

Historical records of suspended particulate matter origin in the Rhône River (France) using the non-reactive geochemical signature of particles

BEGORRE, C¹, DABRIN, A¹, EYROLLE, F², MOURIER, B³, GRISOT, G¹, DHERRET, L¹, MASSON, M¹, COQUERY, M¹

¹ Irstea, UR RiverLy, centre de Lyon-Villeurbanne, 5 rue de la Doua CS 20244, 69625 Villeurbanne, France

² IRSN, PSE-ENV, SRTE/LRTA, BP 3, Saint-Paul-lez-Durance, France

³ Université de Lyon 1, UMR5023 LEHNA, ENTPE, CNRS, 3, rue Maurice Audin, 69518 Vaulx-en-Velin, France

Suspended particulate matter (SPM) conveyed by rivers contribute to the transport of numerous contaminants that can affect water quality through their desorption from particles or during diagenesis processes. In order to assess to SPM deliveries and associated contaminants to the Rhône River then to the Mediterranean Sea, it is essential to identify SPM sources at the scale of the whole Rhône watershed.

We present a first study on the determination the historical SPM inputs from the tributaries in the Upper Rhône River. We apply an original geochemical mixing model onto two sediment cores collected in a same deposit area. To prevent chemical transformations which can occur during particles transport and after settlement of SPM, we use concentrations of key trace elements in the conservative fraction of SPM. Data acquired were integrated into a mixing model coupled to Monte Carlo simulation to assess uncertainties. In addition, the spatial heterogeneity was scrutinized using data from both sediment cores.

To improve accuracy and precision of historical sediment source contributions, we compared mixing model data output using geochemical signatures of SPM from the various samples and from well characterizes flood events. Finally, historical sediment source contributions were compared to hydrological time series and SPM deliveries to the Rhone River.