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An evaluation study of WRF-ARW model with observations during a usual low pressure system over eastern Mediterranean area (Greece) and comparison of the results with an extreme weather event

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The accurate simulation of weather conditions is becoming more and more an issue of increased research interest and public demand. Because of the uncertainty in forecasting such phenomena, the investigation of the choice of a proper model configuration to simulate in a satisfactory way usual weather conditions, as well as extreme events is of crucial importance. In the framework of providing reliable weather forecasting, the WRF atmospheric model was employed to simulate the weather conditions during a usual for the area low pressure system that passed over the Greek peninsula during 2015 (September, 18-24). NCEP FNL analysis data were used for model input. The model configuration was setup to include three nested domains with increasing horizontal resolution inwards (11km, 2km and 0.5km respectively), centered in Attica area. The model parameterization was concluded following a number of sensitivity tests, previously carried out for other weather events including extremes in the same area, such as the Cleopatra cyclone. The main meteorological variables were analyzed and evaluation of the results was performed against in-situ measurements by the network of the Hellenic National Meteorological Service stations. The comparison of the September low-pressure event and the Cleopatra case study model results in temperature showed good agreement with the observations in both cases. Study of the precipitation fields yielded significant improvement compared to the analysis data of the NCEP FNL and the comparison between the model results and observed values was found to be good locally at some stations. The overall conclusion was that the model parameterization and applied methodology proved to be an efficient and useful tool for studying and forecasting such events.