Geophysical Research Abstracts
Vol. 18, EGU2016-7005, 2016
EGU General Assembly 2016

C dynamics in Amazonian podzols under climate change

Naoise Nunan (1), Andre Soro (1), Kevin Potard (1), Valerie Pouteau (2), Celia Montes (3), Adolpho Melphi (3), Yves Lucas (4), and Claire Chenu (2)

(1) Intitut of Ecology and Environmental Sciences, CNRS-UPMC, Paris (naoise.Nunan@grignon.inra.fr), (2) Ecosys, INRA-AgroParisTech, Thiverval-Grignon, (3) Nupegel, Campus Universitario Luiz de Querioz/USP, Piracicaba, (4) Protee, Universite du Sud Toulon-Var, Toulon

It has recently been shown that the C stocks in Amazonian podzols are very large. They are much larger than was previously thought, particularly in the Bh horizon, which has been estimated to contain in excess of 13Pg C for Amazonia alone. It is predicted that the changes in regional climate will result in a drier soil water regime which may affect the C dynamics in these soils that are usually saturated. In order to determine the vulnerability to change of the organic C contained in the Amazonian podzols, a series of incubation experiments were established in which the effects of a number of different factors on microbial decomposition were measured. The direct effect of drier soil water regimes was tested by incubating undisturbed cores from the Bh horizon at a range of matric potentials (saturation to wilting point). Contrary to what is usually found in soils, no significant difference in mineralisation was found among matric potentials, suggesting that other factors control microbial mineralisation of this organic C. The effect of nitrogen additions, of anaerobic conditions and of the addition labile C substrate were also tested on undisturbed cores of the Bh horizon of the podzols. Samples incubated under aerobic conditions produced 3 times more CO_2 than samples incubated under anaerobic conditions, whilst samples incubated under aerobic conditions with the addition of N mineralised 6.7 times more CO_2 than the anaerobic samples. The addition of labile C did not have a significant effect on C mineralisation, i.e. there was no priming effect. The combined addition of labile C and mineral N did not stimulate C mineralisation more than N additions alone. By extrapolating the differences obtained here to the whole of the Amazonian podzols, it is estimated that changes in conditions which result in an increase in O_2 and in N (i.e. changes in vegetation due to increases in dry periods with the establishment of a savanna for example) in the soil will cause the release of 0.14Pg C per year. This is equivalent to 0.2% of the CO_2-C released yearly by the world's soils.