Supplements of:

Importance of succession in estimating biomass loss: Combining remote sensing and individual-based forest models

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Supplements
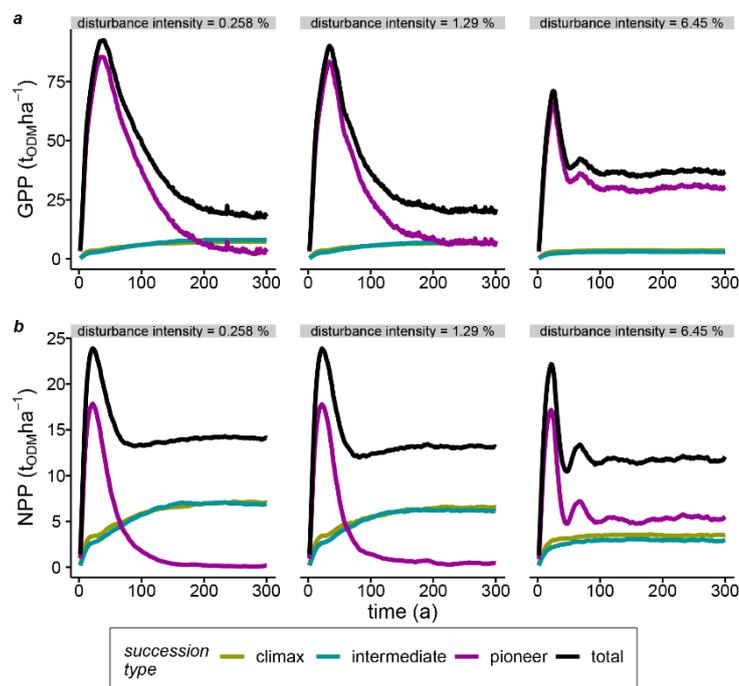
Figure S 1: Development of (a) gross primary production and (b) net primary production of the total stand and three succession types for Terra Firma forests in French Guiana. The disturbance intensity of 1.29% indicates natural forest growth in the baseline scenario. (GPP: gross primary production, NPP: net primary production, ODM: organic dry matter).
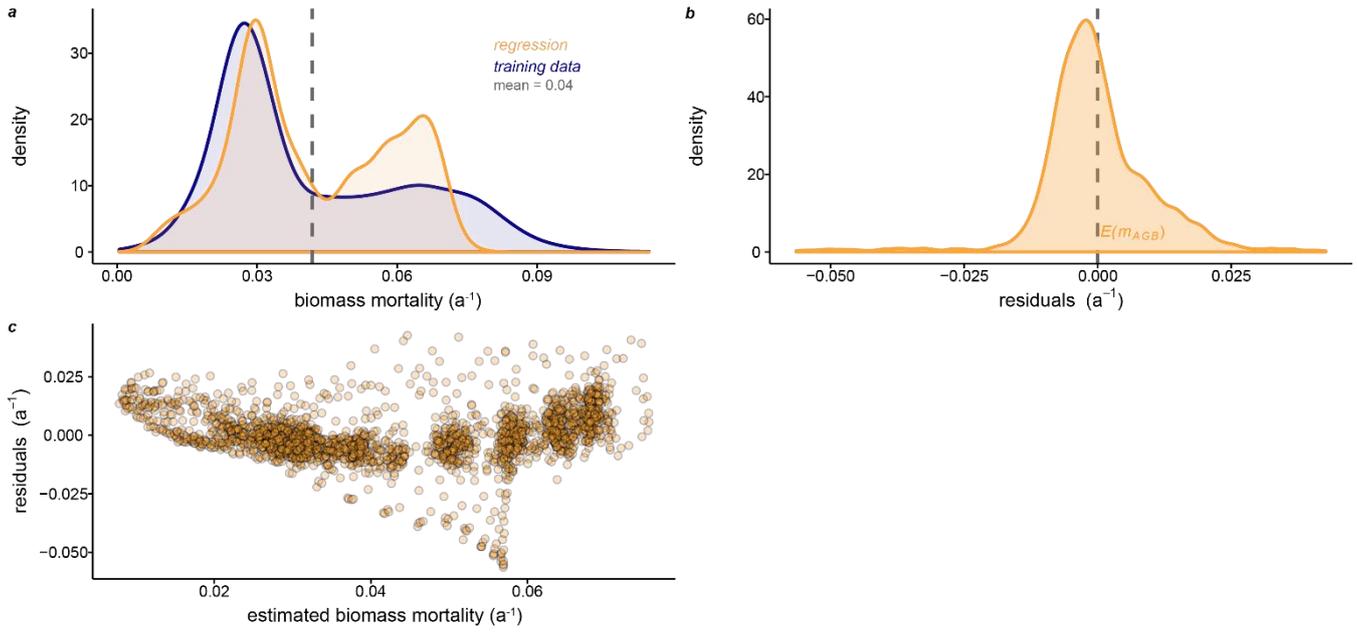
Figure S 2: Goodness of the multivariate linear regression model fit (eq. 6). (a) Frequency distributions of simulated versus fitted biomass mortality rates (m_{AGB}). The dashed line indicates the arithmetic mean of both distributions. (b) Test for normally distributed residuals of m_{AGB} around the expectation value ($E(m_{AGB})$) indicated by the dashed line. (c) Test for homoscedasticity of the residuals over fitted m_{AGB}.
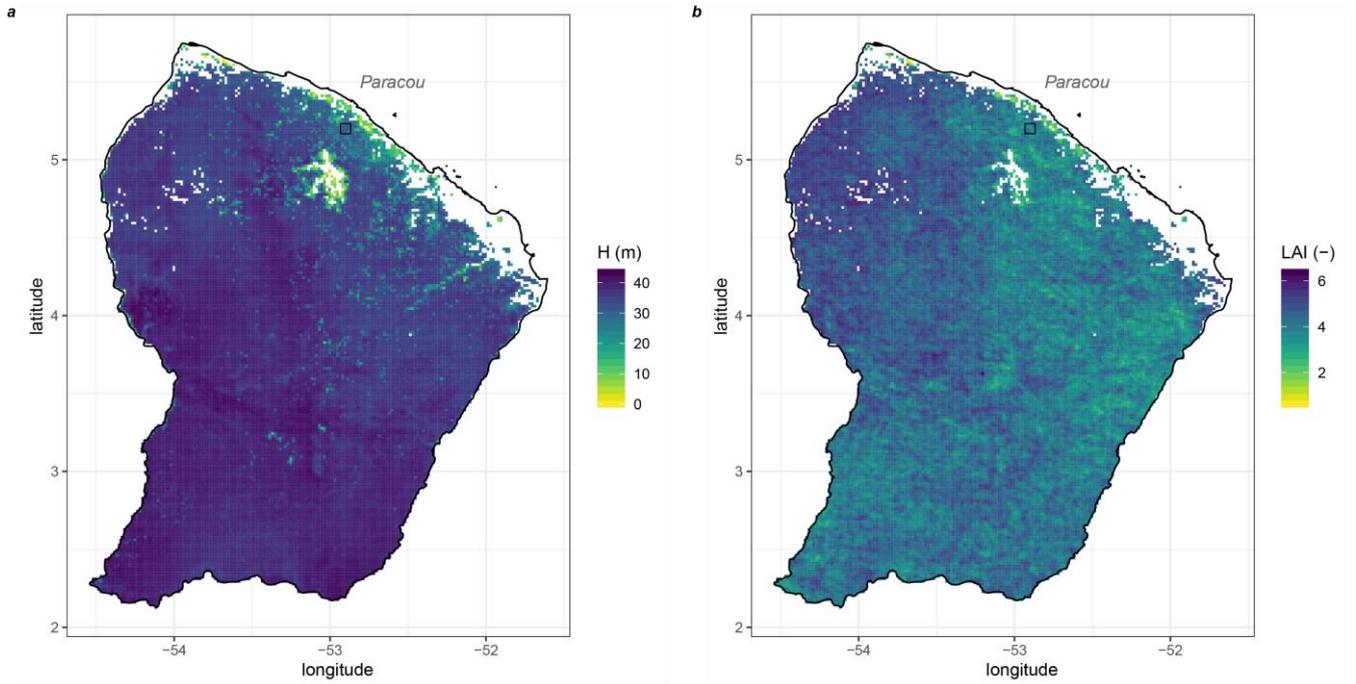
Figure S 3: Input maps for deriving biomass mortality rates for *Terra Firma* forests in French Guiana at ~ 2 km resolution using linear regression modelling (eq. 6). (a) 'Simard' map of forest height (Simard et al., 2011) **and (b) map of leaf area index derived using data from the MCD15A2H Version 6 Moderate Resolution Imaging Spectroradiometer (MODIS) Level 4 in a pixel size of 500 m and averaged then LAI values between 2005-05-20 and 2005-06-23** (Myneni et al., 2015; cf. chap. 2.4). **(Projection: WGS-84, EPSG: 4326).**
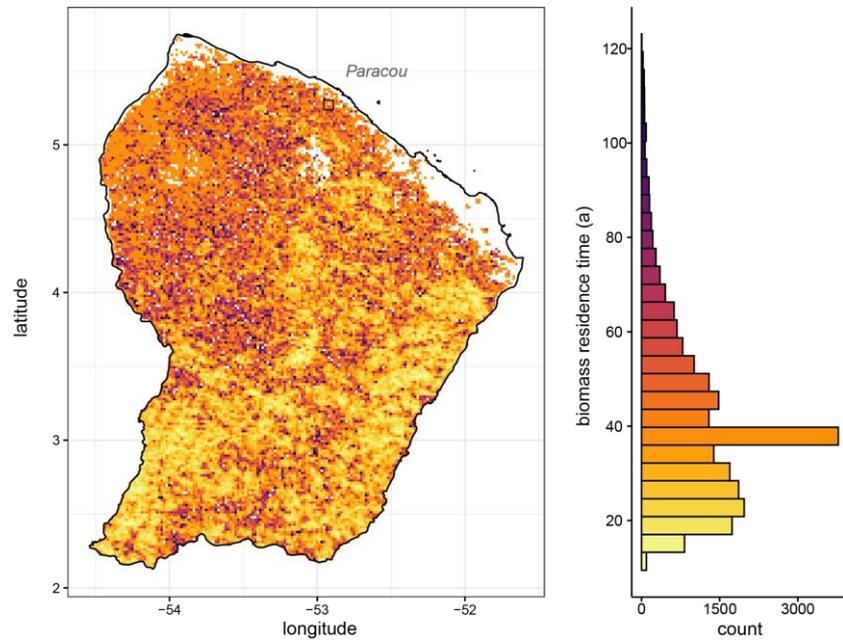
Figure S 4: (left) Map of biomass residence time distribution and (right) its histogram in *Terra Firma* forest of French Guiana at ~2 km resolution. To estimate biomass residence time, remote sensing was combined with a forest model that simulated the forest succession. The black square indicates the location of the Paracou site. Leaf area index and forest height were used as proxy variables for the underlying multivariate linear regression. (Projection: WGS-84, EPSG: 4326, τ: biomass residence time (cf. eq. 4)).

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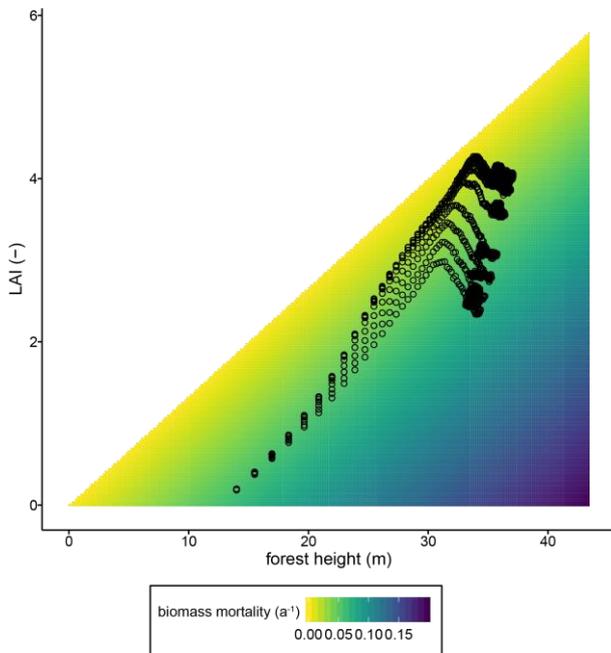
Figure S 5: Heat map of biomass mortality rates according to the underlying multivariate regression model (cf. eq. 6) on the basis
40 **of its proxy variables leaf area index and forest height. Black dots represent the training data simulated using the forest model**
FORMIND. (LAI: leaf area index).

Table S 1: Software used.

To process the simulation data of FORMIND v3.2 as well as the forest height map and LAI map (Myneni et al., 2015; Simard
45 et al., 2011), version 3.6.2 of the R statistical software (R Core Team, 2019) with the packages 'tidyverse' v1.2.1 (Wickham et
al., 2019), 'viridis' (Garnier, 2018), 'broom' (Robinson and Hayes, 2020), 'ggpubr' (Kassambara, 2020), 'data.table' (Dowle
and Srinivasan, 2019), 'gdalUtils' (Greenberg and Mattiuzzi, 2020), 'rgeos' (Bivand and Rundel, 2019), and 'raster' (Hijmans,
2020) were used. The FORMIND forest model can be downloaded for free at www.formind.org.

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