

Sediment transfer in coastal catchments exposed to typhoons: lessons learnt from catchments contaminated with Fukushima radioactive fallout

Olivier Evrard, J. Laceby, Yuichi Onda, Irène Lefevre

► **To cite this version:**

Olivier Evrard, J. Laceby, Yuichi Onda, Irène Lefevre. Sediment transfer in coastal catchments exposed to typhoons: lessons learnt from catchments contaminated with Fukushima radioactive fallout. EGU General Assembly 2016, Apr 2016, Vienne, Austria. pp. EGU2016-7215. cea-02666875

HAL Id: cea-02666875

<https://hal-cea.archives-ouvertes.fr/cea-02666875>

Submitted on 31 May 2020

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Sediment transfer in coastal catchments exposed to typhoons: lessons learnt from catchments contaminated with Fukushima radioactive fallout

Olivier Evrard (1), J. Patrick Lacey (1), Yuichi Onda (2), and Irène Lefèvre (1)

(1) Laboratoire des Sciences du Climat et de l'Environnement (LSCE/IPSL), Unité Mixte de Recherche 8212 (CEA/CNRS/UVSQ), Université Paris-Saclay, Gif-sur-Yvette, France (olivier.evrard@lsce.ipsl.fr), (2) Center for Research in Isotopes and Environmental Dynamics (CRIED), University of Tsukuba, Tsukuba, Japan

Several coastal catchments located in Northeastern Japan received significant radioactive fallout following the Fukushima nuclear accident in March 2011, with initial ^{137}Cs activities exceeding 100 kBq m^{-2} . Although radiocesium poses a considerable health risk for local populations, it also provides a relatively straightforward tracer to investigate sediment transfers in catchments exposed to spring floods and heavy typhoons in late summer and early fall.

This study focused on two catchments (the Niida and Mano Rivers) covering a surface area of 450 km^2 that drain the main radioactive plume. A database of radiocesium activities measured in potential source samples ($n=260$) was used to model radiocesium dilution in 342 sediment deposit samples collected at 38 locations during 9 different sampling campaigns conducted every 6 months from Nov. 2011 to Nov. 2015. The dilution of the initial radiocesium contamination in sediment was individually calculated for each of the 342 samples using a distribution model. Results show that the proportion of heavily contaminated sediment increased from 27% to 39% after the occurrence of typhoons in 2013 (with rainfall amount exceeding 100 mm in 48 hours) and from 29% to 45% after the 2015 spring floods, illustrating the occurrence of soil erosion and resuspension of contaminated material stored in the river channel. In contrast, the occurrence of a very strong typhoon in September 2015 (up to 450 mm in 48h) led to the dilution and the flush of the contamination to the Pacific Ocean, with the proportion of heavily contaminated material decreasing from 45 to 21%.

This case study in catchments impacted by the Fukushima accident illustrates their high reactivity to both human activities and rainfall. These results will improve our understanding of sediment transfers in similar coastal mountainous environments frequently exposed to heavy rainfall.