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Global Temperature Report: September 2017

Warmest September in satellite temperature record

Global climate trend since Nov. 16, 1978: +0.13 C per decade

September temperatures (preliminary)

Global composite temp.: +0.54 C (about 0.97 degrees Fahrenheit) above 30-year average for September.

Northern Hemisphere: +0.51 C (about 0.92 degrees Fahrenheit) above 30-year average for September.

Southern Hemisphere: +0.57 C (about 1.03 degrees Fahrenheit) above 30-year average for September.

Tropics: +0.53 C (about 0.95 degrees Fahrenheit) above 30-year average for September.

August temperatures (revised):

Global Composite: +0.41 C above 30-year average

Northern Hemisphere: +0.40 C above 30-year average

Southern Hemisphere: +0.41 C above 30-year average

Tropics: +0.46 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 Oct. 2, 2017:

Boosted by warmer than normal water in the equatorial eastern Pacific Ocean that peaked in June and July, global average temperatures in the atmosphere rose to record levels in September, according to Dr. John Christy, director of the Earth System Science Center at The University of Alabama in Huntsville. Not only was it the warmest September on record, it was also the warmest month (compared to seasonal norms) in the 38-year satellite temperature record that wasn't associated with an "officially recognized" El Niño Pacific Ocean warming event.

Of the 20 warmest monthly global average temperatures in the satellite record, only September 2017 was not during an El Niño. Compared to seasonal norms, the global average temperature in September made it the ninth warmest month in the satellite record.

Warmest Septembers (global average)
(degrees C warmer than 30-year September average)

1. **2017** +0.54 C
2. 2016 +0.45 C
3. 1998 +0.44 C
4. 2010 +0.37 C
5. 2009 +0.27 C
6. 2015 +0.25 C
   2005 +0.25 C
8. 1995 +0.22 C
   2013 +0.22 C
   2012 +0.22 C

Warmest months (global average)
(degrees C warmer than 30-year seasonal averages)

1. Feb. 2016 +0.85 C
2. Mar. 2016 +0.76 C
3. Apr. 1998 +0.74 C
4. Apr. 2016 +0.72 C
5. Feb. 1998 +0.65 C
6. May 1998 +0.64 C
7. Jun. 1998 +0.57 C
8. Jan. 2016 +0.55 C
9. **Spt. 2017** +0.54 C
10. May 2016 +0.53 C

While September was not during a typical El Niño, it did follow a summer of warmer than normal sea surface temperatures in the equatorial eastern Pacific, Christy said. "We saw a big rise in sea surface temps in June and July. The atmosphere tends to respond two or three months later, so this is what you would expect. The atmosphere is

still feeling this big heat anomaly, so this is the right time for the atmosphere to see this peak."

In the past two months, however, sea surface temperatures in that critical central Pacific region have fallen significantly; so much so that what had been a forecast for an upcoming El Niño warming event has transitioned into a forecast for a possible La Niña Pacific Ocean cooling event. (See attached graph.)

"Based on what we saw during past events, we would expect some atmospheric cooling in the coming months," Christy said.

Cooling is more passive, while warming is active, so that transition might take a bit longer than the warming did.

"Cooling is a bit more muted," Christy said. "It might take a few months for the cooling to filter in."

Compared to seasonal norms, the coldest spot on the globe in September was in the Western Antarctic, near Alexander Island. Temperatures there were 5.65 C (about 10.17 degrees Fahrenheit) cooler than seasonal norms.

Compared to seasonal norms, the warmest place on Earth in September was the Norwegian archipelago of Svalbard in the Arctic Ocean. Temperatures there averaged 4.64 C (about 8.35 degrees Fahrenheit) warmer than seasonal norms.

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 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.

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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