Comment on tc-2021-120

Nicolas Jourdain (Referee)

Referee comment on "Quantifying the potential future contribution to global mean sea level from the Filchner–Ronne basin, Antarctica" by Emily A. Hill et al., The Cryosphere Discuss., https://doi.org/10.5194/tc-2021-120-RC2, 2021

Review of "Quantifying the potential future contribution to global mean sea level from the Filchner-Ronne basin, Antarctica" by Emily A. Hill, Sebastian H. R. Rosier, G. Hilmar Gudmundsson, and Matthew Collins.

Recommendation: minor revision

One of the two nominated referees had to cancel his/her participation for personnal reasons. I nonetheless received a positive preliminary feedback on this work. To save time in the review process, I have therefore decided to write a review myself.

The paper reads well and the methods are robust and clearly described. The results are important for the ice-sheet and sea-level communities, and I only have a few minor comments that will hopefully improve the paper:

L. 136: effect -> effects

L. 165: "with a percentage deviation of only 3%" -> specify in 2100 or 2300.

Fig. 3: indicate the units of tuned coefficients.

Section 3.3: the increased surface mass balance for higher temperatures holds for moderate warming, but for RCP8.5 warming to 2300, there will likely be more ablation by

surface melting and the surface mass balance may become negative at some locations (see Kittel et al. 2021, their Fig. 5 where the negative runoff contribution of the grounded-ice SMB starts to significantly increase towards 2100). This is likely somewhat captured by the lower bound of the *p* parameter which is well below what is expected from the Clausius-Clapeyron relationship, but this could be briefly discussed.

L. 215-221: please provide references, e.g. to IPCC-AR5, and indicate whether the provided warming values refer to the CMIP5 multi-model mean or to the MAGICC emulator.

L. 275: a better or additional reference here would be Favier et al. (2019) in which the box model ("PICO") was evaluated as a relatively good parameterization: Favier et al. (2019). Assessment of sub-shelf melting parameterisations using the ocean–ice-sheet coupled model NEMO (v3. 6)–Elmer/Ice (v8. 3). Geosci. Mod. Dev., 12(6), 2255-2283.

L. 280: indicate that this is sea-floor temperature and salinity.

Discussion section: There is a deep uncertainty related to processes that are not represented, e.g. evolution of the position of the calving front, hydrofracturing due to higher surface melt in the future, evolution of ice damage. Some of these processes may play a key role in the future FRIS contribution to sea level, and this should be discussed.