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Radiogenic Isotope Signatures of Holocene Sediments from Kane Basin: Linkage with the Re-opening and Evolution of Nares Strait

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The re-opening of the Arctic Ocean-Baffin Bay gateway through Nares Strait, following the Last Glacial Maximum, has been partly documented, discussed and revised in the past decades. The Nares Strait opening has led to the inception of the modern fast circulation pattern carrying low-salinity Arctic water towards Baffin Bay and further towards the Labrador Sea. This low-salinity water impacts thermohaline conditions in the North Atlantic, thus the Atlantic Meridional Overturning Circulation. Available land-based and marine records set the complete opening between 9 and 7.5 ka BP [1-2], although the precise timing and intensification of the southward flowing currents is still open to debate. A recent study of a marine deglacial sedimentary record from Kane Basin, central Nares Strait, adds information about subsequent paleoceanographic conditions in this widened sector of the strait and proposed the complete opening at ~8.3 ka BP [3].

We present complementary radiogenic strontium, neodymium and lead isotope data of the siliciclastic detrital sediment fraction of this very record [3] further documenting the timing and pattern of Nares Strait opening from a sediment provenance approach. The data permit to distinguish detrital material from northern Greenland and Ellesmere Island, transported to the core location from both sides of Nares Strait. Throughout the Holocene, the evolution of contributions of these two sources hint to the timing of the ice break-up in Kennedy Channel, north of Kane Basin, which led to the complete opening of Nares Strait [3]. The newly established gateway of material transported to the core location from the north via Kennedy Channel is recorded by increased contribution of northern Ellesmere Island detrital sediment input. This shift from a Greenland (Inglefield Land) dominated sediment input to a northern Ellesmere Island dominated sediment input supports the hypothesis of the newly proposed timing of the complete opening of Nares Strait at 8.3 ka BP [3] and highlights a progressive trend towards modern-like conditions, reached at about 4 ka BP.

References:

[1] England (1999) *Quaternary Science Reviews*, 18(3), 421–456. [2] Jennings et al. (2011) *Oceanography*, 24(3), 26-41. [3] Georgiadis et al. (2018) *Climate of the Past*, 14 (12), 1991-2010.