An RCM Evaluation of Climate Change Trends and Uncertainties over the Eastern Mediterranean Region for GLOWA Jordan River Project

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An important issue when considering adaptation and mitigation responses to climate change is the uncertainty in the predictions of future climate. In addition to uncertainties derived from the model formulation there are those derived from natural climate variability and future atmospheric emissions (Christensen 2004; Deque et al. 2005). The analysis reported here involves two configurations of RegCM3 regional climate model (Giorgi et al. 2004). The two model versions have been used in the regional climate simulations driven from the lateral boundaries by HadCM3 (PRECIS) and FVGCM global models. The use of the two regional model configurations has been aimed to allow a determination of uncertainty due to differences in model formulations. The use of two driving AOGCM models allows estimating an additional level of uncertainty that is introduced by the model internal variability as well as the uncertainty introduced when a different GCM is used as a driving model. No natural climate variability effects have been taken into account.

Experiment setup: (E1) RegCM3 primitive equation regional climate model with 50 km horizontal resolution. (E2) Two RegCM3 configurations differing by vertical resolution (14 and 18 levels) and physical parameterizations adopted (convective processes - according to the Grell with Fritsch-Chappell closure and Emanuel approaches respectively). (E3) Periods of simulations: Current climate (Control) 1961-1990; Scenario (A2, B2) runs 2071-2100; (E4) AOGCM driving data used: HadCM3 PRECIS, NASA FVGCM.

Climate simulations runs performed: (S2) 1961-1990: PRECIS1(14 lev); PRECIS2(18 lev); FVGCM(18 lev); (S2) 2071-2100 A2: PRECIS1(14 lev); PRECIS2(18 lev);FVGCM (18 lev); (S3) 2071-2100 B2: PRECIS1(14 lev); PRECIS2(18 lev).

Preliminary results of the obtained RCM projections of climate changes in the Jordan River area by the end of this century based on A2 scenario (results of the B2 experiment predict similar but weaker climate change as compared with the A2 experiments) may be summarized as follows:

Temperature change

During winter season a 2.5-4^{o}C temperature increase is predicted for the area. According to the PRECIS-based model runs a temperature increase of about $\sim$3^{o}C may be expected. The FVGCM experiment produced a slight cooling ($\sim$-0.2) for the sea-

son however. During summer different experiments produce temperature increase of 3-6ºC. During autumn the expected temperature increase is of about 2.4-4ºC. Similar, though smaller temperature increase is expected for the area in the experiments performed in accordance with the B2 SRES emission scenario.

Precipitation change

A precipitation decrease of about .5 mm/day (10-30 % of model produced DJF rains) winter precipitation is predicted in all the experiments based on both A2 and B2 scenarios. During spring also significant precipitation decrease (20-35%) is simulated. An increase in the amount of summer precipitation is predicted in two of the three experiments. The result apparently indicates a significant relative humidity increase during the season. Only a minor change in amount of the precipitation is predicted for the area during autumn.

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