



2009-2010 Amazon basin carbon budget and its controls derived from regular aircraft measurements

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The Amazon forests contain a substantial fraction of global organic carbon. They thus have the potential to ameliorate or aggravate climate change through uptake or release of carbon and other greenhouse gases. There is evidence from long-term forest census plots that old-growth forests in the Amazon are taking up carbon on the order of 0.5 to 1 PgC yr⁻¹, but also that these forests respond at large-scales to drought. However, there is some controversy whether the extrapolation of the forest census results to the entire basin is valid. Similarly there has been progress with estimating carbon fluxes related to biomass burning and land use change, nonetheless uncertainties remain large for various reasons. An unambiguous integral measure of carbon fluxes from the Amazon basin are provided by the time rate of change and horizontal gradients of carbon in the troposphere over the basin. We report here the results from a novel aircraft and surface station greenhouse gas measurement network in the Amazon as part of the AMAZONICA project measuring CO₂, CH₄, CO, N₂O and SF₆. Our column integration technique automatically integrates all sources and sinks process since coast until the aircraft profile sites. The profile sites are strategically distributed across the Amazon basin following the main airstream. The stations are Santarém (Para, 2S, 54W), Tabatinga (Amazonas; 4S, 64W), Rio Branco (Acre; 10S, 68W) and Alta Floresta (Mato Grosso; 16S, 56W). Additionally there are two background stations along the Atlantic coast measuring providing a background value for air entering the basin: Salinópolis (Para; 1S, 47W), Natal (Rio Grande do Norte; 5S, 35W).

We will present flux estimates for the year 2010 and put them in context with climate drivers, drought indices and biomass burning estimates. We will discuss the results in view of both the global carbon cycle and the debate on northern versus tropical missing carbon sink, and the debate on carbon uptake by tropical forests.