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DOC, Ion and Mineral: A Delicate Situation

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Terrestrial organic C can be lost via degradation or leaching in the form of DOC. A large fraction of aquatic DOC has a terrestrial origin. The DOC level in soil solution strongly influences the mobility of many elements, such as Cu and P. DOC contains in a general term an easily soluble fraction such as simple sugars, which are commonly believed as products of biological activities. DOC contains as well a fraction potentially removable by adsorption and/or precipitation. Interaction between DOC and soil minerals is strongly affected by solution chemistry factors, such as pH, concentration of Ca and PO4. These interactions show a complicated pattern, which makes trend summarization a challenging task.

In this presentation, experimental results regarding ions (Ca2+ and PO43-) and DOC interactions in the presence of pure minerals (goethite) or soils are discussed. In a binary system containing DOC-goethite, Ca-goethite or PO4-goethite, their adsorption behavior such as the pH dependency is well known and predicable. However, in a ternary system containing DOC-ion-goethite or in soils, the interaction is far more complex. The delicate interactions are demonstrated in this presentation with sometimes controversial results. For instance, an increase in pH may not always lead to an increase of DOC concentration in soil solution. With the help of LCD modeling, we can better understand and explain these controversies.