Impact of the 2019 typhoons on sediment source contributions and radiocesium concentrations in rivers draining the Fukushima radioactive plume, Japan

Olivier Evrard[1], Roxanne Durand[1], Atsushi Nakao[2], J. Patrick Laceby[3], Irène Lefèvre[1], Yoshifumi Wakiyama[4], Seiji Hayashi[5], Cécile Asanuma-Brice[6,7], Olivier Cerdan[8]

[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.
[2]Graduate School of Life and Environmental Sciences, Kyoto Prefectural University, Kyoto, Japan.
[3]Alberta Environment and Parks (AEP), Calgary, Alberta, Canada.
[4]Institute of Environmental Radioactivity (IER), University of Fukushima, Fukushima, Japan.
[5]National Institute for Environmental Science (NIES), Fukushima Branch, Miharu, Japan.
[6]CNRS, IFRJ-UMIFRE 19 - MFJ, Tokyo, Japan.
[7]Center for Japanese Studies (CRJ-Centre de Recherche sur le Japon) UMR 8173 - EHESS, Paris, France.
[8]Bureau de Recherches Géologiques et Minières (BRGM), Orléans, France.

Correspondence to: Olivier Evrard, CEA Saclay, LSCE – Orme des Merisiers – bat. 714, 91 191 Gif-sur-Yvette Cedex, France (tel. 00 33 1 69 08 27 96; olivier.evrard@lsce.ipsl.fr).

Supplementary Material

S1. Preparation of soils for recultivation in the Niida River catchment (picture taken by the authors on 26th March 2019). The dark-coloured residual initial soil profile is ploughed with the upper yellow-coloured crushed granite layer to allow recultivation of the soil.

S2. Box-plots of the potential discriminant properties analysed in both sources (i.e. soils) and sediment collected in the Mano Niida Rivers.

See uploaded zip file.

S3. Mean modelled source contributions to sediment collected in the Mano and Niida Rivers in October 2019. The last three samples outlined in grey correspond to the results obtained for material collected in forest landslide areas (similar to that shown in Figure S4).

		Mean source contributions to sediment (%)		
Sample	Catchment	Cropland	Forest	Subsoil
FML-1444	Mano	32.2	43.7	24.1
FML-1446	Mano	99.8	0.1	0.1
FML-1446B	Mano	75.3	24.6	0.1
FML-1447	Mano	61.5	38.4	0.1
FML-1448	Mano	50.4	34.6	15.0
FML-1449	Mano	43.7	56.2	0.1
FML-1470	Mano	86.2	13.7	0.1
FML-1471	Mano	71.6	28.3	0.1
FML-1472	Mano	61.5	38.4	0.1
FML-1473	Mano	0.1	59.8	40.1
FNL-1450	Niida	75.1	14.4	10.5
FNL-1451	Niida	50.1	49.8	0.1
FNL-1452	Niida	62.0	37.9	0.1
FNL-1453	Niida	49.8	50.1	0.1
FNL-1454	Niida	53.5	46.4	0.1
FNL-1455	Niida	92.1	7.8	0.1
FNL-1456	Niida	67.5	32.4	0.1
FNL-1458	Niida	57.3	42.2	0.5
FNL-1459	Niida	57.7	42.2	0.1
FNL-1460	Niida	19.8	80.1	0.1
FNL-1461	Niida	0.1	99.8	0.1
FNL-1465	Niida	0.1	70.2	29.7
FNL-1466	Niida	59.5	40.4	0.1
FNL-1467	Niida	75.4	24.5	0.1
FNL-1468	Niida	61.5	38.4	0.1
FNL-1469	Niida	40.2	59.7	0.1
FNS-1462	Niida	0.1	58.8	41.1
FNS-1463	Niida	0.1	33.9	66.0
FNS-1464	Niida	0.1	12.2	87.7

S4. Forest landslide triggered by typhoon Hagibis in the Niida River catchment (picture taken by the authors on the 30th October 2019). A lot of mobilized material is deposited at the footslope.