Coupling Avicennia tree architecture to radar backscatter models for estimating mangrove forest biomass

Alex Melius [1,2], Christophe Proisy [1], Patrick Heuret [3], Frédéric Boudon [4]

[1] IRD/UMR AMAP, Route de Montabo, BP 145, 9763 Cayenne cedex, French Guiana
Email: melius@cayenne.ird.fr
[2] CETP, 10-12 Avenue de l'Europe, 78140 Velizy, France
[3] INRA/UMR AMAP, TA 40 / PS 2 boulevard de la Lironde 34398 Montpellier,France
[4] LORIA, Campus Scientifique - BP 239 54506 NANCY, France

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Abstract:

The understanding of mangrove ecosystems functioning requires techniques allowing their forest structure and forest biomass to be assessed. Among them, radar measurements have demonstrated powerful capabilities that, however, must be validated extensively, both spatially and physically. Beyond their intrinsic potential to provide basic information on tree growth and forest functioning, 3D tree architecture studies could help the interpretation of radar signal scattering within forest canopies to be performed and thus, improve the accuracy of radar inversion algorithms for estimating forest parameters such as total above-ground biomass and component biomass.

Topological measurements have been conducted at different growth stages on *Avicennia germinans* trees with height less than 5 meters. For each tree measured, leaf size, nodes length and diameter are coded using the AMAPmod terminology. Thanks to this software and assuming stands composed of identical trees, input parameters for the radar backscatter models of forests are then derived from architectural analysis. The simulated radar responses are compared to radar measurements when available. The effect of tree architecture and the structure of associated stands are discussed with the objectives to estimate forest parameters using radar data. This work comes within the international project ALOS Kyoto and Carbon Initiative aiming to monitor forest dynamics, particularly mangrove forests.