Project: 1155

Project title: COPAT2 – Coordinated parameter testing of the COSMO6.0 version and ICON-CLM

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In the last year we, members of the working group EVAL of the CLM community, were working together to figured out the best set up for the COSMO-CLM version 6.0 for Europe. We started based on the recommended setup for version 5.0 with single parameter tests for parameters of new developments for a short period, namely 1979-1985 to test the sensitivity of model. An overview on the tested parameters is given in Figure 1. We developed an objective procedure to summarise the results of the variable- and area-specific comparisons with observational data and, where no such data were available, with ERA5 data. The metrics used are bias, RMSE, linear correlation and AMSESS (Advanced (symmetric) Mean Squared Error Skill Score). The measure is named "Score point of evidence", ScoPi, and in detail described in the publication uploaded to accompany this request. The final score for each simulation is the weighted mean for all subregions where the weight can be chosen between distance to the mid of the domain or the size of the subregion. The score point of evince for a single domain is a weighted mean over the scores per variable. Here the weights were defined by the working group, e.g. not to overemphasise the temperature influence on the measure by evaluating 2m temperature itself and maximum and minimum temperature.

In the second phase, we combined the most promising namelist switches searching for the best performing combinations. In the next phase, we tested whether our findings are stable when a longer time period is analysed and when we shift the period of interest to 2003-2008 where satellite data came into play additionally.

The entire process was finalised now by compiling a community internal report of 37 pages, which is going to be published as COSMO Technical Report in the next months. An example of a ScoPi plot is given in Figure 2.



Figure 1: Scheme of conducted experiments of Phase I, with the tested configuration choices of each experiment reported in correspondence of the different components of the climate system they affect/represent. The experiments are highlighted in different colours, depending on whether their configuration is inherent to the model physics, dynamics, or turbulence representation.



Figure 2: ScoPi-plot based on the differences in the mean BIAS between the observations and each simulation of the second phase, against the ones of the reference simulation C2C301. Highest scores occur for strongest improvements according to the reference simulation C2C301.

The setup of the simulation C2C316 was confirmed at the CLM Assembly in Sept. 2023 to be the new recommended version of COSMO-CLM 6.0.

The same procedure we did for COSMO-CLM 6.0 is going to be applied for ICON-CLM 2.6.6. The first round of parameter tests is finished with 26 simulations over the period of 1979-1984. First evaluations are done for 1980-1984 and the according ScoPi-plots are produced (Figure 3).

In the next step, the combination of the most promising parameters will be tested.



Figure 3: ScoPi plot for the single parameter test with ICON-CLM for 1980-1984.