

Downward variation of $\delta^{13}\text{C}$ and $\Delta^{14}\text{C}$ in riverine particulate organic matter at Kumaki River, a small river in Noto Peninsula

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Small rivers and streams have potential significance in the transport of sediments and organic matter, and its export flux is estimated as ~40% of riverine global organic carbon. 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 system. The present study aims to investigate downward variations in the characteristics of riverine particulate organic matter running through forest and paddy field. We selected the Kumaki River located at the central part of the Noto Peninsula in Ishikawa Prefecture, Japan. The river research was monthly conducted at fixed sites of the up-, mid- and down-stream during April 2016-December 2018.

$\delta^{13}\text{C}$ and $\Delta^{14}\text{C}$ values of organic matter in the riverine suspended solids of Kumaki River show the range of -27.2‰ to -25.1‰, and -130 to +3 ‰, respectively. The carbon isotope composition shows three groups corresponding the up-, mid- and down-stream sites at normal flow condition. After rain events, the carbon isotope values are shifted to lower value of $\delta^{13}\text{C}$ and higher value of $\Delta^{14}\text{C}$ at the three sites under higher flow condition. There is a positive correlation between particulate organic carbon concentrations and their $\Delta^{14}\text{C}$ values, and a negative correlation between the $\delta^{13}\text{C}$ and $\Delta^{14}\text{C}$ values at mid and down-stream sites. All data shows downward variation of carbon isotope composition from upstream to downstream. The $\Delta^{14}\text{C}$ values decrease along the river line, but the $\delta^{13}\text{C}$ increased downward in the Kumaki River. The results indicate that particulate organic matter at each sampling site is mainly supplied from each watershed area. The higher contribution from surface forest soil was observed at all sampling sites after rain events. Therefore, water discharge and land use type of the watershed are related to the transport of particulate organic matter in the small river system.

Keywords: stable carbon isotope, radiocarbon, riverine suspended solids