Ability of ensemble RCMs to reproduce basic hydrometeorological variables for local impact studies. A comparison among two different hydroclimatic regions in Greece.

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Amongst all European regions, the Mediterranean appears most vulnerable to global change with multiple potential impacts, related primarily to increased temperature and reduced precipitation. The state-of-the-art regional climate change ENSEMBLES dataset is used to study the impact of the climate change on the water resources status of the island of Crete and Pinios river basin in Thessaly. To minimize the effect of long-term temporal variability as well as internal model biases which can be quite substantial, especially for precipitation, 30 year long historical and future periods were used to calculate the precipitation climate change signal. Monthly precipitation data obtained from 53 rainfall stations for Crete and 50 rainfall stations for Thessaly for the historical dataset were used to correct the bias of the RCM results. RCM-specific weights were extracted in order to construct the optimal ensemble output for precipitation at a basin scale and monthly temporal resolution. The ENSEMBLES RCMs weights, based on a set of metrics that were defined by their ability to simulate the present climate, were calibrated for the 1973-2000 observed precipitation, both for Crete and Thessaly sub-regions at 25 km resolution. The weighted ENSEMBLES results underestimates local observed precipitation by 28% for the island of Crete and by 11% for Pinios river basin. The difference in RCMs performance may be attributed in regional feedbacks due to regional aerosol-cloud-precipitation interaction, as well as topography induced biases.