TREE HEIGHT ESTIMATION IN TROPICAL RAIN FOREST LANDSCAPE USING IfSAR DATA

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Abstract: Tree height is one of essential components in study of forest biomass. Practically, tree height has been direct calculated based on established allometric equation after regular measurement of diameter of breast height (DBH). However, DBH measurements in high density of primary tropical rain forest is time consuming and laborious. At present, a plot scale measurements is adequately to be used in up-scaling the whole coverage of forest ecosystem conditions. In certain cases, the results seems not representing accurately the real information compare the ratio of area coverage. Currently, with recent development of terrestrial elevation model from airbone remote sensing technology, tree height is able to be derived using semi-automated approach over large area with low cost and rapidly. Indeed, over high dense vegetated area such as in primary Tropical Rain Forest, advances technology is necessary in order to support the limitation of the sustainability process. Thus, this study shows the use of airbone terrestrial elevation model from IfSAR (Interferometric Synthetic Aperture Radar) sensor to derive the tree height in oldest and high density tropical rain forest reserve at nearly center of Peninsular Malaysia named as Pasoh Forest Reserve (PFR). Biometric measurement approach to every single tree at DBH ≥ 10cm over area of 25 hectare has been conducted in one of the experimental plot in PFR. While, X-band of IfSAR data with high spatial resolution (1.25m) and high three dimensional (3-D) extraction information capability (0.5-1.5m) which shows the versatile methodologies in derivation of tree height over wide coverage has been used to calculate the tree height. Two IfSAR 3D product images namely DSM and DTM, respectively have been successfully to be extracted to show the tree height patterns in PFR. Analysis from random locations thirteen of tree height samples derived from IfSAR gives a good confidence accuracy (RMSE = 16.08) and highly correlated (r2 = 0.7) compare with biometric tree height (calculated using established biometric equation). In addition, classification image on tree dominant species using SPOT-5 is then to be overlaid with 3-D image of tree height IfSAR, which is able to give the trend distribution of tree height according tree species. As to conclude, this study has discovered that IFSAR 3D products able to estimate most important information such as tree height whereby can be used to calculate tree biomass as well as net primary productivity in high dense Tropical Rain Forest.

KEYWORDS: Tree height, Tropical Rain Forest, IfSAR.