



Climate change impact on available water resources obtained using multiple global climate and hydrology models

Stefan Hagemann (1), Cui Chen (1), Douglas B. Clark (2), Sonja Folwell (2), Simon N. Gosling (3), Ingrid Haddeland (4), Naota Hanasaki (5), Jens Heinke (6), Fulco Ludwig (7), Frank Voss (8), and Andrew J. Wiltshire (9)

(1) Max-Planck-Institut für Meteorologie, Land in the Earth System, Hamburg, Germany (stefan.hagemann@zmaw.de, 040-41173-366), (2) Center for Ecology and Hydrology, Wallingford, United Kingdom, (3) School of Geography, University of Nottingham, Nottingham, United Kingdom, (4) Norwegian Water Resources and Energy Directorate, Oslo, Norway, (5) National Institute for Environmental Studies, Tsukuba, Japan, (6) Potsdam Institute for Climate Research, Potsdam, Germany, (7) Wageningen University and Research Centre, Wageningen, Netherlands, (8) Center for Environmental Systems Research, University of Kassel, Kassel, Germany, (9) Met Office Hadley Centre, Exeter, United Kingdom

Climate change is expected to alter the hydrological cycle resulting in large-scale impacts on water availability. However, future climate change impact assessments are highly uncertain. For the first time, multiple global climate (three) and hydrological models (eight) were used to systematically assess the hydrological response to climate change and project the future state of global water resources. The results show a large spread in projected changes in water resources within the climate–hydrology modelling chain for some regions. They clearly demonstrate that climate models are not the only source of uncertainty for hydrological change. But there are also areas showing a robust change signal, such as at high latitudes and in some mid-latitude regions, where the models agree on the sign of projected hydrological changes, indicative of higher confidence. In many catchments an increase of available water resources is expected but there are some severe decreases in central and Southern Europe, the Middle East, the Mississippi river basin, Southern Africa, Southern China and south eastern Australia.