MISMIP+ summary of TKL_HOM_TSAI_1000m

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1 Model Details

1. model: TIM-FD^3 (Kleiner and Humbert, 2014).

2. repository: TIM-FD^3 source codes are available on request.

3. englacial stresses: HOM (including vertical resistive stresses R_{zz}), Glen's law, $n = 3$, $A = 2.0 \times 10^{-17}\,\mathrm{Pa}^{-3}\,\mathrm{a}^{-1}$

4. basal traction: Modified power law (Tsai et al., 2015) as in Asay-Davis et al. (2016, Eqns. 7,9,10) with $\alpha^2 = 0.5$, $\beta^2 = 3.16 \times 10^6\,\mathrm{Pa\,m}^{-1/3}\,\mathrm{s}^{1/3} = 10^4\,\mathrm{Pa\,m}^{-1/3}\,\mathrm{a}^{1/3}$

5. space discretisation: Finite Differences on regular grid, equidistant horizontal grid ($\Delta x = \Delta y = 1000\,\mathrm{m}$), terrain-following vertical coordinates, 9 vertical layer (refined at the base)

6. time stepping: fixed time step, $\Delta t = 0.25\,a$

7. grounding line: hydrostatic approximation, no sub-grid grounding line treatment in the model, model output is generated along the contour $h - h_\mathrm{f} = 0$ (floating condition) via linear interpolation in the post-processing

8. MISMIP3d name: `TKL1`, different mesh resolution, FS instead of HOM used in MISMIP3d

2 Comments

Spin-up: As initial condition for the spin-up a pre-computed geometry from BISICLES is used (same parameters as above, `tsai-A2.0e-17-ssa.nc`, provided by S. L. Cornford). To account for different model physics and resolution a 500 years relaxation run was performed.

Mesh resolution: Mesh resolution has been tested on $4\,\mathrm{km}$, $2\,\mathrm{km}$ and $1\,\mathrm{km}$ resolution with the same set of parameters as in the text above for the model spin-up. Only the $1\,\mathrm{km}$ resolution set-up shows a stable grounding line position at the end of the spin-up, while both coarser resolution runs end in a cyclic grounding/ungrounding state with a very stable period.

Ice2r: In all Ice2r-type simulations a minimum ice thickness of $10\,\mathrm{m}$ is used to preserve a stable calving front at $x = 640\,\mathrm{km}$.

References

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