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Final deglaciation of the Barents Sea at 12.9 ka and potential trigger of the Arctic atmospheric dipole

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The specific configuration and history of the marine-based Barents Sea ice sheet has been under dispute for decades. Bjørnøya is situated between northern Fennoscandia and the Svalbard archipelago and therefore lies in a key position for understanding the maximum configuration and final retreat of the ice sheet. Bjørnøya also lies between two important trough systems that contributed to the ice sheet drainage: the Bjørnøya and Storfjorden palaeo-ice streams. We obtained 24 cosmogenic 10Be exposure ages from glacial erratics on southern Bjørnøya to 1) investigate the timing of initial deglaciation of the Barents Sea ice sheet, and 2) determine the timing of complete deglaciation of the island.

The 10Be ages are from glacially transported sandstone and conglomerate boulders situated in the southern part of the island, calculated using the Arctic 10Be production rate, and presented with analytical uncertainty. 18 10Be ages exhibit a very strong mode from 11.9 to 14.5 ka, averaging 12.9 $\pm$ 0.6 ka, a much smaller mode from 24.6 to 26.2 ka (averaging 25.6 $\pm$ 1.2 ka), and three samples were excluded as outliers scattering at different times (3.6 $\pm$ 0.2 ka, 16.3 $\pm$ 0.7 ka and 19.6 $\pm$ 1.0 ka).

Boulders between 17 and 293 m a.s.l. and the highest samples from Antarcticafjellet (340-351 m a.s.l.) indicate ages averaging 12.9 $\pm$ 0.6 ka. These boulders indicate the final deglaciation of restricted local remnants of ice covering the higher Antarctic and Alfred mountains and leaving well-preserved moraine sequences in the lowlands.

We will discuss the ice-free Barents Sea as a potential precondition to build up low pressure in this region needed for a strong Arctic atmospheric dipole. In turn a strong Arctic atmospheric dipole causes increase in Meridional winds succeeding in transport of Arctic sea ice into the North Atlantic with the trans-polar drift.