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Global Temperature Report: Oct 2022

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

October Temperatures (preliminary)

Global composite temp.: +0.32 C (+0.58°F) above the seasonal average

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

Southern Hemisphere: +0.21 C (+0.38 °F) above seasonal average

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

September Temperatures (final)

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

Notes on data released November 4, 2022 (v6.0, with 1991-2020 reference base)

The global atmospheric temperature departure-from-average in October rose slightly from September to +0.32 °C (+0.58 °F) above the long-term average. The rise was evident over the SH as the temperatures there increased by +0.15 °C (+0.27 °F) from September. The NH and Tropics were virtually unchanged from last month. As noted in the last few reports, 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 an overall long-term upward trend in global temperature. Indeed, for each of the last three months (Aug, Sep, Oct), the land areas of the NH poleward of 20 °N experienced their warmest values in the 44-year record, +0.57, +0.71 and +0.82 °C. The global trend according to these observations is +0.13 °C per decade since December 1978. Interestingly, Sep and Oct are characterized by the most positive trends of all the months (+0.16 °C per decade) while Jun is the least positive (+0.11 °C per decade).

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. This is reminiscent of the 3-year La Niñas of 1973-74 to 1975-76 and 1998-99 to 2000-01. The influence of La Niña generally induces cooler global 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, though there have been cases when the ending-year of a La Niña was cooler than the previous year. 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 northern British Columbia at +4.0 °C (+7.2 °F). Areas of especially warm temperatures compared with average occurred over northwestern N America stretching to Greenland to the East and to the North Pacific to the west. Europe, Iran and southern China were also warm. In the southern hemisphere a warm band extended from the South Pacific eastward to South Africa. East Antarctica was quite warm.

The coolest departure from average could be found by following the meridian southward from the warmest spot to the Amundson Sea in the far SE Pacific (-3.8 °C, -6.8 °F). It was cool in the N Atlantic, far eastern Russia and over the tropical Pacific as a consequence of the La Niña.

The conterminous US experienced warmer than average temperatures toward the NW half and cooler in the SE half so that the average was close to zero (+0.16 °C, +0.29 °F). Alaska was warmer on average, so that the 49-state average came in a little higher at +0.22 °C (+0.40 °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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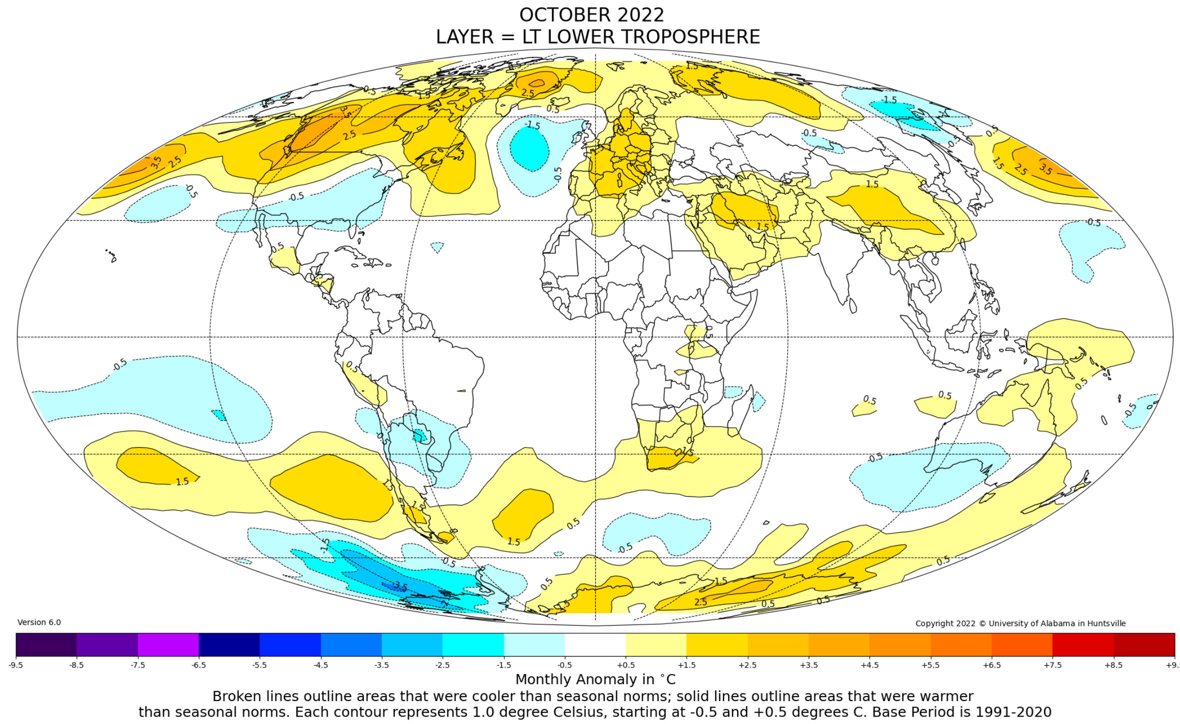

Figure. Lower tropospheric temperature anomalies for October 2022

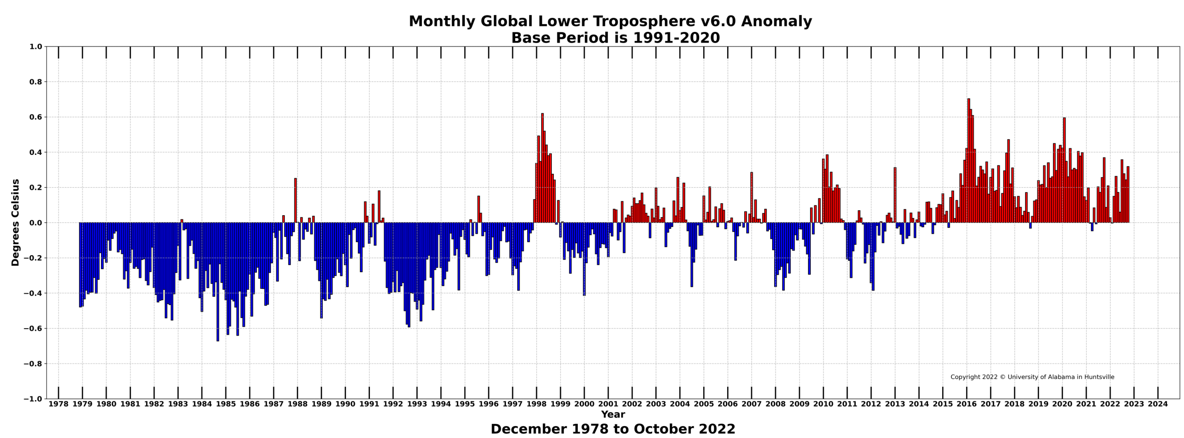

Figure. Bar chart of global monthly lower tropospheric temperature anomalies.