

Interactive comment on “Geology datasets of North America for use with ice sheet models” by Evan J. Gowan et al.

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General comments: This paper presents useful datasets regarding the geology and sedimentology of North America, Greenland, Iceland and parts of Russia. The datasets are extensive and useful for the community. The demonstration of use in ice sheet models is interesting and also useful for the reader to consider how future experiments with this and similar datasets might be conducted. However, the aim of these simulations for this paper should be noted in the text (i.e. to demonstrate utility of the dataset, not to draw scientific conclusions about the Laurentide which I presume is the focus of a later paper). The authors should be applauded for citing all the original literature that goes into this dataset in Tables 1 and 2. It may also be useful to distribute a similar bibliography with the dataset. This is therefore a very worthwhile contribution

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to the literature and I hope that my comments below can help improve the manuscript.

Specific comments: The title - only North America is mentioned, yet the data includes Greenland and Iceland. I think these places need incorporating in the title somehow. As far as I can tell from figures (could not check the actual data as pangea is password protected) the whole of North America is not covered by the data either.

Uncertainty. In creating the dataset the authors necessarily and reasonably had to make some interpretations and interpolations between sources of data. However, there doesn't seem to be any record of where gaps have had to be filled or boreholes consulted. A map of data coverage (boreholes, geology map location etc), or another map showing some sort of confidence level in the data would be very useful for those using the data in model experiments and for focusing future work.

Some notes on the data format that the data is provided in would be useful. As mentioned above, I could not check as not yet accessible through the repository.

Minor comments: Abstract, page 1, line 5. Please state the scale or resolution of the dataset.

P1, L 17 - I find the use of the word substrate odd here, it is more about whether sediments were present beneath the ice sheet or not. To me, these sediments (or bedrock) would then be the substrate, i.e. the bit in contact with the bed of the ice is the substrate.

P1, L 19 - Consider adding the more recent reference of Storrar et al., 2014 on eskers across the Laurentide.

P2, L 9 - Unclear subject matter. Presence or absence of what?

P2, L 15-17 - This section needs better linking to scope of the paper. These are all important factors, but some better crafting of the paragraph is required to state why we need to know about these things. In particular, here the subject jumps from the Laurentide to Svalbard without any linking.

P3, L 6-9 - These sentences are better incorporated into the following section.

P3, L 13 - use of word "extended" is technically correct, but I wonder if better for reader if you use occurred between or similar, given the use of the word "extent" later to refer to where the ice got to.

P3, L 32 - requires rewording. Perhaps "information" rather than "glacial"

Section 2.1. - A statement on the intended use and resolution of the data would be useful for those intending to use the dataset and to prevent misuse. I imagine the datasets will be useful for those doing ice sheet-scale experiments. However, the resolution may limit utility for those interested in a single outlet glacier/ice stream for example.

P5, L 30 - No notes on clay

P6, Section 2.5. This section would be useful for including the notes/map of "uncertainty" stated above.

P7, L 23. I think it worth restating here for the audience that your aim is not to draw specific conclusions about the form of the Laurentide in this paper. The following sections (3.2.1 to 3.2.3) do mention specifics of the modelled ice sheet. However, I think that these are safe as they fall short of evaluating whether there is an improvement or not, by just stating that there is a change induced by the data.

Additional references: Storrar, R.D., Stokes, C.R. and Evans, D.J., 2014. Morphometry and pattern of a large sample (> 20,000) of Canadian eskers and implications for subglacial drainage beneath ice sheets. *Quaternary Science Reviews*, 105, pp.1-25.

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