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## Among Climate Scientists, a Dispute Over 'Tipping Points'

By [ANDREW C. REVKIN](#)

The language was apocalyptic. Last month, a leading climate scientist warned that [Earth's](#) rising temperatures were poised to set off irreversible disasters if steps were not taken quickly to stop [global warming](#).

"The climate is nearing tipping points," the [NASA](#) climate scientist James E. Hansen [wrote in The Observer](#) newspaper of London. "If we do not change course, we'll hand our children a situation that is out of their control."

The resulting calamities, Dr. Hansen and other like-minded scientists have warned, could be widespread and overwhelming: the loss of untold species as ocean reefs and forests are disrupted; the transformation of the Amazon into parched savanna; a dangerous rise in sea levels resulting from the melting of the mile-high ice sheets in West Antarctica and Greenland; and the thawing of the Arctic tundra, which would release torrents of the greenhouse gas methane into the atmosphere.

But the idea that the planet is nearing tipping points — thresholds at which change suddenly becomes unstoppable — has driven a wedge between scientists who otherwise share deep concerns about the implications of a human-warmed climate.

Environmentalists and some climate experts are increasingly warning of impending tipping points in their efforts to stir public concern. The term confers a sense of immediacy and menace to potential threats from a warming climate — dangers that otherwise might seem too distant for people to worry about.

But other scientists say there is little hard evidence to back up specific predictions of catastrophe. They worry that the use of the term "tipping point" can be misleading and could backfire, fueling criticism of alarmism and threatening public support for reducing greenhouse gas emissions.

"I think a lot of this threshold and tipping point talk is dangerous," said Kenneth Caldeira, an earth scientist at [Stanford University](#) and the Carnegie Institution and an advocate of swift action to reduce carbon dioxide emissions. "If we say we passed thresholds and tipping points today, this will be an excuse for inaction tomorrow," he said.

While studies of climate patterns in the distant past clearly show the potential for drastic shifts, these scientists say, there is enormous uncertainty in making specific predictions about the future.

In some cases, there are big questions about whether climate-driven disasters — like the loss of the Amazon or a rise in sea levels of several yards in a century — are even plausible. And even in cases where most scientists agree that rising temperatures could lead to unstoppable change, no one knows where the

thresholds lie that would set off such shifts.

Nevertheless, the use of the tipping point concept has intensified recently, as the Obama administration and Congress work on legislation to curb greenhouse gas emissions and the world's nations negotiate a new climate treaty.

In reports released this month, both the [World Bank](#) and the [United Nations](#) Environment Program focused on tipping points as a prime concern. And last year, a team of European scientists published an influential paper in the [Proceedings of the National Academy of Sciences](#) compiling what is known and not known about various climatic tipping points — including the loss of summer sea ice around the North Pole and worrisome changes in the West African monsoon.

The authors said they wanted to reduce the chance that “society may be lulled into a false sense of security by smooth projections of global change.”

On the other hand, the United Nations Intergovernmental Panel on Climate Change, in its influential 2007 report, expressly avoided specifying tipping points and instead concluded simply that the gradient of risk for a host of “large-scale discontinuities” increased with each degree of warming.

Dr. Hansen defends the use of the term tipping point and said that it accurately depicts some probable consequences of unchecked global warming. There is abundant evidence, he says, that rising temperatures can have an abrupt, calamitous and “nonlinear” effect on glaciers and ecosystems.

“I assure you that nonlinear systems exist,” Dr. Hansen said. “Ice sheets really do disintegrate. Documented sea-level rises of 4 to 5 meters per century exists — that was nonlinear collapse. Ecosystems also can collapse.”

He said that in discussing global warming, he refers not only to tipping points but to more general threats and that he was “not sure where the confusion about tipping points comes from.”

But other scientists, who study the response to climate change of polar ice and tropical forests, said that they saw scant evidence of runaway disruption.

For example, the idea that recent sharp retreat of summer sea ice around the North Pole has now taken on its own momentum has been challenged recently in papers by the earth scientists John S. Wettlaufer of Yale and Ian Eisenman of the [California Institute of Technology](#). They contend that thin ice floes have the capacity to regrow quickly as summer ends, balancing out the melting that occurs as sunlight hits and heats dark open water.

More generally, Dr. Wettlaufer has stressed the importance of being “caustically honest about what we know and don't know.”

As policymakers try to address the risks facing the planet from a warming climate, some experts worry that focusing on tipping points and thresholds will perpetuate paralyzing debates over specifics — and obscure the reality that decisions need to be made, even in the face of uncertainty.

“It would be far better to spend less time musing over tipping points,” said Christopher Green, an

economist who studies energy and climate at [McGill University](#).

“Whether the probability is high, medium, or low, I think the response is the same: climate cannot be stabilized without an energy technology revolution,” he said. “One way or the other, we just need to get busy.”

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