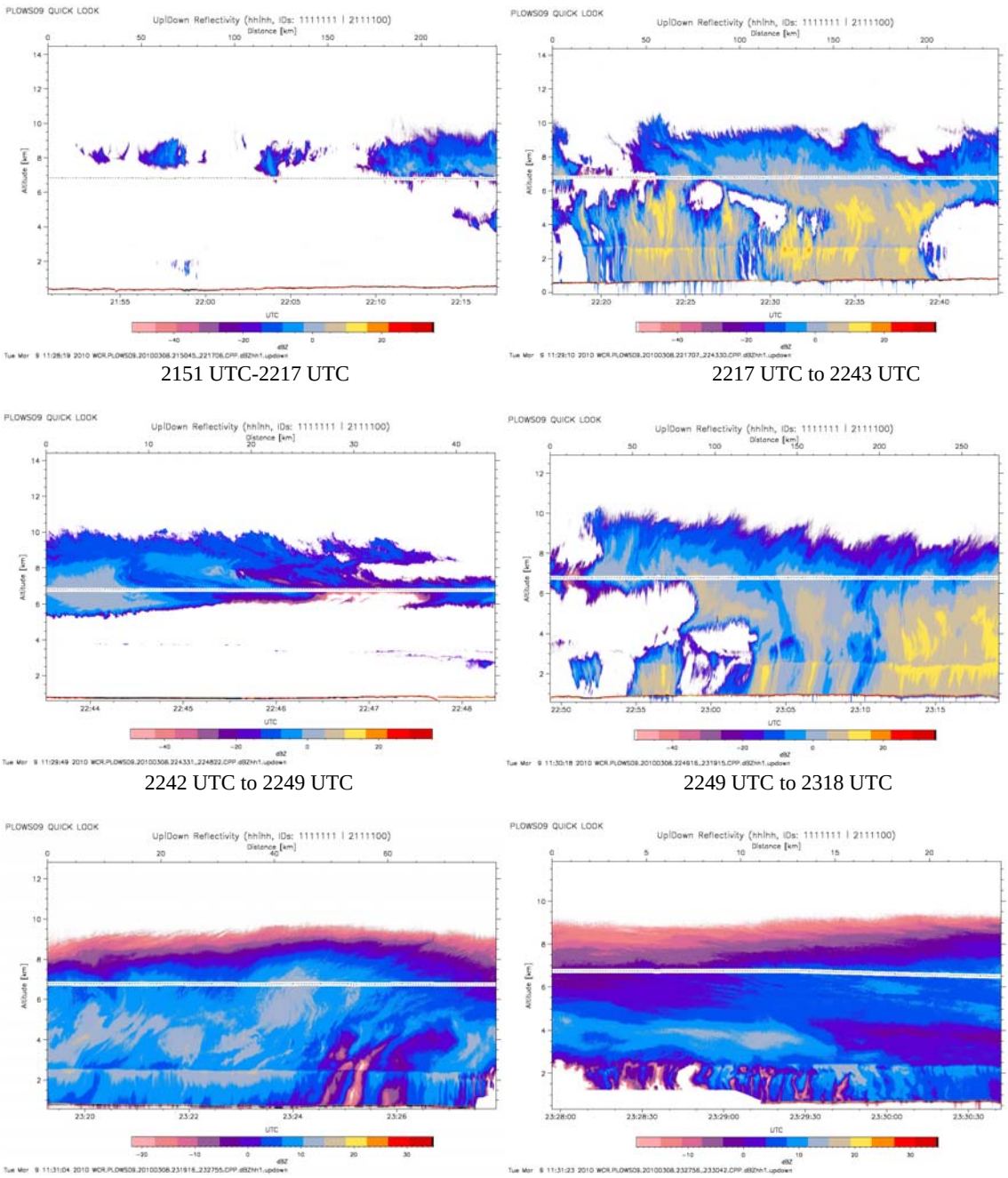


Figure 6: C-130 flight track overlaid on radar composites from 2118 UTC 8 Mar 10 through 0430 UTC 9 Mar 10. Times shown are the times of the radar composites. The flight track for the period just before the composite is shown.



2151 UTC-2217 UTC

2217 UTC to 2243 UTC

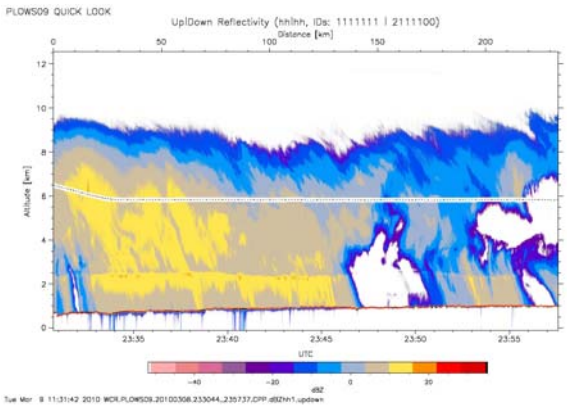
2242 UTC to 2249 UTC

2249 UTC to 2318 UTC

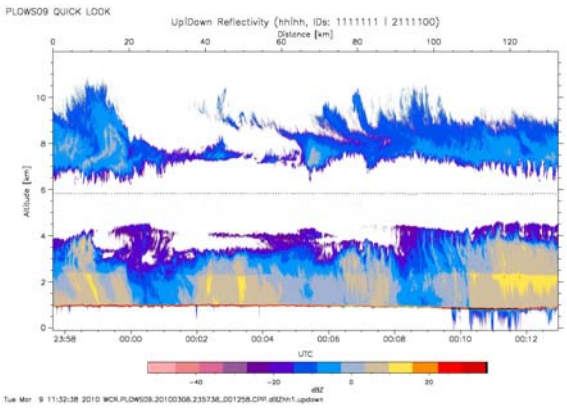
2318 UTC to 2338 UTC

2338 UTC to 2331 UTC

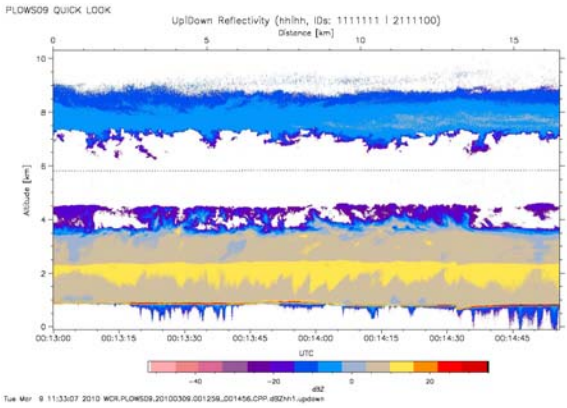
Fig. 7: Wyoming Cloud Radar Quicklook of radar reflectivity between 2151 UTC 8 Mar 10 and 2331 UTC 8 Mar 10.



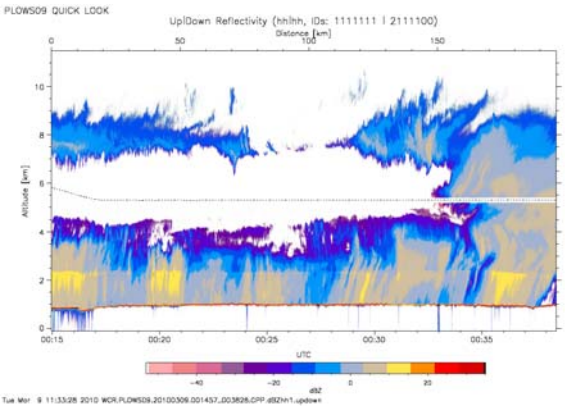
2331 UTC to 2358 UTC



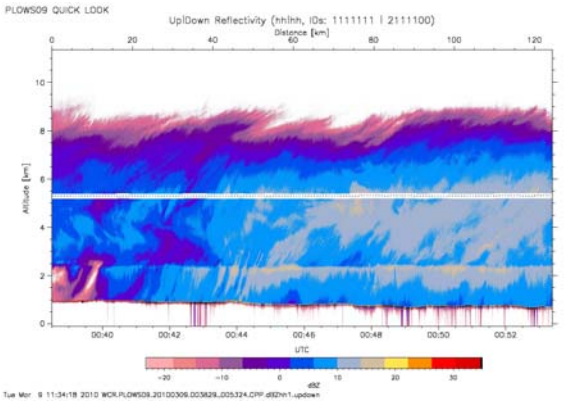
2358 UTC to 0013 UTC



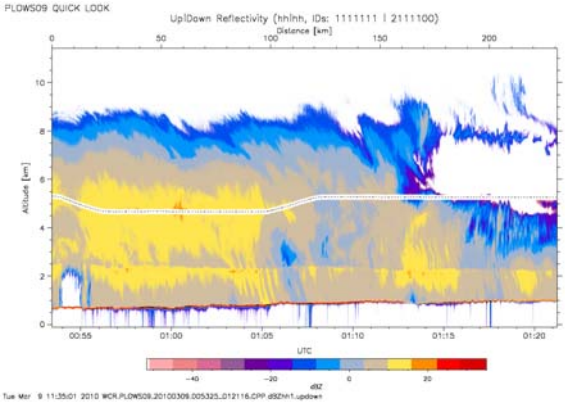
0013 UTC to 0015 UTC



0015 UTC to 0033 UTC

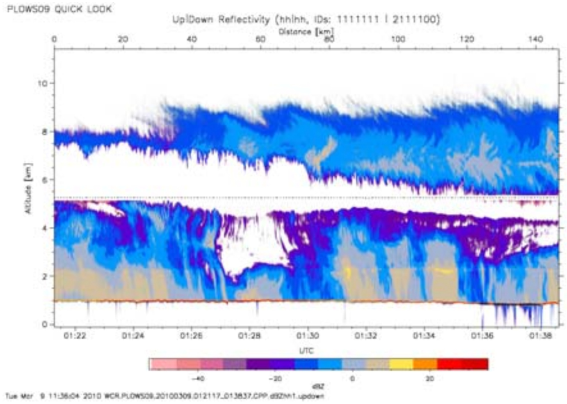


0037 UTC to 0053 UTC

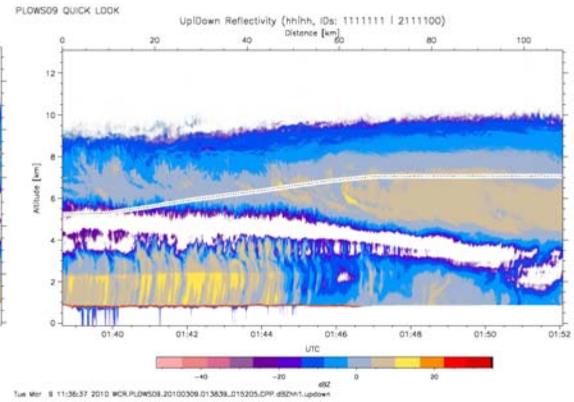


0053 UTC to 0121 UTC

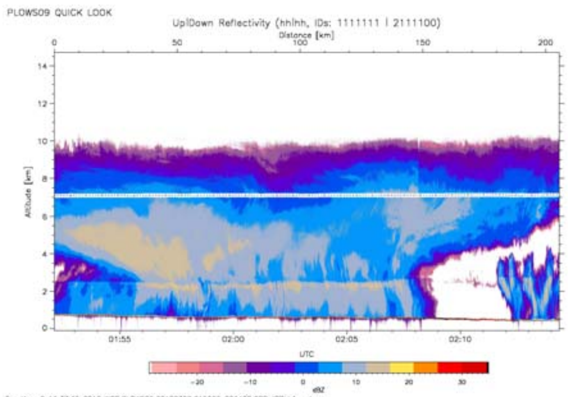
Fig. 8: Wyoming Cloud Radar Quick Look of radar reflectivity between 2331 UTC 8 Mar 10 and 0121 UTC 9 Mar 10.



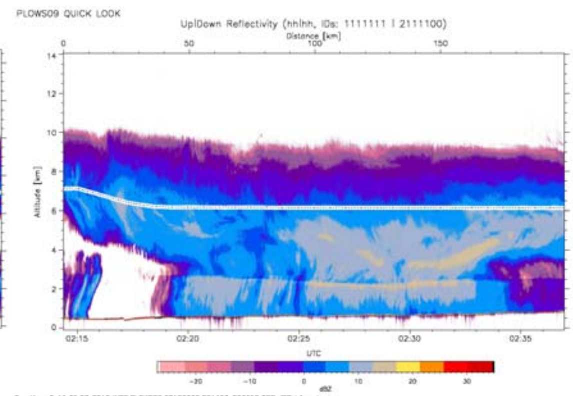
0121 UTC to 0139 UTC



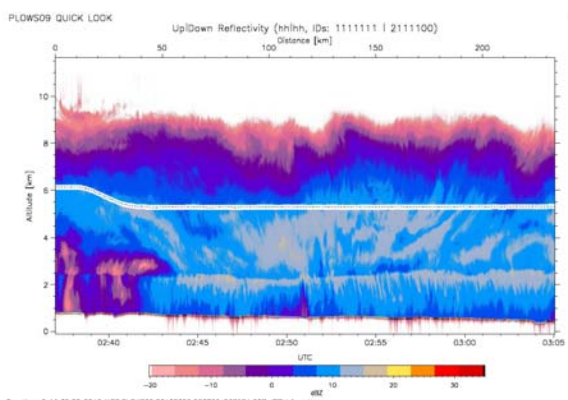
0137 UTC to 0152 UTC



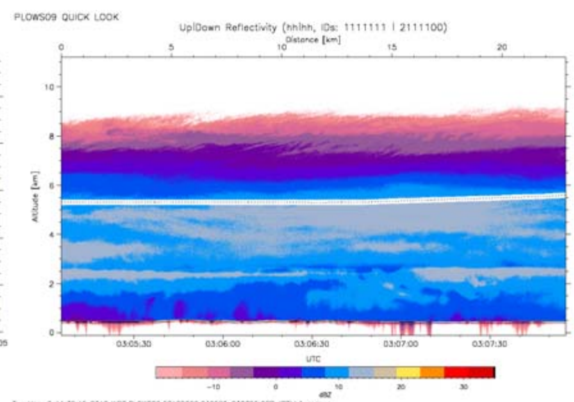
0152 UTC to 0214 UTC



0214 UTC to 0237 UTC

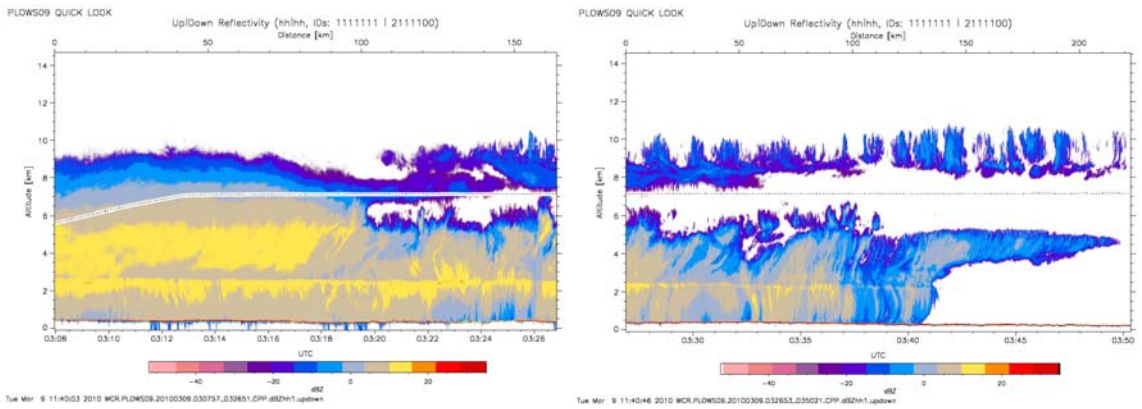


0237 UTC – 0305 UTC



0305 UTC to 0308 UTC

Fig. 9 Wyoming Cloud Radar Quick Look of radar reflectivity between 0121 UTC 9 Mar 10 and 0308 UTC 9 Mar 10.



0308 UTC to 0329 UTC

0326 UTC to 0350 UTC

Fig. 10: Wyoming Cloud Radar Quick Look of radar reflectivity between 0308 UTC 9 Mar 10 and 0350 UTC 9 Mar 10.

5. MIPS operations

The MIPS operated at a remote site near Ames, IA. During operations, a single narrow band of precipitation passed over the site between 1000 UTC and 1800 UTC with all precipitation falling as rain. No coordination with aircraft was done on this IOP. All other systems were functioning.

6. MAX operations

The MAX radar was discovered to have a waveguide leak upon setup. By the time the repair was completed, the narrow band has passed the site. No usable data was collected as a result.

7. MISS 915 MHz Profiler

The MISS profiler was located at the Story City Factory Outlet (next to the Comfort Inn) in Story City, Iowa. During the period of operation, a single narrow band passed over the profiler between 1030 and 1530 UTC on 9 March. No problems were noted with the system.

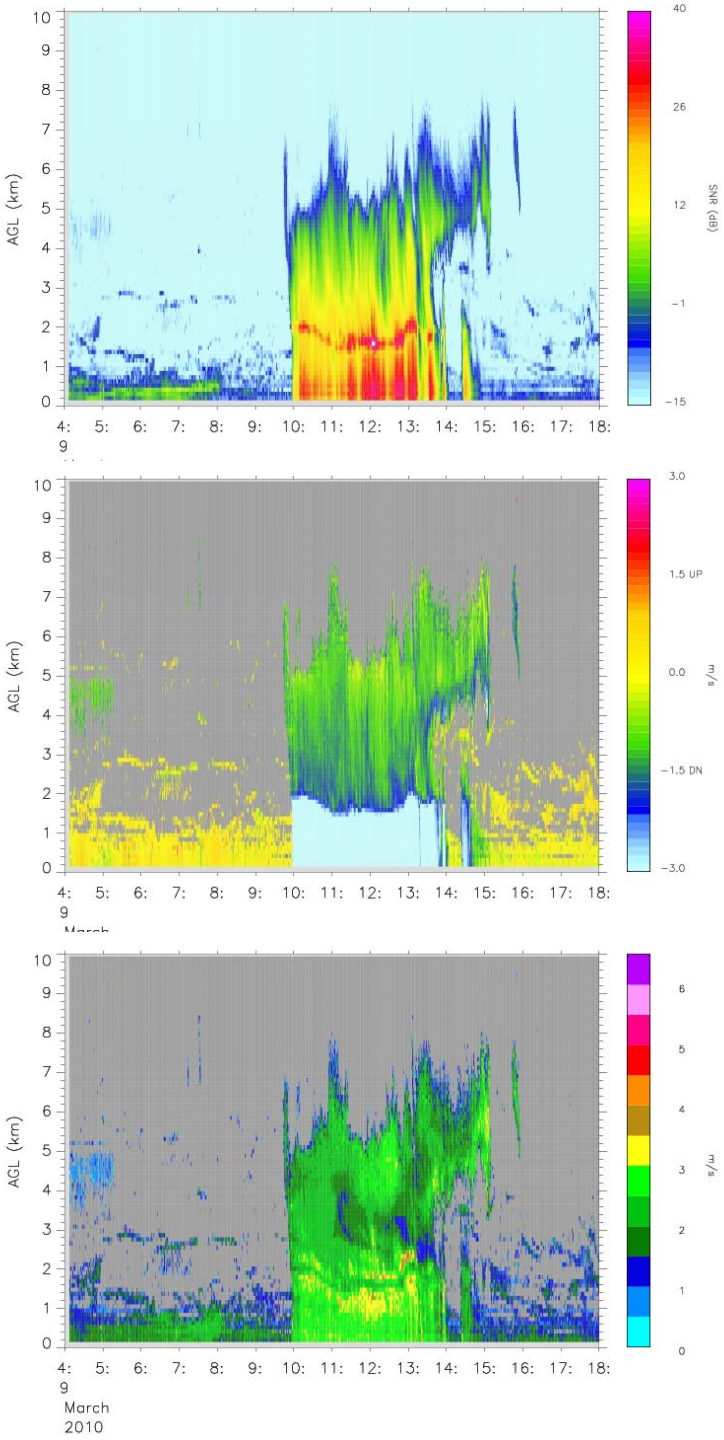


Figure 11: MIPS 915 MhZ Profiler SNR (top), Radial Velocity (center) and Spectral Width (bottom) for the period 0400 UTC 9 Mar 10-1800 UTC 9 Mar 10.

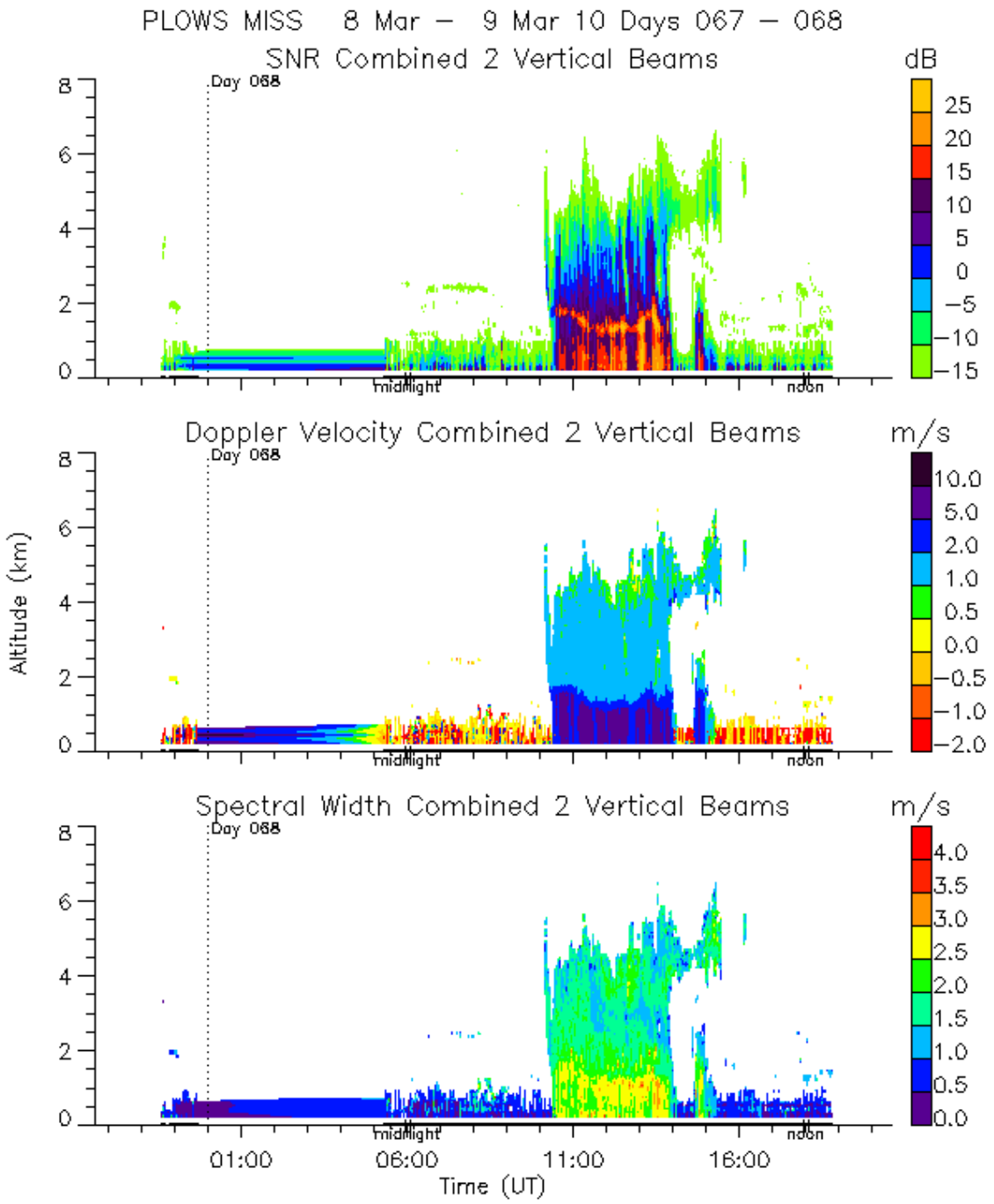


Figure 15: MISS 915 MHz Profiler SNR (top), Radial Velocity (center) and Spectral Width (bottom) for the period 2300 UTC 8 Mar 10 through 1900 UTC 9 Mar 10

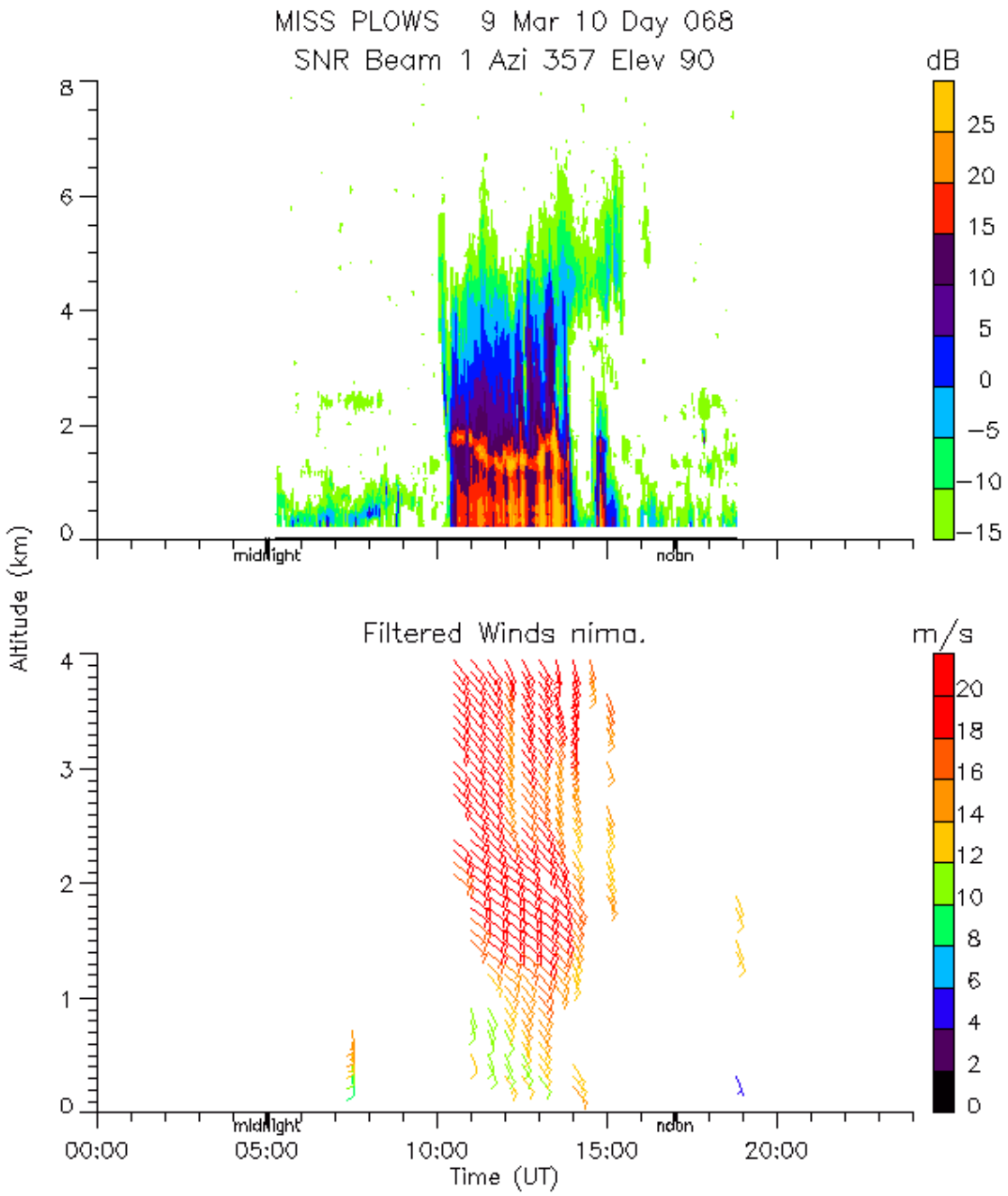


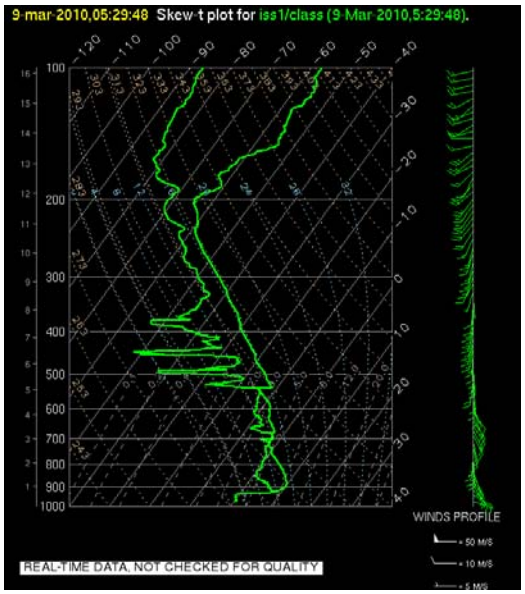
Figure 16: MISS 915 MHz Profiler SNR (top), and winds (bottom)
for the period 0000 UTC 9 Mar 10 through 0000 UTC 10 Mar 10

8. Rawinsondes

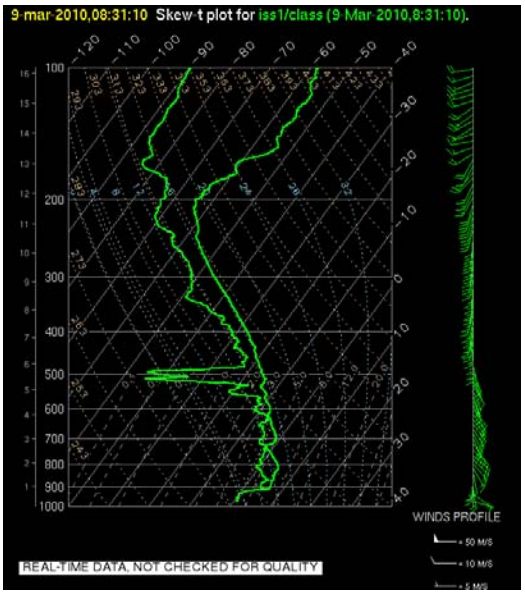
Rawinsondes were launched at the MISS site on a two hourly schedule. The following soundings were launched

DATE	Launch	Nominal Date and time		Status
2010 03 09	**0529 UTC**	**2010 03 09**	**0600 UTC**	**Good**
2010 03 09	**0831 UTC**	**2010 03 09**	**0900 UTC**	**Good**
2010 03 09	**1132 UTC**	**2010 03 09**	**1200 UTC**	**Good**
2010 03 09	**1429 UTC**	**2010 03 09**	**1500 UTC**	**Good**
2010 03 09	**1727 UTC**	**2010 03 09**	**1800 UTC**	**Good**

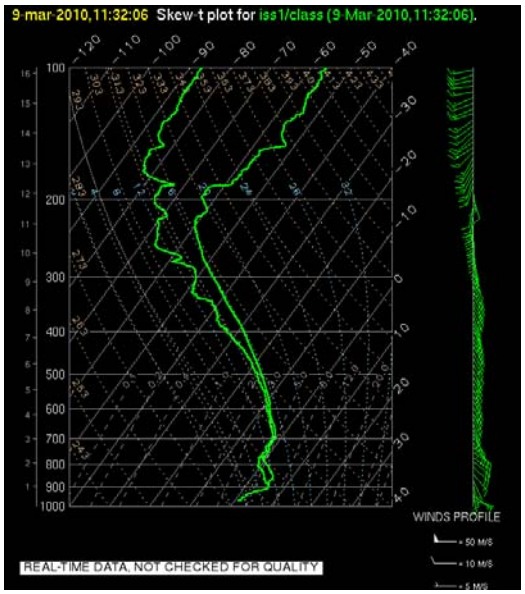
Rawinsondes were not launched by the University of Missouri



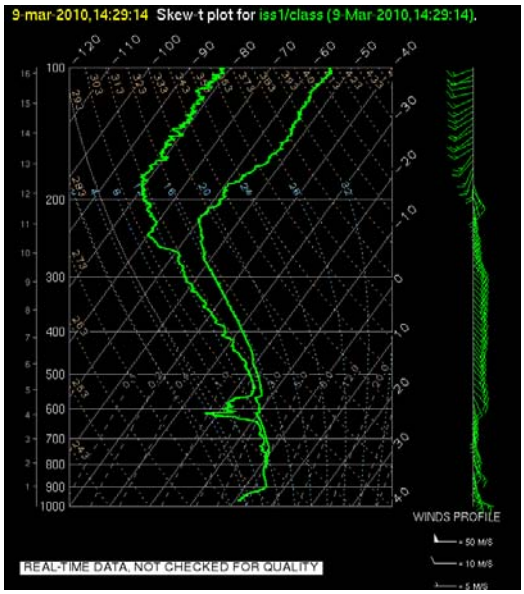
MISS Sounding 0600 UTC 9 Mar 10



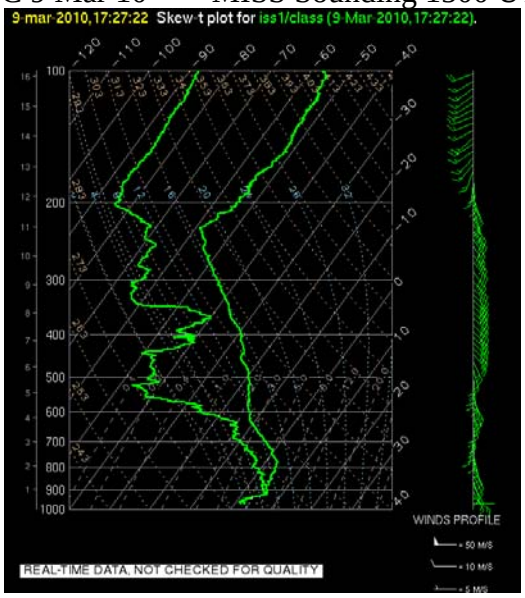
MISS Sounding 0900 UTC 9 Mar 10



MISS Sounding 1200 UTC 9 Mar 10



MISS Sounding 1500 UTC 9 Mar 10



MISS Sounding 1800 UTC 9 Mar 10