

## Natural Factors



- **Volcanic eruptions**

When a volcano erupts it throws out large volumes of sulphur dioxide (SO<sub>2</sub>), water vapour, dust, and ash into the atmosphere



- **Ocean current**

The oceans are a major component of the climate system. Ocean currents move vast amounts of heat across the planet.

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### What evidence do we have of climate change?

The most compelling climate change evidence scientists have of climate change is long term data relating atmospheric CO<sub>2</sub> levels and global temperature, sea level, the expanse of ice, the fossil record and the distribution of species. This data, which goes back millions of years, shows a strong correlation between CO<sub>2</sub> levels and temperature. Recent data shows a trend of increasing temperature and rising CO<sub>2</sub> levels beginning in the early 19th century. Because all parts of the global climate are connected, scientists have been able to create models of how changes caused by heating should work their way through the entire system and appear in different areas, for example, sea level, intemperate weather, the movement of fish species in the ocean. Testing whether or not predicted changes have occurred is an important way to verify underlying theory.

**This can be done in two ways.**

First, it is possible to load a model with historical data and ask: how well does this model predict what we know happened?

A second way to test is to use the model to predict upcoming changes and then to see if emerging reality fits. It is possible to track the rapid retreat of glaciers and observe the summer melting of the Polar Ice Cap. Sea levels are rising measurably, the temperature of the world's oceans is demonstrably rising and consequently many fish species are moving to follow waters that are the right temperature for them.

Correlating these changes to the timing of rises in CO<sub>2</sub> levels and temperature suggests relationship. [NASA](#) provides a good visual tool for viewing these relational models “in action”. In specific instances, for example, CO<sub>2</sub> levels, temperature and ocean pH, the chemical processes are traceable proving direct causal connection.

## Visual Impacts of Climate Change Evidence

### Melting Glaciers



### Flooding



### Supercell Storms



### **Rising Sea Levels**



### **Worsening Droughts**



### **Increasing Tornadoes**



Climate Change – Scientists View – Do all scientists agree that climate change is occurring and is caused by human activity?

No.

Despite the apparent scientists view consensus among scientists, NGOs, international organizations, policy makers and the media, there are respected scientists who remain “climate sceptics,” that is, who doubt that the overall theory of human induced global climate change is correct, or that the observed phenomena demonstrate conclusively that it is, or that the observed phenomena are anything out of the ordinary (viewed in the time frame of “earth history”).

It is important to separate these scientists from ‘sceptics’ who have a financial interest in denying climate change. These people have been important in framing the climate change debate in the United States and the position of the United States government on the issue of climate change. Their success has little to do with alternative science, however, and everything to do with the permeability of the US political process to the influence of such actors.

It is also important to separate these scientists from the ignorant and people who do not understand evidence-based science. Such people are simply uninformed or misinformed, make such ignorant statements as “it’s just a theory” or cite isolated facts as if they mattered. Their numbers have made this group politically powerful in the US, but their ignorance sidelines them in the global debate.

Climate sceptics fall into three camps: those like Freeman Dyson, Bjorn Lomborg and Kiminori Itoh who acknowledge climate change, but think that carbon-based theory and current models are too simplistic to capture such a complex process; those like Ivar Giaever who think that the data is too thin to support such bold claims; and those like Will Happer who contend that the nice analogy of a greenhouse does not apply and that CO<sub>2</sub> is too insignificant to be the culprit.

An article prepared to accompany a petition urging the US not to sign global climate accords reviews each of the main contentions of climate change scientists view and presents data suggesting that each is wrong.

The authors of the article cite data, for example, that suggests that the earth’s temperature today is essentially at the 3,000-year average global temperature, while during the medieval period, long before the use of fossil fuels, temperatures were 24<sup>0</sup> C higher.

In a similar vein, they cite data to suggest that glacier shortening began in the early 19th century, 25 years before the start of intensive fossil fuel use. For a more recent web piece by a well-informed, non-scientist sceptic, see David Siegel’s “scientists view on global warming”

## Evidence of *Natural* Climate Change

For the last 2,000 years, global warming and cooling have been the rule...not the exception

