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Storm-scale surface analyses constructed from home AWS data for a severe hailstorm over northern England

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Following an exceptionally hot day across England and Wales on 1 July 2015, three supercell thunderstorms developed and tracked north-northeast over northern England during the evening, depositing hail with maximum diameters typically in the range 40 to 60 mm. Along the hail swaths, extensive damage occurred to glasshouses, windows and car bodywork. The progress and 'footprints' of the respective storm cells will be described using radar imagery and eyewitness reports. The hail swath from one storm has been provisionally identified as extending from Manchester to Morpeth (Northumberland), a swath length of approximately 190 km.

Data from home automatic weather stations (i.e. those owned by members of the public) have been analysed in the vicinity of one of the supercells, focussing on a 1.5-hour period during which the storm tracked through West Yorkshire, where there is a particularly dense network of home AWSs. After some basic quality control, application of a time-compositing technique, and interpolation onto a 1.5 km grid, the home AWS data are shown to be capable of resolving coherent, storm-scale pressure and wind features, including a surface pressure anomaly couplet straddling the position of the midlevel updraught, with a positive (negative) anomaly under the upshear (downshear) flank of the updraught, and coherent regions of surface inflow and outflow. These results demonstrate the potential utility of home AWS data for operational monitoring, or post-event study, of small-scale weather phenomena including severe storms, in areas with a high density of stations. The home-AWS-derived surface analyses will be presented and interpreted by comparison with dual polarization radar data, photographs of the storm, and with reference to the results of previously published numerical modelling studies of severe thunderstorms.