



Reanalysis of Giant Hail Event in Catalonia (NE of the Iberian Peninsula)

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On the afternoon of 30th August 2022, a powerful supercell thunderstorm in northeastern Catalonia, Spain, produced a giant hail episode. This rare event resulted in one fatality, over 70 injuries and substantial property damage. According to the records of the severe weather of the Meteorological Service of Catalonia (SMC), this is the largest hailstone ever recorded by Meteorological Network Spotted (XOM).

The focus of the study is to understand why hailstones of exceptional size, reaching 10 cm in diameter, were produced by this storm. For this purpose, firstly we consulted the observations recorded by the local people to identify the path of the hailstorm and the different affectations along the way. Next, we combined the remote sensing data to reveal the severe weather signatures. The radar fields revealed large reflectivity strong vertical development, and very large forward anvil, which measured over 40 km in length. Complementary to this, the total lightning flash rate steeply increased at the same time as an intensification of severe weather radar signatures (tilting, three-body scatter spike, BWER-Bounded weak echo region). The satellite imagery allowed the cold ring pattern detection and extreme cold overshooting top-down to -64 °C.

On the other hand, the synoptic, mesoscale, radiosonde, and cross-sections run by WRF 3 km and 1.5 km were evaluated to characterize the thermodynamic and environmental conditions favourable for the growth of a supercell with large-hail potential. The values of CAPE in the coastal line were > 2.500 J/kg, the Total Precipitable Water was > 4 cm, and the hodograph signature revealed a strong low-level inflow and strong upper outflow.