**Legends**

**Figure 1.** Schematic diagram of CAETÊ in its trait-based model approach. From functional trait ranges, the values are uniformly sampled, and the combination of all creates a hypervolume representing the whole functional trait space. Each combination of trait values is a plant life strategy (PLS) that will present a different performance in terms of carbon balance, depending on the grid cell. From the potential functional space, 3000 PLSs were randomly sampled. Environmental filtering, the trade-offs between the chosen functional traits and the physiological processes determine if a PLS survives (positive carbon balance) or dies and is excluded from the grid cell. From the performance (its relative biomass in the grid cell) of the PLSs, the grid cell is occupied as a mosaic. From the grid cell occupation, the ecophysiological variables are updated and returned to the model for the iteration until equilibrium is reached. This modelling framework allows us to assess the model results not only regarding biogeochemical variables but also in terms of trait distribution and, as a consequence, the different components of functional diversity.

**Figure 2.** Percentage change in total carbon storage (a and b) and in fine roots carbon storage (c and d) after reduced precipitation application (-50%) for the two employed modelling approaches: PFT approach and Trait-based approach.

**Figure 3.** Density distributions of traits using the trait probability densities method (TPD; Carmona et al., 2016) for the two employed modelling approaches: PFT and Trait-based. The curves correspond to the probability density distribution of trait values across the Amazon basin. The orange curves represent the results with the applied low precipitation scenario, and the blue curves represent the results concerning the regular climate conditions. The figures from (a) to (f) show the results concerning the allocation traits, and the figures from (g) to (i) display the results for the residence time traits. ABGW: aboveground woody tissues. NPP: net primary productivity. The dissimilarities between the distributions before and after the reduced precipitation are presented in Table 1. Note that the scales of the y and x axes are different for each functional trait. The graphs are presented in this way to improve readability.

**Figure 4.** Hypervolumes created with the six functional traits together for the (a) PFT modelling approach and for the (b) Trait-based modellinf approach through the method of Blonder et al. (2018). The hypervolumes were created after the data were submitted to a PCA (see Figure SM.4.). The blue points indicate the data in a regular climate scenario, and the red points indicate the scenario of -50% of precipitation in the study area. The darker the color of the point is, the higher the density of the value within the functional space is. The bigger circles represent the centroid (*i.e*., the mean values) of data distribution. Here, the volumes of the different approaches are shown separately to improve readability; hence, they are not presented on the same scale. For the volumes of the two approaches together see Figure SM.7.

**Figure 5.** Percentage change in the functional diversity components (divergence, evenness and richness) with the applied precipitation reduction scenario (-50%) for the for the six used functional traits: carbon allocation to (a) leaves, (b) ABGW and (c) fine roots, and carbon residence time for (d) leaves, (e) ABGW and (f) fine roots. Here are shown the results corresponding to the PFT and to the Trait-based modelling approach. ABGW: aboveground woody tissues.

**Figure 6.** Evaluation of CAETÊ performance in representing aboveground carbon storage for both modelling approaches, Trait-based and PFT approach, when compared to two reference maps: Baccini et al. (2012) and Saatchi et al. (2011). Figure shows the absolute difference between values simulated by CAETÊ and those reference values for each grid cell.

**Table 1.** Dissimilarities of trait distributions (Figure 3) with the applied reduction in precipitation (50%) for both employed modeling approaches: TB-approach (trait-based) and PFT-approach (PFT). The closer the value is to 1, the more dissimilar the curves are to each other. α: allocation; τ: residence time; ABGW: aboveground woody tissues.

**Figure SM.1.** Delimitation of the studied region in gray, representing the Amazon basin.

**Figure SM.2.** Percentage change of carbon storage in (a) aboveground woody tissue (ABGW) and in (b) leaves with reduced precipitation (-50%) for the two employed modelling approaches: Trait-based and PFT approach.

**Figure SM.3.** Box plots representing the values of the six functional traits and of the total plant carbon storage simulated by CAETÊ in its trait-based approach**.** Each boxplot represents the median value (orange tick) and variance for each of the 10 runs. The boxes extend from the first to the third quartiles, and the whiskers extend from the minimum and maximum data. The outliers are not shown. Each represented simulation ensemble contains 10 simulations with the same number of PLSs (50, 100, 200, 500, 1000, 3000) randomly sampled from the potential functional space (see Appendix SM.2). Total C.: total plant carbon storage; ABGW: aboveground woody tissues; F. roots allocation: fine roots allocation; res. time: residence time. PLS: plant life strategy.

**Figure SM.4.** Principal component analysis of the trait values used to produce the hypervolumes (Figure 4 and SI.7). The dataset is composed of the model results regarding the six functional traits for both modelling approaches PFT and Trait-based and for both climate scenarios (low precipitation and regular climate).

**Figure SM.5.** Evaluation of CAETÊ performance in representing net primary productivity for both modelling approaches: Trait-based and PFT approach. when compared to the reference map generated by the MODIS NPP Project. The figure shows the absolute difference between values simulated by CAETÊ and those reference values for each grid cell.

**Figure SM.6.** Hypervolumes created with the six functional traits employed. Here, the trait-based and the PFT modelling approaches are shown together as are the two climate scenarios: regular climate and low precipitation. The hypervolumes were created after the data were submitted to a PCA (see Figure SM.4.). The darker the color of the point is, the higher the density of the value within the functional space is. The bigger circles represent the centroid (*i.e.*, the mean value) of data distribution.

**Table SM.1.** Functional traits (carbon allocation and residence time for leaves, woody tissues and fine roots), their respective trade-offs and associated equations. The equations are described in Supplementary Material SM.1 together with the model description. ABGW: aboveground woody tissues.

**Table SM.2.** Functional trait values for each plant functional type (PFT) used in the PFT modelling approach. The values were chosen based on previous literature: Enquist & Niklas, 2002, Foley, 1996; Krinner et al., 2005; Kucharik et al., 2000; Malhi et al., 2009; Malhi, Doughty, Galbraith, 2011; Sitch et al., 2003. α: allocation; τ: residence time; ABGW: aboveground woody tissues.

**Table SM.3.** Range of functional trait values from which values are sampled and its combinations create the different plant life strategies (PLSs). Used in the trait-based modelling approach. α: allocation; τ: residence time; ABGW: aboveground woody tissues; \*months; \*\*years.

**Table SM.4.** Descriptions, units and the respective equation number of the variables used in the CAETÊ model. \*see Oyama & Nobre (2004).

**Table SM.5.** Descriptions, values and units of constant parameters used in the CAETÊ equations. IPAR: incident photosynthetically active radiation.

**Table SM.6.** Values of standard deviation, proportion of variance and cumulative proportion for each of the primary components (PCs) from the PCA (principal component analysis; Fig. SM.4) made as a previous step to construct the hypervolumes (Fig. 4 and Fig. SM.6) used to evaluate functional diversity from a multi-trait perspective.