東広島常緑照葉樹林における微生物呼吸に対する長期的な温暖化の影響
The influence of long-term soil warming on heterotrophic respiration in an evergreen broad-leaved forest in Hiroshima

*寺本 宗正[1]、梁 乃申[1]、近藤 俊明[2]、曾 継業[1]、中根 周歩[3]
*Munemasa Teramoto[1], Naishen Liang[1], Toshiaki Kondo[2], Jiye Zeng[1], Kaneyuki Nakane[3]

1. 国立環境研究所、2. 広島大学大学院国際協力研究科、3. 広島大学
1. National Institute for Environmental Studies, 2. Graduate School for International Development and Cooperation, Hiroshima University, 3. Hiroshima University

Soil respiration is the second largest carbon flux in terrestrial ecosystems, and consists of root respiration and heterotrophic respiration (R_h). Global R_h is estimated to be 51–57 GtC yr^{-1}, more than the half of global soil respiration. It is commonly observed that R_h exponentially increases with rising temperature. Therefore, only a tiny rise of temperature will result in remarkable increase of R_h. That point implies that increased global R_h under warmer environment might further accelerate global warming (positive feedback). However, long-term soil warming experiment that verify the response of R_h to global warming is totally limited in Asian monsoon forests where exhibit high productivity. Examining the response of Asian monsoon forest soil to global warming is thought to be critical for precise estimation for future climate change.

To examine the long-term influence of soil warming on R_h in an Asian monsoon forest, we set multi-channel automated chamber and soil warming systems in an evergreen broad-leaved forest in western Japan, Higashi Hiroshima in September 2007. We prepared 10 trenched chambers (90 cm ×90 cm ×50 cm) to continuously measure R_h. Half of those trenched chambers were artificially warmed by infrared heaters 1.6 m above the soil surface (+2.5ºC), and influence of soil warming on R_h was examined by comparing R_h and warmed R_h for 10 years.

Soil moisture and R_h were strongly related during summer period from July to September. Few precipitation and low soil moisture level in summer period caused to decrease R_h, and the decrease resulted in the decline of annual temperature sensitivity of R_h (Q_{10}). Those results suggested that precipitation and soil moisture during summer period is one of the important control factor for long-term response of R_h to warmer environment.

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