Geophysical Research Abstracts
Vol. 12, EGU2010-15331, 2010
EGU General Assembly 2010

Defining critical thresholds for ensemble flood forecasting and warning

Werner H.A. Weeink (1,2), Maria-Helena Ramos (1), Martijn J. Booij (2), Vazken Andréassian (1), and Maarten S. Krol (2)

(1) Cemagref, Hydrology Group, Research Unit HBAN, Antony, France, (2) University of Twente, Department of Water Engineering and Management, Enschede, The Netherlands

The use of weather ensemble predictions in ensemble flood forecasting is an acknowledged procedure to include the uncertainty of meteorological forecasts in a probabilistic streamflow prediction system. Operational flood forecasters can thus get an overview of the probability of exceeding a critical discharge or water level, and decide on whether a flood warning should be issued or not. This process offers several challenges to forecasters: 1) how to define critical thresholds along all the rivers under survey? 2) How to link locally defined thresholds to simulated discharges, which result from models with specific spatial and temporal resolutions? 3) How to define the number of ensemble forecasts predicting the exceedance of critical thresholds necessary to launch a warning? This study focuses on this third challenge. We investigate the optimal number of ensemble members exceeding a critical discharge in order to issue a flood warning. The optimal probabilistic threshold is the one that minimizes the number of false alarms and misses, while it optimizes the number of flood events correctly forecasted. Furthermore, in our study, an optimal probabilistic threshold also maximizes flood preparedness: the gain in lead-time compared to a deterministic forecast. Data used to evaluate critical thresholds for ensemble flood forecasting come from a selection of 208 catchments in France, which covers a wide range of the hydroclimatic conditions (including catchment size) encountered in the country. The GRP hydrological forecasting model, a lumped soil-moisture-accounting type rainfall-runoff model, is used. The model is driven by the 10-day ECMWF deterministic and ensemble (51 members) precipitation forecasts for a period of 18 months. A trade-off between the number of hits, misses, false alarms and the gain in lead time is sought to find the optimal number of ensemble members exceeding the critical discharge. These optimal probability thresholds are further explored in order to search for correlations with catchment characteristics, forecast lead-time and discharge thresholds.