



Seasonal variability of suspended sediment transport in the Seine river catchment area (France)

Christine Franke (1), Selma Baati (2), Sophie Ayrault (3), Philippe Bonté (3), Olivier Evrard (3), and Catherine Kissel (3)

(1) Mines ParisTech, Centre des Geosciences, 77305 Fontainebleau Cedex, France (christine.franke@mines-paristech.fr), (2) Ecole Nationale des Pont et Chaussées, 6-8 av. Blaise-Pascal, Cité Descartes, 77455 Champs-sur-Marne Cedex 2, France, (3) Laboratoire des Sciences du Climat et de l'Environnement (LSCE), CEA-CNRS-UVSQ, Campus du CNRS, Bat. 12, Avenue de la Terrasse, 91198 Gif-sur-Yvette Cedex, France

This study consists in an innovative application of environmental physico-chemical techniques on fluvial sediments with the aim to trace the seasonal changes in suspended sediment transport of the complex Seine river catchment area in northern France. The aim of this project is to develop a detailed understanding for the discrimination of naturally triggered and anthropogenic induced processes and their temporal changes with weather conditions. With a focus on the heavy metal fraction, we determine the regional distribution of the suspended material and search for environmental fingerprints demonstrating the influence of fluvial transport mechanisms, changes in concentration related to discharge variations or different sediment sources, and in-situ alteration caused by variations in the geochemical conditions (oxy-redox, pH, Eh, etc.). To achieve these goals, we apply a combination of straightforward rock magnetic hysteresis measurements (performed using an AGM2900 at the LSCE) and advanced scanning electron microscopy analyses (SEM). This interdisciplinary approach allows refining the detailed analysis of sediment trap samples, originating from Tessier et al. (2003), as recently shown by Franke et al. (2009).

In our preliminary results, we observe a general increase in magnetic concentrations from summer to winter conditions, coupled with a magneto-mineralogic change to rather reduced metallic mineral phases. However, each riversection of the Seine system shows its specific trend line depending on the regional initial input, weathering conditions, drainage area and potential pollution sources. A systematic analysis of the detailed results will allow highlighting the climatic/seasonal influence on the metallic particle assembly.

Keywords:

Seine river system, environmental magnetism, suspended particulate matter, anthropogenic and natural input, magnetic hysteresis, scanning electron microscopy (SEM), heavy metal pollution, seasonal variability

References:

Franke, C., Kissel, C., Robin, E., Bonté, P. and Lagroix, F., 2009, Magnetic particle characterization in the Seine river system: Implications for the determination of natural versus anthropogenic input, *Geochem. Geophys. Geosyst.*, doi:10.1029/2009GC002544.

Tessier, L., Bonté, P., Mouchel, J.M., Lefevre, I., Sogon, S., Ayrault, S., Le Cloarec, M.F., 2003, Transport et caractérisation des matières en suspension dans le bassin de la Seine : Identification des signatures naturelles et anthropiques, 14èmes Journées Scientifiques de l'Environnement : l'Eau, la Ville, la Vie, Créteil : France 2003. <http://hal.archives-ouvertes.fr/docs/00/20/30/84/PDF/4-JSE-2003-Manuscrit-Tessier-HAL-2008-01-08.pdf>