Are hurricanes increasing? Ask a Georgia Pine tree

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Centuries of hurricane records have been discovered in the rings of southeastern US pine trees. This arboreal archive may contain critical information about how the Atlantic hurricane factory responds over the long term to natural and human-induced climate changes, say researchers at the University of Tennessee, Knoxville.

In a "proof of concept" study of the oxygen isotopes found in the cellulose of late-season growth in annual growth rings from pine trees near Valdosta, Georgia, a team led by Claudia Mora found they could identify all known hurricanes that hit the area over the past fifty years.

But that's just the beginning, says Mora, who is scheduled to present some of her team's findings on Thursday, 11 August, at Earth System Processes 2, a meeting co-convened by the Geological Society of America and Geological Association of Canada this week in Calgary, Alberta, Canada. "We've taken it back 100 years and didn't miss a storm," said Mora.

Since a century is a very short time when it comes to climate change, she and her team applied their new technique to old trees from other parts of the Southeastern US and found a tropical cyclone record spanning 227 years. They've even found additional climate information going back as far as 1450 AD.

"What we're trying to do is understand frequency of hurricanes and how variable their occurrence is over the long-term," said Mora. "We're

trying to come up with a reliable way to establish this."

Mora's group divided each individual annual tree ring in the trees into early-year and late-year growth. That way they could isolate the late-year hurricane season. Then they searched all the woody tissues for any sudden drops in a particular oxygen isotope: oxygen-18. That is the hurricane signal, Mora said.

What makes drops in oxygen-18 so telling is that it matches up with a little known talent of all hurricanes: they are very good at depleting the air of oxygen-18, Mora says. Consequently, there are unusually low concentrations of oxygen-18 in the water that rains out of hurricanes. So when shallow roots of Southeastern trees like the longleaf pine and slash pine suck up that low-O-18 hurricane rain water, the same unusual isotopic signal is preserved in the woody tree cells that start growing as soon as the sun breaks through the storm clouds.

The trees pick up the storm water in the dozen or so days immediately after the storm, according to what other researchers have learned about how pines exploit rainwater, says Mora.

Of course, not every hurricane drops rain on Valdosta, Georgia, says Mora. So to get a fuller picture of hurricane frequencies her team has already begun looking at and searching for more locations and old living trees or well-preserved dead trees in the Southeastern US , she said.

The matter of hurricane frequency has taken on greater importance recently as the Eastern US is seeing more hurricanes and climate researchers have begun asserting that there's reason to believe global warming - at least partially human-influenced - may be causing the increase.

The best way to differentiate natural from anthropogenic increases in

hurricane occurrence is to have a long history of hurricanes and other tropical cyclones to compare with, Mora explains.

Source: Geological Society of America