Goldschmidt 2023 Abstract
https://doi.org/10.7185/gold2023.19228

Transport of arsenic and trace metals in the Orbiel River downstream the Salsigne mining district (Aude, France): sources, dynamics and fluxes during floods

LALI CARRIÈRE[1], ELÉONORE RESONGLES[1], MARIE HEYDON[2], JÉRÔME VIERS[2], EVA SCHRECK[2], RÉMI FREYDIER[1], PIERRE MARCHAND[1], MAURICE GUILLIOD[1], AURÉLIEN DOMEAU[1], MYLÈNE MARIE[1], SOPHIE DELPOUX[1], CAROLE CAUSSERAND-FABBRO[2], ALAIN PAGES[3], PIERRE HORGUE[4], HÉLÈNE ROUX[4], PHILIPPE BEHRA[5] AND CORINNE CASIOT[1]

[1]HydroSciences Montpellier, Université de Montpellier, CNRS, IRD

[2]Géosciences Environnement Toulouse (GET), Université de Toulouse, CNRS, IRD

[3]Observatoire Midi-Pyrénées (OMP), Université de Toulouse

[4]Institut de Mécanique des Fluides de Toulouse (IMFT) - Université de Toulouse, CNRS-INPT-UPS

[5]Laboratoire de Chimie Agro-industrielle, LCA, Université de Toulouse, INRAE

Presenting Author: lali.carriere@etu.umontpellier.fr

Flood events are important vectors for the dissemination of metals and metalloids from former mines into the hydrosystem. These flood events can be extreme (flash floods), especially in Mediterranean areas, where they make the management of old-mining sites very difficult.

In this study, the arsenic and metal transport during floods in the Orbiel River, downstream the ancient gold mine of Salsigne (Aude, France), was investigated. High-resolution sampling was carried out at three stations during four floods in autumn 2021 and spring 2022. River flow data were obtained from a monitoring station together with public database. Rainfall data were extracted from gauging station information and precipitation radar charts. Dissolved and particulate As and metal concentrations were determined in samples collected at an hourly frequency during these floods. Enrichment factors were calculated. A preliminary assessment of metal(loids) fluxes during these events was estimated. The As and metal dynamics during these floods was interpreted with respect to precipitations, *i.e.* location, intensity, and flow rate variations in the Orbiel River and its tributaries. Arsenic and metal sources were investigated using geochemical signatures.

The concentrations of As, which is the contaminant of the greatest concern in this area, reached ~30 µg/L in the dissolved phase and ~200 mg/kg in the particulate phase during the floods, at the most downstream station. Several geochemical signatures were evidenced, both in the dissolved and particulate phases, suggesting the contribution of different sources. A significant variability of As and metal concentrations dynamics was noticed between both flood events, with respect to the intensity, duration and location of the precipitations. Dissolved As flux during the four sampled floods was estimated at 77 kg, which represents a contribution of about 15% of the annual dissolved As flux.

Finally, in this work, we will show the importance of understanding hydrological dynamics during floods in mine-impacted rivers to interpret the short-term variations in dissolved and particulate As and metal concentrations, but also to unravel the potential contribution of different sources.