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Emergence constraints on Late Weichselian Barents Sea ice sheet history

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The ice load history over the Barents Sea is poorly constrained. The maximum ice load could have had a single primary lobe in the center of the Barents Sea which collapsed to island centered loads as deglaciation progressed. Alternatively the dominant ice loads could have been centered over the islands with less ice in the Barents Sea even at maximum glaciation. Emergence data could distinguish these two possibilities.

New cosmogenic nuclide (CN) ages from glacially transported boulders in interior areas of north western Svalbard suggests ice sheet thinning of 650-995 m between 18.3±1.3 ka and 15.4±1.1 ka, and a further thinning of 400 m between 15.4±1.1 ka and 14.1±0.2 ka. Emergence data in western Svalbard consistently indicates a slow emergence of ∼17m between 16 and 11 ka and a rapid emergence of ∼30 m between 11 and 10 ka. Both data sets indicate an early deglaciation of western Svalbard, ending at about 10 ka. In contrast, eastern Svalbard shows a slowing rate of emergence of about 80 m between 11 ka and present.

We have explored which combinations of ice loads and mantle rheology produces the best match to Svalbard emergence data. Results to date suggest a lower central Barents Sea centered ice load is slightly better able to match the emergence data. We are presently further exploring mantle and ice models, and incorporating emergence data from Franz Josef Land, Novaya Zemlya, and the Scandinavian northeast coast.