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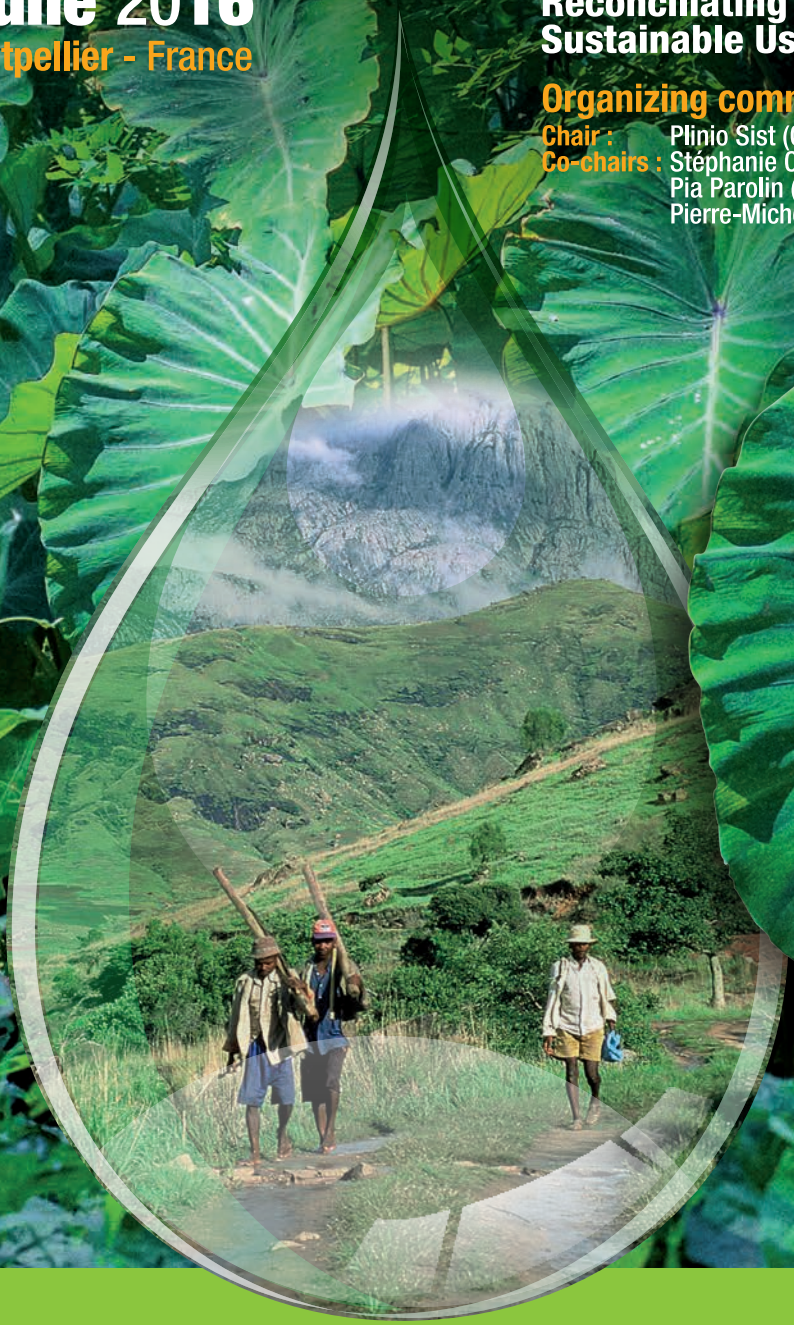

PROGRAM & ABSTRACTS

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O45-04 – S45 *Biodiversity patterns and processes along altitudinal gradients in tropical forests*
Wednesday 22 June / 10:00-15:30 – Antigone3

Do the foliar functional properties of liana assemblages differ from those of the trees they share the forest canopy with? A test on a rain forest altitudinal gradient in Costa Rica

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The abundance of lianas may be increasing pervasively in tropical forests, one possible reason being that they are functionally more acquisitive than trees. Better understanding of drivers of change in liana assemblages, however, should also take into account functional properties of whole assemblages. These considerations are especially important in forests on mountains because of the potential effects of climate change. In four old-growth rain forest types on infertile soils over a 440-2950 masl altitudinal gradient, we determined community weighted means (CWM, basal area-weighted) of six leaf traits. We asked whether liana CWM trait values are more acquisitive than those of the trees with which they share the forest canopy – higher CWM specific leaf area SLA and mass-based leaf nitrogen and phosphorous content (N, P) and lower leaf dry matter content LDMC. We also measured CWM N/P to determine whether lianas and trees may be nutrient-limited in different ways.
We identified and measured lianas >=2 cm stem diameter d and trees >=10 cm dbh in 30 square 0.25 ha permanent plots covering the altitudinal gradient. Leaf traits were measured using standard protocols for species forming 80% of basal area per plot for each growth form separately. We used general linear mixed models to compare CWM traits of the two growth forms, taking into account the effects of mean annual temperature MAT (Worldclim data) and plot soil characteristics synthesized by PCA. Plot was specified as a random factor.
No lianas >2 cm d were found in ten montane forest plots >1650 m asl, suggesting an overall temperature limitation on their distribution. For both growth forms in the three forest types with lianas, assemblage taxonomic composition differed significantly among forest types (ANOSIM, $p<0.05$). There were no differences between growth forms or relationships to environment for CWM N, SLA or LDMC. CWM P did not differ between growth forms but was negatively correlated with MAT and its associated soil gradient for both. CWM N/P was >16 overall, suggesting pervasive P-limitation, though it declined with MAT for trees. CWM N/P was significantly higher for trees than for lianas, suggesting that liana assemblages are less P-limited than trees. Our results suggest that strategies for acquisition and use of P in low-P soils are a primary functional difference between liana and tree assemblages in these forests.

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Altitudinal gradients of tree species diversity and above-ground biomass on a small montane of Atlantic Central Africa

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Tropical forests are both important carbon sinks and among the most biodiverse ecosystems on the earth. Patterns in aboveground biomass (AGB) and their relationship with species diversity of tropical forests over short altitudinal gradients are poorly known and the few previous studies on the subject have yielded variable results. Here, focusing on old-growth forests in Atlantic central Africa, we investigated how AGB varies with altitude, and how this variation is related to altitudinal changes in floristic composition and/or forest structure. We also investigate the relationship between AGB and species diversity along the altitudinal gradient.
We inventoried all trees with a diameter (dbh) ≥ 10 cm in fifteen 1 ha permanent plots (100 m x 100 m) established along a transect from lowland (200 m) to submontane forests (900 m) in the Ngovayang Massif, southwestern Cameroon.
Our data show a negative relationship between AGB and tree species richness, related to the elevation gradient. Forest AGB varied two-fold along this gradient, decreasing from 500-600 Mg ha-1 in lowland plots to less than 300 Mg ha-1 at the highest altitudes, while diversity increased, from 35.4 to 54.6 (Fisher's alpha index). The decreasing trend in AGB was mainly due to large trees (dbh ≥ 70 cm) whose contribution to AGB significantly decreased with altitude while the contribution from smaller trees was constant. Tree height and basal area also decreased significantly with increasing altitude, whereas stem density increased. While maximum potential tree height significantly decreased, wood specific gravity displayed no trend along the gradient. In particular, we showed that AGB variation was mainly determined by shift in species composition because large tree species were filtered out in the highest altitudes. Hence, our work further highlight the need for studying the drivers of large tree species distribution to better understand forest carbon stock variations in tropical forests.
At the regional level, the Ngovayang massif was among the richest sites with highest level of biomass. Our results have strong implications in decisions on balancing carbon sequestration strategies with biodiversity conservation ones. Policy consequences are particularly relevant in forest management and land use planning.
Keywords: Carbon stocks, forest structure, biodiversity, submontane forests, niche filtering, altitudinal gradient.