Application of Recent Northeast Cool Season CSTAR Conceptual Models to Three March 2018 Snowstorms Impacting Eastern New York and Western New England

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Three early-spring snowstorms significantly impacted eastern New York (NY) and western New England on 2, 7-8 and 12-15 March 2018. Albany, NY received 91.4 centimeters (cm) of snow from the 3 storms with approximately 30.5 cm (12.0 inches) from each, which is more than half the seasonal normal in two weeks. The 2 March 2018 storm produced 50-100 cm of snow in the eastern Catskills, Mohawk Valley, Schoharie Valley and Helderbergs in eastern NY due to a large pivoting mesoscale snow band in the northwest quadrant of a coastal cyclone passing south of the region. The 7-8 March snowstorm deposited 50-100 cm of heavy snowfall across portions of the Taconics of NY, the southern Greens of Vermont (VT), Berkshires of Massachusetts, and Litchfield Hills of northwest Connecticut with another pivoting mesoscale snow band that became quasi-stationary, as the coastal cyclone moved across eastern New England. The final snowstorm produced 25-100 cm of snow across the Capital Region of NY into the Taconics, and across western New England with the highest amounts across the southern Green Mountains of VT. The coastal cyclone and the its associated closed upper low produced orographically-forced westerly flow upslope snow over a multi-day period, and an inverted surface trough and Mohawk-Hudson Convergence mesoscale snow band enhanced the totals around the Albany area during the event.

The synoptic-scale set-up was very similar with all three systems. A Miller Type B scenario occurred with each storm, as the primary surface cyclone weakened upstream of the Albany forecast area with a secondary low forming near the Mid Atlantic Coast with a subsequent favorable track for moderate to heavy snow. Upper-level jet streaks played a major role, as well as low-level easterly (-U) wind anomalies tapping copious Atlantic moisture for the heavy snowfall. Precipitable water anomalies as well as favorable integrated water vapor transport aided in the constant supply of moisture for each snowstorm in conjunction with sufficient cold air in place. Low to mid-level 2-D Petterssen frontogenesis (850 to 700 hPa, and 500-700 hPa) helped enhance snowfall rates (2.5-10 cm/hr) in all three systems due to mesoscale banding in the deformation zone of the systems.

This talk will focus on conceptual models that were developed in Collaborative, Science, Technology, and Atmospheric Research (CSTAR) projects with the University at Albany over the past decade to aid operational meteorologists for heavy snow forecasting. The emphasis will be on mesoscale banding, cold pools with upper lows, atmospheric rivers, localized Mohawk Hudson Convergence for heavy snow, mid and upper low positioning and local flows for heavy snowfall in orographic enhancement. Future CSTAR VII research will include a project on improving the forecasting of near-freezing winter precipitation in complex terrain, which was also an issue associated with these early spring storms, especially on March 2nd when temperatures were only marginally cold enough for snow in the Hudson Valley.