

Deep History

Tracking hurricanes through the past

Since about 1850, the U.S. coast has been hit by only three Category 5 storms. That's hardly enough to hazard when and where they will strike again. And yet, these destructive storms are precisely the ones it would be most useful to predict.

Practitioners of the new science of "paleotempestology" believe they have a solution. Written records may date back only 150 years, but the history of older and even ancient storms remains — buried underground, captured in ancient charcoal, hidden away in caves. The paleotempestologists' goal: to free this history, filling in the record of intense hurricanes and other major storms through thousands of years ago.

"It's the uncertainty that kills people, or concerns people," says Kam-biu Liu, a leader in the field and professor of oceanography and coastal sciences at Louisiana State University. "So paleotempestology, by extending the period of observation, can help us to better define and to reduce that uncertainty."

Liu made headlines early this spring when he announced that the Gulf Coast appeared to be in a thousand-year period of few Category 4 and Category 5 storms making landfall. Four sites along the coast from New Orleans to the Florida Panhandle had been hit only once by Category 4 or 5 storms in the current millennium, although they were blasted more often during the period between 3,800 and 1,000 years ago, Liu reported.

He drew his findings from perhaps the most mature of paleotempestology's emerging tools: sediments retrieved from coastal lake or marsh bottoms.

Captured in long tubes plunged deep into the muck, those sediments are



Paleotempestologists plumb the depths of Western Lake near Panama City, Fla., for "sediment cores." The layers of mud and sand found in each core give researchers an impression of the storm activity that washed sand ashore, indicating a likely hurricane that can be radiocarbon-dated. Cores from this site indicated three distinct sand layers, dating back to roughly 1,800, 1,400, and 1,300 years from today.

composed of muck interspersed with layers of sand. Liu contends that the sand was deposited in major storms, when surge picked up the sand from the beach and dumped it into the lake or marsh. "If the storm surge is high enough, it would overtop the coastal sand barrier, and it would wash the sand into the bottom," Liu explains.

There are caveats. Some critics argue that the coast may have been different in the past. That could mean the study lake was far away from the ocean, and the sand deposited by, say, a river. Liu says examination of tiny fossils reveal the old sand contained the same organisms found near the beach today, suggesting the lake's setting was similar.

Regardless of how that argument plays out, paleotempestology is gather-

ing momentum. Liu notes that scientists are mining corals, tree rings, and stalagmites for evidence of ancient hurricanes. All appear to contain a heavy oxygen isotope that is common in rain from large hurricanes but otherwise very rare, suggesting that the isotope may serve as a good indicator of past major storms, he says.

Between Texas and Maine, Liu adds, there are perhaps a dozen "paleoweather" stations — sites where researchers have sought to determine ancient hurricane activity. Many more are needed before paleotempestology becomes a useful predictive tool. "How accurate could our normal weather forecasting be if we had only a dozen weather stations along our entire coastline?" he asks. — Aaron Hoover



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