

Interactive comment on “The Louvain-la-Neuve sea ice model LIM3.5: global and regional capabilities” by C. Rousset et al.

Anonymous Referee #1

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The model describes LIM3.5, in particular changes since version 3.0. The first part of the manuscript is a technical report. There are almost no features that have not been described elsewhere, in particular:

- the operating splitting in the time step that is new to LIM3 is the standard in probably most ice models (at least all I know);
- conservation of properties, while not necessarily strictly enforced in all models, is not really a novelty;
- open boundaries and regional models are not new to sea ice modelling (e.g. M. Schodlok, D. Menemenlis, E. Rignot, and M. Studinger, 2012: Sensitivity of the ice shelf ocean system to the sub-ice shelf cavity shape measured by NASA Ice-

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Bridge in Pine Island Glacier, West Antarctica. *Annals of Glaciology*, 53, 156-162. <http://ecco2.org/manuscripts/2012/Schodlok2012.pdf>, or Dumont et al 2008, doi: 10.1175/2008JPO3965.1, but I am sure that there are others).

As far as I can see, these are the features that are new (not only to LIM3.5):

- thickness categories limits adjusted (different, more flexible way to compute them)
- description of a particular boundary conditions scheme (although not very detailed, there is no references to other work)

Further the presentation of mass budget contributions, salt budget is novel, but there are no further insights based on their presentation (maybe not necessary for GMD).

The presented simulations do not illustrate the effects of the new features (because there is no comparison to simulations without them), but simply describe two different model simulations (with mediocre results; the term “reasonably realistic” that is used to qualify the results is not convincing. There are simpler models that can do as well or even better, so that applying complicated models like LIM3 is not really justified a-posteriori).

The language is mostly OK. Some formulations sound awkward to me (grammar) and could be revised, but I did not provide suggestions for each and every formulation that struck me as strange (I am not a native speaker).

My recommendation for this manuscript depends very much on the scope of the journal, which I am not quite sure of. If GMD accepts technical reports without any true step forward, then this is an acceptable manuscript (after minor revisions). If GMD requires innovation (as a scientific journal should), then there is not enough content in this manuscript and I would recommend to reject it. The technical innovations to LIM3 are not new, and the effects of the innovations are not illustrated (except that now you can run a regional model and you can do a mass/property budget). I would have expected a true technical/modelling innovation, or a demonstration of new science that

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has become possible with the technical/modelling innovations (a budget is not science to my mind).

More specific comments are in the attached annotated PDF.

Please also note the supplement to this comment:

<http://www.geosci-model-dev-discuss.net/8/C1024/2015/gmdd-8-C1024-2015-supplement.pdf>

Interactive comment on Geosci. Model Dev. Discuss., 8, 3403, 2015.

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