

Carbon isotope composition of riverine particulate organic matter in the Kumaki River system with forest and paddy field in Noto Peninsula, Japan

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River systems play an important role on geochemical processes in watershed and the source of nutrient and organic matter to coastal marine environment. Land-use pattern in river watershed reflects water quality and bioavailable chemical compounds in river waters. Rain and snow events also influence water quality, transport flux and migration behavior of organic matter in river systems. To understand the transport processes and sources of organic matter, researchers have been applied tracers such as C/N ratio, $\delta^{13}\text{C}$, radiocarbon and biomarkers. Carbon isotopic compositions, $\delta^{13}\text{C}$ and $\delta^{14}\text{C}$, are useful tools because of identification of plant types (C3 and C4) and apparent age of organic matter. The purpose of this study is to understand the transport behavior of particulate organic matter (POM) in rivers, which have watershed with abandonment of forest and paddy field in present Japanese watershed condition. The river research was carried out at the Kumaki River system, the Kumaki River and Nishiyachi River during 2009-2011, in the Noto Peninsula, Japan. We set up at three sites (headwater, upper and middle reaches) of the Kumaki River and at three sites in the Nishiyachi River of the main tributary. Riverine suspended solids were separated from 60-90 L river waters using continuous flow centrifugation method. $\delta^{13}\text{C}$ values range from -28.5 to -24.8‰ for the organic matter in riverine suspended solids and river bottom sediments. The $\delta^{14}\text{C}$ values are 86 to 97‰ at the headwater site, -5 to 34‰ at the upper site and -18 to -64‰ at the middle site. The $\delta^{14}\text{C}$ of POC decreases from the headwater to the middle sites at the Kumaki River. POC content is 3.9 to 21%, and C/N ratio ranges from 9 to 19. These parameters also show downward decreasing trend in the river line. Similar downward variations were found in the Nishiyachi River but little bit different correlation with $\delta^{13}\text{C}$ and $\delta^{14}\text{C}$. Land-use pattern in the Kumaki River watershed is occupied by forest in the upper area and by paddy field along the middle and lower river area. These results indicate that paddy field in the middle and lower watershed area in the Kumaki River system has main sources of POM exported to the coastal marine environments.

Keywords: Radiocarbon, stable carbon isotope, suspended solids, terrestrial organic matter