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Evaluation of two Operational Weather Forecasting Systems for the Mediterranean Region

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This paper presents an intercomparison and evaluation of two weather forecasting systems for the Mediterranean Sea and the surrounding countries. The POSEIDON weather forecasting system has been developed in the framework of the project "Monitoring, forecasting and information system for the Greek Seas" at the Hellenic Centre for Marine Research (HCMR) in 1999. In the current HCMR's operational procedures the system issues high-resolution ($\sim$5 km) weather forecasts for 5 days ahead. It is based on an advanced version of the non-hydrostatic atmospheric Eta/NCEP model and is forced by the GFS model. To achieve better initialization a meteorological data assimilation package, the LAPS, has been implemented which employs all available real-time observations. Likewise, the Weather Research and Forecasting (WRF) limited area model with the embedded Non-hydrostatic Mesoscale Model (NMM) dynamical core became operational at the Department of Geography at Harokopio University of Athens in 2008. It provides daily 120-hour weather forecasts in a single domain covering the entire Mediterranean basin and the Black Sea at a resolution of 0.09˚x0.09˚.

The performance of the two operational systems has been assessed across the Mediterranean region and the surrounding countries using as reference the surface measurements available from the World Meteorological Organization (WMO) network unevenly distributed over the domain of integration. Surface observations from more than 900 conventional stations were used to verify and compare categorical forecasts of the 10-m wind field, 2-m air temperature and sea level pressure every 3 hours and the accumulated 6-h precipitation. The verification of the operational systems is based on the point-to-point comparison between the model generated variables and the relevant surface observations. 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. 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.