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Global Temperature Report: Jan 2023

Global climate trend since Dec. 1 1978: +0.13 C per decade

January Temperatures (preliminary)

Global composite temp: -0.04 C (-0.07°F) below the seasonal average

Northern Hemisphere: +0.05 C (+0.09 °F) above seasonal average

Southern Hemisphere: -0.14 C (-0.25 °F) below seasonal average

Tropics: -0.38 °C (-0.68°F) below seasonal average

December Temperatures (final)

Global composite temp: +0.05 C (+0.09°F) above the seasonal average

Northern Hemisphere: +0.13 C (+0.23 °F) above seasonal average

Southern Hemisphere: -0.03 C (-0.05 °F) below seasonal average

Tropics: -0.35 °C (-0.63°F) below seasonal average

Notes on data released February 3, 2023 (v6.0, with 1991-2020 reference base)

The global atmospheric temperature in January dropped slightly below the 30-year average to -0.04 °C (-0.07 °F). The tropics remained as cool as they were December, with modest declines in the higher latitudes of both hemispheres, though the North Polar region fell a hefty 0.92 °C from December's value of +0.80 °C as the third year of the La Niña phase continues. The tropical value is the coolest departure since April 2012 but well above the record cool tropical temperature (-0.99 °C) achieved in July 1985.

The latest values of various El Niño/La Niña indices indicate the La Niña (cold phase of the cycle) continues though indicators such as the tropical ocean heat content are now in the neutral range. The impact of the colder-than-average tropical Pacific Ocean surface temperatures induces a complex response in the atmospheric temperatures we report here, but in a very simple sense, cooler water will warm the atmosphere less than usual, causing it to be cooler than average (note the tropical atmospheric temperature in Jan was -0.38 °C). And, the bulk atmospheric temperature follows that of the ocean water temperatures by about 2 to 5 months. The latest on the evolution of La Niña and its anticipated diminishment in 2023 is provided by NOAA here: https://www.cpc.ncep.noaa.gov/products/analysis_monitoring/lanina/enso_evolution-status-fcsts-web.pdf.

The planet's warmest spot in January, in terms of the monthly departure from average, occurred in SW China with a reading of +0.34 °C (+6.2°F). The map of temperature anomalies indicates above average values over northern North America, eastern Europe and regions of the southern oceans around 50° S latitude.

With a reading of -4.2 °C (-7.6°F) the coolest departure from average could be found over eastern Russia. The impact on the atmospheric temperature due to the cool tropical Pacific waters is evident as the tropics were mostly cool. Additionally, Antarctica was cooler than average as was the western US and Turkmenistan.

The conterminous US was near average for January (+0.12 °C, +0.22 °F). This is a good case where the average doesn't represent the situation on the ground as the western states were quite cool and the eastern/northeastern states were warmer than average. Alaska again was warmer (in terms of departure from average) than the lower 48, so that the 49-state average climbed to +0.32 °C (+0.58°F). [We don't include Hawaii in the US results because its land area is less than that of a satellite grid square, so it would have virtually no impact on the overall national results.]

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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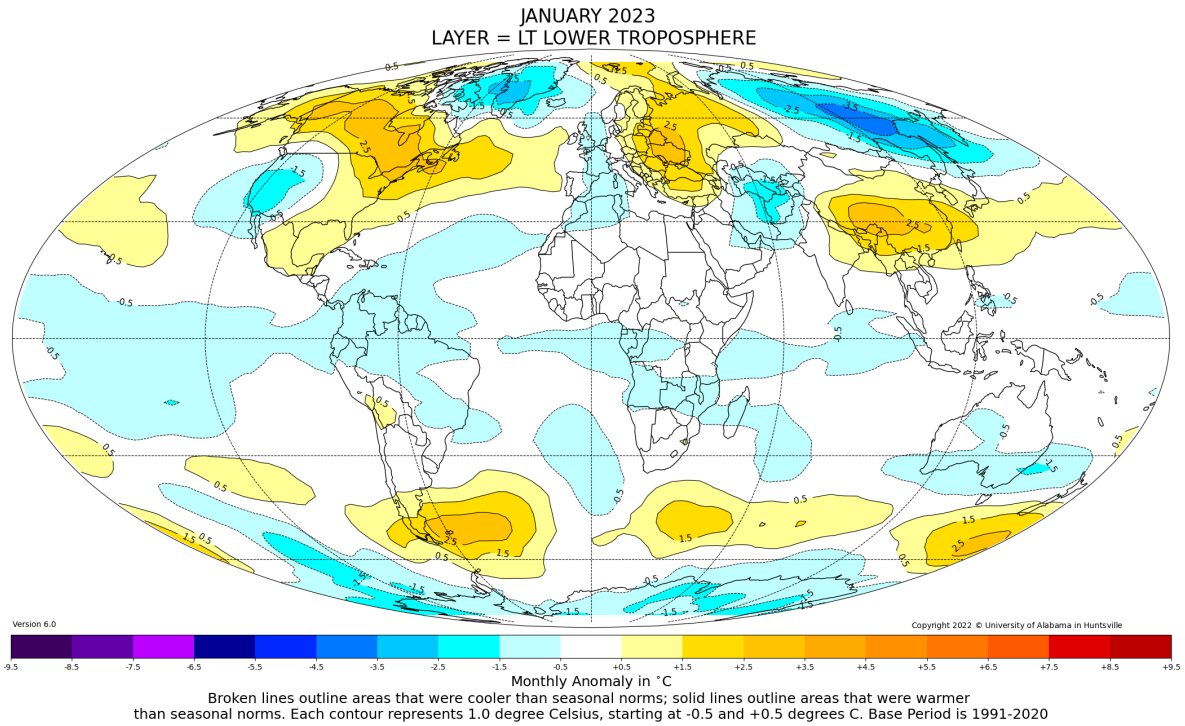

Figure. Lower tropospheric temperature anomalies for January 2023

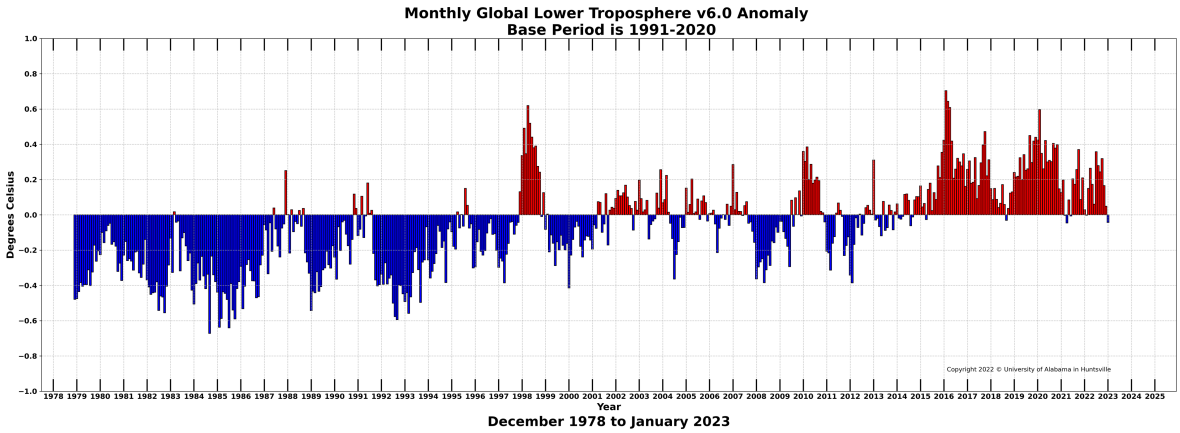

Figure. Bar chart of global monthly lower tropospheric temperature anomalies.