Studying and modelling the effect of organic matter on the sorption of inorganic ions on goethite

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Sorption and desorption reactions have an important influence on the fate of pollutants, which can be retained by the organic or mineral fractions present in the soil. These reactions depend on the nature, relative amounts and properties of these soil fractions. Copper and arsenate are relevant inorganic contaminants involved in processes related to soil and water contamination. Both are very toxic and can lead to important health and environmental problems.

Natural organic matter and iron (hydr)oxides are nanosize colloidal particles present in soils, sediments, and aquatic systems. Natural organic matter, such as humic acids, interact strongly with soil minerals, including iron (hydr)oxides. Mineral-bound humic substances affect the sorption of organic compounds and inorganic ions. Consequently, the mobilization of copper and arsenate in the environment is significantly influenced by these surfaces. The study of the reactions between these pollutants and mineral-bound humic surfaces is important to understand the bioavailability of arsenate and copper in natural systems. A better comprehension of these processes would be helpful to solve environmental and health issues [1] [2].

Arsenate and copper sorption experiments were conducted using a synthetic mineral extensively present in soils, goethite, and three different humic coated goethites. These experiments reflect how the amount of organic matter could affect the sorption of both contamintants. Different attempts have been made to get model predictions for goethite and humic acid coated goethites, allowing to infere how an increase of the amount of organic matter on the mineral surface could enhance or hinder the sorption of arsenate and copper.

[1] Martin, Celi, Barberis, Violante, Kozak & Huang (2009), *Can. J. Soil. Sci.* **89**, 424-434. [2] Murphy & Zachara (1995), *Geoderma* **67**, 103-124.