

New Project Proposal for Computing Time on the supercomputer MISTRAL

Project title: NHCM-2 (Austrian Science Fund P24758-N29)

Long title: The Non-Hydrostatic Climate Modelling, Part II Towards Convection-Resolving Climate Simulations in the Alpine Region

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Abstract

The NHCM-2 is an international research cooperation headed by the Wegener Center for Climate Change and Global Change (WEGC), Graz, Austria with the Climate Service Center 2.0 (CS2.0) - Helmholtz Zentrum Geesthacht, Hamburg, Germany as a project partner. The project is funded by the Austrian Science Fund (FWF) with the project number P24758-N29. In NHCM-2, the major aim is to investigate the largely unknown performance of convection-permitting (~3 km grid spacing) climate simulations in the European Alpine region. Thus, the objectives of NHCM-2 are to: investigate the ability of state-of-the-art non-hydrostatic RCMs operated at convection permitting scales (≤ 3 km grid spacing) to capture important climate processes in the European Alpine region on regional (meso- β) scales; investigate latest NWP developments in PBL turbulence modelling with respect to long-term applications; adapt and further develop advanced analysis tools suitable for very highly resolved simulations and introduce highly resolved gridded reference data from NWP for climate research; and derive model configurations for next generation (i.e. convection-resolving) long-term climate simulations in the Alpine region.

Based on the experiences and competences of WEGC and CS2.0, three regional models (COSMO-CLM, WRF, REMO-nh) are applied within the NHCM-2 Project. REMO-nh is based on the hydrostatic model REMO and it has not been used to simulate the climate in the European Alpine region yet. It is currently in testing phase in the framework of the ongoing NHCM-2 project (<http://www.nhcm-2.eu/>). Within this project, sensitivity studies and a long-term very high resolution (at ~ 3km) simulations will be conducted over the Alpine region using different regional climate models (COSMO-CLM; WRF; REMO-NH). The CS2.0 will perform the following tasks:

- Generate balanced soil-fields for convection-resolving (~3 km \times ~3 km grid spacing) REMO-nh simulations in the Alpine region representing the period 1989 to 2010 (ERA-Interim period) and conduct several mid-term sensitivity experiments with REMO-nh (~3 km \times ~3 km grid spacing) as needed for a proper model configuration in the Alpine region based on balanced soil-fields.
- Conduct one long-term benchmark simulation based on balanced soil-fields and proper model configuration with REMO-nh (~3 km \times ~3 km grid spacing) covering the Alpine region.
- Deliver selected variables of REMO-nh output (including vertical profiles) to WEGC for advanced multi-model analyses with respect to climate-relevant processes as needed in the other work packages for advanced multi-model analysis.

- Analyse all REMO-nh simulations for common multi-model analysis and contribute in all multi-model analyses

The ensemble of high resolution simulations using non-hydrostatic models will be evaluated using a dense observational datasets organized by the WEGC. The results of this project will then contribute to HighEnd:Extremes, which is another research project between the WEGC and CS2.0 and funded by the Austrian Ministry for Transport, Innovation and Technology in the frame of the Climate and Energy Fund. The project aims at the better understanding of the occurrence of future climate precipitation extremes over the Alpine region.

The total sum of applied computing time and storage space that will be used in the accounting period for 2015:

Computing time	1.317.600 core-hours
Storage space (archiv)	31.850 GB
Temporary disk space (work)	20.000 GB
Long term storage (doku)	3.000 GB