

Northern Plains to North Carolina Winter Storm March 24-25, 2018

By Kwan-yin Kong, WPC meteorologist

Meteorological Overview

This wintry weather event occurred toward the end of an abnormally cold and stormy March over the eastern U.S as four nor'easters had already impacted the area since the beginning of the month. The low pressure system responsible for this event moved in a somewhat atypical direction-- from northwest to southeast across the midsection of the country and resulted in a swath of moderate to heavy snowfall extending from the northern Plains across the Midwest toward the southern Appalachians (fig. 1). This atypical orientation of the snowfall axis was the result of a significant adjustment in the large-scale synoptic pattern commencing immediately after the fourth nor'easter had exited the East Coast. A large high pressure system became a dominant feature over eastern Canada, which effectively blocked the developing cyclone in the central U.S. from moving toward the northeast. The high pressure system also continuously fed arctic air toward the storm center and resulted in a swath of snow about 300 miles to the north and east of the storm track (fig. 1). A sharp gradient of the snow can be seen on the northern and southern edge of the swath on satellite images (fig. 4). The heaviest snow in northern Iowa fell during the morning hours on March 24 underneath the track of a developing upper-level low which provided the necessary lift and instability to sustain the snow. Another batch of heavy snow quickly developed over the Appalachians in southwestern Virginia during the morning hours and continued through the afternoon before tapering off during the evening. Terrain-induced forcing likely enhanced the snowfall rates in this area.

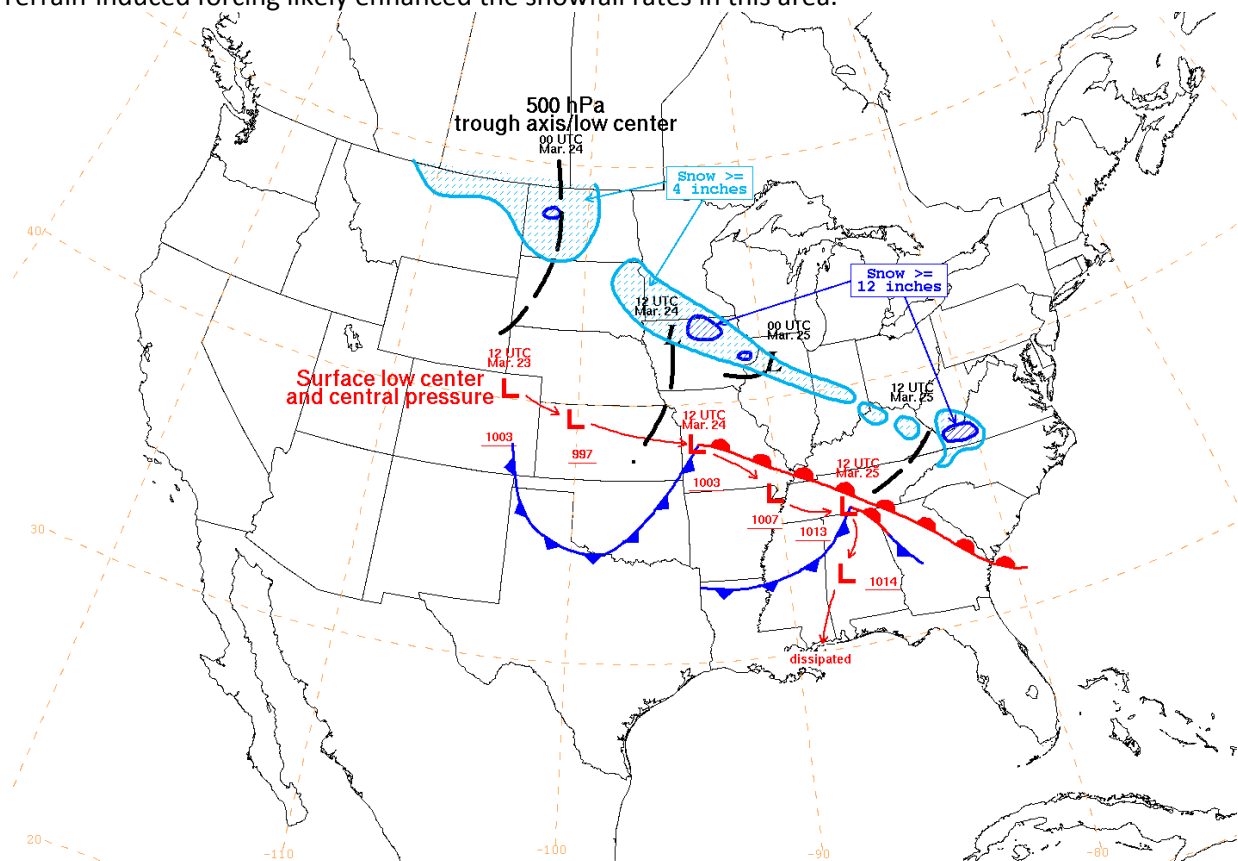


Figure 1. Summary figure of the event showing the track of the surface low pressure center and the 500 hPa trough axis/low center in relation to the observed snowfall axis.

Figure 3 shows a composite of satellite and radar images together with the WPC surface analysis and observations at 18 UTC March 24, 2018. The snow over the Midwest was beginning to taper off as heavy snow was in progress over the higher elevations of southwestern Virginia. Note that a lee trough was analyzed along the western slopes of the Appalachians where surface convergence was enhanced. Much of the wintry precipitation ended by midnight as drier air from the arctic high pressure system filtered in and further weakened the low pressure system over the interior southeastern U.S. The low pressure center then turned toward the south and dissipated over the central Gulf coast early on March 25.

Impacts

This wintry weather event produced a narrow but heavy swath of snow from the Midwest to the southern Appalachians toward the end of an abnormally cold and stormy March. Over a foot of snow fell across northern Iowa and southwestern Virginia (figs. 1 & 2). Highest snowfall reports include 17.5 inches near Mason City, Iowa, 17.0 inches near Bluefield, West Virginia, and 16.2 inches near Pilot, Virginia. Measurable snow fell as far southeast as Raleigh, North Carolina. Over the southern Appalachians, marginally cold temperatures contributed to heavy wet snow which led to widespread power outages not seen in the area since the derecho of June 2012. Downed trees and power lines caused dozens of road closures. People were reportedly stuck along Interstates 81 and 77 for up to three hours following multiple accidents. In Blacksburg, Virginia, this snow event further increased the monthly snowfall total to more 20 inches, which made it the second snowiest month on record for the city. In addition to the snow, some freezing rain and sleet occurred further south over southern Virginia and northwest North Carolina as well as parts of Iowa.

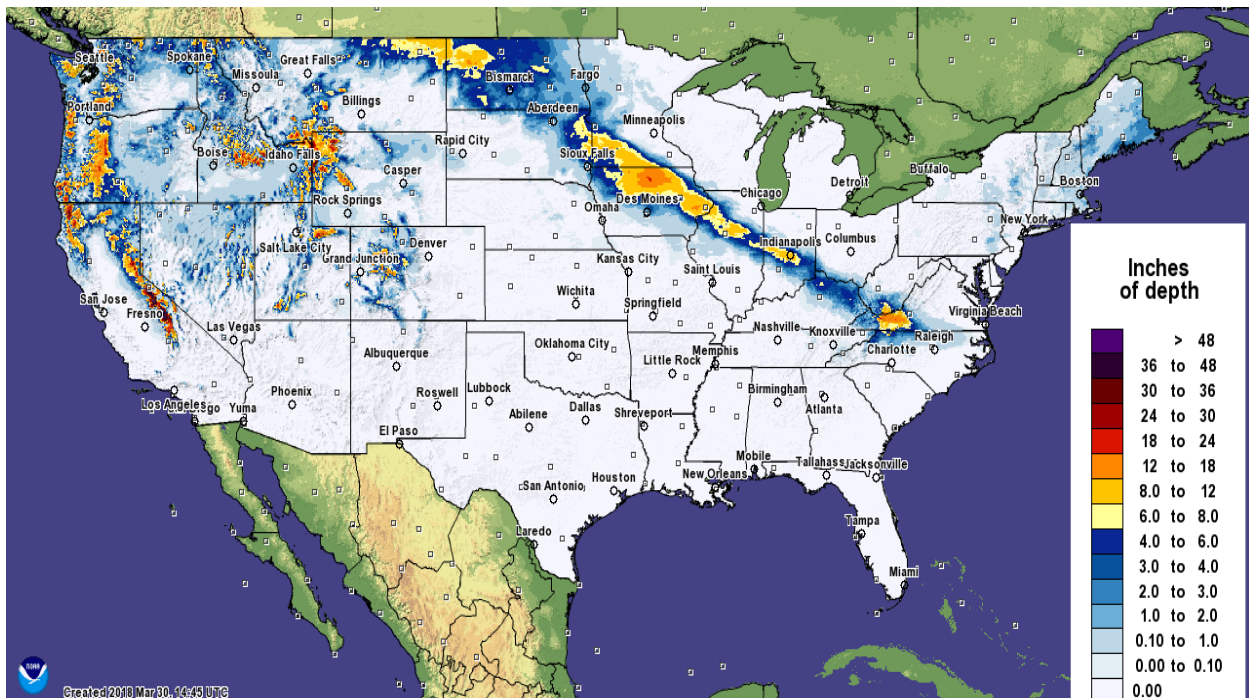


Figure 2. 72-hour observed snowfall analysis ending at 12 UTC March 25, 2018.

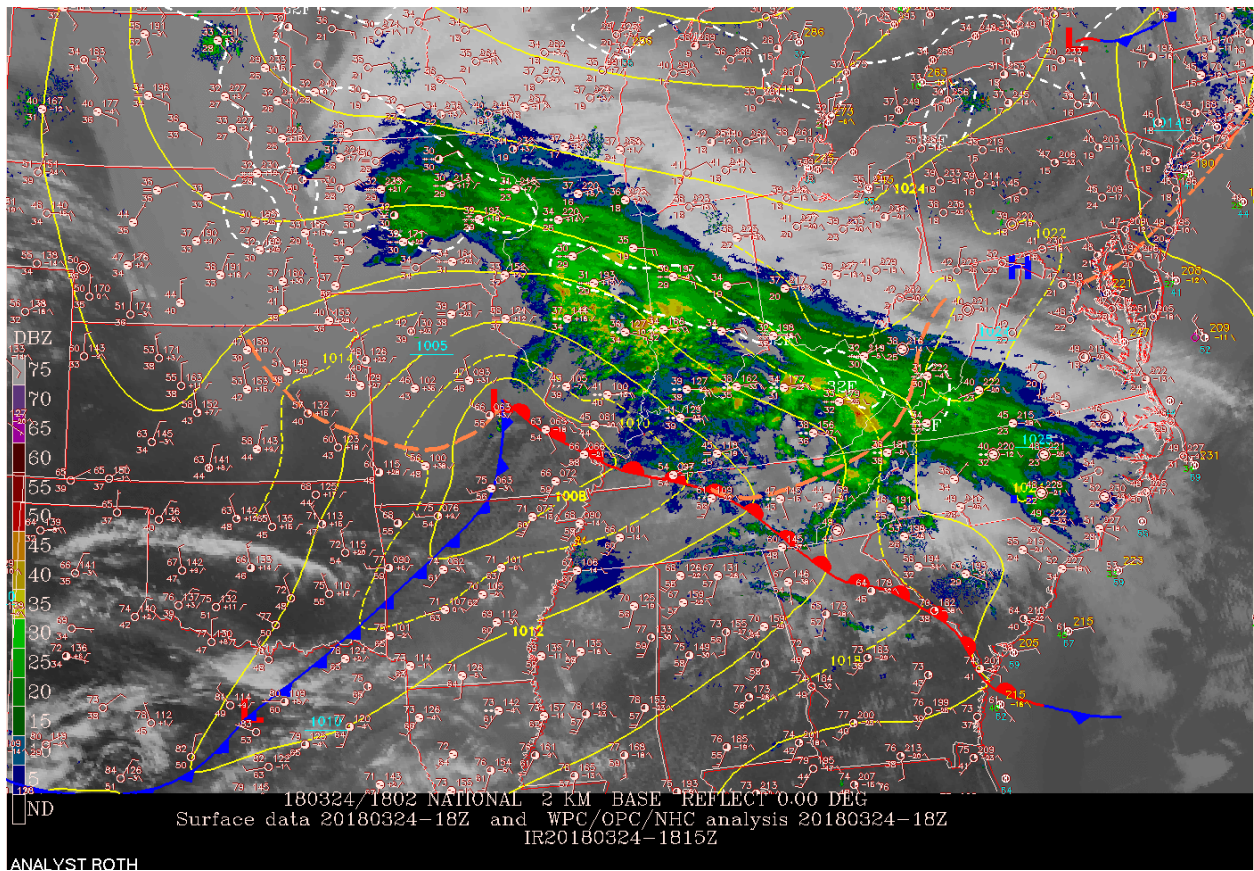


Figure 3. A composite of GOES-East infrared image, radar mosaic, WPC surface analysis and surface observations near 18 UTC March 24, 2018. The 0°C isotherms are also indicated.

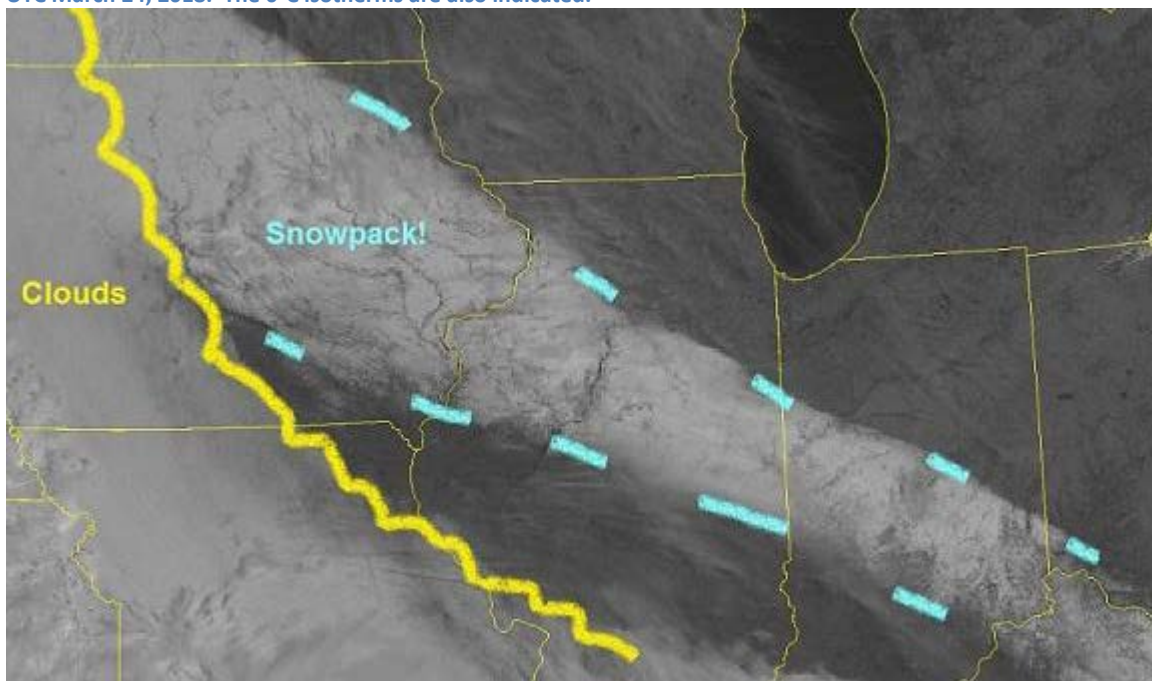


Figure 4 Visible satellite image on March 25, 2018 reveals the narrow axis of the snowpack with sharp edges (image courtesy of National Weather Service Office at Quad Cities, IA/IL).