# Summer 2023: Hottest in Over Two Millennia in Northern Hemisphere



Researchers have concluded that Summer 2023 was the hottest in the Northern Hemisphere in over two millennia. Analyzing tree ring data, scientists determined that temperatures for June, July, and August were at least 0.5°C higher than previous natural climate variations. This year's temperatures were nearly 4°C higher than the coldest summer recorded, influenced by the El Niño weather pattern in the Pacific, which exacerbates human-caused global warming.

Scientists from the University of Cambridge and Johannes Gutenberg University Mainz found that 2023's summer was 2.07°C warmer than the average for 1850-1900, the pre-industrial baseline. Published in *Nature*, the study warns that these temperature increases have surpassed limits set by the Paris Agreement, aiming to cap global warming at 1.5°C.

Tree ring data illustrated that the summer of 2023 was 2.2°C warmer than the long-term average from 1 AD to 1890. The coldest summer, in 536 AD, was significantly influenced by a volcanic eruption, making it 3.93°C colder than 2023. The study's findings indicate that the naturally warmest summer, in 246 AD during a warm peak under the Roman Empire, was 1.19°C cooler than last year's summer.

The current El Niño period is expected to extend into early Summer 2024, suggesting further temperature records could be broken. Prof. Jan Esper of Johannes Gutenberg University noted the amplification of warming in 2023 due to greenhouse gases and El Niño, predicting continued severe heat waves and drought periods if greenhouse gas emissions are not reduced.