Geosci. Model Dev. Discuss.,
https://doi.org/10.5194/gmd-2018-9-SC1, 2018

Geoscientific Model Development Discussions

Interactive comment on "The Open Global Glacier Model (OGGM) v1.0" *by* Fabien Maussion et al.

F. Maussion

fabien.maussion@uibk.ac.at

Received and published: 10 May 2018

We would like to thank Reviewer 1 (David Rounce) for his thoughtful and constructive comments about our manuscript. A detailed point by point response will follow once the other review(s) are available, but we would like to clarify two valid (and important) points raised in the review.

1 External contributions

You write: "*Lastly, the authors state that the model is intended to be community-driven and identify many places in the manuscript where future work/modules will be developed; however, there does not appear to be much discussion of how users in the*

community outside of the model development team could contribute to future model development."

This is an important point and we will include more discussion in the revised manuscript. As model providers/developers, we can only encourage the community to contribute. We attempt to do so by several means:

1. it must be relatively easy for a new user to detect where and how his/her contribution can be implemented
2. the model must be able to cope with different ways to represent/simulate the considered process
3. we must ensure attribution to the original contribution (e.g. a scientific publication)

For point 1, documentation and code clarity is key. We have done our best to make the model accessible and understandable via the online documentation, but we are aware that there are still some rough edges. Furthermore, a good knowledge of the Python language is necessary before being able to contribute. In this respect, OGGM isn't very different from other models written in FORTRAN or C, but we plan to provide as much support as possible to the future contributors of the model.

For point 2, we think that the current structure of the model allows a relatively efficient modularity. Since every task in the workflow writes and reads the data from disk, tasks can be replaced/enhanced at which, as long as the format of the input/output files is agreed beforehand. The modularity will never be perfect, of course, and we expect that the model internals will have to be adapted in order to accept new contributions when they come.

Point 3 is something we didn't consider until recently. Attribution is important in the scientific community, for many reasons. Therefore, we now make the following suggestion to the interested contributors:

- if the changes are small or concerning the model internal structure, they should be proposed to the main codebase
- if the changes concern an entire part of the model workflow (e.g. a new ice thickness inversion model, or a new mass-balance model), then they can be either added to the central codebase or maintained in an external repository. The latter solution has the advantage that it guaranties freedom of development and a correct attribution to the original contributor of the module.

In fact, your comment motivated the development of a template repository for external OGGM modules. Interested users will find this repository on GitHub: https://github.com/OGGM/oggmcontrib and the documentation on ReadTheDocs: http://oggmcontrib.readthedocs.io/en/latest/

We hope that this will foster new collaborations!

2 Coupling of the mass-balance and dynamical models

You write: "*In the current form it appears that the mass balance model and the glacier evolution are completely separate. Is that the case or does the model compute the mass balance for a given timestep (month, year, etc.) and then allow the glacier evolution to occur?*"

You are right, we did not specify this point in the manuscript. The coupling between the two models is a user choice. The mass-balance profile used by the dynamical model can be updated:

- at each time-step of the dynamical model (e.g. daily timescales)
- each month

- each mass-balance year (the default)
- only once (for testing / sensitivity analysis purposes)

In practice, this doesn't make much difference at the time scales relevant for ice dynamics (decades to centuries), and the choice of a yearly update is mostly driven by performance considerations. The model is tested with all three options though, and the results are indeed very close.

Note that this this doesn't mean that the mass-balance model cannot compute the mass-balance at shorter time intervals if required by the physical parameterizations. The interface between the model elements simply requires the mass-balance model to integrate the mass-balance over a year before giving it to the dynamical model.

We will clarify this point in the manuscript.

Interactive comment on Geosci. Model Dev. Discuss., https://doi.org/10.5194/gmd-2018-9, 2018.