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Global Temperature Report: Sep 2022

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

September Temperatures (preliminary)

Global composite temp.: +0.24 C (+0.43°F) above the seasonal average

Northern Hemisphere: +0.43 C (+0.77 °F) above seasonal average

Southern Hemisphere: +0.06 C (+0.11 °F) above seasonal average

Tropics: +0.03 °C (+0.05°F) above seasonal average

August Temperatures (final)

Global composite temp.: +0.28 C (+0.50°F) above the seasonal average

Northern Hemisphere: +0.31 C (+0.56 °F) above seasonal average

Southern Hemisphere: +0.24 C (+0.43 °F) above seasonal average

Tropics: -0.04 °C (-0.07°F) below seasonal average

Notes on data released October 5, 2022 (v6.0, with 1991-2020 reference base)

The global atmospheric temperature departure-from-average in September dropped a bit from August to +0.24 °C (+0.43 °F) above the long-term average, down slightly from +0.28 °C (+0.50 °F). The decline was evident over the SH as the temperatures there fell -0.18 °C (-0.32 °F) from August. As noted last month, the extratropical warmth, especially in the NH, during this multi-year La Niña episode has been a remarkable feature that has kept the global average near or above zero since commencing in late 2020 and is consistent with a long-term upward trend in global temperature. That trend according to these observations is +0.13 °C per decade since December 1978.

The latest values of various El Niño/La Niña indices indicate the La Niña (cold phase of the cycle) continues and is predicted to continue through the NH winter. The influence of La Niña generally induces cooler temperatures, so that one would expect with its potential demise next year, global temperatures will rise somewhat from where they are now. This is not a prediction, simply an observation based on the past. 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 over southern Greenland at +5.4 °C (+10.2 °F). Areas of especially warm temperatures compared with average occurred over western N America and a band that stretched from the Sahara eastward across southern Russia and northern China to the North Pacific Ocean. Scattered locations in the high-latitude southern oceans were also warm.

The coolest departure from average was in the far South Pacific north of the Amundsen Sea at -3.5 °C (-6.3 °F) just edging out a cold pocket over Belarus which was the center of a cold area of northern Europe. Northern Russia and scattered areas of the high latitude southern oceans were also cool.

The conterminous US averaged above the 30-year mean at +0.88 °C (+1.58 °F) as warmth dominated the West. Alaska was not quite as warm, so that the 49-state average came in a little lower at +0.76 °C (+1.37 °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/

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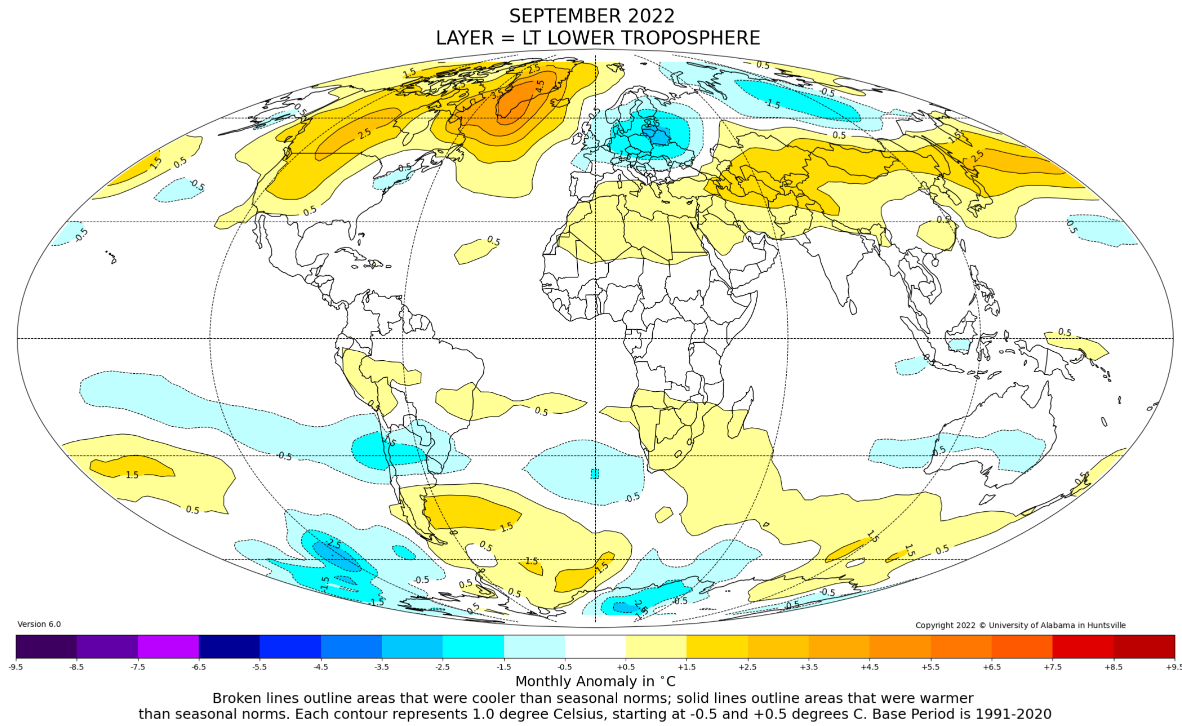

Figure. Lower tropospheric temperature anomalies for September 2022

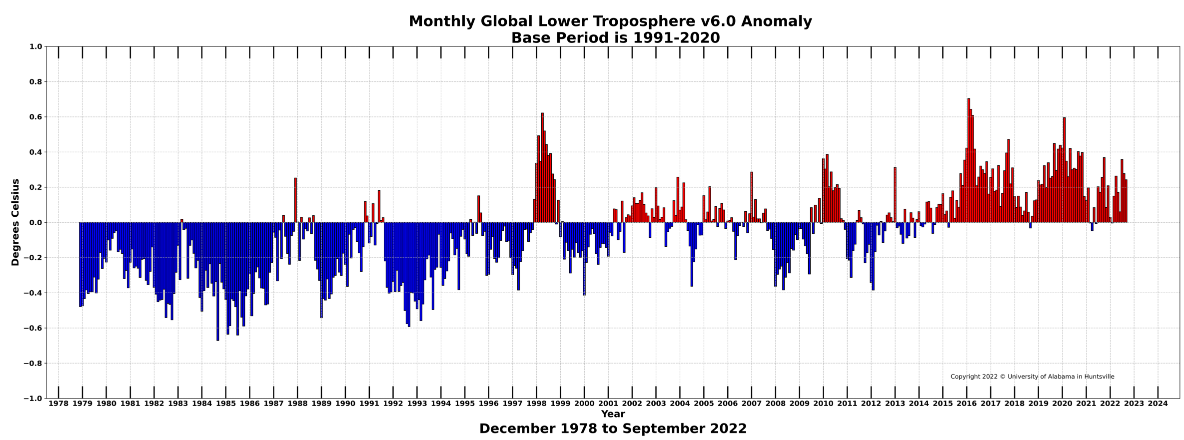

Figure. Bar chart of global monthly lower tropospheric temperature anomalies.