



Climate change effects on summer droughts in Norway

Wai Kwok Wong (1), Stein Beldring (1), Torill Engen-Skaugen (2), Ingjerd Haddeland (1), and Hege Hisdal (1)

(1) Norwegian Water Resources and Energy Directorate, NVE, P.O. Box 5091, Majorstuen, N-0301, Oslo, Norway

(wkw@nve.no), (2) Norwegian Meteorological Institute, P.O. Box 43, Blindern, N-0313, Oslo, Norway

This study examines the impact of climate change on summer droughts in Norway. A spatially distributed hydrological model HBV, driven by downscaled temperature and precipitation fields from two Atmosphere-Ocean General Circulation Models (ECHAM4/OPYC3 and HadAM3H/HadCM3) with two future emission scenarios (A2 and B2), was used to provide hydrological data for the drought analyses. The summer season was defined to be the period of positive temperatures across the whole country, from 15 May to 15 October. Meteorological and hydrological drought characteristics were estimated using the threshold level method. A fixed percentile was applied to a set of hydrometeorological variables including precipitation, soil moisture, runoff and groundwater. Time slice results from future projections (2071-2100) were compared with the control simulations (1961-1990) representing present climate. Changes in both the drought duration and spatial extent of droughts were examined. Overall, changes in future meteorological drought characteristics in Norway are small, but the results indicate substantial changes in hydrological drought characteristics, especially in the northern and southernmost parts of the country where a considerable increase in drought duration is expected. Increased drought duration is also found in regions with a projected increase in precipitation. The largest changes in drought characteristics are found under the high emission scenario A2. This implies that temperature changes are important with respect to changes in drought characteristics. In the Glomma River basin – the largest river basin in Norway, despite small changes in duration and areal extent of future meteorological droughts, hydrological droughts are expected to cover a significantly larger area and have a longer duration.