



Extreme precipitation events in southeastern France in a high-resolution regional climate model : comparison of a 12 km and a 50 km hindcast with ALADIN-Climate

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We present a comparison of the modelling of intense precipitations over France in two regional climate simulations performed with the Limited Area Model (LAM) ALADIN-Climate, run at a 12 km and a 50 km resolution. In both experiments, the model is forced by the ERA40 re-analysis over the 1958-2000 period.

We focus on the representation of the highest precipitation extremes occurring in southeastern France in Autumn. These events involve small-scale processes than can be explicitly resolved only with 2-1 km resolution non-hydrostatic models. However, previous studies have shown that regional climate models are able to simulate heavy rainfalls in this area, although the amounts of rain are much smaller than the ones that are actually observed. Here, we further explore the ability of ALADIN-Climate in reproducing these specific events and the possible added-value of a higher resolution regarding this matter. Indeed, driving the LAM with ERA40 allows the LAM to stick to the real chronology and therefore enables us to analyze its results not only from a statistical point of view but also through day-to-day diagnosis.

First, we assess the performances of the model at the 12 km and 50 km resolutions by comparing the simulated daily precipitations with observations over the south east part of France. To do so, we use the high-resolution gridded SAFRAN analysis which provides series of hourly fields over the french territory at a 8 km resolution, from 1958 to 2008. We consider the differences in the upper quantiles of precipitations between the model and the data, as well as the time correlations of heavy rainfalls and the spatial rain patterns for given extreme events.

Then we compare the performances of ALADIN-Climate in both simulations to the ones obtained with a statistical downscaling method we apply to the last twenty years of the ERA40 period. This method is based on a weather regime approach and uses the analog methodology (Boé and Terray, 2007) to reconstruct fields of daily precipitations over the SAFRAN grid.

By considering the results given with of this technique, we aim at giving a more objective quantification of the differences found in the two ALADIN-Climate experiments and the possible added-value of the high-resolution in the modelling of these extreme precipitations events.