EVALUATING DGVM PERFORMANCE FOR THE AMAZON BASIN WITH NEW BASELINE MAPS OF TROPICAL FOREST PROPERTIES

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JULES meeting 2014
RAINFOR PLOTS

- Typically 1ha plots
- All stems > 10cm diameter measured

RAINFOR PLOTS

Biomass plots

322 plots

Productivity/mortality/turnover – multi-census plots

167 plots
Above ground woody productivity Mg C/ha/yr

Above ground wood biomass Mg C/ha

Stem-based mortality rate %/yr
BIOGEOGRAPHICAL PATTERNS

Guiana Shield
High biomass
High productivity
Low mortality

E. C. Amazon
High biomass
Low productivity
Low mortality

W. Amazon
Low biomass
High productivity
High mortality

Brazilian Shield
Low biomass
Low productivity
High mortality

Guiana Shield
East Central Amazon
Western Amazon
Brazilian Shield
MODEL NPP vs OBSERVATIONS

ORCHIDEE

JULES

INLAND

LPJ
MODEL AGB (mean 2000-2008)
RESIDENCE TIMES AND BIOMASS

Gross primary productivity ($G_p$) 

Photosynthesis 

Autotrophic respiration

$N_p$ allocation 

Net primary productivity ($N_p$) 

Woody productivity ($W_p$) 

Woody biomass residence time ($\tau_w$) 

Tree mortality 

Standing biomass

Observed woody biomass residence times (years)

Galbraith et al (2013)
AGB vs NPP

Orchidee

Jules

Inland

LPJ

Observations
Extracting typical Amazon weather gradients with PCA

Sheffield meteorological forcings.

<table>
<thead>
<tr>
<th></th>
<th>Precip</th>
<th>Temp</th>
<th>Humidity</th>
<th>Radiation</th>
<th>%var</th>
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<tbody>
<tr>
<td>PCA1</td>
<td>-0.503</td>
<td>-0.500</td>
<td>-0.544</td>
<td>0.447</td>
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<tr>
<td>PCA2</td>
<td>0.357</td>
<td>-0.564</td>
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<td>PCA3</td>
<td>0.784</td>
<td>-0.119</td>
<td>-0.126</td>
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<td>PCA4</td>
<td>-0.646</td>
<td>0.751</td>
<td>0.117</td>
<td>-2</td>
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PCA 1 and PCA 2 together explain >80% of the variability

PCA 1 – gradient from wet, warm and cloudy → dry, cool and sunny
### AGB – PCA correlations

<table>
<thead>
<tr>
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<th>ORCHIDEE</th>
<th>LPJ</th>
<th>Inland</th>
<th>Obs</th>
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</thead>
<tbody>
<tr>
<td>PCA 1</td>
<td>-0.16*</td>
<td>0.02</td>
<td>-0.68*</td>
<td>-0.11*</td>
<td>0.16</td>
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*P<0.05
SUMMARY

• New maps of Amazon forest properties (Biomass, productivity, mortality) for validation and calibration of models.

• Comparisons have highlighted lack of agreement between models and observations.

• Climate is not a strong driver of observed biomass compared to the models.

• Models need dynamic mortality schemes with links to edaphic properties as well as climate stress.