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1. The impact of weather forecast improvements on large scale hydrology: analysing a decade of forecasts of the European Flood Alert System

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The European Flood Alert System (EFAS) provides early flood alerts on a pre-operational basis to National hydrological services. EFAS river discharge forecasts are based on probabilistic techniques, using ensemble system and deterministic numerical weather prediction data. The performance of EFAS is regularly analysed with regard to individual flood events and case studies. Although this analysis provides important insight into the strengths and weaknesses of the forecast system, it lacks statistical and independent measures of its long-term performance. In this paper an assessment of EFAS results based on ECMWF weather forecasts over a period of 10 years is presented. EFAS river discharge forecasts have been rerun every week for a period of 10 years using the weather forecast available at the time. These are evaluated for a total of 500 river gauging stations distributed across Europe.. The selected stations are sufficiently separated in space to avoid autocorrelation of station time series. Also, analysis is performed with a gap of 3 days between each forecast which reduces the temporal correlation of the time series of the same station. The data are analysed with regard to skill, bias and quality of river discharge forecast.

The 10 year simulations clearly show that the skill of the river discharge forecasts have undergone an evolution linked to the quality of the operational meteorological forecast. Overall, over the period of 10 years, the skill of the EFAS forecasts has steadily increased. Important hydrological extreme events cannot be clearly identified with the skill score analysis, highlighting the necessity for event based analysis in addition to statistical long-term assessments for a better understanding of the EFAS system and large scale river discharge predictions in general. he predictability is shown to depend on catchment size and geographical location.