Evaluation of allometries for estimating above-ground biomass using airborne LiDAR data in tropical montane forest of Northern Borneo

ABSTRACT

Tropical forests play a crucial component of the terrestrial carbon pool and estimate of above-ground biomass (AGB) with high accuracy is important in quantifying tropical forest carbon stocks. There are several allometries available for estimating tropical forest tree AGB using field measurements, the choice of allometric equation is a decisive factor that can influence the AGB estimation accuracy. This study examined the use of allometric equations to accurately estimate AGB using airborne LiDAR data. The LiDAR data of Ulu Padas area was acquired using Optech Orion C200. 56 field plots were established to collect data on diameter at breast height, tree height and tree species. Field AGB was calculated from allometric equations of Yamakura et al. (1986), Basuki et al. (2009), Chave et al. (2005) and Chave et al. (2014). All LiDAR-derived height metrics and variables were correlated with field AGB (R: 0.30-0.88). Based on stepwise multiple regression analysis, Chave et al. (2014) allometry had highest model R^2, explaining 81% of the variance of the field AGB. In short, allometry that includes wood density should be used in LiDAR applications on tropical forest AGB estimation.