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Environmental changes in the Arctic over the past 10 Myr based on Os Isotope Stratigraphy and Chemical composition of Ferromanganese Crusts

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Hydrogenetic ferromanganese (Fe-Mn) crusts form by precipitation from ambient bottom waters and accretion of colloids onto rock surfaces. Due to their slow growth rates and layered structure, Fe-Mn crusts are a useful tool and archive for studying paleo-climate, oceanography, and geologic evolution over long (millions of years) time scales. This knowledge is especially important for the Arctic Ocean, which remains a poorly explored region. However, precise age determinations for Fe–Mn crusts is still a challenging task. The seawater Os isotopes record is well preserved in Fe–Mn crusts, which allows for the determinationof age by comparison with the seawater Os isotope curve (e.g., [1], [2]).

For the first time, the Os isotope data of four ferromanganese crusts from Arctic Ocean are presented. The hydrogenetic crusts studied were collected from the Amerasia basin (Mendeleev Ridge and Chukchi Borderland) and Norwegian basin (Voring Spur and Knipovich Ridge) within a depth range from 3851 to 1300 mbs. The Os concentration and ^{187}Os /^{188}Os ratios are provided together with major and trace-element compositions of sublayers (2-5 mm) to show temporal variations in composition.

Element associations and ^{187}Os /^{188}Os ratio changes in the Arctic crusts reflect the unique characteristics of the Arctic Ocean, especially the significant influence of glaciation on climate and depositional regime.

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References:

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