

Annex 1 (teachers)

Climate change in history

The climate is always changing. There were ice ages and warmer periods when alligators were found in Spitsbergen. Ice ages have occurred in a 100,000-year cycle for the last 700,000 years, and there have been previous periods that appear to have been warmer than the present despite CO₂ levels being lower than they are now. More recently, we have had the medieval warm period and the little ice age.

Greenhouse gases, mainly CO₂ but also methane, were involved in most of the climate changes in the past. When they were reduced, the global climate became cooler. When they were increased, the global climate became warmer. Volcanic eruptions have caused strong cooling following a period of unusually heavy activity.

When CO₂ levels jumped rapidly, the global warming that resulted was highly disruptive and sometimes caused mass extinctions. Symptoms from those events include big, rapid jumps in global temperatures, rising sea levels and ocean acidification. Humans today are emitting prodigious quantities of CO₂ at a rate faster than even the most destructive climate changes in the planet's past.

The concentration of carbon dioxide has been increasing since the beginning of the Industrial Revolution. From 289 ppm of carbon dioxide in the atmosphere in 1750, to 380 ppm by 2005 and to 407 ppm in 2018. Most of the increase has occurred since 1959, as world energy usage has expanded dramatically.

Source: [Skeptical science](#)

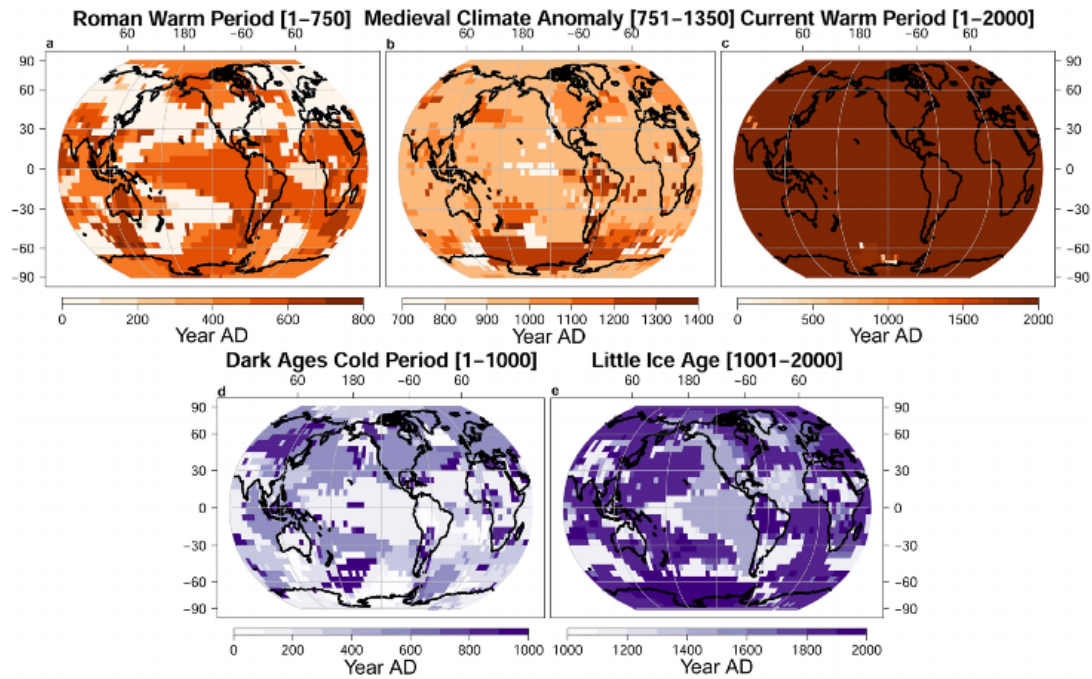


Fig. 3 | Timing of peak warm and cold periods. a–e, Centuries with the highest ensemble probability of containing the warmest (a–c) and coldest (d, e) 51-year period within each putative climatic epoch (see Methods). The full time ranges over which the search was performed for each epoch are indicated in parentheses. The numbers on the y axis and upper x axis are degrees latitude and longitude.

Maps: Raphael Neukom¹, Nathan Steiger², Juan José Gómez-Navarro³, Jianghao Wang⁴ & Johannes P. Werner, [No evidence for globally coherent warm and cold periods over the preindustrial Common Era](#), *Nature* July 2019, page 3