Authors responses to Reviewer2 comments on tc-2022-183

Reviewer 2: Julius Rix

"Progress of the RADIX fast access drilling system" by Jakob Schwander et al., The Cryosphere Discuss.

General Comments:

RC2: Great to see an excellent paper reporting on the continuing development of the RADIX drilling system. This gives a good update from the original Annals of Glaciology RADIX paper and compiles the various seasons in Greenland and Antarctica where the system was tested, the problems encountered, and the modifications carried out to try to overcome problems.

Very impressed with the heated plumb bob and the firn drill, both of which may have many other applications in the future.

Likewise, the fluid recovery technique is unusual and could be used in other drilling systems.

The borehole logger itself is very interesting and in my opinion merits a technical paper of its own. Both the dust logging and the orientation measurements are of interest. It would have been nice to see the dust logger working in the bubble free ice.

For an ice core drilling engineer my feeling is that the amount of detail is at about the
right level for a wide audience. Being a driller there were times when I wanted more detail but realise that not all of this journals readers will be quite as interested. Having said that, it might be more appropriate for the field reports (section 4) to be placed into a supplement. Although the field reports are essential to understand the development of the system, this is probably only of interest to the drilling community.

Reply: Since RADIX is not yet an established system and the recent field experiences are essential for the presentation of the current state of development, we have refrained from separating these experiences into an appendix or supplement. We feel that the chronological reporting provides the reader with a better picture about the current status, or “work in progress”, as also suggested by the title of the paper.

RC2: All in all a very interesting paper for a very ambitious drilling system. The conclusions seem to point to a larger diameter (less ambitious) drill being a solution. Hopefully this knowledge can be usefully used in the future.

Specific Comments:

Line 32 Colis – should be packages?

Changed to packages

Line 43 m3/h – superscript on the 3

Done.

Line 50 5/6 – maybe should be 5 or 6, could be read as 5/6ths. Having read further it would be good to explain what you mean by 5/6 lobes.

5/6 lobes is common terminology for this type of motor, but we agree that it may be difficult to interpret for the major part of readers. We have added an explanation on line 138.

Line 55 m3 – superscript on the 3

Done.

Line 106 3/2mm – should be 3mm/2mm to avoid confusion with 1.5mm

Done

Line 110 liter – should be litre

Corrected.

Figure 6 I'm a bit confused about how the flow controller works, I'm assuming that the flow is from the top downwards, but how does the flow pass the spring-loaded pin?

There are vertical holes in the body around the pin

Line 32 15/5 mm – should be 15mm/5mm to avoid confusion

Done.

Line 138 5/6 – could be 5 or 6 to avoid confusion

Explanation added

Line 160 by a depth counter on the sheave – is this an encoder?

Changed to encoder.

Lines 165-186 and figures 8 and 10 – The figures have consistent wording and numbers which is great however the description does not. For instance, the 150 L drum (clean reservoir) is called the Fluid container with level switch in figure 8. It would be good to make these consistent with each other.

Thanks. Made consistent.

Line 338 some uplift – is this the hose coming off the sheave wheel suggesting that the hose is jamming in the hole?

We agree, this is unclear. Wording improved.