Simulation of the surface climatology over the Eastern Mediterranean region using the RegCM3 model

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Results of regional climate of the Eastern Mediterranean region with third generation of the Regional Climate Model (RegCM3; Giorgi et al. 1999 and Pal et al. 2000) are evaluated through the comparisons with observed surface climatology. The dynamical core of the RegCM is essentially equivalent to the hydrostatic version of the NCAR/Penn State mesoscale model MM5. Surface processes are represented via the Biosphere-Atmosphere Transfer Scheme (BATS) and boundary layer physics is formulated following a non-local vertical diffusion scheme. Resolvable scale precipitation is represented via the scheme of Pal et al. (2000), which includes a prognostic equation for cloud water and allows for fractional grid box cloudiness, accretion and re-evaporation of falling precipitation. Convective precipitation is represented using a mass flux convective scheme while radiative transfer (Giorgi et al. 1999) is computed using the radiation package of the NCAR Community Climate Model, version CCM3. Cloud radiation is calculated in terms of cloud fractional cover and cloud water content, and a fraction of cloud ice is diagnosed by the scheme as a function of temperature. The model domain in the experiment (Figs. 1 - 3) covers the eastern Mediterranean region with a total of 45 x 34 Lamber Confomal grid points with 40 km horizontal resolution and 18 sigma levels in the vertical. The model is nested by the one-way relaxation Davies and Turner (1977) with the initial and lateral boundary conditions provided from NCEP/NCAR re-analysis project (NNRP) data (Kalnay et al. 1996) and the surface forcing is prescribed with observed weekly mean sea surface temperature Reynolds et al. (2002). The simulation was started on January 1, 1981 and was run continuously for 20 years with 3-minute time steps. The monthly and seasonal mean results from the model's simulation for five years from 1985 to 1989 are compared here with the observed screen surface temperature and precipitation from the Climate Research Unit (CRU; New et al. 2000), Climate Prediction Center global precipitation data (CPC; Xie and Arkin, 1996) and NNRP (Kalnay et al. 1996). The mean DJF precipitation simulated by the RegCM3 is consistent with Xie-Arkin observational data and describes the real precipitation space distribution with higher details than in the NNRP data. Most of the land precipitation produced by the RegCM3 is right concentrated in a very narrow band along the coastal zone. Fig. 2 shows the monthly mean surface temperature over the region. The agreement between RegCM3 simulation and CRU observation is quite good. The RegCM3 simulates accurately the seasonal variability of screen temperature over the main parts of the region. The research was supported by German-Israeli research grant (GLOWA - Jordan River) from the Israeli Ministry of Science and Technology; and the German Bundesministerium fuer Bildung und Forschung (BMBF).

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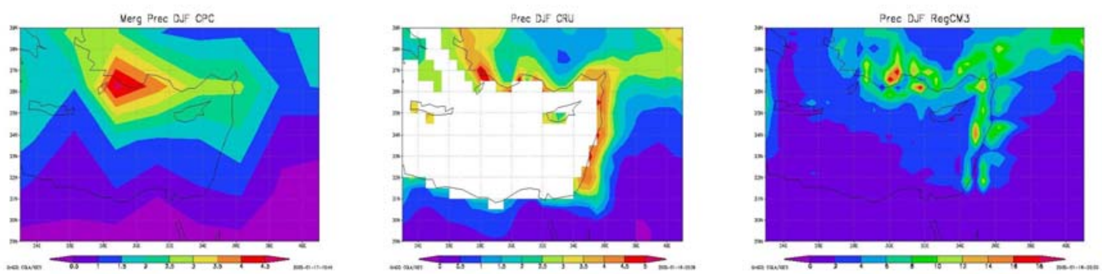

Figure 1. DJF Precipitation (mm/day)

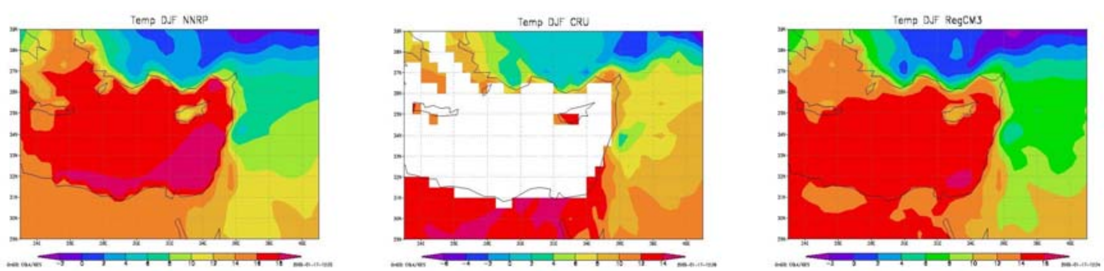

Figure 2. DJF Surface air temperature (°C)

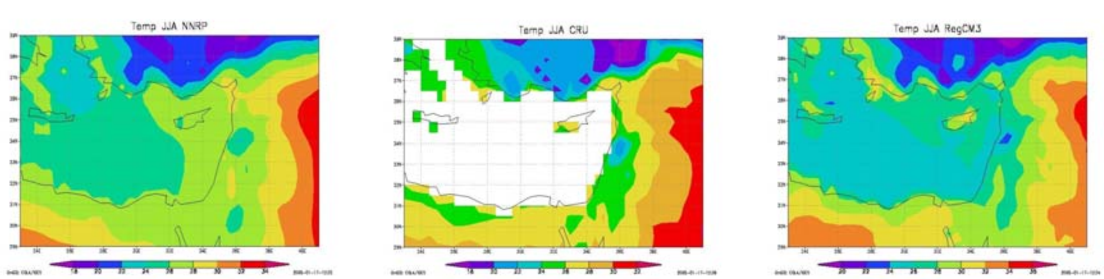

Figure 3. JJA Surface air temperature (°C)