Submitted Abstract

ID IMC22-FSAbstr- 621

First Author First Name / Last Name	Fabrizzio (1) Protti Sanchez
Submitting Author First Name / Last Name	Fabrizzio Protti Sanchez
Correspondence	fabrizzio.protti-sanchez@uibk.ac.at
Co-Authors >> E-Mails will be not listed	Janssens, Ivan (2); Sigurdsson, Bjarni D. (3); Sigurdsson, Páll (3); Bahn, Michael (1)
Organisations	1: Department of Ecology, University of Innsbruck, Innsbruck, Austria 2: Department of Biology, University of Antwerp, Antwerp, Belgium 3: Faculty of Environmental & Forest Sciences, Agricultural University of Iceland, Hvanneyri, Iceland
Country	Austria
Region	Western Europe
Title	Soil Respiration Response To Medium-Term Warming In A Subarctic Grassland.
Keywords	Soil Co2 Efflux, Soil Carbon, Warming, Subarctic, Geothermal Gradient
Type	List Of Focus Session
Focus Session ID	39

Abstract

Soil respiration is a key process of the terrestrial carbon (C) cycle, composed of the carbon dioxide (CO2) respired by soil microorganisms feeding on soil organic matter (heterotrophic source component) and the respiration of plant roots and their associated rhizomicrobial community (autotrophic source component). It is expected that global warming will accelerate metabolic rates leading to higher soil respiration and larger soil C losses, which could cause positive feedbacks to climate change. This is especially relevant in higher-elevation and/or high-latitude ecosystems, such as the arctic and the subarctic, where large amounts of C are stored in the soil. Our current understanding of warming effects on soil C dynamics is largely restricted to short-term warming experiments (1-5 y of warming), which limits our capacity to project the longer-term consequences of a warming climate.

In this study, which contributes to the EU-project FutureArctic, we investigated the effects of 13 years of geothermal warming on soil CO2 efflux and its main source components in subarctic grasslands. We measured soil CO2 efflux along a soil warming gradient ranging from +0 to +14°C above ambient soil temperature using continuously operating automated long-term soil chambers. To distinguish between biogenic and geogenic soil CO2 in this geothermal system, we measured the isotopic composition of soil CO2 efflux by coupling an isotope analyser to the automated long-term soil chambers in some field campaigns. Additionally, during the growing season, we manually measured soil CO2 efflux in shallow and deep soil collars (trenching approach) to partition between the autotrophic and heterotrophic components of soil respiration.

Preliminary results indicate that soil CO2 efflux showed strong seasonal dynamics and increased along the soil warming gradient throughout the whole year. Heterotrophic respiration was the main source component of soil respiration in this subarctic grassland ecosystem. Interestingly, autotrophic, and heterotrophic respiration increased in response to warming to a similar degree. From our first results, we conclude that medium-term warming leads to soil C losses by higher microbial and root respiration in subarctic grasslands.