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Coupled High Resolution Climate and Distributed Hydrological Simulations for the Eastern Mediterranean/Near East and the Upper Jordan Catchment

P. Suppan (1), H. Kunstmann (1), A. Heckl (1) and A. Rimmer (2)

(1) Forschungszentrum Karlsruhe, Institute for Meteorology and Climate Research (IMK-IFU), Kreuzeckbahnstraße 19, 82467 Garmisch-Partenkirchen, Germany.

peter.suppan@imk.fzk.de / Fax: +49-8821-183243 / Phone: +49-8821-183239

(2) Kinneret Limnological Laboratory, Israel Oceanographic & Limnological Research Ltd, PO Box 447, Migdal 14950, Israel

Sufficient freshwater availability is a central prerequisite for agricultural and industrial development in the water scarce environment of the Eastern Mediterranean and Near East (EM/NE). Political peace in the region is strongly linked to the satisfactory compliance of increasing water demands. Sustainable management of water resources requires scientific sound decisions on future freshwater availability, in particular under global climate change and increasing greenhouse gas emissions. Behind this background, the impact of climate change on water availability in EM/NE and in particular the Jordan River catchment is investigated within the framework of the GLOWA-Jordan river project (http://www.glowa-jordan-river.de). This article focuses on the Upper Jordan River catchment (UJC) as it provides 1/3rd of freshwater resources in Israel and Palestine. This is achieved by high resolution coupled regional climate – hydrology simulations. Two 30 year time slices (1960-1990 and 2070-2100) of the global climate model ECHAM4 will be dynamically downscaled using the non-hydrostatic meteorological model MM5 in three nesting steps with resolutions of 54x54 km^2, 18x18 km^2, and 6x6 km^2. Recent emphasis is put on the IPCC emission scenario B2. The meteorological fields finally will be used to drive the physically based hydrological model WaSiM applied to the UJC. The hydrological model computes in detail the surface and subsurface water flow and water balance in a horizontal resolution of 90 x

90 m^2 and dynamically couples to a 2-dim numerical groundwater model.

Preliminary results are presented which show anticipated climate change for temperature and precipitation in the region and the corresponding changes in terrestrial hydrology, particularly impact on surface runoff, groundwater recharge, soil moisture and evapotranspiration in this hydro-geologically extremely complex region.