

## ***Interactive comment on “Geothermal heat flow in Antarctica: current and future directions” by Alex Burton-Johnson et al.***

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Dear Authors,

I enjoyed reading your paper on the comparison of the different GHF estimate methods. This paper provides a great overview of the work done on GHF reconstructions and provides key future directions. All known methods are described and are well supported by explicit examples and references in the manuscript. I really liked section 4 on GHF derived estimates. I think that all the key references are included. I added a few and strongly suggest to add and describe the work of Rezvanbehbahani et al. (2017) on machine learning techniques as done in Greenland. The introduction and conclusion support well the manuscript as do the figures (see specific comments).

C1

The language used is appropriate. However, I would suggest the following general changes: a) In the title you use “flow” but I would suggest to use “flux”, as well as for the whole manuscript (see specific comments). b) The manuscript is qualitative in a few paragraphs. More quantitative descriptions could be provided such as maximum and minimum GHF of the different data sets, discuss the representativeness of point GHF values, ... where possible. c) The limitations of the different methods to estimate GHF (ice borehole measurements, model estimates, ...) are not always discussed. A sentence could be provided for each. E.g. ice borehole measurements provide a minimum GHF value when the base is at the pressure melting point. d) Figure 6 needs to be discussed in more detail in the text. A description of the different data sets used is lacking (see specific comments). e) Section 4.5 is quite long compared to the other subsections, and describes in a lot of details a technique that is not widely in Antarctica because of the lack of measurements. It seems therefore that including specific equations is superfluous, and perhaps the paragraph on its application in Antarctica could then be extended. I attach a detailed review of the paper for the specific line-by-line comments, see attached PDF. All the best, Brice Van Liefferinge

Please also note the supplement to this comment:

<https://www.the-cryosphere-discuss.net/tc-2020-59/tc-2020-59-RC1-supplement.pdf>

Interactive comment on The Cryosphere Discuss., <https://doi.org/10.5194/tc-2020-59>, 2020.

C2