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Climate change projections for the eastern Mediterranean and the Middle East based on CORDEX-CORE simulations

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Many observation-based and modelling studies have identified the Eastern Mediterranean and Middle East (EMME) region as a prominent climate change hot-spot. During the last half century, the region has warmed faster than the global mean, while at the same time changes in the hydrological cycle have been observed. Several studies suggest that these trends are projected to continue and intensify throughout the 21st century, depending on greenhouse gas emission scenarios. To assess climate change impacts on a regional and local level, future climate information of high quality and spatial resolution is required. To provide such information is the objective of CORDEX. The latest advancement of this World Climate Research Programme (WCRP) initiative includes the CORDEX-CORE set of regional experiments that aims at global coverage and was designed to provide regional-level information to the upcoming Assessment Reports of the Intergovernmental Panel on Climate Change (IPCC). This state-of-the-art dataset is available at a spatial resolution of 0.22° (about 25 km). We have complemented this ensemble model data with those from two experiments of the MENA-CORDEX initiative that are available at the same resolution. Here, we have analyzed monthly data from 1971 to the end of the current century. We have adopted a multi-domain and multi-model ensemble approach that is found to add value by addressing shortcomings and reducing uncertainties. Our results corroborate and update existing estimations on the transition to drier and hotter conditions in the EMME region. Under a business-as-usual pathway (RCP8.5), the region-average warming at the end of the current century is expected to exceed 5 °C (with respect to the 1986-2005 reference temperature). On the contrary, under a strong mitigation pathway (RCP2.6) this warming can be limited to less than 1.5 °C. Summer warming is projected to exceed these values by 2-3 °C, favoring the conditions for unprecedented heatwaves. On average, precipitation changes are less robust and significant and range between 0 to -15% of the reference values, while locally stronger drying can occur, particularly under RCP8.5.