Evaluation of ensemble streamflow predictions and flood warnings in Peru

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Worldwide, riverine floods rank among the most frequent, death-causing and damaging natural hazards. To reduce flood losses, both governmental and humanitarian organizations have focused on implementing early warning systems in flood prone areas. As an example, the Forecast-based financing (Fbf) initiative, developed by the Red Cross/Red Crescent, aims to trigger risk reduction and relief actions based on forecast information. Currently, Fbf runs operationally in several lower-income countries, using the hydrological forecasts of the Global Flood Awareness System (GloFAS), which couples ECWMF weather forecasts with a hydrological model to provide flood warnings.

The continuous evaluation of GloFAS performance over different domains and temporal scales is necessary to both gain the trust of the end-users and to guide its further improvement.

This research presents an evaluation framework that assesses GloFAS forecasting skills in Peru, which is a country that has experienced many devastating flood events over the past decade. The predictive skill is assessed on a so-called hindcast mode, using daily forecasts for the years 2009-2015 over lead times from 1 to 30 days.

The skill is examined from two different perspectives: a) by calculating several verification scores at every river point of the Peruvian river network and b) through an event-based analysis, by comparing the flood signals against collected information from multiple disaster databases such as Munich Re, DFO, EM-DAT. Finally, the quantile mapping technique was applied in order to evaluate whether a simple post-processing may be of use to humanitarian organizations and decision-makers for better preventive flood risk management planning.