Dear Sergio Pérez-Montero, Dear Colleagues,

Thank you for considering my comments.

1. Unfortunately, your equation CC1.1 is also problematic because it implies that ice sheets that do not have a boundary with an ocean ($L_{ocn} = 0$) have ice discharge $q \to \infty$.

Let us return to the basics. The total mass balance of an ice sheet can be written as

$$\frac{\partial(HS)}{\partial t} = \dot{m}S - \oint_{\gamma} \int_0^{h_g} v_g dz d\gamma$$

Here $S \sim L^2$ is the area of an ice sheet, γ is the grounding line, h_g, v_g are ice thickness and normal velocity at the grounding line, correspondingly. Indeed, the parameterization of the term $\oint_{\gamma} \int_0^{h_g} v_g dz d\gamma$ is a difficult task because at the grounding line ice thickness $h \to 0$, but ice slope $\partial h/dx \to \infty$. You are not the first ones who face this challenge. For example, in 1980, as a PhD student, I had to present my work to G. I. Barenblatt, and I was honored to be schooled by him about this term. I am not going to advocate here necessarily for the parameterization that was adopted as the result of this conversation (we can always discuss it off-line if needed), but if you want to continue to scale the above mass balance the same way as you did before, then your mass discharge q should be proportional to

$$q \sim \frac{L_{ocn}}{L^2} vH$$

2. I am afraid my advocacy of the vertical temperature advection has been misunderstood. Within the basal boundary layer the vertical temperature advection is indeed negligible. What I meant is that regional air temperature T, that goes into calculations of your h_{cond} is not instant $T(t)$ but it is temperature "from the past", i.e., $T = T(t - \tau)$ where $\tau = H/\dot{s}$ is the vertical-temperature-advection timescale, i.e. time of the temperature "delivery" from the ice-sheet free surface to the upper boundary of the basal boundary layer.

Respectfully,

Mikhail Verbitsky