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Predictability and predictive ability of severe rainfall events over Catalonia for year 2008

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In this study the full set of warnings issued by the Catalan Civil Protection Department for potentially-dangerous events due to high rainfall intensity/depth has been analysed for year 2008, in order to assess the predictive ability of (Quantitative Precipitation Forecasts) QPFs and the so-called "poor-man" rainfall probabilistic forecasts (RPF). The QPFs from the limited-area model MM5 (run by the Meteorological Service of Catalonia, SMC) have been verified against hourly rainfall data provided by the rain gauges network covering Catalonia (with an average density of $\sim$1/200 km^2), managed by SMC. For a group of five selected case studies, MM5 predictive ability has been examined by making use of satellite data, and a QPF comparison has been undertaken between MM5 and COSMO-I7 limited-area models. The "poor-man" rainfall probabilistic forecasts (RPF) issued by SMC at regional scale have also been tested against hourly rainfall observations.
Verification results show that for long events ($>$ 24h) MM5 tends to overestimate total rainfall, whereas for short events ($\leq$ 24h) the model tends to underestimate precipitation. Case studies conclude that most of MM5's QPF errors are triggered by very poor representation of some of its cloud microphysical species, particularly the cloud liquid water and, to a lesser degree, the water vapour. The models' performance comparison demonstrates that MM5 and COSMO-I7 are on the same level of QPF ability, at least for the intense-rainfall events dealt with in the five case studies.
The warnings based on RPF issued by SMC have proven fairly correct when tested against hourly observed rainfall for 6-hour intervals and at small region-scale for the set of warnings during the year of study.