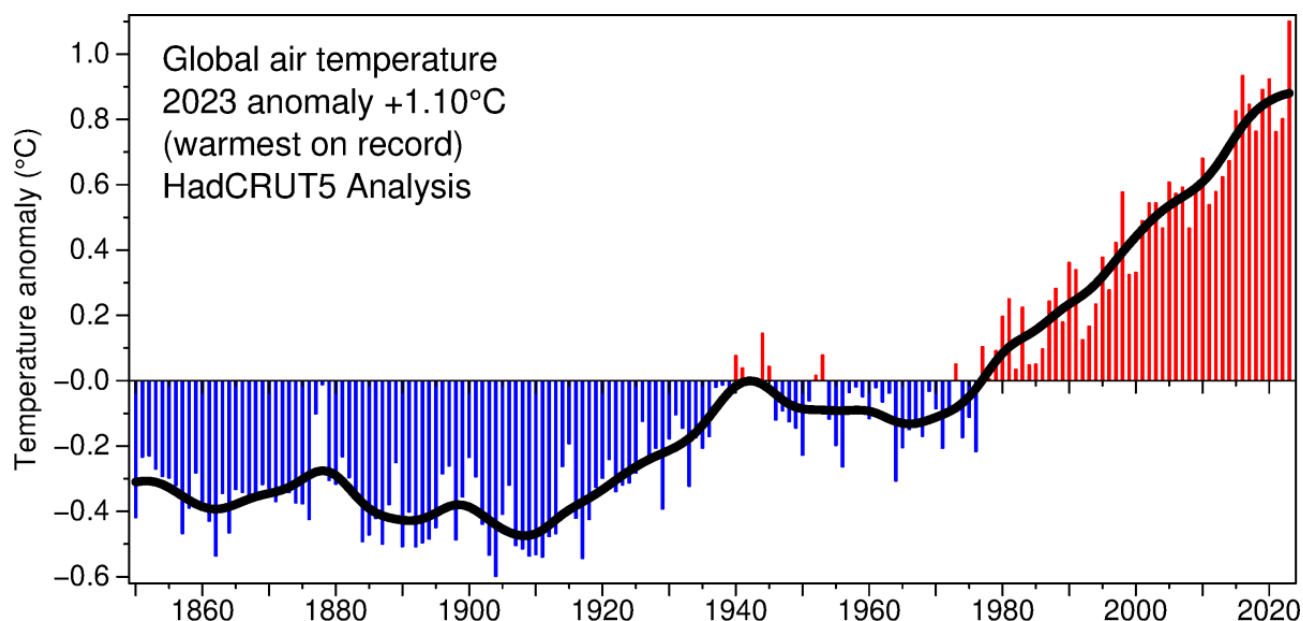


Global Temperature Record

Tim Osborn & Phil Jones



(this graph of HadCRUT5 Analysis temperature anomalies relative to the 1961-1990 baseline is also available as [Encapsulated PostScript](#) and [PDF](#) suitable for publication and the data are available as [Comma-Separated Values](#))

The time series shows the combined global land and marine surface temperature record from 1850 to 2023. Last year (2023) was easily the warmest on record using our latest HadCRUT5 Analysis (Morice *et al.*, 2021), exceeding the previous warmest by much more than the uncertainty on each individual annual value. It was also the tenth year in succession that has equalled or exceeded 1.0 °C above the pre-industrial period (represented by the average during 1850-1900).

Each decade since the 1980s has been warmer than all preceding decades in our record. The average global temperature during the last 10 years (2014-2023) was 0.85(±0.03) °C above the 1961-1990 average and 1.21(±0.10) °C above the late nineteenth century average. The Earth's surface has warmed by about 0.2 °C per decade since the 1970s.

This time series is compiled jointly by the Climatic Research Unit at UEA and by the Met Office Hadley Centre. The UEA work is undertaken under the auspices of the UK's National Centre for Atmospheric Science (NCAS) funded by the Natural Environment Research Council.

The warmth or coldness of individual years is influenced by natural climate variability, such as whether there was an El Niño or a La Niña event occurring in the equatorial Pacific Ocean. This type of variability can temporarily warm or cool the global temperature by 0.1 or 0.2 °C above or below the underlying warming trend.

The dominant cause of the long-term warming observed since the 19th century is clear: it is the increased concentrations of greenhouse gases in the atmosphere due to human activities. And it is because of this human-caused warming trend that, e.g., the last nine years are the warmest nine in our record.

The Intergovernmental Panel on Climate Change (IPCC) used our HadCRUT5 global temperature record in its most recent assessment published in 2021. Their assessment stated:

‘It is unequivocal that human influence has warmed the atmosphere, ocean and land. Widespread and rapid changes in the atmosphere, ocean, cryosphere and biosphere have occurred.’

‘Each of the last four decades has been successively warmer than any decade that preceded it since 1850. Human influence has warmed the climate at a rate that is unprecedented in at least the last 2000 years.’

Links

Global temperature anomaly datasets	http://www.cru.uea.ac.uk/cru/data/temperature/
Further graphs and maps of global temperature	https://crudata.uea.ac.uk/~timo/diag/tempdiag.htm
Central England Temperature (CET) data	https://www.metoffice.gov.uk/hadobs/hadcet/
IPCC: Intergovernmental Panel on Climate Change	http://www.ipcc.ch/
Latest IPCC report from Working Group 1	http://www.ipcc.ch/report/ar6/wg1/

The reference for this global temperature time series is:

Morice, C.P., Kennedy, J.J., Rayner, Winn, J.P., Hogan, E., Killick, R.E., Dunn, R.J.H., Osborn, T.J., Jones, P.D., and Simpson, I.R., 2021: An updated assessment of near-surface temperature change from 1850: the HadCRUT5 dataset. *Journal of Geophysical Research*, **126**, e2019JD032361 <https://doi.org/10.1029/2019JD032361>

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