



Relevance of meso-scales a two-way-nesting approach

Markus Thürkow (1), Ingo Kirchner (1), Uwe Ulbrich (1), Stefan Weiher (2), and Andreas Will (2)

(1) Freie Universität Berlin, Institut für Meteorologie, Klimamodellierung, Berlin, Germany

(markus.thuerkow@met.fu-berlin.de), (2) Brandenburgische Technische Universität Cottbus, Umweltmeteorologie, Germany

The aim of the MesoTel project presented here is to improve (decadal) forecasts for Europe by focusing on the feedback of the meso-beta-scale and large scales in a specific key region, where synoptic systems, relevant for European weather and climate, develop – Central America – North Atlantic (CANA).

Meso-beta-scale atmospheric dynamics affect the development of cyclones and Rossby wave trains, which again affect ocean dynamics. As regional feedbacks are expected to modify the development of the large scales and the conditions for meso-scale processes, a two-way nesting approach is applied.

The two-way coupled model system consists of the atmosphere-ocean general circulation model ECHAM6/MPIOM (MPI-ESM) and of the regional climate model COSMO-CLM (CCLM). As MesoTel is part of the MiKlip research initiative, the potential effects on decadal predictions are of particular interest. Ultimately, the influence of the meso-scale processes resolved on the Northern Hemisphere large to planetary scale dynamics and its interannual to decadal predictability shall be investigated.

In addition, the concept of coupling using the model components OASIS3-MCT, the MPI-ESM and CCLM is presented. This includes the data exchange, horizontal and vertical interpolation respectively aggregation, as well as the physical coupling strategy which had been elaborated. Using this approach no additional spectral transformations are needed to exchange, nest and correct the prognostic variables. We will present how to fix scalability problems using a sequential coupling and how well the OASIS3-MCT coupler copes with high communication respectively data overflow due to the increasing number of coupling fields using a performance analysis. There will be a section which deals with the horizontal and vertical interpolation as well as aggregation steps to validate the error using different interpolation methods, to analyze the signal to noise ratio out of these transformations. First evaluation results using this two-way-nesting approach with respect to regarding effects in the region of interest (CANA and Europe) will be presented.