Geophysical Research Abstracts
Vol. 21, EGU2019-7999, 2019
EGU General Assembly 2019

Potential of spectrocolorimetry to trace sediment sources in coastal catchments draining the main Fukushima radioactive pollution plume (2011–2018)

Olivier Evrard (1), Roxanne Durand (), Anthony Foucher (), Tales Tiecher (), Virginie Sellier (), Yuichi Onda (), Irène Lefèvre (), Olivier Cerdan (), and J. Patrick Laceby ()

(1) CNRS-LSCE, Gif-sur-Yvette, France (olivier.evrard@lsce.ipsl.fr), (2) Department of Soil Science, Federal University of Rio Grande do Sul (UFRGS), Porto Alegre, RS, Brazil, (3) Center for Research in Isotopes and Environmental Dynamics (CRIED), University of Tsukuba, Tsukuba, Japan, (4) Bureau de Recherches Géologiques et Minières (BRGM), Orléans, France, (5) Environmental Monitoring and Science Division, Alberta Environment and Parks, Calgary, Alberta, Canada

Spectrocolorimetric properties provide a quick, low-cost and non-destructive alternative to the measurement of geochemical and organic matter parameters. Their potential to discriminate between forest, cultivated and subsoil sources was tested in soils and sediment collected in coastal catchments draining the main radioactive pollution plume of Fukushima Prefecture, Japan.

Fifteen spectrocolorimetric properties were determined in potential source (n=37) and sediment (n=400) samples collected during 13 campaigns from 2011–2017 in two catchments (covering a total surface area of 450 km^2) draining the main radioactive pollution plume. Potential sources included topsoil from forest and cropland sources along with subsoil material originating from landslides, channel banks and the decontamination of cultivated areas. The optimum set of parameters used in the mixed linear model to calculate the sediment source contributions was obtained through the use of a range test, the Kruskal-Wallis H-test, and a linear discriminant analysis.

Nine colour parameters correctly classified 100% of the source samples (forest, subsoil and cultivated sources). The results illustrate that cultivated landscapes were the main source of sediment to these river systems (mean 56%, SD 34%) followed by subsoil (mean 26%, SD 16%) and forest sources (mean 21%, SD 24%). However, these contributions strongly varied over time, with a peak of subsoil contributions (mean 57%, SD 17%) in Fall 2015, coinciding with the occurrence of a typhoon after the remediation works.

These original results demonstrate that spectrocolorimetric measurements provide a powerful tool for the monitoring of the effectiveness of remediation works in this post-accidental context.