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Impacts of seasonal cycle fluctuations in an A1B scenario over the Euro-Mediterranean

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We analyse the downscaling of an A1B scenario simulation for the Euro-Mediterranean area performed with a regional earth system model by focusing on long-term variations in the seasonal cycle of key impact indicators (surface temperature, hydrological cycle).
The output from the regional model is compared with the driving global simulation (ECHAM5/MPI-OM) and to available observations. Our objective is to highlight the potential additional information end-users may access by using a high-resolution regional coupled system in place of the corresponding coarser global driver.
In the regional downscaling, the large SST bias simulated by the global driver is partially reduced and SST spatially patterns are in better agreement with those observed in the reference climatology, thereby supporting the tenet that coupling the atmosphere with a high-resolution interactive ocean over small areas characterized by complex orography may improve specific aspects of regional climate modelling.
A more accurate description of orography produces in the regional model a narrower identification of the effects of a warmer climate on intense precipitation events and on other key environmental indicators, such as the snow cover extension and the aridity index.
An example of the impact of climate variability on river discharge is also presented for a medium/small-size catchment basin in Northern Italy, the Po river, which responds both to variations in rainfall rates and to the amount of snowfall over the Alps. In contrast with the gross underestimation of the global driver, the regional simulation produces a reasonable estimate of the observed average discharge (1500 m3/s) and of its seasonal variability, which provides a reliable baseline for societal impact studies.