



Not all carbon dioxide degassed from Amazonian rivers is ^{14}C -modern

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Here we show that effluxed carbon dioxide in the Amazon basin may not always be from recent ecosystem derived release of carbon, but may be older, incorporating a maximum of 10% of ‘fossil’-derived carbon or more of pre-1960 carbon. This is the first direct measurement of the age of effluxed carbon dioxide from the Amazon basin. Surprisingly ‘old’ efflux could be found in perennial first order rivers within forested landscapes. These drainage systems are not included routinely in upscaled carbon dioxide efflux budgets, and so are unlikely to also be included in global models of aquatic Amazonian response to changing climate.

The source of this old carbon is either deep soils / trapped organic matter subsequently respiration, or rock weathering. The former is important to consider as we know very little of the inheritance of a landscape and our understanding of the Amazon basin is one of rapid ecosystem-derived carbon cycling, rather than slow release from older reservoirs, other than where there has been anthropogenic-induced erosion. Deep organic soils are not prevalent in the Amazonian basin close to the study area, so the source of this old carbon is more likely to be from groundwater containing weathering-derived fossil carbon.

Future projections of the importance of the Amazon as a global C sink focus largely on an ecosystem response to land use e.g. burning and clearing, or to acute meteorological events e.g. drought, so we must consider how accurate projection how important are older carbon sources in driving efflux.