Geophysical Research Abstracts
Vol. 19, EGU2017-4945-2, 2017
EGU General Assembly 2017

Ground vegetation reduces forest floor net CH_4 uptake in a boreal upland forest

Mari Pihlatie (1,2), Antti-Jussi Kieloaho (1), Elisa Halmeenmäki (1,2), Kira Ryhti (2), and Jussi Heinonsalo (3)

(1) University of Helsinki, Department of Physics, Helsinki, Finland (mari.pihlatie@helsinki.fi), (2) University of Helsinki, Department of Forest Sciences, Helsinki, Finland, (3) University of Helsinki, Department of Food and Environmental Sciences, Helsinki, Finland

Boreal upland forests are considered as an important sink for the greenhouse gas methane (CH_4) due to CH_4 oxidizing microbes in the soil. Recent studies have reported significant CH_4 emissions from trees in both upland and wetland forests, however, contribution of ground vegetation to the net CH_4 exchange has not been assessed. As the processes and process drivers of the CH_4 emissions from vegetation are still poorly understood, partitioning the CH_4 exchange in forest ecosystems to soil, ground vegetation and trees is a way to improve our understanding of the CH_4 cycling processes in forest ecosystems.

We measured the forest floor CH_4 exchange at a Scots pine dominated boreal upland forest in Southern Finland (SMEAR II station) during the growing season 2015. The forest floor consisted of mostly shrubs of bilberry (*Vaccinium myrtillus*), lingonberry (*Vaccinium vitis-idaea*), heather (*Calluna vulgaris*), and forest floor mosses (*Pleurozium schreberi*, *Hylocomium splendens*, and *Dicranum polysetum*). We measured the CH_4 fluxes using transparent chambers under three vegetation treatments: normal vegetation (normal), shrubs only (shrubs), and non-vegetated (cut), and under three soil trenching treatments: control, 50 μm mesh (roots of trees and shrubs excluded), and 1 μm mesh (roots of trees and shrubs, and microbes excluded).

Forest floor acted as a sink of CH_4 in all the vegetation and trenching treatments. Presence of ground layer vegetation significantly reduced the forest floor CH_4 uptake, whereas soil trenching did not affect the CH_4 exchange. Over the period of May – October 2015, the mean forest floor CH_4 fluxes were -53.7 ($\pm$ 3.1 SE), -96.7 ($\pm$ 3.7), and -91.4 ($\pm$ 4.3) μg CH_4 m^2 h^{-1} from normal, shrubs and cut treatments, respectively. The presence of ground vegetation hence nearly halved the forest floor CH_4 uptake compared to the shrubs only and cut treatments. As the largest difference between normal and shrubs treatments were the absence of mosses, our findings suggests that especially mosses play an important role in the forest floor CH_4 exchange as their removal drastically increased the net CH_4 uptake.