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Simulated Future Air Temperature and Precipitation Climatology and Variability in the Mediterranean Basin by Using Downscaled Global Climate Model Outputs

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The Mediterranean Basin is one of the regions that shall be affected most by the impacts of the future climate changes on temperature regime including changes in heat waves intensity and frequency, seasonal and interannual precipitation variability including changes in summer dryness and drought events, and hydrology and water resources. In this study, projected future changes in mean air temperature and precipitation climatology and interannual variability over the Mediterranean region were simulated. For performing this aim, the future changes in annual and seasonal averages for the future period of 2070-2100 with respect to the period from 1970 to 2000 were investigated. Global climate model outputs of the World Climate Research Program's (WCRP's) Coupled Model Intercomparison Project Phase 3 (CMIP3) multi-model dataset were used. SRES A2, A1B and B1 emission scenarios' outputs of the Intergovernmental Panel on Climate Change (IPCC) were used in future climate model projections. Future surface mean air temperatures of the larger Mediterranean basin increase mostly in summer and least in winter, and precipitation amounts decreases in all seasons at almost all parts of the basin. Future climate signals for surface air temperatures and precipitation totals will be much larger than the inter-model standard deviation. Inter-annual temperature variability increases evidently in summer season and decreases in the northern part of the domain in the winter season, while precipitation variability increases in almost all parts of domain. Probability distribution functions are found to be shifted and flattened for future period compared to reference period. This indicates that occurrence frequency and intensity of extreme weather conditions will increase in the future period.

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