

# No pause in global warming in the past 100 years

November 13 2018

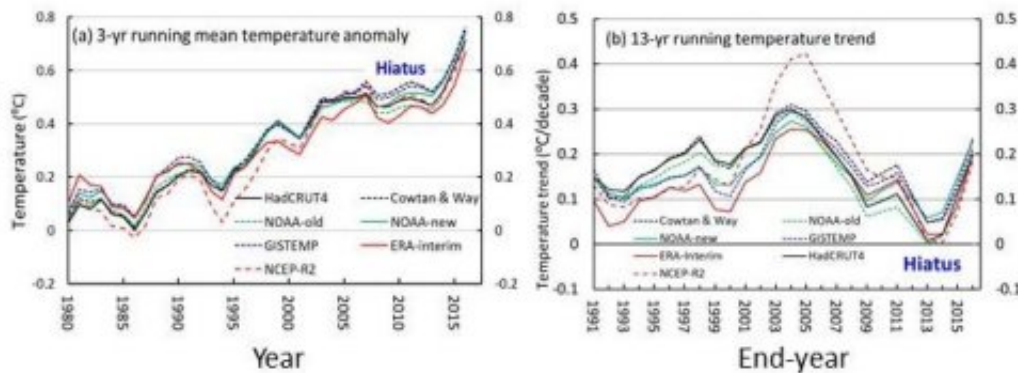


Fig.1 3-year running means (a) and 13-year running trends (b) for seven well-known global mean surface temperature sequences. Credit: DAI Xingang

Global warming has been attributed to persistent increases in atmospheric greenhouse gases (GHGs), especially in  $\text{CO}_2$ , since 1870, the beginning of the Industrial Revolution. Nevertheless, the upward trend in global mean surface temperature (GMST) slowed or even paused during the first decade of the 21st century, even though  $\text{CO}_2$  levels continued to rise and reached nearly 400 ppm in 2013. This episode has typically been termed the global warming hiatus, or slowdown in warming. The hiatus is characterized as a near-zero trend over a certain period. The hiatus appeared during 2001-2013/2002-2012 with extremely weak interannual variability in some GMST sequences, and the slowdown in the others.

The hiatus is often attributed to internal climate [variability](#), external forcing, or both, involving an increase in aerosols in the stratosphere during the period 2000-2010, the negative phase of the Interdecadal Pacific Oscillation (IPO) accompanying intensified trade winds, extensive heat uptake by the deep ocean or an extremely low number of sunspots during the latest solar activity cycle.

A new study published in *Scientific Reports* reveals that global warming has never stopped in the past 100 years, with a maximum rate of change after World War II, and an almost constant rate ( $0.08^{\circ}\text{C}/10\text{a}$ ) during the latest three decades. However, the key cooling against global warming comes from the interannual variability of the temperature that coincides with the variability of the sea surface [temperature](#) in the equatorial mid-eastern Pacific. Hence, the hiatus is merely a decadal balance between global warming and the cooling resulting from anomalous [sea surface temperature](#) in the equatorial Pacific.

The hiatus ended in 2014 as a new El Niño Southern Oscillation (ENSO) event was developing in the equatorial mid-eastern Pacific, which caused a rapid warming in the earth. On the other hand, the multidecadal climate oscillation follows a downward path with increase in cooling.

"Our study suggests that future climate conditions will likely rely on competition between multidecadal cooling and [global warming](#) if the multidecadal climate cycle repeats, as was experienced during the second half of the 20th century," says Dr. Xingang Dai, the lead author from Institute of Atmospheric Physics at Chinese Academy of Sciences.

**More information:** Xin-Gang Dai et al, Identifying the early 2000s hiatus associated with internal climate variability, *Scientific Reports* (2018). [DOI: 10.1038/s41598-018-31862-z](https://doi.org/10.1038/s41598-018-31862-z)

Provided by Chinese Academy of Sciences

Citation: No pause in global warming in the past 100 years (2018, November 13) retrieved 3 May 2024 from <https://phys.org/news/2018-11-global-years.html>

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