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Exploring the diurnal cycle in convection resolving COSMO-CLM simulations

M. Suklitsch and A. Gobiet

Wegener Center for Climate and Global Change and Institute for Geophysics, Astrophysics and Meteorology, Institute of Physics, University of Graz, Austria (martin.suklitsch@uni-graz.at)

With the horizontal resolution for long term climate scenarios ever increasing, it is important to get to know the performance of regional climate models at the convection resolving scale. This particularly includes sub-daily variability (e.g., diurnal cycles). Long term climate scenarios at that scale will be feasible only in a few years, but it is mandatory to understand potential shortcomings of RCMs now and supply model developers with hints for improvements.

In the present study a 12 simulations ensemble of CCLM (COSMO model in Climate Mode) simulations at 3 km and 1 km horizontal resolution is evaluated focusing on the differences in the results due to various changes to the setup. The setup changes range from specific tuning parameters to an entire new model version. In addition to inter-comparing the various simulations the results are also evaluated against an independent reference dataset (INCA, Integrated Nowcasting through Comprehensive Analysis).

It will be shown that the new model version has beneficial effects mainly on the diurnal cycle of temperature and that the strongest impact on the diurnal cycle of precipitation can be achieved by changes in the microphysics scheme.