



[Speaking of Science](#)

A mysterious underwater forest warns of Earth's rapidly changing climate

By [Peter Holley](#) June 29



Divers inspect the remnants of an ancient forest off the coast of Alabama that scientists believe was killed by rising waters during an Ice Age. (Photo courtesy of Ben Raines)

The discovery began with a rumor about a fishing “honey hole” somewhere off the Alabama coast where the red snapper was plentiful.

By the time Ben Raines — an environmental reporter for the Mobile Press Register — heard about the location, the rumor had evolved.

Apparently, a local dive shop owner told him, the fish were congregating around an underwater forest peeking out of the sediment 60 feet below the surface.

Raines spent months persuading the man to take him to the secret location 10 miles offshore, an effort that paid off in 2011 as soon as Raines got his first glimpse of the forest.

“It was like entering a fairy world,” he told The Washington Post. “You get down there, and there are these cypress trees, and there are logs lying on the bottom, and you can touch them and peel the bark off.”

“It was an otherworldly experience where you knew you were in this ancient place,” he added.

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How ancient exactly? That was the question Raines and [researchers from Louisiana State University](#) and the University of Southern Mississippi were determined to answer when they began dating chunks of wood at Lawrence Livermore National Laboratory using radiocarbon dating. The expectation, researchers said, was that the trees would end up being around 10,000 years old. Nobody expected to find out that the trees were about five times that age, Kristine DeLong, a paleoclimatologist at Louisiana State University, told The Post.

Suddenly, DeLong said, researchers realized they had stumbled upon something extraordinary. The site was not merely a forest, but a prehistoric time capsule of the coastline and its climate during a 1,000-year period, when sea levels were much lower and much of the continent was hidden beneath a one-mile thick sheet of ice.

In terms of the bald cypress forest's age, experts say there is nothing else like it in the world.

“That 10,000- to 12,000-year time frame is one that scientists do a lot of research on,” DeLong said. “But there's just not a lot of records from 50,000 years ago because the ice sheets either covered it up or sea level has changed so dramatically that those sites are underwater now. That's one of the reasons that we're so excited about this site.”



This image shows the Gulf shoreline during an ice age 60,000 years ago. You can see the ancient shoreline, the modern shoreline, and the spot where the forest was found. Maps courtesy of Deep Time Maps.

The quest to reveal the forest's scientific secrets is captured in a [newly released documentary directed by Raines and produced by the multimedia group This is Alabama and the Alabama Coastal Foundation](#). Raines and his team filmed the forest during dozens of visits to the site in recent years.

The forest, which stretches the equivalent of multiple city blocks, is located in the Gulf of Mexico, but was

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miles inland from the ancient shoreline. That estimate is partially based on pollen analysis and the fact that cypress trees cannot tolerate exposure to saltwater.

Researchers believe the area was a valley about 50,000 years ago that had rivers running through it, wildlife and swamps.

Scientists believe the forest may have remained hidden were it not for Hurricane Ivan, which caused billions of dollars in damage after it slammed into the Alabama and Florida coast in 2004. The storm [produced massive waves](#) that may have scooped out about 10 feet of sediment covering the forest. Before it was revealed, likely by a hurricane, the forest had to be preserved, which required a number of circumstances.

When the forest was alive, it may have been part of a swamp in which the sediment had low levels of oxygen. Without oxygen, bacteria are slower to decompose organic material. If the forest was buried quickly in a flood, for example, the trees may have been preserved before they had a chance to rot.

“These trees were basically entombed or hermetically sealed,” Raines said. “They have nine feet of sediment over them, and oxygen is locked out. It's similar to peat bogs in Ireland, where scientists have found human bodies that were preserved by the unique environmental conditions.”

“This is the same phenomenon, but with trees,” he added.

When the chunks of the trees are removed from the ocean, researchers noted, ancient sap — still sticky and fragrant — oozes from the wood.

Grant Harley, a [dendrochronologist](#) who has analyzed wood collected from the site, [told AL.com](#) that he was amazed by the quality of the samples.

“When we ran those samples through the band saw, you could smell the resin just like you were cutting



into a fresh piece of wood today. Same thing with when we sanded them down. They smelled fresh. Very well preserved,” Harley said. “Given the fact that these samples are thousands of years old, I was astonished.”

Removed from the water and split open, the 50,000-year-old wood is remarkably well preserved. (Photo courtesy of Ben Raines)



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Researchers said one of the most interesting secrets revealed by the forest came not from the trees, but from pollen found in sediment core samples surrounding the trees. Analysis of the pollen reveals that it more closely resembles a coastal forest in modern-day North Carolina and Virginia, where the winter climate is much colder.

“The top meter of that core is just sand, like you sink your feet into the beach,” Andy Reese, a pollenologist at the University of Southern Mississippi, [told AL.com](#). “Then, the next meter is sand and marine clay. Then, all of a sudden, it transitions to peat. That’s the weirdest thing I’ve ever seen in an oceanic core like that, just perfectly preserved peat, that runs a half a meter down.”

Peat, as AL.com noted, is a type of organic matter that is found at the bottom of swamps and bogs.

Analysis of the sediment cores shows tree pollens switching to various grass pollens as water levels rise and shoreline creeps inland, killing trees in the process. The cores have given researchers a window into ancient climate change during a period in which they suspect sea levels may have been rising as quickly as eight feet every 100 years.

In some ways, the forest is a preview that helps scientists understand what they can expect as the planet warms once again.

“It’s pretty rapid change geologically speaking,” Martin Becker, a paleontologist from New Jersey's William Paterson University who has visited the site, told AL.com. “We’re looking at 60 feet of seawater where a forest used to be ... I’m looking at a lot of development, of people’s shore homes and condominiums, etc., you know. The forest is predicting the future, and maybe a pretty unpleasant one.”

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