



	<b>Experiment title:</b> Characterization of Zn contamination in suspended matter of the Orge watershed by coupling isotopic and EXAFS approaches	<b>Experiment number:</b> 30-02-1037
<b>Beamline:</b> BM30b	<b>Date of experiment:</b> from: 07/09/2012 to: 11/09/2012	<b>Date of report:</b> 26/03/2013
<b>Shifts: 15</b>	<b>Local contact(s):</b> Isabelle Kieffer	<i>Received at ESRF:</i>
<b>Names and affiliations of applicants (* indicates experimentalists):</b> Pierre Le Pape* (UMR 8148 IDES UPS11-CNRS / UMR 8212 LSCE CEA-CNRS-UVSQ / IPSL) Sophie Ayrault* (UMR 8212 LSCE CEA-CNRS-UVSQ / IPSL) Guillaume Morin (UMR 7590 IMPMC CNRS-UPMC-IRD) Alexandre Gélabert*(UMR 7154 LGE CNRS-UP7-IPGP) Caroline Bonnot* (UMR 7154 LGE CNRS-UP7-IPGP)		

## Report:

EXAFS bulk measurements were performed at the Zn-K-Edge on suspended particulate matter (SPM) of the Orge River. The EXAFS spectra obtained were processed with a linear combination fit analysis, using a large set of reference, and considering both the microscopic observations and the results of a previous study achieved in the Seine River (Priadi et al., 2012)

The results indicate that ferrihydrite is an important Zn-bearing phase in all the investigated samples, as it was previously shown for the Seine River.

Moreover, the experiments permitted to highlight contrasted patterns in zinc solid speciation in the SPM of the Orge River as a function of river hydrology. Indeed, when the river was sampled under high water flow conditions, zinc was found to be structurally associated with clays and sorbed on calcite, which is consistent with the preponderance of those mineralogical phases in river when the river flow increases. Zn was also identified in metal alloys in this context, which certainly come from rainfall runoff on urban surfaces.

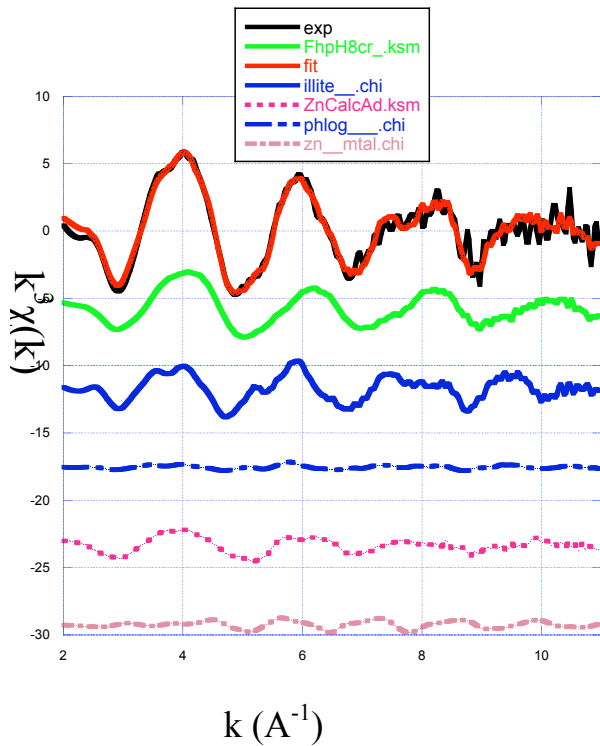
In contrast, under low water flow conditions, the Zn speciation pattern was found to be more complex, and more dependent of the sampling location in the catchment. At the most natural site, where a floodplain is still present, zinc was found to be associated with amorphous silica, which models the association between zinc and biomass (diatom tests). At the most urbanized site, where the river is channeled, zinc was found to be associated with phosphated organic matter (Zn-phytate). Those results under low water flow are consistent with both the occurrence of algae blooms including diatoms and with the release of organic matter from the sewage systems for Zn associated with phosphated organic matter, respectively.

These first results were reported at the PIREN-Seine program in December 2012 (see the link below – report written in French) and a publication is in preparation.

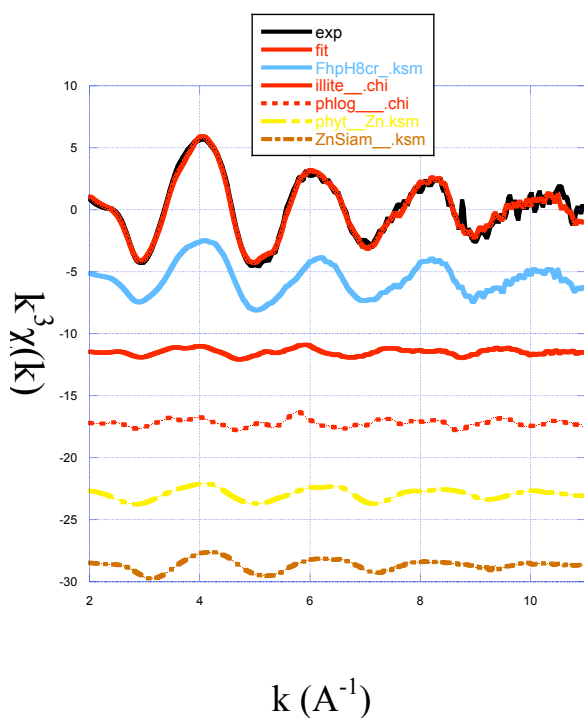
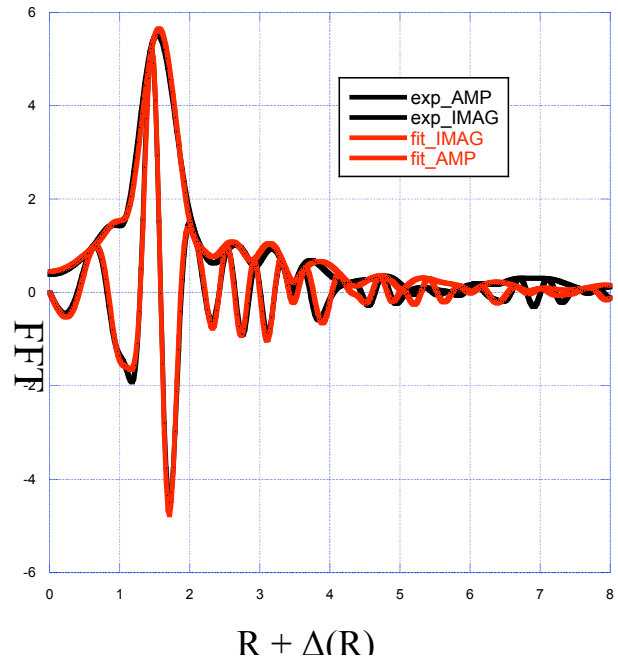
[http://www.sisyphes.upmc.fr/piren/webfm\\_send/1111](http://www.sisyphes.upmc.fr/piren/webfm_send/1111)

A quick summary of the obtained results is provided below:

$\pm 10\%$	Zn/Fh	Zn(0)	Zn/calcite	Zn-clays	Zn/phytate	Zn/amSi	total
<b>High water flow</b>	46	16	28	25	0	0	115
<b>Low water flow</b>	59	0	0	14	19	21	113



### High Water Flow



### Low Water Flow

