Geophysical Research Abstracts
Vol. 13, EGU2011-2161, 2011
EGU General Assembly 2011

Exploring nanoSIMS technique for soil organic matter stabilization issues

Isabelle Basile-Doelsch (1), Pierre Bonnard (1), Thomas Delhaye (2), Perrine Chaurrand (1), Christian Domnici (3), Daniel Borschneck (1), and Philippe Dussouillez (1)

(1) Aix-Marseille University, CEREGE, Aix-En-Provence, France (basile@cerege.fr), (2) Université de Rennes 1, Plateforme NanoSIMS, Rennes , France, (3) CP2M, Aix-Marseille Universités, Marseille, France

Several methods have been recently tested with success to investigate the in situ spatial organization of soil organic matter at nanoscale, i.e. MET/EDX (Chenu and Plante 2006) as well as synchrotron techniques (STXM, NEXAFS, FTIR, Lehmann et al. 2007, 2008 and Wan et al., 2008). The synchrotron techniques seem to be very promising due to their capacity of probing the C speciation. However, the common drawback of these methods is the transmission mode which implies that the spectroscopic signal is integrated over the whole sample thickness (400 nm for example in the STXM/NEXAFS study of Lehmann 2008).
If nanoSIMS cannot provide C speciation, this technique can however image the chemical repartition of all elements (major and traces) in soils over a few nanometer depths, with a theoretical resolution of 50 nm (Herrmann et al. 2007). Thus, it should be the best technique to investigate the spatial organization of soil organic matter at nanoscale.
We will present our first tests in terms of sample preparation (resin embedding, sample cutting, polishing, region of interest, . . .) as well as the very preliminary nanoSIMS images (from 75x75 mm down to 8x8 mm, for which we reached a resolution of 60nm). First interpretations consider the spatial distribution of OM in <2 mm aggregates, the spatial relation of OM with minerals, the association of OM with other elements (Fe, Si and Al), and the signal provided by mineral particles.