

## ***Interactive comment on “From Heinrich Events to cyclic ice streaming: the grow-and-surge instability in the Parallel Ice Sheet Model” by Johannes Feldmann and Anders Levermann***

**F. Ziemen**

florian.ziemen@mpimet.mpg.de

Received and published: 9 December 2016

This is a well written paper on ice surging, and it is not the first one in this field. I enjoyed reading the paper as all findings are nicely presented. In the discussion of the results I missed a comparison of the results and mechanisms to those of other studies investigating parameter dependence of surge cycles in Heinrich events and related setups.

It would be interesting to know how the results with the more sophisticated sliding scheme differ from or support those obtained with the Shallow Ice Equation (e.g. Calov et al. (2002) and Greve et al. (2006)). Greve et al. (2006) study the dependence of the surge cycles on surface mass balance and basal friction coefficient. Are the mech-

C1

anisms and time scale effects comparable (similar questions for Calov et al. (2010), where more models are taken into the comparison)?

Another paper that immediately comes to mind is the study by van Pelt and Oerlemans (2012), where the parameter dependence of surge cycles of a land-terminating glacier in a previous version of the same ice sheet model was studied. This calls for a comparison of the findings.

In the introduction, a mentioning of the full-stokes study of cyclic ice stream behavior by Kleiner and Humbert (2014) might be appropriate.

I'm looking forward to reading the final version of the paper. Please feel free to notify me when it is published. :)

Florian

Calov, R., Ganopolski, A., Petoukhov, V., Claussen, M., & Greve, R. (2002). Large-scale instabilities of the Laurentide ice sheet simulated in a fully coupled climate-system model. *Geophys. Res. Lett.*, 29, 69–1–69–4. <http://doi.org/10.1029/2002GL016078>

Calov, R., Greve, R., Abe-Ouchi, A., Bueler, E., Huybrechts, P., Johnson, J. V., ... (2010). Results from the Ice-Sheet Model Intercomparison Project–Heinrich Event INtercOmparison (ISMIP HEINO). *Journal of Glaciology*, 56(197), 371–383. <http://doi.org/10.3189/002214310792447789>

Greve, R., Takahama, R., & Calov, R. (2006). Simulation of large-scale ice-sheet surges : The ISMIP HEINO experiments. *Polar Meteorology and Glaciology*, 20, 1–15. Retrieved from <http://hdl.handle.net/2115/29659>

Kleiner, T., & Humbert, A. (2014). Numerical simulations of major ice streams in western Dronning Maud Land, Antarctica, under wet and dry basal conditions. *Journal of*

C2

Glaciology, 60(220), 215–232. <http://doi.org/10.3189/2014JoG13J006>

Van Pelt, W. J. J., & Oerlemans, J. (2012). Numerical simulations of cyclic behaviour in the Parallel Ice Sheet Model (PISM). *Journal of Glaciology*, 58(208), 347–360. article. <http://doi.org/10.3189/2012JoG11J217>

---

Interactive comment on The Cryosphere Discuss., doi:10.5194/tc-2016-235, 2016.