

**PARALLEL SESSION B : FRONTIER DOWNSCALING TOOL
B1: VERY HIGH RESOLUTION MODELLING**

Convection permitting latitude belt simulation using the Weather Research and Forecasting (WRF) model

Thomas SCHWITALLA

Institute of Physics and Meteorology, University of Hohenheim, Stuttgart, Germany - Germany

In contrast to global climate models, regional climate models are usually applied as limited area models with 12 to 50 km resolution with the domain centered over the region of interest due to limited computing resources. However, the boundary relaxation zone can deteriorate the representation of synoptic features. At longer time scales, these errors can penetrate into the model domain and impact the results of the higher resolution domain.

In order to study the effect of very high resolution climate modeling we applied the WRF model for a northern hemisphere latitude belt between 20°N and 65°N to omit boundary effects in our scaling study and to study the interaction of small-to-large scale processes with CP resolution. The model was operated both at 12 km and 3 km resolution (comparable to EURO-CORDEX) for July and August 2013. This period covered the European heat wave as well as a major part of the Indian Monsoon. The model was forced with ECMWF operational analyses data at the northern and southern boundary. No additional data assimilation was performed.

A resolution of 12 km still requires the application of a convection parameterization. This often results in an incorrect diurnal cycle of precipitation due to the coarse model orography. We demonstrate the benefit of a very high resolution by validating both simulations with respect to temperature, moisture and wind at different altitudes including surface variables.

Due to the better representation of orographic features, the CP simulation shows a more realistic mesoscale circulation and produces more realistic precipitation patterns as compared to the 12 km simulation. Also the large-scale situation over the North Atlantic and Central Europe is better captured at the CP resolution.

The CP simulation is also capable of simulating low level clouds over the Atlantic. This is especially important for climate simulations where Stratocumulus clouds play a major role for the radiation budget as e.g. over the ocean.

A highlight of the CP experiment is the realistic simulation of Typhoon Soulik at July 10, 2013. The predicted typhoon track is in accordance with the observation with a delay of 6 hours and a track error of approx. 250 km with 10 days lead time. Here, the CP simulation predicted sustained 10-m winds of 60 m/s whereas the 12 km simulation shows maximum 10-m winds of 45 m/s.

Thomas Schwitalla¹, Volker Wulfmeyer¹, Kirsten Warrach-Sagi¹

¹Institute of Physics and Meteorology, University of Hohenheim, Stuttgart, Germany