Geophysical Research Abstracts
Vol. 12, EGU2010-9799-1, 2010
EGU General Assembly 2010

A multi-scale methodology for comparing GCM and RCM results over the Eastern Mediterranean

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The importance of skillful climate modeling is increasingly being realized as results are being incorporated into environmental, economic, and even business planning. Global circulation models (GCMs) employed by the IPCC provide results at spatial scales of hundreds of kilometers, which is useful for understanding global trends but not appropriate for use as input into regional and local impacts models used to inform policy and development. To address this shortcoming, regional climate models (RCMs) which dynamically downscale the results of the GCMs are used. In this study we present first results of a dynamically downscaled RCM focusing on the Eastern Mediterranean region. For the historical 1960-2000 time period, results at a spatial scale of both 25 km and 50 km are compared with historical station data from 5 locations across Israel as well as with the results of 3 GCM models (ECHAM5, NOAA GFDL, and CCCMA) at annual, monthly and daily time scales. Results from a recently completed Japanese GCM at a spatial scale of 20 km are also included. For the historical validation period, we show that as spatial scale increases the skill in capturing annual and inter-annual temperature and rainfall also increases. However, for intra-seasonal rainfall characteristics important for hydrological and agricultural planning (eg. dry and wet spells, number of rain days) the GCM results (including the 20 km Japanese model) capture the historical trends better than the dynamically downscaled RegCM. For future scenarios of temperature and precipitation changes, we compare results across the models for the available time periods, generating a range of future trends.