

温度上昇と水分変動増大が火山灰土壌のCO₂放出におよぼす複合的影響の培養実験による検証

Laboratory examination of combined effects of temperature rising and increased water fluctuation on CO₂ release from volcanic ash soils

*永野 博彦¹、安藤 麻里子¹、小嵐 淳¹

*Hirohiko Nagano¹, Mariko Atarashi-Andoh¹, Jun Koarashi¹

1. 日本原子力研究開発機構

1. Japan Atomic Energy Agency

Global warming will alter the precipitation pattern, resulting in the increase in seasonal fluctuation of soil water conditions. Both environmental factors of soil temperature and water fundamentally affect soil CO₂ release, a major carbon flux in terrestrial ecosystems. However, our understandings of soil CO₂ release under the increased temperature and fluctuated water conditions are still insufficient to infer the feedback of terrestrial carbon cycling in future worlds. In the present study, we are conducting laboratory incubation experiments for examining the combined effects of temperature rising and soil water fluctuation on CO₂ release from volcanic ash soils. Volcanic ash soil is the major soil type in Japan and is expected to have great ability to stabilize carbon as soil organic matter. We incubated volcanic ash soils under four combinatorial conditions of two temperatures (20 and 30 °C) and two water conditions (a continuously constant water and a fluctuated water conditions). The rate of CO₂ release was periodically measured during the incubation. Then, the ratio of CO₂ release at 20 °C to that at 30 °C, namely Q₁₀, was expressed as the temperature sensitivity of soil CO₂ release. The fluctuated water condition was maintained with multiple dry-wet cycles to achieve an average water content of 40% of water holding capacity which was equivalent to that under the continuously constant water condition. For the incubation at 20 °C, soil CO₂ release under the fluctuated water condition was up to 50% greater than that under the constant water condition. The excess of soil CO₂ release under the fluctuated water condition was, however, reduced to less than 10% for the incubation at 30 °C. Thus, Q₁₀ under the fluctuated water condition (1.3 to 1.5) was equivalent to or lower than that under the continuously constant water condition (around 1.5). These preliminary results offer the needs of modifying basal CO₂ release extent and Q₁₀ value for inferring the soil CO₂ release under increased temperature and fluctuated water conditions. The experiments are still ongoing and results and further insights will be presented at the meeting.

キーワード：温室効果ガス、土壌炭素動態、地球温暖化

Keywords: greenhouse gas, soil carbon dynamics, global warming