



Evaluation of regional climate model ALADIN mean and extreme daily precipitation over Croatia

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The coastal mountainous region in Croatia is one of the rainiest areas in Europe, often affected by intense precipitation events that cause flash floods.

In this study we evaluate the performance of regional climate model (RCM) ALADIN versions 5.2 (ALD5) and 6.3 (ALD6) driven by the ERA-Interim reanalysis at high-resolution (0.11 deg) for the period 1979-2012 over Croatia. The spectral nudging technique (SN) was applied on both model versions (ALD5SN, ALD6SN). The statistical metrics used to evaluate RCM performance are analyzed with respect to E-OBS (fine-resolution land-only gridded observational dataset over Europe; version 16, with spatial grid resolution 0.25 deg) and raingauge data from Croatian observational network. The model skill is evaluated against E-OBS in terms of spatial bias for the mean annual and seasonal precipitation, and the extremes are analyzed by using the number of wet days, and the 99.9th quantile. Also, quantile-quantile plots are used with respect to station data for the same period.

All ALADIN versions show a low bias for the mean annual and seasonal precipitation over non-complex terrain in Croatia, but a wet bias over the coastal and mountainous region. The recently developed ALD6SN outperforms the previous versions. In particular, ALD6SN considerably diminishes the drizzling effect, with notably less wet days than in ALD5 and ALD5SN, and with significantly improved lower precipitation quantiles. All model versions show underestimation of higher-order quantiles, including the E-OBS, that has already been proved to underestimate the extreme precipitation. The spectral nudging in version 5.2 causes overestimation of the lower quantiles, but the higher quantiles in ALD5 and ALD5SN do not differ significantly.