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## **Global Temperature Report: June 2019**

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

### **June Temperatures (preliminary)**

Global composite temp.: +0.47 C (+0.85 °F) above seasonal average

Northern Hemisphere.: +0.42 C (+0.76 °F) above seasonal average

Southern Hemisphere.: +0.52 C (+0.94°F) above seasonal average

Tropics.: +0.64 C (+1.15 °F) above seasonal average

### **May Temperatures (final)**

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

Northern Hemisphere.: +0.29 C (+0.52 °F) above seasonal average

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

Tropics.: +0.39 C (+0.70 °F) above seasonal average

### **Notes on data released July 1, 2019 (v6.0)**

June's globally-averaged, bulk-layer atmospheric temperature anomaly of +0.47°C (+0.85°F) rose from May's value thanks in large part to a rise of +0.25°C (+0.45°F) in Tropical temperatures after a drop in April. Since November 2017, global temperatures have remained in a fairly narrow range between +0.13°C and this month's +0.47°C.

The conterminous U.S. experienced the coolest June since 2004 at  $-0.64^{\circ}\text{C}$  ( $-1.15^{\circ}\text{F}$ ) below average. Since 1979, June's lower-48 US temperatures have been as cool as  $-1.34^{\circ}\text{C}$  (1982) and as warm as  $+1.26^{\circ}\text{C}$  (1988). The map is quite interesting in that the entire region from NW Canada south through most of the lower-48 was below average.

Other cooler than average areas were found off the coast of western Europe, western Russia to Afghanistan, Sea of Okhotsk to Japan, the southeast Pacific, south Atlantic through to virtually all of Antarctica. Warmer than average temperatures covered Alaska, northeast Canada to Greenland, central and eastern Europe, northern Russia, southern Brazil to Uruguay and South Africa. As noted, the tropics as a whole warmed up from May.

East Antarctica, with its vast area of colder than average temperatures (and it's already winter there), garnered the award for coldest departure with  $-4.7^{\circ}\text{C}$  ( $-8.5^{\circ}\text{F}$ ) near Dome A. On the other side of the world, Northern Russia was warmest near the village of Saskylakh at  $+4.2^{\circ}\text{C}$  ( $+7.6^{\circ}\text{F}$ ) above the June average. Though much in the news, the heat wave in France did not have much of an impact on the full-monthly average as temperatures were only slightly warmer than usual there.

**Spoiler Alert first published March 2019:** As noted over the past several months in this report, the drifting of satellites NOAA-18 and NOAA-19, whose temperature errors were somewhat compensating each other, will be addressed in this updated version of data released from March 2019 onward. As we normally do in these situations we have decided to terminate ingestion of NOAA-18 observations as of 1 Jan 2017 because the corrections for its significant drift were no longer applicable. We have also applied the drift corrections for NOAA-19 now that it has started to drift far enough from its previous rather stable orbit. These actions will eliminate extra warming from NOAA-18 and extra cooling from NOAA-19. The net effect is to introduce slight changes from 2009 forward (when NOAA-19 began) with the largest impact on annual, global anomalies in 2017 of  $0.02^{\circ}\text{C}$ . The 2018 global anomaly changed by only  $0.003^{\circ}\text{C}$ , from  $+0.228^{\circ}\text{C}$  to  $+0.225^{\circ}\text{C}$ . These changes reduce the global trend by  $-0.0007^{\circ}\text{C}/\text{decade}$  (i.e. 7 ten-thousandths of a degree) and therefore does not affect the conclusions one might draw from the dataset. The v6.0 methodology is unchanged as we normally stop ingesting satellites as they age and apply the v6.0 diurnal corrections as they drift.

**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. Research Associate Rob Junod assists 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:

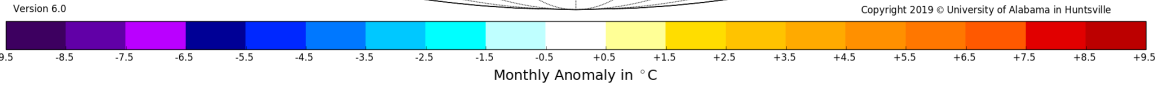
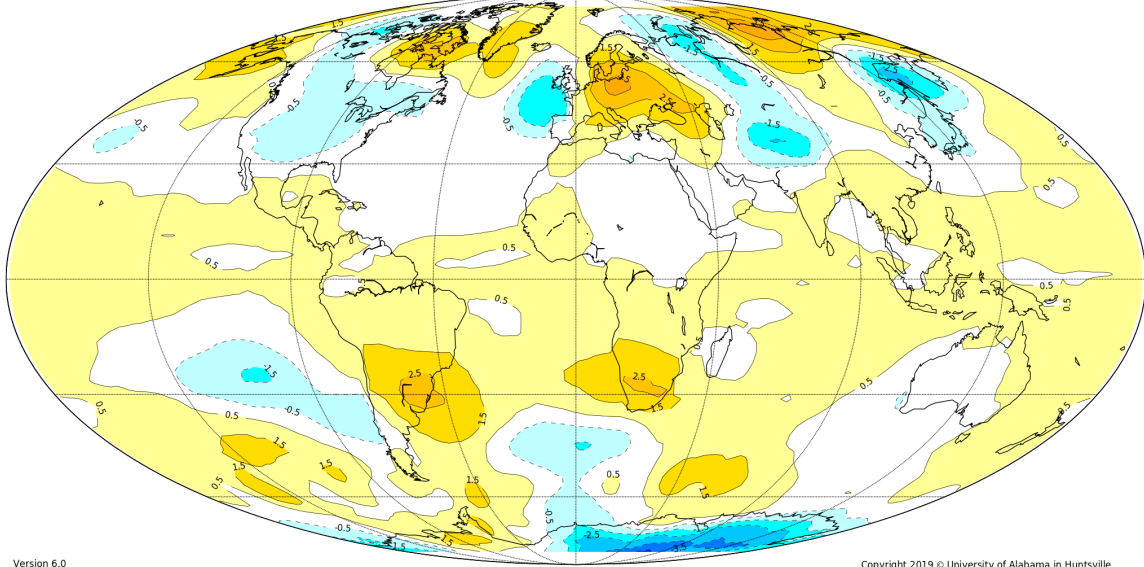
[http://www.nsstc.uah.edu/data/msu/v6.0/tlt/uahncdc\\_lt\\_6.0.txt](http://www.nsstc.uah.edu/data/msu/v6.0/tlt/uahncdc_lt_6.0.txt)

Archived color maps of local temperature anomalies are available on-line at:

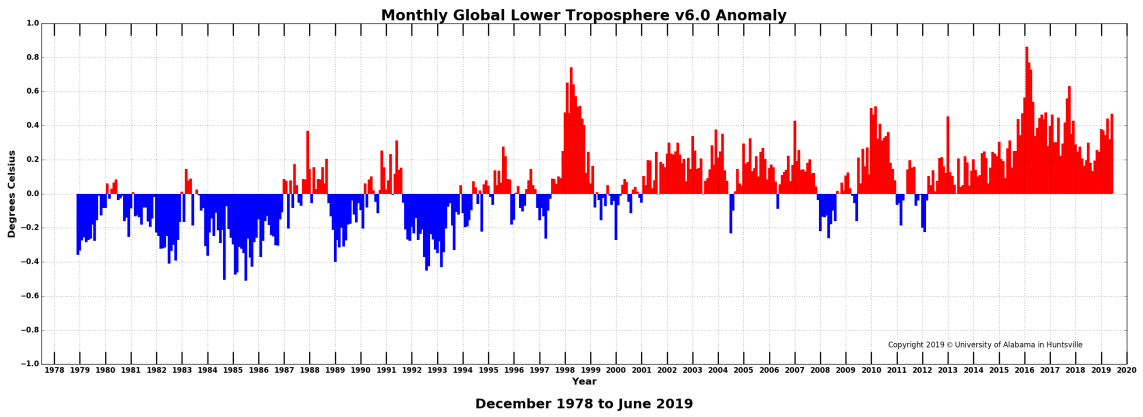
<http://nsstc.uah.edu/climate/>

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JUNE 2019  
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.



December 1978 to June 2019