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The forecaster's added value in QPF

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To the authors' knowledge there are relatively few studies that try to answer this topic: "Are humans able to add value to computer-generated forecasts and warnings ?". Moreover, the answers are not always positive. In particular some postprocessing method is competitive or superior to human forecast (see for instance Baars et al., 2005, Charba et al., 2002, Doswell C., 2003, Roebber et al., 1996, Sanders F., 1986).

Within the alert system of ARPA Piemonte it is possible to study in an objective manner if the human forecaster is able to add value with respect to computer-generated forecasts. Every day the meteorology group of the Centro Funzionale of Regione Piemonte produces the HQPF (Human QPF) in terms of an areal average for each of the 13 regional warning areas, which have been created according to meteo-hydrological criteria. This allows the decision makers to produce an evaluation of the expected effects by comparing these HQPFs with predefined rainfall thresholds. Another important ingredient in this study is the very dense non-GTS network of rain gauges available that makes possible a high resolution verification.

In this context the most useful verification approach is the measure of the QPF and HQPF skills by first converting precipitation expressed as continuous amounts into "exceedance" categories (yes–no statements indicating whether precipitation equals or exceeds selected thresholds) and then computing the performances for each threshold. In particular in this work we compare the performances of the latest three years of QPF derived from two meteorological models COSMO-I7 (the Italian version of the COSMO Model, a mesoscale model developed in the framework of the COSMO Consortium) and IFS (the ECMWF global model) with the HQPF. In this analysis it is possible to introduce the hypothesis test developed by Hamill (1999), in which a confidence interval is calculated with the bootstrap method in order to establish the real difference between the skill scores of two competitive forecast.

It is important to underline that the conclusions refer to the analysis of the Piemonte operational alert system, so they cannot be directly taken as universally true. But we think that some of the main lessons that can be derived from this study could be useful for the meteorological community. In details, the main conclusions are the following:
· despite the overall improvement in global scale and the fact that the resolution of the limited area models has increased considerably over recent years, the QPF produced by the meteorological models involved in this study has not improved enough to allow its direct use: the subjective HQPF continues to offer the best performance;
· in the forecast process, the step where humans have the largest added value with respect to mathematical models, is the communication. In fact the human characterisation and communication of the forecast uncertainty to end users cannot be replaced by any computer code;
· the QPFs verification is one of the most important activities of a Centro Funzionale because it allows a better understanding of the model behaviour in the different meteorological configurations, highlights the systematic characteristics, and helps in evaluating the reliability, in average or extreme values, over long term or in current situations;
· eventually, although there is no novelty in this study, we would like to show that the correct application of appropriated statistical tecniques permits a better definition and quantification of the errors and, mostly important, allows a correct (unbiased) communication between forecasters and decision makers.