

Investigation of the paleoclimate of the Mendeleev Ridge in the western Arctic Ocean using beryllium isotopes

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Abstract

We investigated paleoclimate and environmental changes using beryllium isotopes from the 39 cm-long box core sediment obtained from the Mendeleev Ridge of the western Arctic Ocean. The age of core PS72/396-3 seems to be back < 100 kyr based on stratigraphy of beryllium isotopes and paleomagnetic data and other isotopic data of this study, AMS ¹⁴C ages and oxygen and carbon isotopes of planktonic foraminifer *N. pachyderma* sin. The both authigenic ¹⁰Be and ⁹Be records show that there are three major cold periods during the last 100 kyr and reveals a much longer warm period after the second cold period based on ⁹Be record. The ¹⁰Be stratigraphy also reveals a paleomagnetic excursion at ~45 kyr which is comparable with the record of $\delta^{18}\text{O}$. At depth from 22 to 25 cm, the lowest ¹⁰Be signal may be due to the highest paleomagnetic intensity, which is indicated as an age of 75 kyr elsewhere. However, cold climate signal such as ice coverage could be possible because $\delta^{18}\text{O}$ reveals a cold period. Interestingly, ⁹Be data show that constant input of ⁹Be to the Mendeleev Ridge is clearly observed for this time period. This could be associated in warmer climate which provided constant ⁹Be input to the marine environment from the land. During this time period, TOC (%) values also show a similar pattern. The record of authigenic ⁹Be is inversely correlated to that of Ca and proportional to opal production. These observations confirm that ⁹Be can be a good proxy for climatic tracer. This study may be a useful approach for understanding Arctic climate change for the Mendeleev Ridge as well as global paleoclimate changes during the late quaternary glacial-interglacial cycles.

Keywords: beryllium-10, paleoclimate, Mendeleev Ridge,