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Assessment of regional climate model mean and extreme daily precipitation statistics over Croatia

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Croatian Adriatic coast is often affected by extreme precipitation that leads to flash-floods with severe damage, both human and material. The added value of high-resolution regional climate model (RCM) simulations of mean and extreme precipitation has already been proven, but RCMs' skill over complex terrain, such as coastal mountains in Croatia, still poses some challenges and open questions. We evaluate the daily precipitation simulations of high-resolution (0.11°) RCM ALADIN-Climate versions 5.2 (ALD5) and 6.3 (ALD6) driven by the ERA-Interim reanalysis over the Med-CORDEX domain. The spectral nudging technique (SN) was applied on both model versions (AD5SN, ALD6SN). Reference datasets used are precipitation analysis system MESCAN, available on 5.5 km resolution every 6 h, and 24 h accumulated precipitation data from the Croatian raingauge network. To assess the agreement between model and reference we perform statistical analysis in terms of multi year spatial bias for the mean annual and seasonal precipitation, the number of wet days, the 99.9th quantile, and the quantile-quantile plots for the period 1979-2012. ALD6SN outperforms the previous versions by diminishing the drizzling effect, with notably less wet days than ALD5 and ALD5SN, and with significantly improved lower precipitation quantiles. All model versions show an underestimation of higher-order quantiles. The spectral nudging in ALD5SN causes an overestimation of the lower quantiles, with minimum difference in higher quantiles compared to ALD5.