Introducing the Lokal-Modell LME at the German Weather Service

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1 Introduction

In order to fulfill new requirements of both external and internal customers, for instance in aviation, sea traffic or air pollution modelling, the German Weather Service (DWD) decided to expand the model domain of the operational limited area model, the Lokal-Modell (LM, Doms and Schättler, 2002).

2 The model LME

The current version covers basically Central Europe, including Germany and its neighbouring countries. The new version shall cover almost entire Europe and will therefore get the name LM Europe (LME). The integration domain of LME is shown in Fig. 1. The number of grid points per layer will be enhanced from 325×325 to 665×657, while the mesh size is kept unchanged at 7×7 km^2. The number of vertical layers is increased from 35 to 40. The additional layers are mainly located in the lower troposphere, the height of the lowest layer is reduced from 33 m to 10 m. This is in accordance with the new 40-km version of the driving global model GME which started operation at DWD in September 2004. The poles of the rotated LME coordinate system are different from the LM system. The LME system is rotated in a way that the equator is located within the center of the model domain. This has the advantage that the grid cells have a similar size and shape throughout the entire domain or, in other words, the divergence of the longitude rows is minimal. The main non-technical model change will be the introduction of a new multi-layer soil model, the same that was incorporated into GME in 2004.

3 Preliminary results

The introduction of LME at DWD is done in several steps. First of all, two experiments were set up at ECMWF in 2004, namely LME and LM, running daily forecasts driven by GME. Here, the influence of the domain size or the distance between the boundaries and the region of interest, respectively, can be tested. It turns out that in most weather situations there is very little influence. But, there are sporadic cases where for example the development of a cyclone evolves significantly differently. First results of an objective verification shows some advantage for LME forecasts for precipitation and gusts and some disadvantage for mean sea level pressure.

During spring 2005 LME data assimilation and forecasts are tested in an operational parallel suite at DWD. All postprocessing procedures have to be adjusted. Further subjective and objective verification is carried out. The operational start of LME at DWD is planned in autumn 2005.

Reference

Doms, G. and U. Schättler, 2002: A description of the nonhydrostatic regional model LM.

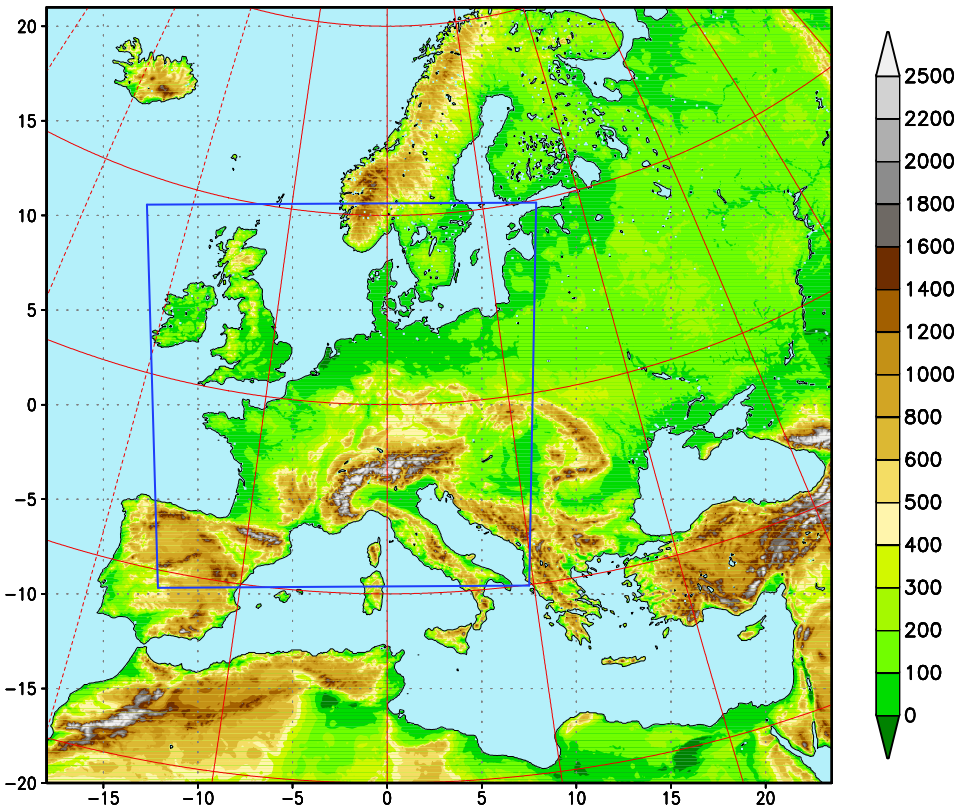

Figure 1: Model domain of LME. Topographical height (m) for land fractions > 50% (for the operationally used filtered orography). The frame in the figure depicts the integration domain of LM.