ESRF	**Experiment title:** Spectromicroscopy studies of the turnover of sulphur in soils, its incorporation in soil organic matter and its influence on the microstructure	**Experiment number**: ME 400
Beamline: ID 21	**Date of experiment**: from: May 07, 2002 to: May 12, 2002	**Date of report**: Aug 27, 2003
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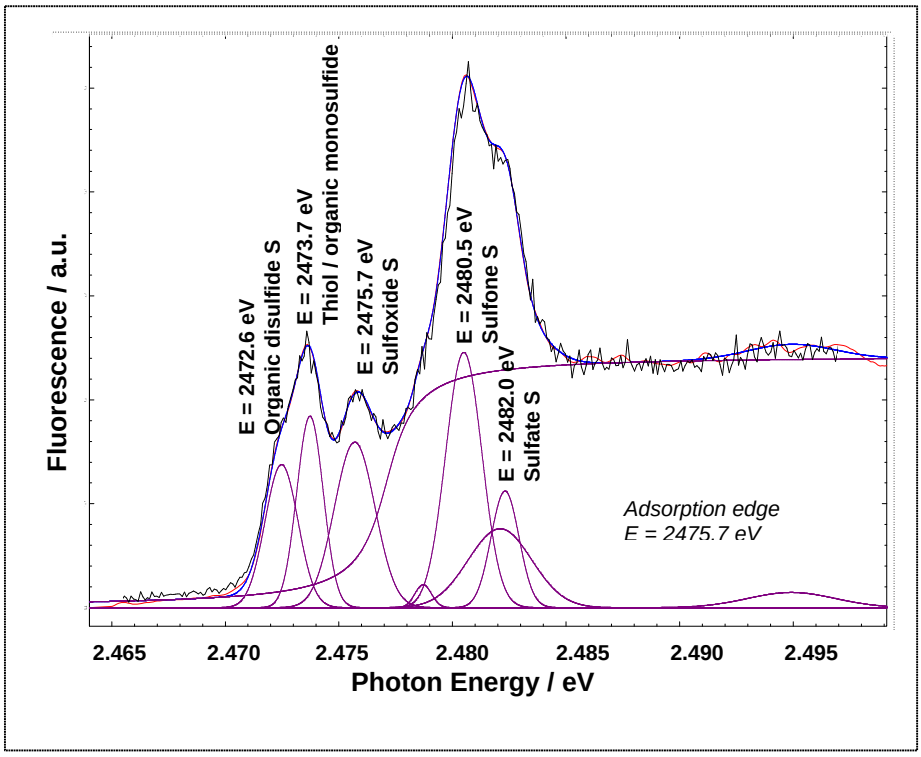
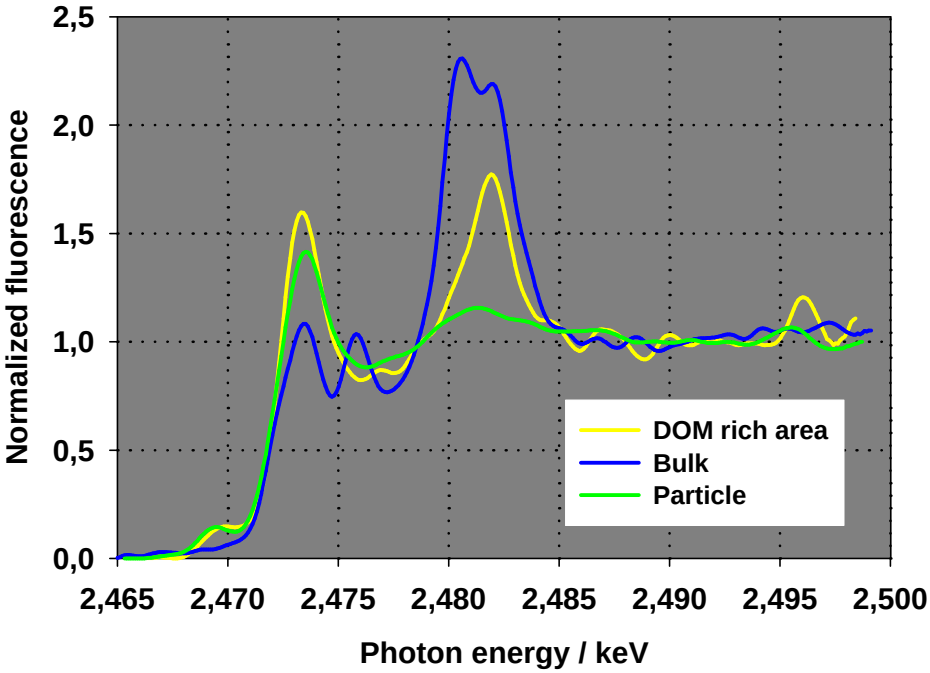
Report:

Sulfur speciation in bulk soil as well as in soil particles and colloids from Oh and Bh horizons of two German forest soils (Haplic Podzols Schluchsee/Black Forest and Rotherdbach/Ore Mts.) was investigated using X-ray microscopy and Near Edge X-ray Absorption Fine structure Spectroscopy (NEXAFS) at the K-adsorption edge of sulfur (2472 eV). The partitioning among different S species as determined on bulk samples of Oh horizons by X-ray spectromicroscopy agreed very well with the results of a conventional S speciation for Schluchsee Oh, and reasonably well for Rotherdbach Oh. NEXAFS analyses conducted on distinct soil particles revealed a strong enrichment of the particles in thiols and organic monosulfides compared to the bulk soil for the Schluchsee Oh (low S deposition environment), and an enrichment in sulfate for Rotherdbach Oh (high atmospheric S deposition). X-ray spectromicroscopy is a suitable and reliable tool for the separation and quantification of soil sulfur species with different oxidation states. The combination of X-ray transmission and sulfur fluoroscence images with unfocussed and focussed NEXAFS spectra at the K-adsorption edge of sulfur taken at defined locations allows the comparison of the S species distribution in bulk soil with that of distinct soil particles and soil colloids. Moreover, it allows an assessment of the micro-spatial distribution of different S species on soil particles on the a scale of a few hundred nm and thus significantly contributes to a better understanding of soil microstructure.

These results have been published in:
J. Prietzel, J. Thieme, U. Neuhäusler, J. Susini, I. Kögel-Knabner: Speciation of sulfur in soils and soil particles using X-ray spectromicroscopy. European Journal of Soil Science 54, June 2003, 1-11



Identification of different S species in the Rotherdbach Oh sample (unfocussed mode), original scan, scan smoothed by Golay-Savitzky algorithm, isolated major components.



Comparison of normalized fluorescence signal at the S adsorption edge taken from bulk soil, a distinct soil particle, and a colloid.