February 12-13, 2010 Heavy Snow Event

OPEN-FILE REPORT

South Carolina Department of Natural Resources
Land, Water and Conservation Division
South Carolina State Climatology Office

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March 12, 2010

HEAVY SNOW EVENT

Event Summary:

A weak wave of low pressure and associated trough tracked across Texas on 11 February 2010 (Fig. 1). This feature tracked along the southern periphery of firmly entrenched ridge of cold, dry Arctic high pressure. A large, slow moving deep low pressure system east of the Gulf of Maine forced a tight pressure gradient that channeled cold dry, Arctic air over South Carolina. This strong northerly flow brought freezing temperatures to the Gulf Coast and South Carolina. Deepening as it tracked across Texas, the transitory low pressure feature delivered a record breaking 12.5 inches of snow to the Dallas-Fort Worth area. Snowfall accumulations from 2-10 inches were observed over inland areas from eastern Texas eastwards through southern Georgia on 12 February.

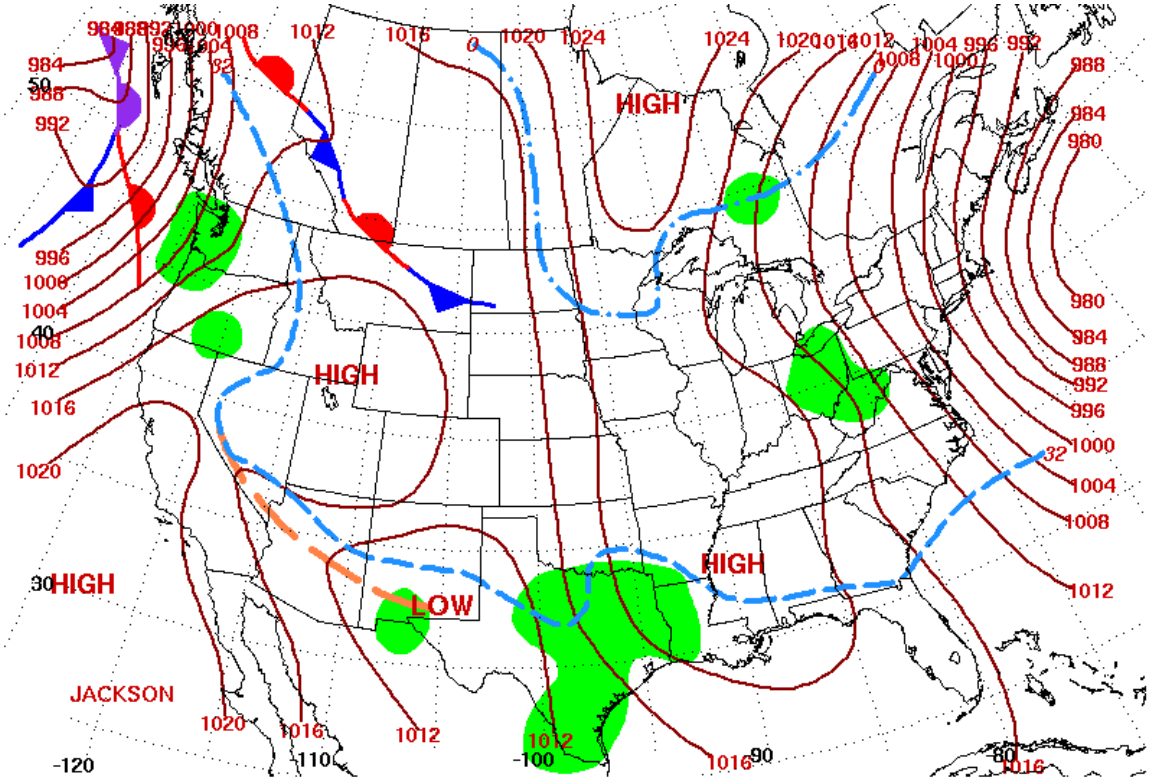

Figure 1. Synoptic situation 1200Z 11 FEB 2010 (NOAA, HPC).

Over the Gulf of Mexico the low pressure system that brought so much snow to central Texas, and across the Gulf States continued to deepen rapidly. This system tracked quickly across the Gulf showing a large, well developed comma-shaped cloud shield that covered the southeast US. (Figs. 2 and 3).

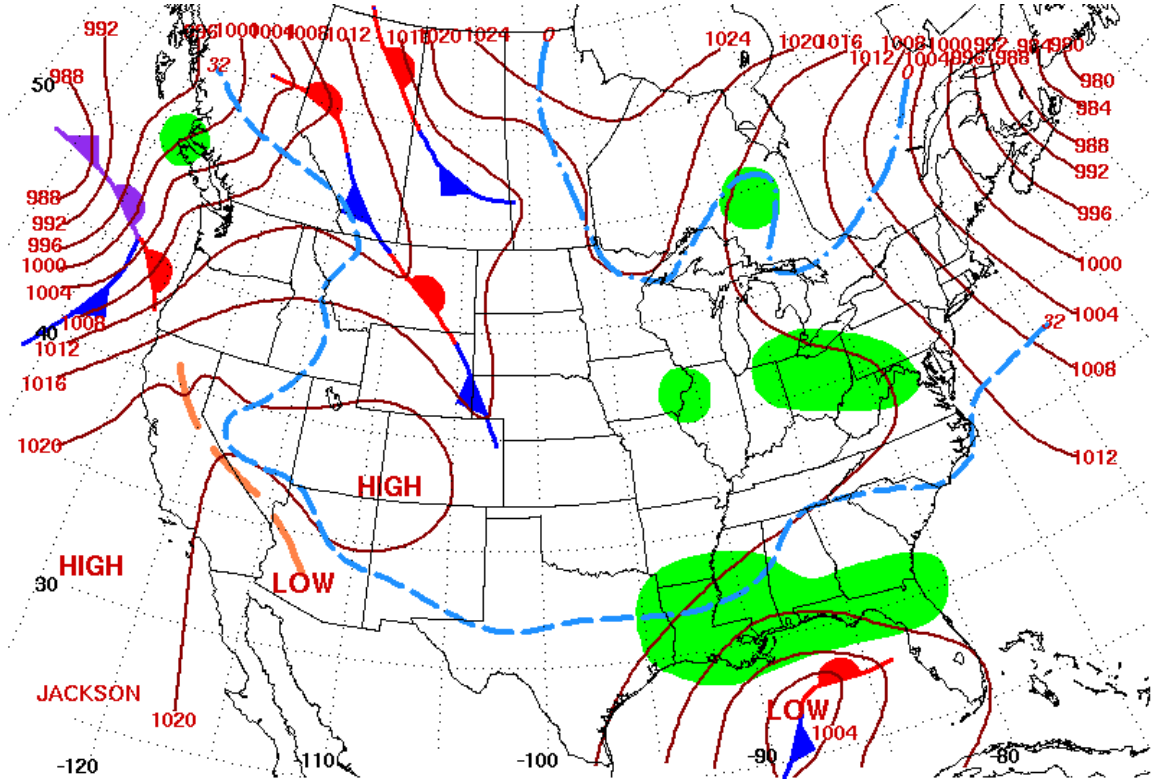

Figure 2. Synoptic situation 1200Z 12 FEB 2010 (NOAA, HPC).

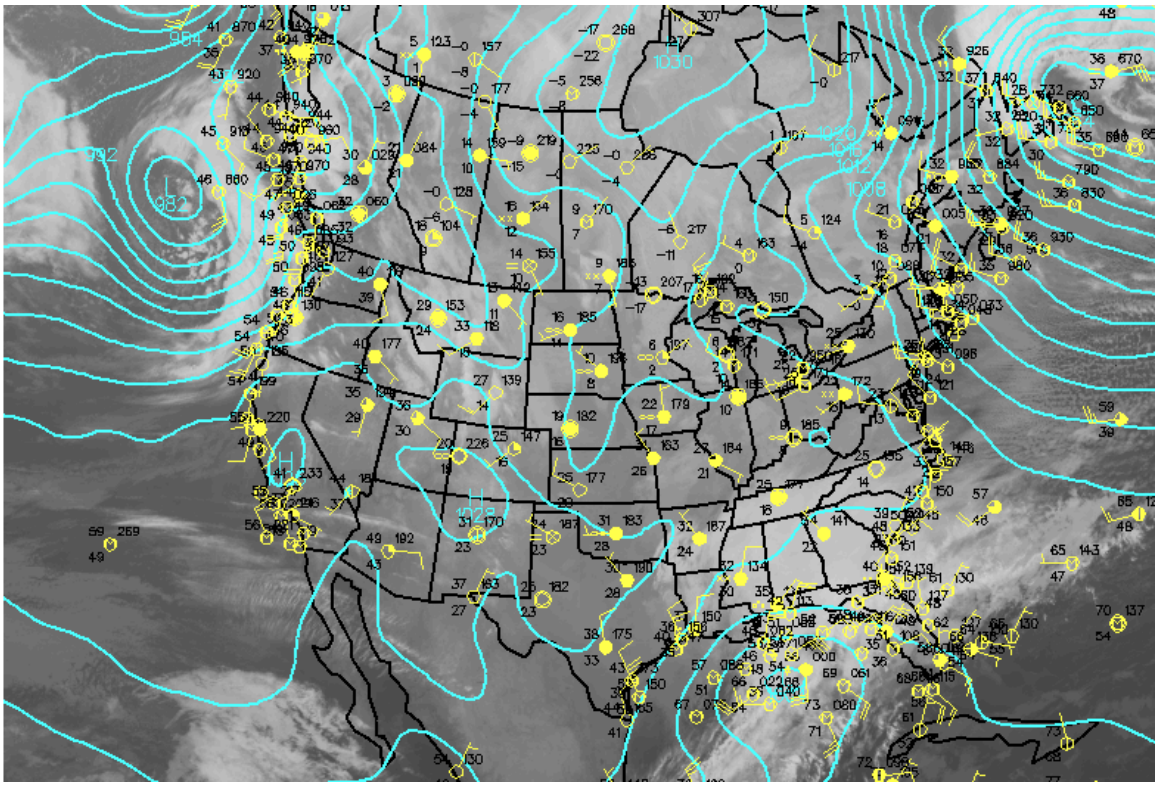
Figure 3. 1200Z 12 FEB 2010 Infra-red image, observations, with GFS analysis overlay. (San Francisco State University).

The Gulf of Mexico low continued across central Florida and intensified further to become a powerful Nor'easter (Fig. 4) as the storm emerged over the Atlantic along Florida's east coast. This storm produced two to eight inches of snow across South Carolina with the highest accumulations across the Midlands and Pee-Dee. Snow fall began on the early afternoon of 12 February and continued until just before sunrise on 13 February. Temperatures rebounded quickly on 13 February under clear sunny skies and rapidly melted the majority of the snow in.

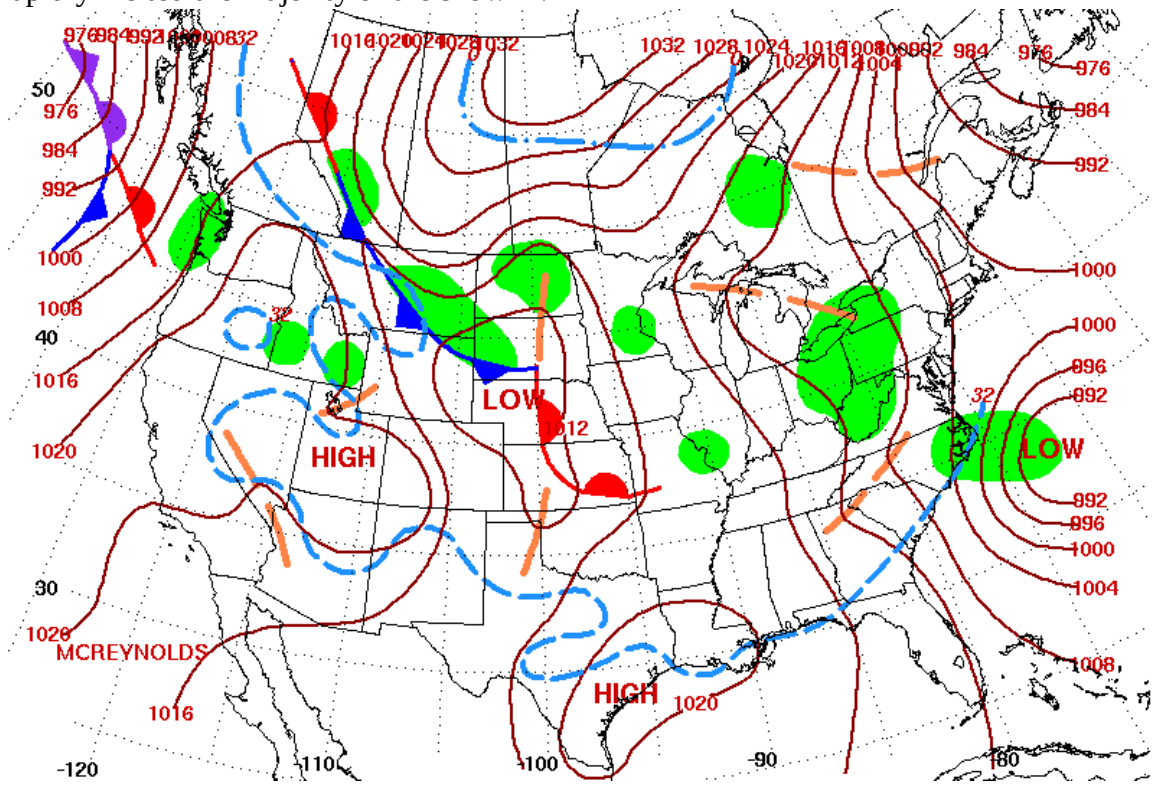

Figure 4. Synoptic situation 1200Z 13 FEB 2010 (NOAA, HPC).

Forecast Considerations:

The primary synoptic players in the 12-13 February heavy snow event were: the transitory deepening low ejected into the Gulf of Mexico, the broad Arctic Ridge over the central and eastern portions of the United States, and a deep slow moving low pressure center near Newfoundland. The transitory Gulf low followed the ideal trajectory that allowed Gulf low level moisture to mix with the entrenched Arctic air over the US.

Enhancing these large scale synoptic features was an extremely strong 250 mb jet (Fig 5). This 175 knot jet created a wide area of upper level divergence that energized the transitory low as it crossed central Florida. This divergence provided enhanced upward vertical velocities for the moist Gulf air advected in by the southwesterly 500-850mb winds shown in figures 6 though 9 below. This progressive moistening of the lower levels is reflected in the Charleston upper air soundings (Figs. 10-12).

The evolution of the storm in the models was generally well forecasted with regards to track and strengthening of the migratory low; however, the models significantly under-forecasted the snowfall amounts (Fig. 13).

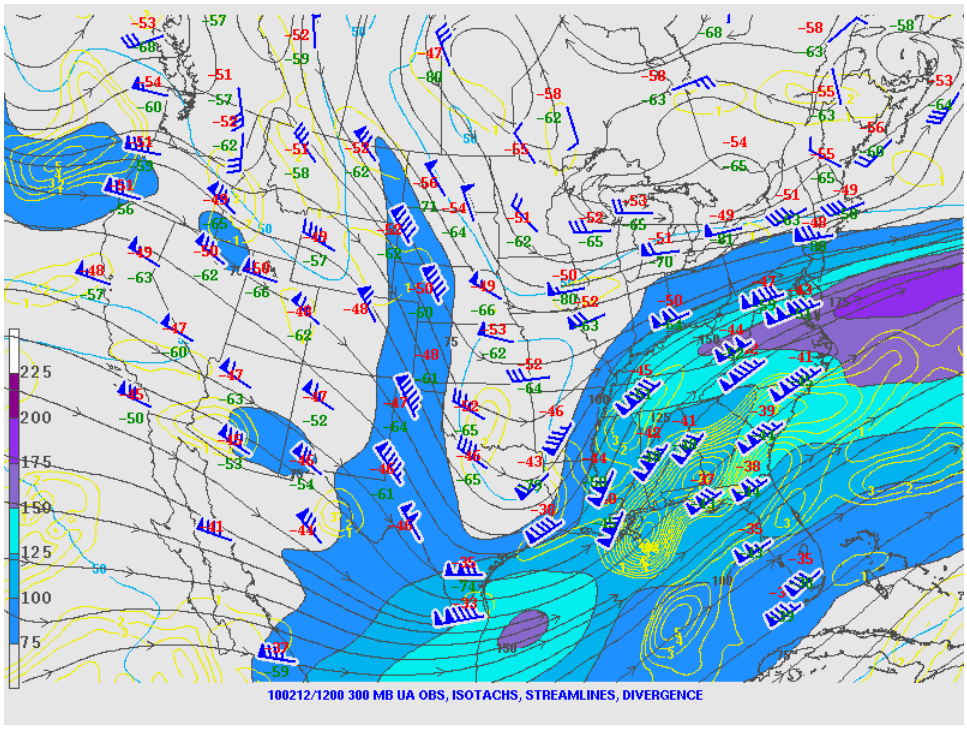

Figure 5. 250 mb 12Z 12 FEB analysis (NOAA-SPC).

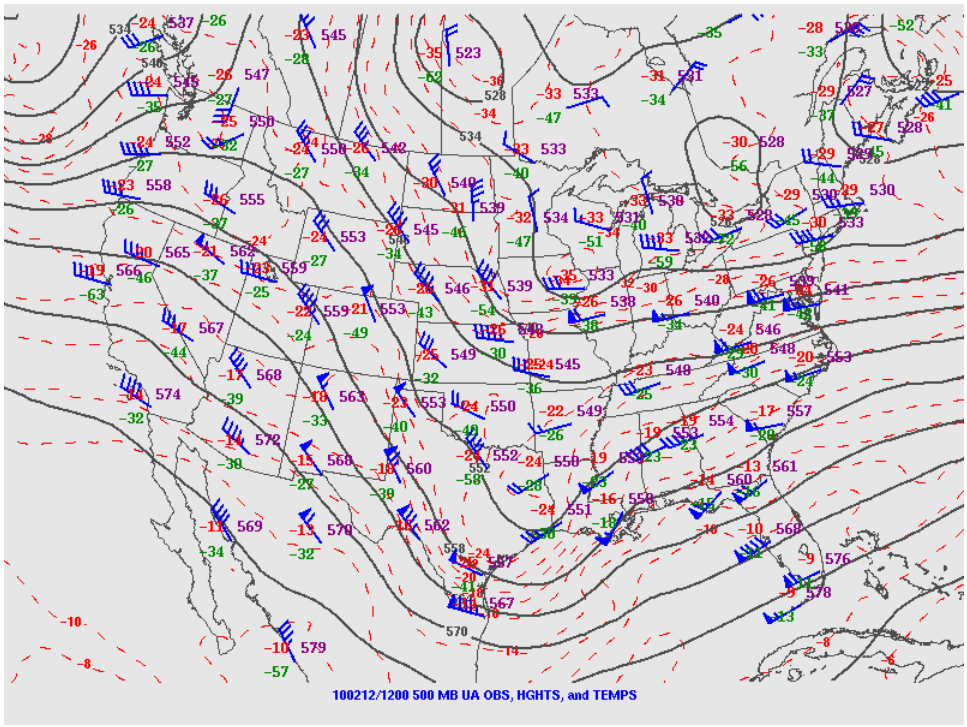

Figure 6. 500 mb 12Z 12 FEB analysis (NOAA-SPC).

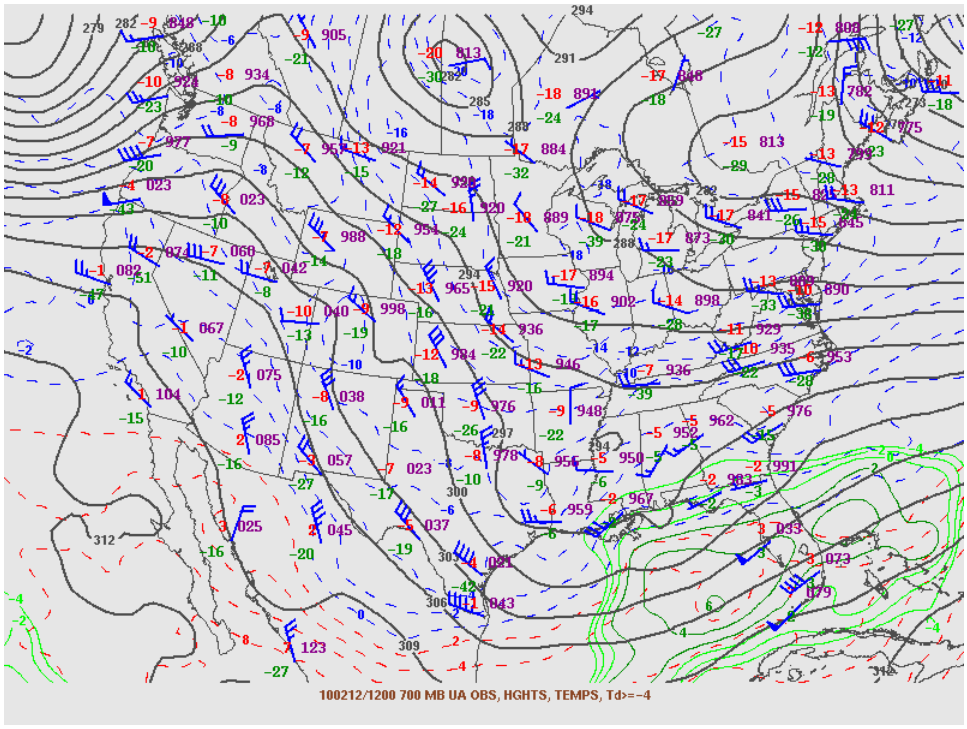

Figure 7. 700 mb 12Z 12 FEB analysis (NOAA-SPC).

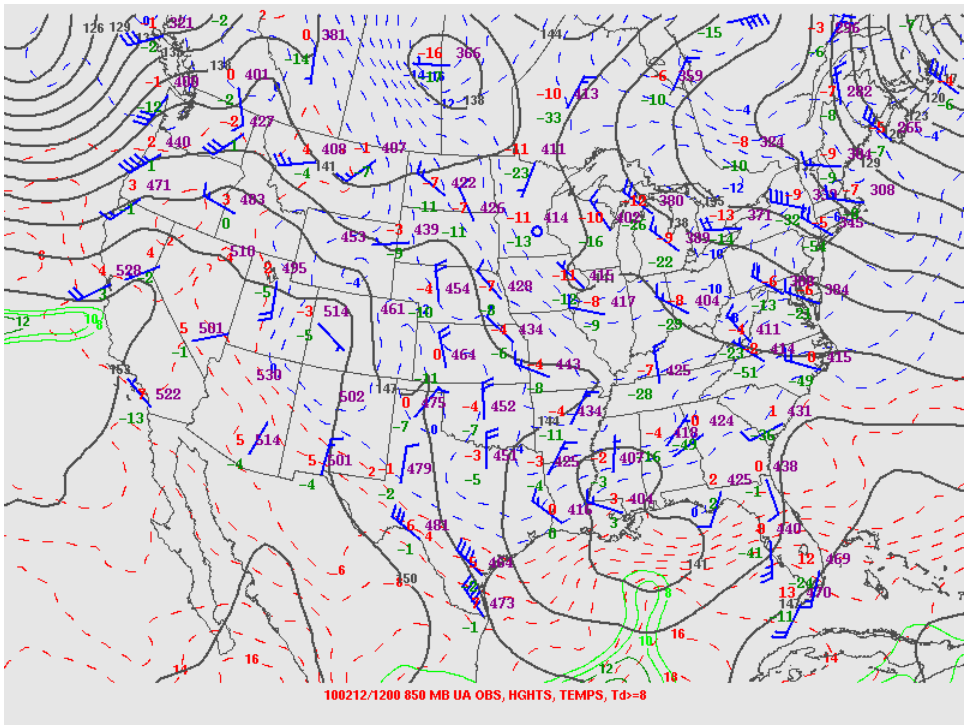

Figure 8. 850 mb 12Z 12 FEB analysis (NOAA-SPC).

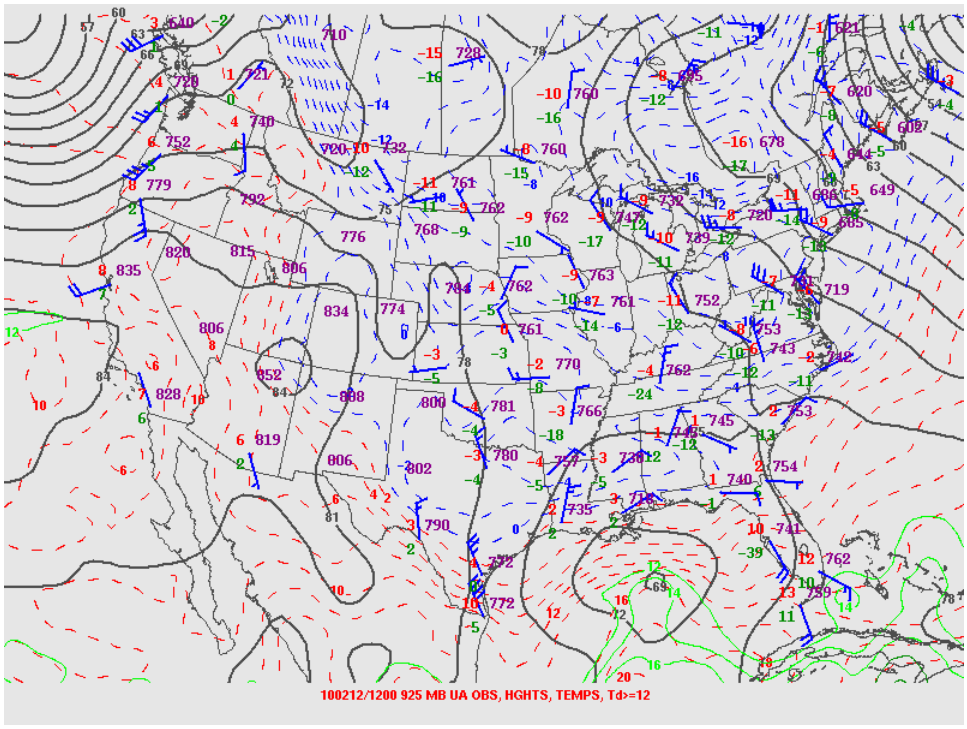

Figure 9. 925 mb 12Z 12 FEB analysis (NOAA-SPC).

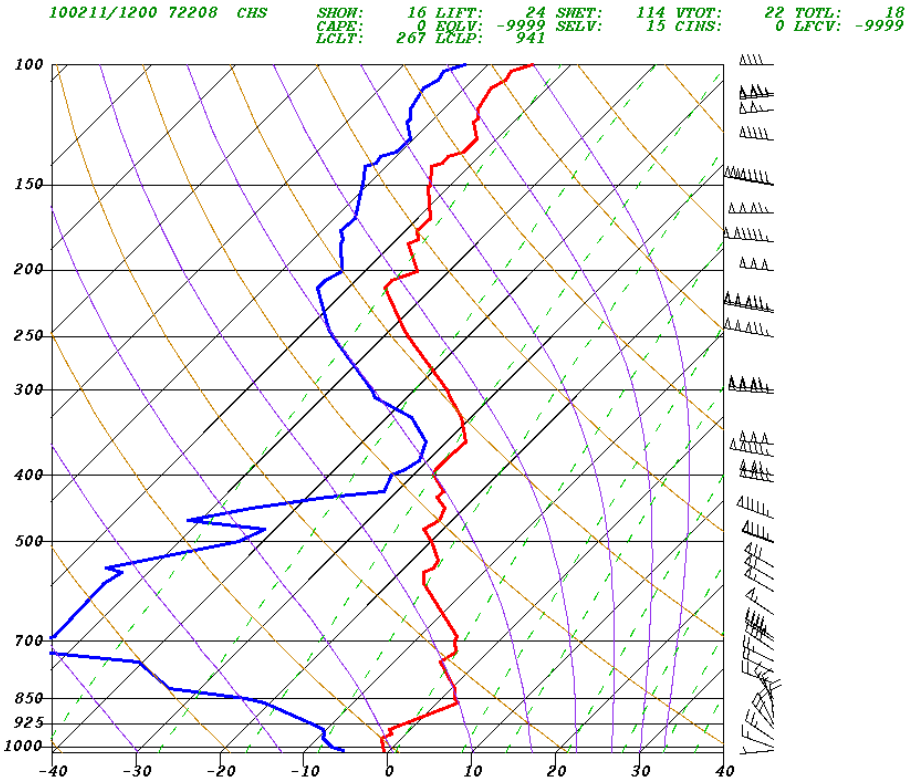

Figure 10. 12Z 11 FEB Charleston upper air sounding (Ohio State University).

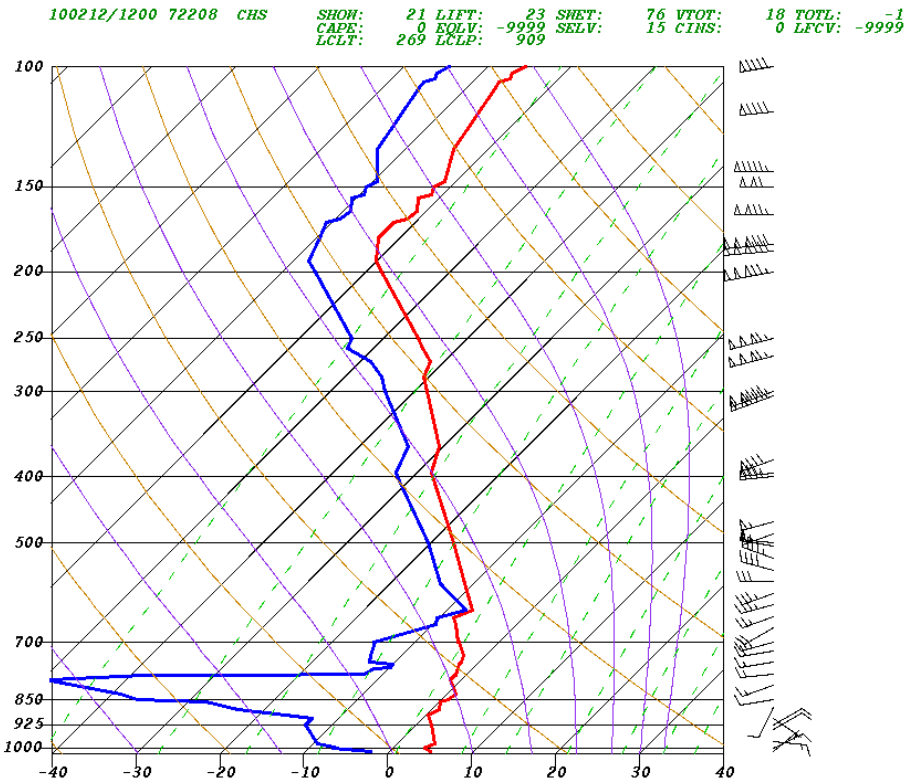

Figure 11. 12Z 12 FEB Charleston upper air sounding (Ohio State University).

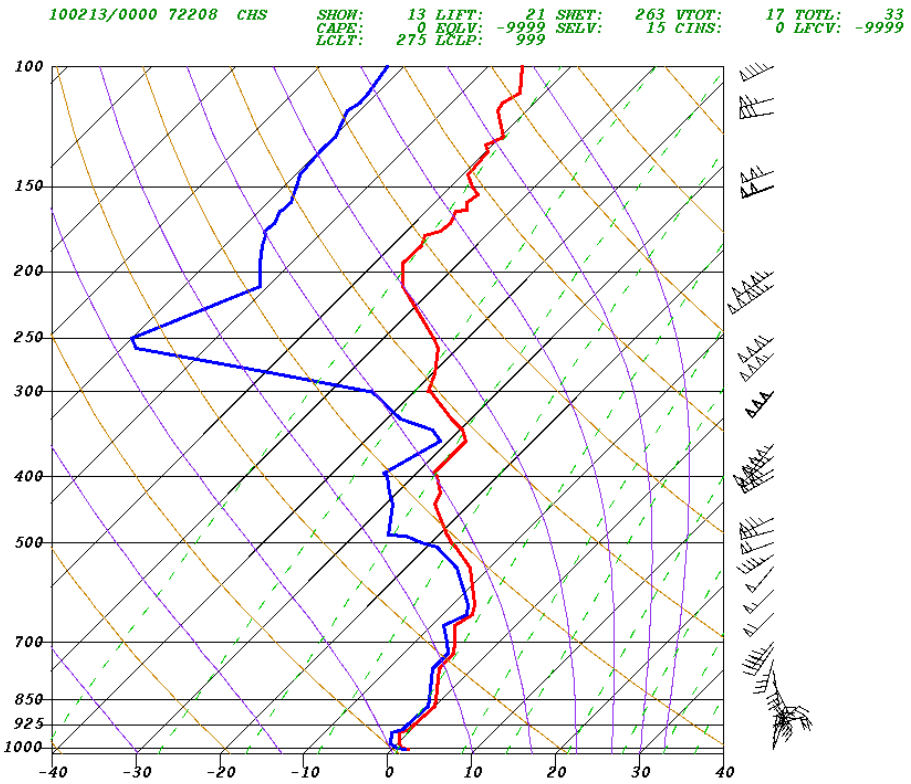

Figure 12. 00Z 13 FEB Charleston upper air sounding (Ohio State University).

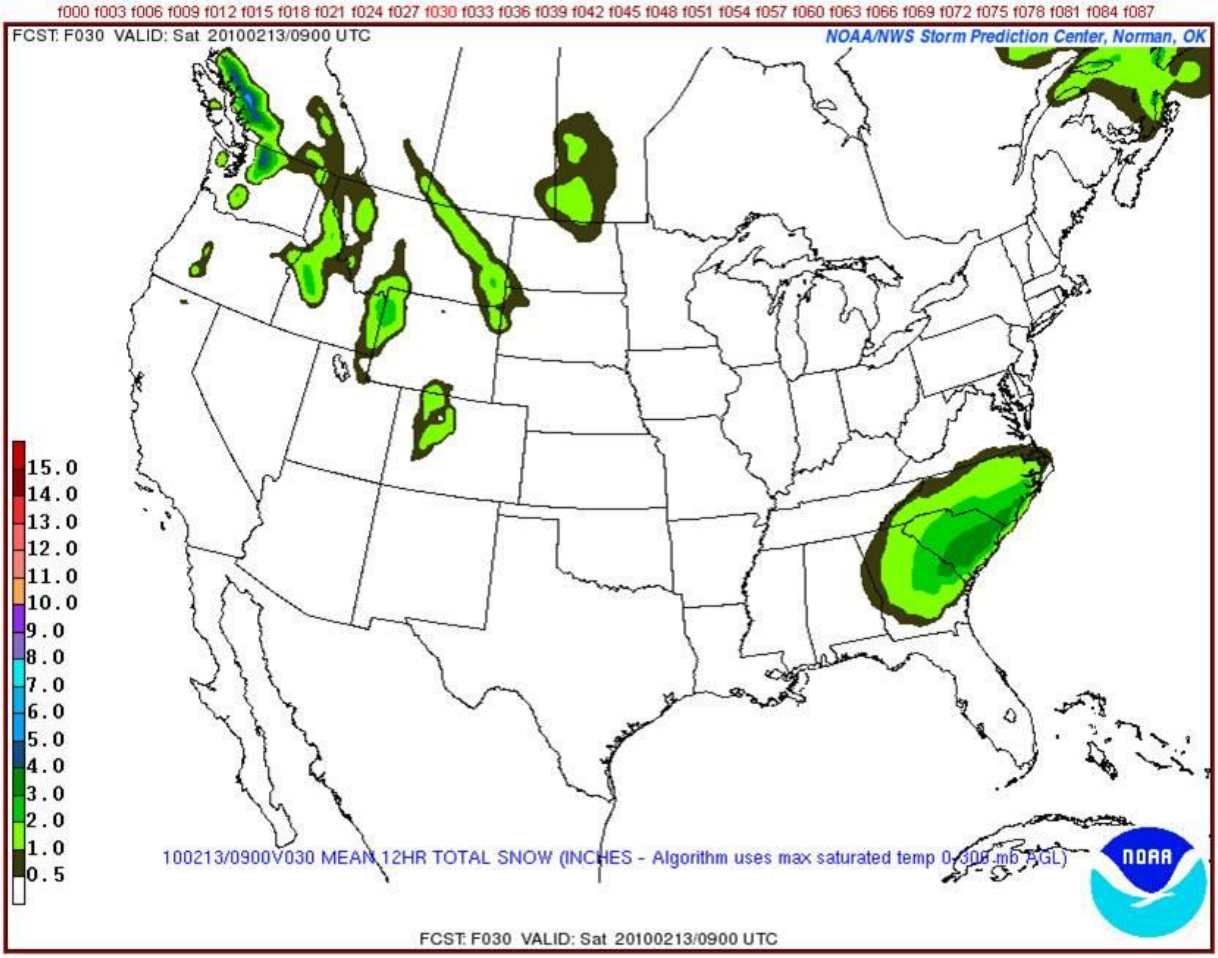

Figure 13. 0900Z 13 February NOAA-SPC SREF 12 hr mean total snow forecast.

South Carolina Effects:

Heavy snow caused treacherous driving and over 1500 auto accidents on 12 February. 37,000 homes lost power. The South Carolina Emergency Management Division's Emergency Operations Center was partially activated to coordinate State law enforcement and Department of Transportation response efforts. Figure 14 shows the distribution of snow accumulation reported across the State by 7 AM 13 February. Selected snowfall totals are listed below for various State locations.

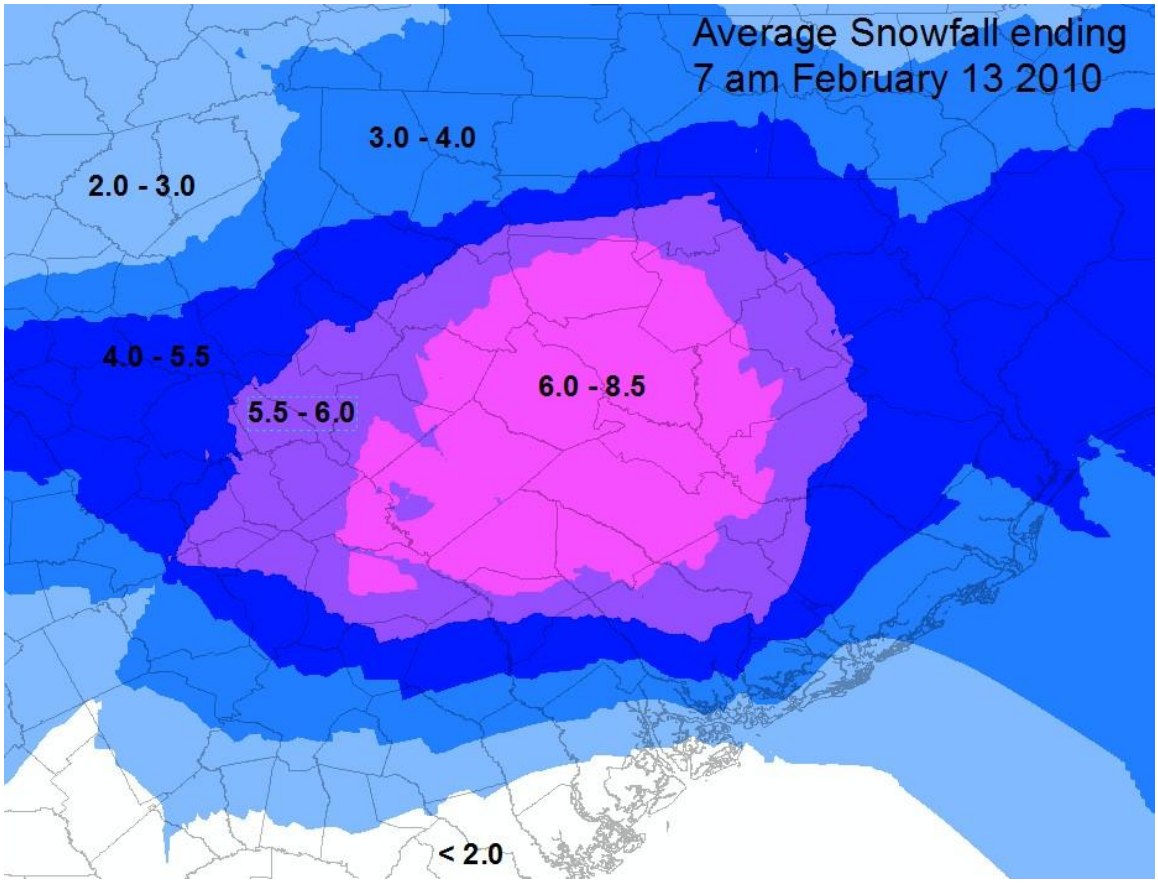

Figure 14. Observed Snow Totals February 13, 2010 (NWSFO Columbia)

Snowfall totals:

LOCATION	SNOWFALL (INCHES)	LOCATION	SNOWFALL (INCHES)
Columbia Metro	8.6	Bennettsville	4.5
Cayce	8	Georgetown	4.5
ST. Matthews	7.5	Loris	4.5
Bamberg	7	Conway	4.5
Bishopville	7	Surfside Beach	4.2
Lexington	7	Abbeville	4
North	7	Lockhart	4
Bowman	7	Catawba	4
Oatland	7	Lake City	4
Hemingway	6.8	Hebron	4
Forest Acres	6.5	Landrum	3.8
Camden	6	Florence	3.8
Orangeburg	6	Chester	3.5
Branchville	6	Myrtle Beach	3.5
Columbia	6	Greenville	3.4
Gaffney	6	Charleston AFB	3.4
Greeleyville	5.5	Marion	3.3
Winnsboro	5	Effingham	3.1
Blythewood	5	Barnwell	3
Sumter	5	Dillon	3
West Pelzer	5	Santuck	2.7
Darlington	5	Walhalla	2.5
Dovesville	5	Aynor	2.3
Kingstree	5	Table Rock	2
Mullins	4.8	Briarcliff Acres	2
Greenwood	4.5	Pageland	1

The following snow amounts and liquid equivalent were measured at the three National Weather Service Forecast Offices:

NWSFO	Snow Depth (inches)	Liquid Equivalent (inches)
Greenville-Spartanburg	4.4	0.44
Columbia Metro Airport	8.6	0.42
Charleston AFB	3.4	0.41

Climatological Perspective:

The 8.6 inch snowfall on 12-13 February was the sixth biggest snow event in Columbia since 1878. The greatest snowfall event was 16 inches on 9-10 February 1973. Eight of the top ten snow events occurred during the month of February.

3.3 inches of snow at Charleston AFB on 12 February set a new daily maximum snow record. There were no previous snow events on this date. The 12-13 February snow event was the fourth highest snowfall in Charleston since 1938.

ACKNOWLEDGEMENTS:

Special thanks to the National Oceanic and Atmospheric Administration and its many divisions for the wealth of weather and climate data made available to prepare this report. Specific thanks to:

- NOAA Hydrometeorological Prediction Center
- NOAA Storm Prediction Center
- National Weather Service Office, Charleston, South Carolina
- National Weather Service Office, Columbia, South Carolina
- National Weather Service Office, Greenville-Spartanburg, South Carolina
- National Weather Service Office, Wilmington, North Carolina

Additional thanks to:

- The Ohio State University Atmospheric Sciences Program for the archived upper air analyses and skew-T Log P diagrams.
- The San Francisco State University Meteorology Program for the satellite image and forecast chart composite archive.