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Numerical simulations of a tornadic supercell in the Mediterranean

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On 28 November 2012, a multi-vortex EF3 tornado affected southeastern Italy (the city of Taranto) causing one casualty and estimated damage of 60 M€ (Miglietta and Rotunno, 2016). At approximately 1050 LT (0950 UTC), this tornado, initially formed as a waterspout over the Ionian Sea, moved inland and hit the largest steel plant in Europe. The case was characterized with a very large vertical wind shear in the lowest km of the atmosphere, corresponding to a storm-relative helicity of 686 m2 s-2 in the layer 0–3-km AGL (553 m2 s-2 in the lowest km) in the nearby Brindisi sounding at 1200 UTC. Comparing these values with the only existing climatology of tornadoes in Italy, the low-level vertical wind shear for this event was more than twice the climatological mean for F3 tornadoes. Together with the favorable wind profile, other local factors may have favored the development of the tornado.
Numerical simulations are performed with the WRF model to explore the possibility to reproduce the evolution of the supercell responsible for the tornado in Taranto, using three nested domains, the inner one having a grid spacing of 1 km. First, the ability of the simulations to properly reproduce the severity of the event is analyzed, considering different initial and boundary conditions to evaluate its predictability. Afterward, the role of the warm Mediterranean Sea, the complex orography of southern Italy, the curved coastline of the Ionian Sea, etc., are investigated in a set of sensitivity experiments to see whether the conceptual models developed for the USA Midwest supercells are still valid over Italy or should be adapted to the different morphology of the region.

REFERENCE:
M. M. Miglietta and R. Rotunno, An EF3 multi-vortex tornado over the Ionian region: is it time for a dedicated warning system over Italy?, BAMS, 97, 23-30, 2016