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|  | Experiment title: Iron and manganese speciation in New Caledonia mangroves. Mining impact vs. natural background. | Experiment number: EC 1077 |
| Beamline: BM23 | Date of experiment: from: 20 Feb 2013 to: 26 Feb 2013 | Date of report: Sep 3, 2013 <i>Received at ESRF:</i> |
| Shifts: 18 | Local contact(s): Manuel Munoz | |
| Names and affiliations of applicants (* indicates experimentalists): Guillaume Morin* Farid Juillot Vincent Noël* Sandy Ardo* Jesssica Brest* IMPMC – UMR 7590 – CNRS – UPMC- IRD - 4 place Jussieu, 75252 Paris Cedex 05 | | |

Report:

This experiment was aiming at determining Fe and Mn speciation using XANES and EXAFS analysis of a well-characterized set of mangrove sediment samples from New Caledonia. The selected samples are representative of the ecological and redox diversity of this complex ecosystem. Particular emphasis is put on the effect of mining inputs to the mangrove sediments. These informations will help understanding the role of physicochemical as well as ecological parameter on the capacity of mangroves to act as a buffer zone against metal contaminations.

XANES and EXAFS data were recorded at the iron K-edge in transmission detection mode in the natural and synthetic samples used as model compounds for Linera combination fitting analysis.

The capabilities of the beamline also offered the opportunity to complete this set of data with the recording of Ni K-edge EXAFS data in fluorescence detection mode using a 13 elements Ge array detector. This option was chosen instead of studying the Mn K-edge because of the potential novelty of the results that we could obtain on the Ni K-edge in such geochemical environments as mangroves. Indeed, the study of Ni in the studied samples was already planned for future XAS experiments, based on SEM, XRD and selective extraction data.

Examples of Fe and Ni K-edge EXAFS data for synthetic Fe and Ni sulfide model compounds mineral species are presented in Figure 1.

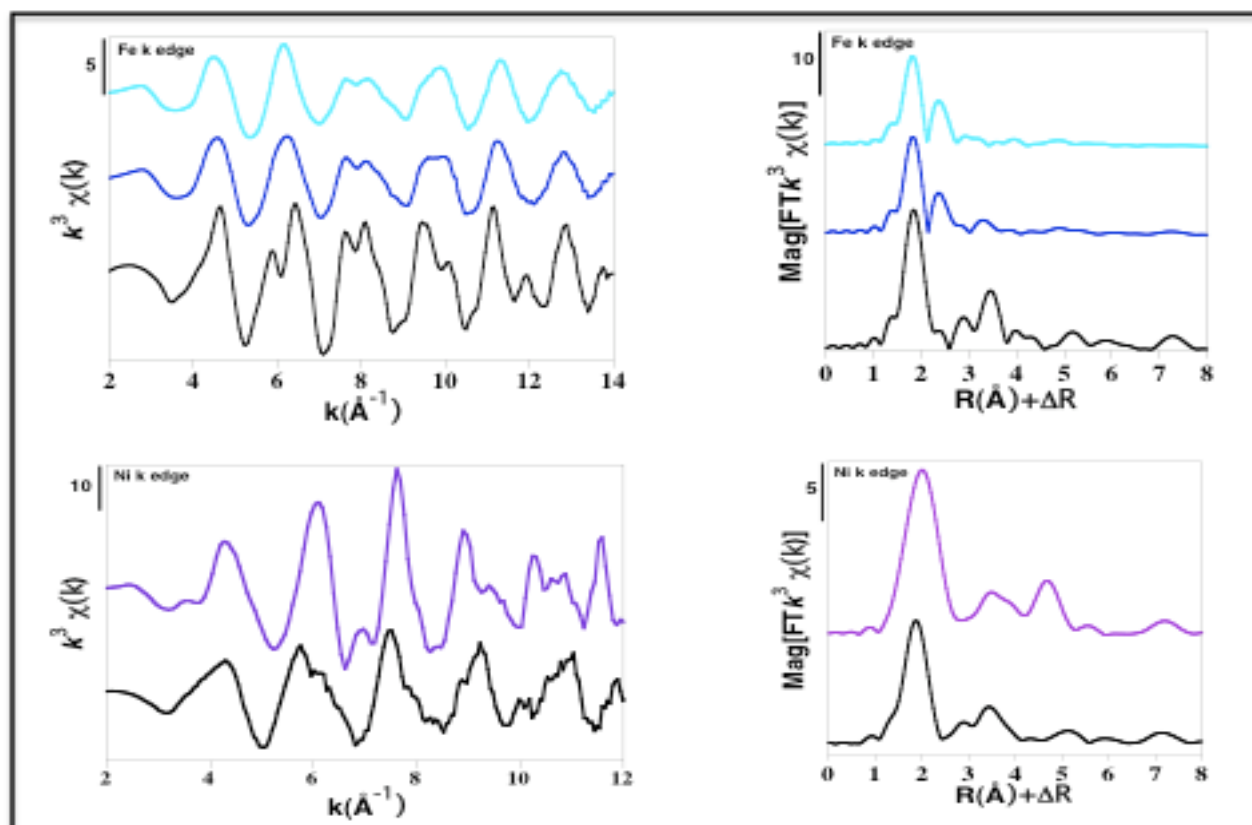


Figure 1. EXAFS spectra Fe and Ni sulfides reference minerals at Fe K-edge and Ni K-edge.

Results of Linear Combination fitting of Ni K-edge EXAFS data for mangrove sediment samples from New Caledonia are shown in Figure 2. A large set of model compounds were recorded at the Ni K-edge during this beamtime, which are used as fitting components.

These data are part of an article in preparation, and which will address the biogeochemical cycling of trace metals in mangrove sediments from New Caledonia.

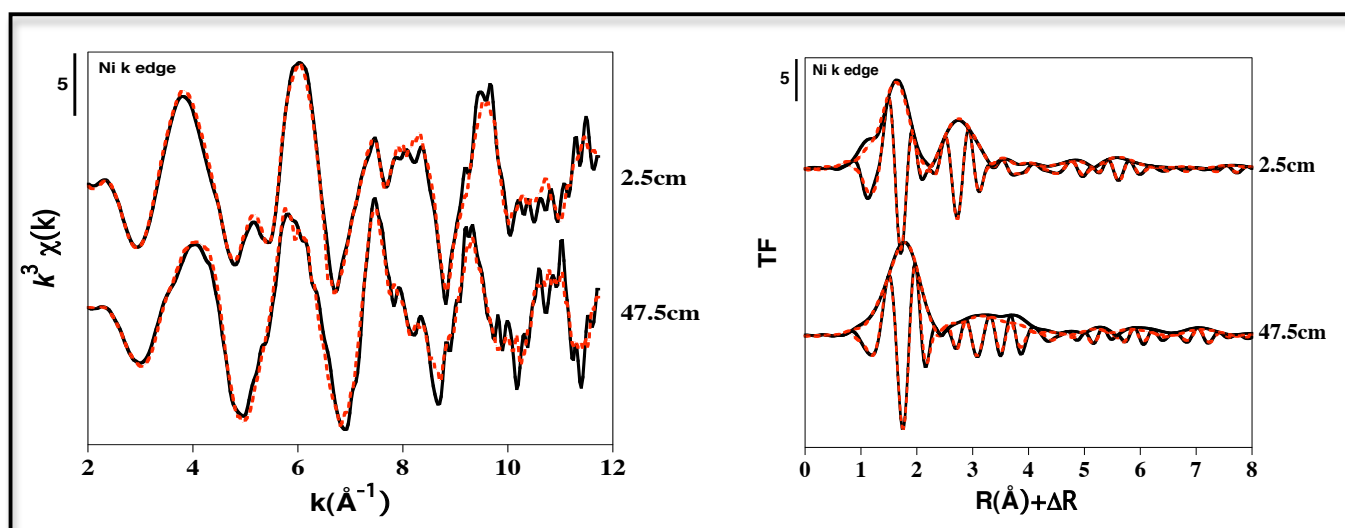


Figure 2. Results of the Linear combination fitting of EXAFS spectra at the Ni K-edge for mangrove sediment samples. Experimental k^3 -weighted EXAFS functions (black lines) and LCF curves (red lines); Fourier transforms of the fit are also plotted.