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# Forecasting Global Point Rainfall using ECMWF's Ensemble Forecasting System

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ECMWF (the European Centre for Medium range Weather Forecasts), in collaboration with the EFAS (European Flood Awareness System) and GLOFAS (GLObal Flood Awareness System) teams, has developed a new operational system that post-processes grid box rainfall forecasts from its ensemble forecasting system to provide global probabilistic point-rainfall predictions.

The project attains a higher forecasting skill by applying an understanding of how different rainfall generation mechanisms lead to different degrees of sub-grid variability in rainfall totals. In turn this approach facilitates identification of cases in which very localized extreme totals are much more likely.

This approach aims also to improve the rainfall input required in different hydro-meteorological applications. Flash flood forecasting, in particular in urban areas, is a good example. In flash flood scenarios precipitation is typically characterised by high spatial variability and response times are short. In this case, to move beyond radar based now casting, the classical approach has been to use very high resolution hydro-meteorological models. Of course these models are valuable but they can represent only very limited areas, may not be spatially accurate and may give reasonable results only for limited lead times. On the other hand, our method aims to use a very cost-effective approach to downscale global rainfall forecasts to a point scale. It needs only rainfall totals from standard global reporting stations and forecasts over a relatively short period to train it, and it can give good results even up to day 5. For these reasons we believe that this approach better satisfies user needs around the world.

This presentation aims to describe two phases of the project:

The first phase, already completed, is the implementation of this new system to provide 6 and 12 hourly point-rainfall accumulation probabilities. To do this we use a limited number of physically relevant global model parameters (i.e. convective precipitation ratio, speed of steering winds, CAPE - Convective Available Potential Energy - and solar radiation), alongside the rainfall forecasts themselves, to define the "weather types" that in turn define the expected sub-grid variability. The calibration and computational strategy intrinsic to the system will be illustrated. The quality of the global point rainfall forecasts is also illustrated by analysing recent case studies in which extreme totals and a greatly elevated flash flood risk could be foreseen some days in advance but especially by a longer-term verification that arises out of retrospective global point rainfall forecasting for 2016.

The second phase, currently in development, is focussing on the relationships with other relevant geographical aspects, for instance, orography and coastlines. Preliminary results will be presented. These are promising but need further study to fully understand their impact on the spatial distribution of point rainfall totals.