

## **Northern Plains and Upper Midwest Winter Storm – April 13-15, 2013**

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**Overview:** From April 13-15, 2013 a deep upper level low developed and moved eastward across the northern plains and the upper Midwest, producing late-season, anomalous snow accumulations across parts of the region (Fig. 1).

On 13 April a deep upper trough moved across western Canada and the northwestern U.S., with a strong upper jet extending from the eastern Pacific into the Great Basin. That evening an upper low within the trough began to weaken as it moved across southern Alberta. Meanwhile, a second center began to develop to its southeast (Fig. 2a). By the morning of 14 April this newly formed center had rotated into southeastern Montana (Fig. 2b). Moisture converging on the northwest side of this newly formed system fell as heavy snow across portions of central and eastern Montana. Meanwhile strong southerly flow ahead of the low advected deep moisture (Fig. 3) into a region of strong low level convergence and upper divergence (Fig. 4), which contributed to the development of heavy snows across parts of North Dakota and northern South Dakota. The upper low continued to deepen as it moved into the central Dakotas by the evening of 14 April (Fig. 2c). Snow moved east across Minnesota, Wisconsin and the Upper Peninsula of Michigan along an axis of strong low level frontogenesis (Fig. 5), while support for heavy snow continued across portions of the central and eastern Dakotas. The low moved east-northeastward into northern Minnesota by the morning of 15 April (Fig. 2d). Precipitation ahead of the low continued to move north through the upper Great Lakes region into southern Canada, while precipitation to the west was reduced to some scattered light snows across eastern North Dakota.

**Impacts:** Up to 14-in of snow fell across portions of northeastern Montana. Several new daily snowfall records were set, including Glasgow International Airport which received 6.4-in on 14 April. Widespread accumulations of over 12-in, with local amounts of up to 22-in, were reported across North Dakota and northern South Dakota, breaking numerous snowfall records there as well. At Bismarck Municipal Airport, the record snowfall amount for any day of the year was set when 17.3-in fell on 14 April, breaking a previous record that had stood for nearly 50-yr. Blizzard conditions were reported in Bismarck, with visibilities dropping to 0.25-mi, while winds gusted to over 35-mph on the morning of 14 April. A wintry mix fell further to the south, with up to 0.25-in ice accumulations reported over northeastern South Dakota. While snow accumulations to the east were generally lighter, numerous daily snowfall records were set across Minnesota and Wisconsin. The heaviest amounts across the region centered from the southern Red River valley to the Arrowhead region of Minnesota, where widespread accumulations of 4-8-in were reported (Table 1).

Scaled Snow Precipitation  
24-Hour Total Ending 2013-04-15 06

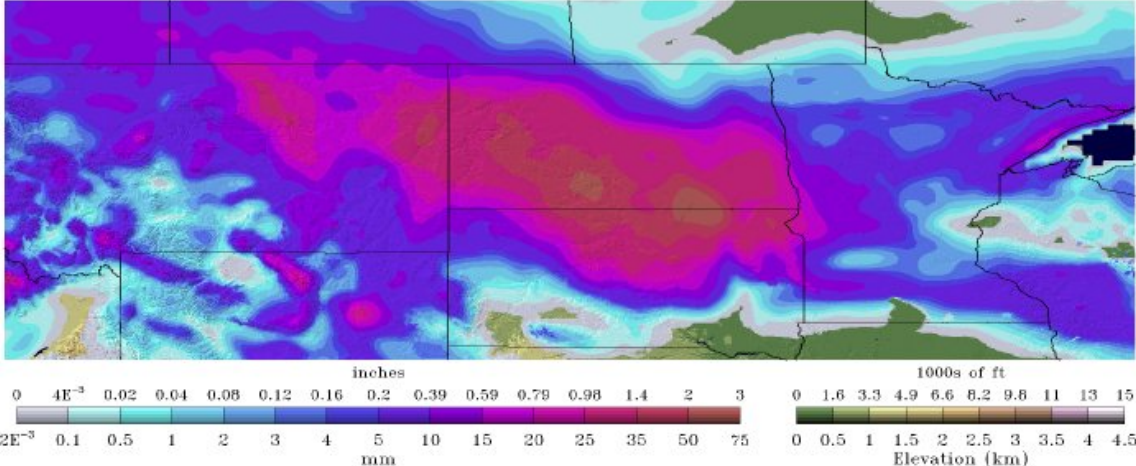


Figure 1: Scaled snow precipitation from 06 UTC on 15 Apr 2013 (NOHRSC).

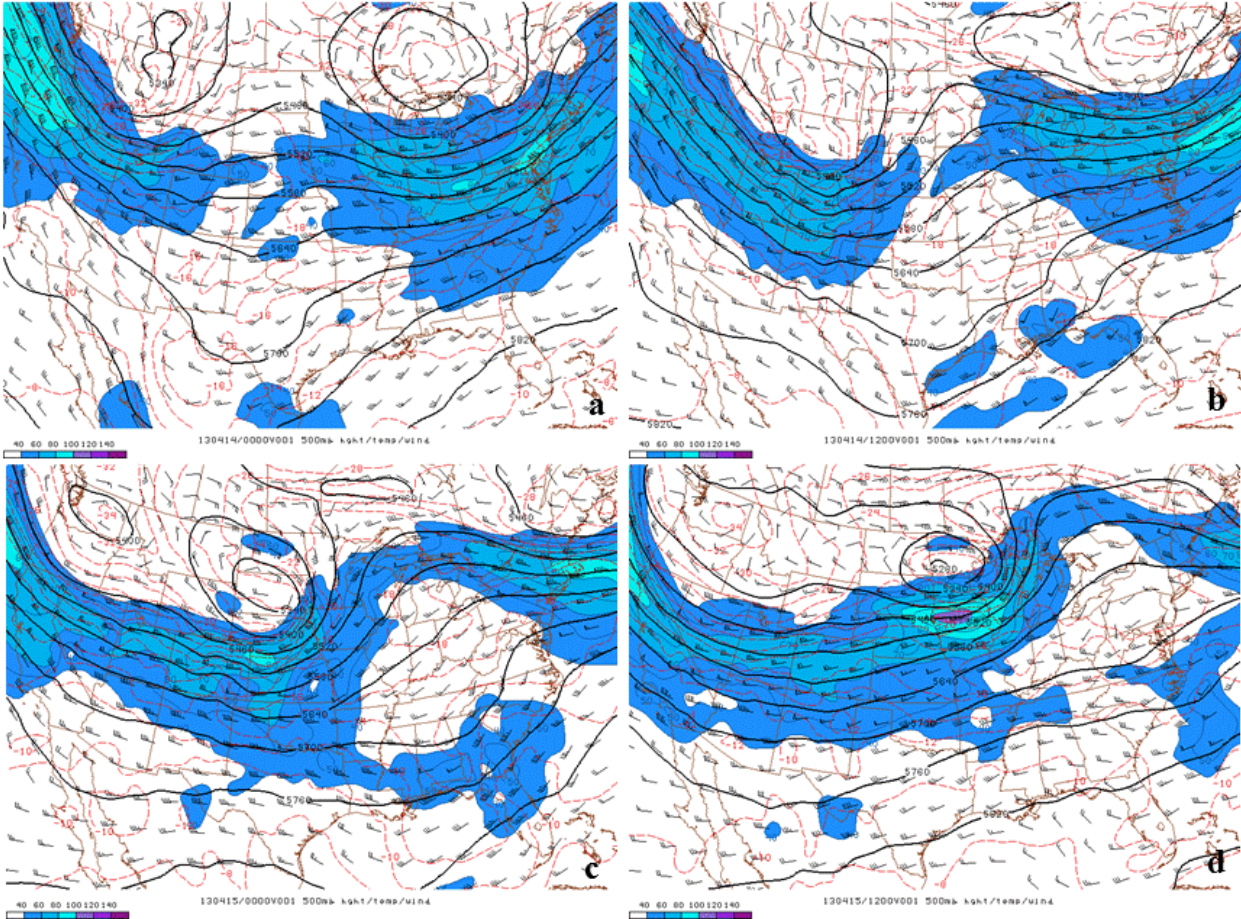
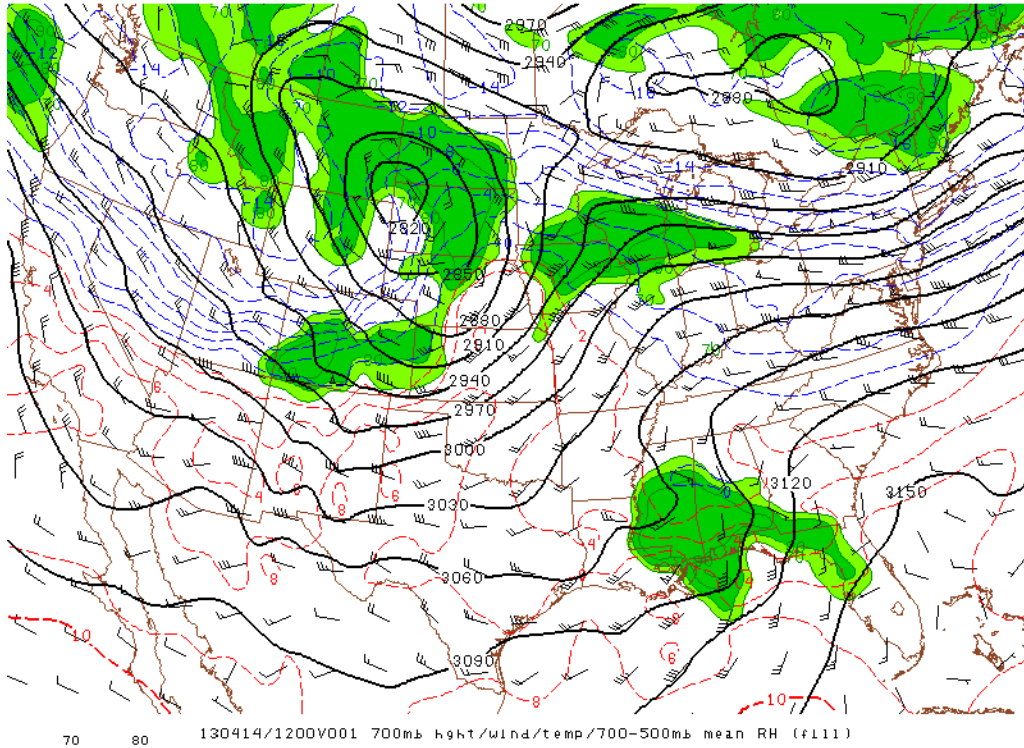
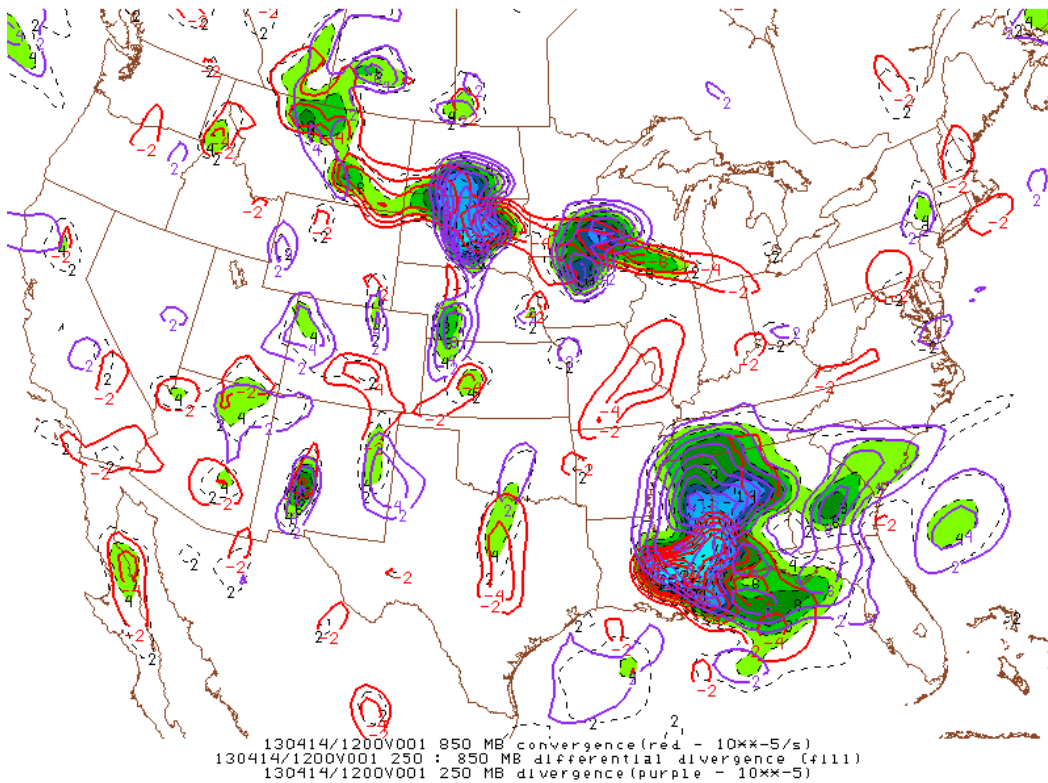


Figure 2: 500 hPa analysis, wind bards, wind speed (shaded) from (a) 00 UTC on 14 Apr 2013, (b) 12 UTC on 14 Apr 2013, (c) 00 UTC on 15 Apr 2013 and (d) 12 UTC on 15 Apr 2013 (SPC).



**Figure 3: 700hPa analysis, wind barsbs, temperature, 700-500hPa mean RH (shaded) from 12 UTC on 14 Apr 2013 (SPC).**



**Figure 4: 850 hPa convergence (red), 850-250 hPa differential divergence (shaded) and 250 hPa divergence (purple) on 12 UTC 14 Apr 2013 (SPC).**

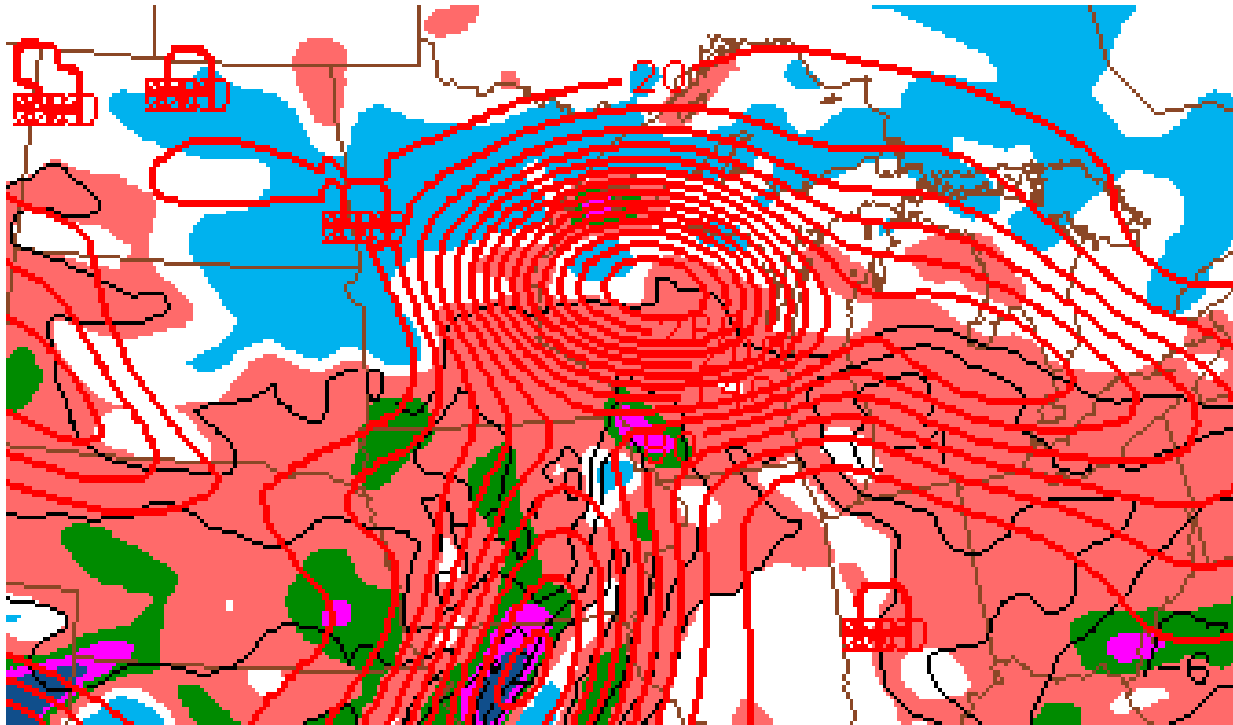


Figure 5: 850 hPa frontogenesis (red), 800-700 hPa EPVg\* (shaded) and conditional instability on 00 UTC 15 Apr 2013 (SPC).

Selected Storm Total Snow Accumulations (in)		Selected Storm Total Freezing Rain Accumulations (in)	
Hinsdale, MT	14.6	Groton, SD	0.25
Glasgow, MT	10.0	Watertown, SD	0.15
Center, ND	22.0		
Fullerton, ND	22.0		
Oakes, ND	19.0		
Bismarck, ND	17.7		
Pretty Rock, ND	15.0		
Fargo, ND	10.8		
Hoven, SD	16.0		
Pollock, SD	14.0		
Roscoe, SD	13.0		
Aberdeen, SD	10.8		
Moorhead, MN	8.8		
Leech Lake, MN	8.4		
Silver Bay, MN	7.0		
Grand Portage, MN	7.0		

Table 1: Selected snow totals (WPC Storm Summary, NCDC and WFO Bismarck).