

Central Rockies to Upper Midwest Snow Storm
30 April – 03 May, 2013
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Meteorological Overview:

A late season snow storm occurred between 30 April and 03 May, 2013, and was noteworthy both for producing impressive snowfall in parts of the Plains and Midwest, and for producing measurable snow across parts of the South at a time of the year when snow has typically long since ended for the season. Three separate regions of the United States were significantly impacted from this system, all receiving snowfall accumulations not common for early May. The higher elevations of the Wyoming and Colorado Rockies received over a foot of snow, followed by 4 to 8 inches into the Central High Plains, well removed from mountain influences (see Figs. 1 and 2). The second region was impacted 24 to 36 hours later affecting portions of the upper Midwest, where a narrow band of snow helped to blanket portions of Iowa into Wisconsin with 12 to 18 inches. Light to moderate accumulations of freezing rain were also recorded across parts of the Midwest, a precipitation type which is rare to see in May. Lastly, measurable snow was reported as far south as Oklahoma and Arkansas, a first for Arkansas since record-keeping began.

The storm began early on 01 May when a deep mid-upper level trough began to evolve over the northwestern U.S. as a north-northwesterly upper level jet of 140 kt entered the Pacific Northwest. The mid-upper level trough amplified as it reached the central U.S., with a closed low developing over the central Plains by 03 May (see Fig. 3). Bitter cold temperatures for early spring filtered southward into the central High Plains behind a strong cold front on 01 May, with low level winds turning to an upslope direction in the central High Plains, leading to the onset of precipitation. The strong change in airmass caused temperature swings of 55 to 65 degrees Fahrenheit at many locations in the central and southern Plains over roughly a 36 hour period. A combination of a favorably oriented low level upslope flow, a moisture source initially from the Gulf of Mexico and strong low-mid level frontogenesis was present during the heaviest snowfall across Wyoming, Colorado, Nebraska and Kansas.

As the slow moving cold front progressed eastward through the Plains on 02-03 May, rain was the initial precipitation type in the post-frontal environment, but a changeover to snow occurred as cold air continued to filter in from the north. An axis of relatively high equivalent potential temperature advected northward across the Plains, overrunning the shallow cold air near the surface. Rare accumulations of sleet and freezing rain were reported in Iowa, Wisconsin and the Upper Peninsula of Michigan. The heaviest snow in the Upper Midwest developed early on 02 May, collocated near a layer of very strong frontogenesis centered near 850 hPa, with 10 to 18 inches falling in a narrow corridor from the central Iowa-Minnesota border into northwestern Wisconsin. A tight snowfall gradient was evidenced by only a trace of snow being measured at Minneapolis-St. Paul International Airport compared to locations less than 50 miles away (to the south and east) receiving as much as 18 inches.

Impacts:

The impacts from this storm were numerous and widespread, setting many records despite warm ground temperatures leading up to the event. Almost every state that received snowfall from this storm contained cities that broke all-time records for storm total snowfall for the month of May. For example, Dodge Center, MN received 15.4 inches on 02 May, establishing a new state record for a 1-day snowfall,

breaking the previous record of 12 inches set back in both 1954 and 1938. In Arkansas, measurable snow had never been reported since record-keeping began back in 1819 for the month of May until this storm, with Decatur picking up 5 inches. Heavy snow was responsible for numerous accidents, road closures, the closing of schools and businesses as well as power outages from fallen trees and power lines. Closures and power outage reports were widespread from Colorado to the Upper Midwest, but numbered greatest from southeastern Minnesota into northwestern Wisconsin within a narrow band of heavy snow resulting in 10 to 18 inches. Lastly, due to the anomalous cold, characterized by 850 hPa temperature anomalies of -10 to -16 C across the Plains, temperatures at the surface were more representative of mid-winter than early May. Record low minimum and maximum temperatures for the month of May were set in locations from Wyoming to Texas and as far east as Tennessee.

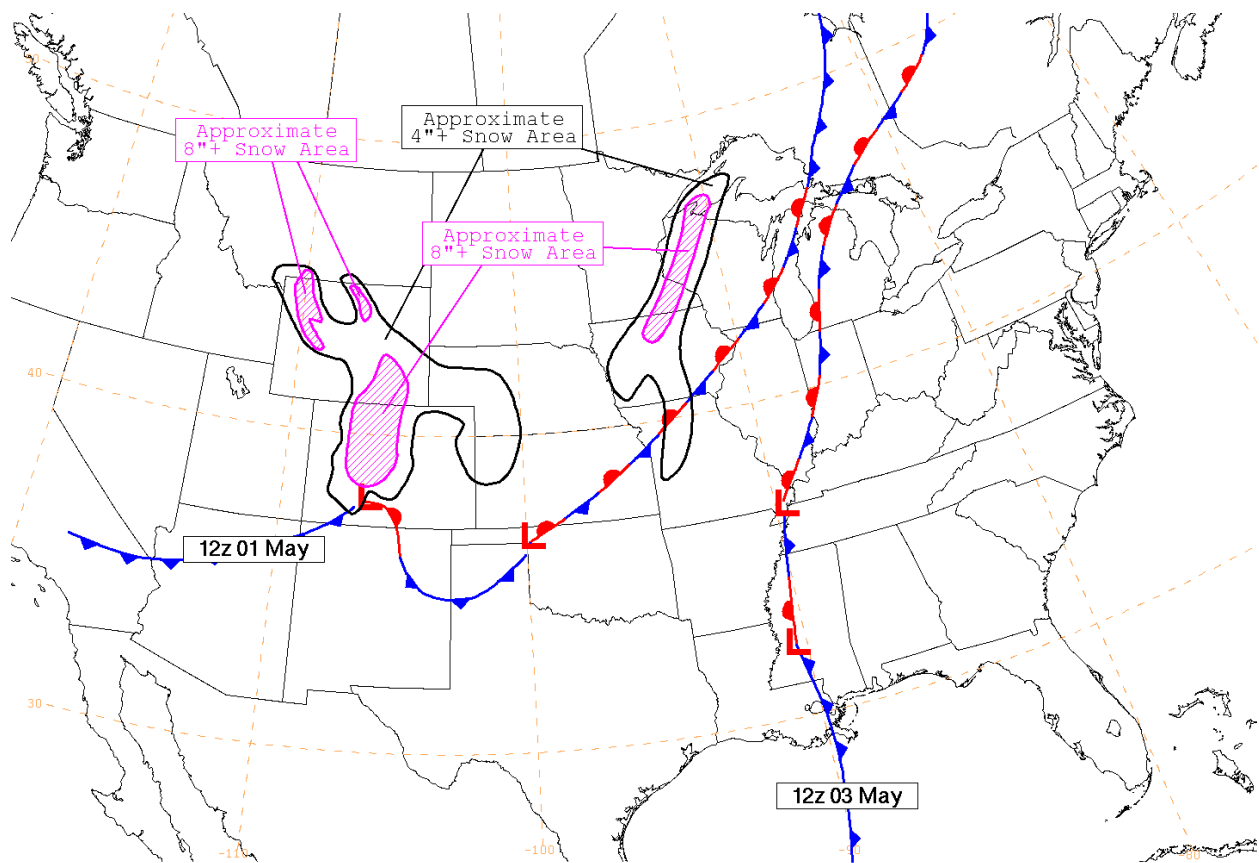


Figure 1: Approximate 72 hour snowfall isopleths of 4 and 8 inches from 0600 UTC 30 April – 0600 UTC 03 May, 2013. Also shown are the locations of a slow moving front at two separate times, 1200 UTC 01 May and 1200 UTC 03 May, 2013. Image courtesy – Weather Prediction Center

Figure 3: Objectively analyzed 500 hPa heights (dam), wind (kt) and temperature (C) in 24 hour time increments; valid (a) 1200 UTC 4/30, (b) 1200 UTC 5/1, (c) 1200 UTC 5/2, (d) 1200 UTC 5/3. Images courtesy – Storm Prediction Center (<http://www.spc.noaa.gov>)