CO_2 emission from permafrost soils of Alaska under the freezing/ thawing condition.

MIYUKI KONDO[1], MASAO UCHIDA[1], SEIICHIRO YONEMURA[2] , GO IWAHANA[3], YONGWON KIM[3], NOBUHIDE FUHITAKE[4], HIROYUKI ENOMOTO[5], KIYOSHI TANABE[1], KENJI YOSHIKAWA[6]

[1]National Institute for Environmental Studies, 16-2 Onogawa, Tukuba, 305-8506, Japan (*correspondance:kondo.miyuki@nies.go.jp)
[2]National Institute for Agro-Environmental Science, 3-1-3, Kannondai, Tsukuba, 305-8604, Japan
[3]IARC, University of Alaska Fairbanks, 930 Koyukuk Drive, PO Box 757340, Fairbanks, Alaska 99775-7340, USA
[4]Graduate School of Agricultural Science Department of Agrobioscience, Kobe University, 1-1 Rokkodai, Nada-ku, Kobe, 657-8501, Japan.
[5]National Institute of Polar Research, 10-3, Midori-cho, Tachikawa-shi, Tokyo 190-8518, Japan
[6]WERC, INE, University of Alaska Fairbanks, PO Box 755860 Fairbanks, Alaska 99775-5860, USA

The dynamics of carbon (C) preserved within permafrost in Sub-Arctic and Arctic is important implications for the current and future carbon cycle with global warming. However, little is known on the microbial decomposability of permafrost organic mater and CO_2 emission once permafrost thaws. The objective of this study is to assess the inherent decomposability of permafrost organic matter by soil incubations using flow-through-chamber technique. We used active layer and permafrost collected from Alaskan boreal forest and tundra with diverse organic matter characteristics and incubated them under the freezing/thawing condition. Soils were incubated under aerobic condition at a temperature from -15 to 15 ºC. We observed that CO_2 was produced at a temperature blew the zero, especially from permafrost of some tundra. After permafrost thawed, CO_2 release rates were much higher in permafrost compared with active layer for same tundra. In the case of the soil collected in the Arctic coastal tundra, CO_2 released in permafrost (27-94 μgC g^{-1} d^{-1}) was nearly 3 times greater than active layer soil (8-34 μgC g^{-1} d^{-1}) from 1 to 15 ºC. This suggests that permafrost C may be very labile. In this meeting, we will discuss CO2 release variability between samples and their relationships with soil chemical and physical characteristics.