

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

Matt O’Regan et al.

matt.oregan@geo.su.se

Received and published: 30 July 2017

Anonymous Referee #1 Received and published: 12 June 2017

The Paper “De Long Trough: A newly discovered glacial trough on the East Siberian Continental Margin” addresses the existence of cross-shelf trough(CST) in the East Siberian Sea (ESS). Many CSTs are found on the Beaufort Sea, off Greenland, and Barents-Kara Sea of the Arctic Ocean, however, no direct evidence of CTS has been found on the ESS yet. This makes it difficult to understand glacial history in the ESS, even though many studies provided several proofs of Pleistocene ice sheet. Results from this paper are expected to contribute to reveal the existence of the fast-streaming ice sheet as well as the glacial history in the ESS. In this paper, several images of SBP

C1

related to grounding-zone wedges (GZW) are presented. Because GZWs are generally found in CST or major fjord system, there is no doubt of the existence of fast-streaming ice sheet in the De Long Trough.

However, some evidences supporting the existence of CST need to be examined carefully.

1. One of evidences for CST is a topographical depression in the IBCAO chart. The IBCAO version 3.0 is known to be compiled using Digital Bathymetric Model (DBM) and collected bathymetric data. In the ESS, however, limited measured bathymetric data may give rise a limited accuracy of IBCAO data in the region. As this paper presented the maximum depth difference between field measurement and IBCAO data reached more than 100 meters. Considering this error range, the depression depth of 140 meter measured using IBCAO data may have another geologic interpretation than CST.

"We appreciate the concerns of reviewer #1 in this regard, and are acutely aware of the uncertainties in IBCAO. The manuscript is built on data collected during SWERUS-C3. The evidence for glacial activity extending out to the shelf edge is from our mapping and subbottom data.

We recognise that IBCAO Version 3.0 is, in this area, completely based on digitized contours from the Russian bathymetric map published by the Head Department of Navigation and Oceanography (HDNO) in 1999 (Naryshkin, 1999, Naryshin 2001). The source data of the Russian HDNO maps are unfortunately not publicly available. However, since the maps were compiled by a "neutral bathymetrist" and not by glacial geologist, we have no reason to believe that a bathymetric trough, here called the De Long Trough, at this location is "over interpreted" from the source data.

We have added a similar paragraph to the discussion section of the manuscript. However, in addition to this it is critical to remember that our interpretation of the broad topographic features seen in IBCAO is based on our more detailed but spatially limited mapping conducted during SWERUS-C3. "

C2

2. In this paper, trough mouth fan (TMF) was presented to support CST. The only supporting evidence of TMF is a topographical feature from IBCAO data. Like the previous reason of poor accuracy of IBCAO data in the ESS, it is not easy to accept as a supporting evidence of TMF.

"In the manuscript we also present and interpret subbottom data that very convincingly shows a sequence of stacked mass-wasting (glaciogenic debris flow) deposits in front of De Long Trough. These coincide with a notable bulge in the slope profile seen in IBCAO. Together these are argued to be evidence for a TMF.

Further evidence for a glaciogenic origin for these deposits, is the dating of the uppermost acoustically laminated unit, whose base must be older than 45-50 ka (based on the radiocarbon dating in cores 23-GC and 24-GC. This is significant because it means that the mass-wasting deposits are not generated in response to transgression/regression during normal glacial cycles. If they were, the uppermost acoustically laminated unit on the slope would have been disrupted by mass-wasting during the last glacial maximum. "

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