



Development of ALARO-Climate regional climate model for a very high resolution

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ALARO-Climate is a new regional climate model (RCM) derived from the ALADIN LAM model family. It is based on the numerical weather prediction model ALARO and developed at the Czech Hydrometeorological Institute. The model is expected to be able to work in the so called "grey zone" physics (horizontal resolution of 4 - 7 km) and at the same time retain its ability to be operated in resolutions in between 20 and 50 km, which are typical for contemporary generation of regional climate models.

Here we present the main results of the RCM ALARO-Climate model simulations in 25 and 6.25 km resolutions on the longer time-scale (1961-1990). The model was driven by the ERA-40 re-analyses and run on the integration domain of $\sim 2500 \times 2500$ km size covering the central Europe. The simulated model climate was compared with the gridded observation of air temperature (mean, maximum, minimum) and precipitation from the E-OBS version dataset 8. Other simulated parameters (e.g., cloudiness, radiation or components of water cycle) were compared to the ERA-40 re-analyses.

The validation of the first ERA-40 simulation in both, 25 km and 6.25 km resolutions, revealed significant cold biases in all seasons and overestimation of precipitation in the selected Central Europe target area ($0^\circ - 30^\circ$ eastern longitude ; $40^\circ - 60^\circ$ northern latitude). The differences between these simulations were small and thus revealed a robustness of the model's physical parameterization on the resolution change. The series of 25 km resolution simulations with several model adaptations was carried out to study their effect on the simulated properties of climate variables and thus possibly identify a source of major errors in the simulated climate. The current investigation suggests the main reason for biases is related to the model physics.

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