

Thank you to the authors for their answers and for having taken into consideration my remarks and suggestions.

I really appreciated that you took the time to run additional simulations using the Budd friction law with $m=1/3$ to answer to my first general comment that related to the choice of the $m=1$.

I also noticed that you modified the figures as suggested. Here, I found the addition of the sensitivity tests with various C_{max} values really interesting and I am convinced this will be an added value to your manuscript.

From my side, this paper is ready for publication, although I still have a few specific comments (mainly typo's and suggestions for symbols and references) for the revised manuscript, which I listed below in order of their appearance.

Note : I noticed a few differences between your italic responses and the revised manuscript. Here, while commenting I have always considered the revised manuscript. Finally, I also noticed some layout issues in the revised manuscript, which are probably due to the « track changes format », but which I nevertheless report here for clarity.

Figure 1 (b) : typo: Ice surface (s is missing)

Eq 1 : maybe use another letter than m, which is already used for another variable in Eq. (6)-(7)

Eq 2 : maybe h_w is better than h for the hydrology sheet thickness

L74 : ice overburden **pressure**

L87 : « Blatter-Pattyn approximation to the full Stokes equations (**Blatter, 1995, Pattyn, 2003**) »

- Blatter, H.: Velocity and stress fields in grounded glaciers: a simple algorithm for including deviatoric stress gradients, *J. Glaciol.*, 41, 333–344, <https://doi.org/10.3189/S002214300001621X>, 1995.
- Pattyn, F.: A new three-dimensional higher-order thermomechanical ice-sheet model: basic sensitivity, ice-stream development and ice flow across subglacial lakes, *J. Geophys. Res.*, 108, 2382, <https://doi.org/10.1029/2002JB002329>, 2003.

L101 : layout issue

Eq 5 : maybe use another letter than B for the ice rigidity, since this is already used for the bedrock elevation

L125 : layout issue

L154 : specify the value of the water density (because Akesson et al, 2021 used sea water density value and Yu et al, 2018 used fresh water density value in the No calculation)

L197 : typo : (Fig. 1a).

L229 : typo : GlaDS

L247 : my apologize, as opposed to what I suggested in my original review, Budd and Jensen (1987) is a good reference when N is expressed as an hydrological potential. Huybrechts (1990) used an N corresponding to an « height above buoyancy » (Budd et al., 1987 ; Van der Veen, 1987 ; referred to as HAB in Pattyn, 1996), which fits more with the Brondex et al., (2017), N_B , defined in L257

L253 : (Fig. 3b) → and place it : [...] below sea level (**Fig. 3b**), yielding [...]

L273 : typo : start with the ‘ of the L272’s end

L345-L352 : repetiton of [...] H is defined in Eq. (9) and x is defined in Eq. (10) [...]

Figure 6 (e) : typo : [...] GlADS output effective epressure [...]

L390 : typo : GlADS

L428 : layout issue

L448 : typo : (Fig. 2d (v))

L462 : remove Kazmierczak et al., 2022

L462-463 : layout issues

L466 : typo : varianace

L481-482 : layout issues

L526 : same comment than in Eq 5 and B is written with a – on top not like in the Eq. (5)

L546 : the number of the figure showing the final rigidities is missing (I imagine it is Fig. B5)

Table B1 : typo : Value l4- Budd

Table B1 caption : typo : ‘-’ is missing after l5

Fig B5 : layout issue, I cannot read the caption

L773 : Akesson et al. 2022 is not at the right place in the bibliography (it is at the end of the final bibliography)