

IOP-12 Summary of Operations
18 December 2009, 0000 UTC – 19 December 2009 0000 UTC

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1. Summary of storm evolution

The IOP-12 storm developed over the Gulf of Mexico three days after the primary PLOWS Fall 09 deployment ended. Since the MIPS was located in Huntsville, AL, and the Huntsville ARMOR radar were available to collect data on the storm, the decision was made to operate these systems during the cyclone passage. The cyclone developed in association with a jetstreak in the subtropical jetstream. The low pressure center initially developed over the Southwestern Gulf and propagated northward toward the U.S. coastline, making landfall near Panama City, FL. During the approach of the storm, a wide shield of precipitation in the wrap-around part of the storm moved directly over Huntsville. The storm eventually propagated northeastward, becoming a major northeast snowstorm that caused significant problems along the U.S. East Coast

2. Locations of instrumentation platforms

MIPS Location:	34°43'27.71"N, 86°38'46.88"W
Profiler Time of Operation MIPS:	continuous during the event
Armor radar location	34°38'46.12"N, 86°46'17.12"W
Armor radar time of Operation	Continuous during the event
MAX Location:	Not used
MISS Location:	Not used
MO Location:	Not used
Flight operations:	No flight

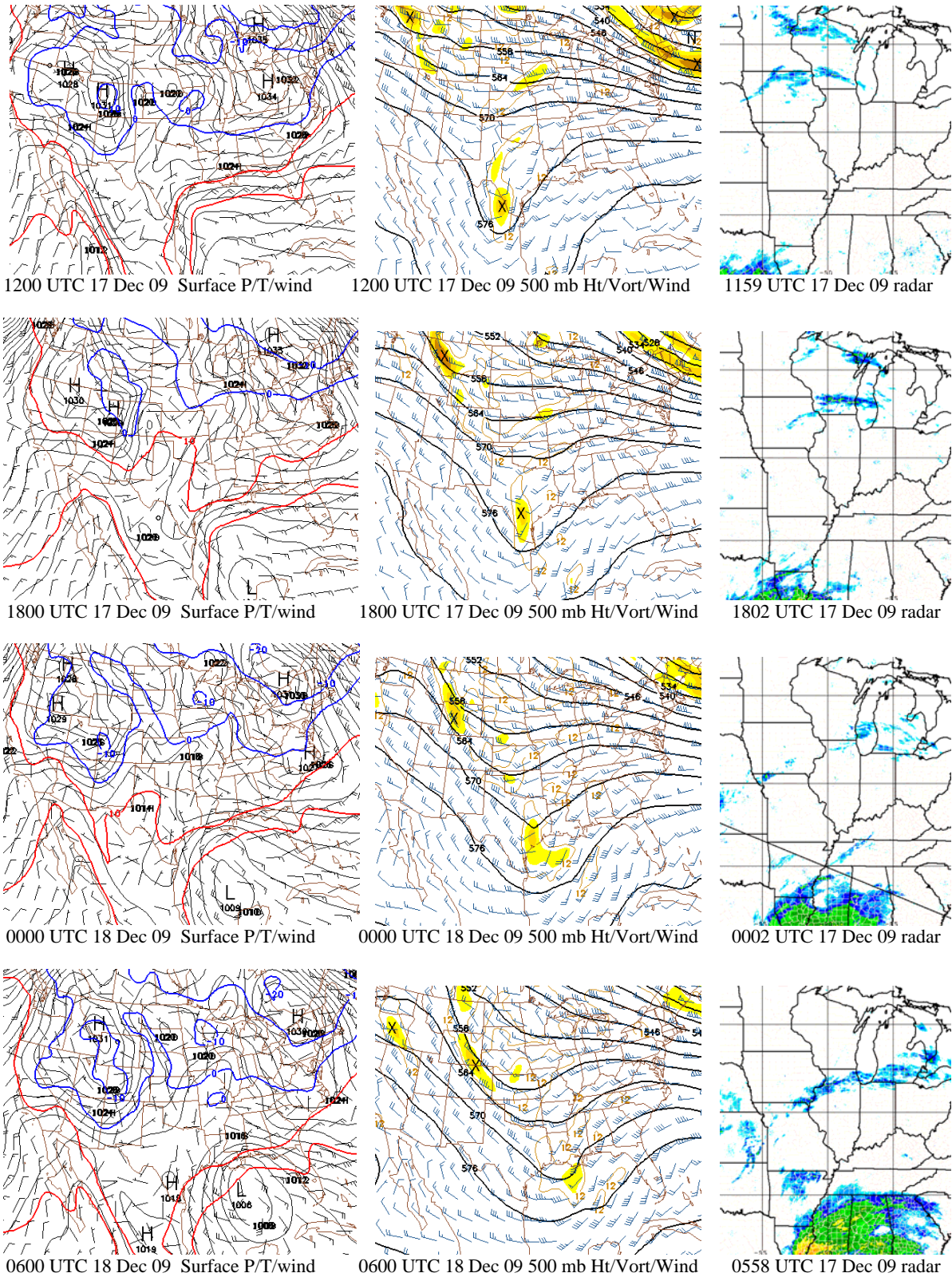
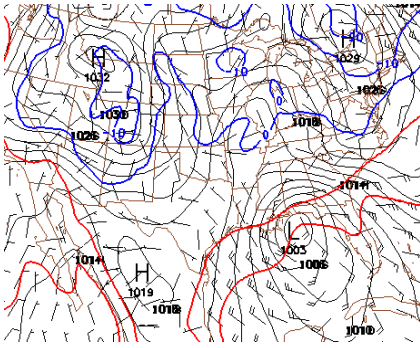
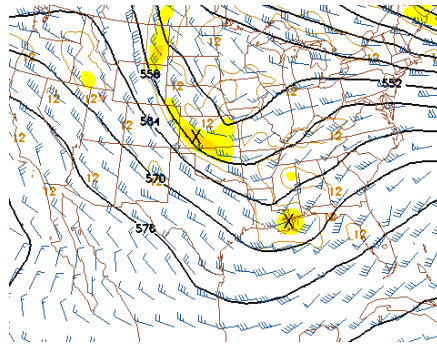


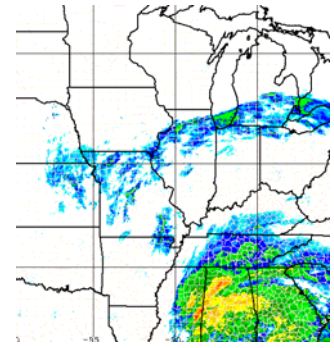
Figure 1: Evolution of the IOP-12 storm at the surface, 500 mb, and radar echoes from 1200 UTC 17 Dec 09 through 0600 UTC 18 Dec 09.



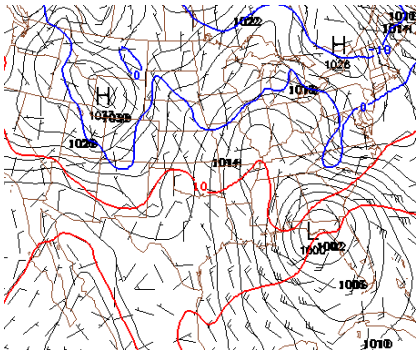
1200 UTC 18 Dec 09 Surface P/T/wind



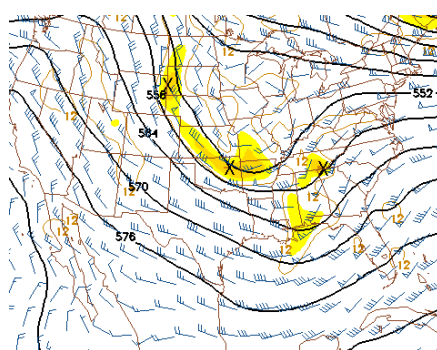
1200 UTC 18 Dec 09 500 mb Ht/Vort/Wind



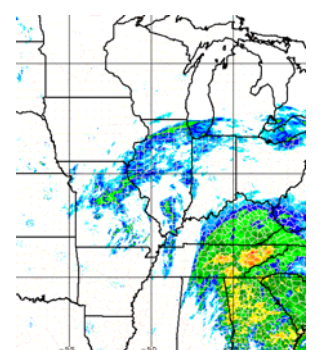
1158 UTC 17 Dec 09 radar



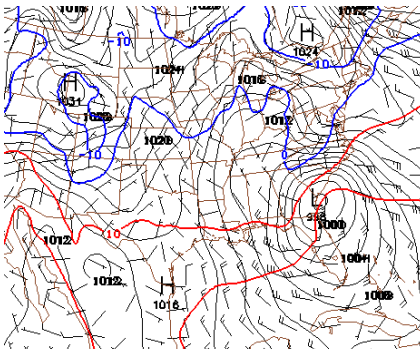
1800 UTC 18 Dec 09 Surface P/T/wind



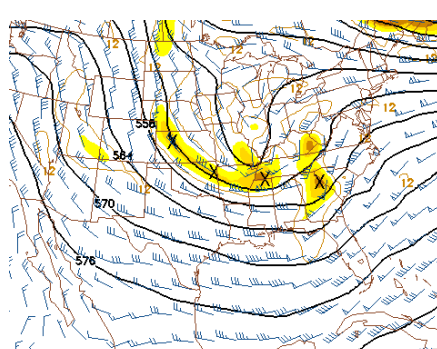
1800 UTC 18 Dec 09 500 mb Ht/Vort/Wind



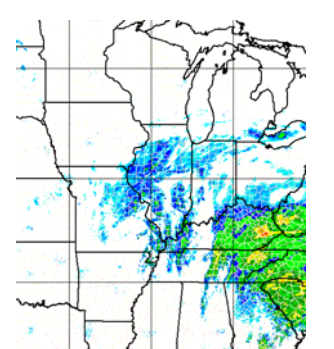
1801 UTC 17 Dec 09 radar



0000 UTC 19 Dec 09 Surface P/T/wind



0000 UTC 19 Dec 09 500 mb Ht/Vort/Wind



2149 UTC 18 Dec 09 radar

Figure 2: Evolution of the IOP-12 storm at the surface, 500 mb, and radar echoes from 1200 UTC 18 Dec 09 through 0000 UTC 19 Dec 09.

3. Precipitation over research area

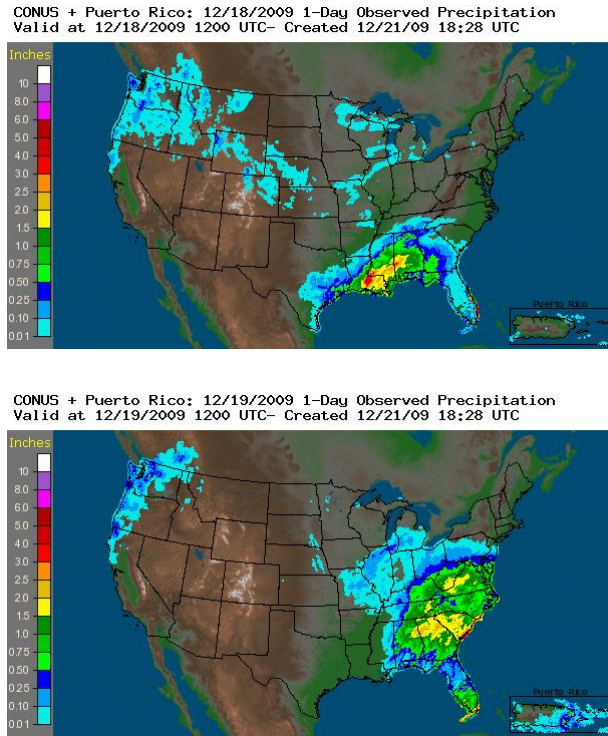


Fig. 3: 24 Hour precipitation ending at 1200 UTC 12/18/09, 1200 UTC 12/19/09 over the United States

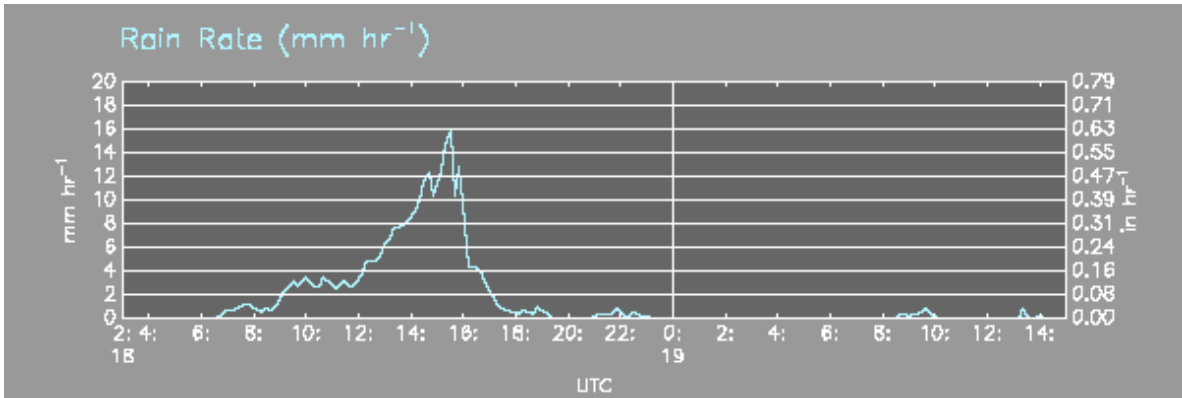


Fig. 4: 24 Precipitation rate at the MIPS on 18 Dec 09

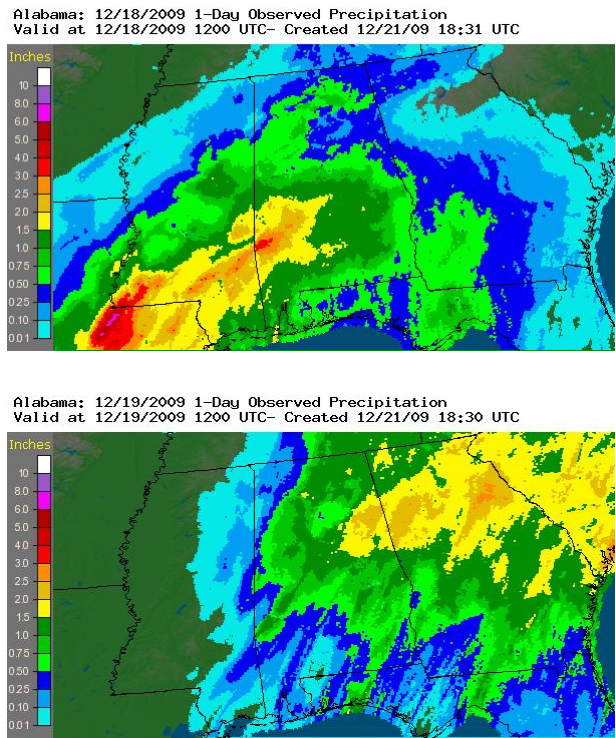


Fig. 5: 24 Hour precipitation ending at 1200 UTC 12/18/09, 1200 UTC 12/19/09 over Alabama

5. MIPS operations

The MIPS operated continuously from the berm area at its home site on the UAHuntsville campus. Operating parameters for all MIPS instruments were identical to those used for previous IOP's. Since this was a rain event, the MPR will have the usual bias from emission from water drops on the radome and the rain itself. The 915 MHz wind profiler communication dropout problem was again present for this case. Although profiler winds are available for the entire event, the Doppler spectra and spectral moments are missing during the middle of the event between 0900 and 1500 UTC. Figs. 6 and 7 display time-height sections of the 915 moments and winds. Additional instruments are available at the MIPS home site: a second Parsivel disdrometer, 2-D video disdrometer, and a Geonor raingage. The time series from this raingage is displayed in Fig. 4. The total rainfall was about 1.5 in.

6. ARMOR operations

The ARMOR is a C-band dual polarization radar located southwest of the MIPS site. The azimuth/range to the MIPS site is 53 deg and 14.4 km. The ARMOR operated continuously during the event, conducting alternating full volume VAD scans and RHI scans over the MIPS site. Figs. 8-9 show consecutive PPI and RHI scans during the middle of the event when rainfall rates exceeded 10 mm hr^{-1} .

The Hytop (KHTX) WSR-88D radar is located at 64 deg and 69 km from the ARMOR. This radar was down until 1647 UTC on 18 December near the end of the rainfall period over the MIPS site, so the majority of the event was not sampled by dual Doppler.

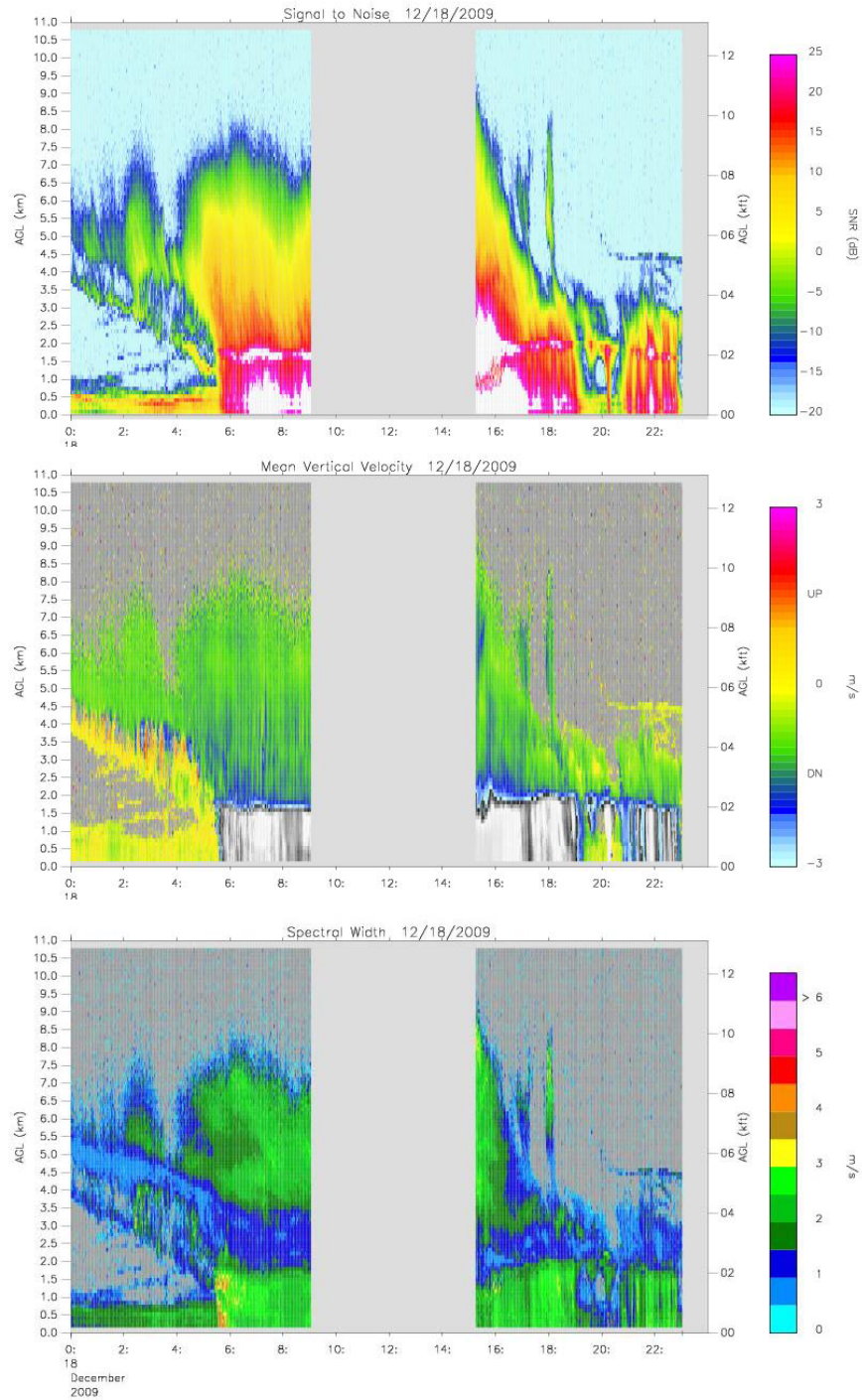


Figure 6: MIPS 915 MhZ Profiler SNR (top), Radial Velocity (center) and Spectral Width (bottom) for the period 0000 UTC 18 Dec 09-2300 UTC 18 Dec 09.

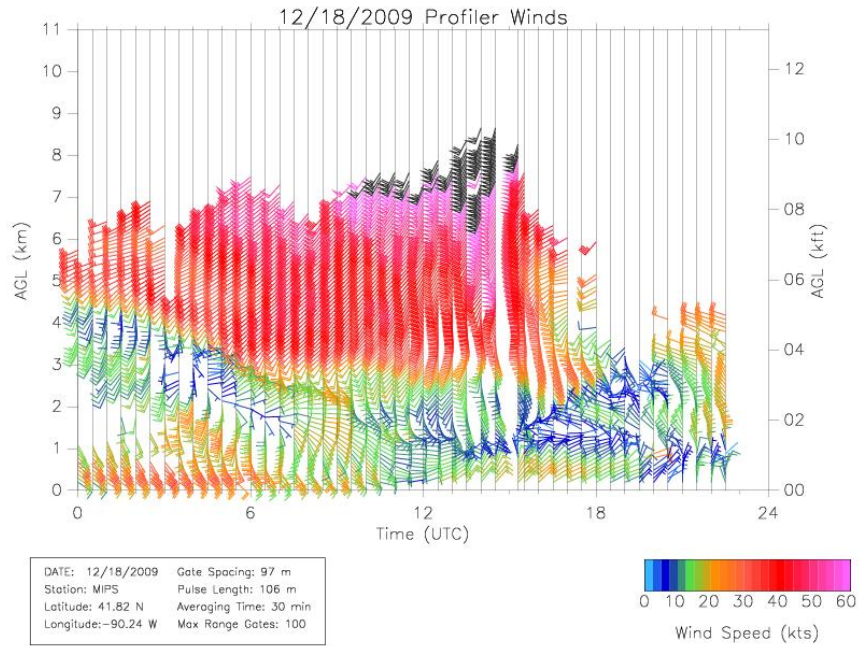


Figure 7: MIPS 915 MhZ Profiler winds for the period 0000 UTC 18 Dec 09-2300 UTC 18 Dec 09.

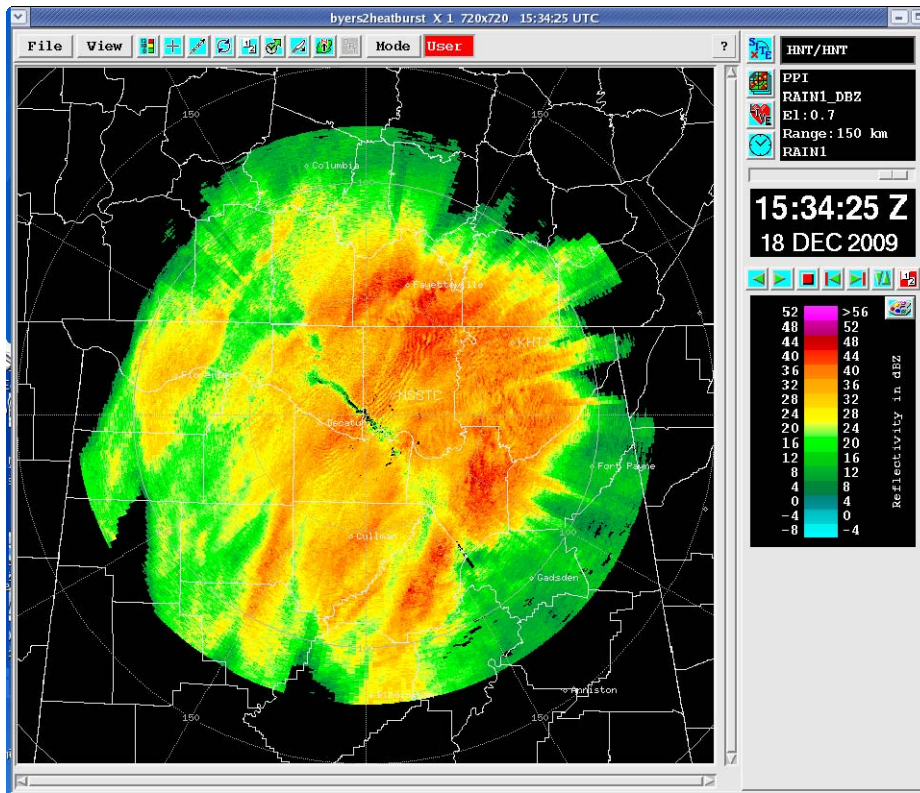


Figure 8a. ARMOR 0.7° PPI of reflectivity factor, Z.

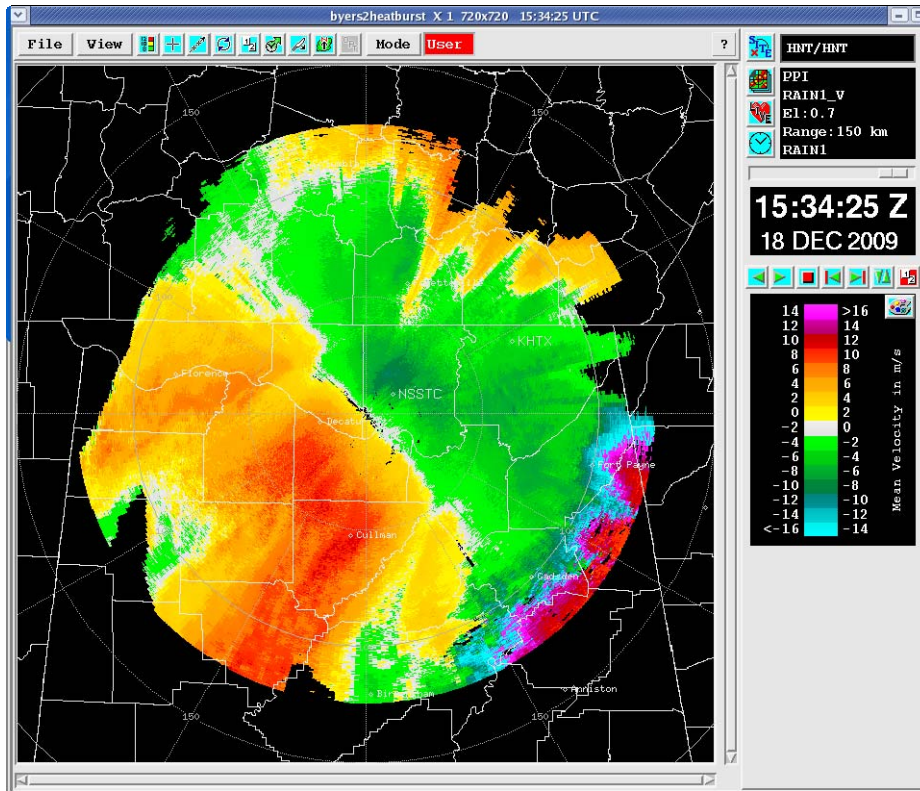


Fig. 8b. ARMOR 0.7° PPI of radial velocity, V_R . A fold in V_R is located to the southeast beyond 100 km range.

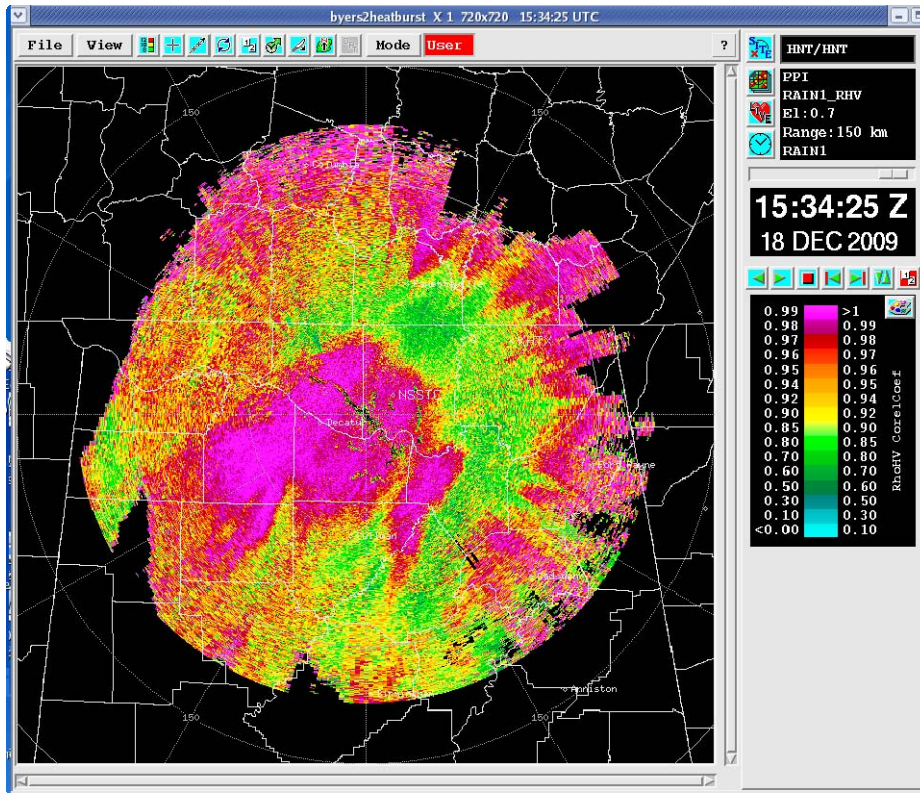


Fig. 8c. ARMOR 0.7° PPI of cross correlation coefficient, ρ_{hv} .

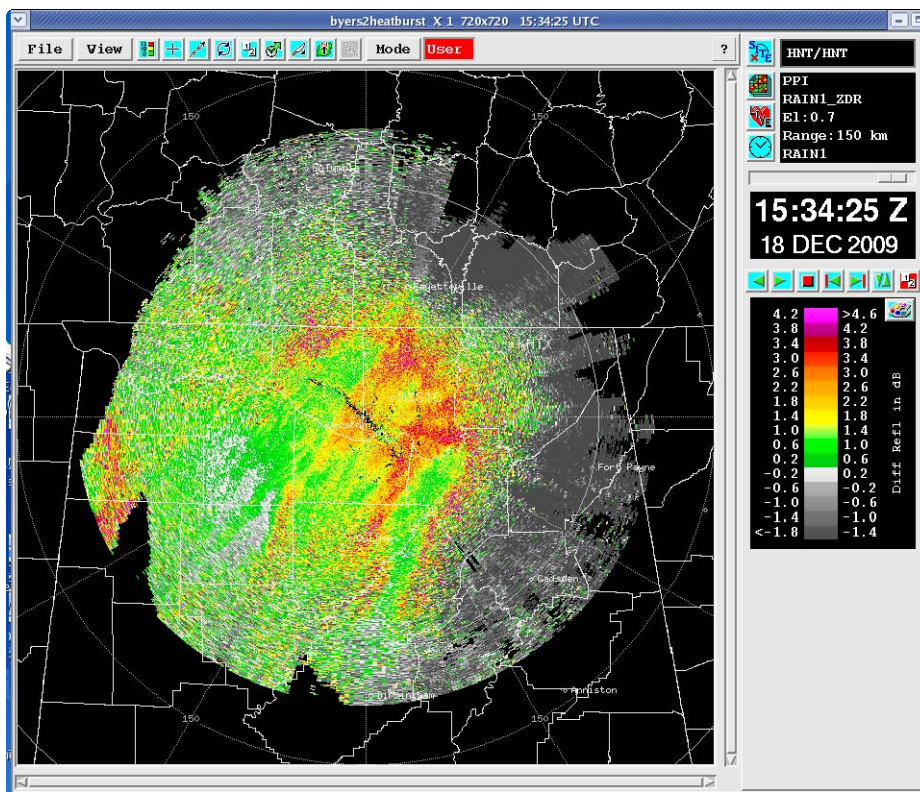


Fig. 8d. ARMOR 0.7° PPI of differential reflectivity, Z_{DR} (not corrected for differential attenuation).

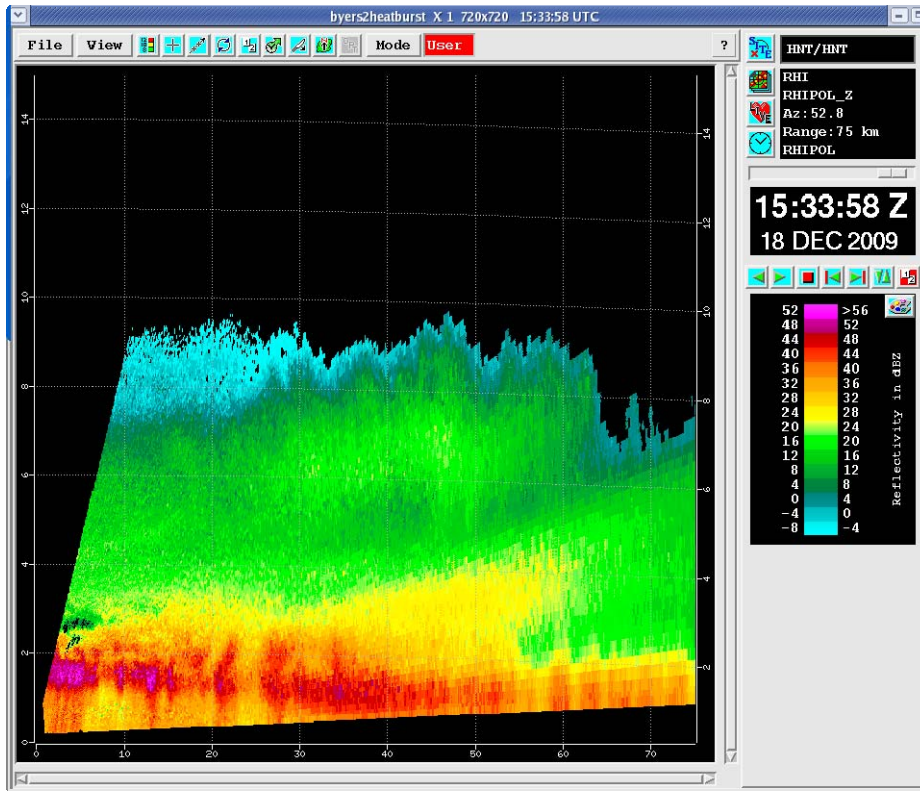


Fig. 9a. ARMOR 52.8° RHI of reflectivity factor, Z, over the MIPS site (range of 14.4 km).

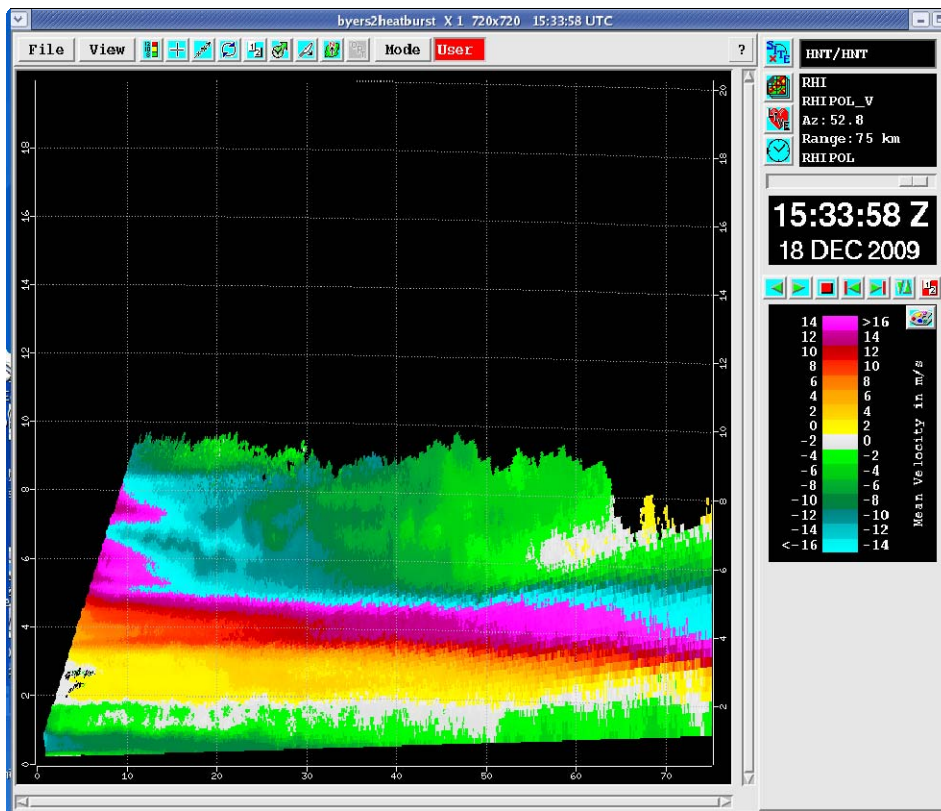


Fig. 9b. ARMOR 52.8° RHI of radial velocity, V_R , over the MIPS site (range of 14.4 km). A velocity fold is located above ~5 km AGL.

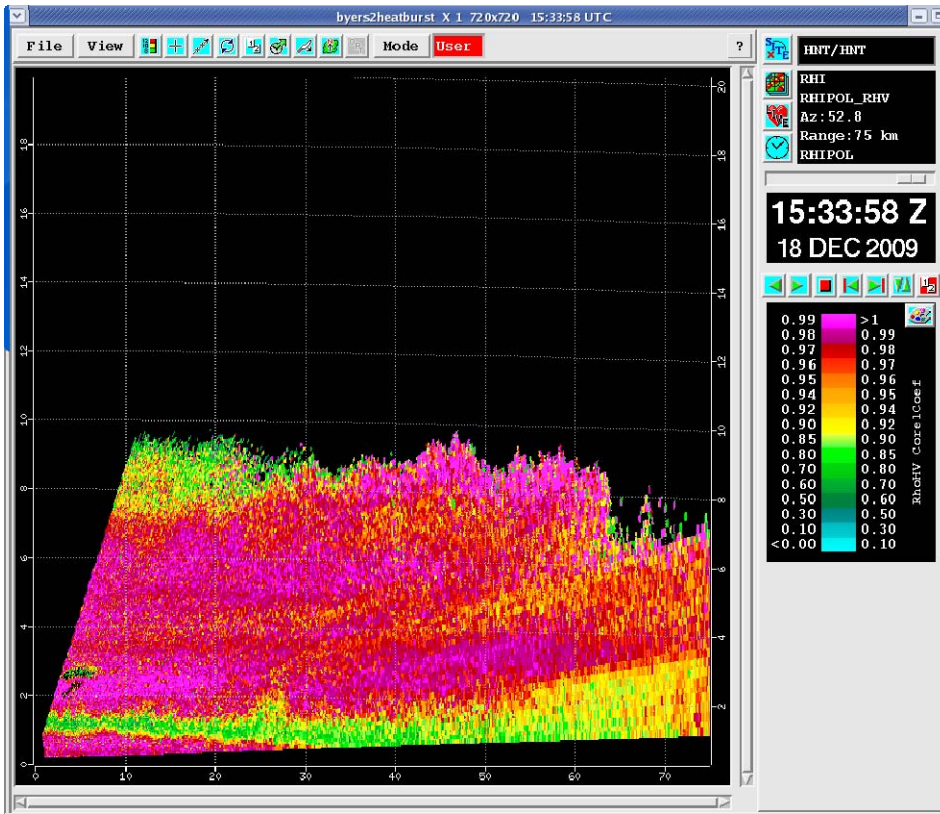


Fig. 9c. ARMOR 52.8° RHI of ρ_{hv} over the MIPS site (range of 14.4 km).

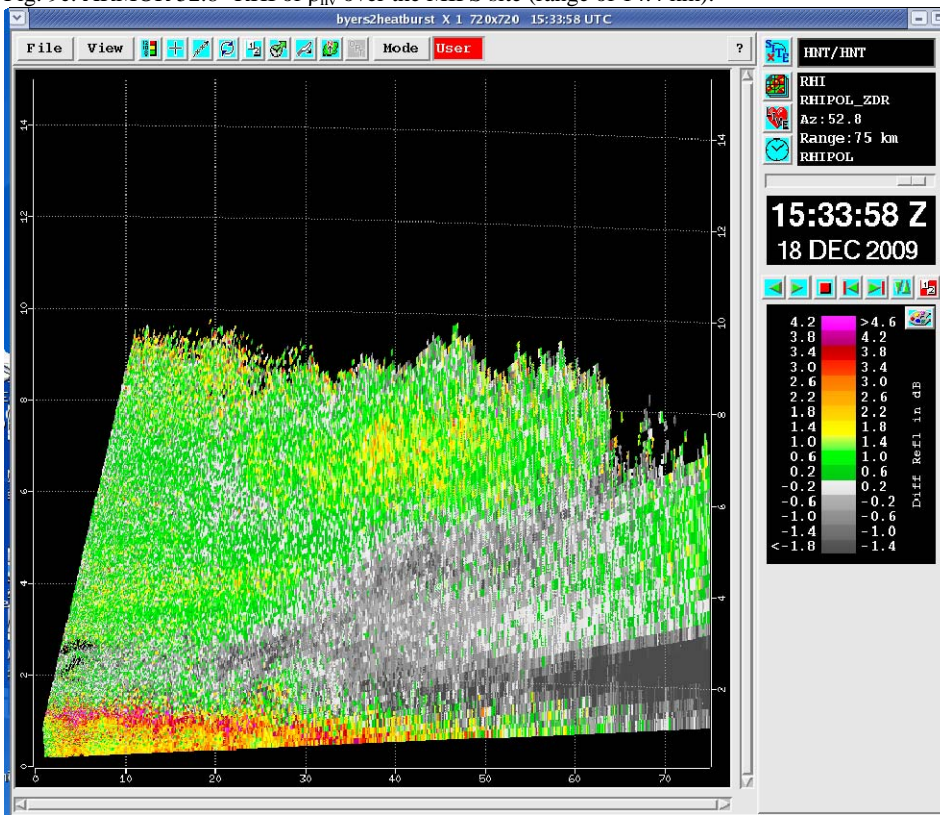


Fig. 9d. ARMOR 52.8° RHI of raw differential reflectivity, Z_{DR} (not corrected for differential attenuation) over the MIPS site (range of 14.4 km).