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Overview of Recent Developments of COSMO-CLM Numerics and Physical Parameterizations for High Resolution Simulations

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The main issue of the presentation is to give an overview of the COSMO-CLM model system and of the CLM-Community, to present the recent developments of numerics and of physical parameterizations and to discuss their relevance for regional climate simulations.

Several RCMs are based on NWP models. They use the NWP dynamical core and extend the model physics relevant on long time scales. This is also the case with COSMO-CLM.
One basic idea of the COSMO-CLM development is that a model improvement should reduce the inaccuracy of operational numerical weather prediction and of regional climate simulations with perfect boundary conditions. Therefore the model is a joined development of COSMO, a consortium of national weather services, and of the open international network of scientist for limited area modelling (CLM-Community).

From version 4 on the COSMO-CLM is a unified model for NWP and RCM designed for high resolution applications of up to 100m horizontal resolution. In NWP mode the model is developed and tested at the 2 to 7 km space and the synoptic time scale. The corresponding RCM mode is used and evaluated at space scales between 2 and 50 km and climatological time scales. Both "views"
- the time development of single weather situations (case studies) investigated in NWP mode and
- the statistics of climate investigated in RCM mode
are regarded as complementary pictures and contribute to the further improvement of the model system.

These are improvements of the leapfrog dynamical core, of the Runge-Kutta dynamical core and of several parts of the model physics (lake model, sea ice, precipitation, turbulence) and extensions of the dynamical components (aerosols, dynamical vegetation).

The developments have not been evaluated independently on climatological time scales at the same configuration. Therefore, they can not be compared directly. Therefore various results will be presented illustrating the influence of each of the developments for idealized test cases (numerics), extreme weather conditions and/or on seasonal to inter-annual time scales.