Thermal and Microphysical Structure of the 8–9 February 2013 Northeast U.S. Blizzard

DAVID M. SCHULTZ[1], BRIAN A. COLLE[2], SARA GANETIS[2], MATTHEW SIENKIEWICZ[2], PAMELA L. HEINSELMAN[3], AND DAVID NOVAK[4]

[1] *Centre for Atmospheric Science, School of Earth, Atmospheric and Environmental Sciences, University of Manchester, Manchester, United Kingdom*
[2] *School of Marine and Atmospheric Sciences, Stony Brook University, Stony Brook, New York*
[3] *NOAA/National Severe Storms Laboratory, Norman, Oklahoma*
[4] *NOAA/NWS/NCEP/Hydrometeorological Prediction Center, College Park, Maryland*

Abstract submitted for the 16th Cyclone Workshop

The Northeast U.S. extratropical cyclone of 8–9 February 2013 — named Winter Storm Nemo by The Weather Channel — occurred during the merger of two cyclones, one originating from south off the East Coast and the other coming from the west across New York State. The blizzard produced 1–2 feet of snow in the New York City and Long Island area, 2 feet in Boston, and over 3 feet of snow in central Connecticut. Hurricane-force wind gusts battered the coast from Massachusetts to Maine. After the storm, President Obama declared a state of emergency for Connecticut. Three features of interest of this storm include (1) the strong winds around the cyclone, (2) radar reflectivity exceeding 55 dB*Z* in the snowband, and (3) the rapid disintegration of the band. These three features are the focus of our presentation.

First, the strong winds along the coast were due to the cold conveyor belt, and strong winds over the ocean occurred due to a sting jet at the tail end of the back-bent front. The merger of the two cyclones resulted in a slack pressure gradient over Long Island, leading to what we propose were weaker winds in this area than would otherwise have occurred.

Second, the high radar reflectivity was due to mixed-phase precipitation microphysics in the band. The highest reflectivities were associated with gradients in differential phase shift (PhiDP) from the dual-polarimetric radar OKX at Upton, New York, indicative of horizontally oriented ice crystals at temperatures of –10 to –15°C, and correlation coefficient (CC) values of 0.9 indicative of mixed-phase precipitation. Consistent with the mixed-phase precipitation, thundersnow was observed on eastern Long Island.

Third, the rapid disintegration of the 50+ dB*Z* reflectivities was hypothesized to be due to the merger between the coastal cyclone and the continental cyclone. This merger disrupted the deformation in the lower troposphere, reducing frontogenesis, and weakening the band. Weaker reflectivities around 30 dB*Z* persisted, possibly enhanced by New England coastal frontogenesis.

Thus, contrary to commentary and media reports at the time of the storm, the merger of the two cyclones did more to weaken certain aspects of the storm (e.g., wind speed, snowband) than strengthen them.