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Statistical evaluation of real-time WRF predictions across the Mediterranean region

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The non-hydrostatic limited area model WRF with the NMM dynamical core has been installed and appropriately configured in the parallel computing infrastructure of the Department of Geography at Harokopio University of Athens since late 2008. A part of conventional weather predictions, the model forecasts support many other operational and research activities such as driving local hydrological models for flash floods predictions, especially over small catchments, producing fire weather indexes and fire risk assessments during summer and providing estimations of the maximum wind power for areas with dense wind farms installations.
In the present study the performance of WRF predictions has been assessed using as reference the surface measurements available from the World Meteorological Organization (WMO) network. The comparison of the WRF weather forecasts against observations was made across the Mediterranean basin and the Black Sea. Surface observations from more than 900 conventional stations were used to verify and compare categorical model forecasts for two consecutive years (2009 and 2010). The statistics are based on the point-to-point comparison between the model generated variables and the relevant surface observations unevenly distributed over the domain of integration. Therefore, a verification procedure has been developed based on the estimation of traditional objective verification techniques such as bias, RMSE and threat scores for both continuous and discrete predictants. Moreover, quality control has been applied to remove erroneous measurements, based on checking the physical range of each parameter being verified, the allowable rate of change in time and the stationarity. Despite the known issues associated with comparing point measurements with area-averaged estimates, the measurements from WMO network are valuable for the study due to their coverage and the continuous recording. Preliminary results indicated that the model errors are highly dependent on the diurnal cycle, the seasonality, the forecast time and the station location especially over areas with complex physiographic characteristics.