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Future changes in the Mediterranean water budget projected by an ensemble of Regional Climate Models

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The Mediterranean basin is a region characterized by its vulnerability to changes in the water cycle. Hence, the impact of global warming on the water resources in the Mediterranean zone is one of the mayor concerns for the scientific community. The future climate projections used to elaborate the IPCC report of 2007 show great alterations in the evaporation and precipitation over the Mediterranean Sea at the end of 21st century. It has been argued that coarse resolution of IPCC models may not be appropriate to correctly simulate the Mediterranean climate. This region presents complicated regional features, so a higher resolution is needed. In this work we investigate the changes in the water budget in the Mediterranean Sea by using scenario experiments performed with high resolution regional models (RCMs) participating in the EU FP6 ENSEMBLES project. These experiments show that the response of the hydrological variables to global warming starts to be statistically significant from 2050. The freshwater deficit anomalies for the period 2070-2099 related to 1950-1999 present a mean increase of +40%, whereas the IPCC models project a mean increase of 28% for the same period and climate scenario. Though there is evidence of great alterations of Mediterranean water cycle at the end of 21st century, a large spread in the model behaviour still remains. The uncertainties associated to climate change, in particular for river discharge and Black Sea exchanges are still very large, suggesting that more effort is needed to reduce the degree of uncertainty.