

Study on transport of particulate organic matter in a small river with forest and paddy field by using carbon isotopes ($\delta^{13}\text{C}$ and $\Delta^{14}\text{C}$)

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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. The present study aims to investigate variations in the characteristics of riverine particulate organic matter running through forests and paddy fields, corresponding to a typical Japanese river system. We selected the Kumaki River located in the central part of the Noto Peninsula in Ishikawa Prefecture, Japan. The river research was conducted at a fixed site of the midstream Kumaki River from April 2016 to March 2018.

Total organic carbon and nitrogen content was measured using the elemental analyzer after the 0.1 M HCl treatment to remove inorganic carbonates. ^{14}C measurements were performed by accelerator mass spectrometry. Final ^{14}C activities are reported in $\Delta^{14}\text{C}$. $\delta^{13}\text{C}$ values were determined for sub-samples of the CO_2 gas generated during graphite production, using an isotope ratio mass spectrometer.

$\delta^{13}\text{C}$ and $\Delta^{14}\text{C}$ values of organic matter in the riverine POC of Kumaki River show the range of -27.2‰ to -25.1‰ , and -130 to $+3\text{‰}$, respectively. There are two negative correlations (correlation factor of 0.78) between the $\delta^{13}\text{C}$ and $\Delta^{14}\text{C}$ values at winter and the other season except for summer in July and August in 2017. The results indicate that particulate organic matter is mixed with two end-members such as surface forest soil and paddy field soil.

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