EGU21-1367
https://doi.org/10.5194/egusphere-egu21-1367
EGU General Assembly 2021

An assessment of basal melting parameterisations for Antarctic ice shelves

Clara Burgard and Nicolas Jourdain
CNRS, Institut des Géosciences de l'Environnement (IGE), France (clara.burgard@univ-grenoble-alpes.fr)

Ocean-induced melting at the base of ice shelves is one of the main drivers of the currently observed mass loss of the Antarctic Ice Sheet. A good understanding of the interaction between ice and ocean at the base of the ice shelves is therefore crucial to understand and project the Antarctic contribution to global sea-level rise.

Due to the high difficulty to monitor these regions, our understanding of the processes at work beneath ice shelves is limited. Still, several parameterisations of varying complexity have been developed in past decades to describe the ocean-induced sub-shelf melting. These parameterisations can be implemented into standalone ice-sheet models, for example when conducting long-term projections forced with climate model output.

An assessment of the performance of these parameterisations was conducted in an idealised setup (Favier et al, 2019). However, the application of the better-performing parameterisations in a more realistic setup (e.g. Jourdain et al., 2020) has shown that individual adjustments and corrections are needed for each ice shelf.

In this study, we revisit the assessment of the parameterisations, this time in a more realistic setup than previous studies. To do so, we apply the different parameterisations on several ice shelves around Antarctica and compare the resulting melt rates to satellite and oceanographic estimates. Based on this comparison, we will refine the parameters and propose an approach to reduce uncertainties in long-term sub-shelf melting projections.

References

- Favier, L., Jourdain, N. C., Jenkins, A., Merino, N., Durand, G., Gagliardini, O., Gillet-Chaulet, F., and Mathiot, P.: Assessment of sub-shelf melting parameterisations using the ocean–ice-sheet coupled model NEMO(v3.6)–Elmer/Ice(v8.3) , Geosci. Model Dev., 12, 2255–2283, https://doi.org/10.5194/gmd-12-2255-2019, 2019.

- Jourdain, N. C., Asay-Davis, X., Hattermann, T., Straneo, F., Seroussi, H., Little, C. M., and Nowicki, S.: A protocol for calculating basal melt rates in the ISMIP6 Antarctic ice sheet projections, The Cryosphere, 14, 3111–3134, https://doi.org/10.5194/tc-14-3111-2020, 2020.