

Report on State of the Climate from NOAA

NOAA COMMUNICATIONS AND EXTERNAL AFFAIRS

Climate data from air, land, sea and ice in 2013 reflect trends of a warming planet

Increases in temperature, sea level and CO2 observed; Southern Hemisphere warmth and Super Typhoon Haiyan among year's most notable events

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In 2013, the vast majority of worldwide climate indicators--greenhouse gases, sea levels, global temperatures, etc.--continued to reflect trends of a warmer planet, according to the indicators assessed in the *State of the Climate in 2013* report, released [online](#) today by the American Meteorological Society.

Scientists from NOAA's National Climatic Data Center in Asheville, N.C., served as the lead editors of the report, which was compiled by 425 scientists from 57 countries around the world

***State of the Climate in 2013* report available [online](#).**

([highlights](#), [visuals](#), [full report](#)) It provides a detailed update on global climate indicators, notable weather events, and other data collected by environmental monitoring stations and instruments on air, land, sea and ice.

"These findings reinforce what scientists for decades have observed: that our planet is becoming a warmer place," said NOAA Administrator Kathryn Sullivan, Ph.D. "This report provides the foundational information we need to develop tools and services for communities, business, and nations to prepare for, and build resilience to, the impacts of climate change."

The report uses dozens of climate indicators to track patterns, changes, and trends of the global climate system, including greenhouse gases; temperatures throughout the atmosphere, ocean, and land; cloud cover; sea level; ocean salinity; sea ice extent; and snow cover. These indicators often reflect many thousands of measurements from multiple independent datasets. The report also details cases of unusual and extreme regional events, such as Super Typhoon Haiyan, which devastated portions of Southeast Asia in November 2013.

Highlights:

- **Greenhouse gases continued to climb:** Major greenhouse gas concentrations, including carbon dioxide (CO₂), methane and nitrous oxide, continued to rise during 2013, once again reaching historic high values. Atmospheric CO₂ concentrations increased by 2.8 ppm in 2013, reaching a global average of 395.3 ppm for the year. At the Mauna Loa Observatory in Hawaii, the daily concentration of CO₂ exceeded 400 ppm on May 9 for the first time since measurements began at the site in 1958. This milestone follows observational sites in the Arctic that observed this CO₂ threshold of 400 ppm in spring 2012.
- **Warm temperature trends continued near the Earth's surface:** Four major independent datasets show 2013 was among the warmest years on record, ranking between second and

sixth depending upon the dataset used. In the Southern Hemisphere, Australia observed its warmest year on record, while Argentina had its second warmest and New Zealand its third warmest.

- **Sea surface temperatures increased:** Four independent datasets indicate that the globally averaged sea surface temperature for 2013 was among the 10 warmest on record. El Niño Southern Oscillation (ENSO)-neutral conditions in the eastern central Pacific Ocean and a negative Pacific decadal oscillation pattern in the North Pacific. The North Pacific was record warm for 2013.
- **Sea level continued to rise:** Global mean sea level continued to rise during 2013, on pace with a trend of 3.2 ± 0.4 mm per year over the past two decades.
- **The Arctic continued to warm; sea ice extent remained low:** The Arctic observed its seventh warmest year since records began in the early 20th century. Record high temperatures were measured at 20-meter depth at permafrost stations in Alaska. Arctic sea ice extent was the sixth lowest since satellite observations began in 1979. All seven lowest sea ice extents on record have occurred in the past seven years.
- **Antarctic sea ice extent reached record high for second year in a row; South Pole station set record high temperature:** The Antarctic maximum sea ice extent reached a record high of 7.56 million square miles on October 1. This is 0.7 percent higher than the previous record high extent of 7.51 million square miles that occurred in 2012 and 8.6 percent higher than the record low maximum sea ice extent of 6.96 million square miles that occurred in 1986. Near the end of the year, the South Pole had its highest annual temperature since records began in 1957.
- **Tropical cyclones near average overall / Historic Super Typhoon:** The number of tropical cyclones during 2013 was slightly above average, with a total of 94 storms, in comparison to the 1981-2010 average of 89. The North Atlantic Basin had its quietest season since 1994. However, in the Western North Pacific Basin, Super Typhoon Haiyan - the deadliest cyclone of 2013 - had the highest wind speed ever assigned to a tropical cyclone, with one-minute sustained winds estimated to be 196 miles per hour.

State of the Climate in 2013 is the 24th edition in a peer-reviewed series published annually as a special supplement to the *Bulletin of the American Meteorological Society*. The journal makes the full report openly available [online](#).

"*State of the Climate* is vital to documenting the world's climate," said Keith Seitter, Ph.D., AMS Executive Director. "AMS members in all parts of the world contribute to this NOAA-led effort to give the public a detailed scientific snapshot of what's happening in our world and builds on prior reports we've published."