Tracing lithogenic fluxes at the south-west Greenland margin using dissolved ^{232}Th and ^{230}Th

GEORGE H. ROWLAND*[1], LAURA F. ROBINSON[1], KATHARINE R. HENDRY[1], AMBER L. ANNET[2], TAO LI[1,3] AND HONG CHIN NG[1]

[1]Bristol Isotope Group, School of Earth Sciences, University of Bristol, Wills Memorial Building, Queens Rd, Clifton, Bristol, BS8 1RJ, UK (*correspondence: gr1850@bristol.ac.uk)

[2]School of Ocean and Earth Sciences, University of Southampton, Southampton, UK

[3] Department of Earth Sciences, Nanjing University, Nanjing, China

Fluxes of terrestrial material to the oceans are important for sustaining primary productivity via the supply of essential micro-nutrients, such as iron, which can be limiting in some parts of the world's oceans. Recent studies of glacial outflows in Greenland have indicated that glaciated continental margins are potentially an important source of bioavailable nutrients to the ocean. However, uncertainty remains regarding the sizes of the potential nutrient fluxes and whether or not nutrients are trapped in coastal settings rather than reaching areas of the ocean in which they would have the largest impact on primary production. Recently it has been demonstrated that the fluxes of dissolved lithogenic trace elements (such as Fe) may be estimated from the scavenging flux of dissolved ^{232}Th in seawater, based on measurements of ^{232}Th and ^{230}Th. We present depth profiles of dissolved ^{232}Th and ^{230}Th from the south-west Greenland margin, with distances of ~50–100 km from the coast. We show that both the concentration and flux of ^{232}Th increase with increasing proximity to the continent, as well as an increase in ^{232}Th flux with depth. The fluxes are comparable to other non-glaciated margins in the Atlantic, and suggest that—the effects of advection and diffusion on flux estimates notwithstanding—the flux of Fe and other trace elements may not be appreciably increased at the Greenland margin. Nonetheless, the fluxes at the Greenland margin are substantially higher than those in open ocean settings. Future work will aim to further constrain the fluxes of lithogenic material at the Greenland margin by measuring ^{232}Th and ^{230}Th in suspended particles collected by in situ pumps, and in core-top sediments collected by ROV. In addition, the margin setting with strong lateral ^{230}Th and ^{232}Th gradients, as well as strong currents, will provide an opportunity to investigate the effects of advection and diffusion on calculated ^{232}Th fluxes.

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