

# Climate: Growing certainties on warming and human role

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Over the past 23 years, UN scientists have issued progressively stronger assertions about climate change.

They have moved from a sketchy warning that heat-trapping [carbon gases](#) emitted by [fossil fuels](#) will cause a "greenhouse" effect to the conviction that this effect is now having an impact on Earth's climate.

Following are extracts from the Intergovernment Panel on Climate Change's assessment reports, the latest of which will be published from Friday.

First Assessment Report (1990)

"... emissions resulting from human activities are substantially increasing [atmospheric concentrations](#) of [greenhouse gases](#)...

"These increases will enhance the [greenhouse effect](#), resulting on average in an additional [warming](#) of the Earth's surface."

Second Assessment Report (1995)

"Most of these studies have detected a significant change and show that the observed [warming trend](#) is unlikely to be entirely natural in origin...

"... the balance of evidence suggests that there is a discernible human influence on [global climate](#).

"... the average rate of warming [in projections for the 21st century] would probably be greater than any seen in the last 10,000 years, but the actual annual to decadal changes would include considerable natural variability."

### Third Assessment Report (2001)

"There is new and stronger evidence that most of the warming observed over the last 50 years is attributable to human activities.

"... the projected rate of warming is much larger than the observed changes during the 20th century and is very likely to be without precedent during at least the last 10,000 years, based on paleoclimate data."

The report said the global [average temperature](#) had risen by 0.6 degrees Celsius (1.08 degrees Fahrenheit) between 1901 and 2000.

Human activity was "likely" to be the cause of warming, a term meaning a probability of more than 66 percent.

### Fourth Assessment Report (2007)

"Warming of the [climate system](#) is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level.

"Most of the observed increase in global average temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic [man-made] greenhouse gas concentrations."

The report said that warming over the previous 100 years was 0.74 C (1.33 F), and 11 of the previous 12 years had been the warmest on

record.

Human activity was "very likely" the cause of warming, meaning a probability of more than 90 percent.

Fifth Assessment Report (draft version seen by AFP)

"In the northern hemisphere, the period 1983-2012 was very likely the warmest 30-year period of the last 800 years and likely the warmest period of the last 1,400 years.

"...Greenhouse gases contributed a global mean surface warming likely to be in the range of 0.5-1.3 C [0.9-2.3 F] over the period 1951-2010."

"...There is high confidence that this has warmed the ocean, melted snow and ice, raised global mean sea level and changed some climate extremes in the second half of the 20th century."

Human activity was "extremely likely" to be the cause of this warming, meaning between 95 and 100 percent probability.

The draft attributes an observed slowing in warming from 1998 to 2012—a phenomenon cited by skeptics as evidence that warming is not man-made—to a temporary cooling cycle in the weather system and lower-than-expected solar activity.

Temperatures since 1901 have risen by 0.89 C (1.6 F), it says.

Additional warming this century is estimated to range from 1.0 to 3.7 C (1.8-6.6 F), and sea level rise from 40 to 62 centimetres (16-24.8 inches), according to four projections based on how much carbon is emitted.

As in past reports, these estimates are an average. Each projection gives a wide margin of variation either side of the figure.

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