

Variation of $\delta^{13}\text{C}$ carbon isotope signatures of particulate organic matter in the Kuzuryu River system in Japan

NAGAO, Seiya^{1*} ; KANAMORI, Masaki² ; ARAMAKI, Takahumi³ ; OCHIAI, Shinya¹ ; YAMAMOTO, Masayoshi¹

¹LLRL, INET, Kanazawa University, ²Grad. School of NST, Kanazawa University, ³National Institute for Environmental Studies

Radioactive and stable isotopes of carbon (^{14}C and ^{13}C) can serve as powerful tools for identifying sources and estimating turnover times of organic matter in aquatic systems. This study discussed with the transport of particulate organic matter in the rivers from a river system with different watershed condition using carbon isotopic signatures.

The Kuzuryu River system is located in Fukui Prefecture in the central part of Japan and consists of a main river, Kuzuryu River and a main tributary of the Hino River. River research was conducted at a fixed station in the Hino River (Fukatani site) and the Kuzuryu River (Nakatsuno site) during June-October in 2010. Suspended solid samples were collected from 130-140 L of river waters using continuous centrifugation. Prior to analysis, inorganic carbonates were removed by adding 0.1 M HCl solution, rinsing with Milli-Qwater, and drying again. Stable carbon isotopic ratio of a sample and the VPDB standard used for normalization were made by analyzing sub-samples of CO_2 gas generated during graphite production using a triple collector mass spectrometer with precision of ± 0.2 ‰ as the $\delta^{13}\text{C}$ value. Radiocarbons were determined using accelerator mass spectrometry at the Japan Atomic Energy Agency. Radiocarbon values were reported as $\Delta^{14}\text{C}$ corrected for sample $\delta^{13}\text{C}$ with absolute error of less than 10 ‰.

$\delta^{13}\text{C}$ of organic matter in riverine suspended solids has -26.3 to -24.0 ‰ for the Kuzuryu River and -27.0 to -26.1 ‰ for the Hino River. The $\Delta^{14}\text{C}$ values of the Kuzuryu and Hino samples are -168 to -87 ‰ and -209 to -143 ‰, respectively. The $\Delta^{14}\text{C}$ values of Hino River depleted in $\Delta^{14}\text{C}$ rather than the Kuzuryu River. The averaged TOC/TN ratio is 9.1 ± 1.1 for the Kuzuryu and 8.2 ± 1.1 for the Hino. There is a positive correlation with the $\Delta^{14}\text{C}$ values and water discharge. These results indicate that the differences in POM character may be explained by the differences in watershed conditions and controlled by water discharge.

Keywords: POC, carbon isotopes, river waters, migration, water discharge