Geophysical Research Abstracts
Vol. 18, EGU2016-8004-1, 2016
EGU General Assembly 2016

Hydrological model calibration for enhancing global flood forecast skill

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Early warning systems play a key role in flood risk reduction, and their effectiveness is directly linked to streamflow forecast skill. The skill of a streamflow forecast is affected by several factors; among them are (i) model errors due to incomplete representation of physical processes and inaccurate parameterization, (ii) uncertainty in the model initial conditions, and (iii) errors in the meteorological forcing. In macro scale (continental or global) modeling, it is a common practice to use a priori parameter estimates over large river basins or wider regions, resulting in suboptimal streamflow estimations.

The aim of this work is to improve flood forecast skill of the Global Flood Awareness System (GloFAS; www.globalfloods.eu), a grid-based forecasting system that produces flood forecast unto 30 days lead, through calibration of the distributed hydrological model parameters. We use a combination of in-situ and satellite-based streamflow data for automatic calibration using a multi-objective genetic algorithm. We will present the calibrated global parameter maps and report the forecast skill improvements achieved. Furthermore, we discuss current challenges and future opportunities with regard to global-scale early flood warning systems.