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Sensitivity study with respect to the domain size with ALADIN-Climate

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The ALADIN-Climate regional climate model was adapted by the Hungarian Meteorological Service (HMS) in 2005, and it has been used to estimate climate change impacts over the territory of the Carpathian Basin. During these experiments it was proved that the applied 10 km-resolution integration domain was too small, and near its boundary artificial noises arose because the edges cross mountainous areas. Therefore, two new areas were tested in a sensitivity study to find a more appropriate domain for the future runs.
Although the size of new integration area is limited by the computational capacity of HMS, both test domains cover the Central-European region containing the whole Danube catchment, with their boundaries far from highly elevated orographic features. The bigger domain includes the smaller one and is extended towards South, West and East. As test period, 1971–1980 years were selected. Lateral boundary conditions were supplied by the 0.44-degree ($\sim$50 km) resolution ALADIN simulation (conducted in EURO-CORDEX) driven with global ARPEGE fields.
Basically three meteorological variables were examined: sea level pressure, 2-m temperature and rainfall. The evaluation was concentrating on their seasonal and annual means, while in case of precipitation daily data was also used: due to high spatial and temporal variability of precipitation, its modelling is difficult task, therefore, additional indices were calculated. During the validation the model results were compared to two different observational gridded datasets: for the Carpathian Basin the homogenized CARPATCLIM is applied and for continent-scale investigations E-OBS is considered as reference.
The obtained results suggest: (1) ALADIN works acceptably over both domains, and although it provides some similar results (e.g., temperature underestimation and precipitation overestimation over major part of the domain and year) as in the earlier experiments, the largest errors derived from the boundary conditions; (2) between the results of the two areas small differences are concluded and in case of investigated meteorological variables the model behaves differently over the two domains indicating that choice of the optimal integration domain is not an obvious exercise. The poster aims to show some of these results.