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Global Temperature Report: November 2019

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

November Temperatures (preliminary)

Global composite temp.: +0.55 C (+0.99 °F) above seasonal average

Northern Hemisphere.: +0.56 C (+1.01°F) above seasonal average

Southern Hemisphere.: +0.54 C (+0.97°F) above seasonal average

Tropics.: +0.55 C (+0.99°F) above seasonal average

October Temperatures (final)

Global composite temp.: +0.46 C (+0.83 °F) above seasonal average

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

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

Tropics.: +0.31 C (+0.56°F) above seasonal average

Notes on data released December 2, 2019 (v6.0), completing our 41st year!

November's globally-averaged, bulk-layer atmospheric temperature anomaly of +0.55°C (+0.99°F) represented the warmest November reading of the past 41 Novembers in our satellite record. In general, November temperature departures are typically reduced as they are not strongly influenced by the big temperature swings due to El Niños that occur from January to May. The second warmest November occurred during the El Niño of 2016 at +0.48°C. The warmth this month was distributed fairly evenly for the major regions with the NH, SH and Tropics all reporting close to +0.55°C. When we see departures at the high or low end of the scale, the values over land tend to have greater magnitude than the

ocean, as in this month, with global land being +0.70 °C and ocean +0.49°C, both highest for November-only. Part of the reason for the SH's warmth is the extremely warm stratosphere due to a "Sudden Warming" event which influenced the lower elevation layer we monitor here. This has been a fairly substantial event that started in September.

The conterminous U.S. as a whole experienced a near-average November (+0.22°C, +0.40 °F) with northeastern portion below average and northwestern sector above average. The warmth in Alaska lifted the 49 continental states' average to +0.68°C (+1.22°F).

Globally, locations with sustained warmer-than-average temperatures for the month appeared over the NE Pacific Ocean northward through the Alaskan Arctic (again) as well as along eastern Europe, western Russia and the Tibetan Plateau. Antarctica and its surrounding ocean were warmer than average as well while the tropics were broadly above average. The globe's warmest spot was in the Gulf of Alaska near Kodiak Is (+5.04 °C, +9.07 °F).

The planet's coldest departure from average this month was -2.97 °C (-5.35 °F) in the South Indian Ocean. Other areas of cooler than average temperatures occurred over eastern Canada, NW Europe/British Isles, central Russia southward to Iran and locations in the SH mid-latitude oceans.

With this report we now have 41 complete years of data monitored by several satellites beginning with TIROS-N in late 1978. Our first complete month was December 1978, hence a full 41 years or 492 months of satellite temperature observations of the global, bulk-layer atmosphere are now available.

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/

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