



Consequences of a dam flushing operation on concentration and fluxes of suspended sediment and associated contaminants in the Rhône River

Hugo Lepage (1), Marina Launay (2), Frédérique Eyrolle (1), Jérôme Le Coz (2), Olivier Radakovitch (1,3), Marina Coquery (2), and Hélène Angot (2)

(1) IRSN, Research laboratory on radionuclide transfers in aquatic ecosystems, St Paul lez durance, France (hugo.lepage@irsn.fr), (2) IRSTEA, UR RiverLy, centre de Lyon-Villeurbanne, 69625 Villeurbanne, France , (3) CEREGE, University of Aix-Marseille, UM34, Aix en Provence, France

The increasing need on energy and fluvial transport due to industrialization during the last century resulted in the construction of infrastructures along rivers, as dams or sluices. Thus, nineteen hydro-electrical dams were built along the Rhône River (France) since 1950. To improve the production of electricity and avoid problems due to sediment storage within these infrastructures, dam flushing operations are organized periodically. It has been demonstrated by numerous studies that several contaminants are strongly fixed to suspended particulate matters (SPM), especially the finest, and may be dispersed during flushing operations. Investigations were conducted in the upper Rhône River to evaluate the impact of dam flushing operations on suspended sediment and associated contaminants (metals, organic contaminants and radionuclides) concentrations and fluxes. The releases took about three weeks in June 2012, and almost fifty suspended sediment samples were collected at six stations along the upper Rhône River. Results demonstrated that suspended sediment concentration and flux were very high in the vicinity of the dam, but most of the sediments were stored in the upper part of the river. Thus, fluxes registered at other stations (approx. 100km downstream) were similar to those observed during flood events. For most of the contaminants (Polychlorobiphenyls-101 (PCB101), Cu, Hg ...), concentrations were lower during dam flushing periods than during flood events or normal flow condition. This difference could be explained by particulate organic carbon (POC) concentrations that were also lower. Only Benzo[a]Pyrene had concentrations significantly higher (+ 50%). Spatial trends demonstrate an increase for all contaminants at the exception of PCB101 that remained constant with distance from upstream dams. Those variations may be related to POC, particle sizes, or additional source of contaminants such as industries or other tributaries. Finally, dam flushing fluxes of contaminants were similar to flood-related fluxes and represent a non-negligible part of the annual fluxes. In 2012, 36% of the annual flux of sediments were transported during this flushing event.