Evaluation of a Wall-to-Wall Canopy Height Satellite Product in Boreal Forests

*Wei Yang[1], Hideki Kobayashi[2]

1. Chiba University, 2. JAMSTEC

Forest canopy height is a crucial parameter for studying forest biomass, species diversity, as well as some other ecosystem functions. Satellite Light Detection and Ranging (LiDAR) is the state-of-the-art technique to measure the canopy height at continental/global scales. However, the Satellite LiDAR may miss some of the forests because of the spatial separation of individual spots. Therefore, a number of efforts have been carried out to generate wall-to-wall canopy height product by combining the LiDAR and other data sets. Among these studies, the product provided by Simard et al. (2011) has been extensively utilized in various applications. Nevertheless, it has also been pointed out that the satellite product yielded estimation biases in China’s forests. More extensive validation efforts to other biomes is therefore needed to derive a more comprehensive assessment of the canopy height product. In this study, we validated the global wall-to-wall canopy height product in boreal forests, where plays important roles in global terrestrial carbon cycles, by using the field measurements obtained from literature resources. Results demonstrated that the satellite canopy height yielded significant correlation with field measurements (R^2 = 0.67, and $P<0.001$). Estimation biases were observed with the regression slope greater than 1.0 and intercept around -10.0. This relationship is consistent with the validation results for MODIS tree cover product, which is a key input parameter for the estimation of satellite canopy height. The evaluation results indicate that the satellite product needs to be further improved in the boreal forests for future applications.

Keywords: remote sensing, boreal forests, literature survey, canopy height

