Supplement of

Geomorphology and shallow sub-sea-floor structures underneath the Ekström Ice Shelf, Antarctica

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Supplementary Material

1 S1 - Marine geophysical data acquisition parameters

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<tr>
<th>Expedition</th>
<th>Technical Details</th>
<th>Year</th>
<th>Reference</th>
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<td>ANT-VIII/5</td>
<td>Hydrosweep DS-1, 15.5 kHz, 59 beams</td>
<td>1989/1990</td>
<td>Steinmetz et al. (2011)</td>
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<td>2015/2016</td>
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</table>

Table 1. List of the expeditions in which the swath bathymetry data were collected with Data Acquisition, Year and Reference.

2 S2 - Calculation of sea level reconstruction

As described in Section ’Paleo-ice sheet setting inferred only from marine geophysical data’, iceberg ploughmarks are found with inside the trough and on the edge of the continental shelf, separated from the trough by a bathymetric sill. The ploughmarks outside the trough are found at deeper water depths. This leads us to the assumption that the ploughmarks outside the trough originated from icebergs carved outside the EIS embayment and those found inside the deeper sections of the trough originated from icebergs calved from the ice shelf itself. From this, an ice thicknesses of ~305 m to 320 m can be derived, including a Glacial Isostatic Adjustment (GIA) of 1 mm a\(^{-1}\) in East Antarctica (Argus et al., 2014), and depending on regional sea level at the time of calving between LGM and Holocene around 10 ka BP (Schannwell et al., 2020).
The iceberg ploughmarks occur in water depth between 290 m to 535 m, the maximal water depth at the continental margin is 420 m. The imprint depth is maximal 10 m. The deepest water depth where iceberg ploughmarks were found that originated from Ekströmisen is 420 m (+10 m imprint depth = -430 m). Schannwell et al. (2020) determined that the water depth at the LGM was 125 m, before 10 ka it was 50 m. The ice thickness at the LGM can therefore be determined with 305 m and 320 m at 10 ka.
References


