Geoscientific
Model Development
Discussions

Interactive comment on "LIVVkit 2.1: Automated and extensible ice sheet model validation" *by* Katherine J. Evans et al.

Anonymous Referee #1

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The paper entitled "LIVVkit 2.1: Automated and extensible ice sheet model validation" by Katherine Evans et al. presents recent developments of LIVVkit, a verification/validation package for stand-alone ice sheet models and coupled Earth System models. They present here how it can be used to validate a Greenland ice sheet simulation using CISM-Albany and CESM. An analysis of the comparison between the modeled surface mass balance (SMB) and RACMO's SMB, for example, shows that Greenland's southwest coast has insufficient ablation.

1   General Comments

Overall the manuscript is well written, easy to read, with appropriate figures. What I am concerned about is the novelty: LIVVkit has already been described in ample detail in JAMES about a year ago (Kennedy et al 2017). It does not seem to me, and I could be wrong, that the extension to new datasets required significant code development as the package was already developed and ready to ingest new datasets (see Kenedy et al. 2017). The analyses shown here are interesting, and provide some good illustrations as to how LIVVkit can be used to determine biases and evaluate the overall performance about a standalone ice sheet model or a coupled ice/climate model, but I don't think this is within the scope of GMD.

What's also not very clear here, is how this package could be used by other modeling frameworks, like other standalone ice sheet models (e.g., PISM, Elmer, ISSM, etc) or other climate models. The package seems to be exclusively developed for CISM-Albany and CESM as it can only deal with a certain type of input file (that is not described by the way) on specific supercomputers.

2   Specific comments

- p2 l6: increased outflow → increased ice discharge ?

- p2 l8: Earth system models (no s in system)

- p2 l22 and elsewhere: consider changing "predictions" to "projections"

- p4 l3: I would disagree with this statement. It was probably true 5 or 6 years ago but the community now has access to a lot of time series (surface velocities, surface elevations, ice retreat) that are not used to initialize numerical ice sheet models.

- p12 l2: $L_2 \rightarrow L^2$

- p25 l4: LandSat8 $\rightarrow$ Landsat 8

- Figure 2c, 4c, 5c and 6c: these figures are difference plots and it would be much better to visualize the difference if the color bar was centered around 0, using a different color scheme such as blue-white-red.

- p30 l 12: CMCt $\rightarrow$ CmCt

3 References

Kennedy, J. H., et al. (2017), LIVVkit: An extensible, python-based, land ice verification and validation toolkit for ice sheet models, J. Adv. Model. Earth Syst., 9, 854-869, doi: 10.1002/2017MS000916.

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