Sensitivity study of the WRF model for regional climate modeling of the Carpathian Basin region

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The WRF model is one of the most tunable models not only based on the sheer number of available parameterizations but several other modeling aspects can be set by the user to create the most efficient and accurate model simulations. In the Hungarian climate modeling community so far the REMO, ALADIN-Climate, PRECIS and RegCM models were adapted out of which currently the ALADIN and the RegCM are used. Because of Hungary's geographical location the most problematic climatic factor is the precipitation, there is no agreement on its foreseeable change according to the existing simulations especially in terms of summer precipitation. Given that the predecessor of the WRF, the MM5 was developed with the intention of creating more accurate precipitation simulations, we began the adaptation of the WRF model for regional climate modeling purposes.

The geographical setup of the model is in accord with the Med-CORDEX region, so comparison with other model simulations could be done in the future. The model is set with a 50 km horizontal resolution and a nested domain includes the Alps, the Carpathian Mountains and the Dinaric Alps with 10 km resolution. Though the resolution would permit the hydrostatic mode, we'd like to take the full advantage of a non-hydrostatic meteorological model for our studies. For the testing period the ERA5 reanalysis database was chosen which has a resolution of about 30 km, boundary conditions are updated in the WRF model in every 6 hours.

In this study short term simulations will be presented to analyze the effect of different parameterizations on simulated climate, validated with the E-OBS and CarpatClim database. Special interest is paid on the precipitation. Initial results show that summer precipitation is well represented in the model, but in other seasons the precipitation is overestimated and in parallel the temperature is underestimated.