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Discussions

Interactive comment on "The 1-way on-line coupled atmospheric chemistry model system MECO(n) – Part 2: On-line coupling" *by* A. Kerkweg and P. Jöckel

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We thank referee #2 for her/his comments, in particular for the encouraging statement that the system "will be highly valuable in examining chemistry in multiple model domains". Below we reply to the specific points brought forward by the referee.

- *Often this paper reads like documentation on how to run the model. I feel that this is not appropriate for a journal article and should be part of model documentation available elsewhere. It seems to me the type of information appropriate to publish is information useful to groups NOT running this particular model.*
  We see the point. In accordance with the "Aims and Scope" of GMD, our intention

was indeed to publish more a model documentation with less focus on specific results. As such, and moreover due to the complexity of the topic, we mainly address two sub-groups of readers, namely

1. those who are using the COSMO model, but not being familiar with the Modular Earth Submodel System (MESSy) and
2. those who are familiar with MESSy (probably by using the global model EMAC), but not familiar with COSMO (or any other regional model).

Although these groups together are not small (and still growing), the referee is right in stating that we probably overshot this mark, disregarding the third group of readers, who are neither familiar with COSMO nor with MESSy. Emphasizing that a peer-reviewed and quotable model documentation is clearly required for complex systems such as the one described (and GMD is exactly made for this), we will, in the revised manuscript, put more effort in for the third group and work out more the fundamental issues of the on-line nesting of regional models into each other and into a global model (which forms, to our knowledge, still a unique approach).

- *For example, it does not seem to me that details on the namelist fields are of particular interest to other groups.*
  We agree, that especially Sect. 7.1, 7.2.2 and parts of 7.3 are too detailed for the main manuscript. We will shorten these sections in the revised version and move the information into the supplement.

- *Items of interest might include: i) documentation of the equations the model is solving so that the results of studies using the model can be better interpreted ii) new algorithms so that other modeling groups can use the information in designing their own models.*

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The most important (new) algorithm of the data exchange is the calculation of the data exchange matrix (called "index list" in the manuscipt), of which the main idea is outlined in the manuscript text and further detailed in the supplement.

Since it was apparently not entirely clear from the manuscript, we will clarify in the revised manuscript that the MMD library itself is for (MPI based) data exchange and not for interpolation. The interpolation methods applied in the MMDCLNT submodel recycle existing routines from the COSMO model suite, which are published elsewhere (this will also be clarified). Thus, no equations are left that could be explained.

- *[...] to be publishable the paper must: a) filter out the details not useful to other modeling groups*
  As stated above, we agree and will shorten Sects. 7.1, 7.2.2 and parts of 7.3 which indeed contain too detailed information.

- *[...] to be publishable the paper must: b) demonstrate what is really new in the coupling algorithm described and compare it to other methodologies of coupling different domains. For example "CPL6: The new extensible parallel coupler for the community climate model" (Craig et al, The International Journal of High Performance Computing Applications 2005) gives an example of a coupler used in climate models. This is not the first paper to describe coupling between different domains.*

  Indeed, we agree to add a paragraph with a discussion on different coupling approaches, including the one of Craig et al. Several differences need to be addressed in this respect: the coupling approaches, i.e., internal versus external versus client-server, the "coupled" components, i.e., domains versus processes versus different model types, structures of exchanged data, i.e., 2D fluxes versus 3D fields etc. Details will be added in the revised manuscript.

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- *I also feel that to be publishable the paper needs to show some results. It is not clear to me that the coupling described is any more than theoretical. Does it work, and if so how efficient is it? As an example the paper referenced above (Craig et al, 2005) gives an entire section on results including how the coupler scales with number of processors. If the paper is oriented towards computation then perhaps showing a computational result might be the most appropriate. At any rate, I think it is important to show some results.*

  We show that the system works in the companion papers. The first part shows results of tracer transport tests, while the third part provides a meteorological evaluation of the coupling procedure in comparison to the "classical" off-line procedure. Nevertheless, we agree with the referee that also some technical results and discussion are valuable, also for other modeling groups. Therefore, we plan to include a discussion about the perfomance of the system depending on the number of tasks and the task distribution among the individual instances. Although the optimal task topology will depend on the actual model setup (resolution, domain size, contained processes etc.), an example with discussion will provide a valuable guideline for model users and other modeling groups, who might want to follow a similar path.

Interactive comment on Geosci. Model Dev. Discuss., 4, 1359, 2011.