Geophysical Research Abstracts
Vol. 13, EGU2011-5049, 2011
EGU General Assembly 2011

Effect of self-assembly on the microbial degradation of humic

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Based on our recent work that demonstrates a self-organizing character for humic materials this study focuses on quantifying how humic materials' self-assembly contributes to their resistance to rapid mineralization. Humic acids extracted from two chemically distinct materials, the IHSS Leonardite and Guanella peat were fractionated using a combination of aqueous alkaline and organic solvent extractions. Physical mixtures of fractions were prepared to recreate the humic acid samples with their original chemical compositions. Humic samples were added as a sole source of carbon to aerobic cultures of a complex microbial consortium isolated from a mineral soil. The amount of humic acid utilized by microbes was assessed by monitoring carbon dioxide released during the incubation and the type of carbon utilized was assessed by 13C solid state NMR of humic materials re-isolated from microbial cultures. The differences between the utilization and transformation of original humic acids and their corresponding physical mixtures were explained in terms of the various contributions of the fractions to the organization of humic materials.