EMS Annual Meeting Abstracts
Vol. 15, EMS2018-553, 2018

An observational and numerical study of the extreme 27 July 2017 hailstorm in Istanbul

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On 27 July 2017, Istanbul city centre was hit by a number of severe convective storms. Especially a supercell, producing hail with size up to 8+ cm, and wind gusts up to 40 m/sec resulted in a record-breaking damage to property. Official reports indicate that 3 people are injured, 311 trees are uprooted, 162 roofs are blown up, 2 minarets in parts of the city, as well as 4 large winches in the harbor are snapped, thousands of cars, windows and walls of many buildings, and some aircrafts are damaged. Flooding in many parts of the city is also reported. As a result, the estimated damage costs more than 300 million dollars. An observational and numerical study of the case, including impressive photos will be presented. Radar data indicate that the storm cells had very complex mesoscale features. A quasi-linear convective system, with some cells revealing mesocyclonic activity were evident. A merging storm just over the city centre was responsible from the very large hail, and series of downbursts, which resulted in most of the damage. Numerical simulations with WRF-ARW mesoscale model provide severe thermodynamic and kinematic features for the environmental conditions. More than 2000 J/kg convective available potential energy and over 20 m/sec 0-6 km bulk shear co-existed in an environment just under a left-exit region of a polar jet, with high dynamical forcing for lift. Feeding by continuous low level moisture advection from surrounding seas, and passage of a frontal zone provided excellent conditions for severe convective weather.