

## ***Interactive comment on “Diagnostic and prognostic simulations with a full Stokes model accounting for superimposed ice of Midtre Lovénbreen, Svalbard” by T. Zwinger and J. C. Moore***

**Anonymous Referee #1**

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Specific comments:

Fig 2: The map is difficult to read. In my printout the four partitions are not clearly distinguishable.

Fig. 3: The map for the age at 10 m above the bed is questionable. How much is the result influenced by the assumption of non-sliding?

Fig. 4: The age distribution in fig. 4 seems to be erroneous. The age must increase monotonously along a particle trajectory (the diagnostic run is steady state?), which

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can obviously not be the case in Fig. 4. The steep jump between stake 5 and 4 also seems to be pointing to some kind of flaw in the calculation, and also the decreasing age in the tongue area. The pure advection equation ( Eq. 12) is known to be difficult to solve numerically. Did the authors use a diffusion term to stabilize? This may explain part of the non-monotonous change along trajectories.

Fig. 8: How accurate is the computation of the dip-angle with Eq. (15). Having in view the strange result in Fig. 4, the evaluation of Eq. (15) seems to be very difficult. This is even more the case since derivatives are a bit difficult to calculate accurately in a coarse resolution finite element field, and in the denominator, you have a difference of derivatives, which makes it even more difficult?

Eq. (7): The logic of neglecting air pressure is wrong. It's the gradient of the air pressure which is negligibly small, and thus, air pressure can be treated as a constant background pressure field, which does not contribute to flow for an incompressible fluid.

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