EGU24-5768, updated on 20 May 2024
https://doi.org/10.5194/egusphere-egu24-5768
EGU General Assembly 2024

$^{10}Be/^{9}Be$ in Arctic Ocean Sediments: Another clue towards a fresh Arctic hypothesis

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Marine sediments provide invaluable records of past climate variations. However, dating these sediments with classical dating methods is challenging in the Arctic Ocean because of the lack of foraminifera, their poor preservation, and the extremely low sedimentation rates. Yet, understanding the history of the Arctic Ocean is of great importance for assessing its potential response to the current fast warming of these high latitudes.

Recently, Geibert et al. (2021) proposed that during some glacial periods, the Arctic Ocean might have been filled with freshwater. This hypothesis, which has potentially far-reaching implications, can explain intervals of low ^{230}Th-excess and low ^{10}Be concentration in Arctic sediments but is strongly debated (Spielhagen et al., 2022; Hillaire-Marcel et al., 2022). This hypothesis posits that during these freshwater intervals, primary input fluxes originated from Arctic rivers rather than the North Atlantic.

To test this theory, we assess the $^{10}Be/^{9}Be$ ratio in sediments that correspond to the freshwater intervals. Since the $^{10}Be/^{9}Be$ ratio differs systematically between North Atlantic and riverine waters, this proxy used as a water mass tracer can give novel insights into the Quaternary history of the Arctic Ocean. We discuss our results in the light of the hypothesis by Geibert et al. and evaluate the use of $^{10}Be/^{9}Be$ as a dating and correlation tool of Arctic Ocean sediments contributing to the ongoing chronostratigraphic investigations in the Arctic Ocean.

Geibert, Walter, et al. "Glacial episodes of a freshwater Arctic Ocean covered by a thick ice shelf." Nature 590.7844 (2021): 97-102.

Spielhagen, Robert F., et al. "No freshwater-filled glacial Arctic Ocean." Nature 602.7895 (2022): E1-E3.

Hillaire□Marcel, Claude, et al. "Challenging the hypothesis of an Arctic Ocean lake during recent glacial episodes." Journal of Quaternary Science 37.4 (2022): 559-567.