

# アラスカ凍土コアサンプルのガス交換特性実験

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## Labotaroty experiment of gas exchange of Alaskan active and permafrost soils

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The release of carbon from the decomposition of organic matters in permafrost soils are very important for the acceleration of global watming (Lee et al., 2012). We applied our dynamic system to Alaskan soils and measured temperature dependence of gas (CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, NO, H<sub>2</sub>, CO) emission/uptake. The Alaskan soils used in this study are summarized in Table 1. Four core samples were placed on petri-dishes which were put into chambers whose temperature was controlled as Table 2. An example of CO<sub>2</sub> emission from soils showed variations different from sample to sample (Fig.1). Even at -5°C, CO<sub>2</sub> emissions were observed. From the time series of CO<sub>2</sub> emission rates, we estimated Q10 values (Table 1). Q10 values were similar between 5-15°C and 15 and 25°C. The distinct relation between carbon concent and Q10 values were not found. Some soils also temperature-dependently emit NO, CO and N<sub>2</sub>O. It was difficult to observe CH<sub>4</sub> emission from the soils probably because the experiment did not catch CH<sub>4</sub> emission just after the initial thawing.

Table 1 Active and premafrost core samples used.

Sample	Site		Depth	Carbon(%)	Nitrogen(%)	Q10(-5-5°C)	Q10(5-15°C)	Q10(15-25°C)
1	UAF1-1	Active layer	21-28cm	44.2	0.69	18.9	2.2	2.1
2	UAF1-3	Permafrost	65cm	1.6	0.08	7.3	2.5	2.1
3	Pulsa	Active layer	17-30cm			18.8	1.7	2.2
4	Pulsa	Permafrost	60-75cm	47.3	1.40	4.7	2.4	2.3
5	OSH	Active layer	25-35cm	6.9	0.20	5.6	2.1	2.4
6	OSH	Permafrost	55-66cm	11.6	0.50	58.4	2.7	2.6
7	MP365	Active layer	20-30cm	3.8	0.13	9.1	1.9	1.7
8	MP365	Permafrost	52-62cm	0.08	2.50	9	2.7	2.6
9	MP410	Active layer	24-34cm	13.4	0.70	9.6	2.8	2.2
10	MP410	Permafrost	52-64cm	8.8	0.40	33.8	2.1	2.3
11	MP267,75	Active layer	16-36cm	36.2	1.70	13.6	2.5	2.2
12	MP267	Permafrost	80-90cm	5.6	0.30	4.5	2.3	2.3

Table 2 Temperature Controlling Procedure

Tempera	Duration (hour)
5	24
-5	24
5	24
15	12
5	12
15	12
25	12
15	12
5	12

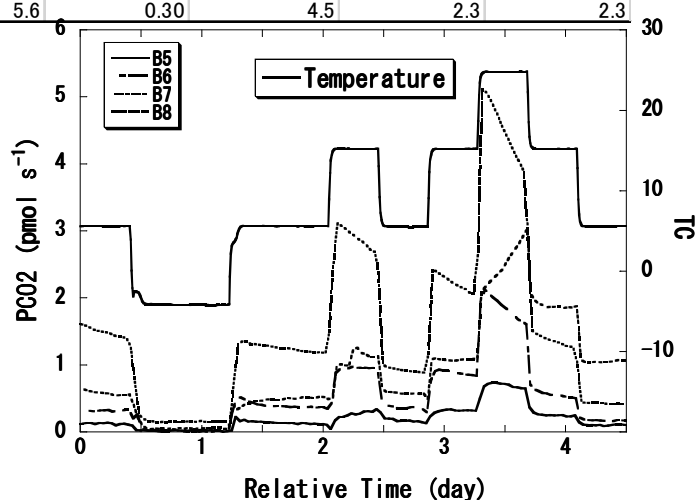


Figure 1 Time-series of CO2 emission of B5-B9

## References

Lee, H., Schuur, E.A.G., Inglett, K.S., Lavoie, M., and Chanton, J.P., The rate of permafrost carbon release under aerobic and anaerobic conditions and its potential effects on climate, *Global Change Biology*, 18, 515-527, doi: 10.1111/j.1365-2486.2011.02519.x, 2012