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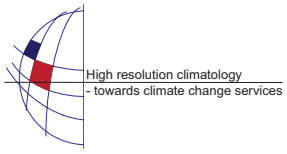

Regional climate simulations over complex topography using WRF: Andalusian present climate

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In this study three WRF simulations were carried out and analyzed to assess its accuracy to describe the main climate features of Southern Spain in terms of maximum temperature, minimum temperature and precipitation.
Present climate was represented by the last 30 year of the 20th Century (1970-1999). The model was evaluated using an observational network distributed throughout Andalusia that comprised both temperatures and precipitation. Since comparison between site-specific measurements and model grid points is definitely troublesome due to differences in spatial-scale, a multi-step regionalization strategy was adopted to upscale observational information. This is of particular importance when studying complex topography regions such as Andalusia, with a wide range of climate conditions in a relative small area. Additionally, WRF outputs were also compared with SPAIN02, a 20-km resolution gridded dataset of precipitation for further validation of the model performance.
The model set up consisted in two domains with one-way nesting and spectral nudging. The target domain has a resolution of 10km with 136 by 136 points covering the whole Iberian Peninsula and nested in a coarser domain of 30-km resolution and 130 by 120 grid points. Both domains have 35 vertical levels. Three different driving data were used to provide the boundary conditions, one reanalysis (ERA-40) and two control runs from different General Circulation Models (ECHAM5 and CCSM 3.0). A conservative 7-month spin-up period was added to the 30-year simulation so that dependence on initial conditions can be completely removed. Physics options were chosen on the basis of previous parameterization sensitivity tests over Andalusia that led to a compromise configuration that adequately describes the different subclimates.
Probability distributions of daily values as well as monthly statistics were examined to determine the uncertainties associated to each variable and take them into consideration for future regional high-resolution projections of climate change scenarios. These analyses permitted to conclude that WRF is an extremely useful tool due to the significant value-added information produced with respect to the driving data. Nonetheless, according to differences in performance between regions it has also been shown that results must be interpreted carefully depending on the region characteristics.
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