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Global Temperature Report: December 2018

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

December Temperatures (preliminary)

Global composite temp.: +0.25 C (+0.45 °F) above seasonal average

Northern Hemisphere.: +0.32 C (+0.58°F) above seasonal average

Southern Hemisphere.: +0.19 C (+0.34 °F) above seasonal average

Tropics.: +0.32 C (+0.58 °F) above seasonal average

November Temperatures (final)

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

Northern Hemisphere.: +0.27 C (+0.49°F) above seasonal average

Southern Hemisphere.: +0.30 C (+0.54 °F) above seasonal average

Tropics.: +0.50 C (+0.90 °F) above seasonal average

Notes on data released January 1, 2019 (v6.0)

The global average bulk-layer atmospheric temperature fell slightly in December to +0.25°C (+0.45°F) led by an unexpected dip in tropical temperatures. It seems the warm seawater temperatures in the tropical Pacific have cooled a bit. NOAA has indicated that this warm El Niño episode may be a mediocre one and the current modest changes support that view. Global temperatures at this point (December 2015) in the 2015-16 major El Niño were +0.47 °C and rising, eventually hitting +0.86 in February 2016. At the current +0.25 °C, the global temperature is well below that of the last event. The modest nature of the El Niño is more revealing In the tropics where the December satellite temperature values for the last two major El Niños (1997-8, 2015-6) were +0.72 and +0.64 °C respectively. As noted above, this December's tropical temperature is +0.32 °C.

The month's coldest seasonally-adjusted temperature departure from average was located near Altai in Western Mongolia (-3.7 °C, -6.6 °F) and the warmest near Dome Fuji in East Antarctica (+3.2 °C, +5.8 °F).

The monthly map for December 2018 shows the usual hot and cold alternating patterns in the higher latitudes of both hemispheres. This time, the cold regions are found in eastern Russia/Mongolia to Alaska, the North Atlantic and Eastern Europe in the Northern Hemisphere. The warm spots are roughly in between these, landing in eastern Canada, Western Europe to northwestern Russia and eastern China to Japan. Australia was well above average too. The tropical band has shown a loss of heating with most of the region now near average.

The evidence for an approaching warm phase of El Niño continues according to NOAA, as the equatorial Pacific sea temperatures, both surface and deeper down, are still well above average, though have declined a bit since late November. A good portion of this extra heat should make its way to the atmosphere in the coming months. If this occurs, we should see considerable tropical warming in the atmospheric layer the satellites monitor.

Because this is December, we will also present diagrams for the entire year. For 2018 as a whole, the Northern Hemisphere's mid-to-high latitudes were dominated by above-average temperatures with the exception being regions in northeastern Canada to the northwestern Atlantic and Kazakhstan. Globally, the year was the 6th warmest of the past 40 calendar years as it was subject to a split personality, beginning with a modest La Niña (cold event) and ending with a modest El Niño (warm event).

Ten warmest years of the past 40 for the global lower troposphere.

2016	0.52
1998	0.48
2017	0.38
2010	0.34
2015	0.27
2018	0.23
2002	0.22
2005	0.20
2003	0.19
2014	0.19

Finally, a map of the 40-year trend (1979-2018) indicates most of the planet experienced a modest warming, overall being +0.13 °C per decade. Faster rates of warming occurred in the high northern latitudes, the conterminous U.S., Eastern Europe to the Black Sea and from China eastward to the North Pacific. In the Southern Hemisphere, a band from Brazil to New Zealand warmed faster than the global average. Patches of little warming or cooling are found in the north Atlantic, eastern subtropical Pacific and portions of Antarctica.

Spoiler Alert (Repeated): Well, the time is once again approaching when new changes are required for the currently operating satellites as their performance changes with age. NOAA-18 has been operating for 13 years and is now past its time frame for accurate diurnal adjustments based on initial drifting, meaning the adjustments are adding spurious warming to the time series. On the other hand, NOAA-19 has also drifted so far that it too is introducing an error, but given its direction of drift, these errors are of the opposite sign. The two satellites are almost compensating for each other, but not to our satisfaction. In addition, the current non-drifting satellite operated by the Europeans, MetOP-B, has not yet been adjusted or “neutralized” for it’s seasonal peculiarities related to the diurnal cycle. 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. So, all in all, we anticipate generating new adjustments for NOAA-18 and NOAA-19 to account for their behavior of late and shall also modify MetOP-B to account for it’s unique seasonal cycle. This will be part of a coordinated plan to eventually merge NOAA’s new microwave sensor (ATMS) carried on Suomi NPP and the new NOAA series JPSS. We are hoping that NOAA-19 will be the last spacecraft for which drifting adjustments will be required as the newer satellites (MetOP, NPP, JPSS) have on-board propulsion to keep them in stable orbits. With so many new items to test and then incorporate, we are waiting until we are confident that these adjustments/additions are appropriately stable before moving to the next version. In the meantime, we shall continue to produce v6.0.

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 get accurate 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.

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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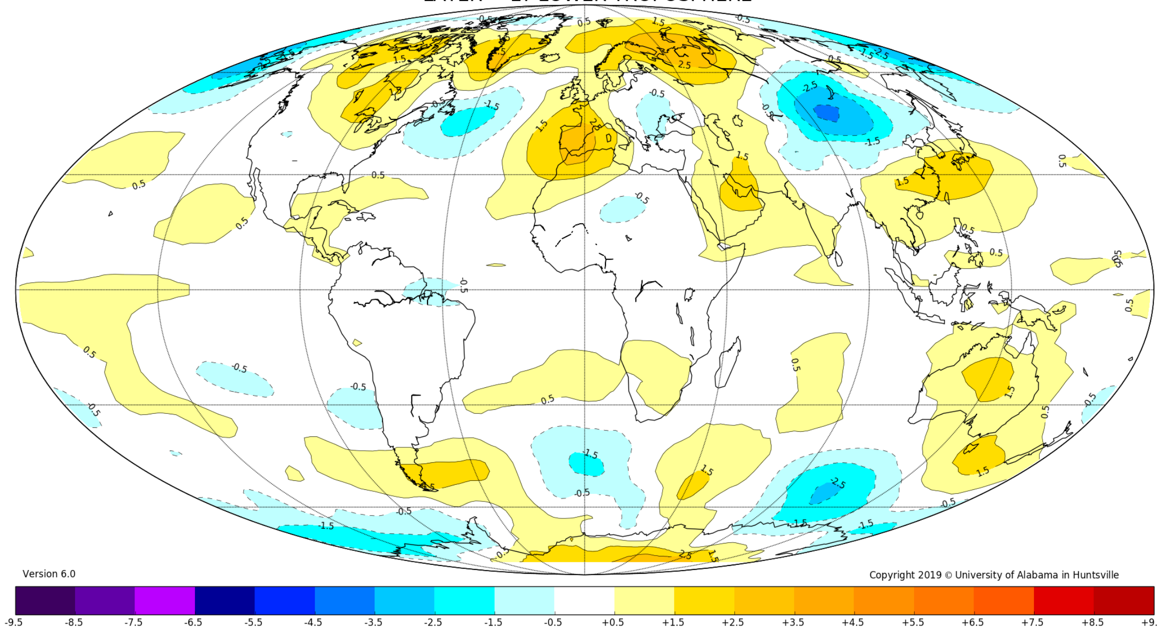
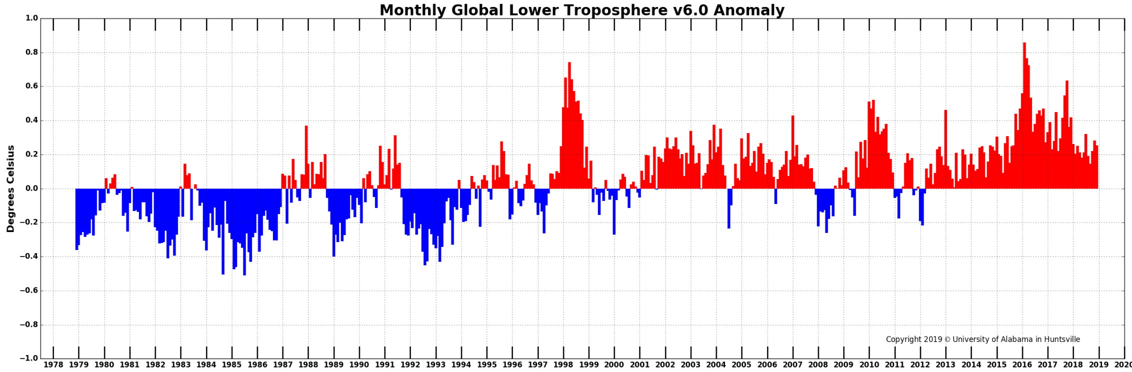
DECEMBER 2018
LAYER = LT LOWER TROPOSPHERE



Monthly Anomaly in °C

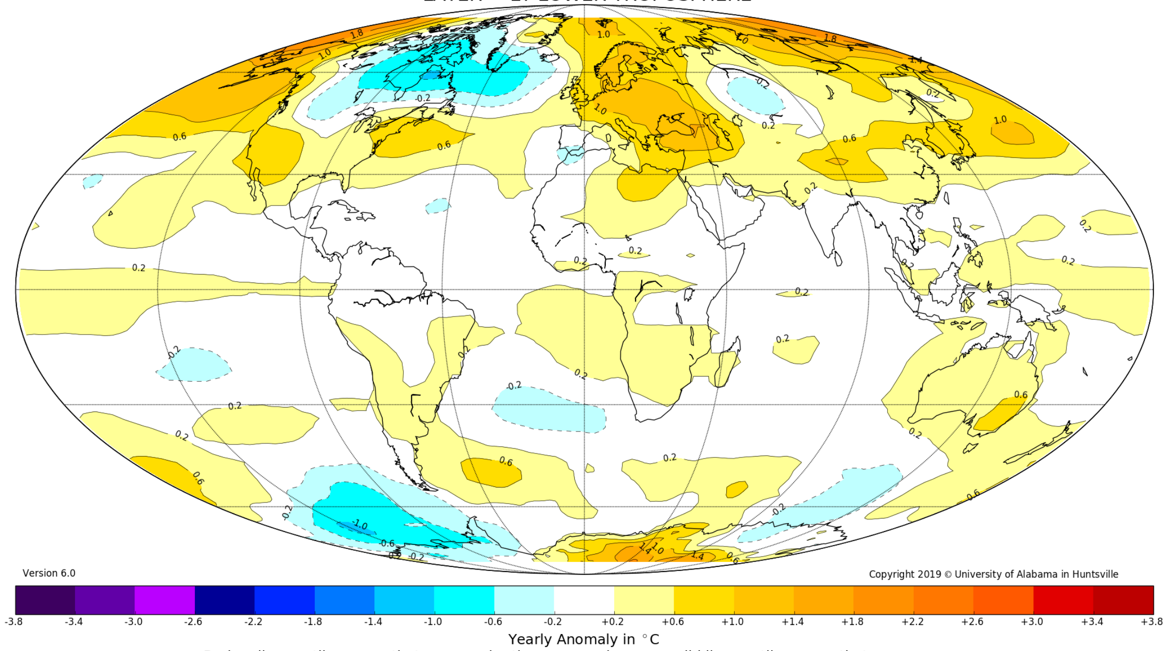
Broken lines outline areas that were cooler than seasonal norms; solid lines outline areas that were warmer than seasonal norms. Each contour represents one degree Celsius, starting at -0.5 and +0.5 degrees C.

Monthly Global Lower Troposphere v6.0 Anomaly



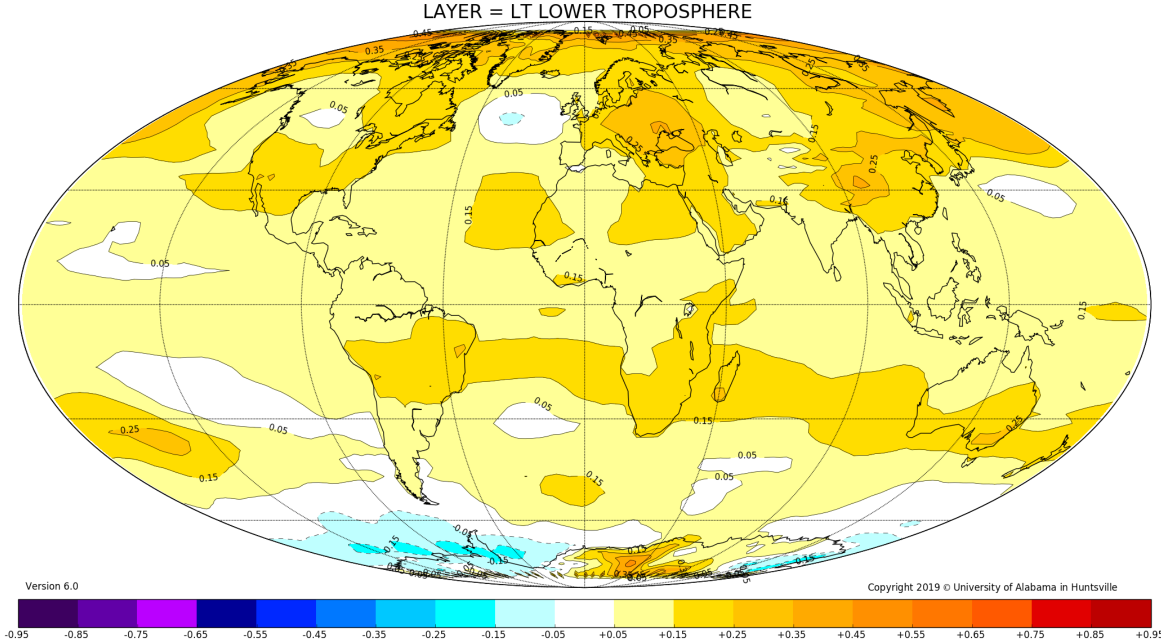
December 1978 to December 2018

2018 LT Anomaly
LAYER = LT LOWER TROPOSPHERE



Broken lines outline areas that were cooler than seasonal norms; solid lines outline areas that were warmer than seasonal norms. Each contour represents 0.4 degree Celsius, starting at -0.2 and +0.2 degrees C.

JAN 1979 to DEC 2018 Trend (°C/Decade)
LAYER = LT LOWER TROPOSPHERE



Broken lines outline areas that have a negative trend; solid lines outline areas have a positive decadel trend. Each contour represents 0.1 degree Celsius per decade, starting at -0.05 and +0.05 degrees C.