

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

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RAINFOR PLOTS



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

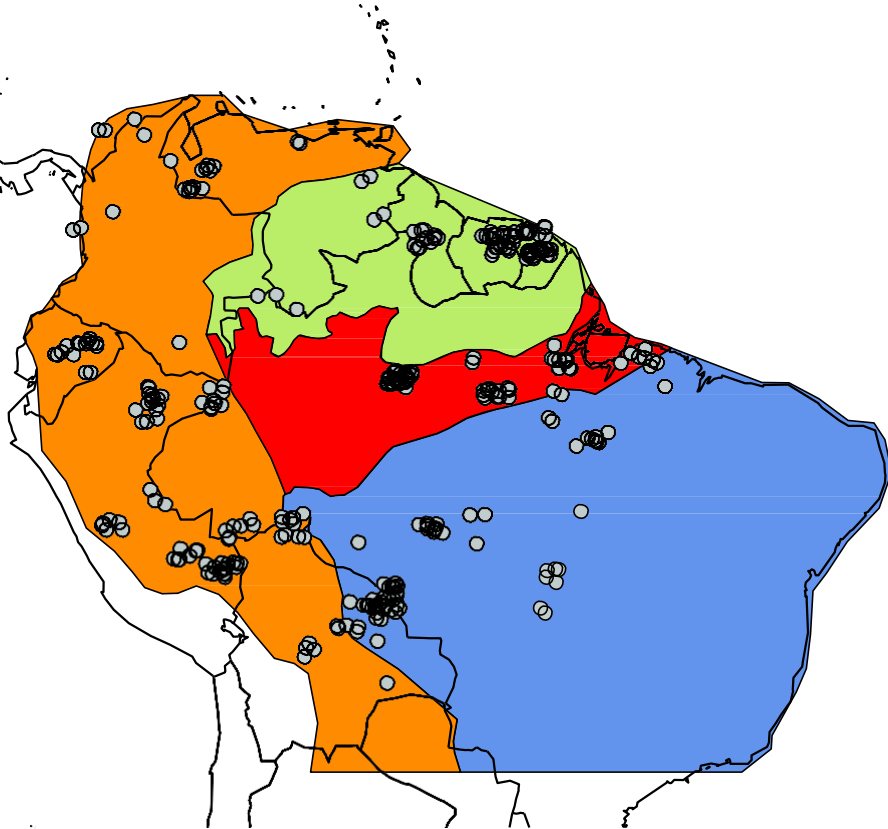


FORESTPLOTS.NET



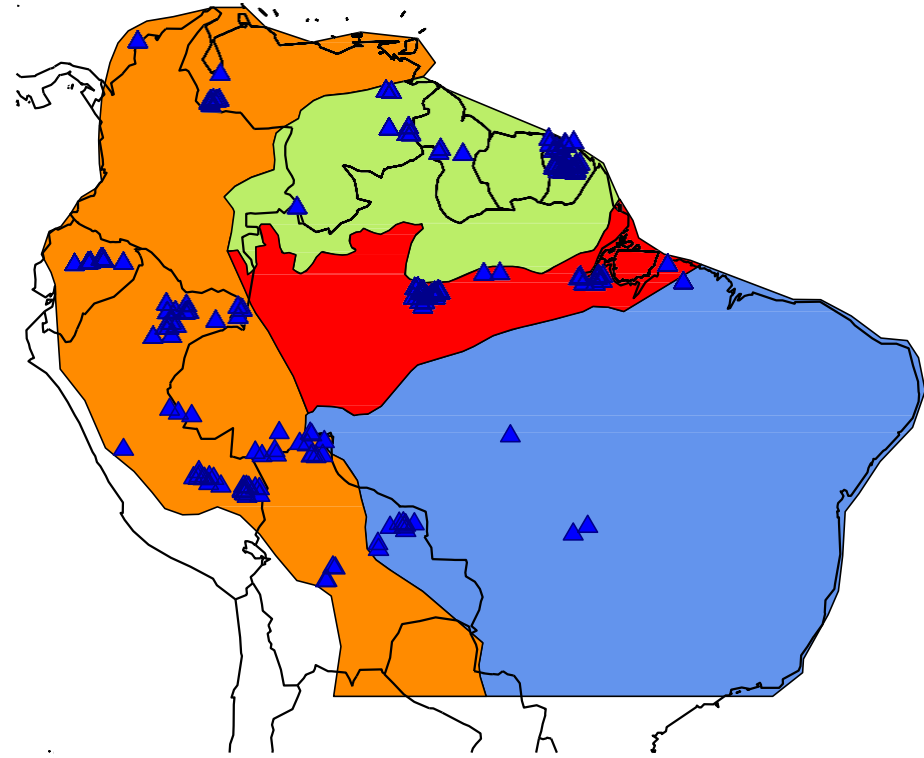
RAINFOR PLOTS

Biomass plots



322 plots

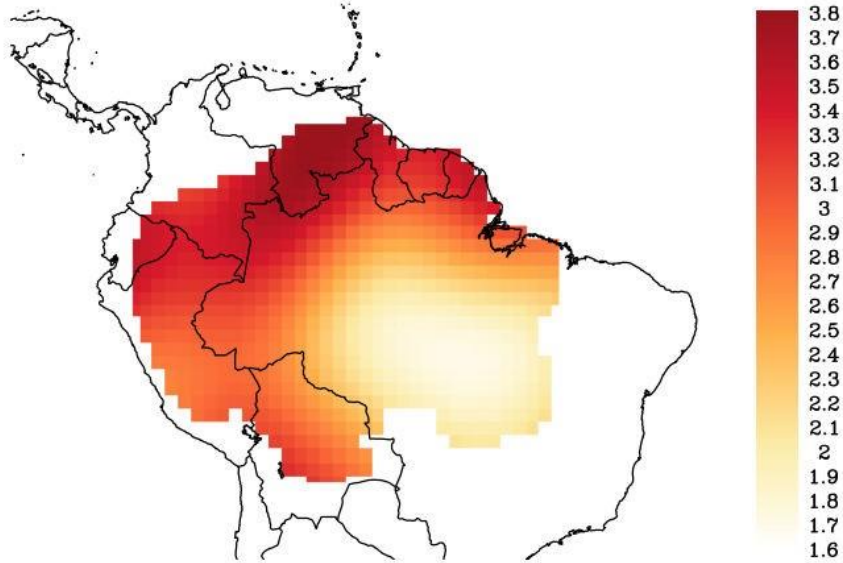
Productivity/mortality/turnover –
multi-census plots



167 plots

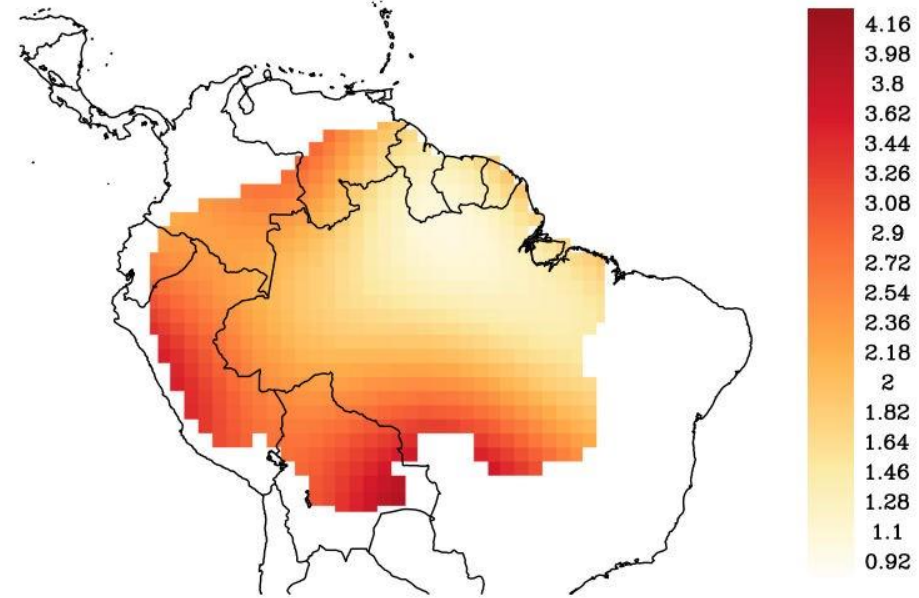
KRIGED OBSERVATIONS

Above ground woody productivity Mg C/ha/yr



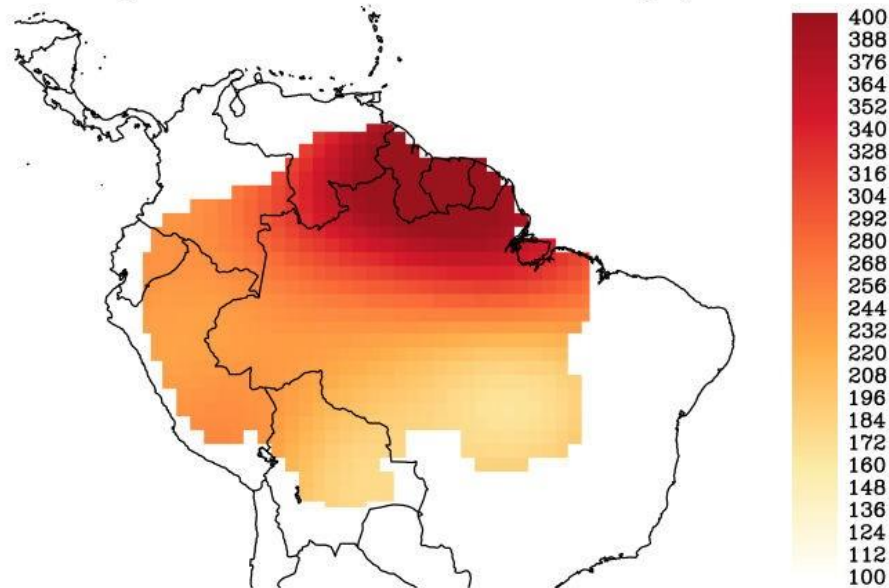
Stem-based mortality rate

%/yr

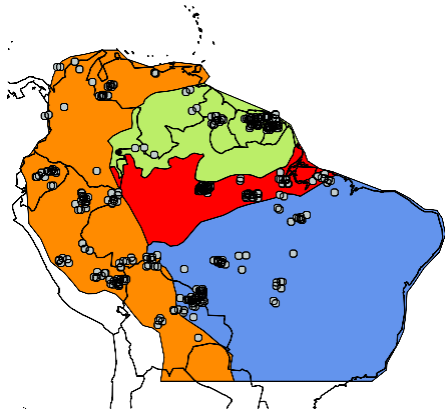


Above ground wood biomass

Mg C/ha

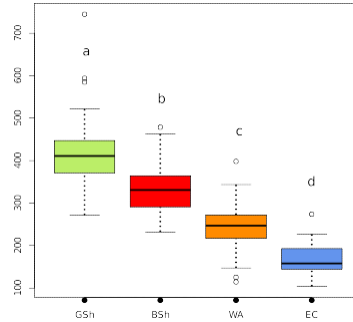


BIOGEOGRAPHICAL PATTERNS



Guiana Shield
 East Central Amazon
 Western Amazon
 Brazilian Shield

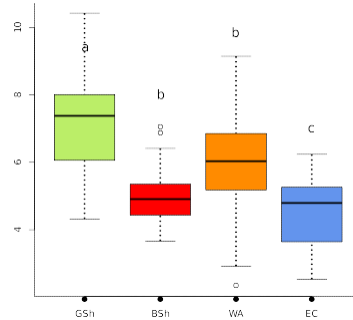
BIOMASS (Mg C ha⁻¹)



Guiana Shield
 High biomass
 High productivity
 Low mortality

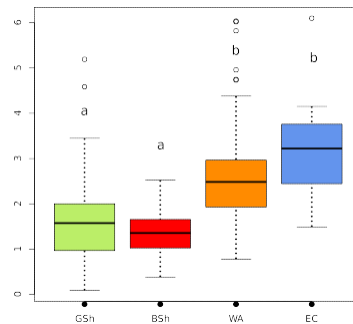
E. C. Amazon
 High biomass
 Low productivity
 Low mortality

PRODUCTIVITY (Mg C ha⁻¹ yr⁻¹)



W. Amazon
 Low biomass
 High productivity
 High mortality

MORTALITY (% yr⁻¹)



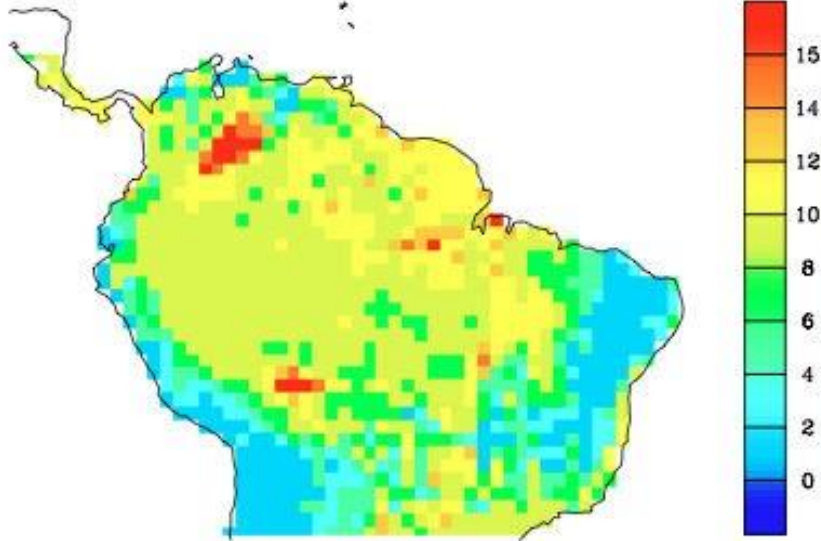
Brazilian Shield
 Low biomass
 Low productivity
 High mortality



MODEL NPP (mean 2000-2008)

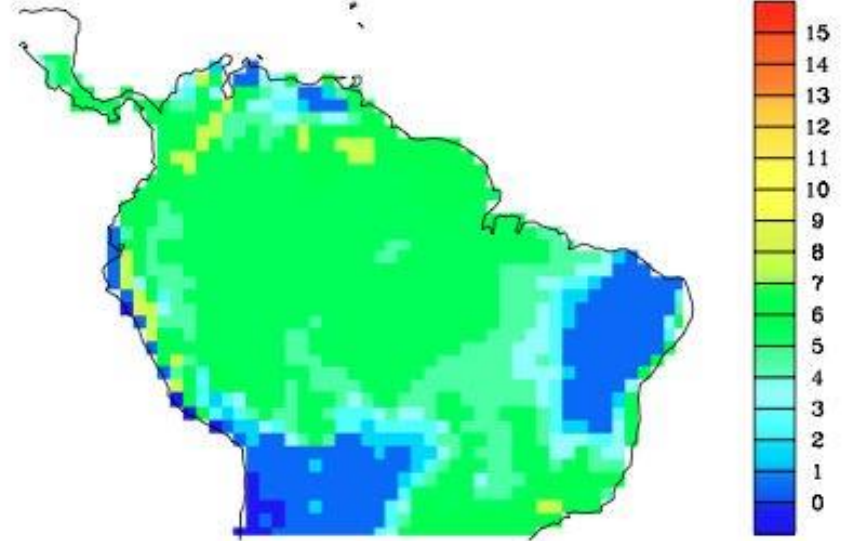
ORCHIDEE

Kg C m⁻² yr⁻¹



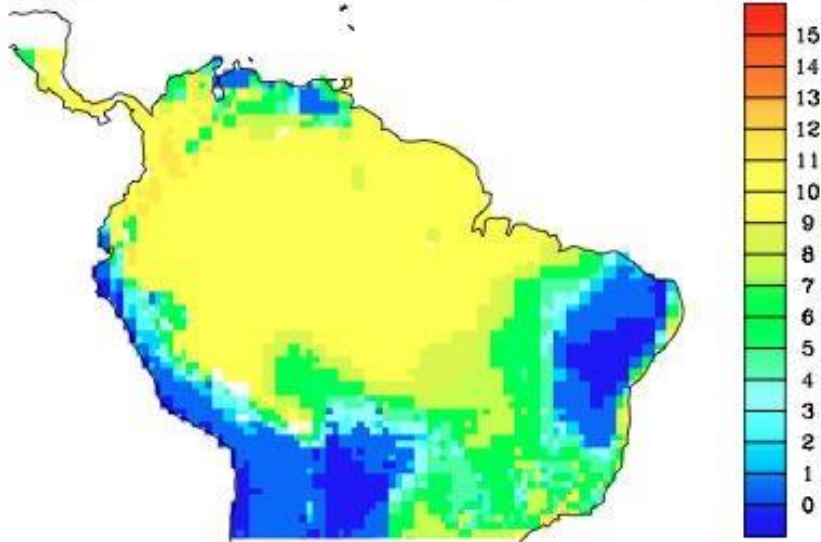
JULES

Kg C m⁻² yr⁻¹



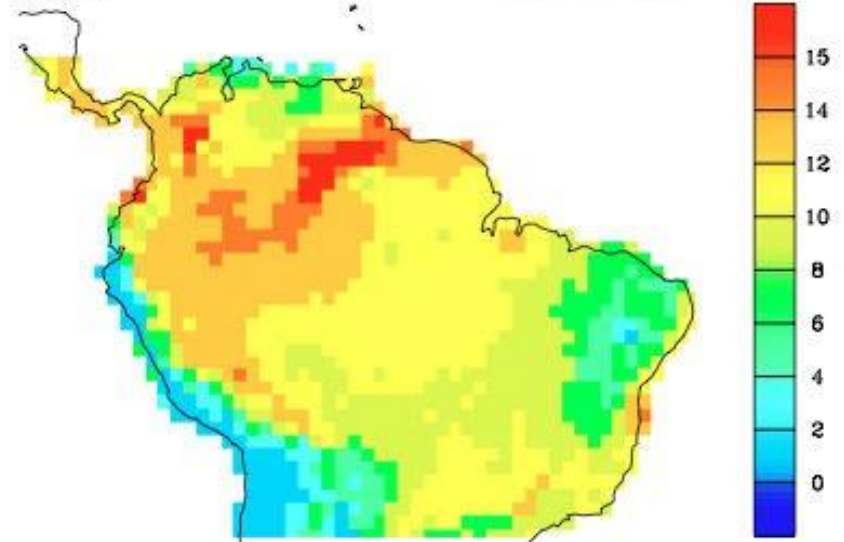
INLAND

Kg C m⁻² yr⁻¹



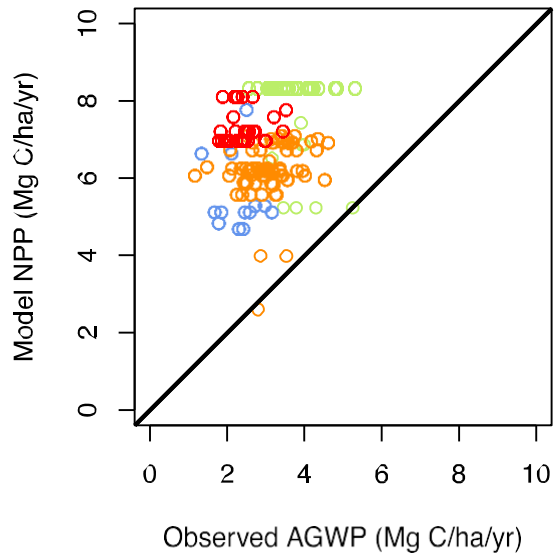
LPJml

Kg C m⁻² yr⁻¹

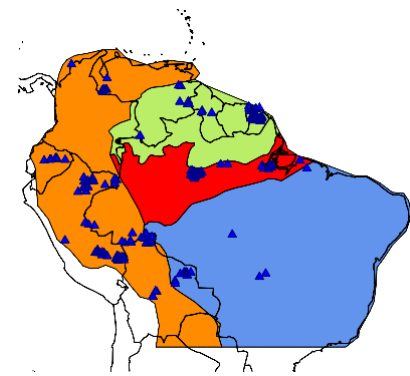
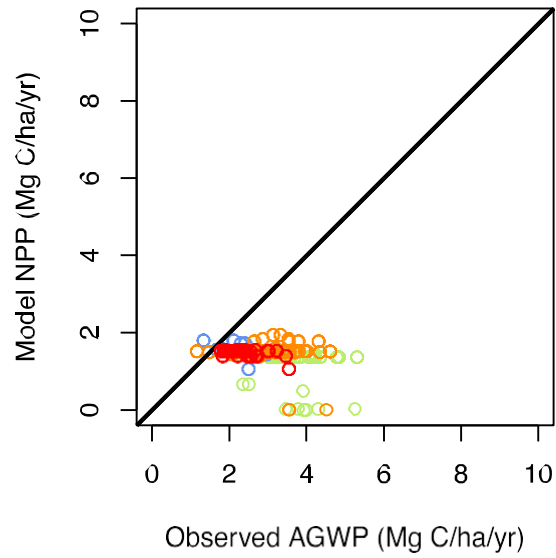


MODEL NPP vs OBSERVATIONS

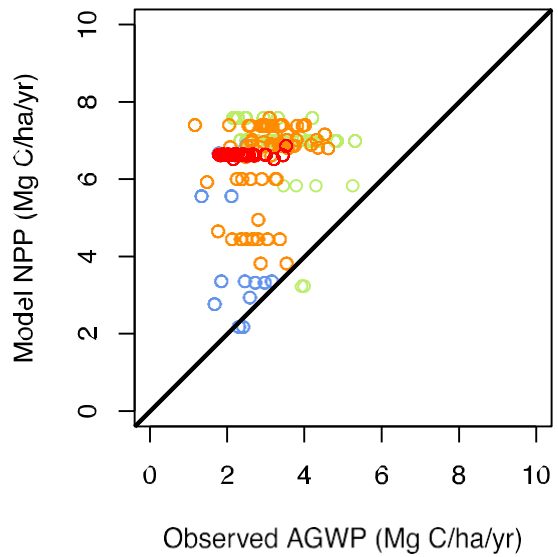
ORCHIDEE



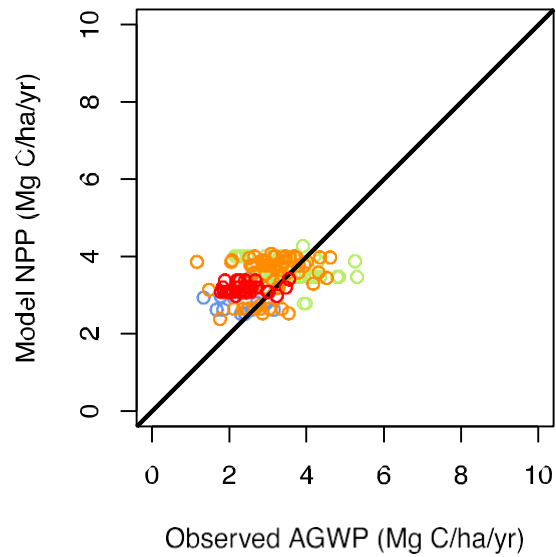
JULES



INLAND



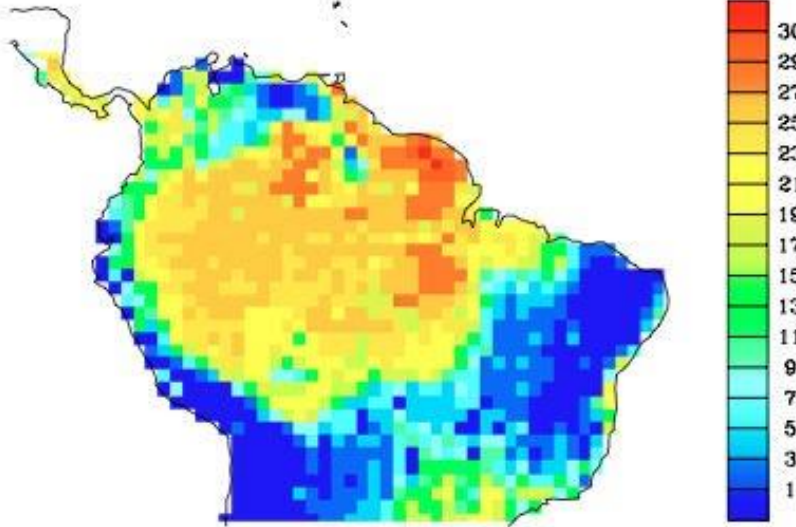
LPJ



MODEL AGB (mean 2000-2008)

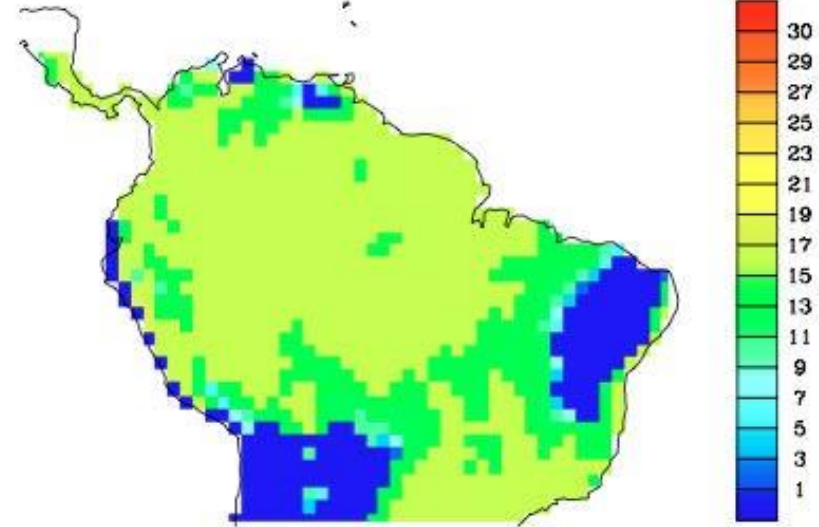
ORCHIDEE

Kg C m⁻²



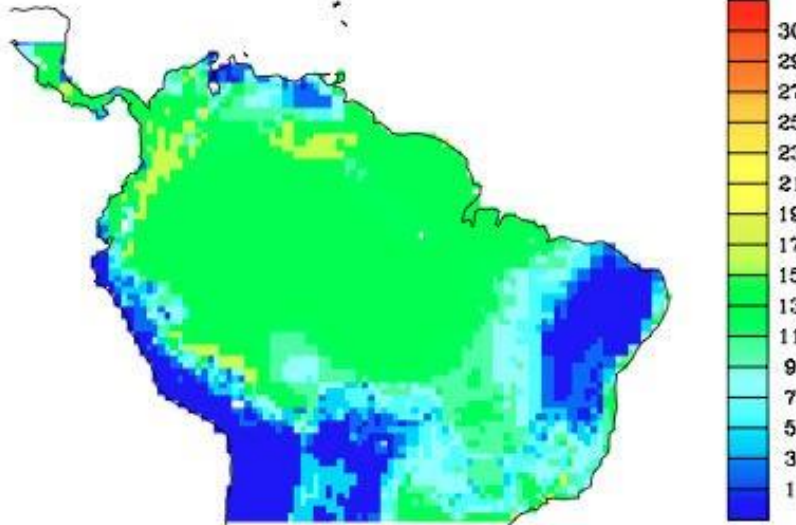
JULES

Kg C m⁻²



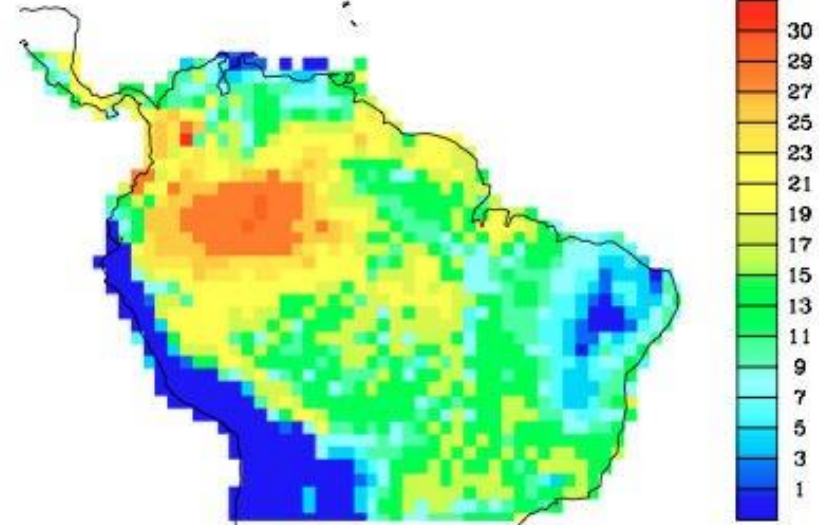
INLAND

Kg C m⁻²



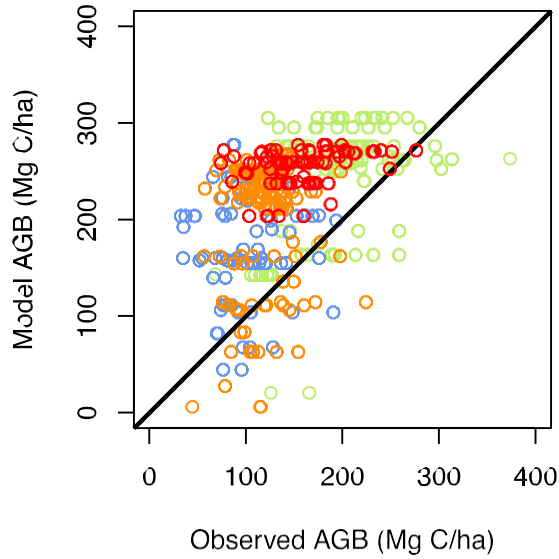
LPJml

Kg C m⁻²

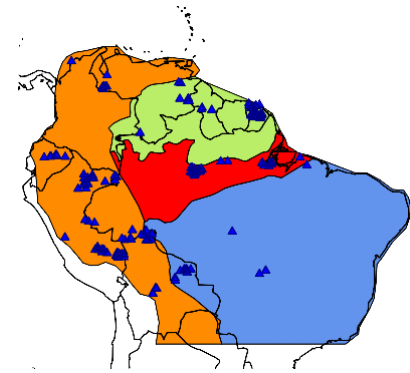
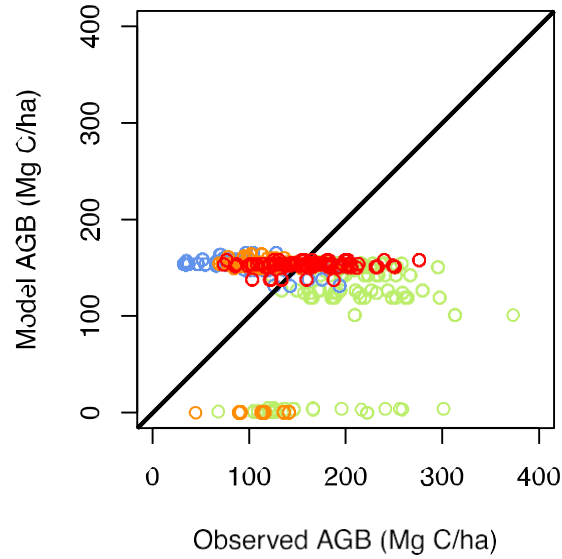


MODEL AGB vs OBSERVATIONS

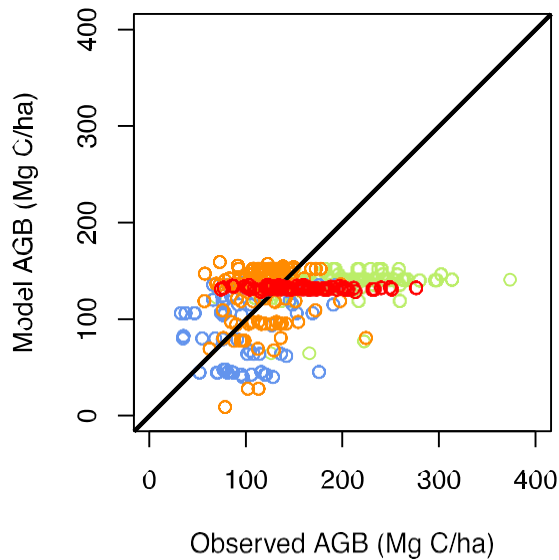
ORCHIDEE



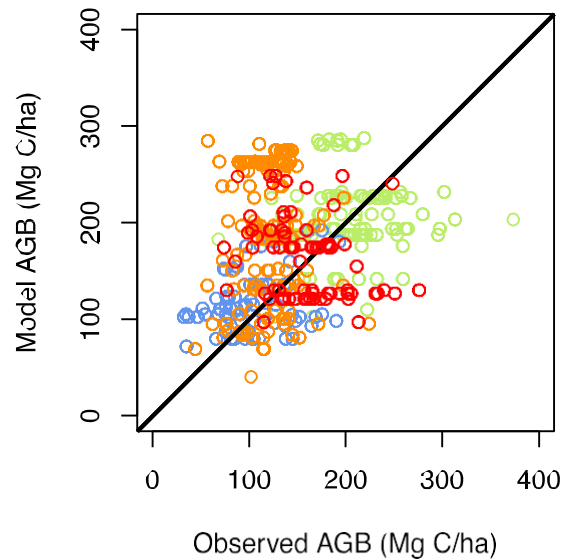
JULES



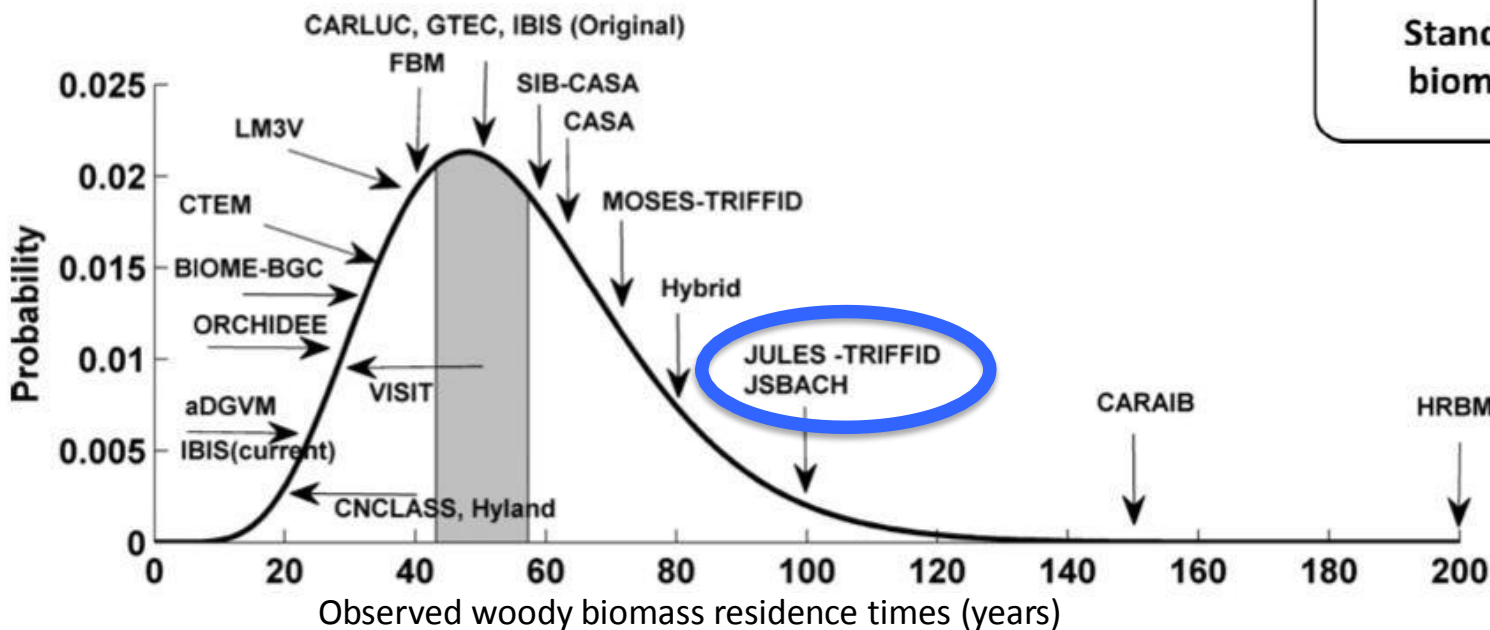
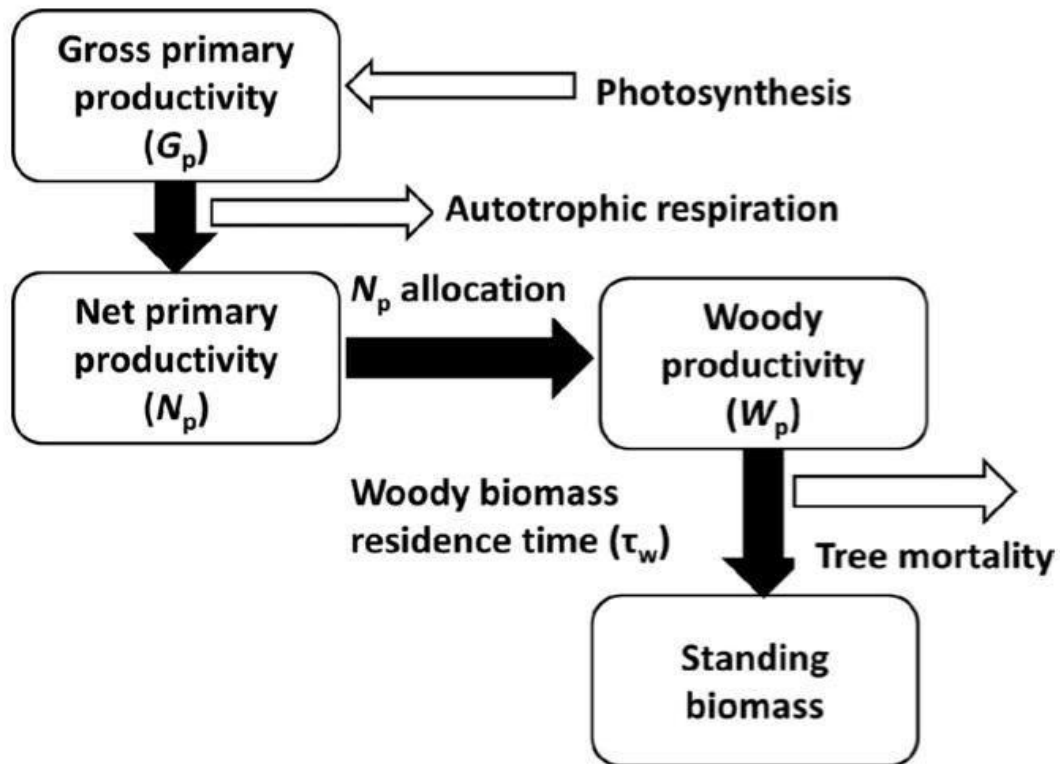
INLAND



LPJ

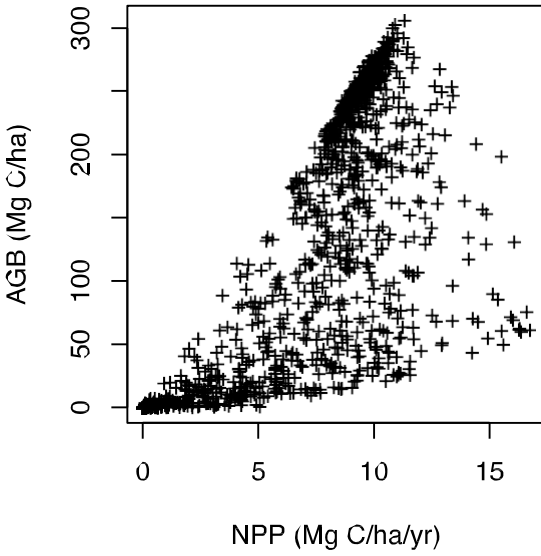


RESIDENCE TIMES AND BIOMASS

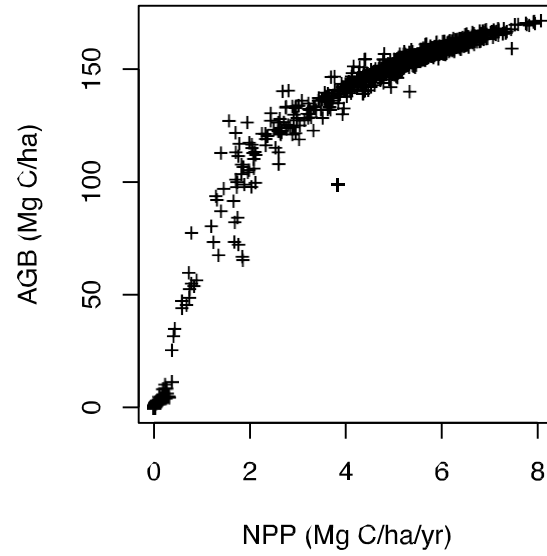


AGB vs NPP

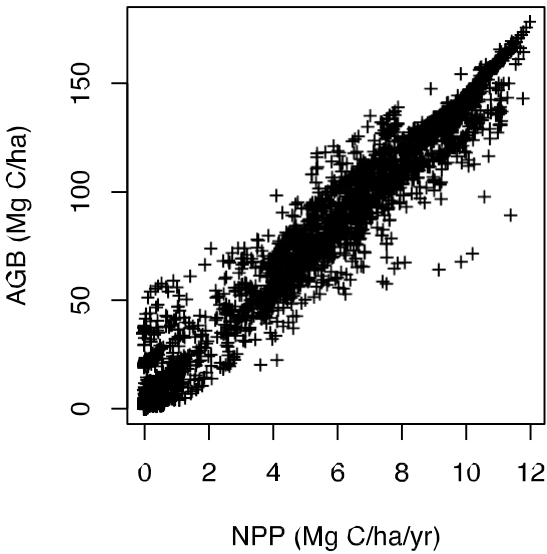
Orchldee



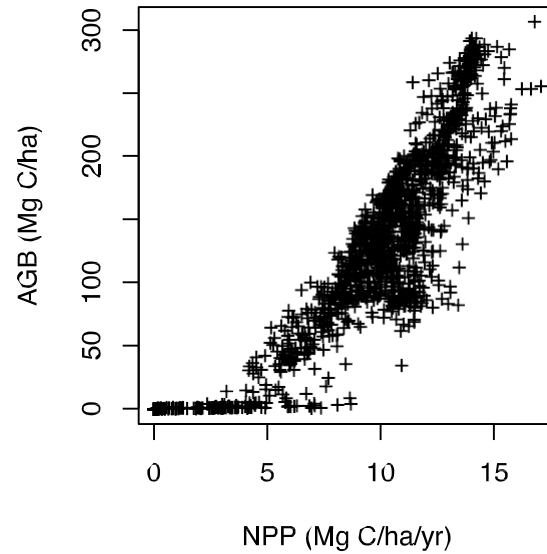
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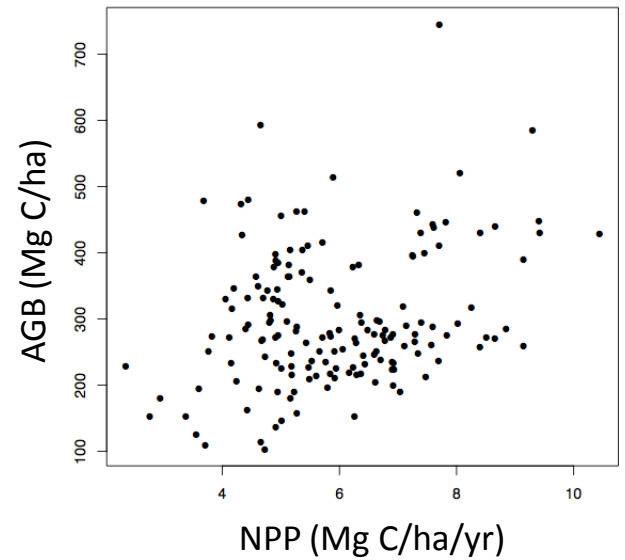
Inland



LPJ



Observations



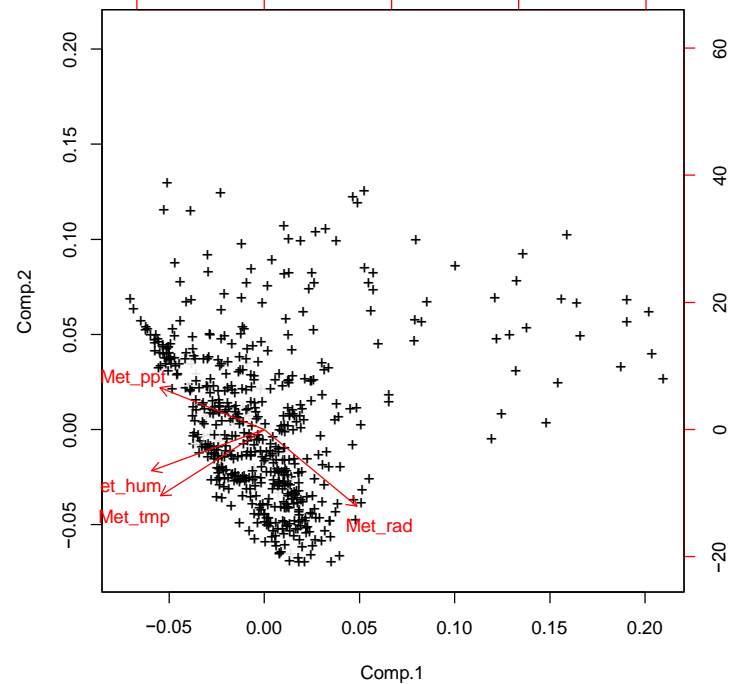
Extracting typical Amazon weather gradients with PCA

Sheffield meteorological forcings.

	Precip	Temp	Humidity	Radiation	%var
PCA1	-0.503	-0.500	-0.544	0.447	62.5
PCA2	0.357	-0.564	-0.351	-0.657	19.8
PCA3	0.784	-0.119	-0.126	0.596	10.7
PCA4		-0.646	0.751	0.117	6.8

PCA 1 and PCA 2 together explain >80% of the variability

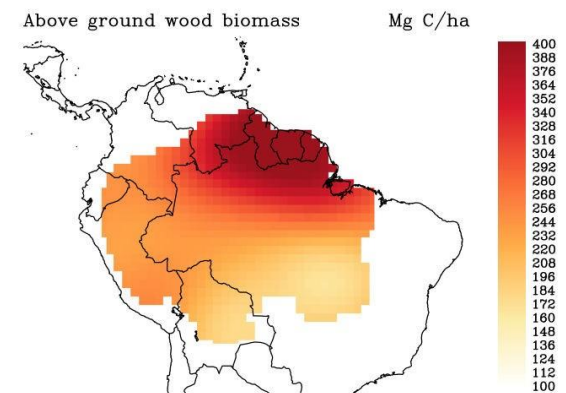
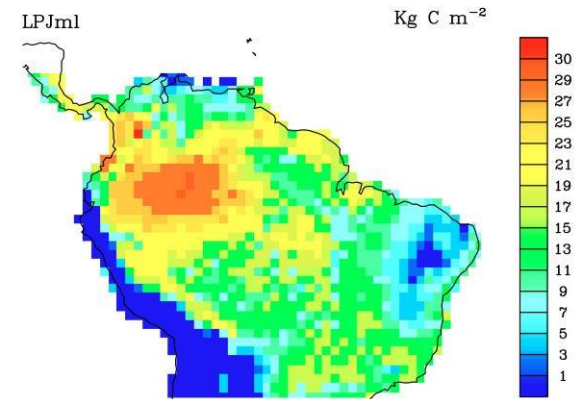
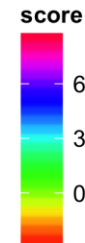
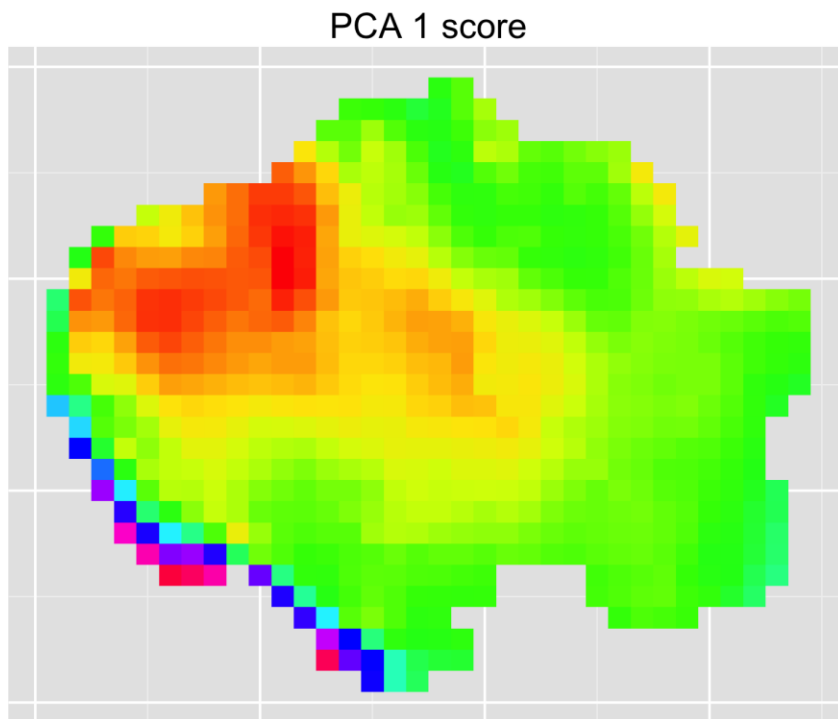
PCA 1 – gradient from wet, warm and cloudy → dry, cool and sunny



AGB – PCA correlations

	JULES	ORCHIDEE	LPJ	Inland	Obs
PCA 1	-0.16*	0.02	-0.68*	-0.11*	0.16

* 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.**