Geoscientific
Model Development
Discussions

Interactive comment on "Towards European-Scale Convection-Resolving Climate Simulations" *by* David Leutwyler et al.

Anonymous Referee #2

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The manuscript entitled "Towards European-Scale Convection-Resolving Climate Simulations" describes a new implementation of the COSMO code capable of using GPU cores. In addition, this new implementation is applied by performing two simulations at convection permitting scales over a large domain. These simulations are compared to 12-km ones. Finally, the computational advantages are discussed.

General comments: The manuscript is easy to read and well written. Most figures are clear and the scientific content seems correct. However, the goals of this study are very unclear to me. In the introduction, the authors wrote: "we assess the applicability of the convection-resolving COSMO model on continental scales". I do not often read Geoscientific Model Development but the publication of such an assessment in COSMO technical report seems more relevant to me. If every time somebody is increasing the domain size, he/she publishes a paper, then there would be a lot of useless literature

out there.

About half of this manuscript describes the methodology and the results of two experiments. The result of these simulations are well-established findings: CPSs can model finer structures and more realistic sub-daily statistics of convective precipitation. This was already found in many studies and is not worse being re-communicated, at least not with so many details. A small part of the paper is, in my opinion, relevant for publication, namely Section 5.

I am not sure what recommendation to give for this paper. I think it needs strong revision on the motivation. What do you want to communicate? Where should you publish this communication? I do not think that stating that the COSMO can be used on big domain is a communication relevant for publication in a peer review journal. I know that in the CLM community they also use quite large domains, also at CPS. For example, they are doing big brother experiments with domain of something like 1000 x 1000 grid points. Because, I may not have understood the real motivation of this manuscript, I recommend a major revision. I ask the authors to express the motivation of the paper clearly and to make sure that the communication they want to publish is relevant. In addition, I ask the authors to restructure this paper according to this motivation. Stating that CPSs can model fine structure is most probably not necessary.

Major Comment:

Line 436: the use of a large domain is motivated by the fact that "large domains provides a tool to study cold pools in heterogeneous ...". I am quite sure that the domain size of Ban et al. (2014) or Kendon et al. (2012) are large enough to reproduce these cold pools. In general, in the manuscript, there is no motivation for the use of large domains. Please motivate the need for such large domain.

Minor comments:

L320: You indicate "not shown". Why not using the supplementary material to display

this information?

L415: Typo: logn should be long?

L423: Typo: bahavior should be behavior?

L489: I agree with using socket for the comparison. Still, I think you should provide more information on what is on each sockets. Please describe the types of CPU/GPU that are used. You could also write the energy efficiency of these hardware. This would allow you to provide a rough estimation of the energy saved for a similar simulation in a latter part of the manuscript.

L509: "5 times more sockets". Why using 5 times in the text and 4.9 on the figures. Please be consistent.