

## **Severe rainfall prediction systems for civil protection purposes**

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One of the most common natural hazards impending on Mediterranean regions is the occurrence of severe weather structures able to produce heavy rainfall. Floods have killed about 1000 people across all Europe in last 10 years. With the aim of mitigating this kind of risk, quantitative precipitation forecasts (QPF) and rain probability forecasts are two tools nowadays available for national meteorological services and institutions responsible for weather forecasting in order to and predict rainfall, by using either the deterministic or the probabilistic approach. This study provides an insight of the different approaches used by Italian (DPC) and Catalanian (SMC) Civil Protection and the results they achieved with their peculiar issuing-system for early warnings. For the former, the analysis considers the period between 2006-2009 in which the predictive ability of the forecasting system, based on the numerical weather prediction model COSMO-I7, has been put into comparison with ground based observations (composed by more than 2000 raingauge stations, Molini et al., 2009). Italian system is mainly focused on regional-scale warnings providing forecasts for periods never shorter than 18 hours and very often have a 36-hour maximum duration. The information contained in severe weather bulletins is not quantitative and usually is referred to a specific meteorological phenomena (thunderstorms, wind gales et c.). Updates and refining have a usual refresh time of 24 hours. SMC operates within the Catalanian boundaries and uses a warning system that mixes both quantitative and probabilistic information. For each administrative region ('comarca') Catalonia is divided into, forecasters give an approximate value of the average predicted rainfall and the probability of overcoming that threshold. Usually warnings are re-issued every 6 hours and their duration depends on the predicted time extent of the storm. In order to provide a comprehensive QPF verification, the rainfall predicted by Mesoscale Model 5 (MM5), the SMC forecast operational model, is compared with the local rain gauge network for year 2008 (Comellas et al., 2010). This study presents benefits and drawbacks of both Italian and Catalanian systems. Moreover, a particular attention is paid on the link between system's predictive ability and the predicted severe weather type as a function of its space-time development.