6,000 years ago, the Sahara desert was tropical—what happened?

December 1 2016

The Sahara desert was once a tropical jungle. Credit: Texas A&M University

As little as 6,000 years ago, the vast Sahara Desert was covered in grassland that received plenty of rainfall, but shifts in the world's weather patterns abruptly transformed the vegetated region into some of the driest land on Earth. A Texas A&M university researcher is trying to uncover the clues responsible for this enormous climate transformation – and the findings could lead to better rainfall predictions worldwide.

Robert Korty, associate professor in the Department of Atmospheric Sciences, along with colleague William Boos of Yale University, have had their work published in the current issue of *Nature Geoscience*.

The two researchers have looked into precipitation patterns of the Holocene era and compared them with present-day movements of the intertropical convergence zone, a large region of intense tropical rainfall. Using computer models and other data, the researchers found links to rainfall patterns thousands of years ago.

"The framework we developed helps us understand why the heaviest tropical rain belts set up where they do," Korty explains.

"Tropical rain belts are tied to what happens elsewhere in the world through the Hadley circulation, but it won't predict changes elsewhere directly, as the chain of events is very complex. But it is a step toward that goal."

The Hadley circulation is a tropical atmospheric circulation that rises near the equator. It is linked to the subtropical trade winds, tropical rainbelts, and affects the position of severe storms, hurricanes, and the jet stream. Where it descends in the subtropics, it can create desert-like conditions. The majority of Earth's arid regions are located in areas beneath the descending parts of the Hadley circulation.

"We know that 6,000 years ago, what is now the Sahara Desert was a rainy place," Korty adds.

"It has been something of a mystery to understand how the tropical rain belt moved so far north of the equator. Our findings show that that large migrations in rainfall can occur in one part of the globe even while the belt doesn't move much elsewhere.

"This framework may also be useful in predicting the details of how tropical rain bands tend to shift during modern-day El Niño and La Niña events (the cooling or warming of waters in the central Pacific Ocean which tend to influence weather patterns around the world)."

The findings could lead to better ways to predict future rainfall patterns in parts of the world, Korty believes.

"One of the implications of this is that we can deduce how the position of the rainfall will change in response to individual forces," he says. "We were able to conclude that the variations in Earth's orbit that shifted rainfall north in Africa 6,000 years ago were by themselves insufficient to sustain the amount of rain that geologic evidence shows fell over what is now the Sahara Desert. Feedbacks between the shifts in rain and the vegetation that could exist with it are needed to get heavy rains into the Sahara."

More information: William R. Boos et al. Regional energy budget control of the intertropical convergence zone and application to mid-Holocene rainfall, *Nature Geoscience* (2016). DOI: 10.1038/ngeo2833

Provided by Texas A&M University

Citation: 6,000 years ago, the Sahara desert was tropical—what happened? (2016, December 1) retrieved 20 March 2024 from https://phys.org/news/2016-12-years-sahara-tropicalwhat.html