Clim. Past Discuss.,
https://doi.org/10.5194/cp-2020-66-RC2, 2020

Climate of the Past Discussions

Interactive comment on "Glacial history of Inglefield Land, north Greenland from combined in-situ ^{10}Be and ^{14}C exposure dating" *by* Anne Sofie Søndergaard et al.

Anonymous Referee #2

Received and published: 7 July 2020

The paper by Søndergaard et al. provides new CRN exposure ages (10Be, 14C) from erratic boulders and pebbles and radiocarbon ages from wood fragments to constrain the glacial history in Inglefield Land in northern Greenland. Based on their data, the authors conclude that that the glacial history in Inglefield Land commenced around 8.5 ka along the western margin and around 7.9 ka in the central part and reached is present position in the central part of the Inglefield by 6.9 ka. An overview of the Northern-Northwestern Greenland Ice Sheet history was also summarized as part of the work, including potential climate forcings.

Overall, this is a very nice study and will make a nice addition to the literature. Like the

two other reviewers, I have similar questions regarding Figure 5 and how it was constructed and some more detailed questions about the some of the data (e.g. lithologies of boulders). Rather than repeat their questions, some of which I also had, I have provided my figure related questions and a few other comments that I hope the authors will address prior to publication. Otherwise this is a very nice, succinct paper that I was very pleased to read and really liked. Great work folks!

Figure 3: It would be useful if the authors included the uncertainties on the figure. Perhaps just including the average 10Be and 14C uncertainty in the legend would suffice. This is important to readers who may not encounter these types of data often need some baseline to who precise the measurements can be. Authors choice on this one since I'm only suggesting it.

Figure 4: I'm not sure I find this figure particularly useful. Does it provide anything more that the table doesn't already provide the reader?

Figure 5: I have the same sentiments as Nicolas on this, so will let you address his comment.

Figure 7b: How does this work compare with the raised beach records from Bennike, 2002 or the modeling work from Lecavalier et al. 2017? The schematic in part b of this figure is interesting and makes me wonder how it might compare to those relative sea level curves and ice margin reconstructions. It might be worth mentioning something in this regard within the text.

Figure 8b: I like these figures that the authors provide. However, it isn't clear to me how they derive some of these numbers. For instance, in Washington Land to the north of their site the authors provide an outer coastal retreat around 9.0 ka and present day ice margin around 8.6 ka. Based on my read of the Ceperley et al. 2020 paper, it seems like the ice margin was at Crozier Island at 8.5 ka and within the interior around 7.6 ka based on taking the youngest 10Be ages. These ages are consistent with what is being found in Inglefield Land and would indicate to me that over this entire

area in the Northwest that the glaciers were largely acting in unison with no significant leads/lags. Perhaps the authors have recalculated these ages which is the reason for the discrepancy but regardless this should be addressed and explained assuming this is the case.

Lines 209-210: I'm not sure how you get inheritance for 14C in this region but I agree with the authors that this age seems unrealistic. Based on Figure 5, the authors have suggested that during MIS 3 this location was ice free. This is a really interesting hypothesis and I think the authors should explain how this might be possible (e.g. climatically, glaciologically) given most people typically don't think of MIS 3 as that much different than the LGM, yet the authors Figure 5 would make MIS 3 seems similar to the present day. More should be said here since this hypothesis has some implications for what the climate might be like in the past and the authors could weigh in on it.

Interactive comment on Clim. Past Discuss., https://doi.org/10.5194/cp-2020-66, 2020.