Analytical advancements to unravel the effects of organic matter on trace elements cycling in the Environment

J. Tolu[1,2]

[1]Eawag, Swiss Federal Institute of Aquatic Science and Technology, Dübendorf, Switzerland, [2]ETH Zurich, Swiss Federal Institute of Technology, Group of Inorganic Environmental Geochemistry, 8092 Zurich, Switzerland

Trace elements play an important role in human health and the functioning of ecosystems. While certain trace elements, such as mercury or arsenic, can be highly toxic, others like selenium or zinc are essential micronutrients for humans, animals, plants, and microorganisms. Assessing and predicting the risks associated with toxicity or deficiency require a comprehensive understanding of the distribution of trace elements in the environment, their transfer between environmental compartments as well as their entry into the food chain.

One well-established fact is that natural organic matter, a main component of terrestrial, aquatic, and atmospheric systems, strongly influences the biogeochemical cycling of trace elements. Unraveling the effects of organic matter on trace element cycling remains, however, challenging due to the intricate nature of organic matter and the low concentrations of trace elements that are furthermore distributed among multiple organic and/or inorganic species, making the detection of individual chemical species difficult.

This talk will present analytical methods based on chromatography coupled with mass spectrometry, which were developed to characterize the molecular composition of organic matter or the associations between organic matter and trace elements. Case studies will also be presented to showcase the insights gained into trace elements biogeochemistry through the application of these methods to lab and/or field experiments.