

**IOP-23 Summary of Operations**  
**1 March 2010, 1200 UTC – 03 March 2010 0000 UTC**

**Authors: Rauber, Knupp**

**1. Summary of storm evolution**

The IOP-23 storm formed along the Gulf Coast off the Texas Coastline and propagated eastward along the Gulf and northward along the eastern seaboard. The storm was associated with a deep trough propagating eastward across the U.S., and a jetstreak moving eastward within the strong subtropical jet. The wrap-around precipitation over Texas during low formation was relatively weak during the time of the first flight at 0000 UTC on March 2. The flight was directed into the precipitation shield over Oklahoma-Texas. As the cyclone deepened, a shield of wrap-around precipitation spread across the southern states, with the leading front moving eastward across the Gulf of Mexico. The storm's dry slot developed during this time. As the storm turned northward along the east coast, the wrap-around stretched north-south along the spine of the Appalachian mountains, with the dry slot boundary right along the eastern boundary of the mountains. The coastal plain, where the MIPS and MAX were located in South Carolina, were covered with low clouds during the entire storm passage. The second aircraft flight was designed to fly a VOR-VOR line across the MIPS and MAX. This strategy worked well for the entire flight in the target region. During the flight, SATCOM was not available so the flight scientist had no geographic data and the ground didn't know the location of the aircraft. Nevertheless, with aircraft skinpaints, we were able to follow the flight and coordinate well.

**2. Locations of instrumentation platforms**

MIPS Location: 33° 58' 13.11" N 80° 57' 1.07" W

MIPS Time of Operation: 0400 UTC 3/2/10 to 1400 UTC 3/3/10

MAX Location: 33° 42' 47.26" N 80° 39' 50.54" W

MAX Time of Operation: 1600 UTC 3/2/10 to 0330 UTC 3/3/10

MISS Location: not used

UM Location: not used

RF-16 Flight operations: 1728 UTC 1 March 10 to 0132 UTC 2 March 10

RF-17 Flight operations: 1731 UTC 2 March 10 to 0151 UTC 3 March 10

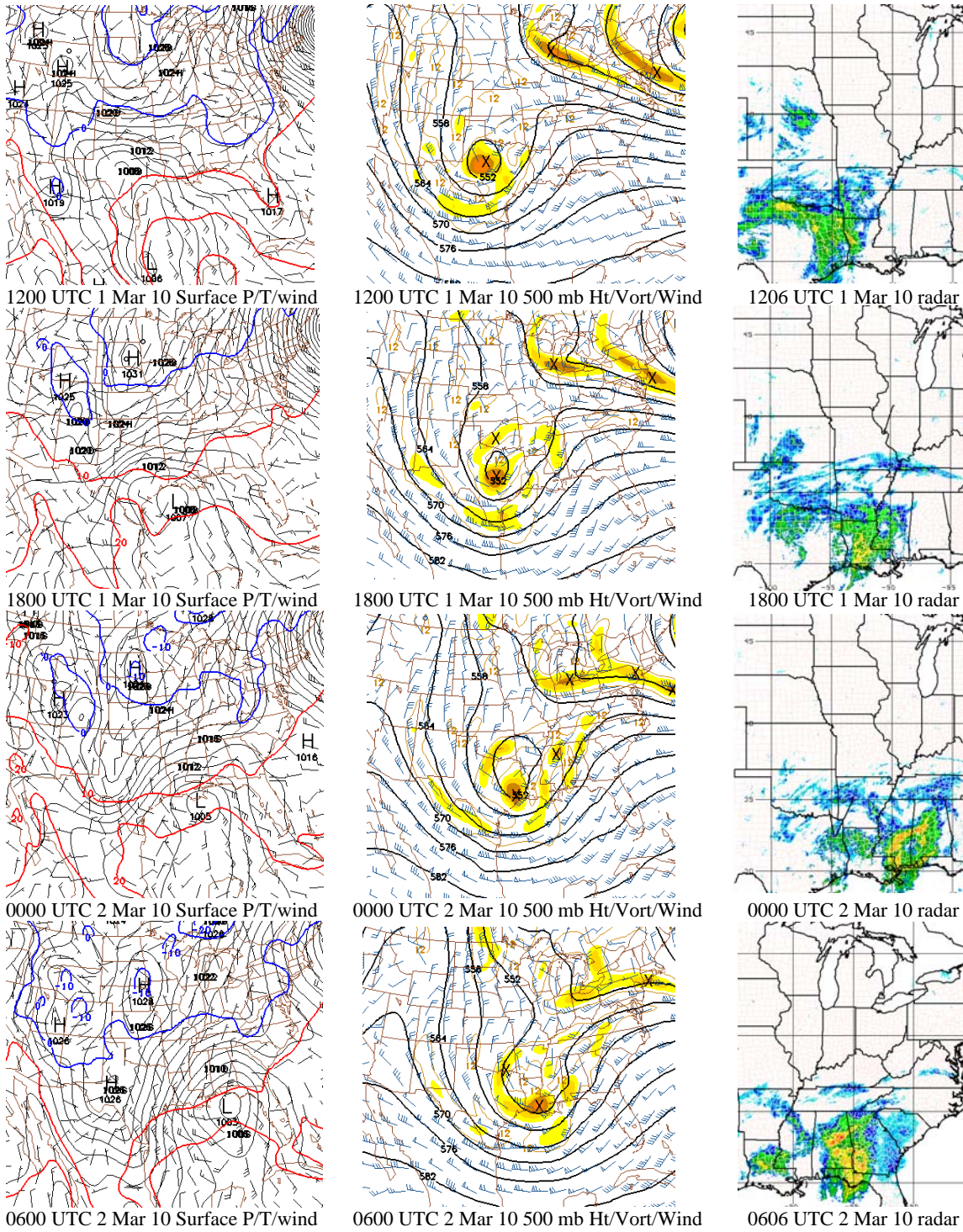


Figure 1: Evolution of the IOP-23 storm at the surface, 500 mb, and radar echoes from 1200 UTC 1 Mar 10 through 0600 UTC 2 Mar 10.

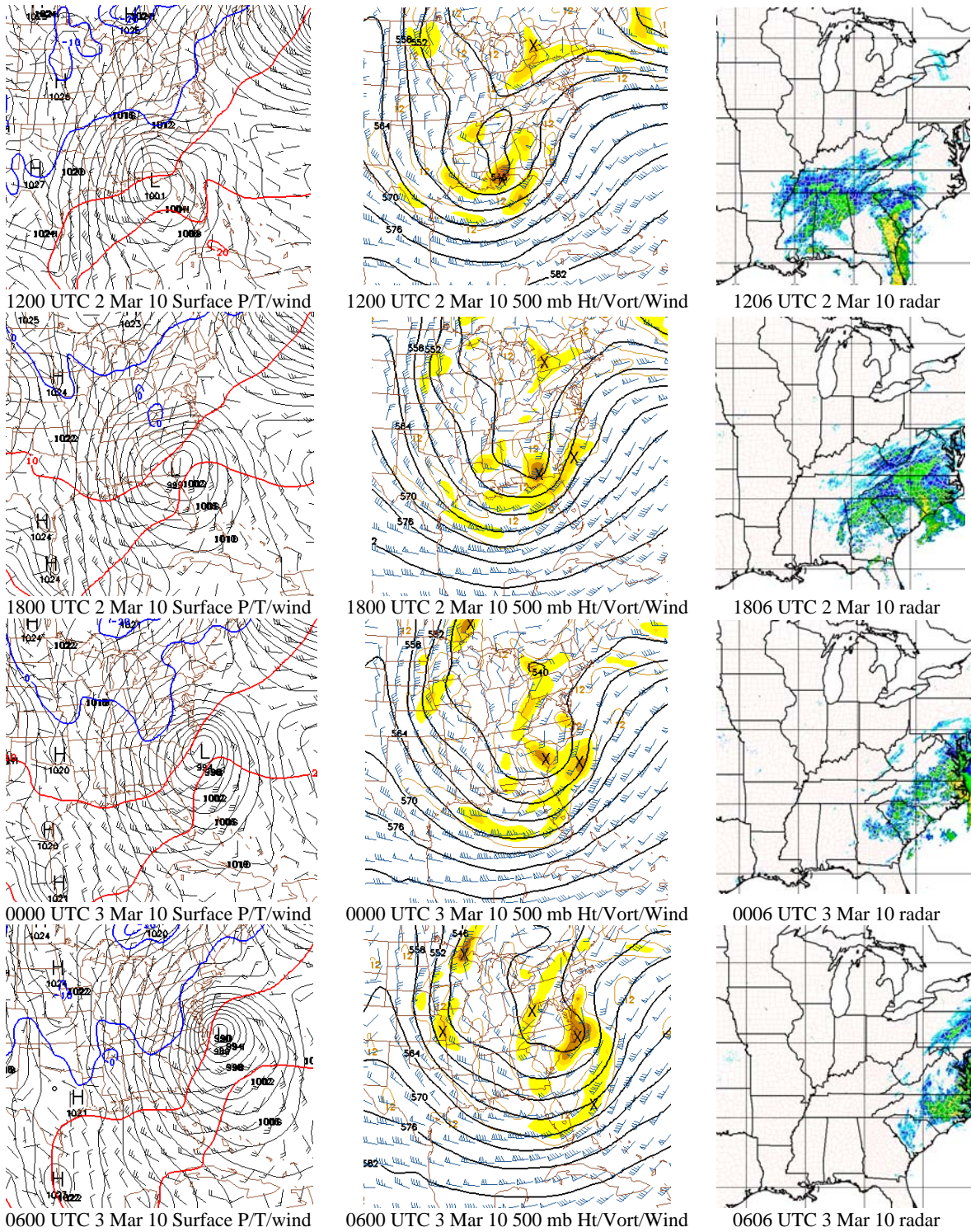
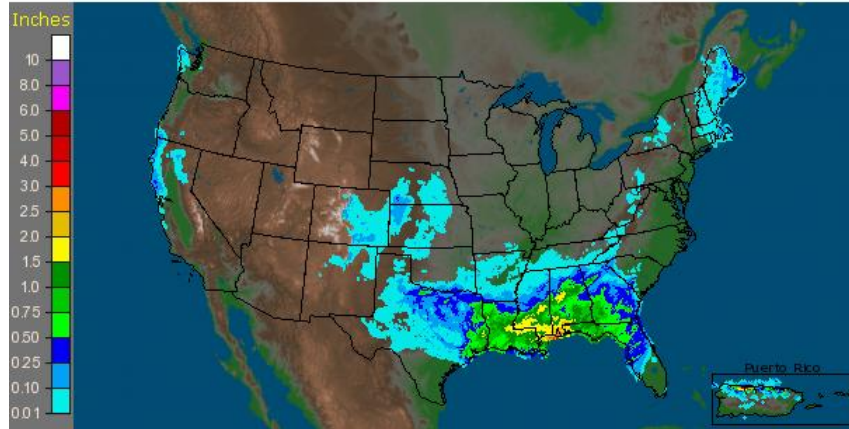


Figure 2: Evolution of the IOP-23 storm at the surface, 500 mb, and radar echoes from 1200 UTC 2 Mar 10 through 0600 UTC 3 Mar 10.



### 3. Precipitation over research area

CONUS + Puerto Rico: 3/2/2010 1-Day Observed Precipitation  
Valid at 3/2/2010 1200 UTC- Created 3/4/10 11:31 UTC



CONUS + Puerto Rico: 3/3/2010 1-Day Observed Precipitation  
Valid at 3/3/2010 1200 UTC- Created 3/5/10 11:30 UTC

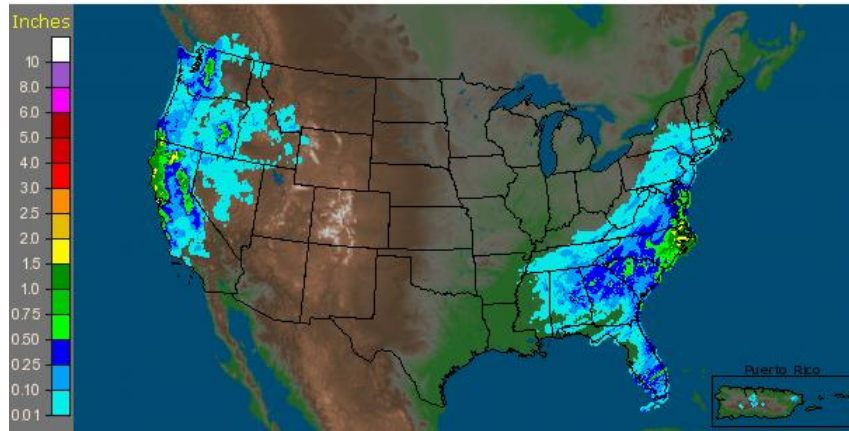


Fig. 3: 24 Hour precipitation ending at 1200 UTC 3/2/10 and 1200 UTC 3/3/10 over the United States

Texas: 3/2/2010 1-Day Observed Precipitation  
Valid at 3/2/2010 1200 UTC- Created 3/4/10 11:32 UTC

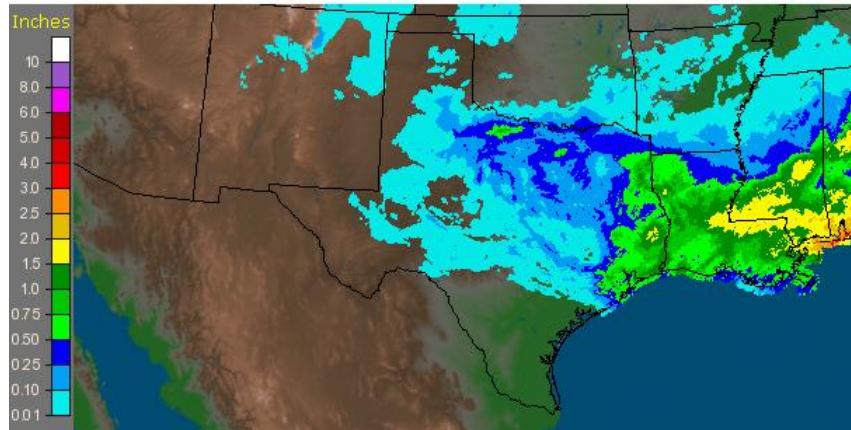


Fig. 4: 24 Hour precipitation ending at 1200 UTC 3/2/10 over Texas.

South Carolina: 3/3/2010 1-Day Observed Precipitation  
Valid at 3/3/2010 1200 UTC- Created 3/5/10 11:32 UTC

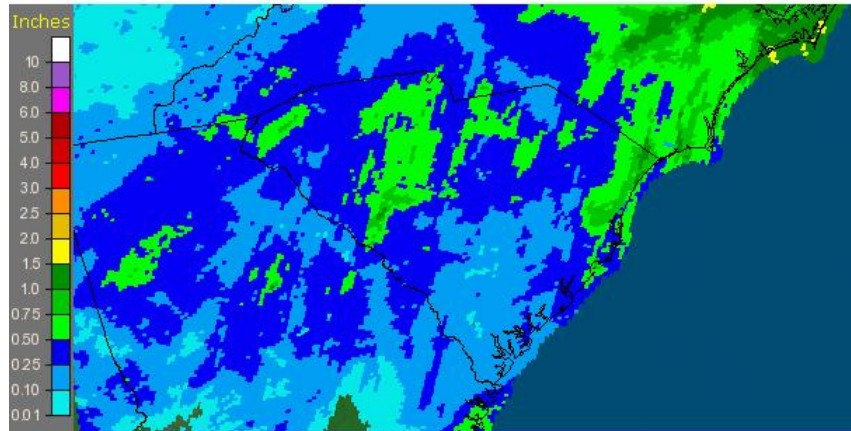


Fig. 5: 24 Hour precipitation ending at 1200 UTC 3/2/10 over Texas.



#### 4. Flight Summary

RF-16 focused on the developing wrap-around region of a cyclone in its early stage of development over Texas. The flight was short because of the plans for a second flight into the storm the following day. The flight consisted of a ferry to the Arkansas-Texas area, followed by a series of stacked legs across Texas-Oklahoma, and a return to Peoria.

#### C-130 Flight RF-16 Flight track

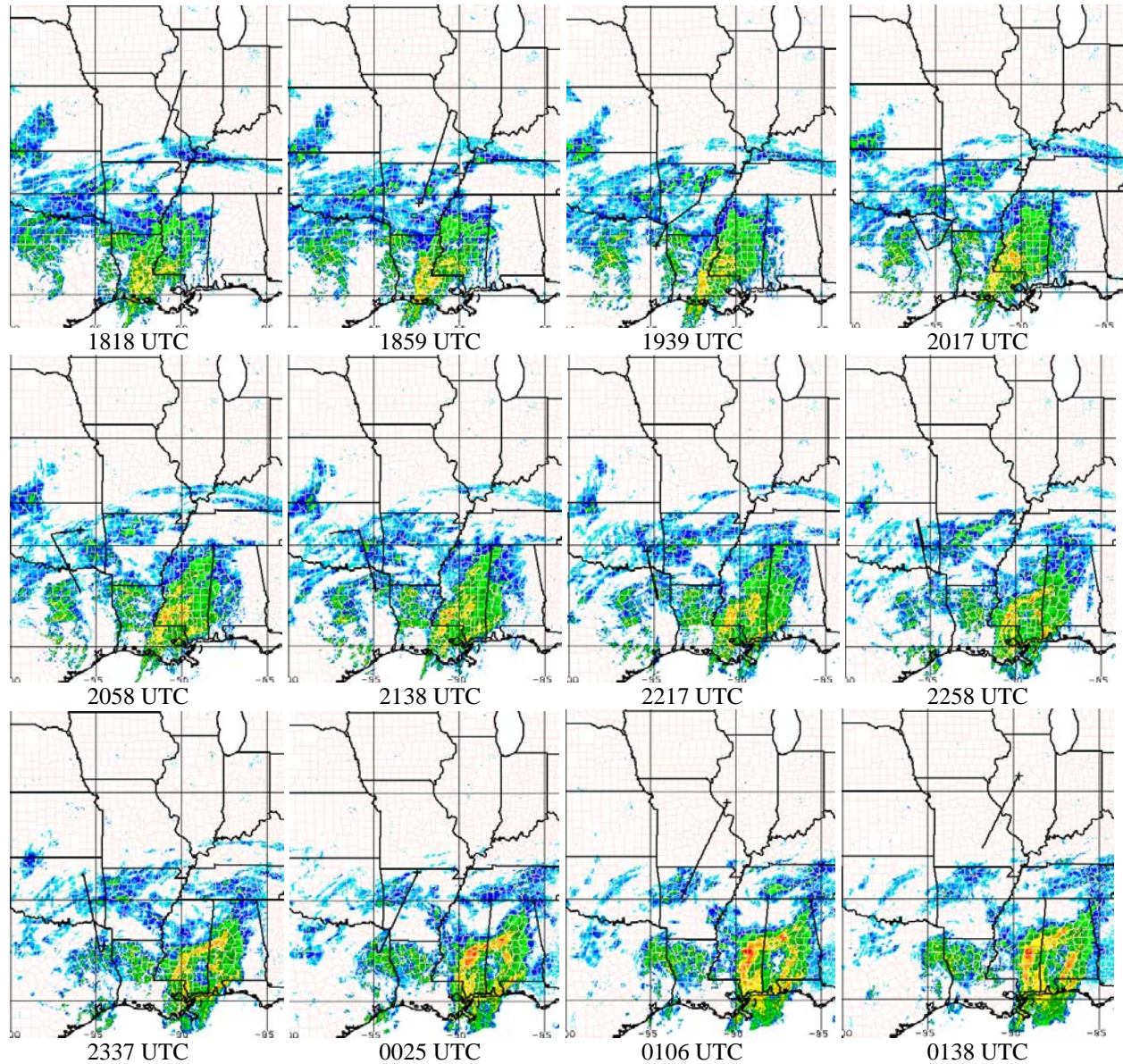
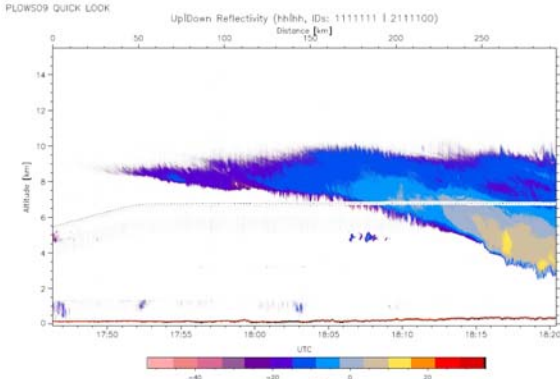
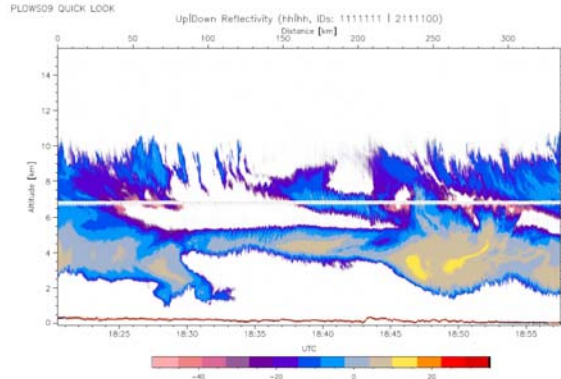


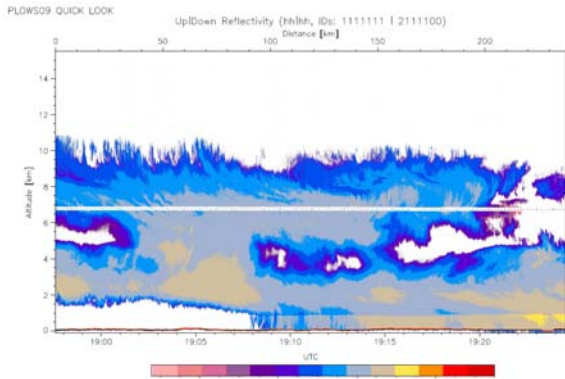
Figure 6: Flight track superimposed on radar images during the the C-130 flight from 1818 UTC 1 Mar 10 through 0138 UTC 2 Mar 10.



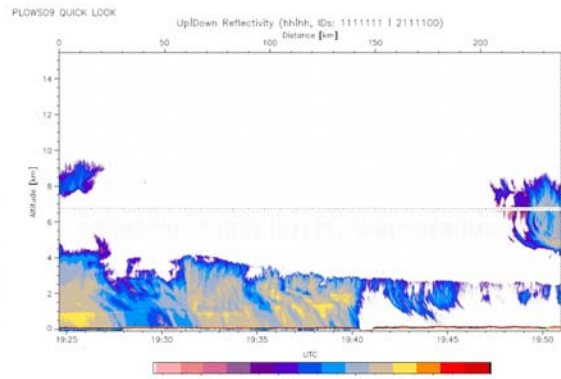
1746 UTC to 1820 UTC



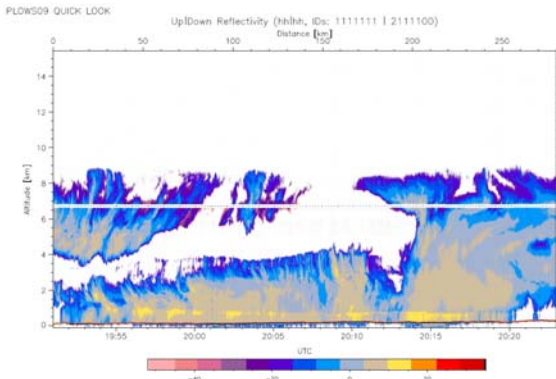
1820 UTC to 1856 UTC



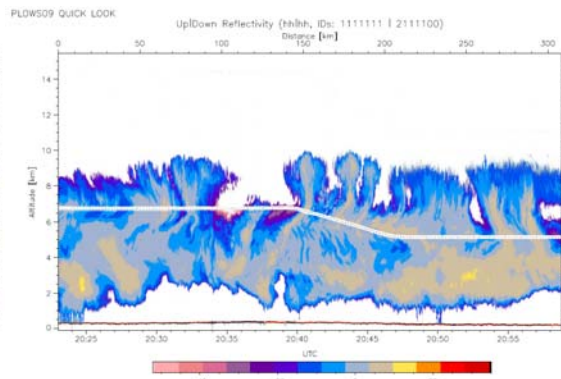
1856 UTC to 1924 UTC



1924 UTC to 1950 UTC



1950 UTC to 2023 UTC



2023 UTC to 2058 UTC

Fig. 7: Wyoming Cloud Radar Quicklook of radar reflectivity between 1746 UTC 1 Mar 10 and 2058 UTC 1 Mar 10.



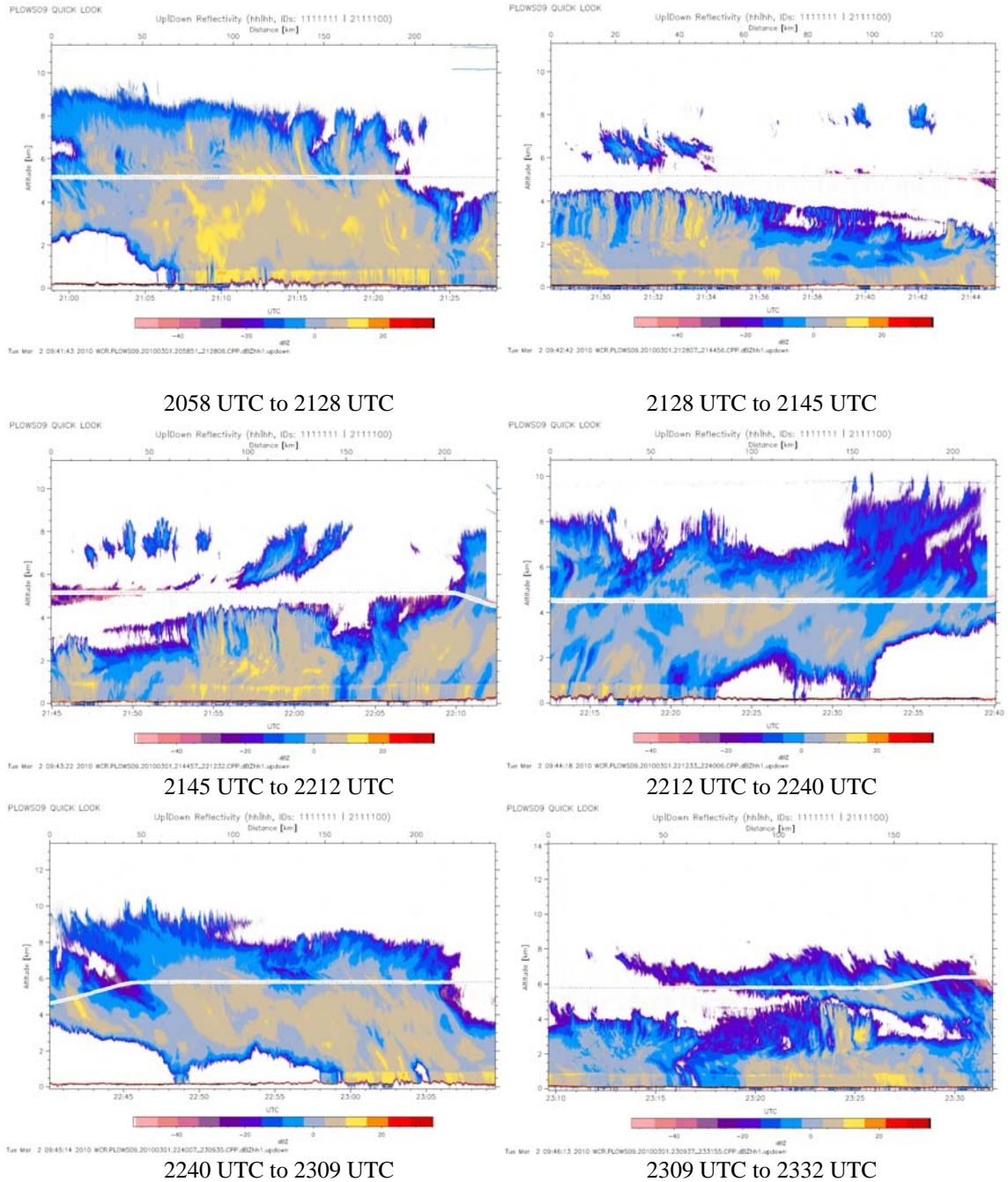
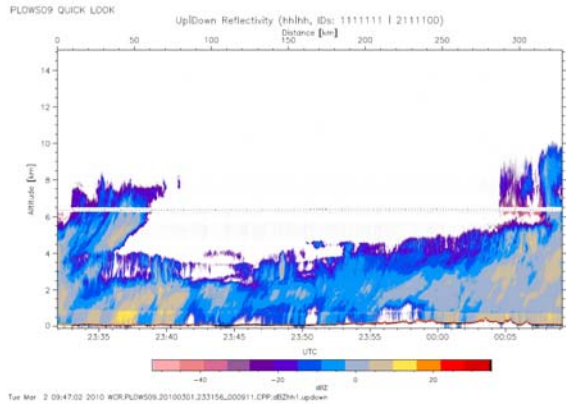
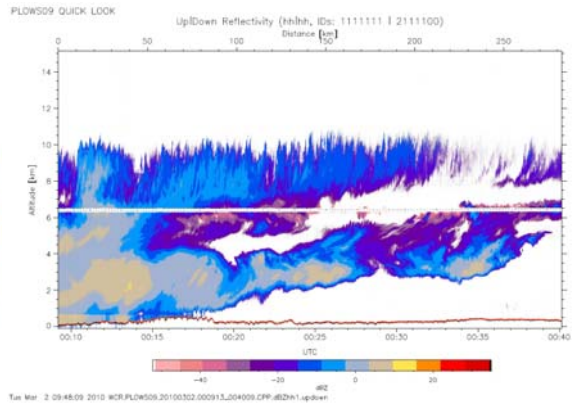


Fig. 8: Wyoming Cloud Radar Quicklook of radar reflectivity between 2058 UTC 1 Mar 10 and 2332 UTC 1 Mar 10.

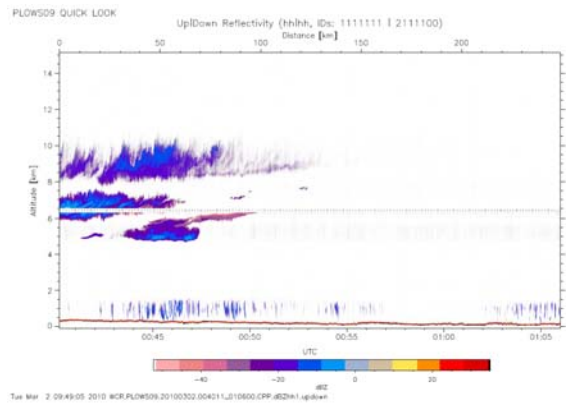




2332 UTC to 0008 UTC



0008 UTC to 0040 UTC



0040 UTC to 0106 UTC

Fig. 9: Wyoming Cloud Radar Quicklook of radar reflectivity between 2232 UTC 1 Mar 10 and 0106 UTC 1 Mar 10.

## C-130 Flight RF-17 Flight track

The flight consisted of a stack pattern between VORs SPA and VAN over the MAX-MIPS network. The flight traversed the deeper band to the west into the dry slot in the east, with shallow clouds present in the dry slot over the MIPS.

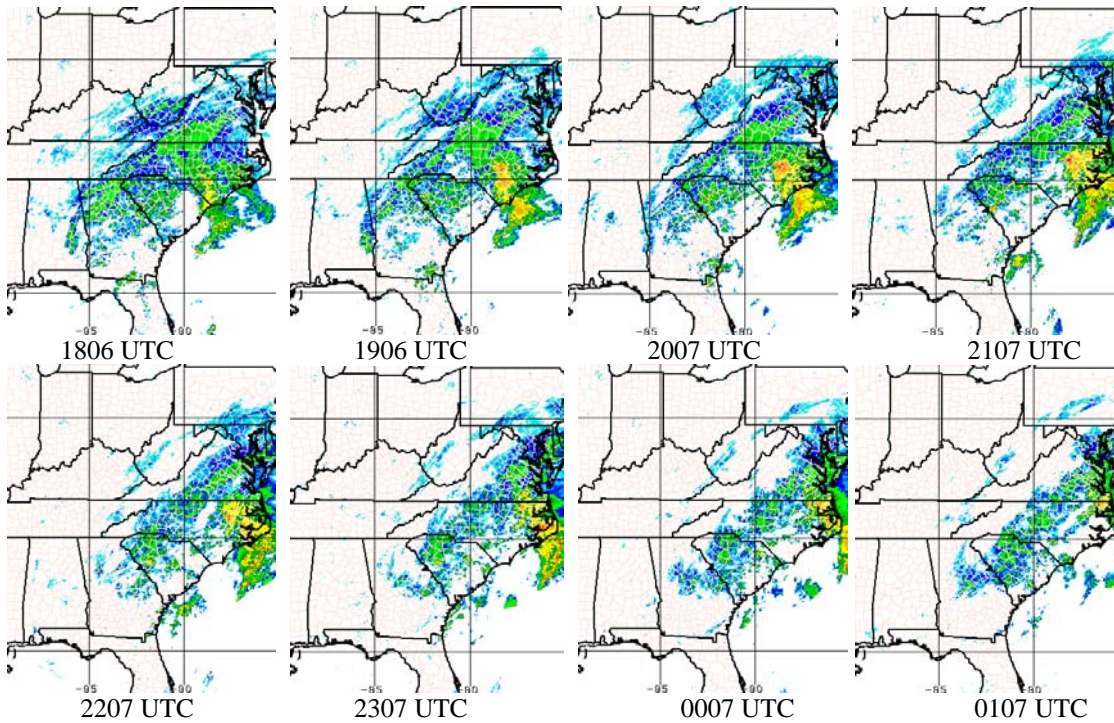
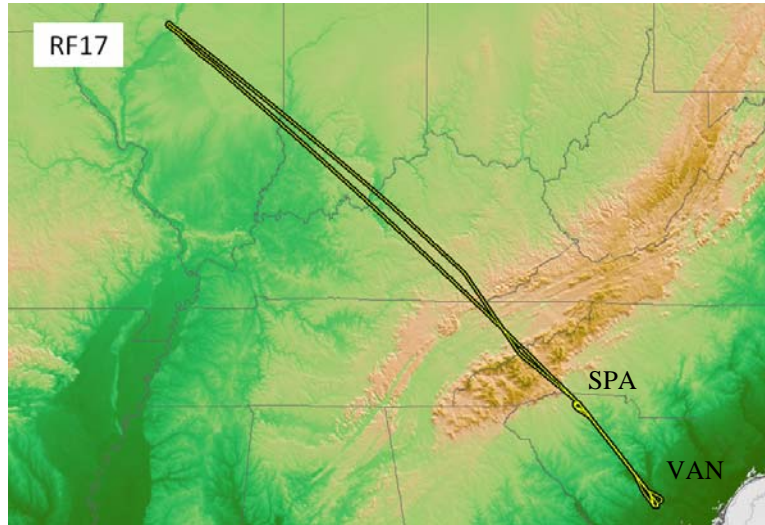
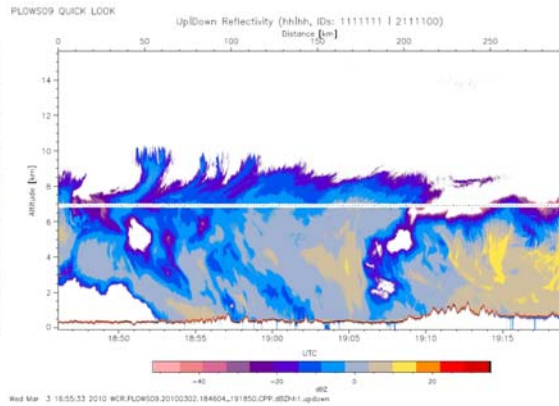
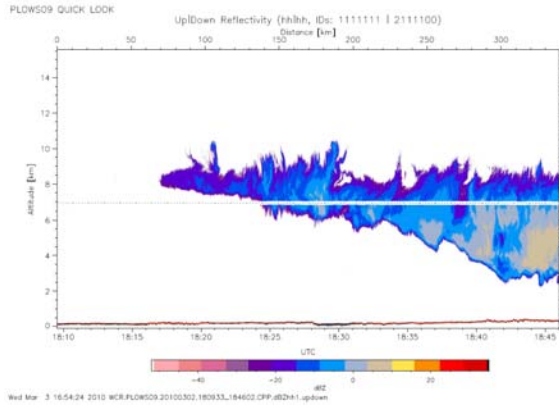


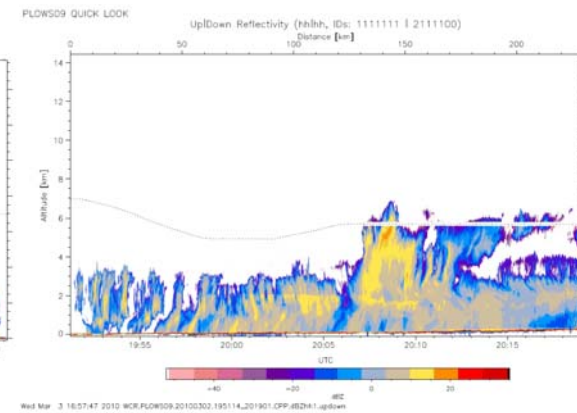
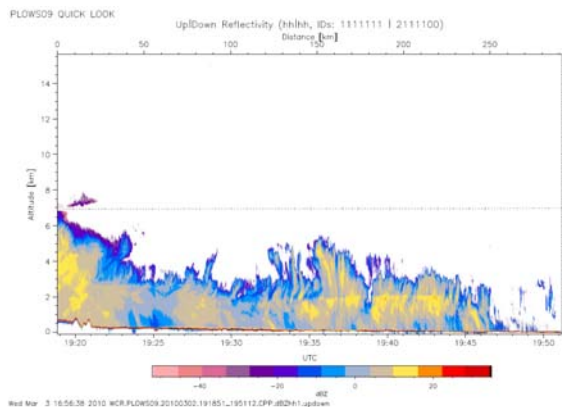
Figure 10: Flight track and radar images (without track – Satcom did not work on this flight) during the C-130 flight from 1806 UTC 2 Mar 10 through 0107 UTC 3 Mar 10.





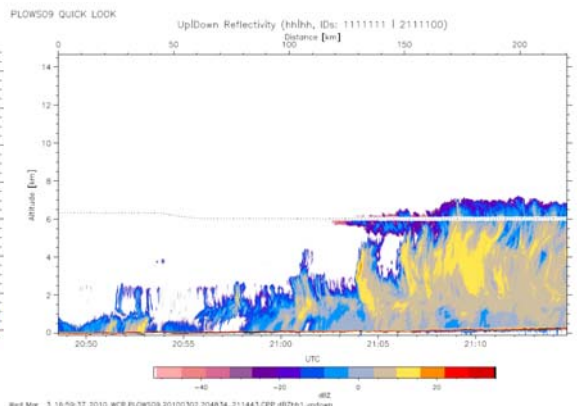
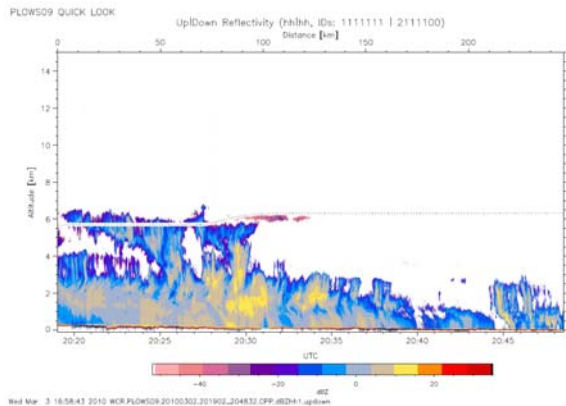
1810 UTC to 1846 UTC

1846 UTC to 1919 UTC



1919 UTC to 1951 UTC

1951 UTC to 2018 UTC



2018 UTC to 2048 UTC

2048 UTC to 2114 UTC

Fig.11: Wyoming Cloud Radar Quicklook of radar reflectivity between 1810 UTC 21 Feb 10 and 2114 UTC 2 Mar 10.

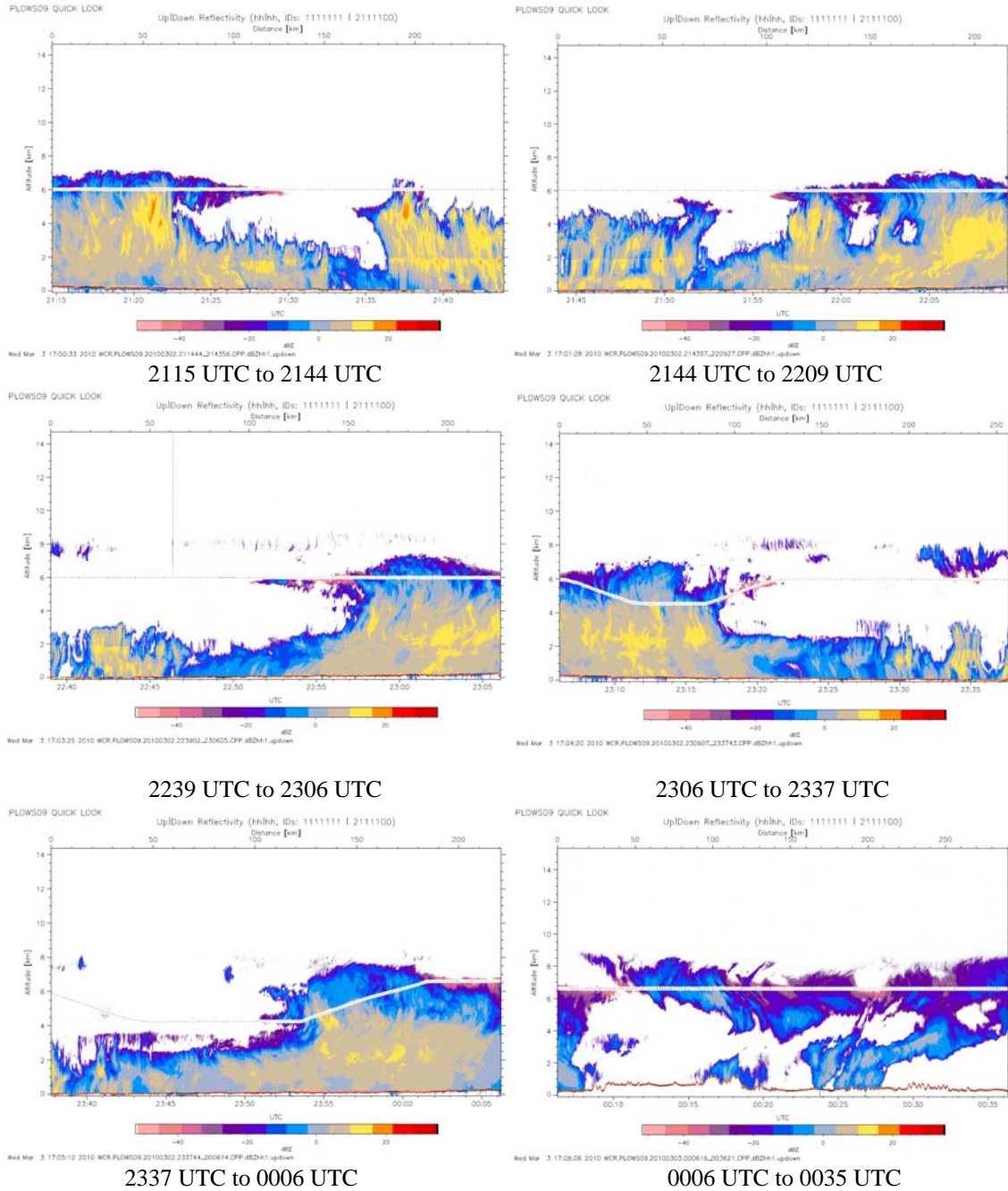


Fig. 12: Wyoming Cloud Radar Quicklook between 2115 UTC 2 Mar 10 and 0035 UTC 3 Mar 10.



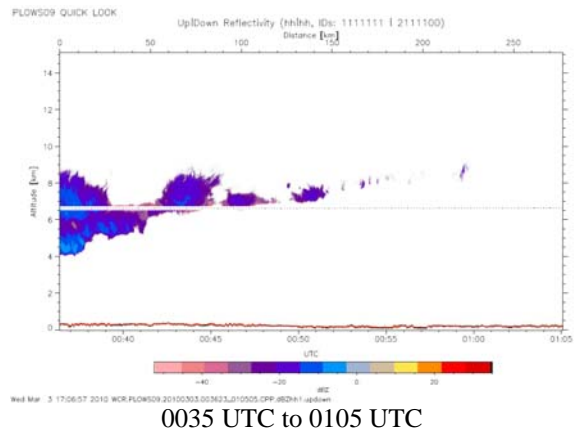


Fig. 13: Wyoming Cloud Radar Quicklook between 0035 UTC 3 Mar 10 and 0135 UTC 3 Mar 10.

## 5. MIPS operations:

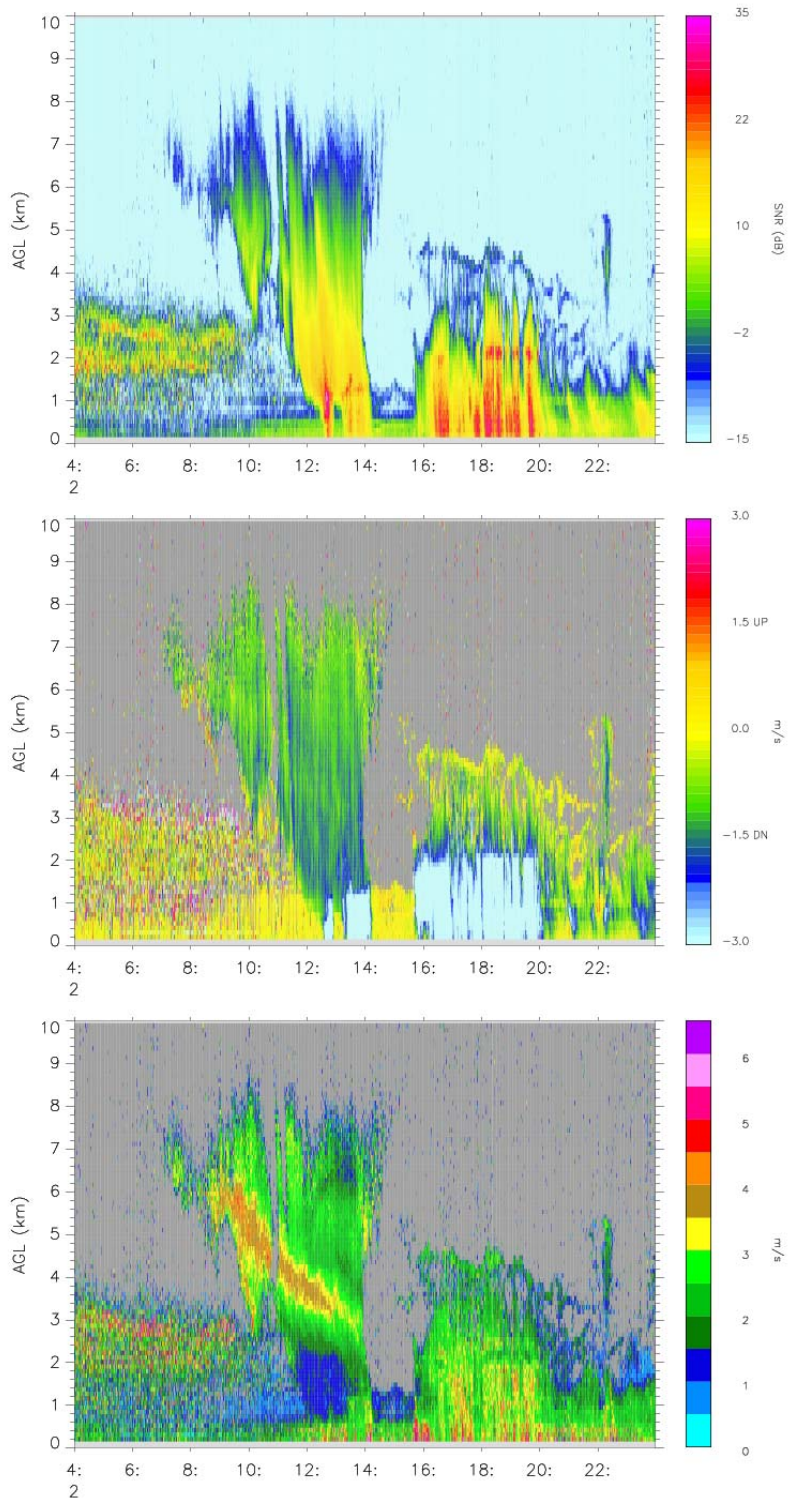


Fig. 14: MIPS 915 MHz Profiler SNR, W, and Spectral Width from 0400 UTC 2 Mar 2010 to 0000 UTC 3 Mar 2010.



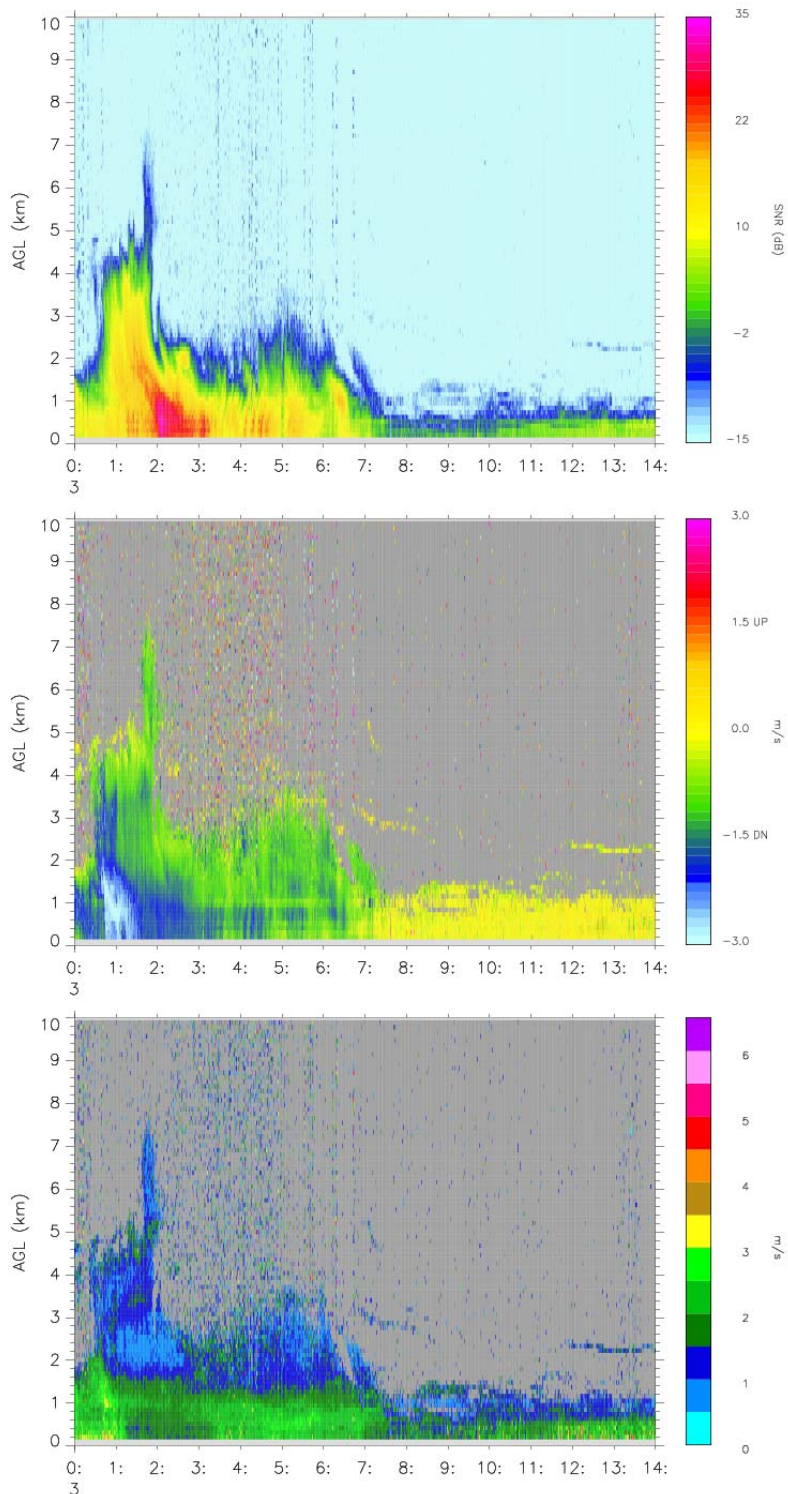


Fig. 14: MIPS 915 MHz Profiler SNR, W, and Spectral Width from 0000 UTC 3 Mar 2010 to 1400 UTC 3 Mar 2010.

## **6. MAX operations:**

The MAX operated with no problems with the RHI scan strategy during the aircraft coordination period. Outside the flight time, the MAX performed dual Doppler volume scans and RHIs with the Columbia, SC radar running VCP-11 scans for PLOWS.

## **7. MISS 915 MHz Profiler**

Not used

## **8. Rawinsondes**

Neither MISS nor Missouri participated in this IOP. A special 1800 UTC 2 March 2010 sounding was launched at Charleston, SC by the National Weather Service.