

Climate scientists find elusive tropospheric hot spot

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Researchers have published results in *Environmental Research Letters* confirming strong warming in the upper troposphere, known colloquially as the tropospheric hotspot. The hot has been long expected as part of global warming theory and appears in many global climate models.

The inability to detect this hotspot previously has been used by those who doubt man-made [global warming](#) to suggest [climate change](#) is not occurring as a result of increasing [carbon dioxide emissions](#).

"Using more recent data and better analysis methods we have been able to re-examine the global weather balloon network, known as radiosondes, and have found clear indications of [warming](#) in the upper

troposphere," said lead author ARC Centre of Excellence for Climate System Science Chief Investigator Prof Steve Sherwood.

"We were able to do this by producing a publicly available temperature and wind data set of the [upper troposphere](#) extending from 1958-2012, so it is there for anyone to see."

The new dataset was the result of extending an existing data record and then removing artefacts caused by station moves and instrument changes. This revealed real changes in temperature as opposed to the artificial changes generated by alterations to the way the data was collected.

No [climate models](#) were used in the process that revealed the tropospheric hotspot. The researchers instead used observations and combined two well-known techniques—linear regression and Kriging.

"We deduced from the data what natural weather and climate variations look like, then found anomalies in the data that looked more like sudden one-off shifts from these natural variations and removed them," said Prof Sherwood.

"All of this was done using a well established procedure developed by statisticians in 1977."

The results show that even though there has been a slowdown in the warming of the global average temperatures on the surface of the Earth, the warming has continued strongly throughout the troposphere except for a very thin layer at around 14-15km above the surface of the Earth where it has warmed slightly less.

As well as confirming the tropospheric hotspot, the researchers also found a 10% increase in winds over the Southern Ocean. The character of this increase suggests it may be the result of ozone depletion.

"I am very interested in these wind speed increases and whether they may have also played some role in slowing down the warming at the surface of the ocean," said Prof Sherwood.

"However, one thing this improved data set shows us is that we should no longer accept the claim that there is warming missing higher in the atmosphere. That warming is now clearly seen."

More information: Atmospheric changes through 2012 as shown by iteratively homogenised radiosonde temperature and wind data (IUK v2) , *Environmental Research Letters* ,
iopscience.iop.org/1748-9326/10/5/054007

Provided by University of New South Wales

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