



Evaluation of regional climate simulations with WRF model in conditions of central Europe

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Regional climate models are commonly used to provide more detailed information on climatic conditions at local or regional scale. Model WRF (Weather Research and Forecasting) is frequently used as a regional climate model (e.g. in CORDEX activities). This work presents evaluation of simulations with applied one-way nesting procedure from 25 km resolution at mother domain for original ENSEMBLES European domain to 6.25 km resolution nested domain covering the Central Europe, against simulations on mother domain only and against simulations on nested domain without any nesting procedure driving using ERA-40. Validation of model outputs is based on E-OBS reference data. The sensitivity tests were performed to assess the best setting of the model parameterization options; finally RRTM+Goddard scheme for radiation shows the best performance, with convection scheme by Tiedtke. For 1961-1990 period simulation on whole Europe driven by ERA40 is providing quite good results, even though a bit worse than for decade 1991-2000, where originally tested, with warm bias about 3°C in the central and eastern Europe in summer. For precipitation, there was basically no bias except overestimation at mountainous regions, in detail of the Central Europe region with high resolution simulation slight bias can be seen locally in the area of Czech Republic and Poland in winter. High resolution runs are compared also to station data for the area of Czech Republic. Full Europe simulation is compared to ENSEMBLES simulations in terms of monthly data for PRUDENCE regions.

Next, this work includes comparison of hydrostatic and non-hydrostatic version of WRF model runs for Central Europe domain with high resolution, for both simulations with one-way nesting procedure and without any nesting procedure. On the nested runs driven by the 25 km simulation, unfortunately, the warm bias in summer is imposed into both simulations, slightly increased, in non-hydrostatic version a bit less. There is basically no bias in winter temperature mean. For precipitation, slight overestimation can be seen locally in the area of Czech Republic and Poland in winter and slight underestimation in summer for the first decade of the period, i.e. 1961-1970, except for mountainous regions, where overestimation appears both in summer and winter. High resolution simulation brings more details and slightly limits the mountainous regions of overestimation, non-hydrostatic simulation produce slight difference in summer reducing both the slight underestimation in whole region as well as overestimation in the high elevations.