Geochemical role of available humus or dissolved organic matter (DOM) in soils and sediments

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The ecological functions of available humus or the dissolved organic matter (DOM) in the environment has recently been the focus of considerable attention. This fraction is very small, but it is the most dynamic of all abiotic fractions. It has a major impact on geochemical processes, since it is the chief driving force in the interaction between the microbiota and their environment. Some processes with geochemical implication in which DOM is involved are:

- Production and binding of environmentally significant gases (CO_2, N_2O, CH_4);
- Podzolisation;
- Stable humus production (humic substances);
- Influencing of soil physical properties. This can have a profound effect both on erosion and on desertification; and
- Mineral dissolution.

Also, DOM quality can and has been used as an early indicator of environmental impacts. All these points will be elucidated during the presentation in greater detail.

However, the above processes tend to have strong short term fluctuations, which makes them difficult to evaluate geochemically. Furthermore DOM research is hampered by non-standard terminology and methods. For example fulvic acids, because they are water soluble, are often equated with DOM. This is usually not correct in soils and sediments where fulvic acids are often not in a soluble state. As a result several questions arise and need to be discussed here.

- To what extent does the unnatural concentration of DOM, especially when it is accompanied by strong pH shifts, result in artefacts?
- Systems such as sediments, flooded rice paddies, and groundwater are always water saturated. However, how strongly is the ecological fate and availability of DOM effected by its location in the different pore sizes?
- What is the effect of pore space location on DOM functionality?

In unsaturated systems, such as most soils, water content determines to a major degree as to what is in situ DOM. This, of course, is closely linked to pore space distribution. Micropores will retain water longer, and certain solid constituents will favour the accumulation of adhesive water.

- To what extent does a given soil's water regime effect the functionality of DOM?
- How can one best sample DOM in order to be able to understand its in situ function?