



A Toolkit for Responding to Climate Change Deniers

for a living planet®

Claim:

Scientific evidence for human-induced global warming is weak.

Response:

The science of climate change is clear and compelling. As the recent statement of the G8 National Academies of Science stated “There will always be uncertainty in understanding a system as complex as the world’s climate. However there is now strong evidence that significant global warming is occurring...It is likely that most of the warming in recent decades can be attributed to human activities (IPCC 2001).”

The overwhelming abundance of scientific evidence clearly shows that human-induced climate change is real and is happening now. It has been proven and accepted, even by deniers, that the global average temperature has risen 0.7°C since the Industrial Revolution. According to internationally accepted, peer-reviewed science, human-induced climate change is largely due to the anthropogenic release of greenhouse gases, such as carbon dioxide (CO₂) from burning fossil fuels and deforestation (IPCC 2001). The scientific community has also widely accepted that the surface temperature is now warmer than anytime during the last 1,000 years, and likely the last 2,000 years (Mann and Jones 2003).

It has been shown in rigorous scientific journals that glaciers around the world are melting, the extent of arctic sea ice is shrinking, and species are migrating towards the poles and up in elevation. These findings are supported by the United Nation’s Intergovernmental Panel on Climate Change (IPCC), the largest independent peer review of scientific research ever conducted. The IPCC’s most recent climate change overview, published in 2001, highlights the evidence, that links climate change to human-caused greenhouse gases, namely from the burning of fossil fuels (such as oil, coal and gas) for energy production.

Claim:

Observed global warming of 0.7°C is within the range of natural variability.

Response:

Records of temperature variability show that the last decade of the last century is very likely to have been the warmest during the last 1,000 years (IPCC 2001). In addition, the IPCC (2001) shows that natural factors alone cannot explain the amount of warming we have experienced during the last century. A recent study examining the earth’s energy imbalance (amount of heat absorbed by the sun versus heat emitted by the planet) proves that human-generated gases (primarily CO₂) are the major cause of recent observed warming of 0.7°C (Hansen, 2005). Researchers claim that even if we stopped all greenhouse gas emissions, we have already committed ourselves to another 0.6°C warming (Hansen, 2005).

This is most likely the fastest global temperature increase since the last ice age. Global atmospheric CO₂ concentrations are at 378 parts per million (ppm), the highest concentration since at least 420,000 years ago. If we continue with business as usual we can expect a further increase to at least 500 ppm within 40 years, which is essentially equal to a doubling of pre-industrial concentrations.



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Claim:

Scientists have disproven global warming in the scientific literature.

Response:

A very small number of scientific articles in the peer reviewed literature have attempted, without success, to show that the climate sensitivity is low and that humans are not having an impact the warming earth. These papers have been thoroughly debated and are now considered to be incorrect, as they are not consistent with data or with soundly based physical theory.

Claim:

Many of the world's glaciers are not shrinking but in fact are growing ... 555 of all the 625 glaciers under observation by the World Glacier Monitoring Service in Zurich, Switzerland, have been growing since 1980 (Bellamy, 2005).

Response:

This statement is simply incorrect. The World Glacier Monitoring Service reports that unequivocally, the majority of the world's glaciers are shrinking (see website below for more information).

Claim:

Satellite data show that there was no warming of the atmosphere during the last 20 years.

Response:

Scientists from the University Corporation for Atmospheric Research (UCAR), which is a non-profit consortium of over 100 university members and affiliates, have recently improved the methods used to interpret temperature observations from satellite data. The new corrections account for the effects of heating on the radiation sensor itself—the first time this source of error had been addressed fully—as well as new adjustments for the drifting orbit of each satellite and other factors.

The authors of a recent report found a warming trend of 0.10°C (0.16°F) per decade in the layer between about 1.5 and 7.5 miles high, compared to a trend of 0.01°C (0.02°F) in the previously published analysis. Both estimates have a margin of error of nearly ±0.01°C (0.2°F) (Santer et al., 2003). These results are a closer match with observed surface warming, as well as with computer-model simulations of 20th-century climate.

Claim:

The urban heat island effect is the reason why we have seen an increase in the global average temperature in recent history.

Response:

The rise in ocean temperatures (both surface and subsurface) during the past century disqualifies the claim that urban heat island effect is the reason for global average temperature rise.

In addition, this issue has been examined extensively in the peer-reviewed scientific literature and has been dismissed by the vast majority of atmospheric and climate scientists as an inadequate explanation of observed temperature rise. While some climate stations are near urban areas and are affected by the urban heat island effect, scientists use mathematical formulas to correct for this influence. Lastly, many climate stations are located no where near urban areas, such as remote climate stations.



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Claim:

Some areas have seen a decline in temperature during the past century.

Response:

Global warming is an increase in global average temperatures. Nothing about specific local temperature decline is inconsistent with the conclusion that the planet as a whole has warmed during the past century, or that it will warm more in the next century if greenhouse gas concentrations continue to climb. In fact, modeled climate projects that demonstrate global warming also show near-term cooling in some areas as a result of altered air and ocean circulation patterns due to warming elsewhere. As you look farther out in projected time even these areas begin to warm.

Claim:

Global temperatures declined from 1940-1970, disproving (or at least casting doubt on) scientific conclusions with respect to global warming. Since concentrations of greenhouse gases rose during this period the fact that global temperature fell calls into question the link between greenhouse gas concentrations and temperatures.

Response:

The average temperature in the Northern Hemisphere did decline during this period. However, temperature is the result of many factors, (i.e., warming effects of greenhouse gases, the cooling effects of volcanic eruptions, changes in solar radiation, etc.) and the fall in Northern Hemisphere temperatures from 1940-1970 reflects the relative weight of cooling factors during that period, not the absence of a warming effect from man-made greenhouse gases. One must look at long-term trends (100 years) in order to partition out natural climatic variability and anthropogenic climate change.

This localized and short-term variability is superimposed upon a long-term warming trend that cannot be entirely explained by natural variability. This warming trend follows closely the rise in global levels of carbon dioxide and can not be explained without the inclusion of greenhouse gas forcing. To zoom in on a short time period and observe that the temperature does not match the carbon dioxide increase is to ignore the impacts of the myriad other factors that cause the climate to warm and cool on short time periods, such as the El Niño/Southern Oscillation, North Atlantic Oscillation, Pacific Decadal Oscillation, volcanic emissions, solar variability, and changing ocean circulation patterns.

Claim:

Antarctica is cooling in places, so global warming must be a hoax.

Response:

Antarctica is a very large continent and its climate varies substantially. For example, the Antarctic Peninsula is perhaps one of the fastest warming places on the planet. A recent study examining 244 glaciers on the Antarctic Peninsula showed that 87% have retreated during the last 50 years and some glaciers have been retreating at rates of up to 50 meters per year, making them some of world's fastest retreating glaciers.

The pattern seen in Antarctica is in fact consistent with the climate models. In the near-term we see cooling in the center of the Antarctic continent, but this becomes warming in the long-term. We should count ourselves lucky, were this not the case the melting of ice that causes sea level rise would be occurring even more dramatically on a shorter time scale.



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Claim:

"Nobody knows how much of the present warming trend might be a natural phenomenon," and
"Nobody knows how much of the present trend might be man-made."

Response:

There is an international scientific consensus that most of the warming observed over the last 50 years is attributable to human activities (IPCC, 2001; ACIA 2004). While natural climatic variability plays a significant role in global climate by affecting ocean currents and global climatic patterns, scientists have attributed the majority of recent warming with human activities such as burning fossil fuels and land use changes. Consequently, while we are sure that most of the warming during the last century is because of human activities, we do not know exactly how much is attributed to natural variability.

It is well accepted that greenhouse gas emissions lead to surface heating of the earth and that current trends can not be explained by only natural variability.

Claim:

It is too expensive for countries to take short-term action to mitigate current levels of CO₂. Society should wait until new technologies become more cost-effective and new innovations from research and development are conceptualized.

Response:

New research suggests that deep cuts in atmospheric CO₂ can be made with existing technologies and that we do not need to wait for new technologies and costly research and development programs. Examples of currently employable solutions include high efficiency standards for houses, buildings, cars, and electric appliances, by shifting our electricity sources from dirty coal to natural gas, and by employing renewable energy sources such as wind and biomass.

Claim:

Generally, it is cheaper to invest in climate change adaptation strategies than into mitigation strategies.

Response:

Many natural systems, such as corals and sea ice, cannot adapt to long-term climate change because they are inherently sensitive to changes in temperature. While adaptation strategies buy us time they have certain natural limitations even for highly resilient ecosystems. It is a much better approach to fix a problem at the source (e.g., reduce greenhouse gas emissions), than to try to remedy the symptoms (i.e., adapt). Prevention is cheaper over the long-term, especially since we really don't know how to fix a system after it is 'broken' by climate change.



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Claim:

Fighting climate change is too expensive and the world should focus on other urgent needs such as food and water scarcity, disease eradication, etc.

Response:

Climate change policies that are enacted and carried out also reduce risks for human health, agriculture, freshwater, and other damages from climate change. A conventional cost-benefit economic analysis of climate change mitigation does not include cost factors such as non-monetary damages to natural and human systems. Conventional cost-benefit economic analyses also do not include the non-climate change benefits, which will occur from advancement and education in technology, new jobs, reduced air pollution, etc.

Current climate change cost-benefit analyses have a relatively short timeframe. Focusing on short-term problems and not the long-term benefits will mean that we will miss the window of opportunity where our actions will make a difference in response to human-caused climate change. Current cost-benefit analyses also fail to recognize that prevention will prove to be much cheaper than adaptation. Waiting to act on the problems of climate change will only leave future generations with a much bigger, more expensive problem, with many aspects having no fixable strategy available (e.g., the melting of sea ice – once it's gone, it's gone!).

Claim:

The information laid out in Michael Crichton's book, The State of Fear, disproves the fact that global warming is occurring.

Response:

Michael Crichton's book is a work of fiction. Does NASA use Arthur Clarke's 2001: A Space Odyssey to design space craft or computers? Science, unlike fiction, is rigorously defined by observations and hypothesis testing, with a goal of explaining phenomena (UCS, 2005). Further, Mr. Crichton is not a scientist; he does not have educational or work experience in climatology or climate change science. Scientists that were cited in Mr. Crichton's book have repeatedly complained of the misuse of their work and misrepresentation by Mr. Crichton.

References:

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- Bellamy, D. 2005. Glaciers are cool. New Scientist 2495, 16 April 2005.
- Hansen et al., 2005. Earth's Energy Imbalance: Confirmation and Implications. Science online, April 28 2005; 10.1126/science.1110252 (Science Express Research Articles).
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This toolkit has been brought to you by the **WWF Climate Change Programme**.

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For more information:

American Geophysical Union statement on Human Impacts on Climate

http://www.agu.org/sci_soc/prri/prri0335.html

Carbon Dioxide Information Analysis Center

<http://cdiac.esd.ornl.gov>

Climate Ark: Climate Change Portal

www.climateark.org/

Climate Wire

www.climatewire.org

Exploratorium: Global Climate Change

www.exploratorium.edu/climate

German Advisory Council on Global Change

http://www.wbgu.de/wbgu_home_engl.html

Intergovernmental Panel on Climate Change

<http://www.ipcc.ch/>

International Research Institute for Climate Prediction

<http://iri.columbia.edu/>

Met Office: Hadley Centre for Climate Prediction and Research

<http://www.metoffice.com/research/hadleycentre/>

National Academy of Sciences

<http://www4.nationalacademies.org/nas/nashome.nsf>

National Oceanic and Atmospheric Administration

<http://www.noaa.gov/climate.html>

Potsdam Institute for Climate Impact Research

<http://www.pik-potsdam.de/>

Union of Concerned Scientists

<http://www.ucsusa.org>

Union of Concerned Scientists - Scientist's statement on climate change: October 2003

http://www.ucsusa.org/global_environment/global_warming/page.cfm?pageID=1264

United Nations Framework Convention on Climate Change

<http://unfccc.int/>

United Nations Environment Program

<http://grida.no/climate/>

United States Department of Energy

<http://www.energy.gov/>

United States Department of State

<http://www.state.gov/g/oes/climate>

United States Environmental Protection Agency

<http://www.epa.gov/globalwarming/>

United States National Assessment

<http://www.gcrio.org/NationalAssessment/>

United States Global Change Research Program (USGCRP)

<http://www.usgcrp.gov>

USAID Global Climate Change Program

http://www.usaid.gov/our_work/environment/climate/

World Glacier Monitoring Service

<http://www.geo.unizh.ch/wgms/>

World Meteorological Organization

<http://www.wmo.ch/index-en.html>

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<http://www.panda.org/climate>

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