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EURO-CORDEX regional climate models: Performance over Mediterranean region

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Regional climate models (RCMs) are high-resolution version of a global climate models (GCMs) designed to achieve simulations at horizontal resolutions relevant for human activities on local and regional spatial scales, and to simulate relevant processes in historical and potential future climate conditions. In this study, a set of experiments the EURO-CORDEX simulations are evaluated over the Mediterranean region. All simulations were made at the two horizontal resolutions (50 km and 12.5 km) and compared with gridded pan-European gridded dataset E-OBSv11 at the regular $0.25^\circ \times 0.25^\circ$ grid for the two periods (1989-2008 for the ERA-Interim-driven ensemble of simulations; 1971-2000 for the GCMs-driven ensemble of simulations). We will evaluate the impacts of (1) the boundary conditions, (2) different horizontal resolutions (0.44°/50 km vs. 0.11°/12.5 km), and (3) the impact of convective parametrization on systematic errors, specialy in case of the RegCM4 model extensively used at DHMZ. For each simulation commonly used evaluation metrics are applied. They include: (1) spatially-averaged differences between RCMs and observations, (2) the spatial 95 th percentiles of simulated and observed temperature and precipitation, (3) spatial correlation coefficients between models and observations, (4) the ratio of spatial standard deviations between simulated and observed fields, and (5) the Spearman rank correlations between simulated and observed time-series of spatially-averaged temperature and precipitation. As commonly found in other studies, the total precipitation in RCM simulations is often overestimated and spatial correlations are noticeably lower than for temperature. The results highlight that, the RegCM4 is able to capture the (observed) spatial variability of the Mediterranean temperature climate. This is indicated by high spatial correlations with values larger than 0.9 and values of normalized standard deviation below 1 for Mediterranean region. The results of this study will provide the basis for the selection of combinations of RCMs and GCMs for investigate the impacts of climate change over Mediterranean region.