

A combined chemical and Sr-Nd isotopic study on terrigenous supply to the western Arctic Ocean

S. TAKEUCHI¹, Y. ASAHARA^{1*}, N. HARADA²,
J. ONODERA² AND K. NAGASHIMA²

¹ Nagoya University, Nagoya 464-8601, Japan
(* correspondence: asahara@eps.nagoya-u.ac.jp)

² JAMSTEC, Yokosuka 237-0061, Japan

Provenance analysis of lithogenic matter in marine environment provides information about atmospheric and ocean circulations and climate change on continent (e.g. [1–3]). It also figures out a relationship between terrigenous input and biological productivity in ocean (e.g. [4]). In this study, radiogenic Sr and Nd isotopes of suspended matter in the Arctic Ocean were analyzed in order to identify the geographical provenance of terrigenous matter. The samples were suspended particulate matter (SPM) collected in the western part of Canada Basin in the Arctic Ocean (75N, 162W, 180 m depth) for one-year period between October 2010 and September 2011, and the detrital (aluminosilicate) fractions were chemically extracted from the SPM.

The chemical compositions such as REE pattern and Co/Ga ratios and diagrams of $^{87}\text{Sr}/^{86}\text{Sr}-\epsilon_{\text{Nd}}$ and $^{147}\text{Sm}/^{144}\text{Nd}-\epsilon_{\text{Nd}}$ reveal that the SPM detritus is mainly composed of the MacKenzie River material (0.732–0.734; –14 [3]) which is carried by the Beaufort Gyre. The Yukon derived material (0.708–0.709; –9 to –8) and the NE Siberia material (0.711; –9 [3]) also contribute to the SPM. The seasonal variation shows higher $^{87}\text{Sr}/^{86}\text{Sr}$ ratios and lower ϵ_{Nd} values in January–March 2011 and lower $^{87}\text{Sr}/^{86}\text{Sr}$ ratios and higher ϵ_{Nd} values in November 2010 and April–August 2011. Combination of the isotopic and chemical data and the SPM flux suggests that the flux of the Yukon derived material and the NE Siberia material to the Canada Basin increases in November 2010 and April–August 2011. The Chukchi Sea shelf sediments derived mainly from the Yukon River (the Bering Sea) and NE Siberia materials are possibly resuspended and transported to the Canadian Basin by brine rejection, storm-mixing [5] or shelf-break eddies [6] in November 2010 and April–August 2011.

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