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Global Temperature Report: July 2022

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

July Temperatures (preliminary)

Global composite temp.: +0.36 C (+0.65°F) above the seasonal average

Northern Hemisphere: +0.37 C (+0.67 °F) above seasonal average

Southern Hemisphere: +0.35 C (+0.63 °F) above seasonal average

Tropics: +0.13 °C (-0.23°F) above seasonal average

June Temperatures (final)

Global composite temp.: +0.06 C (+0.11°F) above the seasonal average

Northern Hemisphere: +0.08 C (+0.14 °F) above seasonal average

Southern Hemisphere: +0.04 C (+0.07 °F) above seasonal average

Tropics: -0.36 C (-0.65°F) below seasonal average

Notes on data released August 8, 2022 (v6.0, with 1991-2020 reference base)

Note for Reports over the past year: These text reports have been delayed due to the extra duties Christy has acquired since June 2021 as interim VP for Research and Economic Development – an operation of $125M/yr and 1,100 employees. This adds to his current duties as Director of the Earth System Science Center, Professor, and State Climatologist. He will be relinquishing the duties of VP on 1 Aug 2022. Please note that Spencer and Christy generate/provide these data on a volunteer-basis as federal funding was terminated a few years ago.

The global temperature departure from average in July bounced back from a drop in June to increased warmth in July. The global mean temperature was +0.36 °C (+0.65 °F) above the long-term average, up +0.30 °C (+0.54 °F) from June. The rise was, as was the drop last month, most prominent in the tropics as the temperature climbed +0.48 °C (+0.86 °F) from June almost claiming the title of a record one-month jump, but came in shy of the +0.53 °C (+0.95° F) that occurred back in the 1983 El Niño. These types of up-and-down shifts occur in all the regions from time to time, for example, the temperature of the south polar region fell over 0.6 °C from June to July just this month.

The latest values of various El Niño/La Niña indices indicate the La Niña is still quite evident, so July's sudden tropical warming is likely related to the periodic heating events associated with oscillations such as the Madden-Julian. Interestingly, the upper-ocean heat content of a major portion of the tropical Pacific lost a considerable amount of heat during July, some of which likely found its way into the atmosphere, warming it up. This heat content was noted to be slightly above average in June, but is now well below average. The latest on the evolution of La Niña and its anticipated diminishment by 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 terms of the monthly departure from average was near the Dateline north of New Zealand at +3.6 °C. The map this month did not show extensive areas of warmth, but rather about a dozen regional warm patches such as over the Northeast Pacific, Europe, Eastern Russia, western China, central South America, Indian Ocean off South Africa, western Australia and two regions in the South Pacific. It is interesting to note that the brief but intense heat wave in Britain did not impact the monthly average atmospheric temperature much at all.

The coolest departure from average was also in the southern hemisphere over the Ross Sea in the far South Pacific at -2.3 °C. A few patches of fairly cool anomalies were also found in the tropical South Pacific, central-south Russia and along the dateline near Alaska and far eastern Russia.

The conterminous US averaged above the 30-year mean at +0.84 °C (+1.5 °F) as the warmth was fairly evenly spread across the lower 48. Alaska was not quite as warm, so that the 49-state average came in a little lower at +0.70 °C (+1.3 °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.

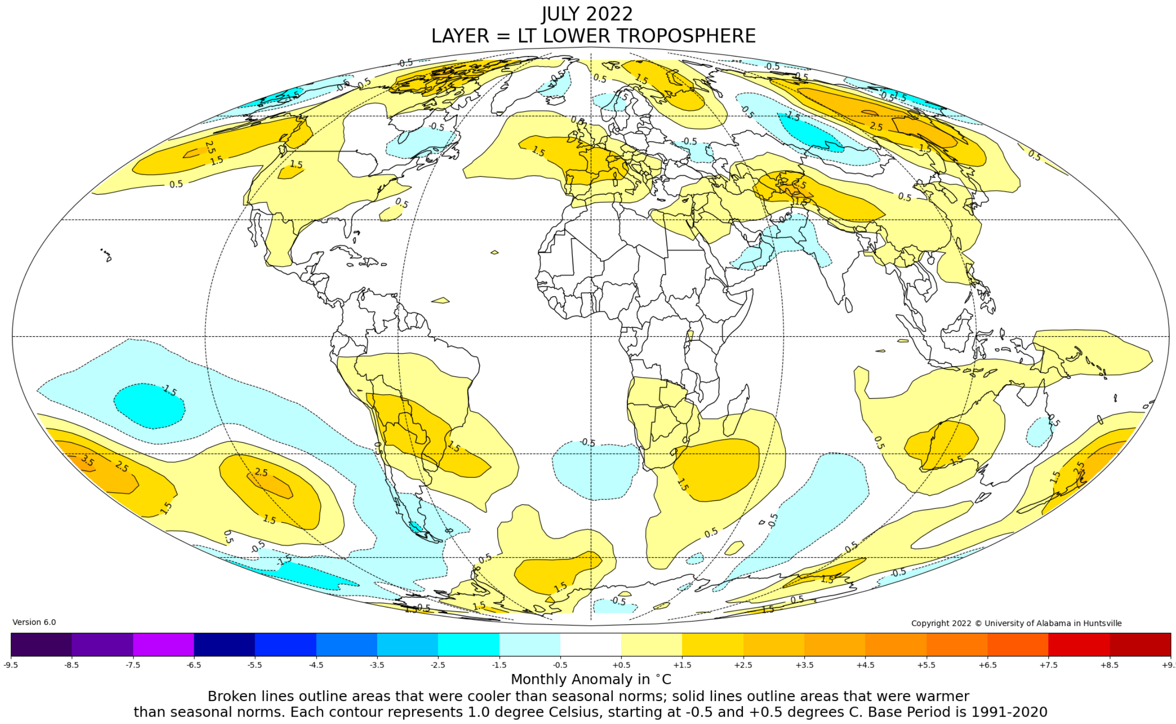

Figure. Lower tropospheric temperature anomalies for July 2022

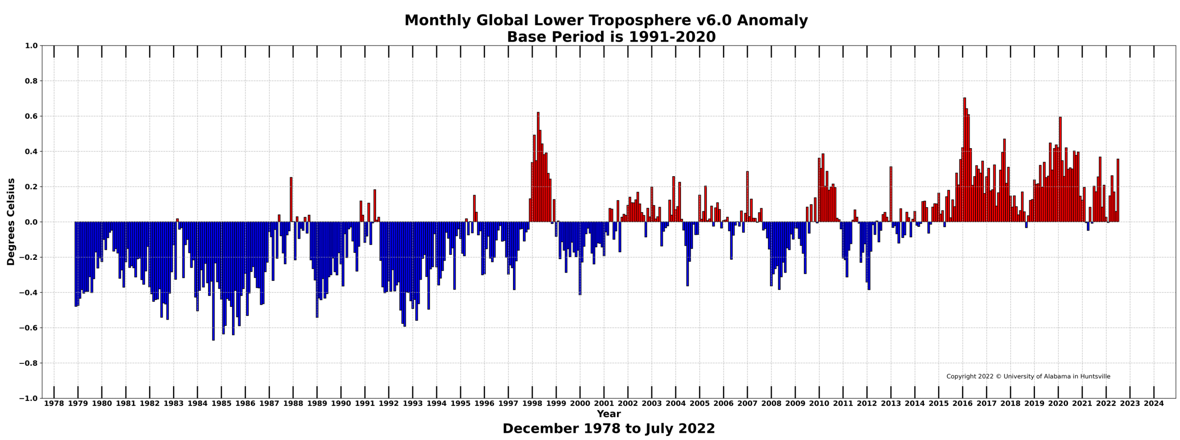

Figure. Bar chart of global monthly lower tropospheric temperature anomalies.