Geophysical Research Abstracts
Vol. 19, EGU2017-646, 2017
EGU General Assembly 2017
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Fine root dynamics in moso bamboo and Japanese cedar forest by scanner method in central Taiwan

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Phyllostachys pubescens is one of the most important economic plant in the world. *Phyllostachys pubescens* originates from China and it had been introduced to neighbor countries about three hundred ago due to its economic value. But substantial bamboo forests were abandoned due to declines in demand. These unmanaged bamboo forests have been expanding to adjacent original forests in northern Taiwan. This vegetation alternation may not only decrease the local biodiversity but also affect the carbon cycle.

Fine roots are responsible for water and nutrients acquisition and forming the most active part of the whole root system. The characteristics of fine roots are non-woody, small diameter and short lifespan. When roots keep producing new roots and replacing old roots, carbon and nutrients was transported into soil. Consequently, fine root production is one of the important component to understand the below-ground carbon cycle. However, there is few studies about fine root production in moso bamboo forests. We still lack effective method to obtain quantitative and objective data in Taiwan. It severely limits us to understand the below-ground carbon dynamics there.

Minirhizotrons method has been used to investigate fine root dynamics by inserting transparent tubes into soil and by comparing changes in root length in images taken by micro-camera. But this method has some shortcomings; i.e. Most of image analysis are conducted manually and time-consuming. And it is difficult to estimate the stand level fine root production from small observation view. A new method “scanner method”, which collect A4-size image (bigger than minirhizotrons) can overcome some parts of the shortcoming of minirhizotrons. The transparent acrylic box with A4-box view is inserted into soil and the interface between soil and box is scanned by commercial scanner. We can monitor the total projected root area, growth and decomposition separately by series of images.

The primary objective of this study is to characterize the temporal and spatial variation of fine root dynamics in moso bamboo forests in central Taiwan by using scanner method with 6 acrylic boxes. Other the other hand, this study compared the result with those of adjacent Japanese cedar forests with 8 acrylic boxes. Consequently, we found the fine root production rate and decomposition rate of the bamboo forest are higher than cedar forest. Also, the timing of first observation of new roots was earlier in bamboo forest than cedar forest. This study also examined differences of temporal patterns among measurement locations based on long-term data after box installation.