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Global Temperature Report: December 2016

2016 edges 1998 as warmest year on record

Global climate trend since Nov. 16, 1978: +0.12 C per decade

December temperatures (preliminary)

Global composite temp.: +0.24 C (about 0.43 degrees Fahrenheit) above 30-year average for December.

Northern Hemisphere: +0.19 C (about 0.34 degrees Fahrenheit) above 30-year average for December.

Southern Hemisphere: +0.30 C (about 0.54 degrees Fahrenheit) above 30-year average for December.

Tropics: +0.21 C (about 0.38 degrees Fahrenheit) above 30-year average for December.

November temperatures (revised):

Global Composite: +0.45 C above 30-year average

Northern Hemisphere: +0.49 C above 30-year average

Southern Hemisphere: +0.50 C above 30-year average

Tropics: +0.37 C above 30-year average

(All temperature anomalies are based on a 30-year average (1981-2010) for the month reported.)

Notes on data released Jan. 3, 2017:

Globally, 2016 edged out 1998 by +0.02 C to become the warmest year in the 38-year satellite temperature record, according to Dr. John Christy, director of the Earth System Science Center at The University of Alabama in Huntsville. Because the margin of error is about 0.10 C, this would technically be a statistical tie, with a higher probability that 2016 was warmer than 1998. The main difference was the extra warmth in the Northern Hemisphere in 2016 compared to 1998.

Year	GL	NH	SH	TROP
2016	+0.505	+0.61	+0.40	+0.61 C
1998	+0.484	+0.51	+0.46	+0.68 C

“The question is, does 2016’s record warmth mean anything scientifically?” Christy said. “I suppose the answer is, not really. Both 1998 and 2016 are anomalies, outliers, and in both cases we have an easily identifiable cause for that

anomaly: A powerful El Niño Pacific Ocean warming event. While El Niños are natural climatic events, they also are transient. In the study of climate, we are more concerned with accurately identifying long-term temperature trends than we are with short-term spikes and dips, especially when those spikes and dips have easily identified natural causes.

"Some records catch our attention because we usually struggle to cope with rare events. For example, the Sept.-Nov. record heat and dryness in the southeastern U.S. (now a thing of the past) will be remembered more than the probability that 2016 edged 1998 in global temperatures. So, from the long-term perspective, 2016's record may be less noteworthy than where the month-to-month temperature settles out between warming and cooling events."

Compared to seasonal norms, the warmest average temperature anomaly on Earth in December was in south central China, near the town of Qamdo. December temperatures there averaged 3.91 C (about 7.04 degrees F) warmer than seasonal norms. Compared to seasonal norms, the coolest average temperature on Earth in December was near the town of Buffalo Narrows in west central Saskatchewan. December temperatures there averaged 4.13 C (about 7.43 degrees F) cooler than seasonal norms.

The December 2016 GTR includes the global temperature anomaly map for the month and the month-by-month graph of global temperature anomalies for the duration of the satellite temperature dataset. It also includes a global map of the 2016 temperature anomalies, and a global map of the regional climate trends from December 1978 through December 2016.

A paper with the scientific explanations of changes made in creating version 6.0 of the satellite troposphere dataset has

been accepted for publication in the Asia-Pacific Journal of Atmospheric Science. 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/

As part of an ongoing joint project between UAHuntsville, NOAA and NASA, Dr. John Christy, director of the Earth System Science Center at The University of Alabama in Huntsville, and Dr. Roy Spencer, an ESSC principal scientist, use data gathered by advanced microwave sounding units on NOAA and NASA 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.

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.