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Ensemble simulations of climate change impacts on hydrological processes in Norway

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Ensembles of climate change impact simulations for hydrological processes in Norway have been estimated through the combination of results from two SRES emission scenarios, two global climate models and dynamical downscaling using two regional climate models, resulting in eight different scenarios of climate conditions for the period 2071-2100. The results were further downscaled to meteorological stations sites and subsequently used for driving a spatially distributed version of the HBVmodel, vielding an ensemble of scenarios for snow and glacier conditions, subsurface moisture and thermal conditions, runoff and evapotranspiration fluxes and streamflow. Present conditions were determined through a control run with the hydrological model using observed meteorological data and climate model results for 1961-1990. The analyses have been performed for the entire Norwegian land surface and for catchments selected from different runoff regimes. The variability of hydrological processes and their extremes have been quantified through frequency analysis of extreme events and statistical characterisation of present and future conditions. The results from the regional climate models were downscaled to meteorological station sites using two different methods; the delta change approach, and a statistical adjustment technique which preserves the changed variability of precipitation from present to future conditions. An evaluation of the two downscaling methods has been performed.