Currents Tell Climate-change Story

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Brad Rosenheim, assistant professor of earth and environmental sciences at Tulane, is pursuing two studies funded by the National Science Foundation using advanced carbon-dating techniques. One study uses radiocarbon records stored in corals and sponges from several sites in the tropical North Atlantic to look backward at how ocean currents have changed over time.

Tracking radiocarbon over time in his research, geochemist Brad Rosenheim is studying how ocean currents might be changing. (Photo by George Long)

"This project will produce records of radiocarbon in the ocean from decades before we were directly measuring it in the 20th century," says Rosenheim. "We need longer records to see how ocean currents might be changing under anthropogenic climate change."

Atmospheric carbon dioxide contains a small amount of radiocarbon and is being continually dissolved into the ocean. Sponges and corals incorporate carbon dioxide as they build calcium carbonate skeletons, and the radiocarbon content of these skeletons is indicative of whether the water in which they formed came from the surface or below.

"These stony skeletons have incremental banding, like tree rings, that have been recording the changing levels of radiocarbon in the seas for hundreds of years before we were," says Rosenheim. "The goal is to look at changes in ocean circulation over the past few centuries of the tropical North Atlantic and how that relates to climate variability."

The second project is focused on developing an instrument for dating carbon in sediment. Rosenheim is using the device to determine how effective river systems are at removing greenhouse carbon dioxide gas from the biological carbon cycle.

The device uses pyrolysis, whereby river sediment is heated up slowly to 1000°C. 'New' carbon contained in leaf debris will break apart at low temperatures, while older forms of carbon, will survive until higher temperatures.

"That way we can separate old carbon from new, and put a proportion on each. Older carbon is less likely to become atmospheric carbon dioxide than new, labile carbon," says Rosenheim.