

Winter CO₂ efflux from snow surface on the high Arctic glacier foreland

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Recent years, it has been indicated that winter soil respiration in Arctic terrestrial ecosystem plays significant role on ecosystem carbon cycle. Although the respiration rate is very small, Elberling (2007) reported that the respiration in winter was observed even at high Arctic. However, CO₂ efflux from snow surface wasn't detected in our study site located about 100 km north from his study site. In this paper, we try to clarify the discrepancy.

The field investigation was conducted in February, 2008 in Ny-Alesund, Svalbard, Norway (79°N, 12°E). At that time, snow depth was 50-100 cm and ice layer was observed at the bottom of snow layer. CO₂ efflux from snow surface was determined from gradient of CO₂ concentration, temperature and snow porosities of the snowpack by using Fick's law. Soil respiration from the collected frozen soil was measured using a closed-chamber method in laboratory, to know whether CO₂ was released from soil or not in the study site.

CO₂ efflux from snow surface was under the detected limit. Significant gradient of CO₂ concentration over ice layer wasn't detected. On the other hand, significant soil respiration was observed even at -10°C. Consequently, we hypothesized that the ice layer prevent diffusion of soil respiration. We will report the effect of ice layer on diffusion of soil respiration in this presentation.