For the 21st century, it is projected that the Amazon forest will experience more frequent and more extreme moisture stress (IPCC, 2021)⁠, which can directly induce biodiversity shifts, including changes in functional diversity (Aguirre-Gutiérrez et al., 2019; Esquivel-Muelbert et al., 2018; Zhang, Niinemets, Sheffield & Lichstein, 2018) and in forest ability to store carbon (da Costa et al., 2010; Hubau et al., 2020; Phillips et al., 2010)⁠. These changes are already underway and have been observed in long-term inventory plots (Esquivel-Muelbert et al., 2018, 2017)⁠ and in ecosystem-scale field experiments in the Amazon forest (Meir et al., 2009; Nepstad et al., 2007; Rowland et al., 2015)⁠. However, the impact of projected climate change on functional diversity and its different components (richness, divergence and evenness, Carmona et al., 2016; Mason et al., 2005)⁠ remains poorly understood (Esquivel-Muelbert et al., 2017; 2018; Poorter et al., 2015; Sakschewski et al., 2016). Also, the degree and direction to which associated ecosystem processes and properties, such as vegetation carbon storage, will be affected by shifts in functional diversity remain uncertain (Bonal et al., 2016; Hubau et al., 2020; Yang et al., 2018). Advance in this understanding is crucial in a time in which biodiveristy is being losed and climate change in a rate never seen.

Vegetation models have been widely used to explore the fate of the Amazon forest carbon sink under unprecedented climatic conditions such as reduced precipitation (Cox et al., 2004; Galbraith et al., 2010; Huntingford et al., 2013; Lapola et al.,, 2009; Rammig et al., 2010; Sitch et al., 2008)⁠. Some of these models project a drastic loss in carbon stock (Cox et al., 2000, 2004; Koch et al., 2021⁠)⁠ and a replacement of the dominant humid tree cover with more arid-affiliated vegetation in large portions of Amazon forests (Hutyra et al., 2005; Salazar et al., 2007). One of the causes that may contribute to this catastrophic projections is the way the models represent diversity of plants. Commonly, the models represent vegetation based on a very small and discrete set of plant functional types (PFTs) and the parameters that represent plant functional traits are previously (*a priori)* defined. Hence, the diversity of plant life strategies found in this ecosystem is very simplified and important mechanisms that link functional diversity with ecosystem functioning responses can not be captured. It may be limiting the

Functional diversity and its different components (composition, richness and evenness) plays a vital role in determining ecosystems functioning and its responses to disturbances. Ultimately, are the functional traits that compose the communities that respond to biotic and abiotic conditions and also determine ecosystem processes and properties such as carbon storage. For example, environmental changes such as reduced precipitation affect functional diversity trough changes in the density distribution of trait values throughout the communities. In other words, disturbances change the way that communities occupy the functional trait space and as a consequence functional diversity components. . On the other hand, the different functional diversity determine how the communities will be affected by changes in the environmenrt.-2

For example, it is widely accepted that more taxonomically and functionally diverse communities tend to be less impacted by environmental changes (Cadotte et al., 2011; Mori et al., 2013; Sakschewski et al., 2016; Schmitt et al., 2019). It has its basis on the insurance hypothesis, which postulates that the fact that higher variability of traits (and plant strategies) also provides higher diversity of responses under new environmental conditions (Mori et al., 2013; Yachi & Loreau, 1999) insuring ecosystem functioning by providing a buffer effect against environmental fluctuations (Fauset et al., 2015; Lohbecket al., 2016; Yachi & Loreau, 1999). Such an effect is expected through the process of functional density compensation, when the composition (that is, the occurrence or abundance of trait values) of a community functionally reorganize and ajusts to the new conditions, enabling types of plants that previously exerted a less relevant functional role (that is, low density) to increase their dominance and vice versa (Mori et al., 2013).

Hence, environmental changes lead to changes in the abundance of plant strategies that compose the community and, as a consequence, how the community occupies the available functional trait space (Boersma et al., 2016; Carmona et al., 2019, Enquist et al., 2017⁠)*⁠.* The occupation of functional trait space determine the different functional diversity components richness, divergence and evenness. Environmental changes such as reduced precipitation can act like an environmental filtering by selecting the plant strategies that can deal of a small subset of functional trait combinations that are more suitable to cope with drought under the reduced precipitation scenario. In this scenario, for example, strategies that invest more carbon to fine roots to acquire the most limiting resource (optimal theory) can be selected over the others. The selection toward a more restricted range of functional trait values in response to reduced precipitation will lead the communities to occupy with lower functional richness (Cornwell et al., 2006; Funk et al., 2017; Kleidon et al., 2009) and decreased evenness (via a less regularly distributed density of trait values), thus favoring strategies in communities with specialized functional traits and producing an increase in divergence (Mouillot et al., 2013; 2011)⁠. All these changes affects ecosystem functioning, but few studies have assessed.

Hence, in an attempt to overcome the limitations of underrepresenting functional diversity with a few PFTs, so-called trait-based vegetation models have been developed (*e.g.*, Fyllas et al., 2014; Joshi et al., 2020; Pavlick et al., 2013; Sakschewski et al., 2015; Scheiter et al., 2013)⁠. This alternative modeling approach represents plant types in a less discrete manner by replacing the low number of predefine PFTs, including variability between PFTs by simulating a large number of randomly generated plant life strategies, each defined by a set of15 trait parameters which characterize various as- pects of plant functioning including carbon allocation, eco- physiology and phenology.with variable ones (Pavlicket al., 2013⁠; Reu et al., 2014; Webbet al., 2010; Wullschleger et al., 2014), thus providing the opportunity to explore multiple functional ecology-related questions that go beyond commonly analyzed biogeochemical variables (Sakschewski et al., 2016; Darela-Filho et al., in prep.)⁠. For example, this approach opens up the avenue for exploring the role of different components of functional diversity, as well as identifying and predicting processes that determine community assemblage and structure, and how this affects the resilience of the ecosystem to environmental changes (Mason et al., 2005; Mouillot et al., 2013; Song et al., 2014).