A HYDRO-METEOROLOGICAL MODEL ENSEMBLE STRATEGY APPLIED TO FOUR EXTREME RAINFALL EVENTS IN A SMALL-SIZE BASIN OF MAJORCA ISLAND, SPAIN

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Hydro-meteorological model simulations of several extreme precipitation events are proposed in order to assess the feasibility of discharge predictions driven by numerical weather forecasts for a small-size basin of Majorca, Balearic Islands. The study is performed for four intense precipitation events, which caused flood events of different magnitude over the Albufera basin. The physically-based HEC-HMS hydrological model is used to generate the runoff simulations. The lack of flow measurements in the basin poses great difficulties to the evaluation of the rain-gauge driven runoff simulations. Therefore, the runoff model is run under the assumption that a best estimation of the hydrological model parameters, mainly related with the infiltration properties of the watershed, can be obtained from the high resolution observational campaign developed by the CORINE project.

The MM5 non-hydrostatic numerical mesoscale model is used to provide quantitative precipitation forecasts (QPFs) for the events. The MM5 driven runoff simulations are compared against stream-flow simulations driven by rainfall observations, thus employing the hydrological model as a validation tool. In addition to the control MM5 simulations, a multi-physics ensemble is carried out in order to evaluate the suitability of the discharge forecast resulting by the one-way coupling between meteorological and hydrological models. That is, different combinations of the physical parameterizations of the MM5 model (cloud microphysics, moist convection and boundary layer

schemes) have been adopted, trying to better encompass the atmospheric processes leading to high precipitation amounts. Results show that high-resolution numerical weather forecasts in this complex orography area reproduce accurately most of the extreme precipitation events under study, allowing the issue of valuable discharge predictions despite the small size of the basin. The value of a multi-physical model ensemble as the one tested to convey the uncertainty of precipitation, and therefore, discharge forecasts is also discussed.