*Reduced precipitation experiment*

In order to explore the potential effects of functional diversity on the Amazon’s carbon storage in a reduction precipitation scenario, as well as the response of functional diversity *per se,* we applied a homogeneous reduction of 50% on precipitation for the whole studied area. With homogeneous we mean that the reduced precipitation was applied for the whole period of the study and for all the grid cells equally. Then, specifically, in this model application we were interested in testing if a plant community with higher functional diversity (trait-based approach) responded differently to the climate in its ability to store and partition carbon compared to a community with lower functional diversity (PFT approach).

With this experiment we did not intend to make reliable predictions regarding the foreseen drought for the region, since we aware that the tendency for drought is not homogeneous along the basin neither through time. Hence, this applied scenario in this study lends itself as proof of concept by showing: (i) the feasibility of trait-based models in being used to explore the effects of environmental changes in ecosystem functioning and in functional diversity (taking into account its different facets); (ii) models based in PFTs to represent vegetation may overestimate the effects of these changes given the underrepresentation of functional diversity; and (iii) the functional diversity of an ecosystem is tightly related to ecosystems processes and functioning, playing a vital role in its responses to environmental changes.

For the analysis in relation to carbon storage we compared the degree of change in carbon stock either considering the whole plant or the compartments separately for both the modeling approaches. For the single-trait framework analysis, we compared the TPDs generated by the two climatic conditions for all the six traits. For this, the dissimilarities between the two TPDs were computed by calculating the degree of overlap between the two distributions (dissimilarity index that can vary from 0 – completely functionally similar - to 1 – completely functionally different; Carmona, de Bello, Mason, & Lepš, 2016). This index shows if functional structure of the community was significantly modified by the climate scenario (Carmona, de Bello, Mason, & Lepš, 2019)⁠⁠. We also compared how the three facets of functional diversity aforementioned changed after the drought.

For the multi-trait framework we performed a PCA (see previous section) using both climatic conditions and the two modeling approaches together, as recommended by Barros et al. (2016). Then, using the factor scores of the three first principal components (PCs), since they were able to explain more than 98% of the variance, four hypervolumes were constructed and compared: one for each model approach and climatic condition. After, we were able to compare the changes in hypervolumes driven by reduced precipitation in terms of its sizes (richness), the distances between the centroids [i.e., central tendency, that represents the change in mean values and in the occupied region of trait space (Boersma et al., 2016)⁠] and, finally, the degree of overlap through Jaccard similarity index that range from 0 (completely dissimilar) to 1 (completely similar). These three metrics together indicate the magnitude of change in functional diversity and composition in response to the applied scenario considering different the plant ecological strategies (or traits combinations).