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The Flash Floods Use Case in the “MISTRAL” project: Methodology and Verification

Ideally, weather forecasts should be provided for points and not for the large regions represented by global model grid boxes. This mismatch problem, which can be particularly acute for rainfall that can exhibit large local variability, can be addressed using either high resolution limited-area models, or by post-processing global model output, as in “ecPoint-rainfall”, a new ECMWF probabilistic post-processing technique to improve precipitation forecasts for points across the world.

MISTRAL (Meteo Italian Supercomputing portAL) is an EU-funded project, which ECMWF participates in to improve probabilistic 6-h rainfall forecast products, to help with the prediction of flash floods in Italy and nearby Mediterranean regions. One objective is exploiting the CINECA supercomputer facilities in Bologna to extract maximum benefit from ecPoint-Rainfall and a 2.2km resolution COSMO limited area ensemble. To do that we apply a new and innovative scale-selective neighbourhood post-processing technique, with the primary aim of identifying and preserving the most reliable heavy rainfall signals, and then blend that output with ecPoint output, to combine the most skilful aspects of the two systems. To do this, new 6-h ecPoint Rainfall forecasts were developed, building on pre-existing developments that now deliver 12-h ecPoint-rainfall forecasts to ECMWF customers in real-time. The final MISTRAL product comprises, for lead times of 1-10 days, for 6-h accumulated rainfall and for each COSMO gridbox, percentiles (1, 2,..99) and probabilities of threshold exceedance. The blending approach exploits the strong points of the two forecasting systems, to improve forecast quality generally, and to support decisions regarding weather alerts related to flash flood prediction. So we provide forecasts with enhanced quality and resolution, for Italy and nearby regions.

In this presentation we will introduce the methodologies applied to create the final probabilistic product and will show verification results for each forecast system, with and without applying the corresponding post-processing.

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