

# Paleoclimatic Data for the Last 2,000 years

Temperature reconstructions for the last 2,000 years agree that recent warming is unprecedented in rate and spatial extent.

## Paleoclimatic Data for the Last 2,000 Years

Beginning in the 1970s, paleoclimatologists began constructing a blueprint of how Earth's temperature changed over the centuries before the widespread use of thermometers. Since the late 1990s, new advances in statistical techniques to combine information from a broad range of [proxy data](#) types has revolutionized what we know about present-day temperature in the context of past centuries ([Briffa et al. 1998](#), [Jones et al. 1998](#), [Mann et al. 1999](#), Figure 6.10 in [Jansen et al. 2007](#), Figure 5.7 in [Masson-Delmotte et al. 2013](#)).

Although there are differences between various large-scale temperature reconstructions, due in part to the diverse statistical methods utilized and sources of the proxy data, they all indicate similar patterns of temperature variability over the last 2,000 years. Most clearly, these reconstructions show a rapid global warming over approximately the past 150 years that is unprecedented in both rate and spatial coherence over at least the last 2000 years. Scientists have identified climatically-distinct periods that occurred prior to 1850 CE, however the timing and spatial structure of these variations is complex. For example, some locations experienced warmer conditions during the "Medieval Climate Anomaly" some time between about 950 to 1250 CE than during the subsequent "Little Ice Age" from roughly 1450 to 1850 CE. One region where these temperature variations played an important role in human history is the North Atlantic, where warmer temperatures during medieval times allowed Norse seafaring and colonization of Greenland that began at the end of the 10th century and continued until cooler and/or drier conditions developed in the 15th century ([Lasher et al. 2019](#), [Zhao et al. 2022](#)).

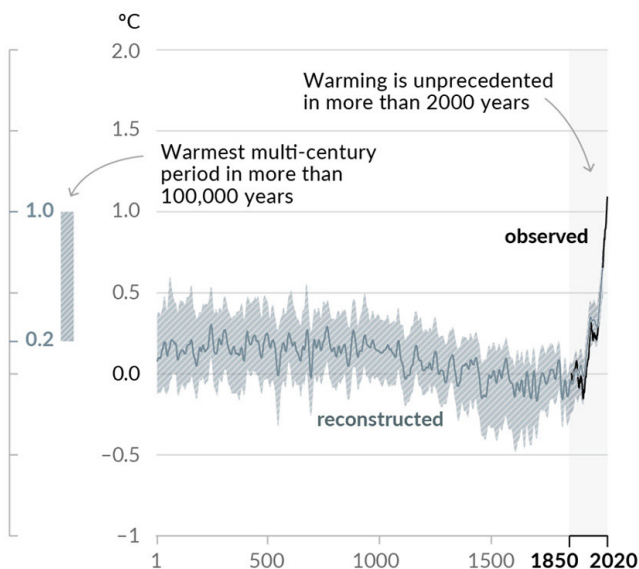
The similarity of characteristics among the different paleoclimate reconstructions of the last 2,000 years provides confidence in the following important conclusions, as reported in the [Intergovernmental Panel on Climate Change Sixth Assessment Report](#):

- Prior to 1850 CE, there was a millennial-scale cooling trend including a multi-century period with relatively cooler temperatures beginning in the 15th century.
- Global temperature has increased over the last 50 years at a rate unprecedented in at least the last 2000 years.
- Warmer than average temperatures are more widespread over the Northern Hemisphere since the mid 20th century than in any previous time in the past 2000 years.

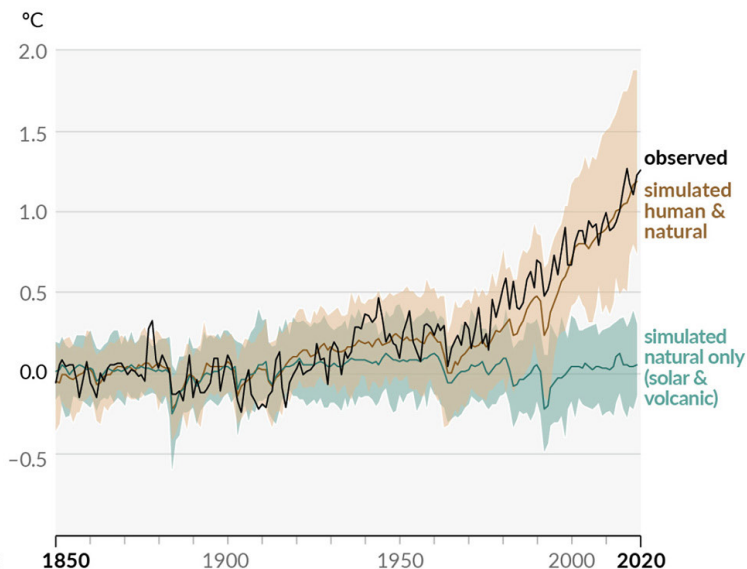
## Human influence has warmed the climate at a rate that is unprecedented in at least the last 2000 years

### Changes in global surface temperature relative to 1850–1900

(a) Change in global surface temperature (decadal average) as **reconstructed** (1–2000) and **observed** (1850–2020)



(b) Change in global surface temperature (annual average) as **observed** and simulated using **human & natural** and **only natural** factors (both 1850–2020)



Changes in global mean annual surface temperature from paleoclimate proxies of the last 2000 years (gray line) and from direct observations (black line). The timeseries are decadal averaged and the gray shading with white diagonal lines shows the uncertainty of the paleoclimate reconstruction. Graphic is from the [Intergovernmental Panel on Climate Change Sixth Assessment Report Reconstruction data are from PAGES 2k Consortium \(2019\)](#).