Reply to Martin Schneebeli comments on "Comparison of manual snow water equivalent measurements: questioning the reference for the true SWE value" by Maxime Beaudoin-Galaise and Sylvain Jutras, The Cryosphere Discuss., https://doi.org/10.5194/tc-2021-354-CC1, 27 Dec 2021

Comments in blue
Answer in black

- This study supports previous studies on the subject of "objective SWE". The large sampler they use is very similar to the ETH tube (as used in the extensive survey of Lopez-Moreno et al., 2020). In my opinion, the title of this paper is well-chosen, but I have difficulty recognizing novelty.

We thank you for your comment and your interest in our submitted manuscript. Indeed, there are similarities with the ETH tube and the HQS sampler used in our study. However, even if the HQS is designed in aluminum like ETH, HQS is a longer sampler (1.43 m) and with a larger opening (I.D.= 12.1 cm; 114.4 cm^2). This difference allows the HQS to take SWE measurements in higher snow depths. With an average snow depth of 99 cm (± 30 cm) for our study, the HQS allowed us to always take a single measurement for the estimation of the SWE of the snow cover. For snow samplers with a shorter length (like ETH with 55 cm length), it would have been necessary to take 2-3 measurements to sample the entire snow column, which leads to a higher uncertainty according to López-Moreno et al (2020).

Regarding the novelty presented in our article, we have performed an analysis of the snow pit on the same scale as the snow samplers. In our methodology and in our analysis, the snow pit did not act as the default reference for true SWE, but as a method for estimating SWE. By calculating the uncertainty due to instruments (Table3), we were able to produce a comparison between the uncertainty of the snow samplers and the snow pit. These results showed that the snow pit has a higher uncertainty than the large diameter samplers. Although our comparison between the large diameter samplers (ULS and HQS) and the SFS rather confirms conclusions of previous studies than brings novelty, the finding concerning the snow pit has not been documented in the literature according to our knowledge and it represents a novelty. Your opinion is very relevant and motivated us to modify subsection 4.2 (discussion section) and the conclusion in order to better highlight the novelty brought by our study.

We invite you to read the replies to comments from the two anonymous referees for more details.