We thank the two reviewers for having clearly reread the manuscript and providing useful comments.

Martin Lüthi

General Comments
This manuscript has been greatly improved since its first version, and the authors carefully took into account the reviewer's comments. In my opinion, this manuscript is ready for publication now. The very minor comments below should nevertheless be taken into account. As a general remark, I think a small discussion of ice deformation vs. sliding motion would be helpful. Maybe just mentionning that dissipation from the former is very small as compared to the latter at the drill site.
-we have added text to section 3.3. to discuss this issue.

Minor Comments
185 It would be useful to reference Figure 8, explaining the designations, here.
--added--

187 "Equation (1)" (most journals put equation numbers in parentheses)
--corrected--

187 "in contact with the bed" ?
--corrected--

189 I don't fully understand Equation (4). I think geothermal heat is supplied on the whole length leading to $L_s Q_{geo}$. Also, somewhat confusingly, shear stress is transferred only on the area $L_s - L_c$, but has the magnitude $\tau_{b} = \frac{L_s}{L_s - L_c} \tau_d$ (τ_d being average driving stress). Integrated over the whole bed, the overall the dissipation still is $L_s \tau_b u_b$, as given in Equation (4). This could be made clearer.
-- We assume that the ice melt from warming of cavity water is negligible. In our calculation we assume that higher order stresses are negligible, so the shear stress at the bed is equivalent to T_d. With this in mind it is appropriate to replace T_b with T_d in Equation (4). We have made this edit, and clarified the equation with additions to the text.

193 It is not clear what kind of test this is, even if it appears twice in the sentence.
--Agreed, that was a terrible sentence. Now reworded for clarity--

294 "relieve" -> "relative" ?
--corrected--

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Samuel Doyle

Thank you for addressing my comments. I have three minor technical corrections:

L33 - In contrast to the statement on L32/33, Ryser et al. (2014b, J. Glac. Fig. 4b) does show acceleration into winter. Fig. 4a doesn't but then there is no data during the winter period.
--this reference was added during the last revision as suggested by the other reviewer. However, we agree with this comment – there is indeed a slight hint of winter acceleration visible in the figure. We do not believe a reference here is required, nor is a debate on this figure relevant, so we have removed the reference.

L179 - Specify ice viscosity after Eq. 3 to distinguish from water viscosity. To ensure reproducibility, a value, calculation and/or justification should be given for ice viscosity as it varies non-linearly, significantly for example, between cold and temperate ice. Also effective pressure is now usually denoted N (sometimes p_e), with σ usually reserved for stress. I see this follows Kamb (1987) so you may choose to use σ for consistency, however, given that v has been subsituted for u_b why not also use N? I note that Kamb (1987) calculates viscosity by assuming the basal shear stress equals the effective pressure. Its not clear whether the same is done here.
--ice viscosity now specified and explained, and reference provided.
--We initially tried to honor Kamb's notation, but you make a convincing rebuttal. We have changed this term as you suggest.

L376 - Is this 2.5 cm water or ice equivalent? Is this the regional average or a local maximum? This needs specifying. Also, the term meltwater would usually suggest a volume (or discharge) rather than a dimension. Perhaps use the term melt and then specify ice or water equivalent?
--wording edited to clarify this point--