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# Influence of fragmentation and climate on biomass dynamics of seasonally dry tropical Atlantic forests in Brazil

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## Abstract

The stability of tropical forest biomass is critical for the maintenance of carbon stocks and for the preservation of carbon fluxes near steady-state. However, changes in climate patterns and human-induced disturbances are capable of transforming these forests from a carbon sink to source. This study evaluated changes in aboveground biomass (AGB) and demography of the highly fragmented secondary seasonally dry tropical (SDTF) Atlantic forest, affected by a severe drought. We hypothesized that forest fragments would experience changes in AGB, carbon stocks and tree density depending upon fragment size and climate. We expected that: (1) smaller fragments would have less biomass stock and carbon gain than larger fragments; (2) the persistence of severe droughts would decrease AGB through time due to an exacerbation of tree mortality, especially in the small fragments. Trees (> 10cm dbh) were measured in 6 fragments (5 plots, 20x20m) from 13ha to 1190ha of SDTF in 2007/2010 and 2016, in a 9-year period during which a drought was reported. The rates of AGB loss and gain, tree recruitment and mortality, did not change among fragments. As a consequence, neither the AGB (Mgha-1, census1=139-246; census2=137-196) nor the stem density (Individuals ha-1, census1=1410-1820; census2=1345-1880), varied significantly with time or with fragment size. Carbon stocks ranged from 60 to 116 Mgha-1. AGB was concentrated in the largest (38% > 25cm dbh), late secondary trees and in some species, such as *Metrodorea nigra*, *Pseudopiptadenia contorta* and *Astronium concinnum*. The intense degradation of those SDTF in the past can influence the change in biomass, hiding the edge effect of the fragments and the possible differences that may have occurred among the fragments of distinct sizes. The low rainfall may have affected tree growth, causing stagnation in AGB increment of the forests, independent of the fragment size.

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