



## **Derivation of Mangrove Structural Properties from Terrestrial Laser Scanning**

Chunyue Niu, Stuart Phinn, and Chris Roelfsema

Remote Sensing Research Centre, School of Earth and Environmental Science, The University of Queensland, Brisbane QLD 4072, Australia

Mangroves are an important component in tropical and subtropical coastal wetlands. In recent decades, mangrove loss and dieback has occurred more frequently due to human activities and climate change. There is an urgent need to monitor their conditions at local to global scales. Although leaf area index and above-ground biomass of mangroves have been mapped from remote sensing images, it is still not clear how canopy structural properties affect the spectral responses of mangroves measured by satellite imaging systems. This limits the potential of remote sensing to measure and monitor the condition of mangroves. This study proposes a method to extract essential canopy structural properties, i.e. plant area index, fractional cover, leaf-to-total area ratio and inclination distributions of plant materials, from terrestrial laser scanning data of typical mangroves in South East Queensland, Australia. Mangroves trees at our field site were divided into three height layers, based on vertical height profiles of each structural property. Structural properties of each layer were then calculated and used to represent the canopy form and distribution of mangroves at plot level. This study adopted a few structural properties to describe mangrove canopy structure and derived these needed properties from terrestrial laser scanning data. Our findings can then be used to link mangrove structural properties and canopy reflectance measured from airborne or satellite data to map and monitor their condition over time.