

Climate Change: Consensus, Controversy, and Insights from the Recent Geological Past

Climate change is one of the great scientific and political issues of our day. A consensus has emerged within the scientific community that global temperatures have been rising over the last century and that most of this warming is the result of an increase in greenhouse gas emissions of human causation (anthropogenic global warming or AGW). This has led the Intergovernmental Panel on Climate Change (IPCC) to seek to persuade governments worldwide that it is necessary to cut carbon emissions or face environmental disaster. However, a minority of scientists and many political campaigners profoundly disagree with the consensus view. This talk will set the contemporary debates in the context of what is known about climate change in the recent geological past. We will review the evidence from terrestrial and deep ocean records with an emphasis on the growth of the Antarctic and Greenland ice sheets and the development of widespread continental glaciation. Both conventional (long age) and nonconventional (short age) models will be described and discussed, including their shortcomings. Consideration will be given to the inferences that can be drawn about present-day climatic change from our study of the geological past, especially the impact that competing models of earth history have on predictions for future climate change and approaches to its prevention or amelioration.

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I. Consensus and controversy

- A. Rising atmospheric CO₂ concentrations 1959 to 2014

- B. Rising mean surface temperatures over last century

- C. Major concerns about shrinking global ice volume, rising sea level and ocean acidification

- D. “It is *extremely likely* that human influence has been the dominant cause of the observed warming since the mid-20th century.” (IPCC 2013)

E. Sceptical challenges to the consensus:

1. Natural variation versus anthropogenic causation
2. Uncertainty about amount of warming
3. Benefits of climate change
4. Economic costs of reducing CO₂ emissions

II. Geological context

- A. Long term cooling trend through Cenozoic
- B. Growth of Antarctic and Greenland ice sheets
- C. Pleistocene glaciation of northern hemisphere

III. Theories of glaciation

- A. Conventional (long age)
 1. Multiple ice ages

2. Driven by Milankovitch orbital cyclicality

3. Shortcomings

B. Non-conventional (short age)

1. Single ice age

2. Driven by warm post-Flood oceans and terrestrial volcanism

3. Shortcomings

IV. Issues arising

A. Is climate change occurring?

B. What is the primary cause?

C. Will harms outweigh benefits?

D. Will proposed solutions be effective, fair, and economic?

Suggested readings

Consensus position on climate change:

Henson, R. 2011. The Rough Guide to Climate Change. Third Edition. Rough Guides.

Sceptical position on climate change:

Singer, S.F. and Avery, D.T. 2007. Unstoppable Global Warming Every 1,500 Years. Rowman and Littlefield.

Conventional (long age) glacial model:

Woodward, J. 2014. The Ice Age: A Very Short Introduction. Oxford University Press.

Non-conventional (short age) glacial model:

Oard, M. 1990. An Ice Age Caused by the Genesis Flood. Institute for Creation Research.