Geophysical Research Abstracts
Vol. 19, EGU2017-11976, 2017
EGU General Assembly 2017

$14CO_2$ in combination with root-exclusion can be used to estimate plant-induced decomposition of soil organic matter

Jussi Heinonsalo (1), Liisa Kulmala (2), Annikki Mäkelä (2), Markku Oinonen (3), Sebastien Fontaine (4), Vesa Palonen (3,5), and Jukka Pumpanen (6)

(1) Department of Food and Environmental Sciences, University of Helsinki, Finland (jussi.heinonsalo@helsinki.fi), (2) Department of Forest Sciences, University of Helsinki, Finland, (3) Finnish Museum of Natural History, University of Helsinki, Finland, (4) Unité de Recherche sur l'Ecosystème Prairial, INRA Clermont-Ferrand, France, (5) Department of Physics, University of Helsinki, Finland, (6) University of Eastern Finland, Department of Environmental Science, Kuopio, Finland

In ecosystem models, the decomposition of soil organic matter (SOM) is estimated using temperature and moisture as main controlling parameters. However, there is increasing evidence that the decomposition is significantly affected by easily available carbohydrates. The C assimilation by the boreal forest trees will increase in the future due to climate change. As trees allocate large part of assimilated C to roots and soil microorganisms, particularly to ectomycorrhizal fungi, the rhizosphere priming effect (RPE) is assumed to increase. The aim of the experiment was to identify and quantify RPE in the field conditions. We established a three-year long trenching experiment in a boreal Scots pine forest where the belowground C flow from standing pine forest was controlled using root-exclusion with mesh fabrics. The mesh size of 1 μm excluded both tree roots and fungal hyphae and served as priming controls with decreased C supply. The unaltered C input entered the non-trenched field plots. Soil CO_2 flux and 14C concentrations were measured. We were able to quantify the RPE in field conditions and show that plant-derived C flow into the soil increases SOM decomposition. Quantification of RPE allows more detailed estimation of soil organic matter decomposition in future changing climate.