Oct. 12, 2009

Vol. 19, No. 5

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Global Temperature Report: September 2009

Warmest September in the tropics and second warmest for the globe

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

September temperatures (preliminary)

Global composite temp.: +0.42 C (about 0.76 degrees Fahrenheit) above 20-year average for September.

Northern Hemisphere: +0.55 C (about 0.99 degrees Fahrenheit) above 20-year average for September.

Southern Hemisphere: +0.30 C (about 0.54 degrees Fahrenheit) above 20-year average for September.

August temperatures (revised):

Global Composite: +0.23 C above 20-year average

Northern Hemisphere: +0.28 C above 20-year average

Southern Hemisphere: +0.18 C above 20-year average

(All temperature variations are based on a 20-year average (1979-1998) for the month reported.)

Notes on data released October 12, 2009:

A relatively routine El Nino Pacific Ocean warming event shouldn't cause the hottest tropical September in the past 31 years, but it did, according to Dr. John Christy, professor of atmospheric science and director of the Earth System Science Center at The University of Alabama in Huntsville. On top of a record-setting month in the tropics, September 2009 was also the second warmest September on record both globally and in the Northern Hemisphere.

"Who would have predicted those temperatures in the atmosphere when the sea surface temperature has been bumping along so nonchalantly?" Christy asked.

Normally, warming in the atmosphere during an El Nino is somewhat linked to rising sea surface temperatures in the Equatorial Pacific. Atmospheric temperatures in September, however, were significantly warmer than might have been predicted based on sea surface temps.

"Sea surface temps for September in a key region of the Pacific were on the order of 0.83 C warmer than average, and the tropical atmosphere was 0.51 C warmer than seasonal norms," Christy said. "We've seen water temps about this warm twice in the past decade (2004-2005 and 2006-2007) without seeing this surge in the atmosphere.

"If you go back to the big El Nino of 1997-1998, sea surface temps (SSTs) in September 1997 in that same part of the Pacific were about 2.29 C warmer than normal, but the tropical atmosphere was only 0.4 C above average.

"Other things drive atmospheric temperatures in addition to SSTs, so it
seems this would have been a warm September even without the El Nino."

Bands of air warmer than seasonal norms circled the Equator in September,
while also cover much of the Central Pacific, Northern and Southeastern
Asia, and Africa. Warmer air stretched in one wide band from the Antarctic
across Australia, the Philippines, China and Siberia into the Arctic.

Compared to seasonal norms, the warmest air (as much as 5.5 C warmer than
season norms) covered most of Canada -- although some ski resorts in
portions of the Western U.S. are opening at the earliest dates on record.

Warmest Septembers, Tropics (20 N to 20 S latitude, from about Havana in
the north to Rio de Janeiro in the south)

2009	+0.51 C
1987	+0.42 C
1997	+0.40 C
1998	+0.28 C
2005	+0.23 C
1995	+0.20 C
1980	+0.13 C
2002	+0.11 C
1983	+0.10 C
1991	+0.10 C

Warmest Septembers, Global

1998	+0.43 C
2009	+0.42 C
2005	+0.35 C
2002	+0.28 C
1988	+0.28 C
2006	+0.27 C
2003	+0.23 C
1995	+0.23 C
2007	+0.20 C
1980	+0.19 C

Color maps of local temperature anomalies may soon be available on-line at:

http://nsstc.uah.edu/climate

The processed temperature data is available on-line at:

vortex.nsstc.uah.edu/data/msu/t2lt/uahncdc.lt

As part of an ongoing joint project between The University of Alabama in Huntsville, NOAA and NASA, Christy and Dr. Roy Spencer, a principal research scientist in the ESSC, use data gathered by 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 for which 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 is collected and processed, it is placed in a "public" computer file for immediate access by atmospheric scientists in the U.S. and abroad.

Neither Spencer nor Christy 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 state and federal grants or contracts.

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