

## Alumni Profile: Tom Guilderson, PhD '97

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Tom Guilderson, about 1,000 meters below the Pacific Ocean, in the Hawaii Undersea Research Laboratory's PISCES V research submersible

Tom Guilderson is a geochemist at Lawrence Livermore National Laboratory and a lecturer in ocean sciences at UC Santa Cruz. In 2011, Guilderson was honored by the U.S. Department of Energy, receiving their E.O. Lawrence Award in Biological and Environmental Sciences for his contributions to our understanding of climate change and the global carbon cycle.

### How would you describe your research and why it matters?

I am a historian and investigative journalist of sorts. Using sediments and fossils, I try to learn when, over the last ~50,000 years, certain events or climatic episodes happened and what occurred or transpired. My "modern" research uses isotopes of carbon to determine how much and where the carbon dioxide that is emitted during the combustion of fossil fuel goes and how long it might stay there. It is in these histories and modern processes that we find out how the coupled Earth system works, and knowing how things work gives us the ability to make informed choices for the future.

### What does your research tell us about the future of our planet?

First and foremost: the background state of the climate system matters. It's like a table set for a dinner where one isn't sure how well the guests will play with each other or whether all of the courses fit nicely together. The background

state sets the large-scale atmospheric and (surface) ocean circulation, but then interaction between regional forcing (cloud cover, sea surface temperature, sea ice, soil moisture, vegetation) occurs and you have variability that plays above the background state. Increasing greenhouse gas concentrations will, without a doubt, change the background state. In other words, we have knowledge of all the players, but still don't know how they'll interact with one another.

### What are some of the most rewarding parts of your work?

Traveling and fieldwork are definite perks that bring me to interesting places around the world, and under the sea. It's rather startling to do the math on how few individuals have been to the bottom of the ocean in deep-sea research submersibles. I consider myself incredibly fortunate to have had the opportunity to dive with the Hawaii Undersea Research Laboratory and the Alvin groups. Over the last 12 years I've also been lucky to work with a wonderful group of post-docs, 11 at current count, and seeing them find their space is very rewarding.

### Who were your mentors at LDEO, and how did they influence your work?

My primary advisers were Wally Broecker and Rick Fairbanks. Other mentors include Bob Anderson, Doug Martinson, and Mark Cane. Bob was a good sounding board for out of the box geochemistry and how to do things in a lab. Doug instilled a sense of rigor and quantitative requirements with an interesting sense of humor. Science could use more Mark Canes. Mark takes a holistic approach that includes working hard but also having life balance—something that I am slowly applying. One of my favorite quotes of Mark's is something along the lines of, "If we were smarter, we would not need as much data."

At Lamont there is also another set of mentors that goes unrecognized: the cohort of postdoctoral researchers. I was fortunate to have the opportunity to learn from Edouard Bard, Bruno Hamblin, Gary Hemming, Sidney Hemming, Gideon Henderson, Will Howard, Leslie Sautter, and Niall Slowey.

### What are some fond memories of the time you spent at Lamont?

There are lots of memories associated with work and research; however, the ones that stand above the rest are about the people of Lamont. I have a lot of memories of the Core Repository's sediment lab, with or without Linda Baker's famous margaritas, and thoughtful discussions over cookies and coffee in the main office.

During a mini conference Wally Broecker held at Lamont in the early 1990s I was privileged enough to be the only student to have the time to go out to dinner with conference attendees. I had a wonderful and intellectually stimulating meal at the Hudson House with Dorothy Peteet, Richard Alley, and Chalmers Clapperton—heady times for a wet-behind-the-ears graduate student.

Another time my parents came to Lamont and brought a cooler filled with food so that we could have lunch together. While eating at one of the picnic tables in front of the old geochemistry building, Wally came out and joined us. My parents were tickled to have lunch and share a beer with Wally. They talked about that afternoon for years.



The PISCES V research submersible being launched from the R/V Ka'imikai-o-Kanaloa during a research expedition Tom Guilderson participated in near Hawaii

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