Geophysical Research Abstracts
Vol. 14, EGU2012-5941, 2012
EGU General Assembly 2012

The effect of chars and their water extractable organic carbon (WEOC) fractions on atrazine adsorption-desorption processes

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Chars are carbonaceous material produced from different type of biomass by pyrolysis. They are known as highly effective adsorbents for atrazine therefore limiting its degradation and its diffusion into the aqueous phase. The aim of the present work is to study the effects of different chars and char's derived WEOC on atrazine sorption–desorption processes. The five chars been used in this study derived from: 1) fast pyrolysis from hard wood (FP1); 2) flash pyrolysis from soft wood (FP2); 3) slow pyrolysis from deciduous wood (CC); 4) gasification from deciduous wood (GC) and 5) the market, purchased as activated charcoal standard (AC). Short-term batch equilibration tests were conducted to assess the sorption-desorption behavior of 14C-labeled atrazine on the chars, with a special focus on the desorption behavior using successive dilution method with six consecutive desorption step. Chars and their WEOC were physically and chemically characterized. Results demonstrate that biomass and pyrolysis process used to produce chars affect their physical and chemical properties, and atrazine adsorption-desorption behavior. Atrazine desorption resulted from the positive and competitive interactions between WEOC and chars surfaces. WEOC pool play important role in atrazine adsorption-desorption behavior. FP1 and FP2 with higher concentration of WEOC showed higher desorption rates, whereas GC, CC and AC with insignificant WEOC concentration strongly adsorb atrazine with low desorption rates. According to our results, when high WEOC pools chars are concerned, an increase in atrazine desorption can be observed but further studies would help in confirming the present results.