

Forest height and aboveground biomass retrieval in tropical forests using multi-pass X- and C-band Pol-InSAR data

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Abstract:

Tropical forests are under severe anthropogenic pressure. Indonesia became one of the largest greenhouse gas emitters worldwide due to deforestation and forest degradation and is therefore in the focus of REDD+ projects which aim at reducing emissions from deforestation and forest degradation. These projects require a precise monitoring of forest carbon stocks and its changes which are generally derived from aboveground biomass (AGB) estimations.

The aim of this project is to estimate forest height and AGB in tropical peat swamp forests in Central Kalimantan on Borneo whereby the focus is on the synergistic use of X- and C- band Pol-InSAR data. Reference data are field inventories, LiDAR measurements and airborne mission dates. Forest height will be retrieved using random volume-over ground (RVoG) and random motion-over-ground (RMoG) models using Radarsat-2, Sentinel-1, TanDEM-X and TerraSAR-X data. Different beam modes, acquisition dates, baselines, polarizations and their impact on forest height and AGB accuracy will be thoroughly evaluated. Furthermore, an algorithm based on existing change detection techniques will be developed to monitor forest height and AGB changes between two acquisition dates. This will be achieved using a combination of existing SAR data from 2012 and new acquisitions planned for 2015. The robustness and transferability of our developed methodologies will then be tested by applying them to a second region with another tropical ecosystem. Our results will deliver robust methods for deriving forest elevation, biomass and their respective temporal changes within tropical regions, using a synergy of X- and C-band data, and Pol-InSAR processing techniques.

PolInSAR4AGB

Duration: 01.08.2015 – 31.07.2018

EO Data Source: TerraSAR-X, TanDEM-X, Radarsat-2, Sentinel-1

Support Program: Development of X and C-band SAR applications

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