



Temporal variations of soil respiration in a moso bamboo (*Phyllostachys pubescens*) forest in central Taiwan

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Understanding soil respiration (R_s) in moso bamboo stands is crucial for accessing potential impact of bamboo invasion on terrestrial carbon cycle in Asian regions. We aimed to evaluate the seasonal and diurnal variations of R_s in a moso bamboo (*Phyllostachys pubescens*) forest in central Taiwan with their abiotic drivers. We selected a 200m² plot in a conservatively managed moso bamboo stand in National Taiwan University Forest, central Taiwan. The 20 measuring locations were set in a 200m² plot, in which we inserted a 5-cm collar for R_s measurement. R_s rates were measured from April 2012 to February 2013 by using a closed dynamic chamber system. Once a month, we observed the R_s averaged over the 20 locations and the diurnal variation at 2 locations with soil temperature (T_s) and soil volumetric water contents (SWC) measurements. Over 10-month observation, results showed the highest R_s and the most significant spatial variations in R_s in the summer seasons with maximum R_s averaged over 20 locations of $4 - 8.36 \mu\text{mol m}^{-2}\text{s}^{-1}$. Seasonal variations of the R_s were considerably corresponded to both T_s and SWC with different patterns. The relationship between R_s and T_s can be described with the exponential Q_{10} function, in which a comparatively higher Q_{10} value of 6.45 was estimated than that of previous averages ($= 2$ to 3). The R_s -SWC relationship shows that soil respiration increased with increases in SWC of below 45%, while the R_s declined with increases in SWC of over 45%. Also, R_s occasionally showed distinctive diurnal variations. In the measurement campaign of June, we found the maximum R_s rate exceed twice the minimum rate (from 3.43 to $9.91 \mu\text{mol m}^{-2}\text{s}^{-1}$). T_s variation is likely to explain the diurnal variation of R_s rather than SWC. Based on the trenching and root exclusion methods, we also quantified partitioning R_s into autotrophic and heterotrophic sources. Further, we discussed characteristics of R_s in the moso bamboo forest by comparing with those of previous literatures in other types of forested ecosystems.