Review of: Benchmarking the vertically integrated ice-sheet model IMAU-ICE by Berends *et al*

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Berends *et al* present a description of the ice sheet model IMAU-ICE version 2.0. The main feature of this model is the use of the depth-integrated viscosity approximation (DIVA) for solving the stress balance. In the paper, the authors provide a detailed overview of the model, then run a series of standardized tests to demonstrate the performance of the model versus several analytical or higher order solutions. The results show that the DIVA solver provides an improvement of the ice sheet evolution over the more commonly used hybrid shallow ice approximation/shallow shelf approximation model.

Overall, I found the paper was well written and easy to follow. I have a few points for the authors to consider.

1 Suggestions for the paper

1.1 Variable definitions

There are a number of equations introduced in section 2, and I found that in a few cases the variables were not explicitly defined. I suggest double checking this. It may also be helpful to include a table with all the variables (perhaps even in the appendix).

1.2 MIPs

There are a number of tests applied to the ice sheet model. Some of these MIPs I was previously not aware of. Though they are defined in section 4, they are sometimes referenced earlier in the paper. I think it would be helpful somewhere early on to have a table with the different MIPs, what they mean and/or what they are testing, and perhaps the main result of the tests with IMAU-ICE version 2.

1.3 Figure 3

It is very difficult to see the results between the different model runs in this figure. Perhaps a better way to display this would be to show it as a difference from Schoof's analytical solution rather than as a raw velocity value.

2 IMAU-ICE software

I tried to get the software running using the instructions on the Github repository. Unfortunately, I had a bit of trouble compiling the program. After finally getting it to compile, I was unable to run the test case. I posted an issue about this on Github (`https://github.com/IMAU-paleo/IMAU-ICE/issues/22`). I think it would be worthwhile for the authors to try to get the program running on other systems to ensure ease of use, as it is an explicit goal of this model.

Best Regards,

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