GSA Connects 2021 in Portland, Oregon

Paper No. 79-9
Presentation Time: 10:20 AM

WEATHERING, RADIOGENIC ISOTOPES, AND MARINE RECORDS OF GLACIAL DYNAMICS

MARTIN, Ellen[1], DEUERLING, Kelly[2], FLYNN, Shauna[1], EVERHART, Cheyenne[3], MARTIN, Jonathan[1], PAIN, Andrea[4] and AN, Emily[1], (1)Department of Geological Sciences, University of Florida, 241 Williamson Hall, P.O. Box 112120, Gainesville, FL 32611-2120, (2)Department of Natural & Applied Sciences, University of Wisconsin Green Bay, 2420 Nicolet Dr, UW Green Bay, Green Bay, WI 54311, (3)USGS, 600 4th Street South, St. Petersburg, FL 33701, (4)University of Maryland Center for Environmental Science, Horn Point Laboratory, PO Box 775, 2020 Horns Point Rd, Cambridge, MD 21613

Glacial advance and retreat is related to numerous climate system feedbacks; yet, this dynamic glacial activity tends to erase its own terrestrial record. As a result, deep-sea sediments may be the best archives for studying past glacial processes. Interpretations of these archives depend on understanding terrestrial sources to the marine sediments. Systematic spatial variations in dissolved riverine and soil leachate Sr, Nd and Pb isotopes across an ~175 km transect from the Greenland Ice Sheet to the coast present an analog for temporal changes during glacial retreat. Specifically, the offset between dissolved (riverine or soil leachates) and bulk sediment (bedload or leached soil) isotopes is highest in young glacial sediments close to the ice sheet and approaches zero in 10 ky old glacial sediments at the coast. This difference is attributed to a transition from preferential chemical weathering of trace minerals and/or radiation damaged sites in freshly comminuted, ice-proximal sediments to predominant weathering of less radiogenic (Sr and Pb) and more radiogenic (Nd) isotopes from bulk major minerals in more extensively weathered coastal material. These isotopes are transported to the ocean where the residence time of Sr is too long to be an effective tracer of local or regional glacial processes; however, the short residence time of Pb makes it an excellent tracer of local chemical weathering processes and the intermediate residence time of Nd allows application to region studies. Data from IODP Sites 1302/3 (3550 m water depth) in the NW Atlantic illustrate that seawater Pb and Nd isotopes preserved in authigenic FeMn-oxide coatings respond dramatically to retreat of the Laurentide Ice Sheet during the penultimate glacial termination (T2; 135-129 ka) and to rapid variations during Dansgaard-Oeschger cycles. These data suggest deep-sea radiogenic isotopes preserve a more detailed record of the long term history of ice sheet dynamics than terrestrial proxies. The systematic variation in chemical weathering linked to ice sheet retreat and reflected in deep-sea isotope records may also help refine estimates of past and future carbon cycling and fluxes of nutrients and isotopes to the ocean associated with high latitude climate change.

Recorded Presentation

Session No. 79

T131. Mountain Glaciation and Climate Change of the Past and Present I
Monday, 11 October 2021: 8:00 AM-12:00 PM

Portland Ballroom 253 (Hybrid Room) (Oregon Convention Center)

Geological Society of America *Abstracts with Programs.* Vol 53, No. 6
doi: 10.1130/abs/2021AM-367602

Back to: T131. Mountain Glaciation and Climate Change of the Past and Present I

<< Previous Abstract | Next Abstract >>