Geophysical Research Abstracts
Vol. 20, EGU2018-16371, 2018
EGU General Assembly 2018

Origin and historical inputs of suspended particulate matter from the Rhône tributaries: use of the non-reactive geochemical signature of particles.

Celine Begorre (1), Aymeric Dabrin (1), Matthieu Masson (1), Ghislaine Grisot (1), Lysiane Dherret (1), Frédérique Eyrolle-Boyer (2), Alain Veron (3), Brice Mourier (4), and Marina Coquery (1)

(1) Irstea, UR RiverLy, centre de Lyon-Villeurbanne, 5 rue de la Doua CS 20244, 69625 Villeurbanne, France, (2) Institut de Radioprotection et de Sureté Nucléaire (IRSN), PSE-ENV, SRTE/LRTA, BP 3, Saint-Paul-lez-Durance, France, (3) CEREGE, Aix-Marseille Univ., CNRS, IRD, Coll de France, Europôle Méditerranéen de l'Arbois, BP80, Aix en Provence Cedex 04, France, (4) Université de Lyon, UMR5023 Laboratoire d'Ecologie des Hydrosystèmes Naturels et Anthropisés, Université Lyon 1, ENTPE, CNRS, 3, rue Maurice Audin, 69518 Vaulx-en-Velin, France

Suspended particulate matter (SPM) flows in rivers are mainly due to soil erosion and anthropogenic activities. They contribute to the transport of a large amount of contaminants and can induce impacts on water quality and river ecosystem. To better manage these inputs in river systems, it is essential to identify the origin of sediments. In that way, SPM fluxes monitoring or fingerprinting approaches in rivers are increasingly addressed. In the frame of the Rhône sediment observatory (OSR) program, the Rhône River, which is the main sediment input to the Mediterranean Sea, is studied through several stations of measurement. Since 7 years, SPM were collected on the Rhône River and its tributaries for contrasting hydrological conditions allowing developing fingerprinting approaches. The aims of this study were to use major and trace element concentrations in the conservative fraction of SPM from the Rhône and its tributaries in order (i) to determine the actual relative contribution of SPM fluxes, with uncertainty, from tributaries to the Rhône River and (ii) to determine the historical SPM inputs of the tributaries by applying this approach on a sediment core. To determine the origin of sediment at given time and space, the use of conservative parameters is essential to avoid any tracer's transformations during particles transport. To assess element concentrations in the conservative fraction of SPM, samples were extracted by a total mineralization (HNO_3, HCl, HF) and a soft extraction (HCl 1M). The discrimination of SPM and sediment sources were realized by using a Kruskal-Wallis test and a Discriminatory Factory Analysis to select element concentrations that could discriminate the main tributaries of the Rhône (Ain, Arve, Bourbre, Fier, Guiers, Saône, Isère, Durance). 17 discriminant elements were then integrated into a mixing model with uncertainty analysis using the Monte Carlo method. Our method allowed to correctly determining SPM origin in the Upper Rhône and downstream the confluence of the Rhône and Saône rivers, for contrasting hydrological conditions. These results were successfully confronted to SPM dynamics estimated by a hydro-sedimentary 1-D model or by using SPM and discharges data obtained via the OSR stations network. Determination of the SPM origin at the outlet of the Rhône is in progress in order to, first, integrate tributaries signatures from the downstream part of the Rhône and, second, to apply this method on a sediment core sampled at the outlet of the Rhône River. The results of the core analyses will allow defining a historical profile of sediment inputs at the outlet of the Rhône catchment.