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Global Temperature Report: January 2024

Global climate trend since Dec. 1 1978: +0.15 C per decade

January Temperatures (preliminary)

Global composite temp: +0.86 C (+1.55°F) above the seasonal average

Northern Hemisphere: +1.06 C (+1.91°F) above seasonal average

Southern Hemisphere: +0.66 C (+1.19°F) above seasonal average

Tropics: +1.27 C (+2.29°F) above seasonal average

December Temperatures (final)

Global composite temp: +0.83 C (+1.49°F) above the seasonal average

Northern Hemisphere: +0.93 C (+1.67°F) above seasonal average

Southern Hemisphere: +0.73 C (+1.31°F) above seasonal average

Tropics: +1.08 C (+1.94°F) above seasonal average

Notes on data released January 4, 2024 (v6.0, with 1991-2020 reference base)

[Please note that we provide these data out of our own initiative, and are only able to produce these updates at times convenient to our working schedules.]

Though up slightly from December's anomaly, the global atmospheric temperature departure for January of +0.86 °C (+1.55 °F) continued a string of months beginning in September 2023 of being very close to +0.90°C (+1.62 °F). A noticeable jump in tropical temperatures to +1.27°C (+2.29°F)

represents the warmest in that region of the 46 Januarys that have been monitored from satellites as well as of any month on record, with second place now held by Feb 1998 of +1.15 °C. There are signs that the current warm El Niño episode is fading with a significant loss of heat in the tropical Pacific Ocean. This heat must go somewhere and we often see an increase in tropical atmospheric temperatures when this occurs.

See more on NOAA's excellent weekly updates here.
https://www.cpc.ncep.noaa.gov/products/analysis_monitoring/lanina/enso_evolution-status-fcsts-web.pdf.

Notice that the global atmospheric trend is now +0.15 °C/decade, up from +0.14 °C/decade last month. The trend had been flirting with +0.15 since the hot anomalies of last year, and just now reached +0.145 °C/decade which we rounded up to +0.15.

It is tempting to think that the global temperature peaked in October at +0.93 °C and that it is now on the decline, but changes of a tenth of a degree are very common and changes of more than 0.20 °C happen every few months. So, thinking we have reached the peak warming of this El Niño is not a good bet to make at this point, but I suspect it will be soon.

The planet's warmest spot in January occurred, unusually, at a fairly low-latitude location over northern Morocco at +3.9 °C (+6.9°F) which was the center of a large warm region in NW Africa. A similar area of heat was centered over Afghanistan. The tropics were universally warm as the El Niño is fully present. Eastern Canada was also much warmer than average.

With a reading of -2.5°C (-4.4°F), the coolest departure from average could be found over western Russia with the region as a whole being below normal. Cooler than average temperatures were found in North America, the southern high latitudes and eastern Antarctica.

The conterminous US was a tiny bit below average at -0.05 °C (-0.09 °F), due mainly to a mid-month influx of Arctic air in the middle of the country. It was slightly warmer than average in Alaska, so the 49-state average was raised to +0.09 °C (+0.16°F). [We don't include Hawaii in the US results because its land area is less than that of one satellite grid square, so it would have virtually no impact on the overall national results.]

Background notes.

In the July 2023 GTR we reported the February 2016 anomaly as +0.70 °C. As the intercalibrations between satellites are recalculated with each month's new data, there is the possibility of tiny changes in the base annual cycle (< 0.01 °C), and thus the anomalies calculated therefrom. This is the reason for the February 2016 value being +0.71 °C this month.

A note about the global temperature trend. For several years, the trend has been extremely close to +0.135 °C/decade. This past July, the threshold of 0.135 was crossed at +0.1352 °C/decade. The global trend is now +0.14 °C/decade by rounding up.

New Reference Base Jan 2021 and forward. As noted in the Jan 2021 GTR, the situation comes around every 10 years when the reference period or "30-year normal" that we use to calculate the departures is redefined. With that, we have averaged the absolute temperatures over the period 1991-2020, in accordance with the World Meteorological Organization's guidelines, and use this as the new base period. This allows the anomalies to relate more closely to the experience of the average person, i.e. the climate of the last 30 years. Due to the rising trend of global and regional temperatures, the new normals are a little warmer than before, i.e. the global average temperature for Januaries for 1991-2020 is 0.14 °C warmer than the average for Januaries during 1981-2010. So, the new departures from this now warmer average will appear to be cooler, but this is an artifact of simply applying a new base period. It is important to remember that changes over time periods, such as a trend value or the relative difference of one year to the next, will not change. Think about it this way, all we've done is to take the *entire* time series and shifted it down a little.

To-Do List: There has been a delay in our ability to utilize and merge the new generation of microwave sensors (ATMS) on the NPP and JPSS satellites. As of now, the calibration equations applied by the agency have changed at least twice, so that the data stream contains inhomogeneities which obviously impact the type of measurements we seek. We are hoping this is resolved soon with a dataset that is built with a single, consistent set of calibration equations. In addition, the current non-drifting satellite operated by the Europeans, MetOP-B, has not yet been adjusted or "neutralized" for its seasonal peculiarities related to its unique equatorial crossing time (0930). While these MetOP-B peculiarities do not affect the long-term global trend, they do introduce error within a particular year in specific locations over land.

As part of an ongoing joint project between UAH, NOAA and NASA, Christy and Dr. Roy Spencer, an ESSC principal scientist, use data gathered by advanced microwave sounding units on NOAA, NASA and European satellites to produce temperature readings for almost all regions of the Earth. This includes remote desert, ocean and rain forest areas where reliable climate data are not otherwise available. Drs. Danny Braswell and Rob Junod assist in the preparation of these reports.

The satellite-based instruments measure the temperature of the atmosphere from the surface up to an altitude of about eight kilometers above sea level. Once the monthly temperature data are collected and processed, they are placed in a "public" computer file for immediate access by atmospheric scientists in the U.S. and abroad.

The complete version 6 lower troposphere dataset is available here:

http://www.nsstc.uah.edu/data/msu/v6.0/tlt/uahncdc_lt_6.0.txt

Archived color maps of local temperature anomalies are available on-line at:

http://nsstc.uah.edu/climate/

Neither Christy nor Spencer receives any research support or funding from oil, coal or industrial companies or organizations, or from any private or special interest groups. All of their climate research funding comes from federal and state grants or contracts.

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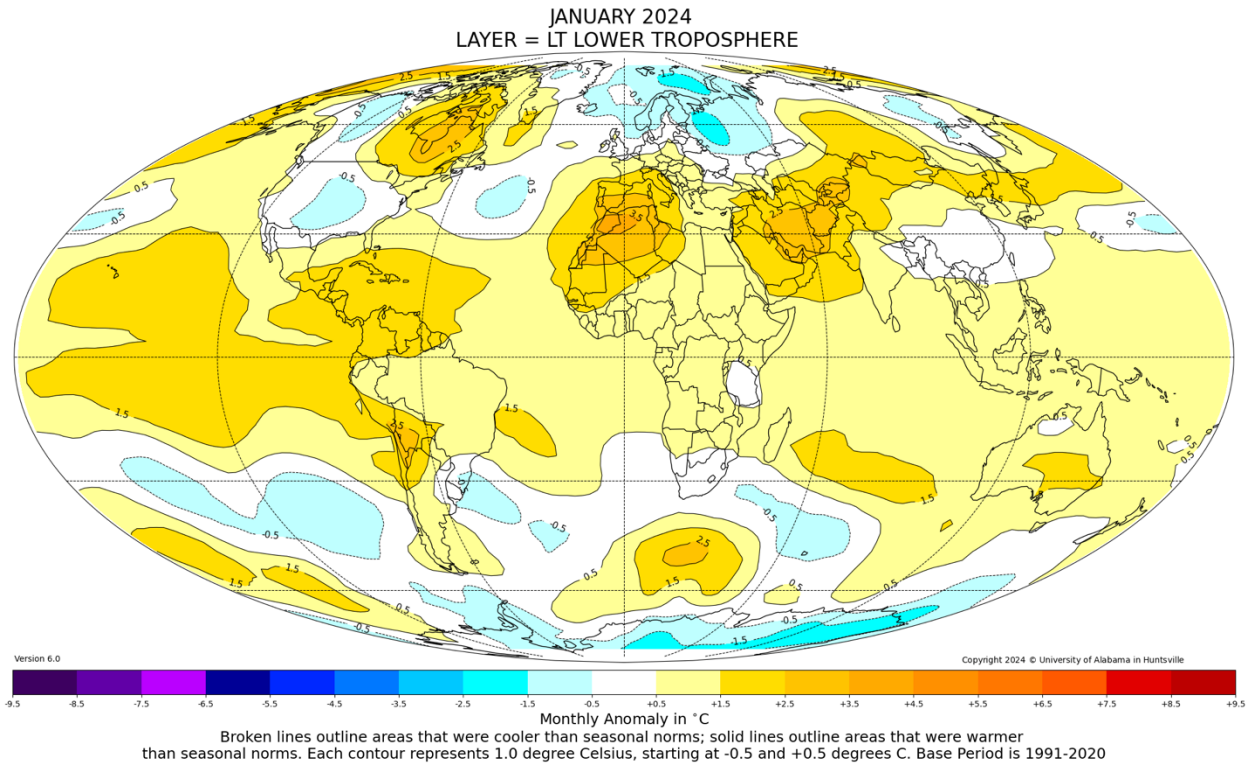

Figure. Lower tropospheric temperature anomalies for January 2024

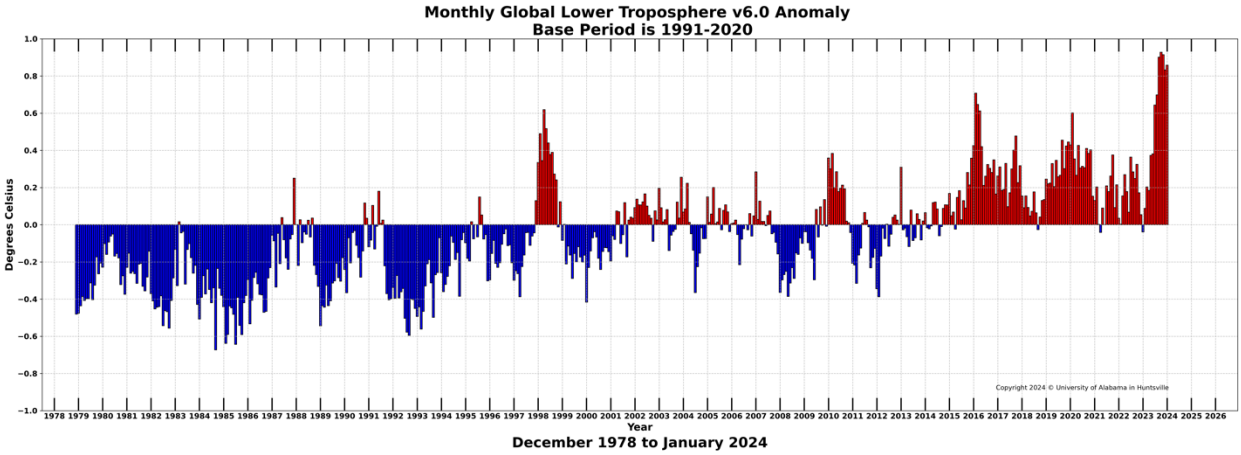

Figure. Bar chart of global monthly lower tropospheric temperature anomalies.