Application of compound-specific radiocarbon dating for studying West Antarctic Ice Sheet during the Late Quaternary

N. OHKOUHI[1], T.I. EGLINTON[2], M. TOYODA[1,3], Y. CHIKARAISHI[1], H. TOKUYAMA[3], H. MIURA[4] AND Y. YOKOYAMA[5]

[1]IFREE/JAMSTEC, Yokosuka 237-0061, Japan
[2]Woods Hole Oceanogr Inst, Wods Hole MA 02543, USA
[3]Ocean Res Inst, Univ Tokyo 164-8639, Japan
[4]National Inst Polar Res, Tokyo 173-8515, Japan
[5]Dept Earth Planet Sci, Univ Tokyo, Tokyo 113-0033, Japan

Compound-specific radiocarbon dating is a powerful tool for reconstructing chronologies in high-latitudinal sediments. Since high-latitudinal sediments generally lack carbonate, total organic matter has been used to establish sediment chronologies. However, the "contamination" of reworked sediments eroded from the Antarctic Continent leads to anomalously old core-top ages or to age reversals down-core (Ohkouchi and Eglinton, 2006).

Ohkouchi *et al*. (2003) first reported that the radiocarbon dating of solvent-extractable, short-chain (C_{14}, C_{16}, and C_{18}) fatty acids isolated from surface sediments of the Ross Sea, Antarctica, indicated them to be consistent with the modern DIC reservoir age (Pre-bomb: $\Delta^{14}C \approx -150‰$, Post-bomb: $\Delta^{14}C \approx -100‰$). Furthermore, the radiocarbon ages of these fatty acids at five down-core intervals progressively increase with the core depth. These results clearly show a utility of the compound-specific radiocarbon dating for developing sediment chronologies in Antarctic margin sediments (Ohkouchi and Eglinton, submitted).

In this study, we determined radiocarbon ages of the fatty acids from a core recovered in the NW Ross Sea to reconstruct sediment chronologies. Furthermore, we determined hydrogen isotopic compositions of sedimentary biomarkers in the core. Around 7, 6, 4.5, and 2.5 kyr ago, the reconstructed δD values of paleo-seawater were -200‰ or lower, suggesting a large amount of meltwater influx to the Ross Sea. We propose that recurrent massive melting of WAIS could have occured at least four times in the Holocene.

References

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Mobility and transport of Nd isotopes during weathering of till in a boreal forest

BJÖRN ÖHLANDER[1], MAGNUS LAND[2] AND JOHAN INGRI[1]

[1]Division of Applied Geology, Luleå University of Technology, Sweden
[2]Department of Geology and Geochemistry, Stockholm University, Sweden

It has been suggested that the Nd transported in the large, pristine Kalix River in northern Sweden originates from organic bound REE from the uppermost soil horizons (Öhlander *et al*., 2000; Andersson *et al*. 2001). Here we present new data of the distribution of Nd isotopes in a spodosol profile developed in a till which was deposited 8700 years ago. In addition, Nd isotopes were analysed in soil water, groundwater and stream water in a small catchment situated within the Kalix River drainage basin.

The results indicate that a large part of the Nd released by weathering in the E-horizon is trapped in the B-horizon, and that the major part of the dissolved Nd exported from the studied catchment via stream water is derived from weathering in the shallow groundwater zone within the till rather than in the top soil. Due to the very low weathering rate at that depth, there is still a relatively little altered pool of reactive minerals containg Nd. It will take a very long time (>> 8700 years) before the Nd leaving the catchment will have an isotopic composition different from today.

The export of Nd from a large boreal drainage basin, in this case to the Bothnian Bay, is, to a large extent, controlled by selective weathering and reactions with organic matter in the upper soil horizons, and by Nd released by slow weathering in the groundwater zone.

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