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Recent advances in the Global Flood Awareness System (GloFAS)

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Over the past 30 years, flooding has been the most damaging, in terms of impact, of natural disasters worldwide. Population increase, climate and land use change are likely to intensify the global impact of floods, particularly in developing countries. To address the need for improved preparedness for floods on a global scale, the European Commission's Joint Research Centre (JRC), in collaboration with the European Centre for Medium-Range Weather Forecast (ECMWF), developed the Global Flood Awareness System (GloFAS). GloFAS has already demonstrated its potential for operational forecasting of large-scale flood events around the world. However further development and testing is required. A prototype of the system is currently running on a pre-operational basis, producing probabilistic discharge forecasts with worldwide coverage, daily temporal and 0.1° spatial resolutions, and a forecast horizon of 15-30 days. GloFAS, in its current state, couples state-of-the-art weather forecasts, provided by ECMWF, with two distributed models: the HTESSEL land surface scheme for computing surface and sub-surface run-off, and the LISFLOOD hydrodynamic model for flow routing through the river network. Discharge forecasts are compared with climatological discharge to detect probabilistic exceedance of warning thresholds.

The objective of this work is to present the latest developments of GloFAS, with an emphasis on the flood routing component. The ongoing and recent developments of the LISFLOOD model and its global setup include: changes of model structure (incorporation of lakes, reservoirs, and water use components), changes of representation of some processes (e.g. transmission loss in large-scale river basins), and refinement of data used for model simulations (e.g. improved global river network and associated channel morphology maps, global river width map). The effects of the above-mentioned changes on the global flood forecasting skill were evaluated using the discharge observations stored in a global discharge database, specifically created for the purpose. Currently, the database contains more than 1500 discharge stations, mainly from the Global Runoff Data Centre (GRDC), with an appropriate spatial coverage and quality. Model calibration and application of regionalization techniques for parameterization of ungauged catchments are envisioned as future tasks.