Geosci. Model Dev. Discuss.,
https://doi.org/10.5194/gmd-2017-221-RC1, 2017

Geoscientific Model Development Discussions

Interactive comment on "A fully consistent and conservative vertically adaptive coordinate system for SLIM 3D v0.4, a DG finite element hydrodynamic model, with an application to the thermocline oscillations of Lake Tanganyika" *by* Philippe Delandmeter et al.

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Received and published: 4 December 2017

A fully consistent and conservative vertically adaptive coordinate system for SLIM 3D v0.4, a DG finite element hydrodynamic model, with an application to the thermocline oscillations of Lake Tanganyika Philippe Delandmeter et al.

This paper presents a novel method for using vertically adaptive meshes in a DG finite elememnt formulation. The method is implemented in SLIM3D and made avaiable

under a suitabily permissive licence. The method is comprehensively described and then verified on an idealised test case. The new method is then demonstrated on a real-world example to show its capabilities.

The paper is well-written, clear and thorough. I see no major issues with the paper and recommend it be published pending some minor corrections/suggestions.

Minor suggestions:

- Page 2: Line 25. Is it worth making it explicitly clear that hr-adaptivity can add or remove nodes as opposed to r-adaptivity here. There are advantages and disadvantages to both (Piggott et al, 2005). This might then clarify for the reader throughout that the number of nodes in the model remains constant throughout the simulation, which in places is lacking (e.g. figure 10, where the adaptive models look to perform no better than fixed, but of course, their numerical performance is better as the same computational cost). This lack of clarity in the number of nodes being fixed also crops up on line 15 (pg 8) and line 10 (pg 9).

- Page 18, line 10. What was the horizontal resolution?

- Page 21-22. Is it possible to produce a figure or stats on where the mesh resolution was placed alongside these figures? It would be interesting to see the temporal dynamics of the mesh movement.

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