

# Albany Forecast Area Significant Hail Climatology and Case Studies

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Significant hail events are fairly rare across eastern New York (NY) and western New England. The National Center of Environmental Prediction Storms Prediction Center considers a severe thunderstorm to be significant if it produces measured or estimated wind gusts of at least 65 knots (74.8 mph), hail two inches (5.0 cm) in diameter or greater or an EF2 tornado or greater. The National Weather Service at Albany Weather Forecast Office (ALY WFO) county warning area consists of 15 counties in eastern NY, and 2 counties in southern Vermont(VT), and one each in western Massachusetts(MA), and northwest Connecticut. A climatology of significant hail reports from 1 January 1950 to 31 October 2017 from the National Climate of Environmental Information *Storm Data* revealed a total of 58 events. The most significant hail events occurred in Columbia County with eight, and no events have been recorded in the mountainous and sparsely populated counties of Schoharie and Hamilton Counties in the northern Catskills and southern Adirondacks. 16 out of the 58 (27.5%) significant hail events have occurred in the Dual Polarization era of Albany (KENX) radar technology from 1 May 2012 to 31 October 2017. Three significant severe weather events occurred 1 June 2011, and 8-9 June 2011 where a total of 13 significant hail events impacted the WFO ALY forecast area, The 1 June 2011 event was unique that five baseball-size or larger ( $\geq 7.0$  cm) hail reports occurred. Mammoth hail stones of 8-10 cm in diameter fell at Shaftsbury, VT, and Windsor, MA located in the Berkshires.

The purpose of this study will be to review the significant hail climatology and discuss common synoptic and mesoscale features with several of the events. The pre-convective environmental analysis will examine the 0-6 km deep shear, convective availability potential instability, low and mid-level lapse rates, and the role of elevated mixed layers. Convective modes will briefly be discussed, as the vast majority of the cases in the climatology were supercells that became hail monsters with tall updrafts and associated massive elevated reflectivity cores.

Finally, this oral presentation will examine briefly the historical significant hail events that occurred early in June 2011 in the ALY WFO. A multi-scale approach will be done analyzing these major severe events from the synoptic-scale to the storm-scale, in order to understand the convective environment that produced the anomalously large hail stones. Observational data used in the analyses will include surface and upper air observations, satellite imagery, and KENX WSR-88D 8-bit radar data. The storm-scale analysis will utilize a variety of radar tools (Four-Dimensional Stormcell Investigator and GR2Analyst) and techniques.