2 Aug 2024

Vol. 35, No. 4

For Additional Information:
Dr. John Christy, (256) 961-7763
christy@nsstc.uah.edu
Dr. Roy Spencer, (256) 961-7960
spencer@nsstc.uah.edu

Global Temperature Report: July 2024

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

July Temperatures (preliminary)

Global composite temp: +0.85 C (+1.53°F) above the seasonal average

Northern Hemisphere: +1.02 C (+1.84°F) above seasonal average

Southern Hemisphere: +0.68 C (+1.22°F) above seasonal average

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

June Temperatures (final)

Global composite temp: +0.80 C (+1.44°F) above the seasonal average

Northern Hemisphere: +0.96 C (+1.73°F) above seasonal average

Southern Hemisphere: +0.64 C (+1.15°F) above seasonal average

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

Notes on data released August 2, 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.]

July's global temperature anomaly, somewhat unexpectedly, rose slightly to +0.85°C (+1.53 °F) rather than continue the decline begun in May. With this value, each of the last 12 consecutive months achieved their highest value in the 45+ year satellite record. And, since July is usually the warmest month in terms of absolute temperature, July 2024 attained the highest value at 266.77

K (-6.38 °C, +20.5 °F). This value is +0.20 K warmer than last July's record. (Recall that this atmospheric layer extends up to roughly 9km altitude where it is much colder than the surface, so the average temperature of the layer is below freezing.)

*Note that the calculated trend for the entire record is +0.1548 °C/decade, so we will anticipate the trend to be **+0.16 °C/decade** next month as we round up to the nearest hundredth of a degree. The sharp El Niño spike in the last 13 months has led to the trend magnitude increasing as it has.

The sight increase in July's warmth over June was spread through most of the globe. While the La Niña cooling continues in the tropical Pacific Ocean waters, the remaining parts of the globe have not yet participated. To see the latest on the La Niña see: https://www.cpc.ncep.noaa.gov/products/analysis_monitoring/lanina/enso_evolution-status-fcsts-web.pdf.

The planet's warmest atmospheric temperature departure in July occurred over the ocean just off East Antarctica at +5.1 °C (+9.2 °F). The western US and Canada, southern and northern-most Africa extending to Southern Europe and western China and eastern Russia were noticably warmer than the average.

With a reading of -2.1 °C (-3.9°F), the coolest departure from average was found over the Ross Sea off the coast of West Antarctica. It was cooler than average over the southern Atlantic and Indian Oceans as well as Greenland and eastern Australia.

The conterminous US cooled a bit from June as the lower-48 averaged +0.77 °C (+1.39 °F). The West and Northeast were much above average while the middle of the country was a bit below. It was again relatively cooler in Alaska, so the 49-state Jun average came in at +0.72 °C (+1.30°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.

A note about the global temperature trend. For several years, the trend has been extremely close to +0.135 °C/decade. In July 2023, the threshold of 0.135 was crossed at +0.1352 °C/decade. With the significant spike in global temperature due to the 2023-24 El Niño, the trend is now +0.15 °C/decade.

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, but we are renewing our efforts as Dr. Braswell is now focused on this task. 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.

Dr. 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 nine 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.

--30—

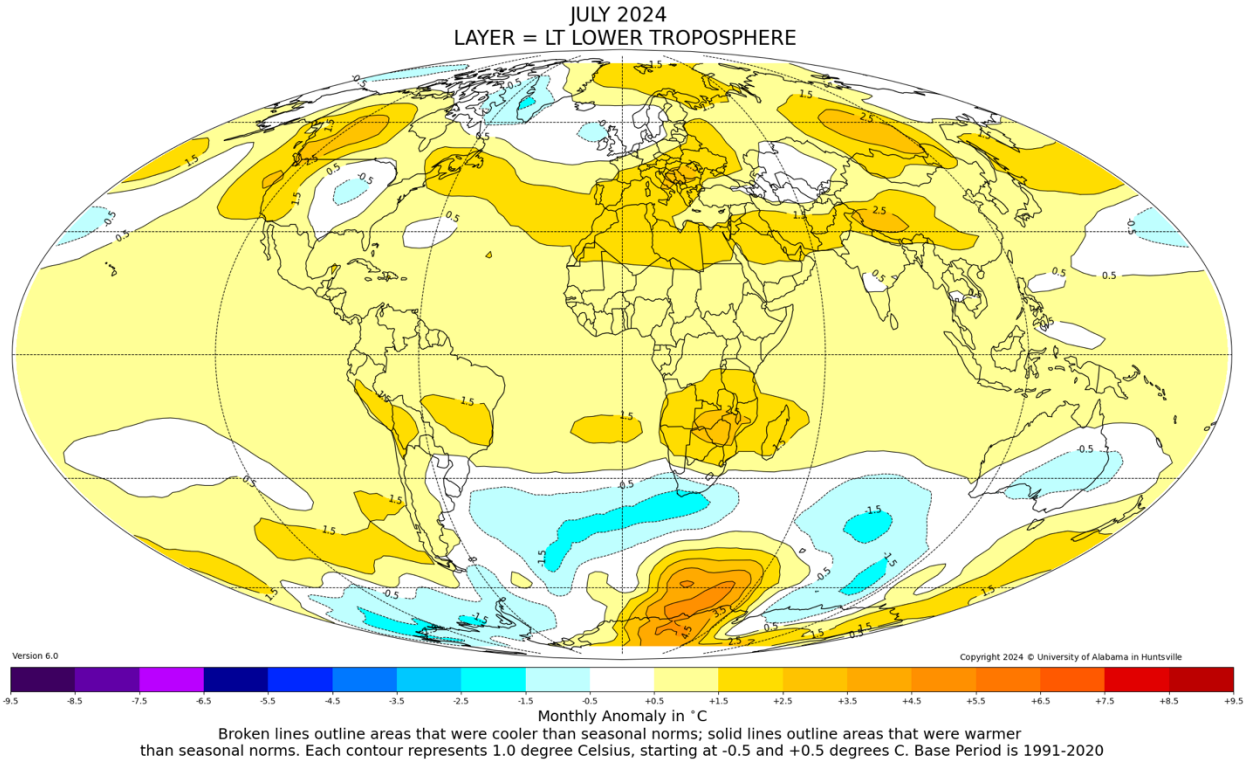

Figure. Lower tropospheric temperature anomalies for July 2024

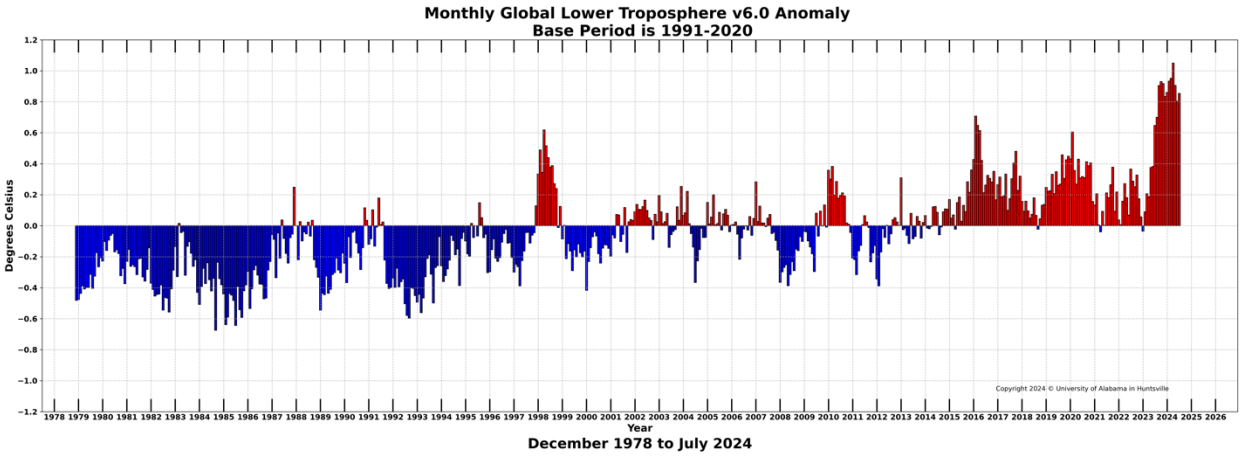

Figure. Bar chart of global monthly lower tropospheric temperature anomalies.