

Midwest & Great Lakes Christmas Eve Winter Storm

12/23 - 12/25 2020

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Meteorological Overview:

A potent shortwave trough crossing the Pacific Northwest and the northern Rockies on December 22nd began phasing with another shortwave disturbance dropping southward from central Canada by the afternoon of the 23rd. A closed upper low evolved over the Upper Midwest by midday on the 24th with the overall synoptic scale pattern becoming increasingly amplified. The upper low then crossed the Ohio Valley Christmas morning and reached the Northeast U.S. by that evening as the trough became negatively tilted.

The result at the lower levels was a sub-990mb surface low that tracked from northwest Iowa to the Upper Peninsula of Michigan, becoming occluded by the evening of the 23rd. Blizzard conditions developed across the eastern Dakotas, much of Minnesota, Iowa, and into western Wisconsin as a tight pressure gradient developed, with a 1028 mb surface high over Manitoba. Winds gusted over 55 mph and reduced visibility to near zero in whiteout conditions for parts of these states. As the primary low lifted northeastward across Ontario and then Quebec, a secondary low developed along the cold front across the southern Appalachians by the morning of the 24th, and this became a highly impactful storm system across the Mid-Atlantic region and extending northward to New England. An impressive low level wind field developed in the warm sector, with southerly 850-925 mb winds on the order of 70-90 knots advecting copious moisture northward across the region. Surface dewpoints rose above 50 degrees, and 2 to 4 inches of rainfall fell over a deep and moisture laden snowpack from eastern Pennsylvania to southern New England. The storm finally exited eastern New England by the morning of the 26th.

Impacts:

This storm system caused severe travel disruptions from the Upper Midwest to New England, with hundreds of flights either badly delayed or canceled. This included about 300 flight cancellations from the greater Minneapolis area, where over 8 inches of snow was reported and set a daily snowfall record. Portions of major interstates were closed with hundreds of automobile crashes from the blizzard conditions.

Farther east, over one hundred thousand residences lost power as a result of the strong winds across the northeastern U.S., including gusts of 65 to 70 mph across portions of southern New England. The widespread heavy rainfall falling atop a deep snowpack led to enhanced snow melting, and this produced numerous instances of flooding and major rises on area rivers and streams. In addition, there was a severe component to the event as well across the Deep South and extending eastward to the southeast coastal region, with a total of 13 tornado reports, and 81 reports of either wind damage or 58+ mph wind measurements (thus satisfying severe thunderstorm criteria) from the 23rd to the 25th.