Variations in $\Delta^{14}C$ of POC in Waters from the Upper to Lower Ishikari River

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The dynamics of bulk particulate organic carbon (POC) discharged from rivers is important to understand the role of rivers in global biogeochemical cycles. We have been investigated dynamics of riverine POC at the Ishikari River system, which is 268 km long from the source to mouth and a drainage basin of 14330 km^2, in northern Japan. The Ishikari River has two peaks of water discharge at spring snowmelt and autumn rain events. For better understanding the origin, forms, and fate of POC, it is important to study the characteristics of riverine POC because of its heterogeneous mixtures of organic matter.

This study reports the variations in $\Delta^{14}C$ values of POC at three observation sites from the Upper to Lower Ishikari River during spring to autumn in 2006. Riverine suspended particles were collected with a single-bowl continuous-flow centrifuge. The organic ^{14}C measurements were performed by accelerator mass spectrometry at the Aomori Research Center of Japan Atomic Energy Agency.

Variations in $\Delta^{14}C$ values of riverine POC are different from each station. In the Lower Ishikari, the $\Delta^{14}C$ values were –260 ‰ for the spring snowmelt season, and –148 ~ –122 ‰ for the normal flow condition. On the other hand, POC of the Middle site shows opposite variation trend. The POC had $\Delta^{14}C$ of –47 ‰ and –148 ~ –122 ‰ at the spring snowmelt and low water discharge, respectively. In the upper Ishikari, the $\Delta^{14}C$ values were +19 ‰ for the spring snowmelt season, but –148 and +208 ‰ for the normal flow condition. The variation range of $\Delta^{14}C$ value is in the order of the Middle ≤ Lower < Upper stations during spring to autumn. These results suggest that the sources and supply processes of POC from watershed are different from the Upper, Middle and Lower Ishikari River.

Spatial distribution of $\Delta^{14}C$ values of organic matter in surface sediments off Saru River in southern Hokkaido, Japan

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A variety of geochemical approaches have been employed to define the mixing ratio of marine and terrestrial organic matter. The simultaneous use of $\Delta^{14}C$ and $\delta^{13}C$ values adds a second dimension to isotopic studies of carbon cycling in surface aquatic environments. This study discussed the effects of the flood on the spatial distribution of organic matter at shelf region on the basis of the $\Delta^{14}C$ and $\delta^{13}C$ values. Because transport of organic matter due to flooding is important for the dynamics and flux of organic matter released from terrestrial environment. The surface sediments off the Saru River, southern part of Hokkaido, Japan were collected from twenty sites with a grab sampler in August of 2007, one year after the severe flood in 2006. Suspended particles of the Saru River were concentrated with a single-bowl continuous flow centrifuge in August 2007 and 2008. ^{14}C measurements were performed by accelerator mass spectrometry at the National Institute for Environmental Studies.

The $\Delta^{14}C$ values of organic matter in surface sediments (water depth of 10 to 39 m) off the Saru River range from –665 to –77 ‰. The silt and clay sediments have $\Delta^{14}C$ values of –240 to –77 ‰, but the sandy sediments ranges from –665 to –388 ‰. The $\Delta^{14}C$ values of particulate organic carbon in the Saru River are –292 to –247 ‰ at normal flow condition. The sediments with fine particles deposited by flood events have organic carbon with a mixture of young and older organic carbon. Therefore, these results indicate that surface soil with younger organic matter is deposited by flooding on the sediment off the Saru River and/or freshly produced organic matter in sea surface is deposited after the flooding.