



## Direct measurements can help to understand the changes in ecosystems: Amazonia a case study

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The Amazon is the largest rainforest on the planet and was an important carbon sink. The carbon sink is declining, mainly due to an increase in tree mortality as a result of deforestation, degradation, and local, regional and global climate change. In addition, deforestation and forest degradation reduce the ability of the Amazon rainforest to act as a carbon sink. CO<sub>2</sub> Vertical Profiles (VP) were performed from 2010 to 2021 (805), using small aircraft at 4 locations: SAN (2.86° S 54.95° W), ALF (8.80° S 56.75° W), RBA (9.38° S 67.62° W) and from 2010 to 2012 on TAB (5.96° S 70.06° W) and since 2013 at TEF (3.39° S 65.55° W). The question if Amazonia is a carbon source or sink is an important role in the global carbon budget. Amazonia vertical profile annual mean derived from CO<sub>2</sub> annual mean vertical profiles (VP subtracted from the background concentration:  $\Delta VP$ ) from the 4 studied sites can help to clarify this important question. The sampling frequency was approximately 2 times per month in each location, from 4.4 km height (a.s.l.) until near surface 300 m (a.s.l.), and usually carried out between 12:00 and 13:00 local time. The CO<sub>2</sub> samples were analyzed at INPE's LaGEE (Greenhouse Gas Laboratory), in São Jose dos Campos. This result is a direct indication of the regional source in the global carbon budget, indeed there are well-known discrepancies from many studies using different methodologies (bottom-up, top-down techniques, and a wide variety of global, regional, and inversion models). In this study, we will present Carbon flux from the time series for the 4 sites and Amazon Carbon balance using the column budget technique, and analyze the correlations with various parameters related to climate, vegetation, deforestation, and biomass burning.