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Statistical evaluation of the simulated convective activity over Central Greece

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In the framework of the project DAPHNE (www.daphne-meteo.gr), the non-hydrostatic Weather Research and Forecasting model with the Advanced Research dynamic solver (WRF-ARW, version 3.5.1) is used to produce very high spatiotemporal resolution simulations of the convective activity over Thessaly plain and hence, enhancing our knowledge on the impact of high resolution elevation and land use data in the moist convection. The expecting results act as a precursor for the potential applicability of a planned precipitation enhancement program.

The three model domains, covering Europe, the Mediterranean Sea and northern Africa (d01), the wider area of Greece (d02) and Thessaly region-central Greece (d03), are used at horizontal grid-spacings of 15km, 5km and 1km respectively. ECMWF operational analyses at 6-hourly intervals (0.25ox0.25o lat.-long.) are imported as initial and boundary conditions of the coarse domain, while in the vertical, 39 sigma levels (up to 50 hPa) are used, with increased resolution in the boundary layer. Microphysical processes are represented by WSM6 scheme, sub-grid scale convection by Kain-Fritsch scheme, longwave and shortwave radiation by RRTMG scheme, surface layer by Monin-Obukhov (MM5), boundary layer by Yonsei University and soil physics by NOAH Unified model.

Six representative days with different upper-air synoptic circulation types are selected, while high resolution (3”) elevation data from the Shuttle Radar Topography Mission (SRTM – version 4) are inserted in the innermost domain (d03), along with the Corine Land Cover 2000 raster data (3”x3”). The aforementioned data sets are used in different configurations, in order to evaluate the impact of each one on the simulated convective activity in the vicinity of Thessaly region, using a grid of available meteorological stations in the area. For each selected day, four (4) sensitivity simulations are performed, setting a total number of 24 runs. Finally, the best configuration provides the necessary forcing fields into a 3D Cloud model, representing a potential cloud seeding process.

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