

Human activity has warmed the Earth

In September 2013, the Intergovernmental Panel on Climate Change¹ published its fifth assessment of the physical science. The following is a synopsis² of the findings.

Global warming

- It is extremely likely (95-100% probability) that most of the global warming since 1950 has been due to human influences.
- Multiple lines of evidence confirm that the **extra heat** being trapped by greenhouse gases is:
 - **warming** the Earth's surface to record levels,
 - **heating** the oceans,
 - **raising** sea levels,
 - **melting** ice caps and glaciers, and
 - changing **weather** patterns and extremes.

Temperature

- The global mean average surface temperature rose by 0.89°C from 1901 to 2012. (Global average surface temperature for the decade 2001-2010 was 14.47°C.)
 - Each of the last three decades has been warmer than all preceding decades since 1850.
 - The first decade of the 21st century was the warmest of all.

Ocean

- It is virtually certain that the upper ocean has warmed from 1971 to 2010.
 - Ocean warming accounts for most of the extra incoming solar energy stored by the Earth, about 93% between 1971 and 2010.
- The rate of sea level rise since the mid-19th century has been larger than the mean rate during the previous two millennia.
 - The global mean sea level rose by about 19 cm from 1901 to 2010 due to increased ocean warming and melting glaciers and ice sheets.

- The rate of rise accelerated between 1993 and 2010.
 - During the last interglacial period, when the climate was 2°C warmer than pre-industrial levels, maximum global sea levels were 5 to 10 meters higher than they are today.
- Seawater has become more acidic (its pH has decreased by 0.1) since the beginning of the industrial era due to humanity's carbon dioxide emissions.

Ice and snow cover

- The annual extent of Arctic sea ice decreased between 1979 and 2012 at a rate that was very likely between 3.5 and 4.1% per decade (about ½ million km²/decade).
- There is very high confidence that glaciers have continued to shrink and lose mass world wide, with very few exceptions.
 - The extent of Northern Hemisphere snow cover has decreased since the mid-20th century, especially in spring.

Extreme weather

- Changes in extreme weather events have been observed since about 1950.
 - In the North Atlantic, increases in intense tropical cyclone activity are virtually certain.
 - In large parts of Europe, Asia and Australia, it is likely that the frequency of heat waves has increased.
 - It is very likely that, on the global scale, the number of cold days and nights has decreased and the number of warm days and nights has increased.

¹ established by the World Meteorological Organization and the United Nations Environment Programme in 1988.

² distilled by John Hollins from the IPCC Summary for Policy Makers.