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# $CO_2$ evolution in highland soils of different land cover types in Iceland

Utra Mankasingh (1), Guðrún Gísladóttir (1,2), Jóhann Þórsson (3), and Minna Palomaki (1)

(1) Department of Geography and Tourism, Faculty of Life and Environmental Sciences, University of Iceland, Reykjavík, Iceland (utra@hi.is), (2) Institute of Earth Sciences, University of Iceland, Reykjavík, Iceland (ggisla@hi.is), (3) Landgræðsla ríkisins, Gunnarsholt, Iceland (johann.thorsson@land.is)

Soil respiration is a key ecosystem process that releases carbon from soil as $CO_2$. Soil $CO_2$ emission is sensitive to temperature, moisture and disturbance and is influenced by land use and land cover change, especially in the upper soil organic layer. Release of $CO_2$ from soils of the south Icelandic highlands (318 - 356 m above sea level) was studied to observe soil respiration in different land cover types and to quantify soil C lost as $CO_2$.

In a laboratory incubation study, exponential release of $CO_2$ from soils was observed (>6 months) for the field moist soils collected from the highlands. Soils were collected at 12 sites from the land cover types (plant communities) in September 2013. The land cover types, categorized by plant communities, were: grasslands (G1-G8), with moss, *Carex Bigelowii* and dwarf shrubs; a sandy fluvial wetland (S), and unvegetated gravels (M1-M3). Since this experiment was conducted at 25˚C whilst the observed annual average temperature was 1.5 ˚C (Vatnsfell, 10 year average), this experiment presents an accelerated picture of $CO_2$ released from soils over a much longer time period. For most soils, the rate of release decreased after 5 days. For all land cover types, the $CO_2$ release was greatest in the topspoil and this decreased with depth. Soils with the highest % organic matter (G sites characterized by mosses and few vascular species) appear to release the most $CO_2$. In the top 5 cm, the $CO_2$ emissions follow the trend: grasslands (G1-G8)> sandy fluvial wetland (S) > unvegetated sites (M1-M3). This trend appears to be related to the amount of organic matter present. For all sites, the less than 250 mg $CO_2$ was lost per kg of soil after 75 days, which is equivalent to losing less than 69 mg C per kg soil, and represented less than 0.5% of the total carbon present in any soil; less than 360 mg $CO_2$ was lost after 260 days.