

The Cryosphere Discuss., author comment AC1
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Reply on RC1

Christophe Ogier et al.

Author comment on "Drainage of an ice-dammed lake through a supraglacial stream: hydraulics and thermodynamics" by Christophe Ogier et al., The Cryosphere Discuss., <https://doi.org/10.5194/tc-2021-151-AC1>, 2021

We would like to thank the reviewer for the corrections proposed. Below we have answered all reviewer comments (RC1) and state how we address them in the revised manuscript.

RC1: Am I right that the ice-dammed lake is located at the margin of the ablation zone of the Glacier de la Plaine Morte where 4--5 m thick winter snow was removed by snowcats and the ice channel then dug into solid ice (cut by an excavator)? Hence, the channel wall was made of solid ice impermeable to water.

Authors: This is exact. The Equilibrium-Line Altitude of Glacier de la Plaine Morte has been above the glacier highest elevation for many years, and the accumulation/firn area had been depleted since a while. We added to the text at L105:

"In a first stage, the 4-5 m deep snow cover had to be removed by snowcats. In a second stage, the solid and impermeable ice was cut and removed by an excavat."

RC1: Line 16. Has drainage through englacial conduits from an ice-dammed glacial lake been reported?

Authors: Yes. Roberts (2005) presents the different types of drainage in his Table 1 (in relation with his Figure 1). He mentions englacial drainage as "intraglacial drainage" in Type 2 and Type 5 (Table 1). We thus left the references as such in the text.

RC1: Line 19/23. Pre-existing veins rather than cracks?

Authors: "Veins" is indeed more appropriate than "cracks" in this context (also in respect of Nye 1976 paper). Modification done.

RC1: Line 57. "Purely driven by physics" i. e. by physical processes or hydraulic processes.

Authors: We replaced "by physics" by "by ice physical and hydraulical processes" to be clearer.

RC1: Line 97. Does the constructed supraglacial channel connect the lake to an englacial

moulin?

Authors: The connection between the supraglacial channel and the lake is not really a moulin. To our understanding, a moulin route the supraglacial water to the subglacial system. Instead, we call this connection an englacial syphon, since it connects horizontally the lake and the canyon-channel system (see Fig. 1b), without interaction with the subglacial system. Note that there is indeed a moulin called Moulin West at the end of the supraglacial construction (see Fig. 1a), and also one in the middle of the supraglacial construction, in the part so-called "micro tunnel" (Fig. 1c), where the channel water enter the glacier.

RC1: Line 239 0.5 m.

Authors: Modification done.