

IOP-15 Summary of Operations
29 January 2010, 0000 UTC – 30 January 2010 1200 UTC

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1. Summary of storm evolution

The IOP-15 storm was a Gulf Coast cyclone associated with the subtropical jet. The low pressure center developed over Mexico, moved over the Gulf and then northward across the Tennessee Valley. The storm was associated with a broad trough which propagated eastward and narrowed with time. The surface low was not very intense, with only two closed contours (4 mb intervals) but a strong high pressure system to the north led to a strong pressure gradient north of the storm and blowing snow. Despite the relatively poor organization of the cyclone, record snowfall occurred in Tennessee, with snow of 6-8 inches extending into southern Illinois. Snow spread northeast across southern Illinois during the day on January 29. The snow fell steadily from late in the afternoon of the 29th through the overnight hours. By sunrise on the 30th, the snow had tapered to flurries. Gusty winds caused some drifting of the snow. The wrap-around precipitation shield with this storm primarily propagated eastward with time.

Significant instrumentation issues plagued this IOP. The MAX radar repair was not finalized until late in the day on the 28th. The need for crew rest precluded deployment of the MIPS/MAX system as a result. Missouri did not deploy rawinsondes since the MIPS/MAX was not available. The MISS was deployed to Southern Illinois, in Vienna, IL. Approximately 7 inches of snow fell at the MISS site. The generator on the MISS was very close to failing, but hung on to the end of the research flight. At that point it was shut down to prevent data loss or other problems. The aircraft repairs were finished in Boulder and the flight testing in Boulder was done at the beginning of the IOP. The crew duty cycle limited the amount of time the aircraft was available for the research on the ferry from Boulder to Peoria to a single pass through the storm.

2. Locations of instrumentation platforms

MIPS Location:	Not used
MAX Location:	Not used.
MISS Location:	37° 24' 49.5"N, 88° 52' 25"W
Profiler Time of Operation	0400 UTC 29 Jan 10 to 0400 UTC 30 Jan 10
UM Location:	Not used
RF-07 Flight operations:	1/30/10 - 0036 to 0429 UTC

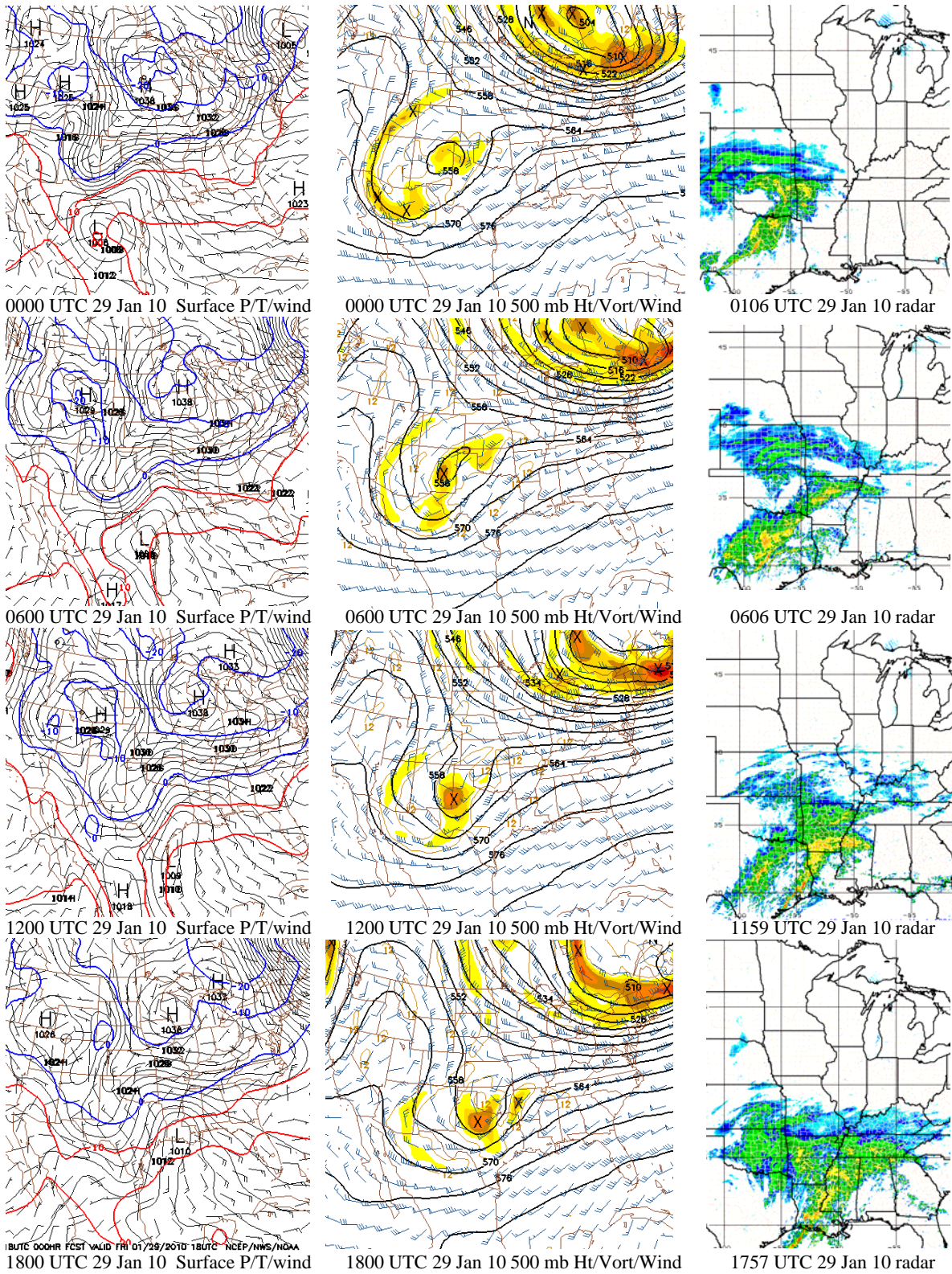


Figure 1: Evolution of the IOP-15 storm at the surface, 500 mb, and radar echoes from 0000 UTC 29 Jan 10 through 1800 UTC 29 Jan 10.

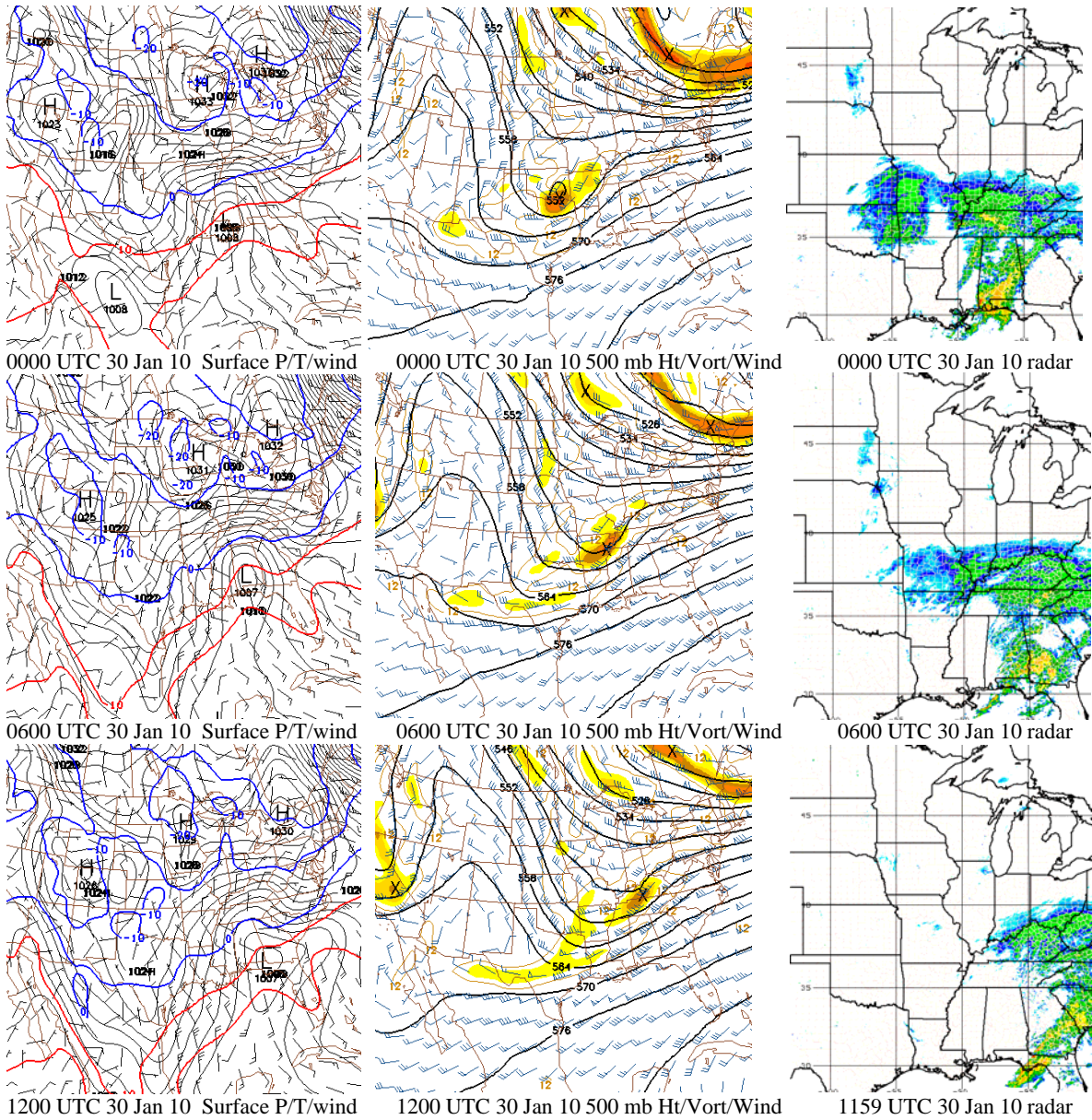


Figure 2: Evolution of the IOP-15 storm at the surface, 500 mb, and radar echoes from 0000 UTC 30 Jan 10 through 1200 UTC 30 Jan 10.

3. Precipitation over research area

CONUS + Puerto Rico: 1/29/2010 1-Day Observed Precipitation
Valid at 1/29/2010 1200 UTC- Created 1/31/10 11:31 UTC

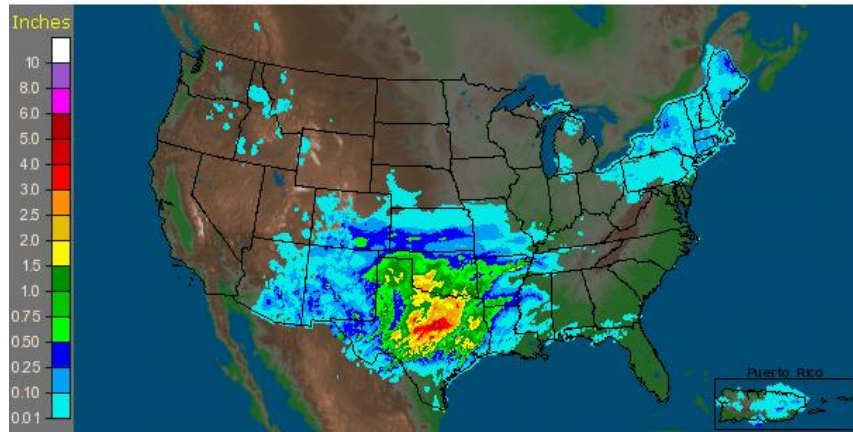


Fig. 3: 24 Hour precipitation ending at 1200 UTC 01/29/10, and 1200 UTC 01/29/10 over the United States

CONUS + Puerto Rico: 1/30/2010 1-Day Observed Precipitation
Valid at 1/30/2010 1200 UTC- Created 2/1/10 11:31 UTC

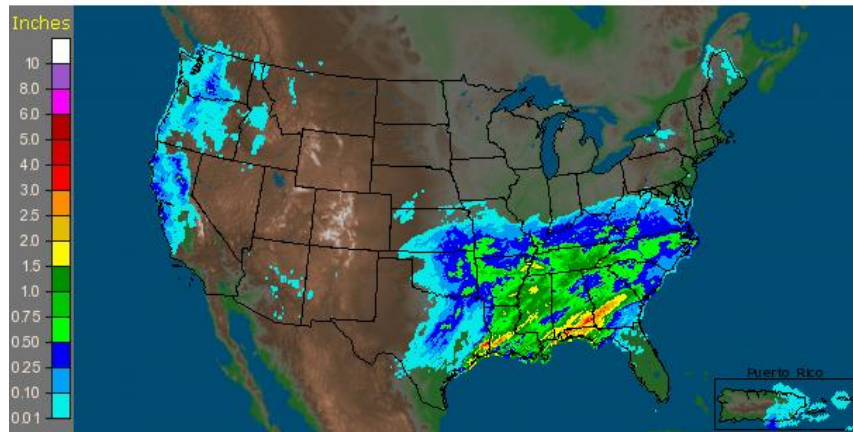


Fig. 4: 24 Hour precipitation ending at 1200 UTC 01/30/10, and 1200 UTC 01/30/10 over the United States

Illinois: 1/30/2010 1-Day Observed Precipitation
 Valid at 1/30/2010 1200 UTC- Created 2/1/10 11:32 UTC

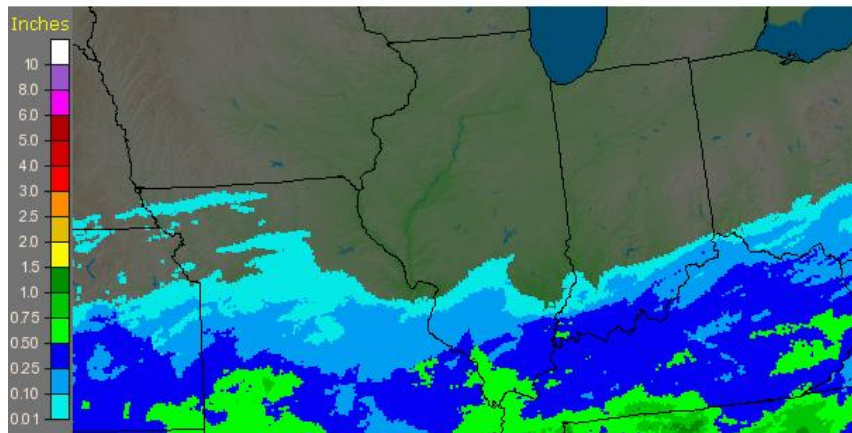


Fig. 5: 24 Hour precipitation ending at 1200 UTC 01/30/10, and 1200 UTC 01/30/10 over Illinois.

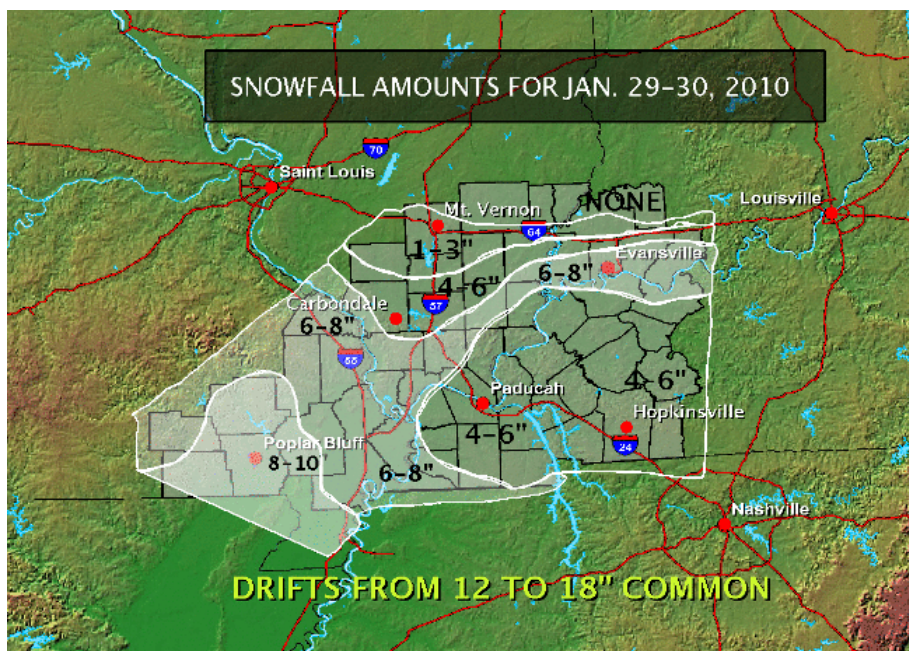


Fig. 6: 24 Storm total snowfall in Illinois and Kentucky for the IOP-15 cyclone

SNOWFALL REPORTS

SNOWFALL REPORTS FOR THE JAN. 29 AND 30 WINTER STORM. THESE REPORTS ARE MAINLY FROM SPOTTERS...CO-OPERATIVE OBSERVERS...AND BROADCAST MEDIA SPOTTERS. DUE TO BLOWING AND DRIFTING OF THE SNOW...ACCURATE MEASUREMENTS ARE VERY DIFFICULT TO OBTAIN. THE FOLLOWING ARE SPECIFIC SNOW TOTALS REPORTED SINCE 11 PM FRIDAY. THE ACCUMULATING SNOW HAS ENDED...BUT SOME OF THESE TOTALS WERE REPORTED BEFORE THE ACCUMULATING SNOW ENDED. THOSE REPORTS SUBMITTED AFTER THE SNOW ENDED ARE MARKED AS FINAL.

MISSOURI

MILL SPRING /WAYNE CO/... 9.5
GREENVILLE /WAYNE CO/... 8.0 FINAL
7 MILES NORTHWEST POPLAR BLUFF /BUTLER CO/...
8.1
POPLAR BLUFF /BUTLER CO/... 6.0 FINAL
SCOTT CITY /SCOTT CO/... 7.5
SIKESTON /SCOTT CO/... 6 TO 8 FINAL
CAPE GIRARDEAU /CAPE GIRARDEAU CO/...7.7 FINAL
OLD APPLETON /CAPE GIRARDEAU CO/... 4.0 FINAL
MARBLE HILL /BOLLINGER CO/... 7.0 FINAL
BLOOMFIELD /STODDARD CO/... 9.5 FINAL
DEXTER /STODDARD CO/... 7.0 FINAL
PORTAGEVILLE /NEW MADRID CO/... 6 TO 6.5 INCHES
FINAL
VAN BUREN /CARTER CO/...6.0 FINAL
RIPLEY CO... AROUND 9.0 FINAL

KENTUCKY

OWENSBORO /DAVISS CO/... 5.0 FINAL
STANLEY /DAVISS CO/... 5.0
MACEO /DAVISS CO/... 4.0
PEMBROKE /CHRISTIAN CO/... 5.7
HOPKINSVILLE /CHRISTIAN CO/...5 TO 7 DRIFTS TO
NEAR A FOOT
NWS PADUCAH /MCCRACKEN CO/... 4.7 FINAL
CADIZ /TRIGG CO/... 6.0 ESTIMATED FINAL
DAWSON SPRINGS /HOPKINS CO/... 4.0 FINAL
MADISONVILLE /HOPKINS CO/... 5 TO 7 FINAL
MORTONS GAP /HOPKINS CO/... 6 TO 7
MAYFIELD /GRAVES CO/... 4 TO 5 FINAL
CUBA /GRAVES CO/... 6.0 FINAL
MURRAY /CALLOWAY CO/... 4.0 FINAL
NORTHERN CALLOWAY CO... 5.4
BEACH GROVE /MCLEAN CO/... 4 FINAL
CALHOUN /MCLEAN CO/...6.5 FINAL
GREENVILLE /MUHLENBERG CO/... 6.2 FINAL
BROWDER /MUHLENBERG CO/... 5.0 FINAL
CLINTON /HICKMAN CO/... 6.0 FINAL
BENTON /MARSHALL CO/... 6.4 FINAL
MARION /CRITTENDEN CO/...4.7

INDIANA

EVANSVILLE /VANDERBURGH CO/... 8.5 FINAL
EVANSVILLE AIRPORT /VANDERBURGH CO/... 6.0
FINAL
SOUTHEAST SIDE OF EVANSVILLE
/VANDERBURGH/... 5.5
BOONVILLE /WARRICK CO/... 6.5 FINAL
NEWBURGH /WARRICK CO/... 6.0 DRIFTS TO 1.5 FT
ROCKPORT /SPENCER CO/... 6.8
GRANDVIEW /SPENCER CO/... 5.5 FINAL
FORT BRANCH /GIBSON CO/... 1 FINAL

ILLINOIS

ZEIGLER /FRANKLIN CO/... 3.7
THOMPSONVILLE /FRANKLIN CO/... 5.0
BENTON /FRANKLIN CO/... 4.0 FINAL
GALATIA /SALINE CO/... 5.0 FINAL
ELDORADO /SALINE CO/... 6.0
HARRISBURG /SALINE CO/... 8.0 FINAL
CARRIER MILLS /SALINE CO/... 6.5
CAIRO /ALEXANDER CO/... 5.5 FINAL
MOUNT VERNON /JEFFERSON CO/... 1.0 FINAL
CARMi /WHITE CO/... 6.1 FINAL
NORRIS CITY /WHITE CO/... 6.0 FINAL
VIENNA /JOHNSON CO/... 7.7 FINAL
JONESBORO /UNION CO/... 6.5 FINAL DRIFTS TO 16 IN.
ROUND KNOB /MASSAC/... 5 FINAL
MARION /WILLIAMSON/... 4.75 FINAL
PINCKNEYVILLE /PERRY/... 3 TO 4 FINAL
DU QUOIN /PERRY CO/... 2.5
SHAWNEETOWN /GALLATIN CO/... 5.0 FINAL

4. Flight Summary

The flight was a shortened mission which consisted of a ferry from Boulder to Peoria, diverted southward so that one pass could be made through the cyclone. Since only one pass was made, we chose to fly at an altitude of 4.5 km. The aircraft first passes through the tail region of the wrap-around where significant banding was observed, with narrow bands extending to 9 km, 2-3 km above the top of the continuous stratiform cloud. The banding became less significant as we approached the dry slot. Within the dry slot, a shallow stratiform deck was present, with a top exactly at 4.5 km, the aircraft altitude. The cloud tops contained significant supercooled water, leading to rapid aircraft icing. The aircraft turned toward Peoria within the dry slot, and climbed to escape the icing conditions. However, the clouds deepened to the north at almost the same rate as the aircraft ascended, keeping the aircraft in the cloud tops a longer time and increasing the ice accumulation. Fortunately the aircraft entered a deeper cloud area and the icing ceased. On the northward leg, the cloud tops exhibited turbulent structure with many narrow turrets. A broad frontal “anvil” was present as the aircraft flew northward to Peoria.

C-130 Flight RF-07 Flight track

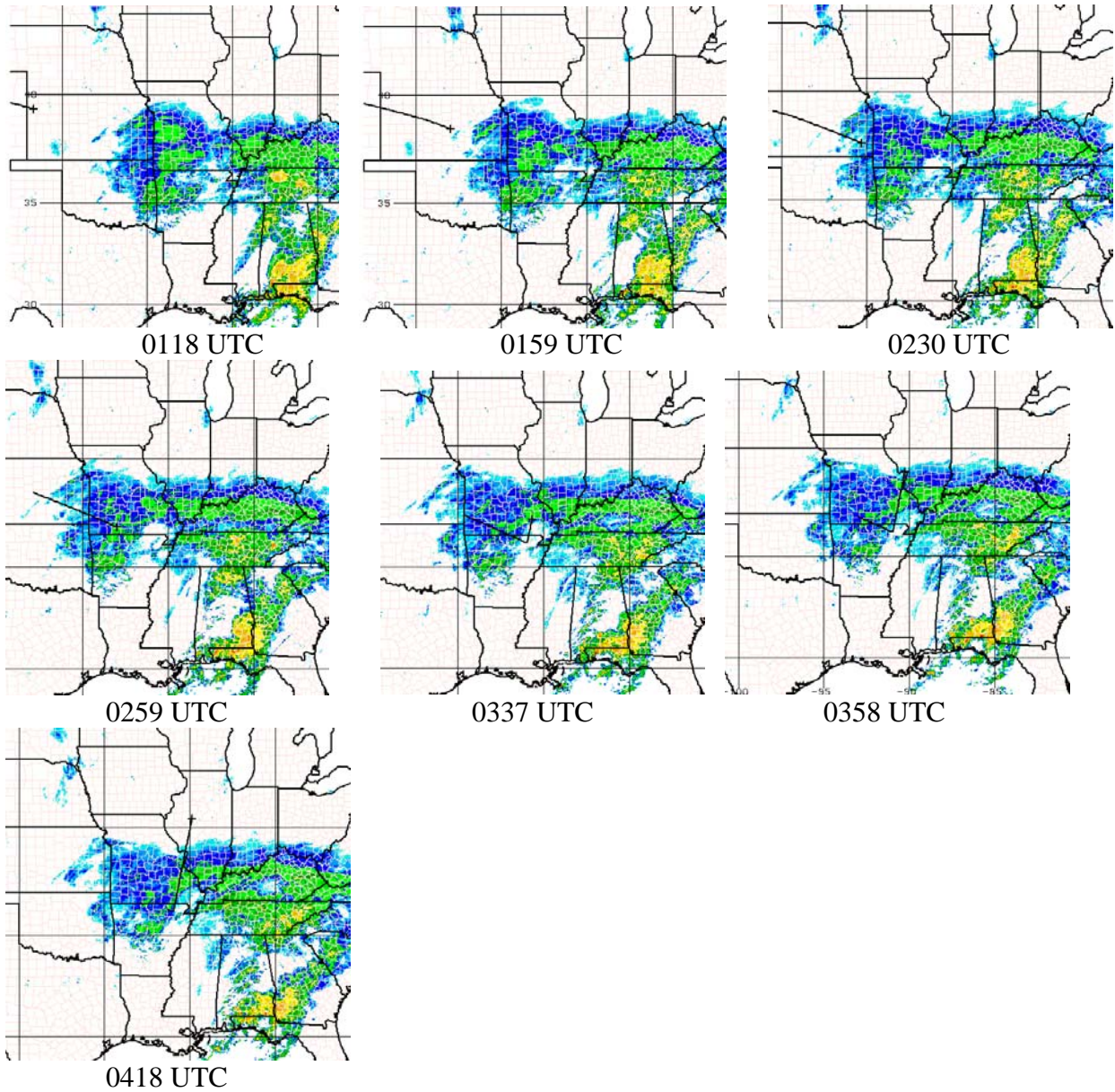
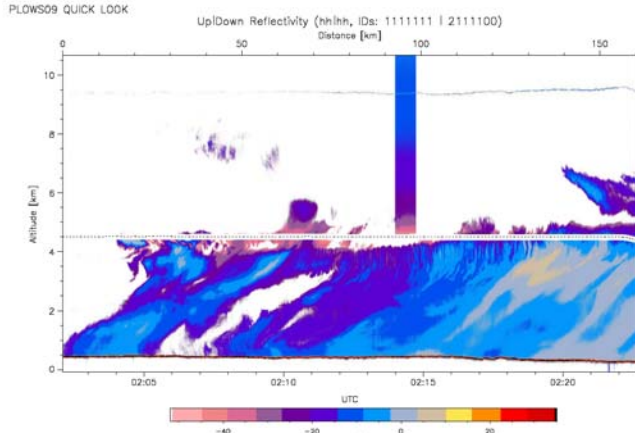
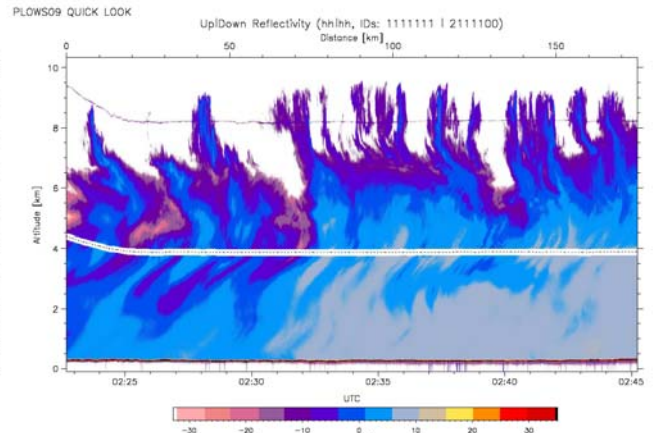


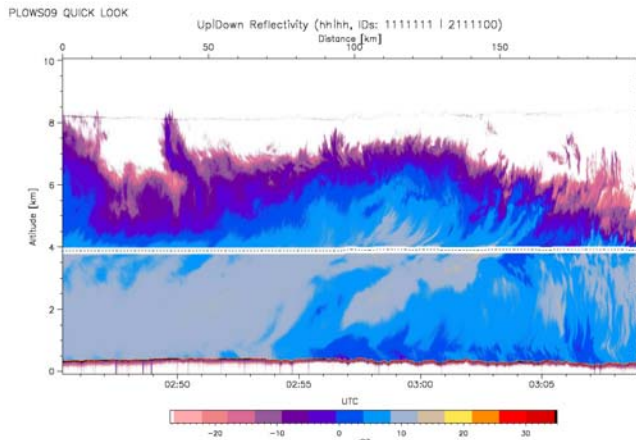
Figure 7: C-130 flight track overlaid on radar composites from 0118 UTC 30 Jan 10 through 0418 UTC 30 Jan 10. Times shown are the times of the radar composites. The flight track for the period just before the composite is shown.



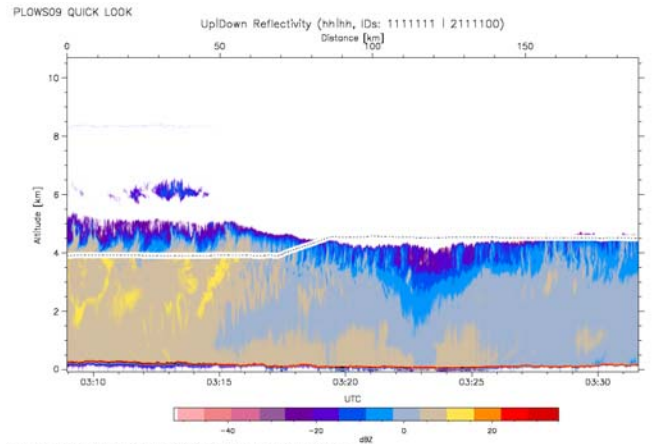
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0202 UTC to 0222 UTC



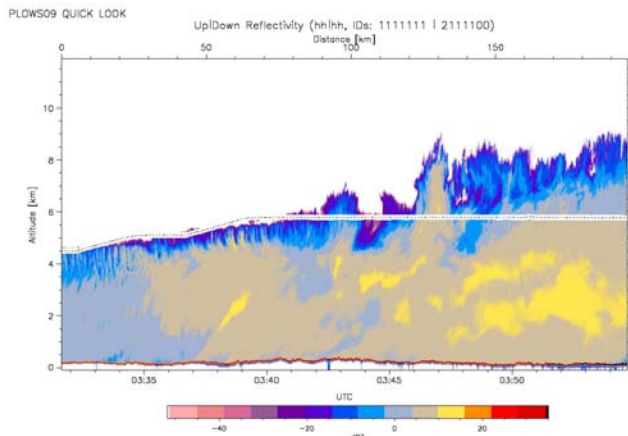
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0222 UTC to 0245 UTC



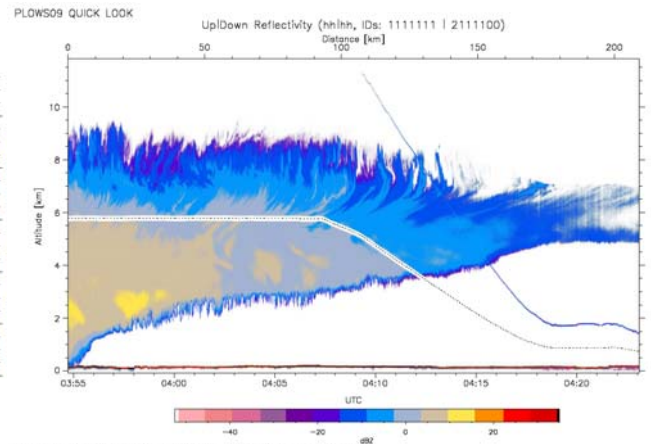
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0245 UTC to 0309 UTC



Man Feb 1 17:49:28 2010 WCR_PLOW509_20100130.030858_033137.CPP.dBZh1.updown
0309 UTC to 0332 UTC



Man Feb 1 17:50:27 2010 WCR_PLOW509_20100130.033138_035443.CPP.dBZh1.updown
0331 UTC to 0355 UTC



Man Feb 1 17:51:33 2010 WCR_PLOW509_20100130.035444_042306.CPP.dBZh1.updown
0355 UTC to 0423 UTC

Fig. 8: Wyoming Cloud Radar Quicklook of radar reflectivity between 0202 UTC 30 Jan 10 and 0423 UTC 30 Jan 10.

5. MIPS operations: Not used

6. MAX operations: Not used

7. MISS 915 MHz Profiler

The MISS operated in Vienna, IL. A long period of no precipitation occurred as elevated snowfall fell into a dry layer and sublimated. Eventually light snow reached the ground. Heavy snow began about 19Z on the 29th and continued for several hours. The system was shut down prior to the termination of precipitation because the generator was very close to failing and was nearly shutting down every few minutes.

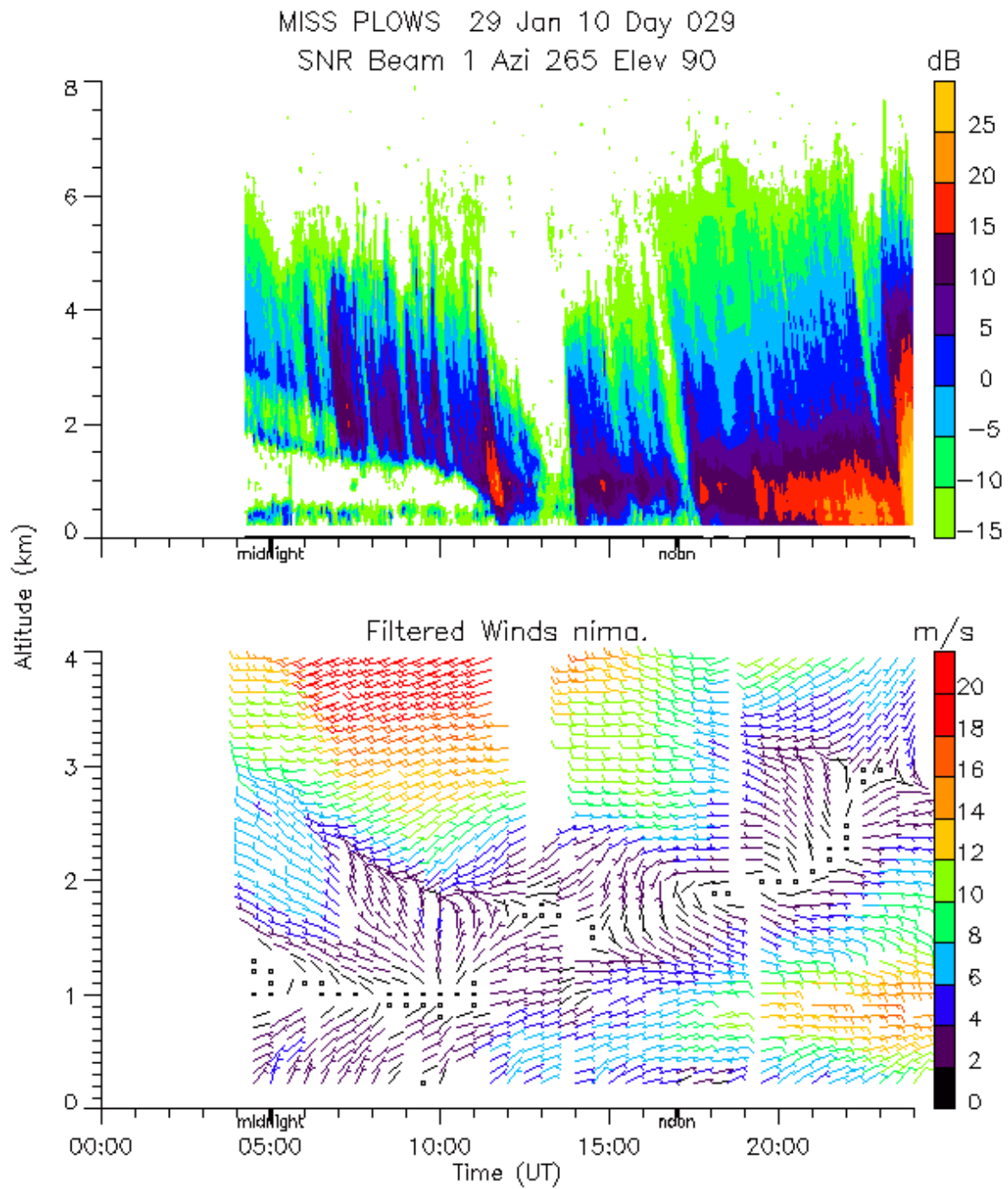


Figure 9: MISS 915 MHz Profiler Winds
for the period of operation 0430 UTC 29 Jan 10 through 0000 UTC 30 Jan 10

MISS PLOWS 30 Jan 10 Day 030
SNR Beam 4 Azi 265 Elev 90

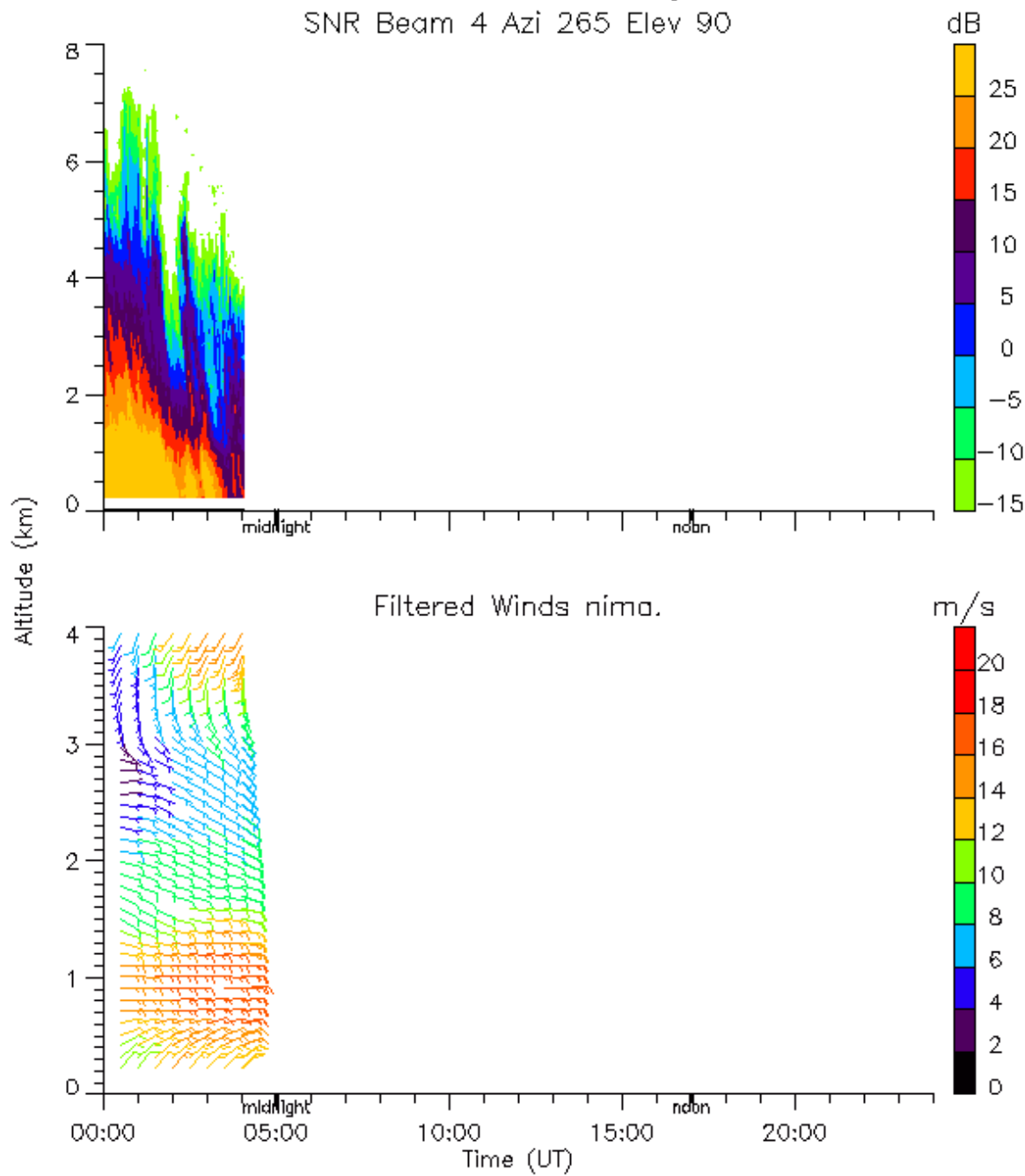


Figure 10: MISS 915 MHz Profiler Winds
for the period of operation 0000 UTC 30 Jan 10 through 0500 UTC 30 Jan 10

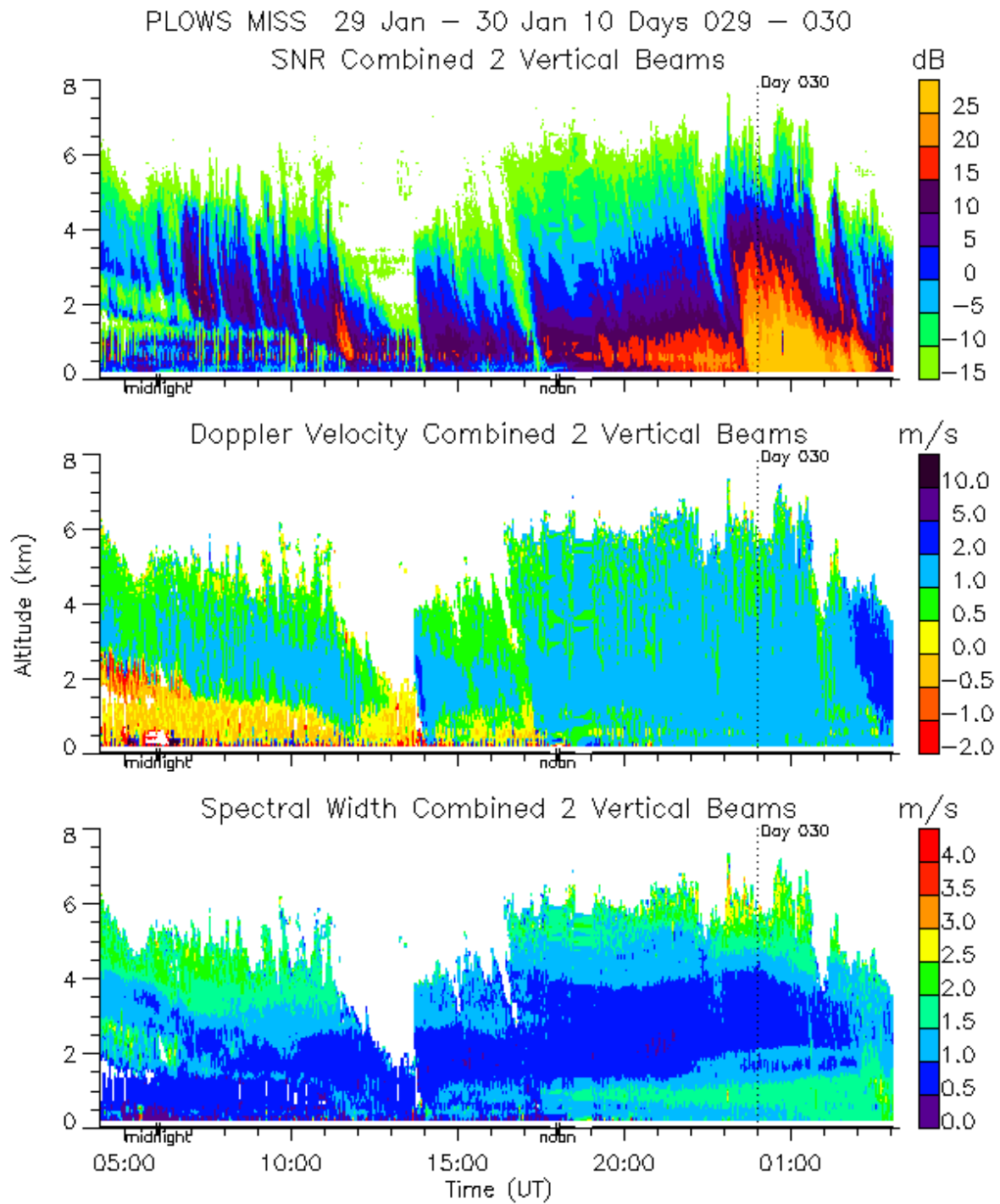


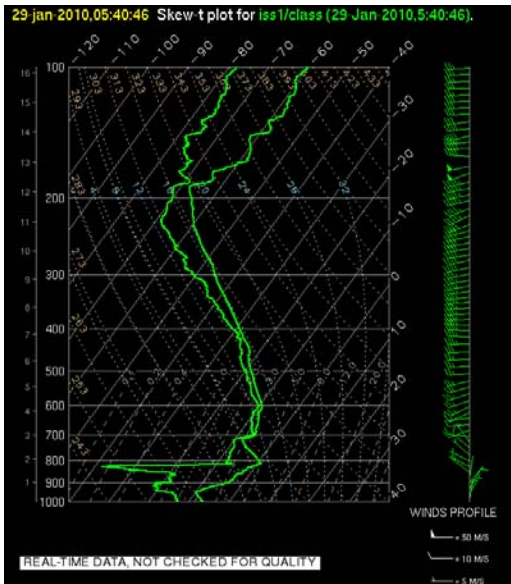
Figure 11: MISS 915 MHz Profiler SNR (top), Radial Velocity (center) and Spectral Width (bottom) for period from 0500 23 Jan 10 to 0400 UTC 30 Jan 10

8. Rawinsondes

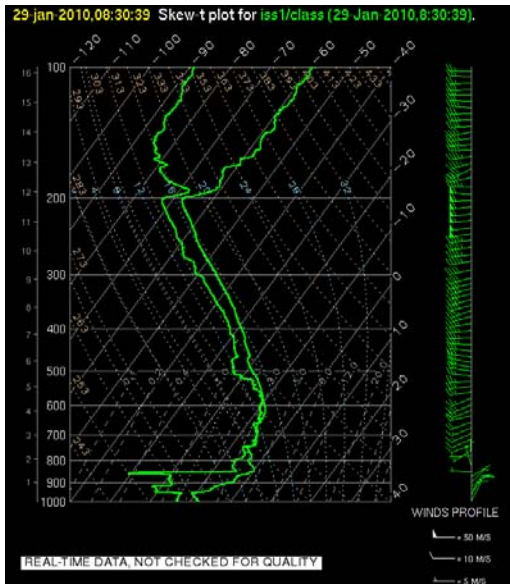
Rawinsondes were launched at the MISS site in Vienna, IL on a 3 hourly schedule. The following soundings were launched

DATE	Launch	Nominal Date and time		Status
2010 01 29	0540 UTC	2010 01 29	0600 UTC	Good
2010 01 29	0830 UTC	2010 01 29	0900 UTC	Good
2010 01 29	1129 UTC	2010 01 29	1200 UTC	Good
2010 01 29	1426 UTC	2010 01 29	1500 UTC	Good
2010 01 29	1730 UTC	2010 01 29	1800 UTC	Good
2010 01 29	2041 UTC	2010 01 29	2100 UTC	Good
2010 01 30	2331 UTC	2010 01 29	0000 UTC	Good
2010 01 30	0227 UTC	2010 01 29	0600 UTC	Good

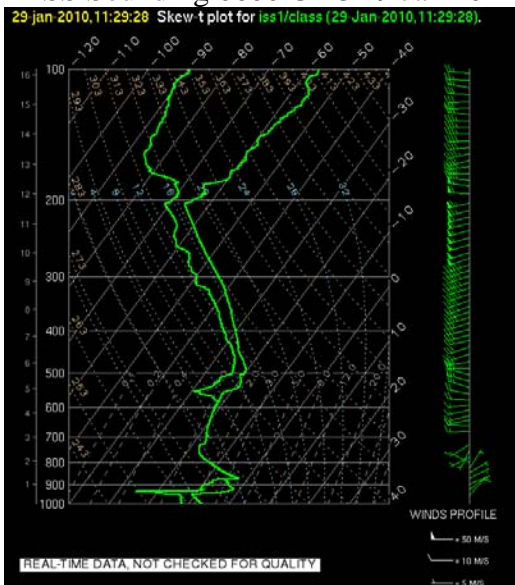
Rawinsondes were launched not launched by Missouri during this IOP.



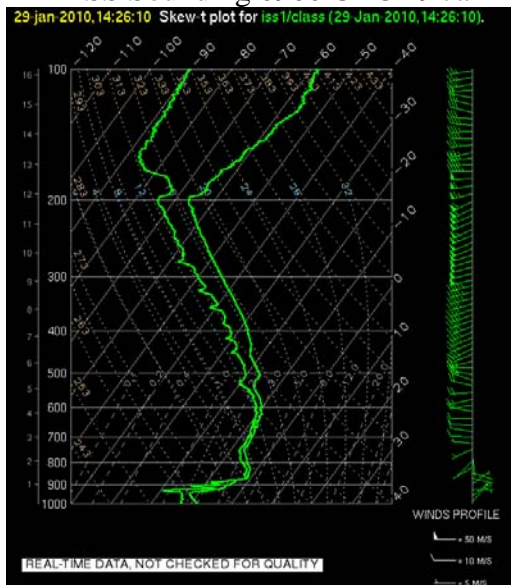
MISS Sounding 0600 UTC 29 Jan 10



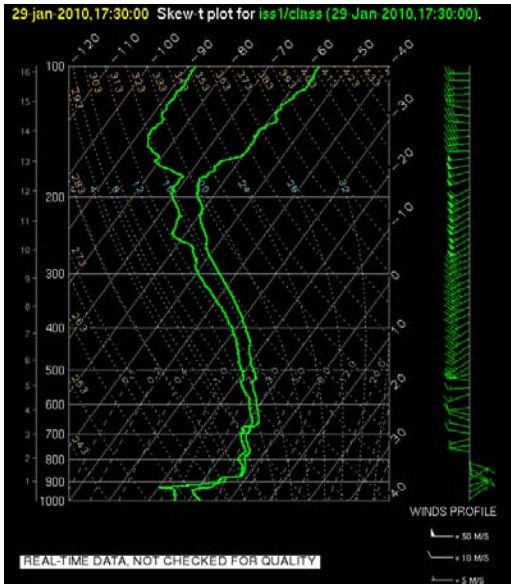
MISS Sounding 0900 UTC 29 Jan 10



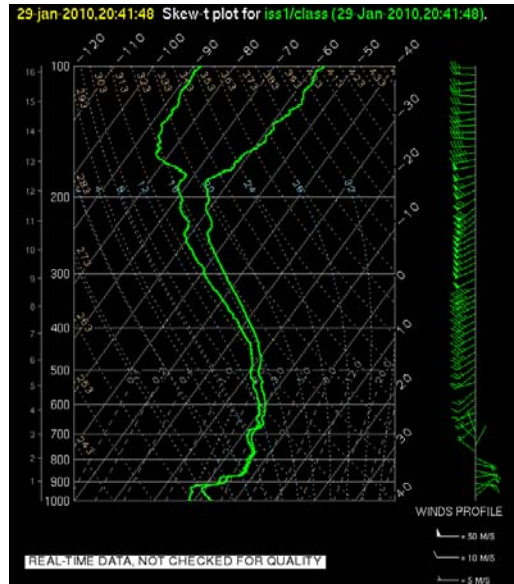
MISS Sounding 1200 UTC 29 Jan 10



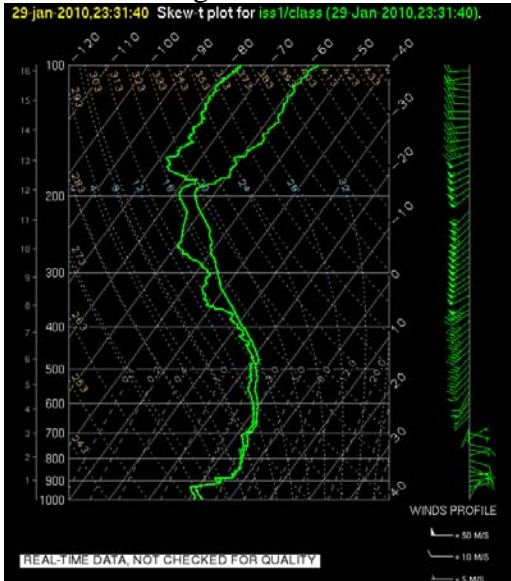
MISS Sounding 1500 UTC 29 Jan 10



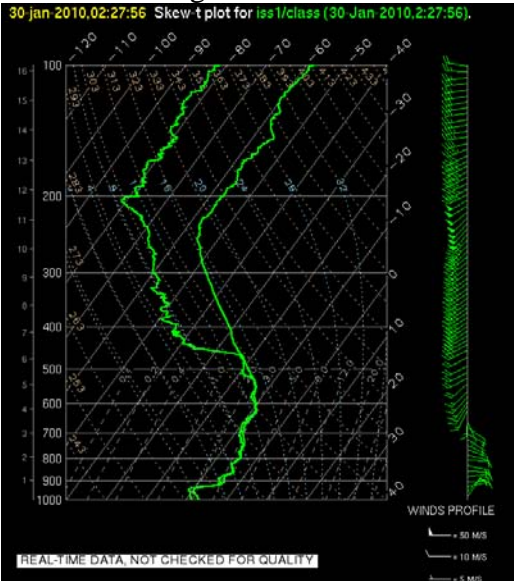
MISS Sounding 1800 UTC 29 Jan 10



MISS Sounding 2100 UTC 29 Jan 10



MISS Sounding 0000 UTC 31 Jan 10



MISS Sounding 0300 UTC 30 Jan 10