

Answers to Topical Editor comments

Dear Editor, we provide below the answers to your suggestions and comments, in grey italic font. We hope our answers will be satisfactory.

Dear Dr. Colleoni and co-authors,

After two very positive reviews and your responses and changes, I am happy to recommend your work for publication in GMD, following minor revisions based around the comments that I leave below:

1. The name of the software. I note your "backtracking" vs. "backstripping" argument -- something that is new to me -- and happily defer to your expertise here. However, this naming seems a bit incongruent with the name of the software ("PALEOSTRIP"). I imagine that backstripping is a more well known procedure... perhaps this is the reason for the name? And might you consider changing it to better match what the software does?

Has you said, PALEOSTRIP can also do backstripping (because the equation is the same) but the main interface is more backtracking oriented. So the name remains pertinent here. Also, it has already been downloaded many times and we got already people using it so we prefer not changing the name at this stage. This is also true that we are developing a new interface to choose in which direction to use the main equation: backtracking or backstripping.

2. "Scattered data". You answered the referee's comment in the response, but I think that it would be better to also make the text a bit clearer in this regard.

*You are right. We added the following sentence within the manuscript directly, at line 347 : "This means that points are unstructured and are not written in a file following a classical $NX*NY$ structure but treated as independent single points. When data is treated as scattered, this takes more computational time, but this also allows one to input either structured gridded data, or irregular polygon data"*

3. "Note that inputs of dynamic topography require some post-processing to be adjusted to the area of interest before being passed through the GUI."

Is this just ensuring that the dynamic topography inputs are aligned and clipped to the model domain and cell size. If so, this seems trivial (so maybe no need to mention), but perhaps you could make it more clear (to me "some post processing" may imply vague additional changes that need to be made).

Thanks for pointing this out! We meant "pre-processing"... So we corrected it within the manuscript (line 316).

4. It could be helpful to include a table of suggested standard lithological parameters.

We disagree on this point. This is because there are no such standard parameters. It is very difficult to retrieve the lithological properties for sediments and clays or silt or sand have a large spectrum of coefficients depending on the context in which they have been deposited and the sediment composition: sometimes it is not 100% sand, or clay or silt. Instead we inserted a reference Kominz et al., (2011) that explains how to retrieve them and also provides table of parameters in various IODP sites. This is a more honest approach. We added the following sentence at line : "Since the

lithological parameters varies a lot given the composition of sediments and their depositional context, we refer the reader to Kominz et al. (2011) for values and detailed explanations on how to retrieve the decompaction coefficients for the different lithologies of marine sediments."

5. Both referees mention erosion and re-sedimentation. I understand that PALEOSTRIP does not at present include these. However, this seems a bit incompatible with your Ross Sea example. How would you propose to address this?

No actually, this erosion and deposition issue is the same wherever you apply backstripping or backtracking on the globe. This is a real conceptual issue of paleo reconstructions. For example, in Paxman et al., (2019), they applied a correction for erosion a posteriori (after the backtracking). This is the only approach one can have and this is not an issue of PALEOSTRIP or the Ross Sea. The only thing we can do within PALEOSTRIP, in a future version, is to allow one to provide this correction during runtime, thus to account for related sediment weight at a different place. But this require to change the entire code structure and have flexible number of layers (new layers that at present have been eroded, but were there at a given time in the past).

6. You should remove the mentions of new releases: We cannot see the future.

Ok. We removed them.

7. I might suggest including a bit about the definition and importance of backtracking to recover paleobathymetries in the abstract/introduction. This might be very helpful towards engaging readers who are interested in the problems that you address but who may be earlier in their careers / coming from different backgrounds, and who therefore do not yet know the vocabulary.

Agreed. We added the following sentence in the abstract: "Reconstructing paleo-bathymetries is critical to better understand how oceanic circulation and ice sheets evolved through time and interacted with the different components of the Earth's system. Backtracking paleo-bathymetries implies reconstructions of these interactions in the past. Past reconstructions also directly serve as boundary conditions to numerical climate and ice sheet models, and as such, reliable reconstructions accounting for a maximum of sedimentary and solid Earth processes are necessary."

Since the interest of such procedure is already described in depth in the first and mostly the second paragraph of the introduction, we did not added this sentence to the introduction.

8. I would suggest changing your GitHub repository naming/versioning structure. GitHub repositories are for a piece of code, whereas the releases (which can be integrated with Zenodo to provide automated doi tagging) are for the versions. Of course, I can't require this as a journal editor, but I would recommend it as good coding practice.

Ok. Thank you for the advice. For the moment we will let it as it is. This is because we are developing a far much complex of it and it will be hosted in a different directory. There won't be branches to the current v1 of the code.

9. Noting that a colorblind-unfriendly color scale is "the PALEOSTRIP default colorscale" is not a rebuttal, but rather an admission of a flaw in the accesibility of the software. Surely there should be a simple way to replace this wtih any number of other color scales? Perhaps this may help: <https://www.fabiocrameri.ch/colourmaps/>

Actually the color scale can be changed easily on the MATLAB Figure interface with any other colorscale provided by MATLAB. We thus choose to let the colorscale as it is and instead insert a sentence in the figures 9, 10 and 11 caption to explain it.

10. Dimensions. Considering that 1D is a line and 2D is a plane, mathematically, I think that your 2D/3D flexural isostasy have an additional dimension added beyond those of the problem. (I do admit that van Wees and Cloetingh did the same...).

Yes, that's always a bit tricky when explaining. It was correctly explained at lines 101-102. But we also improved slightly in section 4:

- *For 2D, the title of the section was changed to "vertical transect" and the introductory sentence was inserted: "Vertical transects imply that input data are provided along an horizontal direction X and a vertical direction (depth) Z".*
- *For 3D, the following introductory sentence was inserted: "Maps implies that data are provided along the two horizontal directions X and Y and along the vertical direction Z".*

I look forward to seeing your revised manuscript.

We hope our answers and corrections are satisfactory!