

Soil microbial respiration and decomposition characteristics in a raised beach deposit in the High Arctic

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Spitsbergen Island in the Norwegian high Arctic, raised beach deposits are widespread on the northwestern coast. Since soil organic matter in the deposit layer would include a marine organic matter, it is probable that microbial activity may show different response in comparison to the other layer including terrestrial organic matter. To investigate microbial activity in the deposit layer, we measured soil microbial respiration and decomposition characteristics in the deposit layer.

The study site is situated in Ny-Alesund, Spitsbergen Island. The deposit layer was observed 20-30 cm depth from the mineral soil surface in the study site. Soils of the deposit layer (20-22 cm) and other soil layers (0-2 and 10-12 cm) were corrected and measured the respiration rate using an infrared gas analyzer. It was investigated what kinds of carbon sources are decomposed by the microbes living in the each layer using BIOLOG EcoPlate. Total organic carbon and nitrogen contents in each soil layer were also determined.

Total organic carbon content of the 0-2, 10-12 cm and the deposit layer was 4.2, 2.1 and 2.3%, respectively. Microbial respiration rate tended to be smaller with increasing soil depth but CO₂ release was confirmed from the deposit layer. 15 kinds of carbon sources such as Glycogen, D-Cellobiose, D-Mannitol, Galacturonic Acid, L-Arginine were decomposed by soil microbes of the deposit layer but 6 carbon sources of them were not decomposed by the microbes in the 10-12 cm layer. Our results suggest that microbial decomposition characteristics in the deposit layer would be different from the 10-12cm layer and respiration activity is low even though the organic carbon content of the deposit layer is a similar level of the 10-12 cm layer.