

# Amazon River Cycles Carbon Faster than Thought

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The rivers of South America's Amazon basin are "breathing" far harder - and cycling the greenhouse gas carbon dioxide far faster - than anyone realized. Most of the carbon being exhaled as carbon dioxide from Amazonian rivers and wetlands has spent a mere five years sequestered in the trees, plants and soils of the surrounding landscape, researchers report in the July 28 issue of the journal *Nature*.

Because this time scale is so much shorter than researchers had thought, says James Morris, program director in the National Science Foundation (NSF)'s division of environmental biology, "this work adds important information to the global carbon cycle puzzle."

Morris' division funded the research in conjunction with the Center for Accelerator Mass Spectrometry at Lawrence Livermore National Laboratory, the National Aeronautics and Space Administration (NASA) and the Research Support Foundation for the State of San Paulo (FAPESP), Brazil.

Until now, explains Emilio Mayorga, University of Washington (UW) oceanographer and lead author of the *Nature* piece, researchers had hoped that regions such as the nearly 2.4 million-square-mile Amazon River basin, where tropical forests rapidly gulp carbon dioxide during photosynthesis, were holding onto that carbon for decades or centuries.

Indeed, says his co-author, Anthony Aufdenkampe of the Stroud Water Research Center in Pennsylvania, "those who've previously made

measurements assumed that the return of this carbon to the atmosphere must be a slow process that offered at least temporary respite from greenhouse effects."

But the data told a different story, Aufdenkampe says: "As part of the largest radiocarbon age survey ever for a single watershed, we show that the enormous amount of carbon dioxide silently being returned to the atmosphere is far 'younger' than carbon being carried downstream."

"'River breath' is clearly happening much faster than anyone realized," says Jeff Richey, an oceanographer at UW and another co-author of the paper.

Carbon is carried by rains and groundwater into waterways from soils, decomposing woody debris, leaf litter and other organic matter. Once in waterways it is chewed up by microorganisms, insects and fish. The carbon dioxide they generate quickly returns to the atmosphere an amount equal to what is absorbed each year by the Amazonian rainforest.

"Land use patterns, vegetation distribution and other parameters in the region are all changing as a result of human activities, and the system is responding fairly quickly," Mayorga says. "Both human and natural systems, in turn, will be impacted."

Other co-authors of the paper are Paul Quay and the late John Hedges, both UW oceanographers; Caroline Masiello of Rice University; Alex Krusche of the University of São Paulo, Brazil; and Thomas Brown of the Center for Accelerator Mass Spectrometry at Lawrence Livermore National Laboratory.

Source: The National Science Foundation

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