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Post-processing of global model output to forecast point rainfall

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ECMWF (the European Centre for Medium range Weather Forecasts) has recently embarked upon a new project to post-process gridbox rainfall forecasts from its ensemble prediction system, to provide probabilistic forecasts of point rainfall. The new post-processing strategy relies on understanding how different rainfall generation mechanisms lead to different degrees of sub-grid variability in rainfall totals. We use a number of simple global model parameters, such as the convective rainfall fraction, to anticipate the sub-grid variability, and then post-process each ensemble forecast into a pdf (probability density function) for a point-rainfall total. The final forecast will comprise the sum of the different pdfs from all ensemble members. The post-processing is essentially a re-calibration exercise, which needs only rainfall totals from standard global reporting stations (and forecasts) to train it. High density observations are not needed.

This presentation will describe results from the initial 'proof of concept' study, which has been remarkably successful. Reference will also be made to other useful outcomes of the work, such as gaining insights into systematic model biases in different synoptic settings. The special case of orographic rainfall will also be discussed.

Work ongoing this year will also be described. This involves further investigations of which model parameters can provide predictive skill, and will then move on to development of an operational system for predicting point rainfall across the globe. The main practical benefit of this system will be a greatly improved capacity to predict extreme point rainfall, and thereby provide early warnings, for the whole world, of flash flood potential for lead times that extend beyond day 5. This will be incorporated into the suite of products output by GLOFAS (the GLObal Flood Awareness System) which is hosted at ECMWF. As such this work offers a very cost-effective approach to satisfying user needs right around the world. This field has hitherto relied on using very expensive high-resolution ensembles; by their very nature these can only run over small regions, and only for lead times up to about 2 days.