

Interactive comment on “GHOST: Geoscientific Hollow Sphere Tessellation” by Cedric Thieulot

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GENERAL COMMENTS

The manuscript summarises the methodology behind building computational meshes for spherical shells and provides a useful, novel open-source software to build three commonly used ‘hollow sphere’ meshes efficiently. Even though there are many numerical codes built upon such meshes, I am not aware of any comparable open-source tool to build these meshes from scratch. As such it will prove useful across many numerical modelling disciplines in Earth Sciences and for students and advanced researchers alike. The manuscript is concise, well structured and clearly presented. I only have a few suggestions that might make the current manuscript even more useful to interested readers, and a couple of minor specific comments.

SPECIFIC COMMENTS

C1

The manuscript explains the theory behind the code GHOST, but does not explain how to use it in practise. I think it would be useful to most interested readers if the author would consider adding a short section about the actual use of the code. Maybe something similar to section 3 of the manual that is provided with the code itself (which should also be referred to in the manuscript).

The manuscript provides a nice comparison between three different spherical shell grids, but a conclusive discussion about which grid performs best (which might depend on specific circumstances) is not provided (I guess a grid spacing that is as equal as possible is one criterium). Interested readers might find it useful to read about the author’s conclusion on that maybe in the discussion section.

The author could also consider ensuring the long-term availability of the code by providing a DOI to the code itself (or to a specific version). Zenodo (<https://zenodo.org>) has, for example, an option to easily link an existing GitHub account and provide a DOI. Also, citing a number (in the title or text) for the specific code version discussed in the manuscript might be helpful.

TECHNICAL CORRECTIONS

page 1: lines 19-20: Consider rewording this slightly to account for the possibility to model a spherical planet in a rectangular 3-D grid. Even though this might cause some numerical artefacts, it is possible after all, and has been used in the past. line 24: Full stop missing after the bracket.

page 5: line 7: Is there something missing grammatically in this sentence? line 8: same here: the sentence does not seem to make sense grammatically.

page 7: lines 2-3: define variables c, dx, dy, dz . lines 3-4: consider clarifying that the error decreases “with increasing number of points”. line 6: define ρ line 9: what is ρ_0 ?

appendix A: general: declare all variables used; e.g., $\rho, r, R1, R2, \dots$

C2

table 1: consider declaring 'N' and 'Nel' in the caption, and clarifying the three different grid type acronyms.

figures 4, 5, 7: for clarification, define what variable 'N' is and that the tags 'HSxx' are the three grid types.

figure 5 & 7: consider to clarify whether the error is percentage of total volume or something else.

figure 6: commas and full stop are missing in the caption.

figure 7: declare 'N' in the caption.

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Interactive comment on Solid Earth Discuss., <https://doi.org/10.5194/se-2018-7>, 2018.