Geoscientific

Model Development

Discussions

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Interactive comment on "The on-line coupled atmospheric chemistry model system MECO(n) – Part 5: Expanding the Multi-Model-Driver (MMD v2.0) for 2-way data exchange including data interpolation via GRID (v1.0)" *by* Astrid Kerkweg et al.

Anonymous Referee #1

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Review of: "The on-line coupled atmospheric chemistry model system MECO(n) – Part 5: Expanding the Multi-Model-Driver (MMD v2.0) for 2-way data exchange including data interpolation via GRID (v1.0)"

By Astrid Kerkweg, Christiane Hofmann, Patrick Jöckel, Mariano Mertens, and Gregor Pante

Submitted to: GMD Manuscript gmd-2017-87

Recommendation: Minor revisions

Overview:

This manuscript documents new features of the MECO system (MESSyfied ECHAM and COSMO models nested). A new version (MMD v2.0) of the Multi-Model-Driver has been implemented and the capabilities of the 2-way coupling is illustrated.

General Comments: a) The manuscript is well written and the achieved model improvements are clearly described. b) A description of the time management during the 2-way coupling is missed. I would see a more detailed explanation in terms of coupling frequency, time slices considered to average (accumulate) fields before interpolation, etc. c) An evaluation of the MMD v2.0 model performances (the increased computational cost quantification, etc) compared to the v1.0 could improve substantially the present work.

Specific Comments: - Page 3 line 5: I suggest to uniform the syntax and to use coupling OR nesting throughout the paper. - Page 5 line 25: what do you mean with "longer simulation"? I assume this system as also available for climate simulations, thus a "restarting feature" is a mandatory requirement. Is it the system designed considering this feature? - Page 6 line 20: figure 3 labels (panel b) are not readable. Also please uniform the subpanel labelling [a), b) ..] in all of the manuscript figures. - Page 7 line 5: is there any plan to add other remapping approaches? - Page 7 line 10: you use "0. and 1." Instead of the "1. and 2." Approach used in the previous page. Why? - Page 8 line 15: figure 4 labels are not readable. - Page 9 line 1: ". . .as one central part" should be "..as the central part" - Page 9 line 4: What does "ideally" means? - Page 11 line 15: The remapping steps mentioned (first horiz. then vert.) are the typical ones. Not sure this is always the best way, depending on spatial resolution and fields considered. Is it possible to give the user the possibility to choose the interpolation order? - Page 12 line 10: the last sentence of this chapter is a conclusion before results description. I suggest to move it after the discussion of the TC example. -

Page 12 line 15: "For 2-way applications. . ..." please rephrase this sentence. - Page 12 line 25: "NO" must be typed explicitly. - Page 12 line 30: if I understand well, the only interpolation available is a conservative one. I suggest to add NO spatial integral values as obtained after and before the interpolation, to complement the information obtained by figure 5 and 6. - Page 13 line 30: I think it could help to see in the present work also the model deficiency induced by topography. - Page 14 line 10: what do you mean with "..performed without any scaling of the emissions" ? - Page 15: are we looking (figures 10 and 11) at daily or 6hourly (or model time step snapshot) values? Is it possible to see the same as figure 10, but based on 10 meter wind speed? - Page 15: I think it is really important to highlight the role of the coupling frequency when coupling components/models to improve the representation of certain features such as TCs (see Scoccimarro et al. 2017 and Zarzycki et al. 2016). Thus please add some comment on the coupling frequency you used and some information on sensitivity tests (if any). - FIGURES: Figure 1 and 2 can be also smaller: I suggest to leave more space to enlarge figures as figure 4. Labels are not readable in figure 3a, 4, 10 and 11. Please uniform subpanels labelling (also add it to figure 10 and 11. I suggest to set white colour for near 0 values in figures 3a, 4 and 9.

References mentioned in the review document: -Scoccimarro E., P.G. Fogli. K. Reed, S. Gualdi, S.Masina, A. Navarra, 2017: Tropical cyclone interaction with the ocean: the role of high frequency (sub-daily) coupled processes. Journal of Climate , doi: 10.1175/JCLI-D-16-0292.1

-Zarzycki, C. M., Reed, K. A., Bacmeister, J. T., Craig, A. P., Bates, S. C., and Rosenbloom, N. A.2016: Impact of surface coupling grids on tropical cyclone extremes in high-resolution atmospheric simulations, Geosci. Model Dev., 9, 779-788, doi:10.5194/gmd-9-779-2016.

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