지상라이다를 활용한 착엽 및 낙엽기의 수관부피 추정에 관한 연구

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Estimation of Canopy Volume at the Leaf-On and Leaf-Off Seasons using Terrestrial LiDAR Dataset

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Canopy volume or biomass is an important parameter to estimate the carbon stock in tree canopies. Photosynthetic part in the canopy volume is a key factor to determine the ecosystem function. LiDAR (Light Detection and Ranging) remote sensing has emerged as a powerful technology to measure the three dimensional canopy structures in more accurate and effective way. This study aims to measure estimate the change in canopy volume and the amount of photosynthetic parts at the single tree to plot level, by the terrestrial LiDAR measurements at leaf-on and leaf-off seasons within a year. We measured the canopy volume of 30 trees in *Zelkova Serrata* planted at two plots in the Experimental Forest of Seoul National University, Suwon, Korea (37°15'58.7"N 126°56'22.7"E), on March 22nd (leaf-off season) and August 30th (leaf-off season), respectively. And we used the terrestrial LiDAR in two different seasons to capture the shape of whole canopy structures at the same places as possible. Then the LiDAR point cloud dataset of the trees' canopy was normalized by the 1 mm3 voxel (Hosoi and Omasa, 2013), and the canopy volume was calculated by the total numbers of voxels. From the differences in the canopy volumes of two seasons, we estimated the amount of foliage in at the single tree level and the plot level. The preliminary results highlighted the potential usefulness of multi-temporal LiDAR measurements to quantify the change in canopy structure in more than centimeters accuracy. However, it has been challenged by the measurement errors based on the unstable field condition (e.g., wind) or the options on pre-processing methods for the LiDAR data.

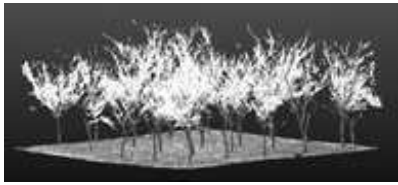* Correspondence to : songkoon@gmail.com

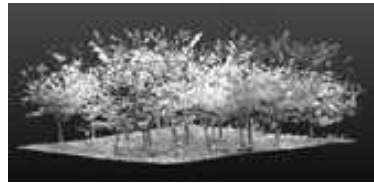Fig. 1. LiDAR data taken in the leaf-off season

Fig. 2. LiDAR data taken in the leaf-on season

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