

## Long-term warming effect on heterotrophic respiration in a beech forest on Mount Naeba

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Soil respiration is the second largest carbon flux in terrestrial ecosystems and the global soil respiration is estimated to be 98 GtC yr<sup>-1</sup>. Soil respiration consists of root respiration and heterotrophic respiration ( $R_h$ ), and  $R_h$  contributes more than half of the soil respiration. It is commonly observed that  $R_h$  exponentially increases with temperature. Therefore, a small increase of temperature can result in a remarkable enhancement of  $R_h$ , indicating that it is an important positive feedback factor to accelerate global warming under a warmer environment. However, the long-term warming effect on  $R_h$  is not well understood especially in the humid Asian monsoon region.

To examine the long-term response of  $R_h$  to global warming in Asian monsoon forests, we set a multi-channel automated chamber measurement system in a beech forest on Mount Naeba in July 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 (+2.5°C), and the influence of soil warming on  $R_h$  was examined by comparing control plots and warming plots. Measurements were conducted mainly during growing season from June to October.

Even though there was a large inter-annual variation, enhancement of  $R_h$  by soil warming was confirmed in all 8 years measurements. Soil temperature was the primary factor for the seasonal variation of  $R_h$ . The influence of soil moisture on seasonal variation of  $R_h$  was relatively small.

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