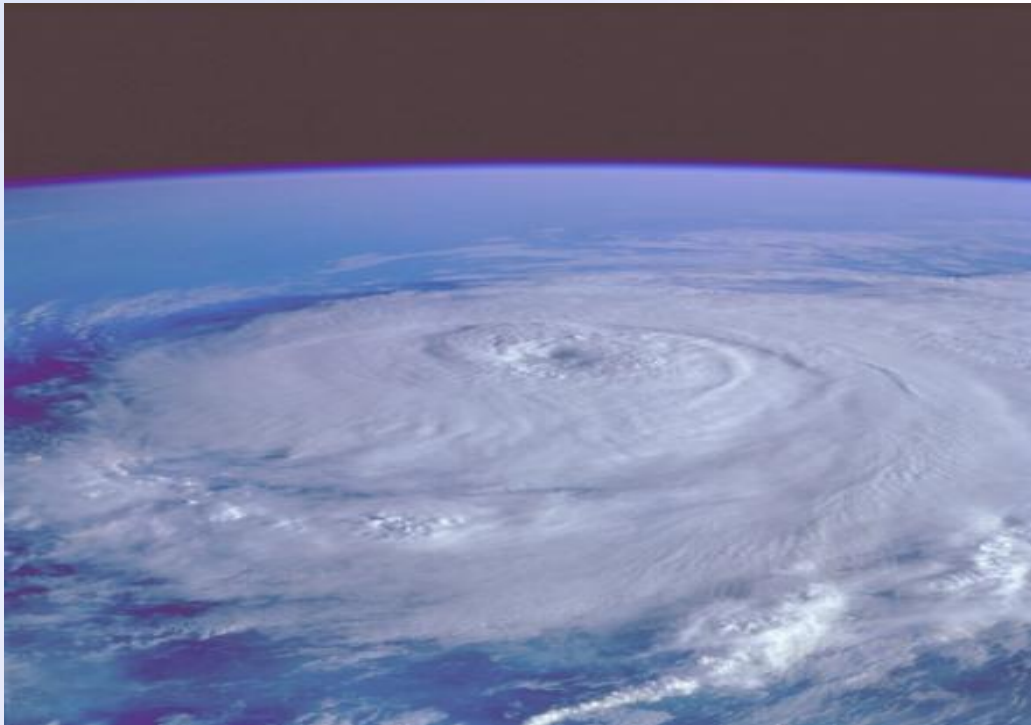


# Climate Change



REOC 2008



Source: <http://www.charnwood.gov.uk/uploads/1437b1d8468e72033818971.jpg>

- **What is Climate change?**
- **What is Global Warming?**
- **What is the Greenhouse Effect?**
  - **The world is warming**
    - **The evidence**
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  - **The effect on the UK**
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## What is Climate Change?

Climate refers to the average weather experienced in a region over a long period, typically 30 years. This includes temperature, wind and rainfall patterns. The climate of the Earth is not static, and has changed many times in the past in response to a variety of natural causes. The term 'climate change' usually refers to recent changes in climate that have been observed since the early 1900's.

## What is the Global Warming?

Global warming refers to the increase in the average temperature of the earth's atmosphere. Climate change refers to the changes in climate that might accompany the warming of the atmosphere, such as changes in the frequency and intensity of extreme weather and sea level rise. Many people use these expressions interchangeably. The word 'warming' may be misleading, as it doesn't suggest the range of changes that could result.

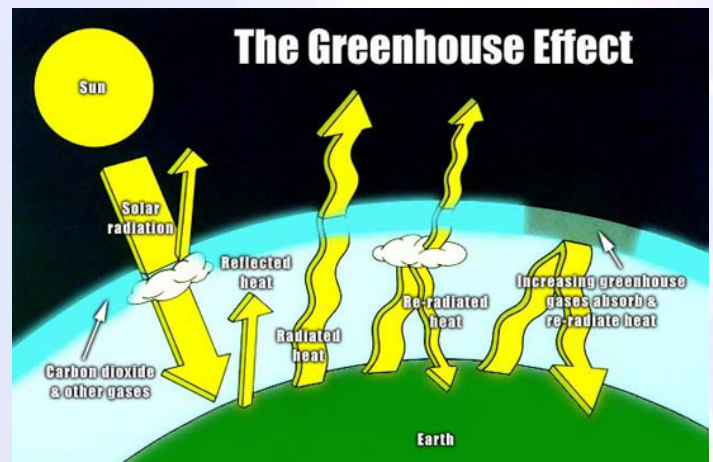


Source:

<http://newsbusters.org/static/2007/09/2007-09-29GlobalWarming.jpg>

## What is the Greenhouse Effect?

The earth is kept warm by the greenhouse effect. Certain gases in the atmosphere (greenhouse gases) absorb energy that is radiated from the Earth's surface, and so warm the atmosphere. The greenhouse effect is a natural phenomenon without which life on Earth as we know it would not be possible, as the Earth would be approximately 30°C cooler. However, our modern lifestyles have resulted in us releasing large amounts of greenhouse gases – like carbon dioxide and methane – into the atmosphere, enhancing the greenhouse effect and so pushing up temperatures globally.

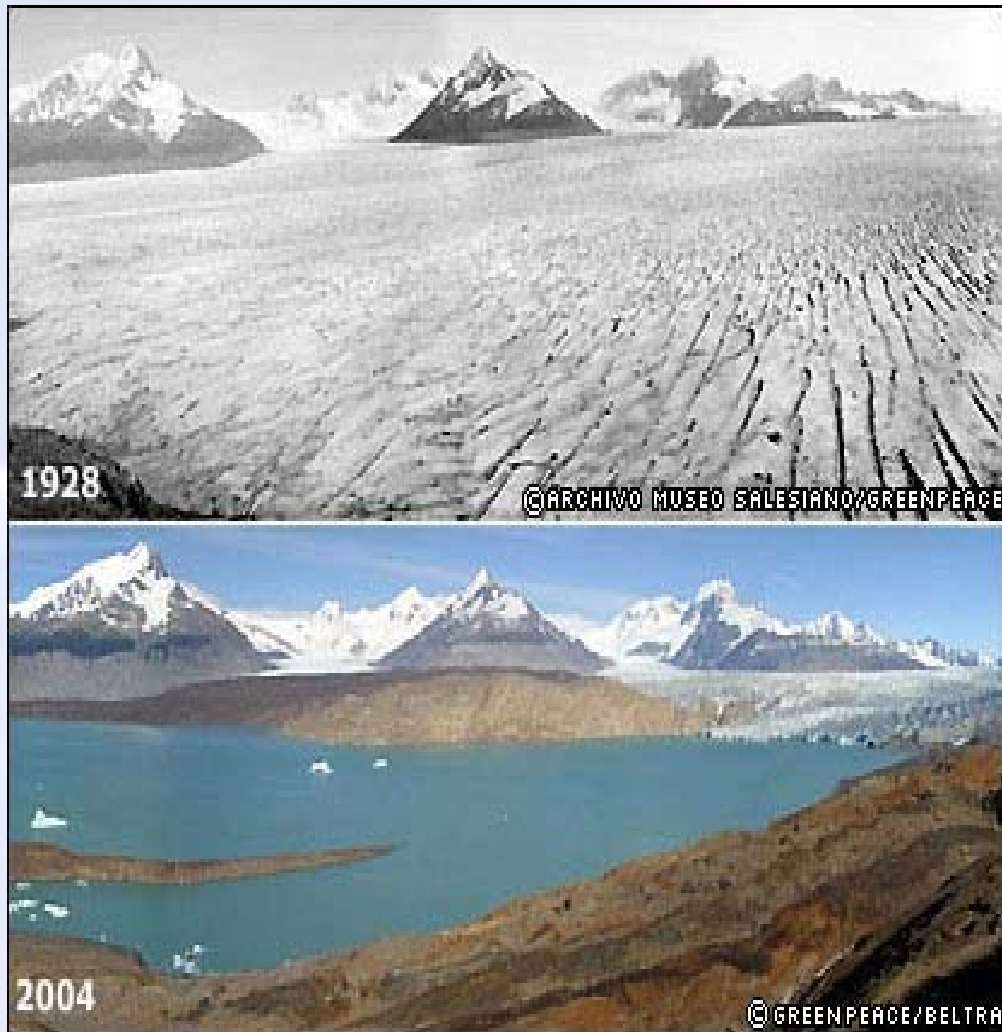


Source:

[http://www.virtualsciencefair.org/2005/stro5c0/public\\_html/greenhouse\\_effect.jpg](http://www.virtualsciencefair.org/2005/stro5c0/public_html/greenhouse_effect.jpg)

## The world is warming

The world is warming. That much is certain. Global mean temperatures have risen about 0.6°C since 1860 when systematic temperature records began. The 20th Century was probably the warmest in the past 1000 years. In the UK, eight of the last ten years have been the warmest since records began, with 1999 and 1990 the two warmest years ever recorded. Globally, 2005 is one of the warmest years on record. As a result our climate is changing. 2003 saw the highest maximum temperature recorded in the UK (38.5°C at Brogdale, Kent).

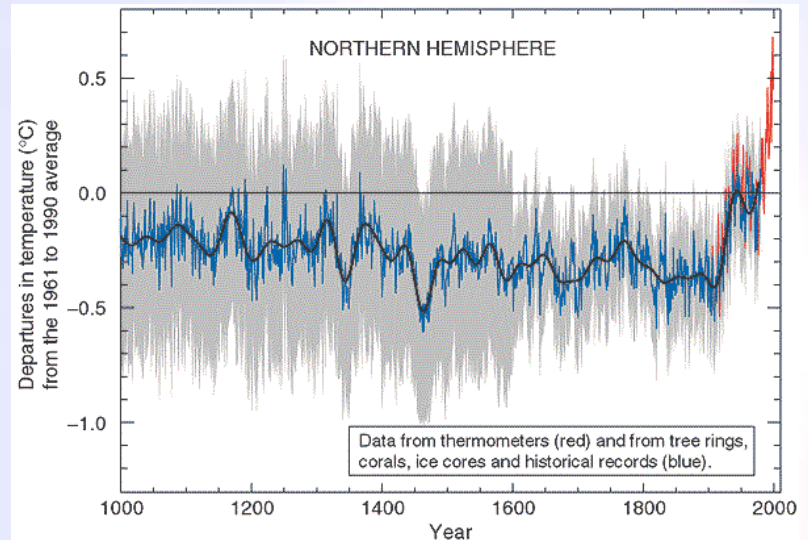


*Picture to show the change in ice cover over the last century*

## Evidence of climate change

There is evidence that rainfall patterns are changing, sea levels are rising, glaciers are retreating and arctic sea-ice is thinning. The incidence of extreme weather is also increasing in some parts of the world.

Researchers are confident that the majority of the warming is due to increasing concentrations of greenhouse gases in the earth's atmosphere. Concentrations of these gases have risen by around 50% in less than 200 years, largely through the burning of carbon rich fossil fuels and deforestation. The IPCC, concluded in 2001 that 'most of the Earth's warming observed in the last 50 years is attributable to human activities'.



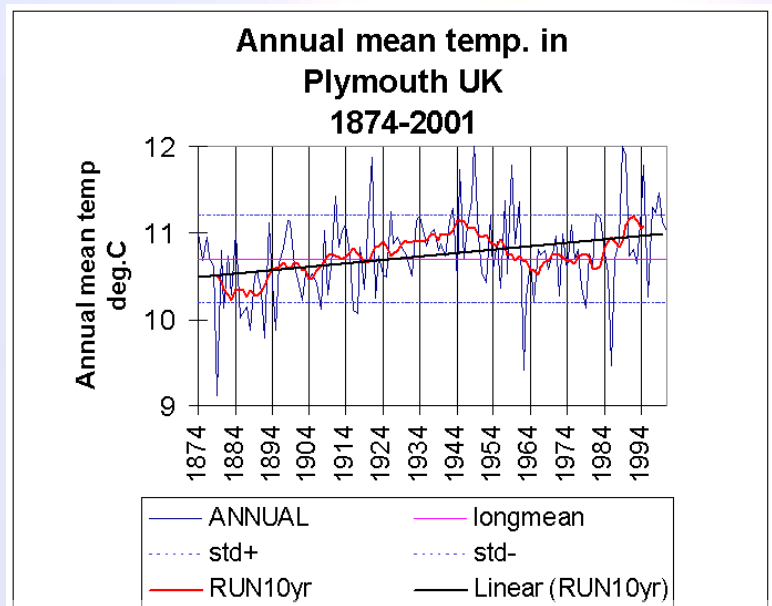
"The Hockey Stick Graph". Showing Temperature change in the Northern Hemisphere. Source: <http://www.global-warming-and-the-climate.com/images/Manns-hockey-stick.gif>

### The South West

The longest temperature series in the South West is for Plymouth where records have been kept since 1874.

*A warming trend of 0.8°C can be seen in Plymouth over the last 125 years.*

Annual mean temperatures show a large variability (Figure 1). A warming trend of about 0.8 °C from the 1880s to 1940s is evident, followed by a cooling period until the 1960s. The last two decades have shown a warming of 0.6 °C, with a quite rapid return to the annual mean temperatures of the 1940s. Overall, a warming trend of 0.5 °C can be seen in Plymouth over the last 125 years. Four of the ten warmest years within the 125-year record in Plymouth have occurred since 1989 (1989, 1990, 1995, 1999).



Graph to show the annual mean temperature in Plymouth 1874-2001 (Source: South West Climate Change Impacts Scoping Study.)

## The year ahead

2008 is set to be cooler globally than recent years say Met Office and University of East Anglia climate scientists, but is still forecast to be one of the top-ten warmest years.

The development of a strong La Niña in the tropical Pacific Ocean will limit the warming trend of the global climate. During La Niña, cold waters upwell to cool large areas of the ocean and land surface temperatures (visit <http://www.elnino.noaa.gov/> for up-to-date descriptions of El Niño and La Niña).

## The Future

*This is our future - famous cities are submerged, a third of the world is desert, the rest struggling for food and fresh water.*

*(Richard Girling, The Sunday Times, 11/03/07)*

The international community accepts the reality of global warming, but without knowing how much more fossil fuel will be burnt, the best science can offer is a range of plausible "scenarios". These vary so widely that the Intergovernmental Panel on Climate Change (IPCC), in its Third Assessment report in 2001, was able to suggest only that global average temperatures by the end of the 21st century will have risen between 1.4 and 5.8C above the average for 1990 - an estimate which in 2007 it pushed up to a possible maximum of 6.4C. It doesn't look much, but it could measure the difference between survival and the near-extinction of human life.

In high latitudes, such as Britain, the rise is likely to be much higher, perhaps 8C. The warming seems to be proceeding faster than anticipated, yet there still remains an assumption that climate change is controllable, if CO<sup>2</sup> emissions can be curbed.

### Three degrees rise

At present, the world's temperature is on course to rise by more than 3 °C despite efforts to combat global warming, Britain's chief scientist has warned.

Sir David King issued a stark wake-up call in 2006 that climate change could cause devastating consequences such as famine and drought for hundreds of millions of people unless the world's politicians take more urgent action.



According to computer-modelled predictions for the Government, a 3 °C rise in temperatures could put 400 million more people at risk of hunger; leave between one and three billion more people at risk of water stress; cause cereal crop yields to fall by between 20 and 400 million tons; and destroy half the world's nature reserves.

Sir David believes it is essential that the world begins to make the necessary changes now. "We don't have to succumb to a state of despondency where we say that there is nothing we can do so let's just carry on living as per usual. It is very important to understand that we can manage the risks to our population - and around the world," he said. "What we are talking about here is something that will play through over decades - we are talking 100 years or so. We need to begin that process of investment. It is going to be a major challenge for the developing countries. There are no certainties here. If you ask me where do we feel the temperature is likely to end up if we move to a level of carbon dioxide of 550 parts per million - which is roughly twice the pre-industrial level and the level at which we would be optimistically hoping we could settle - the temperature rise could well be in excess of three degrees Centigrade. And yet we are saying 550 parts per million in the atmosphere is probably the best we can achieve through global agreement."

In response to this, Peter Ainsworth, the shadow Environment Secretary, said: "Sir David King's pessimism on climate change is disturbing. All credible scientific evidence, including his own, clearly implies that a rise in global temperature of over 2°C would threaten to unleash rapid and catastrophic climate change, leading to economic and social disaster. The world's poorest people would be hit first and hardest. With effective political action at international, national and local levels, we can not only avert this disaster, but also create lasting prosperity based on clean, new technologies. Defeatism can only pave the way to a miserable future."

For further information on the rising of global temperatures by 3 °C visit <http://www.terrature.org/3degrees.htm>



Source: <http://www.climate-speakers.org.uk/images/ccukweb2%2025Jan06.jpg>

Below, Mark Lynas, Author of Six Degrees: Our Future on a Hotter Planet provides a degree-by-degree guide not just to our grandchildren's futures but to our own:

## RED ALERT

If global warming continues at the current rate, we could be facing extinction. So what exactly is going to happen as the Earth heats up? Here is a degree-by-degree guide

**1 °C Increase** > Ice-free sea absorbs heat and accelerate global warming; fresh water lost from 1/3 of the world's surface; low-lying coastlines flooded



**2 °C Increase** > Europeans dying of heatstroke; forests ravaged by fire; stressed plants beginning to emit carbon rather than absorbing it; a third of all species face extinction

*Scientists predict that 20-30% of species could face extinction if the global temperature rises by even 1.5 to 2.5 degrees. (Subhankar Banerjee/Associated Press)*

**3 °C Increase** > Carbon release from vegetation and soils speeds global warming; death of the Amazon rainforest; super-hurricanes hit coastal cities; starvation in Africa

**4 °C Increase** > Runaway thaw of permafrost makes global warming unstoppable; much of Britain made uninhabitable by severe flooding; Mediterranean region abandoned



**5 °C Increase** > Methane from ocean floor accelerates global warming; ice gone from both poles; humans migrate in search of food and try vainly to live like animals off the land

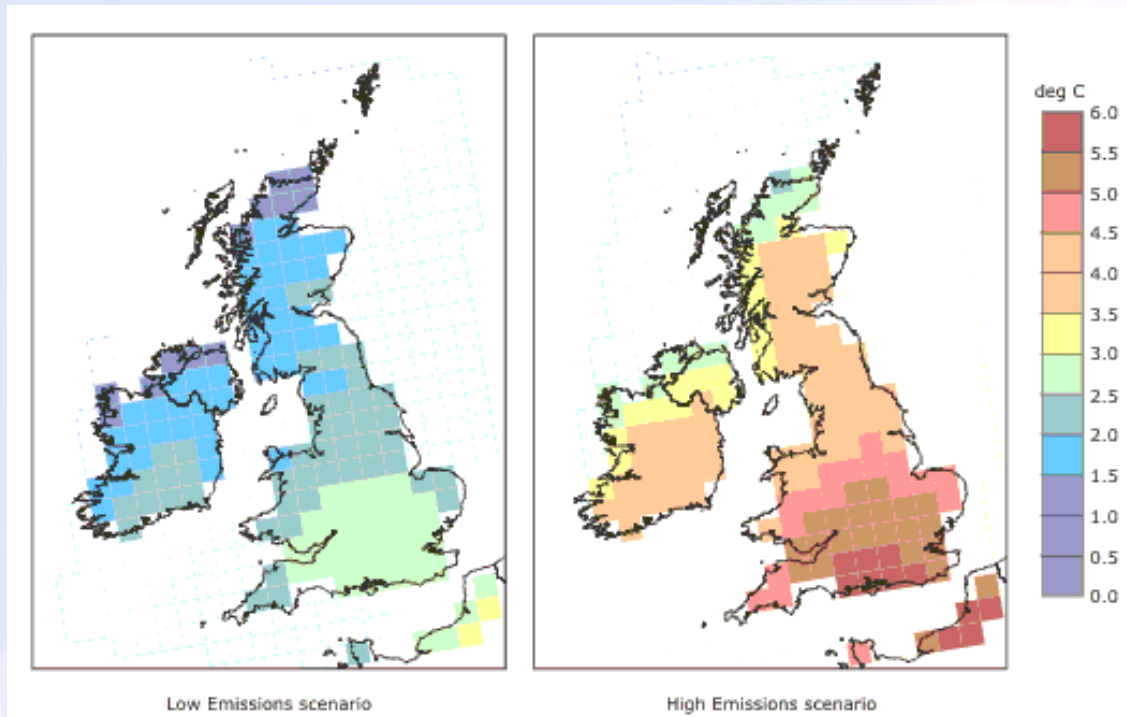
Source:

<http://www.greenpeace.org.uk/files/images/migrated/MultimediaFiles/Live/Image/300.jpg>

**6 °C Increase** > Life on Earth ends with apocalyptic storms, flash floods, hydrogen sulphide gas and methane fireballs racing across the globe with the power of atomic bombs; only fungi survive

For further information on this rather shocking research visit the full article at <http://www.timesonline.co.uk/tol/news/uk/science/article1480669.ece>

## The effect on the UK



*Change in summer average daily temperature – 2080s. Source:*  
<http://www.defra.gov.uk/environment/statistics/globalmos/images/gafg02s.gif>

The climate change we expect in the next 30-40 years will be due to our past greenhouse gas emissions. Climate change later this century will be determined by the emissions we allow now. The UK will be warmer and this will certainly bring advantages. However, we are also likely to experience more extreme weather and we need to start planning now to deal with the consequences, such as additional flooding, drought and sea level rise.

There are also likely to be serious implications for other parts of the world, for example, our trading partners, that will have effects for the UK. It is likely that there will be a northwards shift in natural habitats and agricultural zones of 50-80 km per decade (NERC, 1997). It's in our interest to be prepared. In addition we have an ethical responsibility as part of the developed world (which has emitted the majority of greenhouse gases leading to man-made climate change) to help those less-developed countries in which the impacts will be most felt.

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