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Use of WRF QPF estimates to improve upon MSGMPE products for Northern of Tunisia

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A previous study was conducted on the analysis of the Meteosat Second Generation Multi Sensor Precipitation Estimate MSGMPE product for 24h accumulated rainfalls (6 a.m. to 6 a.m), with respect to heavy rainfall events. Considering the observed daily rainfall network Northern Tunisia and two seasons (dry and humid seasons) in the period from January 2007 to June 2009, events were selected according to the rule of at least 50 mm per day for at least one rainfall station. It was found that accurate results can provide for some events. The MPE method was more suitable for the dry period. However, out of 78 selected events during this 3-year period, 17 events were totally undetected by satellite and seven events were underestimated. So, in this work, another quantitative estimation of precipitation over land is obtained using the ECMWF data facilities with a higher time and space resolutions. The skill of the Weather Research and Forecasting (WRF) model to dynamically downscale the corresponding ECMWF Re-Analysis data is investigated. The performance of this mesoscale model depends on the particular set of physical options chosen. This study examines the sensitivity of the model precipitation estimates over Tunisia to different Planetary Boundary Layer (PBL) and Cumulus Physics (Cu) schemes with the aim of obtaining realistic rainfall estimation fields for the study area. Our results show that WRF is able to improve upon the MSGMPE estimates for both the undetected and underestimated heavy precipitation events in Tunisia. Based on these results, we come to the conclusion that the climate models can improve the efficiency of the MSGMPE method to provide quantitative precipitation forecasts almost for the wet season. Finally, we suggest that the MSGMPE method should be combined with other atmospheric data to give more reliable extreme rainfall estimation for different weather situations in Tunisia.