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Expertise

My research over the years can be characterized as environmental geochemistry; looking into the acid-base chemistry of soils, the association between organic contaminants (TNT, chlorinated hydrocarbons) and natural organic matter (NOM), and in particular the chemical speciation of trace metals in soils and waters. I have studied the functional groups of NOM and their complex formation with the metals Hg, MeHg, Cd, Zn, Cu, Fe and Pb by use of X-ray absorption spectroscopy (XAS) techniques. In particular I have been interested in quantifying reduced sulfur groups (by S K-edge XANES) and to determine their complexes with Hg and MeHg (by Hg L_{III}-edge EXAFS). With this information as a fundament, I have tried to understand the biotic and abiotic processes of reduction and methylation of Hg(II) and MeHg demethylation under varying redox conditions in soils and waters. Impacts of contaminated sediments, wetland restoration and forest harvest have been the overall arching research questions. More recently, the chemical speciation of S, Fe, Co and Ni in biogas reactors has attracted my attention.

Key papers related to the COST action

1. Shakeri Yekta, S., Gustavsson, J., Svensson, B.H., and **Skyllberg, U.** 2012. Sulfur K-edge XANES and acid volatile sulfide analyses of changes in chemical speciation of S and Fe during sequential extraction of trace metals in anoxic sludge from biogas reactors. *Talanta*. 89, 470-477. Doi:10.1016/j.talanta.2011.12.065.
2. Gustavsson, J., Shakeri Yekta, S., Sundberg, C., Karlsson, A., Ejlertsson, J., **Skyllberg, U.**, and Svensson, B.H. 2013. Bioavailability of cobalt and nickel during anaerobic digestion of sulphur-rich stillage for biogas formation. *Applied Energy* 112, 473-477.
3. Gustavsson, J., Yekta, S.S., Karlsson, A., **Skyllberg, U.**, and Svensson, B.H. 2013. Bioavailability and chemical forms of Co and Ni in the biogas process – an evaluation based on sequential extraction and acid volatile sulfide extractions. *Engineering in Life Sciences* 13, 572-579.
4. Shakeri Yekta, S., Lindmark, A., **Skyllberg, U.**, Danielsson, A., Svensson, B.H. 2014. Importance of reduced sulfur for the equilibrium chemistry and kinetics of Fe(II), Co(II) and Ni(II) supplemented to semi-continuous stirred tank biogas reactors fed with stillage. *J. Haz. Mat.* 269, 83-88.
5. Shakeri Yekta, S., Svensson, B.H., Björn, A., and **Skyllberg, U.** 2014. Thermodynamic modelling of iron and trace metal solubility and speciation under sulfidic and ferruginous conditions in full scale continuous stirred tank biogas reactors. *Appl. Geochem.* 47, 61-73.
6. Drott, A., Lambertsson, L., Björn, E., and **Skyllberg, U.** 2007. Importance of dissolved neutral Hg-sulfides for methyl mercury production in contaminated sediments. *Environ. Sci. Technol.* 41, 2270-2276.
7. Drott, A., Lambertsson, L., Björn, E., and **Skyllberg, U.** 2008. Do potential methylation rates reflect accumulated methyl mercury in contaminated sediments? *Environ. Sci. Technol.* 42, 153-158.
8. **Skyllberg, U.** 2008. Competition among thiols, inorganic sulfides and polysulfides for Hg and MeHg in wetland soils and sediments under suboxic conditions – illumination of controversies and implications for MeHg net production. *J. Geophys. Res.* 113, G00C03, doi:10.1029/2008JG000745.
9. Drott, A., Björn, E., Bouchet, S., and **Skyllberg, U.** 2013. Refining thermodynamic constants for mercury(II)-sulfides in equilibrium with metacinnabar at sub-micromolar concentrations of dissolved sulfide. *Environ. Sci. Technol.* 47, 4197-4203.