



The Hollywood film 'The Day After Tomorrow' shows apocalyptic scenes supposedly resulting from abrupt climate change. Friends of the Earth's Director Tony Juniper said: "This is a dramatisation, not a documentary

and is above all a Hollywood movie. Although the depiction of the science is exaggerated and at times misleading the scale of the threat and the underlying politics are all too true. Science alone has failed to convince politicians and international companies with the power and influence to make a difference.

The film will reach entirely new audiences who may not have heard about global warming. We hope it will help to create a much needed sense of urgency to fight climate change in the real world, especially in the United States.". Friends of the Earth will now seek to help to distinguish between fact and fiction and has released a briefing on the science of abrupt climate change.

What do we know already?

- Global temperatures rose by an average of about 0.6 °C over the last century and in 2003 there were unusual climate related events worldwide; droughts in Southern Africa, heatwaves in India, huge forest fires in Siberia and flooding in parts of South America. Global average temperatures are currently predicted to increase by between 1.4 and 5.8 °C by 2100. The idea that climate change is harmless and will just mean 'nicer weather' is wrong and dangerous. A warming of just 2 to 3°C in the next 100 years would put 3 billion people at risk from water shortage, an extra 300 million facing the threat of malaria and 100 million more in danger because of coastal flooding. Even more lives could be at risk if the climate changes over a shorter time scale - so called abrupt climate change.



What is abrupt climate change?

- Imagine a car being pushed slowly up a hill; it may reach the top of the hill and then suddenly fall down the other side, at a rate much faster than it was being pushed.
- In scientific terms abrupt climate change occurs when a climate system crosses a threshold and enters a new state at a rate faster than can be explained by cause. The climate may change dramatically over just 10 to 20 years - so fast that human and natural systems have difficulty adjusting. And once the threshold has been reached it may be hard or even impossible to return to the previous state.
- The Day After Tomorrow is loosely based on one possible example of abrupt

climate change that would occur as a result of the weakening or halting of the thermohaline circulation.

The thermohaline circulation is the natural movement of water in the Atlantic Ocean, driven by temperature and salinity, that brings warm water northward and produces a more temperate climate in Northern Europe, including the UK. (This is subtly different from the Gulf Stream - the wind driven movement of water in the Atlantic Ocean which also currently warms Northern Europe - and is unlikely to be affected by climate change).

- If, as predicted, climate change was to raise global temperatures it is likely there would be an increase in the amount of freshwater flowing into the North Atlantic from the rivers of Russia and Greenland. This freshwater would lie on top of the denser salt water and reduce the heat transfer by acting as a cap.
- It would also reduce the salinity of the water and potentially at a certain threshold, eventually stop the North Atlantic water from sinking, halting the circulation entirely. The result for the climate of Northwest Europe would be dramatic, with temperatures no longer rising as expected with global 'warming', but suddenly cooling. Such a change could cool down selective areas of the globe by 3° to 5° Celsius. Unfortunately, there is currently insufficient data to say how likely this scenario is.



- Most climate models predict that there will be a weakening in the present warming influence of the thermohaline circulation, but there is a considerable difference in their predictions and two models show no change at all. However, this does not necessarily indicate that change is unlikely - it just means we don't yet know enough about the climate system to predict what will happen. Recent observations at a few key locations suggest that significant changes are happening in the North Atlantic. A weakening of the thermohaline circulation may already be in progress.

The Natural Research Council has invested £20 million in a six year scientific study of rapid climate change - RAPID, in particular the thermohaline circulation. This work is due for completion in 2007, and will hopefully go a long way to clarifying the current uncertainty.

Will there be an increase in extreme weather events?

- Climate change will not only cause changes in average temperatures, but will also trigger more so-called extreme weather events. Global warming is predicted to change the frequency, intensity, and duration of extreme events leading to more hot days, heat waves and heavy precipitation, and cyclones might become stronger. As an example of extreme weather events March 2004 saw the first ever recorded cyclone in the South Atlantic. Tropical Cyclone Catarina hit Brazil, causing considerable destruction and loss of life.