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Subglacial Roughness of the Former Barents Sea Ice Sheet

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Sliding across a rough lithosphere is an important contribution to the motion of ice sheet sectors with a temperate base. The roughness of the bed is thus of high importance for the estimation of the sliding velocity. Measurements of basal properties in present day ice sheets are restricted to ground penetrating radar and seismics, with point or linear surveys retrieving relatively coarse datasets. Deglaciated areas like the Barents Sea offer the possibility of studying the basal roughness of former ice sheets and ice streams, as the former ice/lithosphere interface can be surveyed by ship-borne 2D/3D seismics and multibeam sonar with high resolution.
Here, we quantify the subglacial roughness of the former Barents Sea Ice Sheet by estimating the spectral roughness of the basal topography. We also make deductions about the past flow directions by looking at how the roughness varies along a 2D line as the angle of the line changes. We compare our estimated roughness of the bed of the former Bjørnøyrenna Ice Stream to estimates made for the beds of various Antarctic ice streams.
Lastly, we investigate how the estimated basal roughness is affected by the resolution of the basal topography dataset. We do so by comparing the spectral roughness along a cross section in full-resolution to the one obtained using a sampling interval typical for airborne radio echo sounding over present day ice sheets.