Author Responses for manuscript "Radar sounding survey over Devon Ice Cap indicates the potential for a diverse hypersaline subglacial hydrological environment"

Referee comment #1

This is an interesting and well-written paper, and I believe it will make a great addition to this journal. I have identified a few minor issues that I have noted below, but pending these, I believe that the article is suitable for publication.

We thank the referee for the great and constructive feedback which helped to improve the manuscript.

Specific comments:

Line 163: why only 100 times? Usually several thousand times are chosen

We agree that we should test the subglacial hydrology model with more model runs. We therefore changed the number of model runs to 1000. The overall result did not change significantly but helped to identify the main flow paths a bit more clearly. In particular, while a few model runs still predict water flow towards South Croker Bay Glacier, we think that the uncertainty in the flow path at this location is reduced when using the 1000 model runs. Accordingly, we slightly edited the text on L329-331:

"In contrast, the subglacial lakes would most likely drain into North Croker Bay Glacier, located in the south of DIC. However, in a few of the model runs, the flow paths switched from leading into North- to South Crocker Bay Glacier (Fig. S12). Given this uncertainty, we cannot conclusively determine to which of these two outlet glaciers brine from the subglacial lakes might drain into."

Figure 3: Is there a reason that the 25m RMSD contour line is highlighted? If so, state in the caption or main text.

The 25 m RMSD was chosen based on a visual correlation with specularity anomalies. We added a statement in brackets to the figure to elaborate:

"c) Basal roughness along profile lines expressed as the RMSD. The brown contour marks a RMSD of 25 m (chosen based on visual correlation with specularity anomalies)"

Line 290: Could these anomalies not be further pockets of brine?

Yes, we realized that this possibility wasn't noted explicitly, and therefore changed the sentence to:

"These could represent additional areas with brine or brine-saturated sediments, however, we cannot fully differentiate between reflectivity anomalies from subglacial water and flat, smooth, or polished bedrock (Carter et al., 2007)."

Figure 4: How was the extent of the hypothesized brine network chosen? There are many isolated anomalies (orange in Fig. 4e) within the location of the Ocb outcrop that are not identified as brine networks. How/why was this discrimination made?

The outline of the brine network was chosen to include the areas with the highest concentration of reflectivity anomalies over the Ocb unit. To clarify, we added the following sentence:

"We limit the outline of the brine network to the T1 region where the highest concentration of reflectivity anomalies coincides with the Ocb unit, however, we note that there are isolated reflectivity anomalies outside this area which also coincide with the Ocb unit."

Table 1 caption. 'brackets' should be 'parantheses'

Done