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Geoscientific Model Development Discussions
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Interactive comment on "Scalability and some optimization of the Finite-volumE Sea ice-Ocean Model, Version 2.0 (FESOM2)" *by* Nikolay V. Koldunov et al.

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This is an excellent paper that should be published. The results are important for the community as current ocean models are struggling to make efficient use of modern supercomputers. It is an excellent result that a model based on unstructured grids can compete with structured models in terms of throughput on large supercomputers. The challenges for scalability that have been identified and quantified in this papers (2D models) should be taken very seriously by the community.

The paper could essentially be published as it is but may improve if the minor comments below are addressed. Non of this is mandatory.

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Discussion paper

- There are minor (but many) problems with the English language throughout the paper that should be corrected. In particular regarding the use of "the".
- p.3 l. 26: "will be lower" Why is this?
- Section 2.2: Can you briefly state the physical motivation why these grids were generated with the focus on resolution in very different locations?
- Section 3: This may not be possible but it would be great if you could discuss/speculate a bit more how the optimal supercomputer for FESOM would look like if assembled from existing hardware components.
- p.9 l.23: I do not understand why.
- p.13 l.8: "depends on the sizes of parallel partitions" Really? Why?
- p.16 l.5+6: Why are these "estimates"? I guess these have been measured?
- Figure 11 (left): I am not sure whether this level of detail is required here. You could just add 1-2 sentences of text and remove this figure.
- Section 6.3: You could cite the ESCAPE project that is trying to develop dwarfs for weather and climate models. You could just refer to the webpage http://www.hpc-escape2.eu/ .?
- You could maybe improve the discussion on the use of concurrency to achieve further improvements in scalability. Expected benefit, how to apply it, where to start,...

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