



## Numerical simulations of a supercell in northeastern Italy with WRF-HAILCAST

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In the early morning of 1 August 2021, a supercell developed over the Veneto plain and moved eastward towards Friuli-Venezia Giulia, locally producing hailstones with diameters up to 9 cm.

In the present work, this event is studied by means of simulations with the Weather Research and Forecasting (WRF) model at 1 km resolution, coupled with the HAILCAST hail growth parameterization, which provides estimates of the maximum hail size at the ground. Several simulations are performed using different initial and boundary conditions (GFS and IFS forecasts), different initialization times and physics options, to study the predictability of the event.

The analysis of the model results highlights a significant sensitivity to the forcing meteorological model and the initialization time. In particular, WRF is not able to properly simulate the development of strong convection over the Veneto and Friuli-Venezia Giulia plain in the early morning of 1 August using GFS forcing, while better results are obtained with IFS initial and boundary conditions, especially when simulations are initialized more than 24 hours before the event. Moreover, results are significantly affected by the microphysics scheme and the land surface model, while the planetary boundary layer parameterization seems to have a minor influence. However, the development of the supercell is properly simulated, with hailstone diameters comparable to observations, only when data from radiosoundings of Udine Rivolto are nudged into the model, highlighting the importance, and at the same time the complexity, of correctly reproducing local thermodynamic conditions for the simulation of extreme convection events.