



GloFAS v4.0: towards hyper-resolution hydrological modelling at global scale

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The Global Flood Awareness System (GloFAS, <https://www.globalfloods.eu/>) is a freely available flood forecasting service that is running fully operational as part of the Copernicus Emergency Management Service since April 2018. GloFAS offers a number of products, which are tailored to give an overview of the current and future hydro-meteorological situation. The GloFAS dataset includes medium-range and seasonal discharge forecasts, as well as storages (e.g. soil moisture, snow cover, lakes volumes) and main fluxes (e.g. surface and sub-surface runoff, actual evapotranspiration).

The GloFAS dataset is generated using the open source hydrological model OS LISFLOOD (<https://ec-jrc.github.io/lisflood/>). OS LISFLOOD is a distributed, physically based rainfall-runoff model, which has been designed for the modelling of rainfall-runoff processes in large and transnational catchments for a variety of applications including flood simulation and forecasting; water resources assessment (drought forecast); analysis of the impacts of land use changes, river regulation measures, and other water management plans; or climate change analysis. The recent high-resolution global implementation of OS LISFLOOD allowed the delivery of the newest GloFAS set-up, namely GloFAS v4.0 which is foreseen to become operational in Q2 2023. This latest set-up has a 0.05 degrees resolution (~5km), 4 times higher than the previous version. Moreover, a crucial feature of the high-resolution implementation is the use of the latest research findings and remote sensing datasets to prepare the set of high-resolution input maps for the hydrological model. These maps allow to account more accurately for the morphological, physical, and land use characteristics of the catchments and thus enable an improved representation of the rainfall-runoff processes in different climates and socio-economic contexts at global scale.

This presentation provides an overview (i) of the GloFAS v4.0 OS-LISFLOOD high-resolution implementation, (ii) of the model calibration incorporating almost 2000 gauging stations and a pragmatic regionalization approach, and (iii) of the technological solutions adopted to limit the computational time of global high-resolution simulations.

OS-LISFLOOD, the high-resolution implementation maps, and GloFAS v4.0 are publicly available

and they disclose opportunities for further analysis of the terrestrial water cycle fluxes and storages, and of the current and future state of global water resources.