

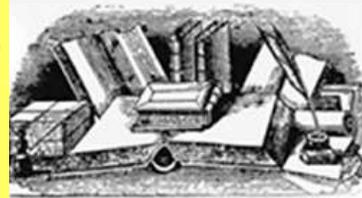
# CLIMATE SCIENCE FORUM



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## IPCC wants a permanent carbon budget to avoid dangerous interference in climate

We present the key points of the [Summary for Policymakers](#) of “[Climate Change 2013](#),” the new Assessment of the Intergovernmental Panel on Climate Change (IPCC) released last September. The new findings 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.

**An all-time “budget” of fossil-fuel carbon** is needed to stabilize climate: for the first time, the IPCC recommended a cap on the total amount of fossil fuels that can ever be burned in order to keep the warming of Earth to 2°C or less. That limit is 1 trillion tons of carbon in all fossil fuels, if CO<sub>2</sub> if the only greenhouse gas considered. The IPCC estimates 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 industrial nations have agreed that a 2°C limit on total global warming would avoid dangerous interference.

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A reality check for us: more than 50% of this “budget” of fuel has already been burned and released into the atmosphere as CO<sub>2</sub> 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 a rainfall 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 extra energy retained on Earth due to global warming from 1971 to 2010. The IPCC is certain that the ocean has warmed in the last 40 years, when measurements were good and the ocean has likely warmed in the hundred 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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## State of the Climate

**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.

**CO<sub>2</sub> levels:** Concentrations of CO<sub>2</sub> are measured in bubbles found in ice cores taken from the great ice sheets of Antarctica. Current concentrations of CO<sub>2</sub> and methane in the atmosphere exceed the highest levels measured in ice core bubbles from the last 800,000 years. Translation: the amount of CO<sub>2</sub> in the atmosphere has never been as high in the last 8000 centuries as it now is.

**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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Three distinct snapshots of the current climate and its annual changes are worth a look :

- “**State of the Climate in 2013**” ([footnote 2](#)) is the 23rd report of the previous year’s climate from the US National Climatic Data Center, and 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 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*. The largest section covers regional climates on seven continents or continental regions, including changes from prior years.

- The World Meteorological Organization (WMO, [footnote 3](#)) also reports the climate of the previous year. At only 24 pages, their most recent “**Status of the Global Climate in 2013**” is easily readable in one sitting. The editors clearly wrote it for general readers, not scientists nor specialists.

- 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. The [Intergovernmental Panel on Climate Change](#) (IPCC) released its latest assessment report last year, including a **summary for policymakers** ([link](#), [footnote 1](#)). It later released 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 editors from 39 countries wrote and debated the exhaustive report.

#### Citations

1. The IPCC is on the internet at <http://www.ipcc.ch/>
2. “[State of the Climate in 2013](#),” by J. Blunden and D.S. Arndt, editors, 2014. Special supplement to the *Bulletin of the American Meteorological Society*, vol. **95**, number 7, pages S1–S257, 273 pp.
3. “[WMO statement on the Status of the Global Climate in 2013](#)” – World Meteorological Organization, no. 1130, Geneva, 2014, 24 pp.

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