A Case Study of the 1-3 December 2019 Snowstorm Across the NWS Albany, NY Forecast Area

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A significant winter storm affected the Northeast U.S. during 1-3 December 2019. The hardest-hit locations in eastern New York included the Capital District, eastern Mohawk Valley, eastern Catskills, southern Green Mountains of Vermont and the Berkshires of western Massachusetts. Within this region, snowfall totals of 20 to 28 inches were common. After 39 consecutive hours of falling snow, the Albany Airport officially measured 22.6 inches which ranks as the 8th largest snowstorm on record, 4th largest for the month of December and the highest amount from a single storm since the March 1993 Superstorm.

This storm occurred in two phases. Initially, an anomalously strong upper-level low over the Pacific Northwest on Thanksgiving weekend traversed the country, producing very strong warm air advection aloft within a dual jet structure. This produced an impressive, frontogentically induced snow band from the mid-Atlantic into the Northeast on 1 December 2019. Snow rates ranged from 1 to 3 inches per hour over eastern NY and western New England. While model guidance indicated the best dynamics would exit the region during the evening hours, secondary low pressure off the New Jersey coast allowed the warm conveyor belt to persist overnight, with heavy snow continuing.

Phase two began with a ‘lull’ in precipitation intensity as the coastal low became the dominant feature during the morning hours of 2 December 2019. Deformation along its northwest periphery produced mesoscale bands of heavy snow during the afternoon of 2 December, especially just north of the Capital District. As the surface low traveled toward Cape Cod, snow bands shifted southeast into the Capital District during the evening and consolidated into a larger snow band that produced snowfall rates of up to 2 inches per hour. Snow finally ended early on 3 December 2019.

This presentation will investigate why “phase 1” overachieved in many locations, especially around the Capital District. While it is common in east to northeast flow regimes for downsloping effects to limit snowfall accumulation in the Hudson Valley/Capital Region, this did not occur. The combination of impressive jet dynamics and strong frontogenesis likely played a significant role in the higher than expected snowfall. In addition, model guidance struggled in its analysis of the thermal profile including the northern extent of the warm nose intrusion and potential for strong forcing for ascent to intersect the dendritic snow growth zone.