

Radiocarbon is key to understanding Earth's past

November 4 2021



Credit: CC0 Public Domain

Radiocarbon records are critical to understanding the history of Earth's climate, magnetic field, and the sun's activity, say researchers.

In an article published today in the journal *Science*, scientists have highlighted how recent advances in our knowledge of past [radiocarbon](#) levels are improving our understanding of [climate](#) processes, solar activity, geophysics and the carbon cycle.

Understanding the past is essential to understanding our present and to

projecting Earth's potential changes in the future. Developing an accurate [record](#) of atmospheric radiocarbon extending back 55,000 years helps researchers understand Earth's processes and consequently improve projections of [climate change](#).

Radiocarbon also tells us about the possibility of past extreme solar storms, orders of magnitude greater than any instrumentally observed. Similar storms today would have the potential to catastrophically damage our communications networks and electricity grids.

Dr. Tim Heaton, lead author and senior lecturer from the University of Sheffield's School of Mathematics and Statistics, said: "Radiocarbon is best known as the tool by which we date and synchronize many of the various archaeological and climate records from the last 55,000 years. However, past levels of radiocarbon are also critical to understand the sun, the geodynamo, past climate, and changes in the carbon cycle. Recent years have seen a revolution in our ability to construct detailed records of past radiocarbon levels, leading to new insights in the chronology of past climate events, changes in the sun's activity, carbon cycle and fluxes in Carbon Dioxide (CO₂) levels."

Developments in [radiocarbon dating](#) have allowed the IntCal Working Group to estimate radiocarbon levels with unprecedented accuracy back to the limits of the technique ~55,000 years ago.

Last year the IntCal Working Group [recalculated the internationally agreed radiocarbon calibration curves](#) for the first time in seven years, making them more detailed than ever before.

They used measurements from almost 15,000 samples from objects dating back as far as 60,000 years ago to create the new radiocarbon calibration curves, which are fundamental across the scientific spectrum for accurately dating artifacts, and understanding the Earth and climate

systems.

Radiocarbon is vital to geoscience and archaeology. Scientists on the Intergovernmental Panel on Climate Change (IPCC) rely upon radiocarbon to improve their models—as a proxy for the sun, and as a target to improve their understanding of the Earth system—and as a clock to date most paleoclimatic records over the past 55,000 years. This is essential to better understand and prepare for future changes in climate. Archaeologists use radiocarbon dating to understand pivotal changes in our societal systems that help to explain our present and answer the grand challenges we face today.

More information: T. J. Heaton, Radiocarbon: a key tracer for studying the Earth's dynamo, climate system, carbon cycle and Sun, *Science* (2021). [DOI: 10.1126/science.abd7096](https://doi.org/10.1126/science.abd7096).
www.science.org/doi/10.1126/science.abd7096

Provided by University of Sheffield

Citation: Radiocarbon is key to understanding Earth's past (2021, November 4) retrieved 5 May 2024 from <https://phys.org/news/2021-11-radiocarbon-key-earth.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.