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Role of Tropics in Global Climate Change Gains Attention

The tropics are being recognized as an important element in the dynamic process of global climate change, according to a new study headed by David Lea, professor of geological sciences at the University of California, Santa Barbara.

Lea is first author in an article in the September 5 issue of the journal *Science* which delves into a tropical record of climate change -- the Cariaco record -- shedding light on the role of the tropics at the end of the last ice age.

The Cariaco Basin, located on the northern Venezuelan shelf in the tropical Atlantic and southeastern Caribbean region, provides a unique look back in time. A core of sediment from the bottom of the ocean, in that area, contains layers of plankton microfossils that serve as a recorder of past climate conditions.

"This site is unique in the tropics because sediments that are deposited within the basin contain undisturbed annual layers that record past climate changes like pages of a book," said Lea. He explained that temperature records were developed from the sediments by determining changes in the magnesium content of the plankton shells, a highly sensitive technique that was developed previously by UCSB researchers.

The importance of the tropics to global climate change is now seen as far more important than a decade ago, said Lea. Scientists are intrigued because the tropics

used to be seen as "relatively passive" in global climate models. If the tropics are a cause or a trigger of climate change then their role becomes critical, according to Lea, and even if -the tropics are an amplifier of changes that started elsewhere, then it is still scientifically important to understand how they play that role.

The Cariaco record indicates that three large, rapid shifts of five to seven degrees Fahrenheit occurred in the tropics on time scales of a century or less as the earth warmed at the end of the last ice age, between 14,600 and 11,400 years ago. Similar rapid climate shifts are well known from polar ice cores, but they represent a new discovery in the tropics.

"People used to think the tropics were relatively stable," said Lea. "A change of five to seven degrees is a very large difference. For one, it greatly influences how much moisture is held in the air."

The timing of the warming in the Cariaco record indicates that the changes were synchronous within 30 to 90 years with temperature and climate changes recorded in Greenland ice cores.

One of the biggest concerns, according to Lea, is how the temperature changes correspond to rainfall shifts. "The tropical changes might be due to rapid northward and southward shifts in the latitudinal band of rising air and rainfall that lies near the equator," said Lea. "The shifts in the position of this zone are predicted by climate models simulating deglacial conditions, as well as (more speculatively) future global warming scenarios."

The Cariaco data suggests that rainfall belts shifted by at least 300 miles. "The more we understand about how such shifts happened in the past, the better we can predict future shifts," said Lea.

Other researchers contributing to this study are: Dorothy K. Pak of UCSB; Larry C. Peterson of the Rosenstiel School of Marine and Atmospheric Science, University of Miami; and, Konrad A. Hughen of Woods Hole Oceanographic Institution.

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