

CLIMATE SCIENCE FORUM



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IPCC eyes a permanent carbon budget to limit dangerous interference in climate

We present these highlights of the [Summary for Policymakers](#) of the new Fifth Assessment ([Climate Change 2013](#)), that the Inter-governmental Panel on Climate Change (IPCC) released on 27 September. The new findings on the physical basis of climate changes include:

Confidence in a human influence on climate changes: “It is extremely likely that human influence has been the dominant cause of observed warming since the mid-20th century.” An outcome is considered extremely likely if there is a better than 95% chance that it is truly happening.

A “*budget*” of fossil-fuel carbon for all time is needed to stabilize climate: For perhaps the first time, the IPCC prescribed a limit to the total carbon in fossil fuels that can ever be extracted and burned, while keeping the warming of the Earth (since 1870) to 2°C or less. That limit is 1 trillion tons of carbon in all fossil fuels, if CO₂ is the only greenhouse gas considered. The IPCC estimates (with a certainty of 66%) that global warming will not exceed 2°, if that budget is kept.

Why two degrees? The United Nations Framework Convention on Climate Change set a goal of limiting emissions of greenhouse gases at a level that “prevents dangerous interference in the climate system.” The science academies of several nations have stated that a 2°C limit on total global warming does avoid dangerous interference.

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A reality check is that already 530 billion tons of carbon in fossil fuels—over 50% of the “budget”—have been burned and released as CO₂ by 2011.

Amount of warming: From 1880 to 2012, the surface of the Earth warmed on average by +0.85°C (1.5°F); since 1901, almost the entire globe experienced surface warming.

Recent hiatus in warming: Trends based on short periods (such as the last 15 years) do not reflect longer trends (such as over a century), because climate naturally varies year-to-year and over short periods of time.

Extreme rainfall: Precipitation has increased over land in the middle latitudes of the Northern Hemisphere -- there is high confidence in an increase after 1950, and only medium confidence before 1950. Heavy precipitation events have become more frequent and more intense over Europe and North America.

Ocean warming: The Ocean has stored more than 90% of the energy retained on Earth due to global warming from 1971 to 2010. It is certain that the ocean warmed in the last 40 years, when measurements were good, and likely warmed in the 100 years before 1970.

Loss of polar ice: The Greenland ice sheet has lost ice *five times faster* in the last ten years than it lost in the previous ten years.

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Sea level: Sea level began to rise at a faster rate over 110 years ago, but the current rate of rise is about twice the rate observed since 1901.

CO₂ levels: Concentrations of CO₂ are measured in bubbles found in ice cores taken from the great ice sheets of Antarctica. Current concentrations of CO₂ and methane in the atmosphere exceed the highest levels measured in ice core bubbles from the last 800,000 years. Translation: the level of CO₂ in the atmosphere has never been as high (in the last 8000 centuries) as it is now.

The Medieval warm period: The IPCC now states that the last thirty years (1983–2012) “was likely the warmest 30-year period in the last 1400 years” or since 600 A.D., in the Dark Ages. This implies that our current climate is now warmer than the Medieval Warm period, which some scientists thought was as warm as the present.

[Next Item: State of the Climate](#)

CLIMATE SCIENCE FORUM

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State of the Climate

Three Reports to Check

Three different assessments of the current climate and its ongoing changes appeared this year:

- Every six years, an international team of scientists deliberates and writes a thorough review of climate change to date, with prognoses for future climate for the next 100 years. This month, the [Intergovernmental Panel on Climate Change](#) (IPCC) released its fifth assessment report since 1990; and it announced a new **summary for policymakers** on September 27 ([link](#), [footnote 1](#)). On September 30, the IPCC released online the [full draft report on the physical basis for climate change](#), including a technical summary. We report key findings here on [page 1](#). Some 209 lead authors and 50 review editors from 39 countries wrote or debated the exhaustive report.

- “**State of the Climate in 2012**” ([footnote 2](#)) is the 23rd report of the previous year’s climate from the US National Climatic Data Center, it is published annually by the American Meteorological Society since 1990. It no longer focuses on just the atmosphere, but also reports changes in the entire Earth “system” including the Ocean (currents, salinity, heat content, circulation, and sea level), the realm of ice on land and sea, the land cover and vegetation, the hydrological cycle including rivers and soil moisture, and the carbon cycle.

Some 415 authors and editors from dozens of nations contributed to the new *State of the Climate*. As usual, the largest section is devoted to regional climates on seven continents or continental regions, including changes from prior years.

- The World Meteorological Organization (WMO, [footnote 3](#)) also reports on the climate in the previous year. At only 33 pages, their most recent “[Status of the Global Climate in 2012](#)” is attractively illustrated and easily readable in one sitting. Unlike the above publications, the editors clearly wrote it for general readers, not for scientists or specialists.

Citations

1. The IPCC is on the internet at <http://www.ipcc.ch/>
2. “[State of the Climate in 2012](#),” by J. Blunden and D.S. Arndt, editors, 2013. Special supplement to the *Bulletin of the American Meteorological Society*, vol. 94, number 8, pages S1–S238, 256 pp.
3. “[WMO statement on the Status of the Global Climate in 2012](#)” – World Meteorological Organization, no. 1108, Geneva, 2013, 33 pp.

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