



## Analysis of a hail bearing Mediterranean supercell through weather radars

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In recent years, the Mediterranean area has been affected by a continuous and significant increase in the intensity of violent weather events resulting in floods, hailstorms and tornadoes and an increasing impact on human activities, infrastructure and agricultural production.

Among these extreme events, a particularly intense phenomenon occurred on July 10, 2019 affecting much of the central Adriatic coast. In particular, the Pescara area was affected by a supercell that produced heavy rainfall and an exceptional hailstorm, with hailstones even larger than 10 cm in diameter, causing extensive damage.

This contribution documents, for the first time in Italy, the dynamics, morphology and main characteristics of the Pescara supercell [1] which was simultaneously observed, by two C-band meteorological radars of the national Department of Civil Protection (DPC). The results obtained highlight the irreplaceable role of dual-polarization Doppler weather radars in monitoring the evolution of hail, identifying the mesocyclone initiation and the related updraft and downdraft zones as well as their vertical extension, and highlighting the current limitations in determining the size of hail particles from radar measurements. Numerical simulations with the WRF model, using the HAILCAST module to simulate the evolution of hail, were carried out in order to evaluate the capabilities of an operational model in the simulation of such a particular event.

In the context of the intensification of extreme events, this work is also a food for thought on the main aspects to be addressed in the near future to improve the chain of alerting and modelling of extreme events for prevention and civil protection.

[1] M.Montopoli, E.Picciotti, L.Baldini, S.Di Fabio, F.S.Marzano, G.Vulpiani, "Gazing inside a giant-hail-bearing Mediterranean supercell by dual-polarization Doppler weather radar", Atmospheric Research, Vol. 264, 15 Dec. 2021, 105852, <https://www.sciencedirect.com/science/article/pii/S0169809521004087?dgcid=author>

