

The Cryosphere Discuss., referee comment RC1 https://doi.org/10.5194/tc-2021-188-RC1, 2021 © Author(s) 2021. This work is distributed under the Creative Commons Attribution 4.0 License.

Comment on tc-2021-188

Zoe Courville (Referee)

Referee comment on "Microstructure, micro-inclusions, and mineralogy along the EGRIP ice core – Part 1: Localisation of inclusions and deformation patterns" by Nicolas Stoll et al., The Cryosphere Discuss., https://doi.org/10.5194/tc-2021-188-RC1, 2021

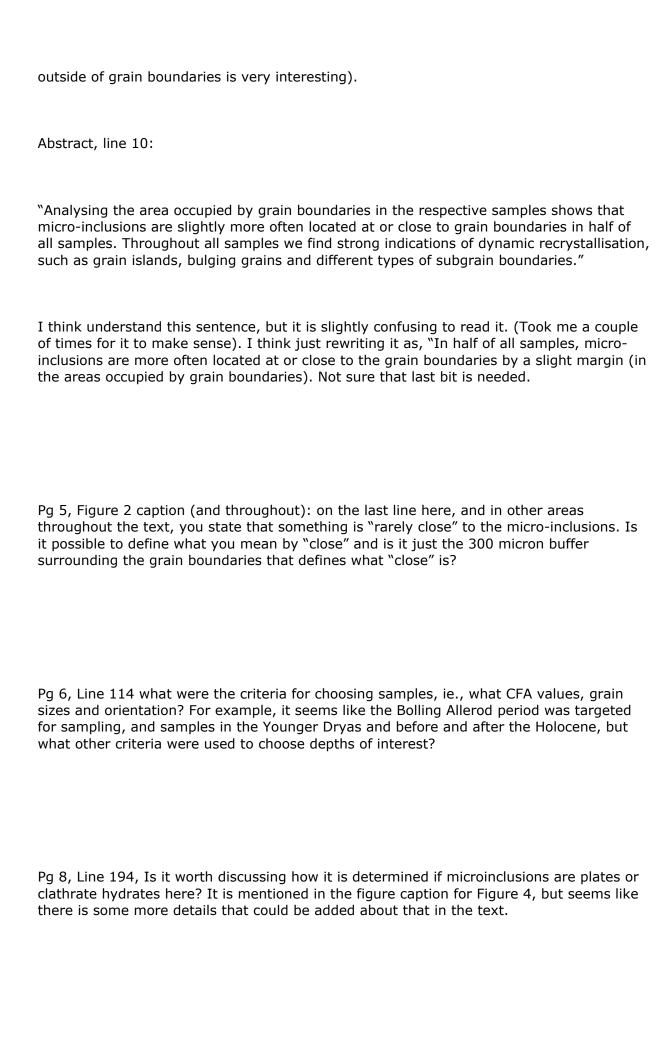
The authors present a very methodical, comprehensive examination of solid micro-inclusions in polar ice at a range of depths that shows the potential for such a systematic approach to answer many outstanding questions about the role of impurities in ice structure and evolution. The work represents the first investigation of solid micro-inclusions in fast moving polar ice, and uses the methods outlined by Eichler et al. (2017) to construct impurity maps of over 5000 micro-inclusions and allows a robust statistical analysis of the frequency of location of micro-inclusions within the ice microstructure at a level that has not been obtained to date, and helps shed light on several long-speculated processes.

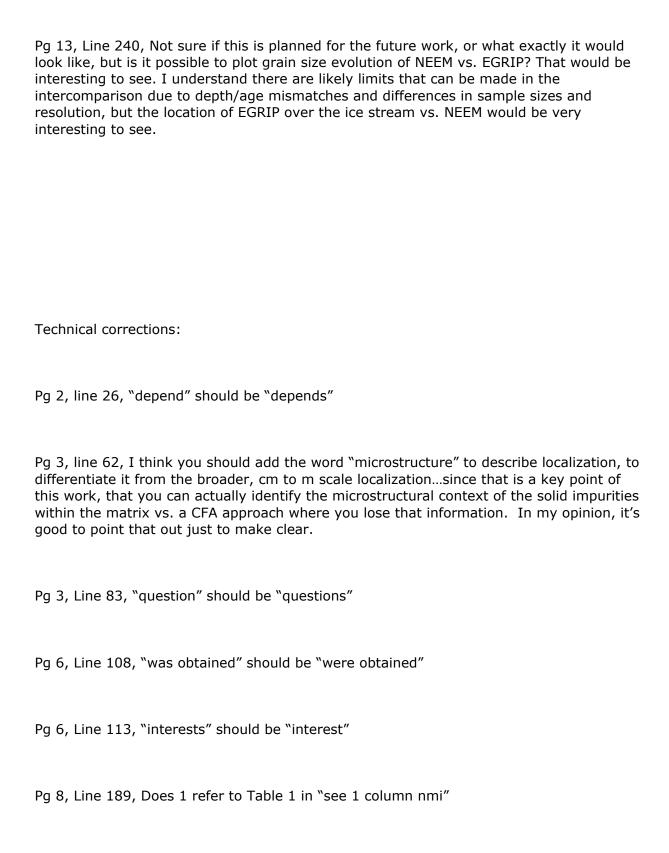
Future implications are particularly tantalizing...e.g., the examination of the impacts of mineralogy, grain boundary sliding, and precipitation and recrystallization on ice properties from the microscale to the mesoscale, which has been suggested in past literature, but with no prior methodology for proving definitively, is a very interesting consequence of this work.

The methods, results and conclusions are well articulated and presented, I have only a few minor specific comments and a small amount of very minor, technical corrections.

Specific comments:

Figures: I found the figures particularly compelling and interesting, especially Figures 1 and 2 (but all of the figures showing the variability of the micro-inclusions both within and





Pg 10, Figure 4 caption, 2nd line, "micro-inclusion" should be "micro-inclusions." Also, I mentioned this in the specific comments, but in this caption it is mentioned that there are plate-like inclusions and clathrate hydrates, but there is no mention in the text about the difference and how it the two types are determined. Guessing it's just a visual determination?

