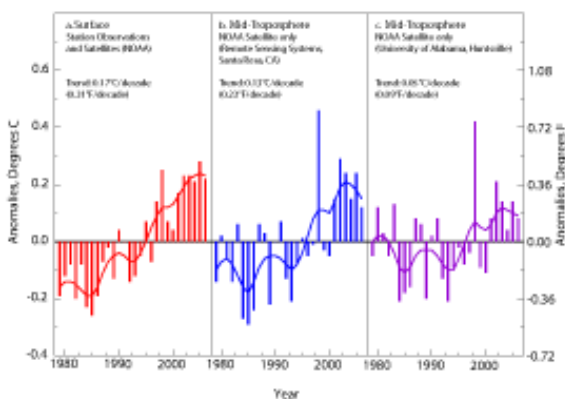


Tropospheric and Stratospheric Temperature Record from Satellite Measurements

The National Climatic Data Center

Climate Monitoring Branch

Annual Temperature Anomalies: Middle Troposphere and Surface



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Analysis of the satellite record that began in 1979 indicates that global temperatures are increasing in the mid-troposphere, but the magnitude of the trend differs based on the analysis methods used in adjusting for factors such as orbital decay and inter-satellite differences.

Mid-tropospheric and lower stratospheric temperature data are collected by NOAA's TIROS-N polar-orbiting satellites and adjusted for time-dependent biases by the Global Hydrology and Climate Center at the [University of Alabama in Huntsville \(UAH\)](#). An independent analysis is also performed by [Remote Sensing Systems \(RSS\)](#) and a third analysis has been performed by Dr. Qiang Fu of the the University of Washington (UW) ([Fu et al. 2004](#))**.

**Fu et al. (2004), developed a method for quantifying the stratospheric contribution to the satellite record of tropospheric temperatures and applied an adjustment to the UAH and RSS temperature record that attempts to remove the satellite contribution (cooling influence) from the middle troposphere record. This method results in trends that are larger than the those from the respective source.

This adjustment to both the RSS and UAH datasets is accomplished by deriving separate weighting coefficients for the MSU T2 and T4 over the tropics (30N to 30S), Northern and Southern hemispheres, and for the global mean by fitting radiosonde troposphere anomalies to radiosonde-simulated T2 and T4 anomalies over the period from 1958-2004 as

$$T_{850-300} = a_0 + a_2 * T_2 + a_4 * T_4$$

where $T_{850-300}$ is the radiosonde 850-300 hPa layer; T_2 and T_4 are the radiosonde simulated MSU brightness temperature anomalies; and a_0 , a_2 , and a_4 are the coefficients derived from this linear regression.

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[Analysis](#)

Monthly analysis and associated graphics are available in NCDC's web-based [State of the Climate Reports](#) and the Bulletin of American Meteorology Society's Annual Reports, [2000](#), [2001](#), [2002](#), [2003](#), [2004](#), [2005](#).

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<http://www.ncdc.noaa.gov/oa/climate/research/msu.html>

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