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Global Temperature Report: March 2024

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

March Temperatures (preliminary)

Global composite temp: +0.95 C (+1.71°F) above the seasonal average

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

Southern Hemisphere: +0.88 C (+1.58°F) above seasonal average

Tropics: +1.34 C (+2.41°F) above seasonal average

February Temperatures (final)

Global composite temp: +0.93 C (+1.67°F) above the seasonal average

Northern Hemisphere: +1.03 C (+1.85°F) above seasonal average

Southern Hemisphere: +0.83 C (+1.49°F) above seasonal average

Tropics: +1.24 C (+2.23°F) above seasonal average

Notes on data released April 4, 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.]

March's global atmospheric temperature anomaly crept up to +0.95 °C (+1.71 °F) and continued the string of months beginning in September 2023 of being within ±0.06 °C of +0.89°C (+1.60 °F). This becomes the warmest departure from average of the past 46 Marches (and all months) that

have been monitored from satellites and edges out Oct 2023 and Feb 2024 (+0.93 °C) as the warmest anomaly measured to date. The difference of a tiny +0.02 °C vs. the previous "record" is within the margin of error, so it is equally feasible to say March and the other months were tied as warmest on record, all thanks to the El Niño.

Sectional records were also set for the tropics (+1.34 °C vs. +1.27 °C in Jan 2024) and the Southern Hemisphere (+0.88 °C vs. +0.86 in Sep 2023).

As noted last month, there are signs that the current warm El Niño episode is fading with a significant loss of heat in the tropical Pacific Ocean. This heat must go somewhere and we often see an increase in tropical atmospheric temperatures for a couple of months when this occurs, as has now apparently happened.

See more on NOAA's excellent weekly updates here.
https://www.cpc.ncep.noaa.gov/products/analysis_monitoring/lanina/enso_evolution-status-fcsts-web.pdf.

Also noted two months ago, we reported that the global atmospheric trend moved to +0.15 °C/decade, up from +0.14 °C/decade. The trend had been flirting with +0.15 since the hot anomalies of last year, and in January reached +0.145 °C/decade which we rounded up to +0.15. It is now +0.148 °C/decade.

We've been asking this question for a few months: Is this now the peak of the El Niño warming? As we stated last month "though the ocean temperatures are falling, there are still processes that can heat the atmospheric temperature which would cause an increase in March from February's record-tying value." And, that's what happened. So, I still don't think it's a good idea to place a bet on whether April will see the start of the cooling, but I suspect it will be soon.

The planet's warmest spot in March occurred over central Greenland with a reading of +4.2 °C above the average. The tropics were ubiquitously above average as was northern Europe, the Canadian Maritimes, and central So. America among other locations.

With a reading of -2.1°C (-3.9°F), the coolest departure from average was found over southern Chile. The southwestern US, northwestern Russia and regions in the western north and south Pacific were below average.

The conterminous US was very near the 30-year average with an anomaly of +0.23°C (+41°F) with cooler than normal temperatures in the SW and warmer than average in the NE. It was slightly warmer in Alaska, so the 49-state average came in at +0.38 °C (+0.68°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.

In the July 2023 GTR we reported the February 2016 anomaly as +0.70 °C. As the intercalibrations between satellites are recalculated with each month's new data, there is the possibility of tiny changes in the base annual cycle (< 0.01 °C), and thus the anomalies calculated therefrom. This is the reason for the February 2016 value being +0.71 °C this month.

A note about the global temperature trend. For several years, the trend has been extremely close to +0.135 °C/decade. This past July, the threshold of 0.135 was crossed at +0.1352 °C/decade. The global trend is now +0.14 °C/decade by rounding up.

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 focussed 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.

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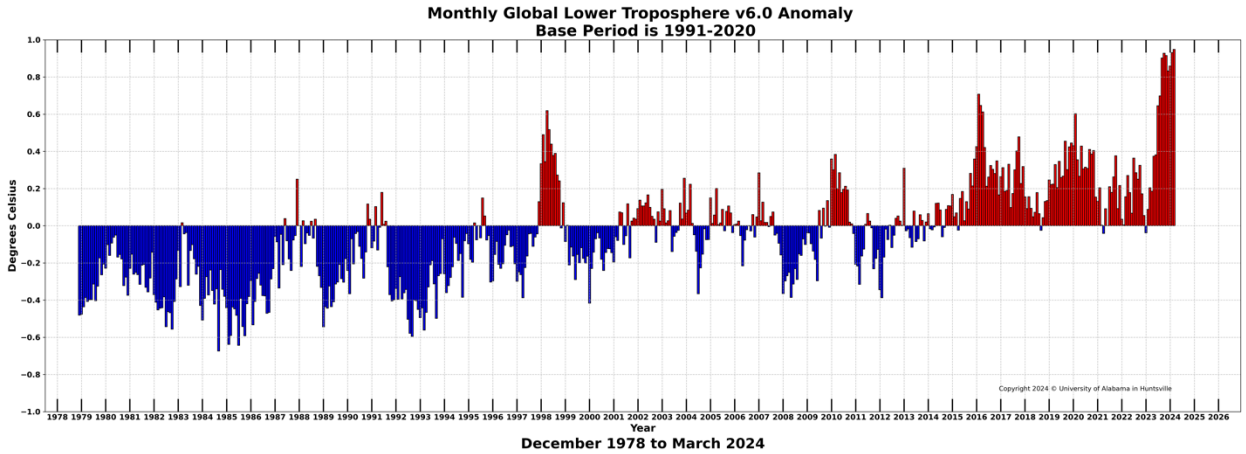

Figure. Lower tropospheric temperature anomalies for March 2024

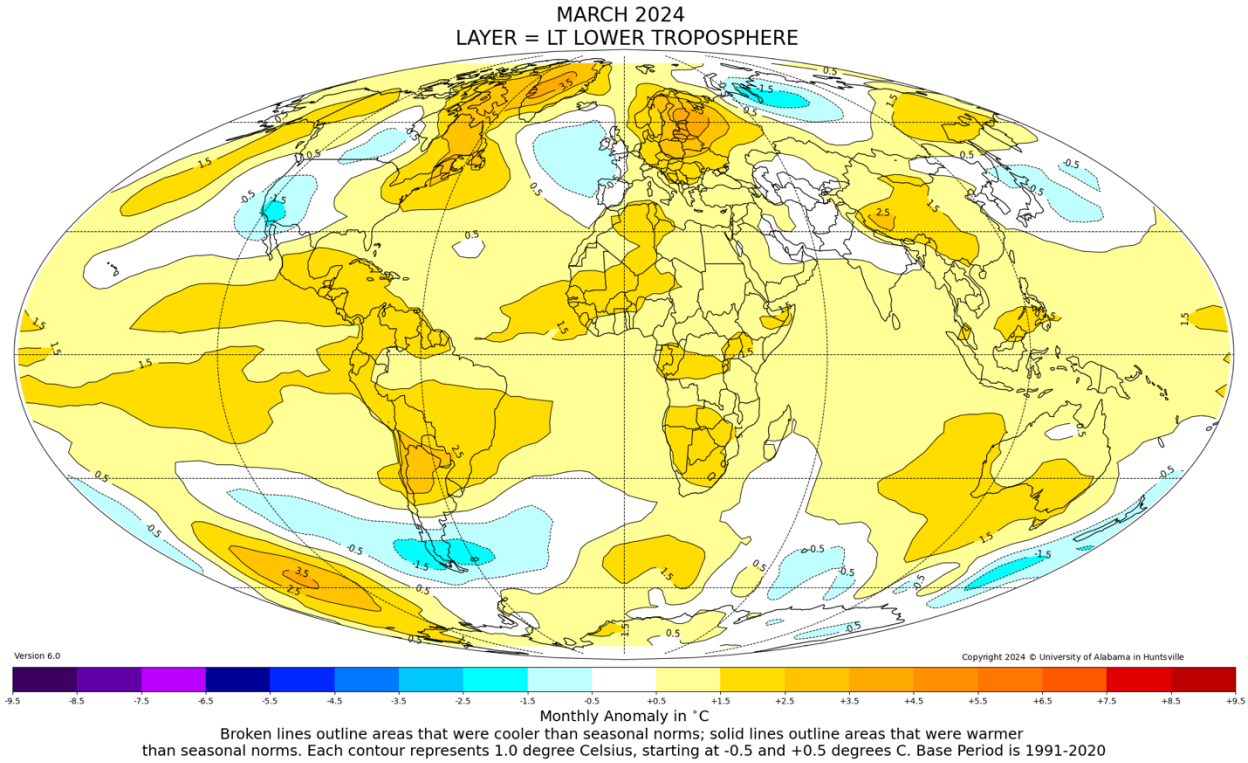

Figure. Bar chart of global monthly lower tropospheric temperature anomalies.