Annual Global Analysis for 2017

2017 was another top-three record-warm year

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NASA 2017 Global Temperature

2017:
0.9°C / 1.6°F above 1951-80 average

2nd Warmest year of NASA GISTEMP record
NOAA 2017 Global Temperature

0.84°C / 1.51°F above 1901-2000 average; 3rd warmest year of record

USA - CONUS
3rd warmest year
Wetter than average

ENSO
Neutral to La Nina conditions prevailed most of the year

Argentina
110°F on 27 Jan at Puerto Madryn was highest temperature recorded this far south

Continental Temperatures records begin 1910

S. America
2nd warmest year

Asia
3rd warmest year

Africa
4th warmest year

Europe
5th warmest year

N. America, Oceania
6th warmest year

South of 20°S latitude:
Warmest year of record
Global Temperature Time Series
NOAA GlobalTemp

Annual Global Temperature: Difference From 1951-80 Average, in °F
Global Temperature Time Series
NASA GISTEMP

Annual Global Temperature: Difference From 1951-80 Average, in °F
El Niño / La Niña & Global Temperature

Global Surface Temperature Departures in °C, colored by monthly ENSO values
Jan 1980 through Dec 2017

NOAA’s National Centers for Environmental Information

Months with La Niña conditions in blue
Months with El Niño conditions in red
Impact of ENSO on NASA analysis

Maximum correlation to annual mean is Feb-Mar ENSO index

ENSO contribution to specific years:
2015: 0.04°C
2016: 0.12°C
2017: 0.00°C
Global Analyses Side by Side

Several major datasets: relative to a common 1951-1980 base period
Looking at the Atmosphere

- **Lower Stratosphere (38 yr record)**
  - RSS, NESDIS: 9\textsuperscript{th} coolest (tie)
  - UAH: 5\textsuperscript{th} coolest (tie)

- **Middle Troposphere (38 yr record)**
  - UAH, RSS, UW-RSS, NESDIS: 4\textsuperscript{th} warmest
  - UW-UAH: 3\textsuperscript{rd} warmest

- **Lower Troposphere (38 yr record)**
  - RSS: 4\textsuperscript{th} warmest
  - UAH: 3\textsuperscript{rd} warmest

- **Radiosonde / balloon data (59 yr record, not shown)**
  - \~5,000 ft (850mb): 2\textsuperscript{nd} warmest
  - \~10,000 ft (700mb): 2\textsuperscript{nd} warmest
  - \~18,000 ft (500mb): 2\textsuperscript{nd} warmest
  - \~30,000 ft (300mb): 2\textsuperscript{nd} warmest
  - \~40,000 ft (200mb): 16\textsuperscript{th} warmest
Upper Ocean Heat Content

Source: NOAA/NCEI Center for Coast, Oceans & Geophysics
Arctic Sea Ice Extent Since 1979
(inset: Arctic temperature change vs. Global average)

March and September Arctic sea ice extent, difference from average, in percent, 1979 through 2017

GISTEMP Anomaly

Arctic 64°N-90°N
Global Mean
**Arctic Sea Ice: Day-by-Day in 2017**

<table>
<thead>
<tr>
<th>Month</th>
<th>% vs avg</th>
<th>Rank (of 38)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan</td>
<td>-8.67%</td>
<td>Smallest</td>
</tr>
<tr>
<td>Feb</td>
<td>-7.78%</td>
<td>Smallest</td>
</tr>
<tr>
<td>Mar</td>
<td>-7.52%</td>
<td>Smallest</td>
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<tr>
<td>Apr</td>
<td>-6.33%</td>
<td>2nd smallest</td>
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<tr>
<td>May</td>
<td>-5.04%</td>
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<tr>
<td>Jun</td>
<td>-8.92%</td>
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<td>Jul</td>
<td>-16.58%</td>
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<tr>
<td>Aug</td>
<td>-24.03%</td>
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<tr>
<td>Sep</td>
<td>-25.12%</td>
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</tr>
<tr>
<td>Oct</td>
<td>-19.64%</td>
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<tr>
<td>Nov</td>
<td>-11.59%</td>
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</tr>
<tr>
<td>Dec</td>
<td>-8.45%</td>
<td>2nd smallest</td>
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</table>

![Arctic Sea Ice Extent - Daily](chart.png)

*Data through December 31, 2017*
### Antarctic Sea Ice: Day-by-Day in 2017

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<tr>
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<td>-26.06%</td>
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<tr>
<td>Mar</td>
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<td>Apr</td>
<td>-20.73%</td>
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<td>May</td>
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<td>Sep</td>
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<td>-10.28%</td>
<td>4th smallest</td>
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</tbody>
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**Antarctic Sea Ice Extent - Daily**

Data through December 31, 2017

- 1981-2010 average
- 2016 - Smallest December Extent
- 2007 - Largest December Extent
- 2017

Data provided by the National Snow and Ice Data Center
Northern Hemisphere Snow Cover Extent
Period of record: 1967-2017 (50 years)

Departure from Normal – January 2017

Northern Hemisphere Snow Cover Trends (1967-2017)

Data provided by the Rutgers Global Snow Lab
http://climate.rutgers.edu/snowcover/
Questions?

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