October 3, 2019

Vol. 29, No. 6

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Global Temperature Report: September 2019

(UPDATE 4 Oct) After further analysis, the originally published numbers are credible. The record swings of the stratospheric temperature are real which affected all products. For more information see:
https://www.drroyspencer.com/2019/10/record-antarctic-stratospheric-warming-causes-sept-2019-global-temperature-update-confusion/

(3 Oct) CAUTION: There appears to be a problem with the raw satellite data for September 2019. These September results are very preliminary and should be used with caution.

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

September Temperatures (preliminary)

Global composite temp.: +0.61 C (+1.10 °F) above seasonal average

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

Southern Hemisphere.: +0.58 C (+1.00°F) above seasonal average

Tropics.: +0.60 C (+1.08°F) above seasonal average

August Temperatures (final)

Global composite temp.: +0.38 C (+0.68 °F) above seasonal average

Northern Hemisphere.: +0.33 C (+0.59 °F) above seasonal average

Southern Hemisphere.: +0.44 C (+0.79°F) above seasonal average

Tropics.: +0.45 C (+0.81 °F) above seasonal average

Notes on data released October 3, 2019 (v6.0)

September's globally-averaged, bulk-layer atmospheric temperature anomaly of +0.61°C (+1.10°F) represented the warmest September reading of the past 41 Septembers in our satellite record. The jump from August was substantial (+0.23°C) and ranks among the largest month-to-month changes. (Several previous jumps were greater than 0.3°C however.) The warmth was global in extent with warmest September temperatures posted for both hemispheres and the tropical belt. This month-to-month heating is possibly related, at least in part, to the tropical Pacific Ocean's loss of heat energy to the atmosphere in the recent months as El Niño conditions declined. The impact of additional greenhouse gases in the atmosphere over the last 41 years plays a role as well in terms of the slow, long-term rise, though the magnitude of this effect is uncertain. Though this is the warmest September departure from average recorded by satellites, other months, especially those in the heart of the El Niño cycle (Feb-Apr) achieved departures exceeding 0.7 °C.

The conterminous U.S. experienced one of its warmest Septembers (+1.14 °C, +2.05 °F) though well below the warmest from 1998 (+1.78 °C, 3.20 °F). The Northwest was below average but a larger area of the Eastern half of the lower-48 (and Alaska too) was above average.

Globally, locations with sustained warmer-than-average temperatures for the month appeared over the SE and NE Pacific Ocean (the latter known as the warm "blob" by coastal residents there). The Arctic warmth in the western hemisphere was associate with the warmest local temperature anomaly in Northern Greenland of +3.2°C. Other warm spots were central South America eastward across the South Atlantic to South Africa, parts of the Middle East and much of central China.

The planet's coldest departure from average this month was -2.9 °C in western Russia near Khmelevka on the Kazakshstan border. Other cool areas were seen on the south Greenland Plateau, South Indian Ocean, NW Pacific Ocean and portions of Antarctica.

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 °C. The 2018 global anomaly changed by only 0.003°C, from +0.228°C to +0.225°C. These changes reduce the global trend by -0.0007 °C/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

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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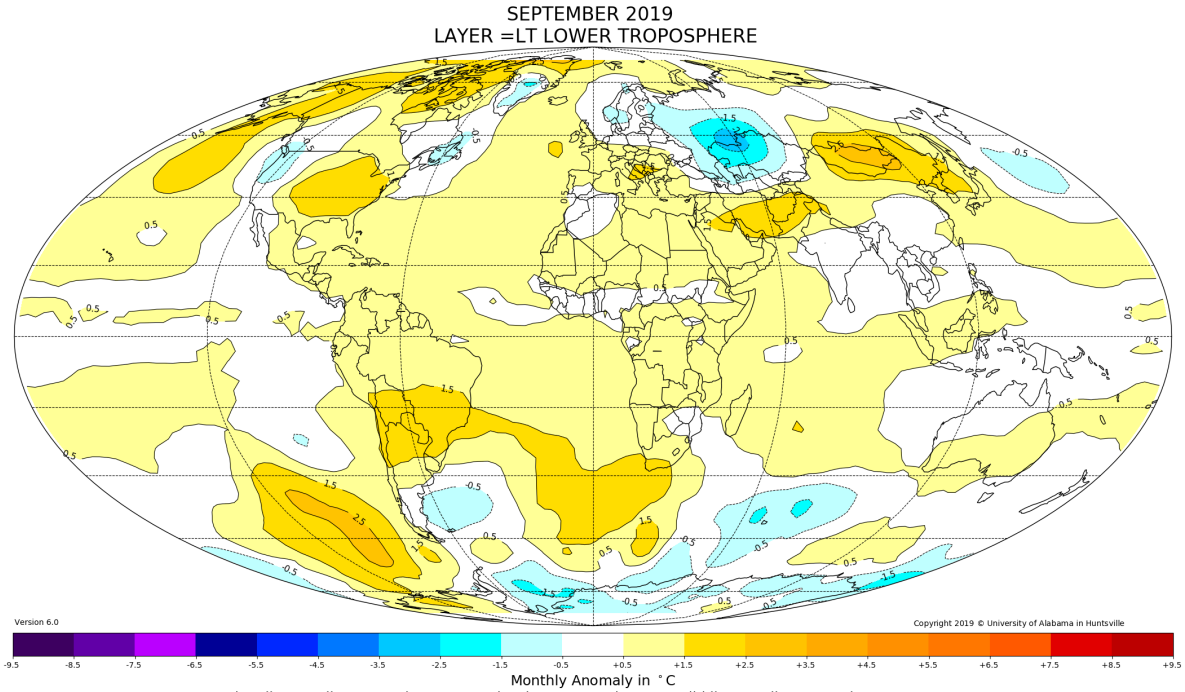

Monthly Anomaly in ˚C

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