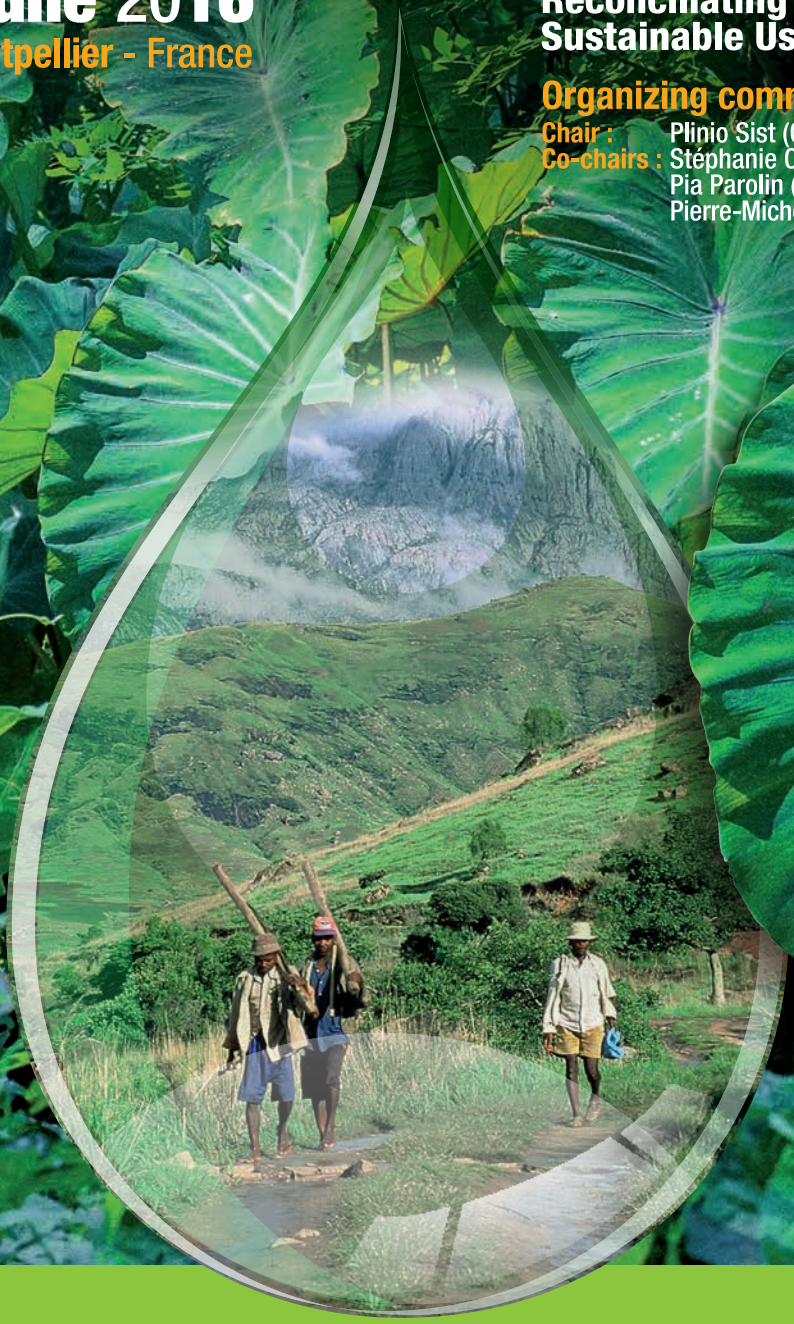
53rd ATBC 2016

# Annual Meeting of the Association for Tropical Biology and Conservation

**19-23 June 2016**
Le Corum, Montpellier - France

## Tropical Ecology and Society Reconciliating Conservation and Sustainable Use of Biodiversity

**Organizing committee :**
Chair : Plinio Sist (CIRAD)
Co-chairs : Stéphanie Carrière (IRD)
Pia Parolin (INRA)
Pierre-Michel Forget (MNHN, CNRS-INEE)



**PROGRAM & ABSTRACTS**

www.atbc2016.org

Association for Tropical Biology and Conservation
cirad
IRD Institut de recherche pour le développement
INRA SCIENCE & IMPACT
MUSÉUM NATIONAL D'HISTOIRE NATURELLE
cnrs
CIFOR

CONGRESS OFFICE
HOPSCOTCH CONGRÈS
23/25, rue Notre-Dame des Victoires
75002 Paris | France
www.hopscotchcongres.com

**O56-08 – S56** *Towards refined carbon budgets of managed forests*
Thursday 23 June / 14:30-17:00 – Einstein

## Xtrawood: refining estimation of tree above ground biomass using wood specific gravity variations and tree structure

ROMAIN LEHNEBACH[1], HÉLÈNE MOREL[2], JULIE BOSSU[3], JACQUES BEAUCHÊNE[2], ERIC NICOLINI[4], JEAN-FRANÇOIS BARCZI[1], SÉBASTIEN GRIFFON[1]
[1]CIRAD, JRU AMAP, botAny and Modelisation of Plant Architecture and vegetation, 34398, Montpellier, France
[2]CIRAD, JRU EcoFoG, Ecology of Guianan Forest, 97310, Kourou, France
[3]CNRS, JRU EcoFoG, Ecology of Guianan Forest, 97310, Kourou, France
[4]CIRAD, JRU AMAP, botAny and Modelisation of Plant Architecture and vegetation, 97310, Kourou, France

Background: Tree above ground biomass (AGB) is currently estimated by tree-level allometrical models that take into account, tree volume estimated from proxy variables of tree size (DBH) and species average wood specific gravity (WSG). These methods are common and realistic from a practical point of view. However, they do not take into account deviance from fixed allometrical trajectories and spe-cies or tree level WSG variations. Here, we present Xtrawood software that allows computation of tree AGB according to structure and WSG variations.
Method: Xtrawood reconstructs tree structure and integrates WSG variations by merging tree structure and WSG data measured at different position in trees, leading to the computation of global AGB and visualization of WSG variation along tree structure. Tree structure is measured according to stem dimensions (length, diameter) and positions within tree, and encoded in Multiscale Tree Graph format (MTG). WSG data is made of radial WSG profiles (1 measure each 0,5 cm from pith to bark) sampled at different heights within whole tree. Xtrawood output are illustrated using a dataset collected on an Amazonian forest 'biomass dominant species', Dicorynia guianensis Amsh., also known to exhibit substantial WSG gradients along both radial and vertical axis. 9 trees ranging from 15 to 60 cm DBH were measured by climbers. Each tree was felled and samples were collected at different positions (3 in trunk, 1 to 5 in crown) to record WSG radial profiles.
Results: Xtrawood allows computation of tree volume, but also visualization of WSG variations in tree as well as inference of WSG radial profiles at different heights. Output variables are decomposed according to different tree scale and locations (axis, trunk/crown) and easy to extract. Xtrawood results will be compared to those of standard estimation method and can be used to identify positions in trees where WSG value leads to the better estimate of tree AGB.
Conclusion: Xtrawood produces AGB estimate with data from intensive measurements practices. The sampling protocol, used here, remains destructive and time-consuming because Xtrawood is not directly dedicated to forest managers, but to help calibration of realistic sampling strategies. Moreover, Xtrawood offers a way to understand relationships between tree development, WSG variations within tree structure and biomass accumulation in the context of natural forests or plantations. A software demo is available at coffe break.

---

**O57-01 – S57** *Intraspecific variation in tropical trees – implications for tropical forest responses to global change*
Thursday 23 June / 08:00-10:00 – Sully1

## Species coexistence, inter- and intraspsecific trait variation in a tropical forest

CYRILLE VIOLLE
CNRS, Centre d'Ecologie Fonctionnelle et Evolutive, 34293, Montpellier, France

The incorporation of functional traits in community ecology has recently led to crucial advances in the understanding of community assembly rules. However, intraspecific trait variation still needs to be accounted for, despite its theoretical importance in species coexistence theory. Individual is the fundamental unit of ecological interactions. Therefore, intraspecific variation can help us to better understand assembly processes shaping ecological communities. In that purpose, we used variance decomposition and ratios of variances at different organizational levels for 19 traits measured in 4671 individuals belonging to 668 species in a tropical rainforest. Combined with null models, these methods allowed us to (i) quantify the relative importance of intra- and inter-specific variations for the assemblage of communities of tropical trees, (ii) test the relevance of individual-centred community ecology for the coexistence of tropical trees and (iii) infer underlying community assembly mechanisms. Intraspecific trait variance is large (39 % on average) including features often averaged by species only in the ecological literature (e.g. specific leaf area and canopy height). Species undergo no filter while individuals undergo an external filter, mainly captured by delta 15N in leaves. In addition, 16 traits are involved in the internal filter of the community, particularly traits associated with resistance / tolerance to herbivory. These results highlight the importance of intraspecific variation in the assembly of tree communities.