Supplementary Material

Article

Model-Based Estimation of Amazonian Forests Recovery Time after Drought and Fire Events

Bruno L. De Faria [1,2,*], Gina Marano [3], Camille Piponiot [4], Carlos A. Silva [5], Vinícius de L. Dantas [6], Ludmila Rattis [7,8], Andre R. Rech [1] and Alessio Collalti [9,10]

[1] Programa de Pós-Graduação em Ciência Florestal, Universidade Federal Vales do Jequitinhonha e Mucuri Campus JK, Diamantina 39100-000, MG, Brazil; andre.rech@ufvjm.edu.br
[2] Federal Institute of Technology North of Minas Gerais (IFNMG), Diamantina 39100-000, MG, Brazil
[3] Department of Agriculture, University of Napoli Federico II, 80055 Portici (Naples), Italy; gina.marano@unina.it
[4] Smithsonian Tropical Research Institute, 03092 Panamá, Panama; PiponiotC@si.edu
[5] School of Forest Resources and Conservation, University of Florida, Gainesville, FL 32611, USA; c.silva@ufl.edu
[6] Institute of Geography, Federal University of Uberlandia (UFU), Av. João Naves de Ávila 2121, Uberlandia, Minas Gerais, 38400-902, Brazil; viniciusdantas@ufu.br
[7] Woods Hole Research Center, Falmouth, MA 02540, USA; lrattis@woodwellclimate.org
[8] Instituto de Pesquisa Ambiental da Amazônia, Canarana 78640-000, MT, Brazil
[9] Institute for Agriculture and Forestry Systems in the Mediterranean, National Research Council of Italy, 06128 Perugia, Italy; alessio.collalti@cnr.it
[10] Department of Innovation in Biological, Agro-food and Forest Systems, University of Tuscia, 01100 Viterbo, Italy

* Correspondence: blfaria@gmail.com

Figures

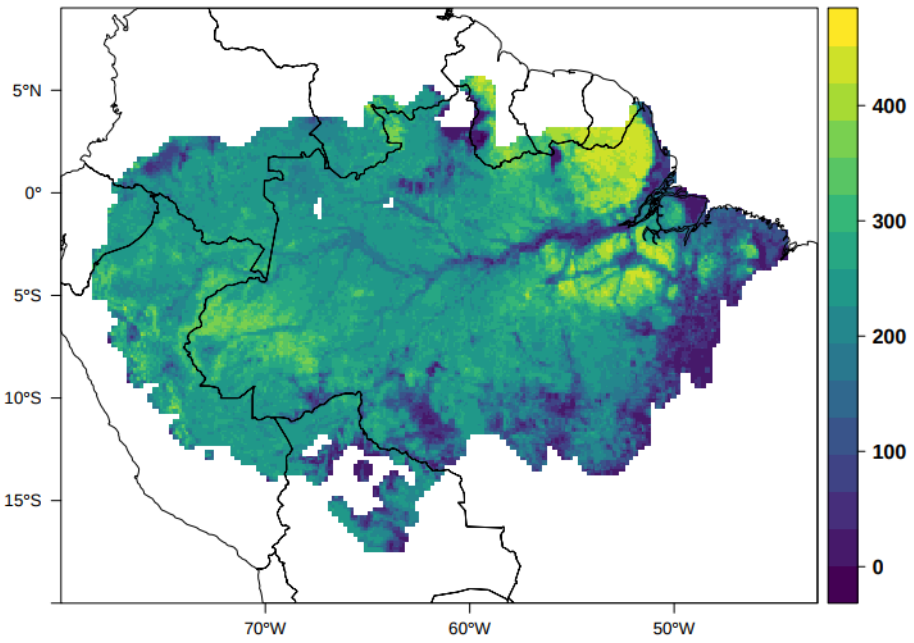

Figure S1. Pre-disturbance reference biomass map according to Avitabile et al. [60].

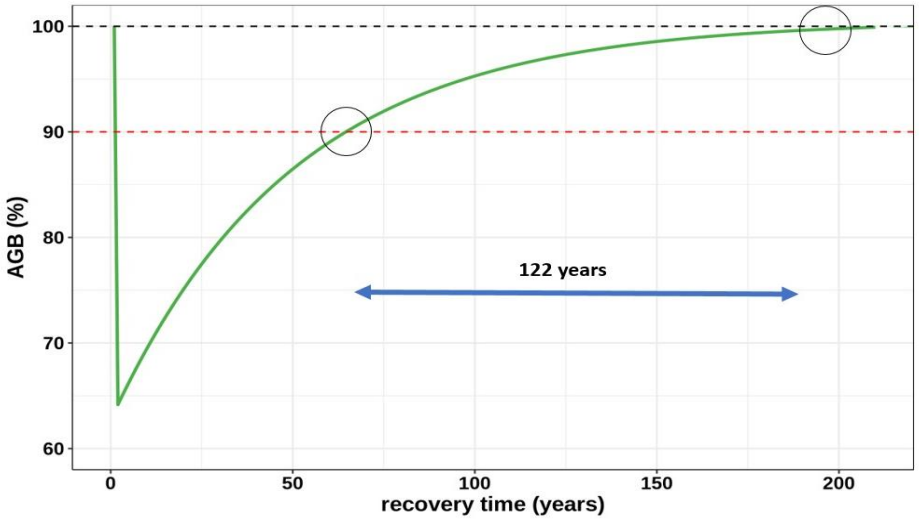

Figure S2. The AGB dynamic as reproduced by the forest growth model (3-PG green line) showing the relationship between aboveground biomass (%) and recovery time in years to reach recovery threshold. Red dotted line 90% threshold and black dotted line 100% threshold.

Tables

Table S1: Parameters description and their values used in 3-PG model (modified from Hirsch et al., 2004)

Parameter	Description	Mean value and units
Y	NPP/GPP ratio (i.e. CUE)	0.47 (dimensionless)
α	Canopy quantum efficiency	0.035 (mol C mol uAPAR^{-1})
SLA	Specific leaf area	20 (m^2 kg leaf C^{-1})
P_w	Fractional allocation to wood	0.4 (dimensionless)
P_f	Fractional allocation to foliage	0.25 (dimensionless)
P_r	Fractional allocation to fine roots	0.35 (dimensionless)
F_h	Fraction of decomposed dead organic matter passing to humus	0.17 (dimensionless)
F_m	Metabolic/structural ratio in leaves and roots	0.1 (dimensionless)
PAR	Incident photosynthetically active radiation	Model input (MJ m^{-2} month^{-1})
λ	Fractional absorption of PAR by foliage	0.7 (per unit LAI)
τ_w	Turnover time of live wood	600 (month^{-1})
τ_f	Turnover time of live leaves	12 (months^{-1})
τ_r	Turnover time of live roots	12 (months^{-1})
τ_m	Turnover time of the metabolic fraction of leaf and root litter	4 (months^{-1})
τ_s	Turnover time of the structural fraction of leaf and root litter	48 (months^{-1})
τ_h	Turnover time of soil humus carbon	300 (months^{-1})
τ_{wd}	Turnover time of woody debris	60 (months^{-1})
τ_{wp}	Turnover time of wood products	120 (months^{-1})

Table S2: Details of ALS data acquisitions

Data Attributes	Value
ALS (Airborne Laser Scanning) system	ALTM 3100
Flight Altitude (m)	750
Acquisition Date	10/05/2018
Scan Angle (º)	10
Scanning Frequency (Hz)	40
Point Density (points/m^2)	22.98
Datum	SIRGAS 2000