

Climate scientist addresses misconceptions about climate change

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Credit: AI-generated image ([disclaimer](#))

(Phys.org) —The notion that we'll avoid serious damage to the world's climate if we limit the warming of the atmosphere to a 2-degree-Celsius rise in temperature is untrue, says Stanford climate scientist Chris Field.

A [United Nations climate conference](#) in Germany last month reaffirmed

a global [agreement](#) to keep the Earth's temperature from rising more than 2 degrees Celsius (3.6 degrees Fahrenheit) above preindustrial levels.

But that "2C" target – widely adopted by environmental organizations worldwide – does not define a safe threshold for protecting the planet, says a leading climate expert at Stanford University. It's a misconception, one of several that cloud public understanding of [climate change](#).

"Politically, 2C might be a useful target to rally the [global community](#) around," said Chris Field, the director of the Carnegie Institution's Department of Global Ecology at Stanford. "But the concept of a safe threshold is a myth and tends to distract attention from evidence that we are already seeing widespread and consequential [impacts of climate change](#)."

Scientists have determined that the average [global temperature](#) has risen about 0.8 degrees C (1.4 F) since the mid-1800s. The 2010 U.N. Cancun Agreement, signed by more than 120 countries and reaffirmed in May, recommended capping the [temperature increase](#) at 2C to prevent dangerous human-caused interference with the climate.

But focusing too much on that target can undermine practical efforts to deal with the [effects of global warming](#), said Field, a professor of interdisciplinary environmental studies at Stanford.

"We're already experiencing real impacts from climate change that we need to cope with today," he said. "But a frustratingly large amount of the dialogue on climate change risks pointing people away from smart solutions by making the problem seem either simpler or more complicated than it really is."

As a scientific leader of the [Intergovernmental Panel on Climate Change](#) (IPCC), Field has worked with hundreds of scientists around the world to develop a consensus on what is known, and not known, about the potential consequences of a warming climate. Last week he was named a co-recipient of the [2013 Max Planck Research Prize](#), one of Germany's top science awards, for having "significantly increased our knowledge of how life on Earth responds to climate change." Each prizewinner receives 750,000 euros (\$969,000) to finance future research.

His own views on atmospheric warming:

Is the average rise in temperature the key thing to watch?

"People tend to ask, 'When will the average conditions cross a threshold that results in climate change?' But that's not really relevant. People and ecosystems can adapt to the average conditions, but where things fall apart is in the extremes. We experience damages from climate mainly at the extremes, and it's the extremes that can result in disasters.

"Farmers might have enough rain on average to grow corn in Illinois. But in a drought, as in 2012, yields get whacked. Corn yields decline rapidly when temperatures rise above 29 C (84 F). If temperatures are above that 29 C threshold once every 200 years, it may not be a big problem. But if it is every five years, farmers start seeing impacts on yield and, if the high temperatures occur too frequently, on the viability of corn farming in that area.

"We're already seeing evidence of climate-change impacts in the increased frequency of extreme events. We've seen record-setting temperatures almost every year, including a phenomenal number in the United States in 2012. Globally, nine of the 10 hottest years on record

have occurred since 2000. In the future, high-temperature episodes are very likely to become more frequent and more severe. For most areas on land, we are already seeing that, and expect a future with more of the rainfall coming in the heaviest events, the kind of events that can lead to floods.

"In the last century, sea level has risen an average of about 6 inches. Over the rest of the century, it could rise another 12 to 30 inches. If you're trying to manage risk and prevent disasters, it's important to recognize that the damages will continue to occur in the extremes. Not acting magnifies risk in the same way as not wearing a seat belt or not having insurance."

Who will be affected the most by climate change, the rich or the poor?

"There is a lot of misunderstanding about the nature of the vulnerability to climate change. Many people assume that it's concentrated somewhere else, especially in poor parts of the world. In reality, vulnerability has different dimensions in different places.

"If you look at global losses from climate-related disasters, it's clear that economic loss occurs overwhelmingly in the developed world, while mortality occurs overwhelmingly in the developing world. With Hurricane Sandy, the people of New York and New Jersey sustained massive economic losses. If that same hurricane were to hit a developing country, economic loss might be lower, but loss of life might be greater.

"Much of the discussion about vulnerability focuses appropriately on the individuals at risk as a consequence of poverty, weak institutions or poor infrastructure. But this focus, although appropriate, should not divert attention from the fact that individuals and property in wealthy

communities are also at risk. The experience with Hurricane Sandy is a harsh reminder of economic and personal vulnerabilities in the developed world."

Will the world be OK if we limit the average temperature rise to 2C?

"The idea that we won't see meaningful impacts of climate change until we reach warming of 2C is demonstrably wrong. We've already experienced widespread and consequential impacts of climate change.

"The 2C threshold may be a useful policy target, but that's different from recognizing it as some kind of guardrail where we know we're safe if we don't pass it. There are almost certainly tipping points in the climate system, levels of warming beyond which Earth experiences really major impacts. One of these would be the threshold for eventual melting of a major continental-scale ice sheet like Greenland, which has an ice volume representing more than 20 feet of sea-level rise. It is possible that the threshold for commitment to melting of the Greenland ice sheet is close to 2C, but it might be substantially lower or higher. We really don't know what that temperature threshold is."

Should we wait for more research before acting?

"We want to be sure that we don't fall into the trap of delaying action based on the hope that a few more years of research will provide scientific clarity. The scientific community has made and continues to make tremendous progress on understanding climate change. There is still a great deal to learn. But it is not likely that additional research will eliminate uncertainty about the severity, timing and spatial patterns of future impacts.

"The challenge of dealing with climate change is, at its essence, a challenge in making smart decisions under uncertainty. We have enough information now to understand the value of action on climate change, including the value of early action."

Field presented his ideas in more detail during a recent [talk](#) at Stanford University.

Provided by Stanford University

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