Tracing source contributions to radiocesium contaminated sediment with carbon and nitrogen stable isotope ratios and elemental concentrations

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After broad-scale decontamination following the FDNPP accident, one important research question is whether there is, or may be, a downstream transfer of radiocesium from forests that covered over 65% of the most contaminated region. Accordingly, carbon and nitrogen elemental concentrations and stable isotope ratios are used to quantify the relative contributions of forests and rice paddies to transported sediment in three contaminated coastal catchments. Samples were taken from the three main identified sources: cultivated soils (rice paddies and fields, n=30), forest soils (n=45), and subsoils (channel bank and decontaminated soils, n = 25). Lag deposit sediment samples were obtained from five sampling campaigns that targeted the main hydrological events from November 2011 to November 2014. In total, 86 samples of deposited sediment were analyzed for particulate carbon and nitrogen elemental concentrations and isotope ratios, 24 from the Mano catchment, 44 from the Niida catchment, and 18 from the Ota catchment. The discriminant tracers were modelled with a concentration-dependent distribution mixing model. Preliminary results indicate that cultivated sources (predominantly rice paddies) contribute disproportionately more sediment per unit area than forested regions in these contaminated catchments. Moreover, forested landscapes were indeed a source of contaminated sediment. Understanding these sources will be important for managing post-fallout radiocesium contamination in the Fukushima Prefecture.