El Nino, La Nina to become more dominant in New Zealand with climate change

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(PhysOrg.com) -- El Niño and La Niña weather patterns will become even more dominant in New Zealand with climate change, according to research from The University of Auckland published in *Nature Climate Change*.

“As the world continues to warm New Zealand is likely to experience the impacts of El Niño and La Niño events with comparable intensity and frequency to what we have seen over the last three decades, and possibly more so,” says lead researcher Dr Anthony Fowler from the School of Environment. “This means that we should anticipate more extreme events, such as flooding and droughts, in the regions affected by these weather patterns.”

In New Zealand, El Niño events usually bring more cool south-westerly winds. The whole country tends to be relatively cool with associated droughts in sheltered eastern areas of both islands. The winds reverse with La Niñas. Moisture laden air from the sub tropics elevates temperatures, especially in the North Island, and brings higher rainfall to much of the country, sometimes with associated floods.

“The El Niño / La Niña phenomenon has been referred to as the heartbeat of the world,” Dr Fowler says. “After the seasonal cycle and monsoons, it’s the most important source of year-on-year climate variation. Strong events often cause incredible damage and affect hundreds of millions of people around the world. El Niños, in particular, have been responsible for some of the devastating 20th century droughts

in Australian, floods in South America, and failure of the monsoons in India."

"To date the global climate models used to 'predict' the future have been unable to give us a clear picture of what will happen with El Niño and La Niña as the world warms," he says. "But understanding the phenomenon is critical to learning what climate change will mean for the world's population."

"The premise of our work is that we know that the world has warmed over the last few centuries and we can look back to see what has happened with El Niño / La Niña over that time. By studying how the phenomenon has behaved in the past we can anticipate what might plausibly happen in the future. This should result in more informed scenarios of future regional climate change."

The scientists studied the climate record in kauri tree rings dating back to AD 1300. "Kauri trees are quite sensitive to these weather patterns," Dr Fowler explains. "During El Niño events they grow rapidly and have wide tree rings whereas during La Niña events they grow more slowly and have narrow rings." The rings can be accurately dated, providing a detailed record of when El Niño and La Niña events have occurred.

"Notably wide and narrow kauri tree rings have become more frequent as the world has warmed over the last few centuries. We infer from this that El Niño and La Niña events become more frequent or intense as the world warms, or that New Zealand's climate becomes more strongly influenced by such events. Either possibility suggests that droughts and floods related to El Niños and La Niñas will continue to significantly affect New Zealand, and may well become more intense."

Dr Fowler says that stitching data together from living trees and logged wood, to create a continuous record of the last 700 years, was a

significant achievement for the research team. He notes the irony in one form of environmental damage yielding clues about another. “Kauri logging in the 19th and early 20th century devastated the landscape,” he says. “But a lot of the wood that was cut down can still be found in the weatherboards of our houses and provided important data for our research.”

The next phase of the research, which is almost complete, involves adding data from kauri trees preserved in swamps to extend the record back almost 4,000 years before present. This longer record may help to answer the outstanding question of whether the El Niño / La Niña activity in the 20th century is the most intense ever seen – as suggested by currently available records – or a return to conditions that have occurred in the past.

Provided by University of Auckland