Geophysical Research Abstracts
Vol. 18, EGU2016-14123, 2016
EGU General Assembly 2016

Flood events across the North Atlantic region – past development and future perspectives

Bettina Matti (1), Bastien Dieppois (1), Damian Lawler (1), Helen E. Dahlke (2), and Steve W. Lyon (3)

(1) Centre for Agroecology, Water and Resilience, Coventry University, Coventry, United Kingdom, (2) Department of Land, Air and Water Resources, University of California, Davis, USA, (3) Department of Physical Geography, Stockholm University, Stockholm, Sweden

Flood events have a large impact on humans, both socially and economically. An increase in winter and spring flooding across much of northern Europe in recent years opened up the question of changing underlying hydro-climatic drivers of flood events. Predicting the manifestation of such changes is difficult due to the natural variability and fluctuations in northern hydrological systems caused by large-scale atmospheric circulations, especially under altered climate conditions. Improving knowledge on the complexity of these hydrological systems and their interactions with climate is essential to be able to determine drivers of flood events and to predict changes in these drivers under altered climate conditions. This is particularly true for the North Atlantic region where both physical catchment properties and large-scale atmospheric circulations have a profound influence on floods.
This study explores changes in streamflow across North Atlantic region catchments. An emphasis is placed on high-flow events, namely the timing and magnitude of past flood events, and selected flood percentiles were tested for stationarity by applying a flood frequency analysis. The issue of non-stationarity of flood return periods is important when linking streamflow to large-scale atmospheric circulations. Natural fluctuations in these circulations are found to have a strong influence on the outcome causing natural variability in streamflow records. Long time series and a multi-temporal approach allows for determining drivers of floods and linking streamflow to large-scale atmospheric circulations. Exploring changes in selected hydrological signatures consistency was found across much of the North Atlantic region suggesting a shift in flow regime. The lack of an overall regional pattern suggests that how catchments respond to changes in climatic drivers is strongly influenced by their physical characteristics. A better understanding of hydrological response to climate drivers is essential for example for forecasting purposes.