

Interactive comment on “Basal thermal regime affects the biogeochemistry of subglacial systems” by Ashley Dubnick et al.

Anonymous Referee #3

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The authors of this manuscript evaluate the effect of basal thermal regime on the characteristics of effluent from 3 glaciers associated with and one edge of the Devon Ice Cap. The goal was to see if the differences in movement and basal thermal regime resulted in differences in solutes, dissolved organic matter composition, and microbial community composition as assessed by comparing 16S amplicons from each site. They found the three glacial sites (warm basal ice) to be different from the one cold basal site taken at the western edge of the ice cap. The authors hypothesize that “basal thermal regime plays an important role in defining the physical and biogeochemical characteristics and variability of basal ice”; although one could argue that a hypothesis that states - differences in temperature affect microbial assemblages, weathering, and biogeochemical processes is more of a null hypothesis than an alternative hypothe-

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sis. More importantly though, because they have three warm sites and a single cold site it seems that this hypothesis is untestable and that the statistical comparisons between each feature (warm basal ice vs. cold basal ice) relies on variation from multiple samples taken with each site and not from truly replicated glacier characteristics in the landscape (i.e. pseudoreplication). For the warm basal site, I think it is reasonable to say that there are triplicate samples (i.e., $n=3$), however for the cold basal ice site appears to be unreplicated (i.e., $n=1$) and so that hypothesis cannot be tested using the standard statistical analyses employed (t-tests, table 1). That said I wouldn't consider that a fatal flaw in the manuscript as what they are reporting is primarily observational and exploratory in nature and there is also value in that. Beyond this principal concern the paper is well-written, clear and straight forward. The comparisons among effluent chemistry, DOM fluorescent properties, and 16S amplicons are standard and do a reasonable job describing the differences among sampling locations. Given how hard these samples are to gather, how quickly the planet is losing the cryosphere, and how little we understand about the characteristics of glacier effluent being released different glacier types, it seems that these data, presented as they are in a clear and unambiguous fashion, are valuable and merit publication.

Very Minor Comments:

Line 64: I am not sure what the "a" refers too in "> 20 m a-1" but perhaps this is a common unit from studies on glaciers that I am unfamiliar with

Line 199 - this seems like an odd way to report this. "less than half a percent of the OTUs" perhaps <0.5% would be clearer?

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