

ESSAY REVIEW

The Climate Change Debates

Philip Kitcher

In one of the earliest and most eloquent pleas for open discussion and debate, John Milton wrote:

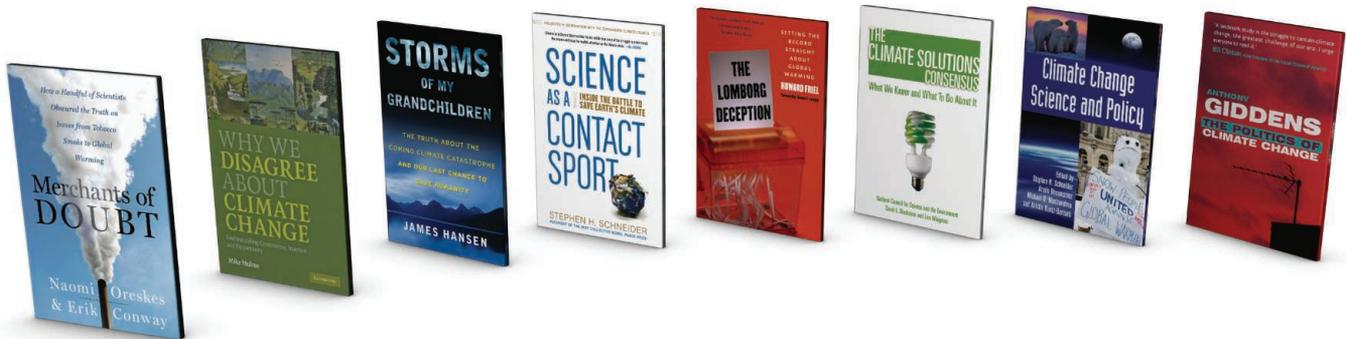
And though all the winds of doctrine were let loose to play upon the earth, so Truth be in the field, we do injuriously, by licensing and prohibiting, to misdoubt her strength. Let her and Falsehood grapple; who ever knew Truth put to the worse, in a free and open encounter. (1)

Two centuries after Milton, in the same year in which Charles Darwin published the *Origin*, John Stuart Mill's essay *On Liberty* (2) added further arguments for the free exchange of ideas, suggesting that such exchange is vital for intellectual and social health. Although both Milton and Mill stand behind our current acquiescence in the value of extensive free discussion, both of them

tives on public discussion and policy bears on our own times, although the risks may affect our species as a whole and the stakes may be far higher. For three decades, prominent climate scientists have been warning of the dangerous effects of the continual emission of greenhouse gases into Earth's atmosphere. They have been attempting to identify and to explain just what those effects are likely to be—for ourselves, our children, and our more remote descendants. And they have been urging a variety of measures that might prevent some of the disasters whose possibility they claim to foresee. Yet it is evident that substantial disagreement remains about the consequences for humans and for other species. This is so even in those countries where citizens have largely accepted the conclusions that anthropogenic global warming exists and is likely to raise the average temperature on our planet at least 2°C by the end

voices sometimes muffled. In *Storms of My Grandchildren*, Hansen attempts to combine the story of his own efforts with (yet another) attempt to explain the pertinent parts of climate science as clearly as he can. *Science as a Contact Sport* presents Schneider's insider account of the struggles to understand and moderate human-induced atmospheric changes. Other climate scientists, like Mike Hulme (University of East Anglia), who live in societies where the level of discussion has usually been more informed, are inclined to see matters differently. They hold that continued debate reflects the genuine difficulties of the underlying issues and sometimes explicitly chide their colleagues (as Hulme does in *Why We Disagree About Climate Change*) for a tendency to "apocalyptic" pronouncements. So, in reflections on the debates of the past decades, there opens up a genuine dispute about the role of scientists in influencing public policy, with some urging a stronger voice for expert testimony and others recommending reticence and even quietism.

In part, the differences between Hansen and Schneider, on the one hand, and Hulme, on the other, stem from their concerns with



knew that they were opposing ancient suspicions about the viability of democracy. The political theorists and philosophers of the Greco-Roman world viewed ordinary folk as vulnerable to deception and exploitation. Allowed to determine the direction of the state, the folk would be easily seduced into believing falsehoods aligned with the interests of charismatic leaders, so that the popular voice would enthusiastically clamor for disastrous policies. Better, then, to entrust the ship of state to wise navigators, whose wisdom embraced both depth of understanding and moral integrity.

The contrast between these two perspec-

of the century. In the United States, the state of discussion is less advanced: Denying the reality of human-caused climate change continues to figure as a serious possibility in public debates. And a large fraction of the populace believes that scientists' warnings about the impact of any increases in global temperatures are exaggerated.

For those who play the role of Cassandra in this drama, such as climatologists James Hansen (NASA Goddard Institute for Space Studies) and Stephen Schneider (Stanford University), a 30-year effort to alert policymakers, politicians, and the public to what they perceive as significant dangers can only be seen as frustrating. They have been moved to write books, accessible to a general readership, that will record the ways in which their warnings have been ignored—and their

rather different controversies. It is useful to differentiate three questions. First is the issue of whether human activities, specifically actions that increase the emission of greenhouse gases, are contributing to a significant average warming of Earth. (As all the expert authors point out very clearly, there is no suggestion that the temperature of every region will rise during the next decades.) Second are questions about the probabilities with which various phenomena (complete melting of ice sheets, for example) will occur and about their consequences for human beings and other species. Third are considerations about what might be done to halt (or even reverse) the warming and to limit the damaging consequences. Hulme emphasizes the complexity of the third set of issues. He notes how they are intertwined with difficul-

The reviewer is in the Department of Philosophy, Columbia University, New York, NY 10027, USA. E-mail: psk16@columbia.edu

ties about understanding economic trends and changes, about global justice, about the values assigned to things that are hard to assess in economic terms (ecosystems, the continuation of particular forms of human social life), about practical geopolitics, and even about religious perspectives. Focusing on this intricate web of problems, he elaborates an extensive case for the naturalness of continued disagreement.

For Hansen and Schneider, however, the first two questions are primary (although Hansen ventures some proposals about the third as well). Both contributed to repeated attempts to persuade successive American administrations of the existence and importance of anthropogenic global warming, and Schneider participated in lengthy discussions during the preparation of Intergovernmental Panel on Climate Change (IPCC) reports—discussions in which voices representing political interests seem to have forced compromising the eventual presentation of the pertinent scientific ideas. Their experiences incline them to emphasize the importance of expert judgment, effectively renewing the ancient worries about the dangers of democracy. Both believe that genuine democratic participation in the issues can only begin when citizens are in a position to understand what kinds of policies promote their interests. To achieve that requires a far clearer and unmistakable communication of the consensus views of climate scientists, with respect to the existence of anthropogenic global warming and to the chances of various effects, than has hitherto been available. In his choice of title, Hansen implicitly questions the frequent assumption that effects on future generations are subject to some “deep discount.” He explicitly notes that people’s common concern for the fates of their children and grandchildren provides a shared starting point for responding to the changes that might threaten them. Consequently, if citizens are to be able to express their views about things that matter most to them, they need informed views about the planet on which their descendants will live. Serious democracy requires reliance on expert opinion.

It is all too easy to be beguiled by an opposite thought: that democracy demands that there be extensive public discussion, even on technical matters, discussion in which all participants operate as equals. Those in the grip of this idea will view Hansen and Schneider as hysterical and arrogant people who aim to short-circuit the proper air-

Online

sciencemag.org

S To join a discussion of the issues raised here, go to <http://tiny.cc/clichng>

ing of alternative views. (Although sympathetic critics might also ponder the fact that these two eminent scientists have been rebutting the same “alternatives” for decades). Perhaps continued discussion could be tolerated, were there no urgency about the issue under debate. If they saw no compulsion to act soon—and if they were convinced that the fight were fair—Hansen and Schneider might share Milton’s confidence that truth would ultimately emerge as victor. Yet the stories they tell in their gripping narratives reveal all too many points at which messages have been distorted and suppressed

because of the short-term interests of economic and political agents. They also demonstrate many ways in which the arena of public discussion has been set up to block the widespread acceptance of conclusions based on an increasing body of evidence.

The insiders’ stories of ways in which crucial information has effectively been withheld from voters, particularly in the United States, should give us pause about the functioning of our democracy. Even more powerful is the account provided by two outstanding historians who have reviewed a sequence of controversies around topics of public concern. In their fascinating and important study, *Merchants of Doubt*, Naomi Oreskes and Erik M. Conway offer convincing evidence for a surprising and disturbing thesis. Opposition to scientifically well-supported claims about the dangers of cigarette smoking, the difficulties of the Strategic Defense Initiative (“Star Wars”), the effects of acid rain, the existence of the ozone hole, the problems caused by secondhand smoke, and—ultimately—the existence of anthropogenic climate change was used in “the service of political goals and commercial interests” to obstruct the transmission to the American public of important information. Amazingly, the same small cadre of obfuscators figured in all these episodes.

Oreskes (University of California, San Diego) and Conway (NASA’s Jet Propulsion Laboratory) painstakingly trace the ways in which a few scientists, with strong ties to particular industries and with conservative political connections, have played a disproportionate role in debates about controversial questions, influencing policy-makers and the general public alike. Typically, these scientists have obtained their stature in fields other than those most pertinent to the debated question. Yet they have been able to cast enough doubt on the consensus views arrived at by scientists within the relevant disciplines to

Merchants of Doubt

How a Handful of Scientists Obscured the Truth on Issues from Tobacco Smoke to Global Warming

by **Naomi Oreskes and Erik M. Conway**

Bloomsbury, New York, 2010. 365 pp. \$27, £25. ISBN 9781596916104.

Why We Disagree About Climate Change

Understanding Controversy, Inaction and Opportunity

by **Mike Hulme**

Cambridge University Press, Cambridge, 2009. 432 pp. \$80, £45. ISBN 9780521898690. Paper, \$29.99, £15.99. ISBN 9780521727327.

Storms of My Grandchildren

The Truth About the Coming Climate Catastrophe and Our Last Chance to Save Humanity

by **James Hansen**

Bloomsbury, New York, 2009. 320 pp. \$25, £18. ISBN 9781608192007.

Science as a Contact Sport

Inside the Battle to Save Earth’s Climate

by **Stephen H. Schneider**

National Geographic, Washington, DC, 2009. 303 pp. \$28, C\$35, £16.99. ISBN 9781426205408.

The Lomborg Deception

Setting the Record Straight About Global Warming

by **Howard Friel**

Yale University Press, New Haven, CT, 2010. 270 pp. \$28, £18.99. ISBN 9780300161038.

The Climate Solutions Consensus

by **David E. Blockstein and Leo Wiegman**

Island Press, Washington, DC, 2010. 328 pp. \$50, £31. ISBN 9781597266369. Paper, \$30, £18.99. ISBN 9781597266741.

Climate Change Science and Policy

Stephen H. Schneider, Armin Rosencranz, Michael D. Mastrandrea, and Kristin Kuntz-Duriseti, Eds.

Island Press, Washington, DC, 2010. 542 pp. \$95, £59. ISBN 9781597265669. Paper, \$49.50, £37. ISBN 9781597265676.

The Politics of Climate Change

by **Anthony Giddens**

Polity, Cambridge, 2009. 272 pp. \$69.95, £55. ISBN 9780745646923. Paper, \$22.95, £12.99. ISBN 9780745646930.

delay, often for a substantial period, widespread public acceptance of consequential hypotheses. They have used their stature in whatever areas of science they originally distinguished themselves to pose as experts who express an “alternative view” to the genuinely expert conclusions that seem problematic to the industries that support them or that threaten the ideological directions in which their political allies hope to lead.

The extraordinary story of deliberate obfuscation that Oreskes and Conway document begins with the delight of the tobacco companies in recruiting Fred Seitz and with Seitz’s own connections to “scientists in their twilight years who had turned to fields in which they had no training or experience.” It moves through the forging of a network of industrial and political alliances, and the creation of a variety of institutes and think-tanks devoted to challenging various forms of expert consensus, to a brilliant chapter in which the authors analyze the reasons why, as of 2009, a significant percentage of Americans (43%) continued to dissent from the minimal claim that there is “solid evidence the Earth is warming.” As Oreskes and Conway conclude:

There are many reasons why the United States has failed to act on global warming, but at least one is the confusion raised by Bill Nierenberg, Fred Seitz, and Fred Singer.

This apparently harsh claim is thoroughly justified through a powerful dissection of the ways in which prominent climate scientists, such as Roger Revelle and Ben Santer, were exploited or viciously attacked in the press.

None of this would have been possible without a web of connections among aging scientists, conservative politicians, and executives of companies (particularly those involved in fossil fuels) with a short-term economic interest in denying the impact of the emission of carbon into the atmosphere. But it also could not have produced the broad public skepticism about climate change without help from the media. As Oreskes and Conway point out, “balanced coverage” has become the norm in the dissemination of scientific information. Pitting adversaries against one another for a few minutes has proven an appealing strategy for television news programs to pursue in attracting and retaining viewers. Nor is the idea of “fair and balanced” coverage, in which the viewer (or reader) is allowed to decide, confined to Fox News. Competing “experts” have become common on almost all American radio and television programs, the Internet is awash in adversarial exchanges among those who claim to know, and newspapers, too, “sell” science by framing it as a sport (preferably as much of a contact sport as possible). Oreskes and Conway identify the ways in which the *Washington Times* and the *Wall Street Journal* have nourished the public sense that anthropogenic climate change is a matter of dispute, how they have given disproportionately large space to articles and opinion pieces from the “merchants of doubt,” and how they have sometimes censored the attempts of serious climate scientists to set the record straight. Even the *New York Times*, the American newspaper that takes science reporting most seriously, typically “markets” scientific research by imposing a narrative based on competition among dissenting scientists.

Media contributions to public confusion—what Schneider labels “mediarology”—are elaborated in a number of these books. There is a serious question as to whether American science journalists have conspicuously failed to discharge what might have seemed their central function: to enlighten the public about topics of concern, in areas where an expert consensus has been reached. Howard Friel’s *The Lomborg Deception* offers a careful analysis of the ways in which the “skeptical environmentalist,” Bjørn Lomborg, has selectively used (and sometimes distorted) the available evidence. Friel (an independent scholar whose previous books have critiqued the foreign and Middle East coverage of the *New York Times*) shows how Lomborg’s claims and his status as an expert were uncritically accepted. Apparently, the idea of framing environmental science in terms of a duel between rival “expert perspectives” was too seductive to resist.

For half a century, since the pioneering work of Thomas Kuhn (3), scholars who study the resolution of major scientific debates have understood how complex and difficult judgments about the probative value of data or the significance of unresolved problems can be. The major transitions in the history of the sciences, from the 16th and 17th centuries to the present, have involved intricate debates among competing research programs, among well-informed scientists who gave different weight to particular sorts of evidence. It is an absurd fantasy to believe that citizens who have scant backgrounds in the pertinent field can make responsible decisions about complex technical matters, on the basis of a few five-minute exchanges



among more-or-less articulate speakers or a small number of articles outlining alternative points of view. Democratic ideals have their place in the conduct of inquiry, for it is arguable that there should be more communication between scientists and outsiders in the construction of research agendas, in the discussion of standards of acceptable risk, and in the articulation of policies based on scientific consensus. Genuine democracy, however, requires a division of labor, in which particular groups are charged with the responsibility of resolving questions that bear on the interests of individuals and societies. Other groups, those covering such questions in the media, have the duty to convey the results so that citizens can cast their votes as an enlightened expression of freedom, justifiably aimed at the outcomes for which they hope. Staging a brief disagreement between speakers with supposedly equal credentials, especially when it is not disclosed that one of them is answering to the economic aspirations of a very small segment of the society, is a cynical abnegation of that duty.

Because it is so thorough in disclosing how major policy decisions have been delayed or distorted, *Merchants of Doubt* deserves a wide readership. It is tempting to require that all those engaged in the business of conveying scientific information to the general public should read it. And that science journalists should abandon the obfuscating practice of presenting alternatives with inferior justification as if they were on a par with the scientific consensus.

* * *

Even if American public opinion were reformed overnight, so that virtually all citizens were convinced that anthropogenic global warming is likely to raise the average temperature of the planet by at least 2°C, that would be only the beginning. Beyond that minimal acceptance lie the difficult issues of deciding just what the consequences of a warmer planet will be and what can be done about them. Here, too, denial can easily be induced. Those who want to resist regulatory actions contend that the difficulties that are likely to arise for our descendants have been greatly exaggerated, that whatever problems arise will be addressed by people in a better economic position than we are today, that human beings have shown an admirable ability to adapt to changing environments, and so on and on and on. In countries that have long taken anthropogenic climate change as a settled question, agreeing on the expected consequences and the appropriate response has not

proved easy. American discussions are likely to be haunted by the long denial, so that suspicions about alarmism linger. As psychologists have repeatedly discovered, those who are misinformed and later corrected often lapse into versions of their original error.

Scientists who believe that there are grave consequences for Earth and its future inhabitants face a difficult dilemma. They can talk in probabilistic terms—typically very imprecise probabilistic terms—about possible scenarios. If those potential futures are to be made vivid in ways that might engage citizens and inspire them to action, then the scenarios need to be given in some detail. Yet, as they become more specific, the precision about probabilities goes down, even to the extent that it is only responsible to declare that some outcome lies within the range of possibilities. Occasionally, those who raise the alarm are more definite. If the Arctic ice (including the Greenland ice sheet) melts, polar bears will lose their habitat and the species will go extinct; if sea levels rise in the most probable ways, low-lying islands (and many coastal areas, such as the Ganges delta) will be submerged. Outcomes like these are often met with an uncomfortable shrug. They are to be regretted, of course, but if avoiding them really requires a serious modification of civilized life, then it seems better to adapt: relocate some polar bears to artificially cooled preserves; transport the unfortunate flood victims to higher ground.

Concentration on scenarios that can be presented in detail and also justified as likely entails a serious cost. For it encourages a public perception that these are the only outcomes the Cassandras of climate science fear. A stereotype easily follows. The movement toward action derives from an ideology, one centered in a dislike of competitive market capitalism, a fondness for regulation, a tendency to give priority to the needs of the poor, and an overemphasis on environmental conservation. Global warming is a device used by Birkenstock-wearing, tree-hugging, business-hating liberal intellectuals for advancing their political aims.

“Ideology” is a word that appears relatively frequently in Hulme’s *Why We Disagree About Climate Change* (although he never explains what he means by it). A climatologist who has devoted some serious time to studying history and social studies of science, Hulme aims to offer a broader perspective on the debates that arise once the initial question of the reality of human-caused global warming has been settled. His book is valuable for its diagnosis of the many different levels at which disagreement can arise and the vari-

ety of political stances and value judgments that can incline people to divergent conclusions about what is likely to happen and what might be done. In delineating that diversity, he moves the discussion beyond any appeal to polarized stereotypes: on this side, the captains of industry, their tools, and their dupes; on the other, the flower children in sandals.

Yet Hulme’s book invites misreading. His immersion in the language of various domains of social studies leads him to write as if the theoretical conceptions he deploys in classifying various positions were as reliably grounded as the scientific findings he so clearly and concisely explains. Sometimes, there is even a fashionable indulgence in skeptical distancing, the use of inverted commas (scare quotes) to raise a knowing eyebrow. He announces, for example, that he will tell the story of “how we ‘discovered’ that physical climates could change,” before going on to give a lucid account of how the discovery (real discovery) occurred. In a similar vein, he tells us that the “‘post-normal’ character of climate change” requires a wider range of expert voices, that scientists must concede ground to “other ways of knowing,” and that climate change can become “a mirror into which we can look and see exposed both our individual selves and our collective societies.” The concerned environmentalist who presses on through Hulme’s discussions of the “opportunities” provided for “us” by climate change may eventually give up when he tells his readers to “change our position and examine climate change as an idea of the imagination rather than as a problem to be solved.” Tell it to the Maldives!

That response, however, is too impatient. Hulme’s ideas are more subtle than the (often maladroit) jargon in which he expresses them. If his book more explicitly differentiated areas in which particular groups of people might have greater authority, it would be possible to recognize the value of his diagnoses of the difficulties that attend debates about climate change without supposing that he is advocating the narcissistic quietism his words often suggest. He could accept, for example, the judgment common to Hansen, Schneider, and Oreskes and Conway: that conclusions about the reality of anthropogenic climate change and about the risks that attend some scenarios for the future are matters that can be—and have been—authoritatively decided by a scientific community to which he himself belongs. He should then agree with the implication that, in this domain, it would be foolish to introduce “other ways of knowing.” Hulme could reasonably suppose that the public becomes properly engaged at the

moment when risks have been specified—to the extent that they can be specified—and that citizens' judgments are crucial to decisions about what risks count as acceptable. He could emphasize, as he comments in one of his best discussions, that any decision as to whether a possible future can be tolerated (or even welcomed) should be informed by economic considerations, even though ethical values are crucial to any serious assessment. Finally, his apparently passive recommendation to see ourselves in "the mirror" of climate change—like his Kennedyesque injunction to ask "what climate change can do for us"—can be interpreted more sympathetically as a call for a more systematic investigation of the global challenges that confront us today and those that our descendants will face, one that formulates strategies for safeguarding the future without sacrificing the interests of those currently living.

To make progress on these issues, there will be a need for generally accessible accounts of the likely impact that various levels of global warming will produce. Both Hansen and Schneider describe potential futures, with Schneider being particularly insistent on the important point that scientists owe the public a specification of probabilities (to the extent that that is possible). Two other recent books—*The Climate Solutions Consensus* from the National Council for Science and the Environment and *Climate Change Science and Policy* (for which Schneider served as one of its editors)—offer some helpful and relatively nontechnical information for concerned citizens. The organization of *Climate Change Science and Policy* is particularly valuable, because of the volume's focus on specific types of changes that would affect the lives of future people. It breaks free of the stereotypical concerns about marooned polar bears and dispossessed islanders to emphasize facts about rising sea levels and melting glaciers that are not sufficiently appreciated. Thus Peter Gleick's chapter on water concisely identifies the likely disruption of water supplies and the serious chances of flood-induced pollution. Similarly, Kristie Ebi delivers a useful summary of a variety of ways in which our descendants will probably be more vulnerable to infectious diseases and respiratory conditions. (Although she omits concerns about the possible effects of environmental change on the evolution of disease vectors and cross-species transmission—perhaps because, in assessing these events, the chances are unspecifiable.)

Even though discussions of the predicaments people will face in the future do not exhaust the relevant considerations for decid-

ing what actions we should take now, it is wise to bring them to the fore. Citizens need to understand the challenges with respect to shelter, food supply, water supply, and disease that are likely to arise for their descendants. Hansen's clear perception that an overwhelming majority of the world's population can share a concern about the kinds of lives that will be available to their children and grandchildren is echoed in the decision by the distinguished social theorist Anthony Giddens (London School of Economics) to ground his recommendations in the thesis that "objects in nature can only have value through us" (4). Although some environmentalists would demur, Giddens's approach in *The Politics of Climate Change* has the advantage of increasing the chances for consensus. Like Hulme, he is much concerned to recognize the connections among global problems, insisting, from the beginning, that the challenges of responding to climate change and of meeting the energy needs of the human population must be faced in tandem. He differs from Hulme in not attempting any wide survey of sources of disagreement, and, as readers of his previous works might expect, he is lucid and precise in outlining potential courses of social action. If his book, conceived as a guide for the perplexed citizen, has a flaw, that lies in the breadth and number of the ideas he explores. Those ideas are offered in response to threats he views as profoundly serious:

It will be a colossal task to turn around a society whose whole way of life is constructed around mobility and a 'natural right' to consume energy in a profligate way. Yet it isn't as hopeless an endeavour as it looks.

* * *

All the books reviewed here were written before climate change deniers exultantly exposed the mistakes made by the IPCC in announcing the imminent demise of the Himalayan glaciers and the "conspiratorial e-mails" from the East Anglia climate center. In the wake of these "important revelations," the merchants of doubt were back in business. In December 2009, *Reuters* published a discussion by Singer in which he claimed that the IPCC report was based on "distorted raw data" and algorithms that were not shared with other scientists (5). Few readers of Singer's presentation, or those given by other long-standing climate-change deniers, learned that there is significant independent evidence for Himalayan glacier melt, although not as rapid as the erroneous sentence implied. Probably

still fewer understood that the competitive-cooperative interactions among scientists often involve unguarded remarks about the work of rival "teams," and that references to "tricks" frequently advert to strategies for simplifying complicated mathematical problems or (as in this case) graphical methods of presenting a conclusion perspicuously, rather than to stratagems for deceiving the public. Captured by a naïve and oversimplified image of what "objective science" is like, it is easy for citizens to reject claims of scientific authority when they discover that scientific work is carried out by human beings.

These revelations probably retarded any serious American consensus even on the minimal judgment that is the preliminary to the longer and more difficult debate. Meanwhile, the disappointment at Copenhagen can be seen as evidence that the world is lapsing into a state of resignation. The emissions, of course, do not take a break from the hard decisions.

Nevertheless, there are grounds for the hope expressed by Giddens. Among them is the fact that serious scholars from a variety of crucial disciplines have written valuable books on which future deliberations can build. Those deliberations will require a new synthesis that involves scientists, social scientists, historians—and others, too. It is an embarrassment (at least for me) that philosophers have not contributed more to this necessary conversation. We might clarify some of the methodological issues—for instance, those concerning the variety of risks involved in model-building. Perhaps more important, we could use recent ethical work on responsibilities to future generations and to distant people to articulate a detailed ethical framework that might help a planet's worth of policy-makers find their way to consensus. With luck, a broader group of dedicated scholars may be galvanized by the books discussed here, so that the potential disasters Hansen and Schneider have been warning us about for 30 years will be averted. Perhaps, in the end, truth—and wisdom—will prevail.

References and Notes

1. J. Milton, *Areopagitica* (London, 1644); www.gutenberg.org/etext/t608.
2. J. S. Mill, *On Liberty* (London, 1859); http://ebooks.adelaide.edu.au/m/mill/john_stuart/m645o/.
3. T. S. Kuhn, *The Structure of Scientific Revolutions* (Univ. Chicago Press, Chicago, 1962).
4. Giddens derives this view about values from the political philosopher Robert Goodin [see, for example, (6)].
5. <http://blogs.reuters.com/great-debate/tag/climate-change-conference/>.
6. R. Goodin, *Green Political Theory* (Polity, Cambridge, 1992).

10.1126/science.1189312

Science

The Climate Change Debates

Philip Kitcher

Science **328** (5983), 1230-1234.

DOI: 10.1126/science.1189312originally published online May 27, 2010

ARTICLE TOOLS

<http://science.sciencemag.org/content/328/5983/1230.1>

PERMISSIONS

<http://www.sciencemag.org/help/reprints-and-permissions>

Use of this article is subject to the [Terms of Service](#)

Science (print ISSN 0036-8075; online ISSN 1095-9203) is published by the American Association for the Advancement of Science, 1200 New York Avenue NW, Washington, DC 20005. 2017 © The Authors, some rights reserved; exclusive licensee American Association for the Advancement of Science. No claim to original U.S. Government Works. The title *Science* is a registered trademark of AAAS.