Geophysical Research Abstracts
Vol. 14, EGU2012-10652, 2012
EGU General Assembly 2012

Potential Impacts of Climate Change on Hydrological Extremes Across Europe

Dr. C. Donnelly, J. Dahné, Dr. J. Andersson, and Dr. B. Arheimer
Swedish Meteorological and Hydrological Institute, R.& D. Hydrology, Norrköping, Sweden (chantal.donnelly@smhi.se)

Regional scale predictions of floods and droughts are particularly useful for demonstrating to the general public the potential impacts of climate change, for example for the European continent. The E-HYPE pan-European application of the HYPE model was used to simulate hydrological data at a median subbasin resolution of 215 km2 for all of Europe. This data was then used to calculate, at this resolution, a number of drought and flood indices for today's climate and for a small ensemble of bias-corrected regional climate change projections. Indices calculated include the 1 in 10 and 1 in 50 year flood levels, mean annual high water discharge, mean annual low water discharge, number of days per year with hydrological drought and agricultural drought and the intensity of days with agricultural drought. Maps showing the relative changes in these variables for various time periods in the future were then made from the results. These maps may then be used to indicate 'hot-spots' for where hydrological extremes are important today and for where large changes in flood and drought levels or frequency may be expected for a future climate.

The E-HYPE model, used to make these predictions, has been evaluated using a large data set of discharge observations (over 800) at independent sites across Europe. The model uses readily available pan-European input data sets and a single parameter set across the entire continent. This homogenous treatment of the model domain means that results from all over Europe are easily comparable. Validation is made to ensure the model simulates discharge volumes and daily variation at each station, but novel for this study is that a validation of the model's ability to capture the drought and flood indices was also made. Although E-HYPE is a large domain model, the high subbasin resolution means that these results are available at high-resolution across Europe. Nevertheless, prediction uncertainty increases with decreasing catchment scale, so this study also presents unique work that has been done on quantifying the prediction uncertainty at different scales within the model domain.