



	Experiment title: Geochemical partitioning of trace elements in soil fractions by XAS after the BCR sequential extraction scheme.	Experiment number: 30-02-786
Beamline: BM30B	Date of experiment: from: 20/09/06 to: 25/09/06	Date of report: 06/10/06
Shifts: 15	Local contact(s): Dr. Olivier Proux	<i>Received at ESRF:</i>
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Report:

Though total trace metal content is useful to evaluate soil contamination, it gives insufficient information on the potential mobility of trace metals. The environmental effects of trace metals are directly related to the chemical forms of these elements in soils (i.e. their geochemical partitioning). Sequential extraction procedures have been commonly used to evaluate the potential mobility of trace metals in soils or sediments. They consist in successively applying various chemical reagents to solid samples in order to extract metals bound to different geochemical fractions. These indirect chemical methods have been criticized especially because (i) the isolated phases are not discrete but operationally defined, (ii) the reagents could be non selective, (iii) metals extracted from one fraction during a given step of the procedure could be readsorbed by another fraction. The purpose of this experiment is to obtain a direct determination of trace metal partitioning in the initial soil and in the subsequent fractions resulting from the sequential extraction procedure. The idea is to validate or invalidate the BCR sequential extraction scheme for metals in calcareous soils of Champagne vineyard.

The Cu and Zn surrounding in soils and soil fractions obtained after the BCR sequential extraction were investigated using Cu and Zn K-edges XANES and EXAFS fluorescence detection at room temperature. First of all, the samples are sensitive to the beam and a degradation occurs during the recording (Figure 1). The use of a cryostat seems to be necessary for further experiments. Secondly, the EXAFS spectra of the different fractions arising from the subsequent fractions resulting from the sequential extraction procedure (Figure 2) seem to indicate that the metal environment and therefore the mineral fraction, on which the metal is fixed, are different.

These first results are encouraging. The complete analysis of the spectra (extraction and fit) is in progress. To validate these first results, further experiments with a great number of soil sample are necessary. Moreover, it would be helpful to record these new samples with an He cryostat in order to limit their degradation under the beam.

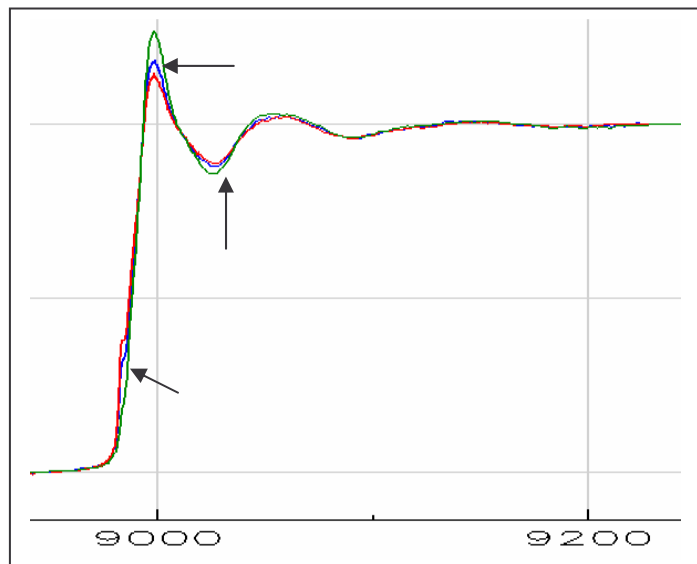


Figure 1 : 3 successive XANES spectra of the same soil sample (Cu *K*-edge).

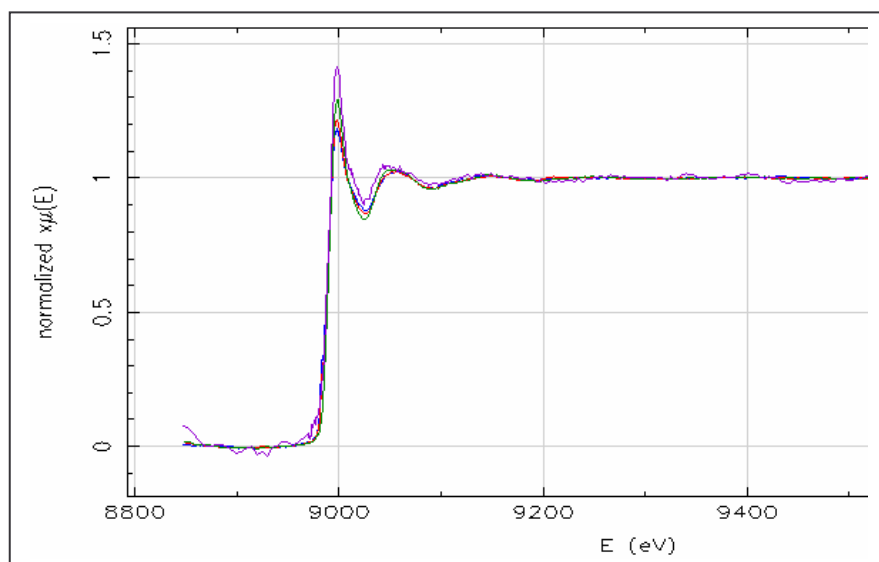


Figure 2 : Evolution of the spectrum in the bulk sample and in the successive residues obtained with the BCR sequential extraction scheme.