

Interactive comment on “De Long Trough: A newly discovered glacial trough on the East Siberian Continental Margin” by Matt O’Regan et al.

Anonymous Referee #2

Received and published: 13 June 2017

The paper ‘De Long Trough: A newly discovered glacial trough on the East Siberian Continental Margin’ presents new geophysical and geological data from the East Siberian outer shelf and slope. Very little is presently known about the glacial history and past ice-sheet dynamics of this region, making this study particularly relevant to ideas about a Siberian Ice Sheet and an Arctic ice shelf. I have a few comments about the structure of the paper and the interpretations that are presented.

Major comments

- There could be further separation of description and interpretation in the manuscript. At present, the interpretations occur in the Discussion section and it is not clear what each of the six acoustic units have been interpreted as. Perhaps include separate description and interpretation headers within each of the results sub-chapters.

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- Some of the architectural features and landforms that are described in the Discussion should be introduced earlier in the manuscript. For example, the first paragraph of section 4.1 is background information that would better fit in an introduction. The introduction could include a short paragraph on the landforms that are typically associated with ice streams, e.g. GZWs, TMFs and mega-scale glacial lineations. This section would also benefit from additional references about GZWs, TMFs and moraines.

- There is some discussion of the atypical characteristics of the De Long trough, i.e. it is quite shallow compared with other cross-shelf troughs. There could be further discussion of the ways in which the De Long trough differs from other cross-shelf troughs/ the limitations of the available data, e.g. the trough doesn’t appear to cross the entire shelf, e.g. the seafloor becomes deeper towards the shelf break, whereas most Arctic cross-shelf troughs have a reverse gradient.

Minor comments

- Are any iceberg ploughmarks detected on the sub-bottom profiles or bathymetry?

- Start of second sentence of 4.1. Replace ‘they’ with ‘ice streams’, otherwise it could read as though cross-shelf troughs terminate in calving fronts.

- Although some GZWs are found at the shelf break, they are more often outer-shelf to mid-shelf features, and are commonly associated with shallower and/or narrower regions of a trough.

- Section 4.1.1. The fact that the landforms occur close to the shelf break isn’t evidence that they are GZW, as shelf-break moraines are common in the geological record. Why does M2 more closely resemble a series of terminal moraines? Is this due to geometry/ amplitude/ length to height ratios?

- In Section 4.1.1: ‘As both types of features are found at the terminus of marine based ice streams...’. The presence of moraines doesn’t indicate a fast-flowing ice stream; in fact, moraines are more commonly associated with inter-ice stream regions. Both

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features do indicate the presence of grounded ice at the shelf break.

- Fig. 6. Labels could be added to this figure, e.g. acoustically transparent intervals.

- Fig. 7. The numbers in panels a and b should be rotated so they can be read. Where is the shelf break in panel a? This could be marked on, e.g. with a dashed white line. Panel a could be rotated so that the shelf is at the top of the image and the slope at the bottom, as in the other figures. Label the GZW in the profile in c.

Interactive comment on Clim. Past Discuss., <https://doi.org/10.5194/cp-2017-56>, 2017.