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Mesoscale numerical modelling of a torrential rain event on the Spanish Mediterranean coast: evaluation of the sea-surface-temperature data input on model results

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Torrential rains are a frequent meteorological risk in the Mediterranean basin from late summer to winter. In the last few decades they have caused numerous catastrophic floods in most of the Mediterranean countries with human casualties in the worst cases. The Valencia region, on the east coast of the Iberian Peninsula, is one of the most affected regions in the Western Mediterranean basin; 48 severe torrential rain events have occurred here in the last 30 years. The resulting damages could be reduced by accurately forecasting the meteorological situations capable of producing such events. In this work a mesoscale numerical model, RAMS (Regional Atmospheric Modelling System) has been used to study an event that took place from 4 to 7 September 1989, one of the strongest in the last ten years with more than 500 mm recorded at some places. Previous studies have shown that the Sea-Surface-Temperature (SST) is a key factor in the development and intensity of such events. The first objective of this work was to quantitatively check the impact of the Sea-Surface-Temperature input into RAMS on the model results. The second objective was to study the possibility of a more accurate forecasting by improving some inputs into the model. The methodology followed has consisted in running three different RAMS simulations of the event using progressively improved SST data sources. The data inputs ranged from monthly climatological averages distributed with RAMS to the closer-to-real-time data available from NOAA satellite images from the days previous to the event. Significant improvement was found in the model results when using NOAA satellite images to retrieve SST data. While the spatial distribution of the rainfall was well located in the three simulations, major differences in the amounts of rain arise from the analysis of the model results. The main conclusion from the analysis of the results is the importance of SST in the genesis of torrential rain events. It follows that modelling development should place

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more emphasis on the implementation of better real-time data input techniques, like SST estimations from satellite images.