



## **The simulation of cyclone Cleopatra over Greece: WRF model sensitivity tests and evaluation**

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There is evidence that extreme or high impact weather events are occurring more often over the last decades in the Mediterranean region. The main tool for forecasting and studying the weather conditions related to these events over complex topography with sea-land interfaces is the use of numerical weather prediction models. In this study, the WRF atmospheric model was employed to evaluate its ability to simulate the weather conditions during the pass of cyclone Cleopatra over Greece (November 16-24, 2013), which caused heavy precipitation and flooding. NCEP FNL analysis data were used as model input. Firstly, the WRF-Chem model (WRF model coupled with Chemistry) configuration was tested with the dust effects option activated and deactivated to investigate their performance on the simulation of the high precipitation. Then, using the WRF-ARW model, the 2-way and 1-way nesting options were applied on nested domains of increasing horizontal resolution (11 km and 2 km and 11 km, 2 km and 0.5 km, respectively) to study the multi-scale flow phenomenon. The main meteorological variables were analyzed and evaluation of the results against in-situ measurements was carried out. The comparison of the model results in temperature and wind fields showed better agreement with the observations both for the 2-way and the 1-way nesting test cases. The study of the precipitation fields yielded improvement for the same sensitivity tests, where the model results and observed values were found to be in satisfactory agreement at a number of stations. The specific model parameterization and applied methodology yielded the good potential for using the tool for the forecasting of extreme precipitation events in the region.