



HAL
open science

Tracing the sources of fine sediment in a nickel mining catchment using fallout and geogenic radionuclides (Thio River, New Caledonia)

Olivier Evrard, O. Navratil, Irène Lefèvre, Patrick Laceby, Michel Allenbach

► To cite this version:

Olivier Evrard, O. Navratil, Irène Lefèvre, Patrick Laceby, Michel Allenbach. Tracing the sources of fine sediment in a nickel mining catchment using fallout and geogenic radionuclides (Thio River, New Caledonia). EGU General Assembly 2016, Apr 2016, Vienne, Austria. pp. EGU2016-7155, 2016. cea-02666867

HAL Id: cea-02666867

<https://cea.hal.science/cea-02666867>

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.



Distributed under a Creative Commons Attribution| 4.0 International License



Tracing the sources of fine sediment in a nickel mining catchment using fallout and geogenic radionuclides (Thio River, New Caledonia)

Olivier Evrard (1), Oldrich Navratil (2), Irène Lefèvre (1), J. Patrick Lacey (1), and Michel Allenbach (3)

(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) Laboratoire Environnement-Ville-Société (UMR 5600), Université Lumière Lyon 2, Lyon, France, (3) LIVE- EA 4243, Université de Nouvelle-Calédonie, Nouméa, Nouvelle-Calédonie, France & LABEX Corail

Soil erosion and subsequent sediment transfer in rivers are exacerbated in tropical regions exposed to heavy rainfall. In New Caledonia, an island located in the southwestern part of the Southern Pacific Ocean, a significant fraction of this sediment is likely originating from tributaries draining nickel mining sites that are known to increase the terrigenous inputs to the rivers and, potentially to UNESCO World Heritage listed coastal lagoons. However, downstream contributions from these tributaries remain to be quantified.

A pilot sediment tracing study has therefore been conducted in the 400-km² Thio River catchment. Fallout and geogenic radionuclides have been measured in sediment deposits collected in potential sources, i.e. (i) tributaries draining mines, (ii) tributaries draining 'natural' areas affected by landslides, and (iii) the main stem of the Thio River.

Thorium-228 and Caesium-137 provide the best discrimination between sediment originating from the two tributaries. A distribution modelling approach was used to quantify the relative sediment contributions from these tributaries to the Thio River main stem. Results demonstrate that tributaries draining mining sites supply the majority of sediment (67–84%) to the main river.

In the future, the validity of these results obtained on sediment deposits collected in April and May 2015 should be verified over a longer time period by applying a similar approach to sediment cores collected in the Thio river deltaic plain. Once validated, this method will be applicable to other catchments draining mines in New Caledonia to design appropriate measures to limit sediment supply to the lagoon.