

Highest pre-modern lead pollution occurred 800 years ago

April 2 2020, by Alexander More



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Scientists and archaeologists from the University of Nottingham, the Climate Change Institute at the University of Maine and Harvard University discovered the highest levels of air pollution before the modern era occurred around 800 years ago.

The study, published by Cambridge University Press' *Antiquity* journal,

includes data that represents the highest-resolution, most detailed and chronologically accurate record in existence for [pollution](#), climate change and economic growth over the past two millennia.

A team of researchers from the CCI, Heidelberg University and the University of Bern retrieved the [ice core](#) from an alpine glacier (Colle Gnifetti) on the border of Switzerland and Italy. The glacier is well known among researchers in Germany, Switzerland (as [reported](#) in the *New York Times*), Italy and the United States for the quality of its ice.

Scientists at the Climate Change Institute used cutting-edge laser technology to chemically identify changes in [pollution and climate](#), year by year, and even season by season.

"We have improved the sampling resolution in ice cores from the previous standard of 100 samples per meter to 10,000 samples per meter, meaning that even in old, compressed ice at depth, high-fidelity data is emerging that remained masked or 'smoothed out' in lower-resolution records," says Paul Mayewski, director of the Climate Change Institute.

"This leap in data accessibility opens up new realms of investigation into the association between climate, pollution and society."

Historians painstakingly matched the data with documents preserved in the archives and libraries of Europe, bringing history to life with a warning for the present.

"The mid-late 12th century had the same levels of lead pollution as we see in the mid 17th century and even in 1890, so our notions of atmospheric pollution starting in the industrial revolution are wrong," says professor Christopher Loveluck of the University of Nottingham.

Comparing data obtained by analyzing glacial ice and [historical records](#), the team showed how political crises and wars left a mark on Europe's [economic growth](#) and environment under some of the most celebrated kings in England—Henry II, John Lackland, and Richard the Lionheart.

"By shining a laser on centuries-old ice, we've learned to read glaciers as we read a book. We're doing both to shed light on economic history and its health implications," says professor Alexander More of the CCI, Long Island University, and Science of the Human Past at Harvard.

Even low levels of exposure to lead, a toxic metal, can reduce brain function and result in lifelong health complications. Humans have mined and used lead for centuries in coins, roofs, water pipes and paint.

Typically, pre-industrial civilization serves as a baseline to compare today's pollution levels.

However, contrary to assumptions of a much cleaner yesterday, humans have released toxic chemicals into the environment for far longer than the last two centuries.

Indeed, this study shows that before industry, very high levels of lead pollution came from Great Britain, particularly the mines of Carlisle and the Peak District.

In addition to their historic findings, the work of the British-American researchers represents a major innovation in the study of pollution, health and economic history.

Michael McCormick, chair of the Initiative for the Science of the Human Past at Harvard, emphasized the consilience of scientific and historical findings.

"Thanks to this new technology, those 12th-century particulates embedded in the ice core converge with Britain's medieval royal [financial] archives, the Pipe Rolls, to track yearly lead production, casting sharp new light on the dynamics of the medieval economy," he says.

In addition to Mayewski, CCI researchers Andrei Kurbatov, Heather Clifford, Nicole Spaulding, Michael Handley, Laura Hartman, Elena Korotkikh and Sharon Sneed are co-authors of the study.

More information: Christopher P. Loveluck et al. Alpine ice and the annual political economy of the Angevin Empire, from the death of Thomas Becket to Magna Carta, c. AD 1170–1216, *Antiquity* (2020). [DOI: 10.15184/aqy.2019.202](https://doi.org/10.15184/aqy.2019.202)

Provided by University of Maine

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