Hyperspectral remote sensing for tropical rain forest.

ABSTRACT

Problem statement: Sensing, mapping and monitoring the rain forest in forested regions of the world, particularly the tropics, has attracted a great deal of attention in recent years as deforestation and forest degradation account for up to 30% of anthropogenic carbon emissions and are now included in climate change negotiations. Approach: We reviewed the potential for air and spaceborne hyperspectral sensing to identify and map individual tree species measure carbon stocks, specifically Aboveground Biomass (AGB) and provide an overview of a range of approaches that have been developed and used to map tropical rain forest across a diverse set of conditions and geographic areas. We provided a summary of air and spaceborne hyperspectral remote sensing measurements relevant to mapping the tropical forest and assess the relative merits and limitations of each. We then provided an overview of modern techniques of mapping the tropical forest based on species discrimination, leaf chlorophyll content, estimating aboveground forest productivity and monitoring forest health. Results: The challenges in hyperspectral Imaging of tropical forests is thrown out to researchers in such field as to come with the latest techniques of image processing and improved mapping resolution leading towards higher precision mapping accuracy. Some research results from an airborne hyperspectral imaging over Bukit Nanas forest reserve was shared implicating high potential of such very high resolution imaging techniques for tropical mixed dipterocarp forest inventory and mapping for species discrimination, aboveground forest productivity, leaf chlorophyll content and carbon mapping. Conclusion/Recommendations: We concluded that while spaceborne hyperspectral remote sensing has often been discounted as inadequate for the task, attempts to map with airborne sensors are still insufficient in tropical developing countries like Malaysia. However, we demonstrated this with a case study focused on a mixed hill dipterocarp forest in Kuala Lumpur, Malaysia and discuss the work in the context of reducing uncertainty for carbon monitoring and markets.

Keyword: Airborne; Spaceborne; Hyperspectral; Remote sensing; tropical Mixed hill dipterocarp forest.