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Fine scale climate response to greenhouse forcing over the Mediterranean region: Results from double nested RCM experiments

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We conducted three 30-year climate change simulations over the Mediterranean basin with a regional climate model (the ICTP RegCM3) used in double nested mode. With this technique, the RegCM is run at 20 km grid spacing over a Mediterranean domain using lateral boundary conditions (LBC) from corresposnding 50 km grid spacing RegCM runs driven at the lateral boundaries by GCM fields. Simulations for present day (1961-1990) and future climate conditions (2071-2100 under the A2 and B2 IPCC emission scenarios) are discussed. We first show that the use of high resolution improves the simulation of precipitation in areas of complex topography (the Alps). We then show that the fine scale precipitation change signal (and to a lesser extent the temperature change signal) is strongly affected by the topographical forcing, with this effect being seasonally dependent in response to different circulation changes across seasons. We also discuss changes in extreme events as affected by the topographical forcing. Our results clearly point to the importance of high horizontal resolution in the development of climate change scenarios over the Mediterranean region for use in impact assessment studies.