	Experiment title: Characterization of Tl sorption mechanisms on clay minerals and Tl speciation in whole soils using Tl L_{III}-edge XAS	**Experiment number**: EV 303
Beamline: BM26A	**Date of experiment**: from: 4. April to: 8. April 2018	**Date of report**: 27.2.2020
Shifts: 12	**Local contact(s)**: Dipanjan Banerjee	*Received at ESRF:*

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Report:

During beamtime for proposal EV 303, we collected Tl L_{III}-edge XAS data on three sets of samples:
- Mn-oxide samples from experiments on Tl sorption onto different types of Mn-oxides.
- Soil samples with elevated natural Tl contents.
- Soil and clay samples from experiments on Tl adsorption onto whole soils and a soil clay fraction.

Our XAS measurements went very well, and profited from the stable setup of BM26A, the robustly running fluorescence detector, and excellent support during by the beamline staff.

The XANES and EXAFS data collected on Tl-loaded Mn-oxides, in combination with sorption isotherm data, revealed that different mechanisms control Tl uptake by different Mn-oxides, and that these differences are reflected in differences in sorption strength. These results, which contribute to a better understanding of the impact of Mn-oxides on the fate of Tl in soils and sediments and their performance in water treatment have recently been published open access in Environmental Science and Technology [1].

The XANES data collected on geogenically Tl-rich soil samples and on soils with freshly sorbed Tl, in combination with a vast set of additional experimental results (soil extractions, sorption isotherms, sorption modelling, isotope dilution experiments), provided novel insights into the roles of micaceous clay minerals as stable long-term hosts for Tl in soils and as sorbents controlling Tl solubility in the short-term, as well as into the relevance of Mn-oxides as rather labile but highly specific sorbents for Tl. These results have been compiled in recently finished PhD thesis and will be submitted to a high-quality journal soon [2].

Publications (published, in preparation)

1. Wick, S., Peña, S., Voegelin, A., *Thallium sorption onto manganese oxides*. Environmental Science Technology, 2019. 53: p. 13168−13178. (https://pubs.acs.org/doi/pdf/10.1021/acs.est.9b04454)
2. Wick, S. et al., *Thallium sorption and speciation in soils: Role of micaceous clay minerals and manganese oxides*. in preparation.