



Towards a high-resolution climatology of seasonal precipitation over the south-eastern Mediterranean

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The present work demonstrates the capability of the Weather Research and Forecasting (WRF) model-based four-dimensional data-assimilation system (WRF-FDDA) to produce a high-resolution climatology of seasonal precipitation in the south-eastern Mediterranean. The system was used to dynamically downscale global Climate Forecast System (CFS) reanalysis along with continuous assimilation of conventional and unconventional observations. Seven precipitation seasons (December-January-February), including two extreme dry and wet seasons, were generated at 2-km spatial resolution. Verification against rain-gauge observations shows that the WRF-FDDA system successfully reproduces the spatial and inter-annual variability, as well as the timing, intensity and length of wet and dry spells. The best agreement between model and observations was obtained at areas dominated by complex terrain, illustrating the benefit of the high-resolution lower-boundary forcing in the dynamical downscaling process. On the other hand, some biases were observed over coastal flat terrain areas. Objective weather-regimes verification reveals the skill of the climatology for different types of extra-tropical cyclones. While biases are larger at coastal-flat areas under shallow-cyclonic conditions, deep-cyclonic conditions lead to more significant biases at complex-terrain regions. The weather-regimes dependent information may be used for further calibration of the downscaled precipitation.