Geophysical Research Abstracts
Vol. 21, EGU2019-14765, 2019
EGU General Assembly 2019

Evaluation of GloFASv2.0 hydrological forecast skill at the global scale

Shaun Harrigan (1), Ervin Zsoter (1), Lorenzo Alfieri (2), Christel Prudhomme (1), Hannah Cloke (3,4,5), Peter Salamon (2), Elisabeth Stephens (3), and Florian Pappenberger (1)

(1) European Centre for Medium-Range Weather Forecasts (ECMWF), Reading, UK (shaun.harrigan@ecmwf.int), (2) European Commission Joint Research Centre, Disaster Risk Management Unit, Ispra, Italy, (3) Department of Geography and Environmental Sciences, University of Reading, UK, (4) Department of Meteorology, University of Reading, UK, (5) Department of Earth Sciences, Uppsala University, Uppsala, Sweden

The Global Flood Awareness System (GloFAS; http://www.globalfloods.eu/) is a 24/7 supported operational system monitoring and forecasting floods across the world. GloFAS is part of the Copernicus Emergency Management Service and its aim is to complement relevant national and regional authorities and services, and to support international organisations in decision making and preparatory measures before major flood events, particularly in large trans-national river basins. Critical to both forecast end-users and scientific development is evaluation of forecast quality. This highlights when and where forecasts can provide skilful information on future flood prospects, identifies strengths and weaknesses of the ensemble hydro-meteorological system, and benchmarks whether recent scientific advances translate into improved forecast skill.

A major upgrade of GloFAS to version 2.0 was implemented in November 2018. The upgrade includes i.) new scientific developments, with calibration of the Lisflood groundwater and river routing component, and improvement in initialisation of forecasts using the new near-real-time ECMWF ERA5 reanalysis; and ii.) user-focused enhancements, with production of more GloFAS datasets including a new long-term (1981-present) GloFAS-ERA5 hydrological reanalysis, and release of 20-year reforecasts to the community so individuals can conduct their own detailed assessments of GloFAS performance in their regions of interest.

In this study, a comprehensive evaluation of the skill of GloFASv2.0 was undertaken at the global scale. In our experimental design, river flow reforecasts were produced twice per week over the 20-year reforecast period (1997-2016) for 11 ensemble members out to a lead time of 30 days globally at $\sim$10 km gridded spatial resolution. Four benchmark forecasts against which to evaluate skill were tested: deterministic persistence, probabilistic persistence, probabilistic climatology, and ensemble reforecasts from the previous model cycle, GloFASv1.0. Observations were used from over 1400 river flow stations with at least 4 years of data across the reforecast period. Additionally, evaluation against the GloFAS-ERA5 hydrological reanalysis was undertaken for a more complete spatio-temporal picture given the lack of observations in many parts of the world. A range of ensemble forecast verification metrics were used to assess overall probabilistic forecast performance, bias, reliability, and skill during extremes. Results provide the basis to judge the impact of the new model upgrades, understand where more research and development is needed, and will be published on the public GloFAS map viewer to aid forecasters and decision-makers.