



Climate change scenario (21st century) for the Mediterranean using an atmosphere-ocean regional climate model

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In order to study the evolution of the climate of the Mediterranean region of the 21st Century, we have developed a high resolution Atmosphere-Ocean Regional Coupled Model (AORCM). This model named SAMM (Sea-Atmosphere Mediterranean Model) results from a coupling between a global spectral AGCM (ARPEGE-Climate), whose variable resolution is maximum in the Mediterranean region and a Mediterranean sea limited area OGCM (OPA-MED8). The horizontal resolution of the AORCM is about 50 km for the atmosphere allowing us to represent the major atmospheric characteristics driven by the orography of the Mediterranean basin and 10 km for the Mediterranean Sea. A 100-year numerical experiment starting in 1960 was run with the AORCM. Up to year 2000, forcing was prescribed from observed values: SST at the global ocean surface (outside the Mediterranean sea), river runoff fluxes, Atlantic box hydrology, greenhouse gas and aerosol concentrations. A simple monthly heat flux correction on air sea exchanges was applied to ensure the model stability. Then, beyond 2000, an IPCC-A2 scenario was prescribed for the greenhouse gas and aerosol concentrations. An anomaly approach was used to represent the evolution of the other forcings that was provided from a global low-resolution coupled climate scenario run previously. The warming and the drying of the Mediterranean climate have been quantified for the 21st Century. The regional impact of the climate change on the Mediterranean SST has been assessed as well as the changes in the Mediterranean ThermoHaline Circulation (MTHC) and in the water mass characteristics. Comparisons between this regional coupled simulation and a previous scenario run with a forced Mediterranean model (Somot et al. 2006) have been analysed.