Geophysical Research Abstracts
Vol. 16, EGU2014-15378, 2014
EGU General Assembly 2014

Labile structures in organic matter under the incfluence of water – an issue for dynamic interfaces?

Gabriele E. Schaumann
University Koblenz-Landau, Environmental and Soil Chemistry, Landau, Germany (schaumann@uni-landau.de)

Soil organic matter (SOM) controls large part of the processes occurring at biogeochemical interfaces in soil. In this contribution, the idea that sequestration of organic chemicals is driven by physicochemical SOM matrix aging, and its consequences for interfacial properties will be discussed. Physicochemical matrix aging involves changes in the supramolecular arrangement of SOM molecules and molecule segments. Water molecule bridges (WaMB) and cation bridges (CaB) between segments of soil organic matter (SOM) have been found to stabilize the supramolecular SOM matrix. Organic chemicals entrapped in nanovoids, which are closed by WaMB or CaB can be released suddenly upon changes in environmental conditions like moisture, temperature or melting. Understanding their dynamics is thus highly important to to understand release and transport of organic chemicals. Although the idea of CaB in solid soil organic matter is more and more accepted, there is increasing evidence that they are relevant only, where distances between functional groups are sufficiently small. Larger distances can only be bridged by CaB-WaMB associations. Also interfacial properties are dynamic and can be controlled by associations of CaB and WaMB, which can fix supramolecular arrangements inducing water repellency and increase kinetic barriers for the release and uptake of water and sorption and transport of organic chemicals in soil.