

Huge spike in global carbon emissions linked to El Nino

October 13 2017, by Kerry Sheridan



A drought caused by the El Nino climate phenomenon made ruins reemerge of the western Venezuelan town of Potosi, inundated more than 30 years before when a hydroelectric plant was built and pictured here June 4, 2016

A huge spike in carbon emissions seen in the past couple of years has puzzled scientists, since there was no evidence of a rise in human activities, like fossil fuel burning, that might explain it.

But new satellite data shows that the weather phenomenon El Nino is to blame, because it led to dry spells that put stress on plants and trees across the tropics, and made it harder for them to perform their important role of absorbing carbon dioxide from the atmosphere.

Experts warn that in the coming decades, climate change could lead to even more such warming in the future, as severe droughts and heat waves become more common across the planet.

The 2015-16 El Nino was one of the strongest on record, and led to the biggest increase in annual concentrations of carbon released into the atmosphere in some 2,000 years, according to the NASA-led study published Thursday in the journal *Science*.

In those two years, the tropical regions of Africa, South America and Asia released 2.5 billion tons more carbon into the atmosphere than they did in 2011, it said.

These increases in [atmospheric carbon dioxide](#) were 50 percent larger than the average increase seen in recent years.

Excess heat and drought related to El Nino in the tropics of South America, Africa and Indonesia "were responsible for the record spike in global carbon dioxide," NASA said in a statement.

Key drivers of this change in [carbon emissions](#) were lower precipitation in South America and increased temperatures in Africa.



An April 2016 heatwave brought on by the El Nino weather phenomenon severely affected food production and caused chronic water shortages in many countries

"These drier and hotter conditions stressed vegetation and reduced photosynthesis, meaning trees and plants absorbed less carbon from the atmosphere," NASA said.

In tropical Asia, the increased carbon release was mostly due to biomass burning.

Satellite data

Carbon dioxide is a leading byproduct of [fossil fuel burning](#), and its accumulation in the atmosphere heats up the Earth, hence the name "greenhouse gas."

Scientists have suspected El Nino—a weather pattern that causes sea surface temperature and air pressure in the tropical Pacific Ocean to fluctuate, and may last years at a time—might wield an influence on the balance of carbon in the atmosphere.

But 28 months of data from a NASA satellite—called the Orbiting Carbon Observatory-2 (OCO-2) and launched in 2014—have clarified its role.

The satellite's mission is to examine how carbon dioxide moves across the Earth and how it changes over time.

Scientists compared 2015-16 data from the NASA satellite in recent years to 2011 data from the Japan Aerospace Exploration Agency's Greenhouse Gases Observing Satellite (GOSAT), because 2011 was a normal year, weather-wise, with no El Nino.



Researchers found seasonal changes in the carbon cycle across the Northern Hemisphere, concluding that spring gets under way and summer approaches, plants begin to soak up more carbon again

Since [climate change](#) is expected to bring less rain to South America and higher temperatures to Africa by the end of the century, researchers warn the trend will get worse in the tropics, which have traditionally served as a buffer for [fossil fuel emissions](#) because they absorb so much carbon.

"If future climate brings more or longer droughts, as the last El Nino did, more [carbon dioxide](#) may remain in the atmosphere, leading to a tendency to further warm Earth," said OCO-2 deputy project scientist Annmarie Eldering of NASA's Jet Propulsion Laboratory.

Another study that was part of a collection of five on the topic in *Science*, found "striking" seasonal changes in the carbon cycle across the Northern Hemisphere.

"In the spring there's a dramatic uptake of carbon by terrestrial plants," said the paper.

"During the winter, however, carbon uptake by plants is minimal, while the breakdown or decay of plant material feeds carbon back into the [atmosphere](#)."

This cycle, coupled with the continual emissions from fossil fuel burning over China, Europe and the southeast United States, means carbon levels reach a seasonal high in April in the northern hemisphere, it said.

Then, as spring gets under way and summer approaches, plants begin to

soak up more [carbon](#) again.

More information: A. Chatterjee at Universities Space Research Association in Columbia, MD et al., "Influence of El Niño on atmospheric CO₂ over the tropical Pacific Ocean: Findings from NASA's OCO-2 mission," *Science* (2017).

[science.sciencemag.org/cgi/doi ... 1126/science.aam5776](https://science.sciencemag.org/cgi/doi/10.1126/science.aam5776)

J. Liu et al., "Contrasting carbon cycle responses of the tropical continents to the 2015-2016 El Niño," *Science* (2017).

[science.sciencemag.org/cgi/doi ... 1126/science.aam5690](https://science.sciencemag.org/cgi/doi/10.1126/science.aam5690)

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