Performance of the operational high-resolution numerical weather predictions of the Daphne project

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In the framework of the DAPHNE project, the Department of Meteorology and Climatology (http://meteo.geo.auth.gr) of the Aristotle University of Thessaloniki, Greece, utilizes the nonhydrostatic Weather Research and Forecasting model with the Advanced Research dynamic solver (WRF-ARW) in order to produce high-resolution weather forecasts over Thessaly in central Greece. The aim of the DAPHNE project is to tackle the problem of drought in this area by means of Weather Modification. Cloud seeding assists the convective clouds to produce rain more efficiently or reduce hailstone size in favour of raindrops. The most favourable conditions for such a weather modification program in Thessaly occur in the period from March to October when convective clouds are triggered more frequently. Three model domains, using 2-way telescoping nesting, cover: i) Europe, the Mediterranean sea and northern Africa (D01), ii) Greece (D02) and iii) the wider region of Thessaly (D03; at selected periods) at horizontal grid-spacings of 15km, 5km and 1km, respectively. This research work intents to describe the atmospheric model setup and analyse its performance during a selected period of the operational phase of the project. The statistical evaluation of the high-resolution operational forecasts is performed using surface observations, gridded fields and radar data. Well established point verification methods combined with novel object based upon these methods, provide in depth analysis of the model skill. Spatial characteristics are adequately captured but a variable time lag between forecast and observation is noted.