Geophysical Research Abstracts,
Vol. 11, EGU2009-913-1, 2009
EGU General Assembly 2009


# Climate Change impacts on the Jordan River, Israel: Downscaling application from a Regional Climate Model

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This paper aims to evaluate the impact of future climate change on streamflow and water resources in the Jordan River watershed. Such changes are expected to play an important role in water availability, planning and policy as well as in the ability to comply with international treaty obligations. Currently, Global Climate Models (GCMs) and Regional Climate Models (RCMs) are the leading tools available for assessing long term climatic evolution and for projecting future conditions of transient atmospheric circulation variables that are a response to unseen CO2 levels. However, the scale at which the results are generated, in the 100s or even 10s of kilometers is too coarse to answer questions regarding local precipitation, water management or agriculture decisions. Here we statistically downscale precipitation output from a regional climate model focused on the Middle East, as well as temperature, radiation, relative humidity and wind speed, which were used to asses local changes in potential evaporation (using Penman-Monteith equation). The climate model used is the ICTP RegCM3 model driven from the lateral boundaries by results of ECHAM5/MPI-OM1. Transient climate simulation from 1960 to 2060 (SRES A1B emission scenario after 2001) are used. The results are then used as input into a hydrological model calibrated for the upper catchments of the Jordan River. This allows us to evaluate the impact on streamflow and water resources and to compare the predicted baseflow and surface flow components of the tested watersheds. We compared the average hydrological variables of 3 periods: 1. 1980-2005; 2. 2010-2035; and 3. 2035-2060. No significant differences were observed between period 1 and 2, however significant differences were observed after 2030, i.e. during period 3, where we found 12% reduction in rainfall, 3.7% increase in potential evaporation, 10% reduction in baseflow, 18% reduction in surface flow and 12% reduction in total flow of the Jordan River.