Geophysical Research Abstracts
Vol. 18, EGU2016-8029, 2016
EGU General Assembly 2016

Quantifying sediment source contributions in coastal catchments impacted by the Fukushima nuclear accident with carbon and nitrogen elemental concentrations and stable isotope ratios

J. Patrick Laceby (1), Sylvain Huon Huon (2), Yuichi Onda (3), and Olivier Evrard (1)

(1) CNRS, Laboratoire des Sciences du Climat et de l'Environnement (LSCE), Gif-sur-Yvette Cedex, France (placeby@lsce.ipsl.fr), (2) Université Pierre et Marie Curie, UMR 7618, iEES Paris, (3) Center for Research in Isotopes and Environmental Dynamics, University of Tsukuba

The Fukushima Dai-ichi Nuclear Power Plant accidental release of radioactive contaminants resulted in the significant fallout of radiocesium over several coastal catchments in the Fukushima Prefecture. Radiocesium, considered to be the greatest risk to the short and long term health of the local community, is rapidly bound to fine soil particles and thus is mobilized and transported during soil erosion and runoff processes. As there has been a broad-scale decontamination of rice paddy fields and rural residential areas in the contaminated region, one important long term 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 determine 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 October 2011 to October 2014. In total, 86 samples of deposited sediment were analyzed for particulate organic matter elemental concentrations and isotope ratios, 24 from the Mano catchment, 44 from the Niida catchment, and 18 from the Ota catchment. Mann-Whitney U-tests were used to examine the source discrimination potential of this tracing suite and select the appropriate tracers for modelling. 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. Future research will examine if there are areas in particular where forest sources have elevated concentrations and may require some attention in the decontamination and monitoring of potential radiocesium downstream transfers.