Geophysical Research Abstracts
Vol. 16, EGU2014-14001, 2014
EGU General Assembly 2014

Biochar and hydrochar reactivity assessed by chemical, physical and biological methods

Christophe Naisse (1), Marie Alexis (2), Katja Wiedner (3), Bruno Glaser (3), Alessandro pozzi (4), Christopher Carcaillet (5), Irene Criscuoli (6), Franco Miglietta (6), and Cornelia Rumpel (1)

(1) CNRS, BIOEMCO, Thiverval-Grignon, France (cornelia.rumpel@grignon.inra.fr), (2) UPMC, BIOEMCO, Paris, France, (3) Universität Halle, Halle, Germany, (4) Advanced Gazification Technology, Cremona, Italy, (5) Ecole Pratique des Hautes Etudes, Montpellier, France, (6) Foxlab - Fondazione Edmund Mach, Trento, Italy

Field application of biochar is intended to increase soil carbon (C) storage. The assessment of C storage potential of biochars lacks methods and standard materials. In this study, we compared the chemical reactivity of biochars and hydrochars and their potential mineralisation before and after physical weathering as one possibility to evaluate their environmental stability. We used biochars produced by gasification (GSs) and hydrochars produced by hydrothermal carbonisation (HTCs) produced from three different feedstocks as well as Holocene charcoals (150 and 2000 yr old). Their chemical reactivity was analysed after acid dichromate oxidation and their mineralisation potential after laboratory incubations before and after physical weathering. Our results showed that use of acid dichromate oxidation may allow for differentiation of the reactivity of modern biochars but that chemical reactivity of biochars is poorly suited to assess their environmental residence time because it may change with exposure time in soil. Physical weathering induced a carbon loss and increased biological stability of biochar, while reducing its positive priming effect on native soil organic matter. Model extrapolations based on our data showed that decadal C sequestration potential of GS and HTC is globally equivalent when all losses including those due to priming and physical weathering were taken into account. However, at century scale only GS may have the potential to increase soil C storage.