

Excerpt from Chapter 4 of Oreskes, Naomi and Erik M. Conway, 2010. *Merchants of Doubt: How a Handful of Scientists Obscured the Truth on Issues from Tobacco Smoke to Global Warming*. (New York: Bloomsbury Press.), reproduced with permission.

### ***Constructing a Counter-narrative***

It took time to work out the complex science of ozone depletion, but scientists, with support from the U.S. government and international scientific organizations, did it. Regulations were put in place based on science, and adjusted in response to advances in it. But running in parallel to this were persistent efforts to challenge the science. Industry representatives and other skeptics doubted that ozone depletion was real, or argued that if it was real, it was inconsequential, or caused by volcanoes.

During the early 1980s, anti-environmentalism had taken root in a network of conservative and libertarian “think tanks” in Washington. These think tanks—which included the Cato Institute, the American Enterprise Institute, Heritage Foundation, the Competitive Enterprise Institute, and, of course, the Marshall Institute, variously promoted business interests and “free market” economic policies, the rollback of environmental, health, safety, and labor protections. They were supported by donations from businessmen, corporations, and conservative foundations.<sup>i</sup>

One aspect of the effort to cast doubt on ozone depletion was the construction of a counter-narrative that depicted ozone depletion as natural variation that was being cynically exploited by a corrupt, self-interested, and extremist scientific community to get more money for their research. One of the first people to make this argument was a man who had been a Fellow at the Heritage Foundation in the early 1980s, and whom we have already met: S. Fred Singer.<sup>ii</sup>

Now Chief Scientist for the U.S Department of Transportation, Singer first protested what he called the “ozone scare” in an article that the *Wall Street Journal* ran on page one.<sup>iii</sup> In

this article, Singer admitted that ozone depletions had been observed, but he dismissed them as “localized and temporary” and insisted there was no proof that CFCs were responsible. “Some scientists believe that ozone is not lost at all but simply moves about as atmospheric motions bring in ozone-depleted air for a few weeks,” he wrote. This was in April 1987-- so it was true that *definitive* proof of CFCs role wasn’t in yet--but it was still an absurd claim, because the satellite data were *global*; if the ozone had just “moved about,” then the satellite would have detected ozone *increases* somewhere else.

Singer also recycled the old tobacco tactic of refutation by distraction, noting that there are many causes of skin cancer, including “viruses, genetic predisposition, environmental carcinogens, population shifts to the Sun Belt, changes in life style, earlier detection of melanomas, and even diet.”<sup>iv</sup> All true, but besides the point: the point was that if ozone depletion continued, it would lead to additional skin cancers, on top of those already generated by other causes.

Finally Singer created a fiction that echoed for the next decade. Just as he had created the fiction that fixing acid rain was “a billion dollar solution to a million dollar problem,” he now invented the fiction that scientists had wrongly worried that water vapor from the SST would destroy ozone. “According to then-prevailing scientific wisdom,” he wrote, “water vapor from the SST exhaust was supposed to destroy ozone, admitting more ultraviolet [sic] radiation to the earth’s surface.”<sup>v</sup> In truth, significant water vapor-induced depletion had been *rejected* by the organized assessments back then—it wasn’t “prevailing scientific wisdom” at all, but a hypothesis that had been rapidly discredited. But Singer went on. It was the beginning of a counter-narrative that scientists had over-reacted before, were over-reacting now, and therefore couldn’t be trusted.

In 1988, Singer laid out his own idiosyncratic interpretation of the ozone hole. He found it conspicuous that the hole appeared suddenly in 1975, at essentially the same time as a global surface warming trend on Earth had started. Accepting that high levels of chlorine played a role (though not necessarily from CFCs), Singer argued that the real cause of the hole was the stratospheric cooling, and this cooling was just part of the Earth's natural climate variability.<sup>vi</sup>

If this were true, then there was no need to regulate CFCs—they were irrelevant. Humans could resume unrestricted release of CFCs, and since the Montreal Protocol had been “spurred by the belief that the [ozone hole] may just be the precursor of a general global decline in stratospheric ozone,” it was clearly unnecessary.<sup>vii</sup> Natural warming would in due course bring everything back to normal.

Singer's views were not necessarily preposterous, and they didn't violate the laws of nature. They just went against the accumulated work of hundreds of experts over the previous decade. It was his own *personal* theory—a theory that was shared by almost no one who was actually doing research on stratospheric ozone—and it just happened to lead to the conclusion that no regulation was needed, a pretty convenient result for a man affiliated with an organization committed to less government regulation.

Singer's article is also interesting for what it doesn't say. His source for the argument that stratospheric cooling was linked to surface warming was a recent article by V. Ramanathan, a leading atmospheric chemist at the University of Chicago, entitled “The Greenhouse Theory of Climate Change: A Test by an Inadvertent Global Experiment.” The experiment Ramanathan referred to was the human emission of greenhouse gases that were changing the composition of the atmosphere. By this time, it was well-understood among scientific researchers that humans had been increasing the atmospheric levels of greenhouse gases, and Ramanathan had

summarized their likely effects. As greenhouse gas levels increased, they would trap heat in the lower portion of the Earth's atmosphere—the troposphere—and slow the migration of the Earth's heat out into space. The troposphere would warm, while the upper part of the atmosphere—the stratosphere—would cool.<sup>viii</sup>

Ramanathan had *not* argued that the stratospheric cooling was part of a natural cycle. He had argued the *reverse*: that humans were altering the climate system, causing warming of the troposphere and cooling of the stratosphere. Increasing amounts of CFCs, methane, and CO<sub>2</sub> were likely to cause further stratospheric cooling, so continued human emissions of these gases would produce more stratospheric ozone depletion. It was precisely the opposite of Singer's position. Singer had turned Ramanathan's argument upside down.

Ramanathan wasn't the only authority Singer misrepresented. He included a graph showing the upward trend of global surface warming since 1880, produced by James E. Hansen, director of the Goddard Institute for Space Studies. In August 1988, Hansen had given dramatic testimony to Congress asserting that "The scientific evidence for the greenhouse effect is overwhelming," he declared. "The greenhouse effect is real, it is coming soon, and it will have major effects on all peoples."<sup>ix</sup> Singer used a graph from Hansen's presentation, present in the hearing transcripts and published in the *Journal of Geophysical Research*. But Hansen had *not* created the graph to assert that the warming trend was part of a natural cycle, but to help show that it *wasn't*.

Singer conveniently neglected to mention Ramanathan and Hansen's arguments, and in doing so misrepresented their larger points: *both* the surface warming and stratospheric cooling trends were direct results of human activities. The ozone hole was anthropogenic from two distinct, but interrelated, standpoints: the excess chlorine came from CFCs, and the cooling effect

came from anthropogenic global warming. But that wasn't the narrative Singer wanted his readers to read.

Given this, it's hardly surprising that Singer had a hard time getting his letter published. In a 1989 *National Review* article, he complained that it had been rejected by *Science* before being accepted by EOS—the newsletter of the American Geophysical Union. *National Review* is a conservative political magazine, and Singer used this platform to launch an attack on the scientific community. In “My Adventures in the Ozone Layer,” he cast the scientific community as dominated by self-interest. “It’s not difficult to understand some of the motivations behind the drive to regulate CFCs out of existence,” he wrote. “For scientists: prestige, more grants for research, press conferences, and newspaper stories. Also the feeling that maybe they are saving the world for future generations.”<sup>x</sup> (As if saving the world would be a bad thing!)

Singer alleged that scientists had rushed to judgment. There was a bit of serious illogic here, for if scientists wanted above all to keep their own research programs going, then they would have had no reason to rush to judgment. They would have been better off continuing to insist that more research was needed, rather than saying that there was now sufficient evidence to warrant regulations.

Singer also insisted that Dobson had discovered the ozone hole in 1956, before CFCs had built up significantly, and then concluded by insisting that replacing CFCs was likely to prove difficult and expensive—even dangerous. CFC substitutes “may be toxic, flammable, and corrosive; and they certainly won’t work as well. They’ll reduce the energy efficiency of appliances such as refrigerators, and they’ll deteriorate, requiring frequent replenishment.”<sup>xi</sup> They *certainly* won’t work as well? How could Singer know that, if substitutes hadn’t yet been developed? Singer was doing just what he had done for acid rain—insisting that any solution

would be difficult and expensive, yet providing no evidence to support the claim. In fact, he was going further, making bold assertions about the nature of technologies that did not yet exist.

Was Singer's description a fair summary of what the research community actually thought and did during the 1980s? No. It had hardly been "obvious" to everyone in the research community that CFCs were implicated; when the ozone hole was first detected, both solar effects and meteorology were considered and investigated.<sup>xii</sup> Singer also ignored the field expeditions and laboratory experiments sponsored by NASA and NOAA. That's an important omission, since the chemical data that clinched the case came from them.<sup>xiii</sup>

In short, Singer's story had three major themes: the science is incomplete and uncertain; that replacing CFCs will be difficult, dangerous, and expensive; and that the scientific community is corrupt and motivated by self-interest and political ideology. The first was true, but the adaptive structure of the Montreal Protocol had accounted for it. The second was baseless. As for the third, this was surely the pot calling the kettle black. And we now know what happened when CFCs were banned. Non-CFC refrigerants are now available that are *more* energy efficient, due to excellent engineering and stricter efficiency standards, than the materials they replaced, and they aren't toxic, flammable, or corrosive.<sup>xiv</sup>

Whether or not they had any basis in fact, Singer's efforts began to bear fruit. In 1990, Dixy Lee Ray, a zoologist and former chair of the Atomic Energy Committee, as well as former governor of the state of Washington, collaborated with journalist Lou Guzzo to produce the book *Trashing the Planet: How Science Can Help Us Deal with Acid Rain, Depletion of Ozone, and Nuclear Waste (among Other Things)*. Billed as an effort "to separate fact from factoid, to unmask the doom-crying opponents of all progress, and to re-establish a sense of reason and balance with respect to the environment and modern technology," it was in reality a tirade

against the environmental movement--and the science that supported it.<sup>xv</sup> Ray and Guzzo dismissed energy conservation and renewable energy, attacked toxic chemical “scares” promoted by environmentalists, and constructed a narrative that sedulously omitted the findings of the scientific experts and replaced them with the claims of professional critics and skeptics. **And they concluded that, if there were ozone depletion, it was caused by volcanoes.**”<sup>xvi</sup>

Sherry Rowland was disturbed by the rapid spread of these “false facts” and dedicated his 1993 presidential address to the AAAS to combating them.<sup>xvii</sup> Without naming names, Rowland chided “senior scientists” for helping to spread such erroneous claims. Then he addressed specifics, starting with the idea that CFC’s didn’t reach the stratosphere. In fact, CFCs had been measured “ in literally thousands of stratospheric air samples by dozens of research groups all over the world.”<sup>xviii</sup>

Rowland also addressed the volcano red herring. First, he debunked the 1980 *Science* paper that had argued that a single eruption of Mt. Augustine, Alaska, in 1976 had put as much chlorine into the stratosphere as the entire 1975 CFC production. That claim was based on the chlorine content of ashfall, not on what had actually reached the stratosphere. Rainout would have reduced the amount reaching the stratosphere, but the rain’s chemistry hadn’t been measured. “[N]o actual evidence was presented in this *Science* paper to show that any hydrogen chloride had really reached the stratosphere in this volcanic plume.”<sup>xix</sup> He then recounted evidence that the eruption of El Chichon in April 1982 had produced an increase of hydrogen chloride in the stratosphere of less than 10%, and that the June 1991 eruption of Pinatubo—a much larger eruption—had increased it even less. Yet hydrogen chloride levels had increased steadily between those two eruptions, despite the lack of any other explosive eruptions during the

interceding nine years. This showed conclusively that the chlorine did not come from volcanoes.

Rowland traced the next phase of misrepresenting the volcanic effects to Fred Singer's 1989 *National Review* article, which had been amplified by Maduro and Ray's error in attributing extremely high chlorine releases to Mt Augustine.<sup>xx</sup> This error had been taken as fact by people "who are relying, often unquestioningly, upon such fourth-hand descriptions of the volcano problem, rather than going back to the original literature." Then the error had been broadcast far and wide by a variety of media outlets.<sup>xxi</sup>

But Rowland's attempt to correct these errors didn't make a difference. In March 1994, Singer repeated the claim that the evidence "suggest[ed] that stratospheric chlorine comes mostly from natural sources."<sup>xxii</sup> In September 1995, Singer served as a star witness in hearings in the U.S. Congress, sponsored by Republican Congressman Dana Rohrabacher—on "scientific integrity." Singer recycled some of his earlier claims and concluded that the committee was being "misled, bamboozled, and otherwise manipulated...." by the testimony of Robert Watson, former director of the NASA Upper Atmosphere Research Panel and currently at the Office of Science and Technology Policy. Referring to the issue as "so-called" ozone depletion, he asserted that scientific basis for concern was simply "wrong."<sup>xxiii</sup>

In his written statement to the committee, Singer added that there was "no scientific consensus on ozone depletion or its consequences."<sup>xxiv</sup> Just a few weeks later, Sherry Rowland shared the 1995 Nobel prize in chemistry with Mario Molina and Paul Crutzen for their work on the understanding of stratospheric ozone chemistry—the highest honor any scientist can achieve—and the clearest possible evidence of broad acceptance and appreciation of one's work.<sup>xxv</sup>



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<sup>iii</sup> S. Fred Singer, “Ozone Scare Generate Much Heat, Little Light,” *Wall Street Journal* April 16 1987, pg. 1.

<sup>iv</sup> S. Fred Singer, “Ozone Scare Generate Much Heat, Little Light,” *Wall Street Journal* April 16 1987, pg. 1.

<sup>v</sup> Ibid.

<sup>vi</sup> S. Fred Singer, “Does the Antarctic Ozone Hole Have a Future?” *EOS* 69, no. 47 (Nov. 22, 1988): 1588.

<sup>vii</sup> Ibid.

<sup>viii</sup> V. Ramanathan, “The Greenhouse Theory of Climate Change: A Test by an Inadvertent Global Experiment,” *Science* 240, no. 4850 (Apr. 15, 1988): 293-299.

<sup>ix</sup> *Greenhouse Effect and Global Climate Change*, Hearing before the Committee on Energy and Natural Resources, 100<sup>th</sup> Congress., 1<sup>st</sup> sess., 9 November 1987 (Washington, DC: United States Government Printing Office, 1987), 53; also see J. Hansen, et. al., “Global Climate Changes as Forecast by Goddard Institute for Space Studies Three-Dimensional Model,” *Journal of Geophysical Research* 93:D8 (Aug. 20, 1988): 9341-9364.

<sup>x</sup> S. Fred Singer, “My Adventures in the Ozone Layer,” *National Review* (June 30, 1989): 34-38, quoted from 36.

<sup>xi</sup> Ibid.

<sup>xii</sup> See Roan, *Ozone Crisis*, chapter 11.

<sup>xiii</sup> Christie, *The Ozone Layer*, 46-47.

<sup>xiv</sup> The major consumer-level CFC replacement, HFC-134a, has “comparable cycle efficiency,” and energy efficiency standards adopted for refrigerators in 1990 actually led to a large reduction in energy consumption despite the adoption of non-CFC refrigerants. See James R. Sand et.al., *Energy and Global Warming Impacts of HFC Refrigerants and Emerging Technologies* (Washington, DC: US Department of Energy, 1997), 22.

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<sup>xv</sup> Dixy Lee Ray and Lou Guzzo, *Trashing the Planet: How Science Can Help us Deal with Acid Rain, Depletion of the Ozone, and Nuclear Waste (Among Other Things)* (New York: HarperPerennial, 1990), 12; originally published by Regnery Gateway, 1990.

<sup>xvi</sup> *Ibid.*, 45.

<sup>xvii</sup> Gary Taubes, “The Ozone Backlash,” *Science* 260 (June 11, 1993): 1580-1583.

<sup>xviii</sup> F. Sherwood Rowland, “President’s Lecture: The Need for Scientific Communication with the Public,” *Science* 260 (June 11, 1993): 1573.

<sup>xix</sup> *Ibid.*, 1574.

<sup>xx</sup> David A. Johnston, “Volcanic Contribution of Chlorine to the Stratosphere: More Significant to Ozone than Previously Estimated?” *Science* 209, no. 4455 (July 25, 1980): 491-493

<sup>xxi</sup> F. Sherwood Rowland, “President’s Lecture,” 1574.

<sup>xxii</sup> S. Fred Singer, “The Hole Truth about CFCs,” *Chemistry & Industry* (March 21, 1994): 240. See also S. Fred Singer, “Bad Science Pulling the Plug on CFCs?” *Washington Times*, February 22, 1994, Final edition, sec. A.

<sup>xxiii</sup> Testimony of S. Fred Singer, *Scientific Integrity and Public Trust: The Science Behind Federal Policies and Mandates: Case Study 1—Stratospheric Ozone: Myths and Realities*, Hearing before the Subcommittee on Energy and the Environment of the Committee on Science, US House of Representatives, 104<sup>th</sup> Congress, 1<sup>st</sup> Sess., September 20, 1995 [No. 31] (Washington, DC: United States Government Printing Office, 1996), 50-64, quotes on p. 50 (“misled”) and p. 52 (“wrong”).

<sup>xxiv</sup> *Ibid.*, 54.

<sup>xxv</sup> “The Nobel Prize in Chemistry 1995,” Nobelprize.org,

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## The Long Consensus On Climate Change

By Naomi Oreskes  
Thursday, February 1, 2007; A15

With the release of the new report by the Intergovernmental Panel on Climate Change tomorrow, the fourth since the organization's founding in 1988, many will be looking for what's new. How have estimates of sea-level rise changed? How soon will we achieve a doubling of carbon dioxide levels?

Scientists and journalists focus on novelty, because both are largely about discovery. But from a policy perspective, what matters is not what's new but what's old. What matters are not the details that may have shifted since the last report, or that may shift again in the next one, but that the broad framework is established beyond a reasonable doubt. Although few people realize it, this framework has been in place for nearly half a century, and scientists have been trying to alert us to its importance for almost that long.

Scientific research on carbon dioxide and climate dates to the 19th century, when Irish scientist John Tyndall established that CO<sub>2</sub> is a greenhouse gas -- meaning that it traps heat and keeps it from escaping to outer space. In the 19th century, this was understood as a fact about our planet, one that made it hospitable to life, but did not have any political implications.

That began to change in the early 20th century, when Swedish geochemist Svante Arrhenius deduced from Tyndall's work that CO<sub>2</sub> released to the atmosphere by burning fossil fuels could alter Earth's climate. By the 1930s British engineer Guy Callendar had compiled empirical evidence that this effect was already discernible.

Callendar's concern was pursued in the 1950s by numerous American scientists, including oceanographer Roger Revelle, a one-time commander in the U.S. Navy Hydrographic Office, who helped his colleague Charles David Keeling find funds to implement a systematic monitoring program. By the 1960s, Keeling's assiduous measurements at Mauna Loa Observatory in Hawaii demonstrated conclusively that atmospheric carbon dioxide was, indeed, steadily rising. (For this work, President Bush [awarded](#) Keeling the National Medal of Science in 2002.) Although these scientists may not be household names, they are well known in the scientific community. However, even most scientists don't know that they -- and others -- have been communicating concerns about global warming to presidents of both parties since the 1960s.

One early warning that we "will modify the heat balance of the atmosphere to such an extent that marked changes in climate . . . could occur" came in 1965 from the Environmental Pollution Board of the President's Science Advisory Committee. While the Bush administration has been loath to accept this reality, an earlier administration accepted it as a statement of scientific fact. In a special message to Congress in February 1965, President Lyndon B. Johnson noted: "This generation has altered the composition of the atmosphere on a global scale through . . . a steady increase in carbon dioxide from the

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burning of fossil fuels."

A second warning came in 1966 from the U.S. National Academy of Sciences Panel on Weather and Climate Modification, headed by geophysicist Gordon MacDonald, who later served on President Richard Nixon's Council on Environmental Quality. While examining the question of deliberate weather modification, MacDonald's committee concluded that increased carbon dioxide might also lead to "inadvertent weather modification."

In 1974, in the wake of the Arab oil embargo, Alvin Weinberg, director of the Oak Ridge National Laboratory, realized that climatological impacts might limit oil production before geology did. In 1978, Robert M. White, the first administrator of the National Oceanic and Atmospheric Administration and later president of the National Academy of Engineering, put it this way:

"We now understand that industrial wastes, such as carbon dioxide released during the burning of fossil fuels, can have consequences for climate that pose a considerable threat to future society."

In 1979 the subject was addressed by the JASON Committee, the reclusive group of scientists with high-level security clearances who gather annually to advise the U.S. government; its members have included some of the most brilliant scientists of our era.

The JASON scientists predicted that atmospheric carbon dioxide might double by 2035, resulting in mean global temperature increases of 2 to 3 degrees Celsius and polar warming of as much as 10 to 12 degrees. This report reached the Carter White House, where science adviser Frank Press asked the National Academy of Sciences for a second opinion. An academy committee, headed by MIT meteorologist Jule Charney, affirmed the JASON conclusion: "If carbon dioxide continues to increase, [we] find no reason to doubt that climate changes will result, and no reason to believe that these changes will be negligible."

It was these concerns that led to the establishment of the Intergovernmental Panel on Climate Change and, in 1992, to the United Nations Framework Convention on Climate Change, which called for immediate action to reverse the trend of mounting greenhouse gas emissions. One early signatory was President George H.W. Bush, who called on world leaders to translate the written document into "concrete action to protect the planet." Three months later, the treaty was unanimously ratified by the Senate.

Since then, scientists around the world have worked assiduously to flesh out the details of this broadly affirmed picture. Many details have been adjusted, but the basic parameters have not changed. Well, one thing has. In 1965, the concern that greenhouse gases would lead to global warming was a prediction. Today, it is an established scientific fact.

*The writer is a professor of science history at the University of California at San Diego.*

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## The Scientific Consensus on Climate Change

Naomi Oreskes

This year's essay series highlights the benefits that scientists, science, and technology have brought to society throughout history.

Policy-makers and the media, particularly in the United States, frequently assert that climate science is highly uncertain. Some have used this as an argument against adopting strong measures to reduce greenhouse gas emissions. For example, while discussing a major U.S. Environmental Protection Agency report on the risks of climate change, then-EPA administrator Christine Whitman argued, "As [the report] went through review, there was less consensus on the science and conclusions on climate change" (1). Some corporations whose revenues might be adversely affected by controls on carbon dioxide emissions have also alleged major uncertainties in the science (2). Such statements suggest that there might be substantive disagreement in the scientific community about the reality of anthropogenic climate change. This is not the case.

**Without substantial disagreement, scientists find human activities are heating the Earth's surface.**

The scientific consensus is clearly expressed in the reports of the Intergovernmental Panel on Climate Change (IPCC). Created in 1988 by the World Meteorological Organization and the United Nations Environmental Programme, IPCC's purpose is to evaluate the state of climate science as a basis for informed policy action, primarily on the basis of peer-reviewed and published scientific literature (3). In its most recent assessment, IPCC states unequivocally that the consensus of scientific opinion is that Earth's climate is being affected by human activities: "Human activities ... are modifying the concentration of atmospheric constituents ... that absorb or scatter radiant energy. ... [M]ost of the observed warming over the last 50 years is likely to have been due to the increase in greenhouse gas concentrations" [p. 21 in (4)].

IPCC is not alone in its conclusions. In recent years, all major scientific bodies in the United States whose members' expertise bears directly on the matter have issued similar statements. For example, the National

Academy of Sciences report, *Climate Change Science: An Analysis of Some Key Questions*, begins: "Greenhouse gases are accumulating in Earth's atmosphere as a result of human activities, causing surface air temperatures and subsurface ocean temperatures to rise" [p. 1 in (5)]. The report explicitly asks whether the IPCC assessment is a fair summary of professional scientific thinking, and answers yes: "The IPCC's conclusion that most of the observed warming of the last 50 years is likely to have been due to the increase in greenhouse gas concentrations accurately reflects the current thinking of the scientific community on this issue" [p. 3 in (5)].

Others agree. The American Meteorological Society (6), the American Geophysical Union (7), and the American Association for the Advancement of Science (AAAS) all have issued statements in recent years concluding that the evidence for human modification of climate is compelling (8).

The drafting of such reports and statements involves many opportunities for comment, criticism, and revision, and it is not likely that they would diverge greatly from the opinions of the societies' members. Nevertheless, they might downplay legitimate dissenting opinions. That hypothesis was tested by analyzing 928 abstracts, published in refereed scientific journals between 1993 and 2003, and listed in the ISI database with the keywords "climate change" (9).

The 928 papers were divided into six categories: explicit endorsement of the consensus position, evaluation of impacts, mitigation proposals, methods, paleoclimate analysis, and rejection of the consensus position. Of all the papers, 75% fell into the first three categories, either explicitly or implicitly accepting the consensus view; 25% dealt with methods or paleoclimate, taking no position on current anthropogenic climate change. Remarkably, none of the papers disagreed with the consensus position.

Admittedly, authors evaluating impacts, developing methods, or studying paleoclimatic change might believe that current

climate change is natural. However, none of these papers argued that point.

This analysis shows that scientists publishing in the peer-reviewed literature agree with IPCC, the National Academy of Sciences, and the public statements of their professional societies. Politicians, economists, journalists, and others may have the impression of confusion, disagreement, or discord among climate scientists, but that impression is incorrect.

The scientific consensus might, of course, be wrong. If the history of science teaches anything, it is humility, and no one can be faulted for failing to act on what is not known. But our grandchildren will surely blame us if they find that we understood the reality of anthropogenic climate change and failed to do anything about it.

Many details about climate interactions are not well understood, and there are ample grounds for continued research to provide a better basis for understanding climate dynamics. The question of what to do about climate change is also still open. But there is a scientific consensus on the reality of anthropogenic climate change. Climate scientists have repeatedly tried to make this clear. It is time for the rest of us to listen.

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8. See [www.ourplanet.com/aaas/pages/atmos02.html](http://www.ourplanet.com/aaas/pages/atmos02.html).
9. The first year for which the database consistently published abstracts was 1993. Some abstracts were deleted from our analysis because, although the authors had put "climate change" in their key words, the paper was not about climate change.
10. This essay is excerpted from the 2004 George Sarton Memorial Lecture, "Consensus in science: How do we know we're not wrong," presented at the AAAS meeting on 13 February 2004. I am grateful to AAAS and the History of Science Society for their support of this lectureship; to my research assistants S. Luis and G. Law; and to D. C. Agnew, K. Belitz, J. R. Fleming, M. T. Greene, H. Leifert, and R. C. J. Somerville for helpful discussions.

The author is in the Department of History and Science Studies Program, University of California at San Diego, La Jolla, CA 92093, USA. E-mail: noreskes@ucsd.edu

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## Naomi Oreskes

### Professor of the History of Science

Affiliated Professor of Earth and Planetary Sciences  
Harvard University, Cambridge MA

[Oreskes@fas.harvard.edu](mailto:Oreskes@fas.harvard.edu)

<http://www.fas.harvard.edu/~hsdept/bios/oreskes.html>

### Education

B.Sc. (First Class Honours) 1981 Royal School of Mines, Imperial College

Ph.D. 1990 Stanford University (Graduate Special Program: Geological Research and History of Science)

## EMPLOYMENT

Current:	Professor of the History of Science, Affiliated Professor of Earth and Planetary Sciences, Harvard University.
2012-2013	Professor-at-Large, Institute of Advanced Studies, University of Western Australia, Perth, Australia.
2005-2013	Professor, Department of History & Program in Science Studies Adjunct Professor of Geosciences (from 2007), University of California, San Diego
2008-2011	Provost, Sixth College, University of California, San Diego
Spring 2010	Francis Bacon Visiting Professor of History, California Institute of Technology
2003-2006	Director, Science Studies Program, University of California, San Diego
Autumn 2001	Visiting Associate Professor, Department of History of Science, Harvard University
1998- 2005	Associate Professor, Department of History & Program in Science Studies University of California, San Diego
1996-1998	Associate Professor, History and Philosophy of Science Gallatin School of Individualized Study, New York University
1991-1996	Assistant Professor of Earth Sciences and Adjunct Asst. Professor of History, Dartmouth College, Hanover, New Hampshire
1990-1991	Visiting Asst. Professor of Earth Sciences and Visiting Asst. Professor of History Dartmouth College, Hanover, New Hampshire
1984-1989	Research Assistant, Geology Department, and Teaching Assistant, Depts. of Geology, Philosophy, and Applied Earth Sciences Stanford University
1981-1984	Geologist, Western Mining Corporation, Adelaide, Australia

## MAJOR HONORS

William T. Patten Visiting Lectureship, Indiana University, March 2015 (Previous Patten Professors include Herbert Feis and George Sarton).

American Historical Association Herbert Feis Prize for Public History, 2014

History of Science Society, Forum for American Science Distinguished Lecture, 2014

American Geophysical Union Presidential Citation for Science and Society, 2014.

Climate Change Communicator of the Year, George Washington University Center for Climate Change Communication, 2011

Francis Bacon Medal for outstanding scholarship in the history of science and technology, Francis Bacon Foundation and Caltech, 2009

UCSD Chancellors Associates' Faculty Excellence Award for Community Service, 2008

National Science Foundation Young Investigator, 1994-1999.

## SCHOLARLY PRODUCTS: FILM

*Merchants of Doubt*, 2015. A film by Robert Kenner, produced by Participant Media and distributed by SONY Pictures Classics. (I appear in the film and consulted on all aspects of its production. I also served as a liaison between the film-maker and many of the people featured in the film.)

**Appearances at Screenings:** Toronto Film Festival; NY Film Festival; Landmark Cinema, Cambridge, MA; Wheeler Opera House Aspen, CO; U.S. Congress, House Energy and Environment Caucus, Washington, DC.

## SCHOLARLY PRODUCTS: PUBLICATIONS

### Books/ Monographs

Oreskes, Naomi, *Science on a Mission: American Oceanography from the Cold War to Climate Change*, under contract to University of Chicago Press, expected completion 2015.

Michael Oppenheimer, N. Oreskes, D. Jamieson, K. Brysse, J. O'Reilly & M. Shindell, in prep. *Assessing Assessments: Scientific Knowledge for Public Policy*, expected completion 2015.

Oreskes, Naomi and Erik M. Conway, 2014. *The Collapse of Western Civilization*, Columbia University Press.



- French edition: Oreskes, Naomi and Erik M. Conway, 2014. *L'effondrement de la Civilisation Occidentale*, (Paris: Les Liens qui Libèrent).
- *Under contract for editions in German, Italian, Spanish, Chinese, Japanese, Korean, Greek and Turkish.*

Cherry, John et al. (16 authors), 2014. *Harnessing Science and Technology to Understand the Environmental Impacts of Shale Gas Extraction*, Ottawa: Council of Canadian Academies.

Oreskes, Naomi and Erik M. Conway, 2010. *Merchants of Doubt: How a Handful of Scientists Obscured the Truth on Issues from Tobacco Smoke to Global Warming*. (New York: Bloomsbury Press.)

- Short-listed for the 2010 *Los Angeles Times* Book Prize.
- Winner of Watson-Davis Prize, History of Science Society, 2011.
- Japanese, Korean, French, Chinese and German editions.

Whipple, Chris et al. (fourteen additional authors), 2007. *Models in Environmental Regulatory Decision Making* (Washington DC: National Academy of Sciences- National Research Council, Board on Environmental Studies and Toxicology), 287 pp.

[http://books.nap.edu/catalog.php?record\\_id=11972](http://books.nap.edu/catalog.php?record_id=11972)

Oreskes, Naomi, 1999. *The Rejection of Continental Drift: Theory and Method in American Earth Science* (New York: Oxford University Press).

### **Edited Books**

Oreskes, Naomi and John Krige, editors, 2014. *Science and Technology in the Global Cold War*, MIT Press.

Oreskes, Naomi, editor, with Homer E. Le Grand, 2001. *Plate Tectonics: An Insider's History of the Modern Theory of the Earth* (Boulder: Westview Press), paperback edition February 2003.

- Library Journal choice for one of the “Best Science and Technology Books of 2002,”
- Choice Magazine Outstanding Academic Title, 2003
- Adopted as a core text by ERESE: Enduring Resources for Earth Science Education (<http://earthref.org/ERESE>).

### **Edited Journal Volumes**

Oreskes, Naomi and James R. Fleming, eds. 2000. “Perspectives on Geophysics,” Special Issue of *Studies in the History and Philosophy of Modern Physics*, 31B, September 2000.

### **Journal articles**

Heede, Richard and Naomi Oreskes (in review). Potential emissions of CO<sub>2</sub> and methane from proven reserves of fossil fuels, submitted to *Global Environmental Change*.

Frumhoff, Peter, Richard Heede, and Naomi Oreskes (in review) The climate responsibilities of industrial carbon producers, submitted to *Climatic Change*.

Lewandowsky, Stephan, James S. Risbey, and Naomi Oreskes, 2015 (accepted pending revisions), “The “Pause” in Global Warming: Turning a Routine Fluctuation into a Problem for Science,” *Bulletin of the American Meteorological Society*.

- Lewandowsky, Stephan , Naomi Oreskes, James S. Risbey, Ben R. Nerwell and Michael Smithson, 2015 (in press). "Climate Change Denial and its Effect on the Scientific Community," *Global Environmental Change*.
- Oreskes, Naomi, 2015. "How earth science became a social science," *Historical Social Research* 40 (2): 246-270.
- Zalasiewicz, Jan et al. (26<sup>th</sup> of 26 authors), 2014. "When did the Anthropocene begin? A mid-twentieth century boundary level is stratigraphically optimal," *Quaternary International* xxx 1-8, <http://dx.doi.org/10.1016/j.quaint.2014.11.045>
- Risbey, James S., Stephan Lewandowsky, Clothilde Langlais, Didier P. Monselesan, Terence J. O'Kane, and Naomi Oreskes, 2014. "Well-estimated global surface warming in climate projections selected for ENSO phase," *Nature Climatic Change* 4: doi:10.1038/nclimate2310i.
- Oreskes, Naomi, 2014. "Scaling Up Our Vision," *Isis* 105:379-391. <http://www.jstor.org/stable/10.1086/676574>
- Oreskes, Naomi, 2013. "How Plate Tectonics Clicked," *Nature* 501: 27-29.
- Oreskes, Naomi, 2013. "Why I Am a Presentist," *Science in Context*, special issue on *How and Why We Write History of Science*, edited by Oren Harman and Alexandre Metraux,
- Oreskes, Naomi, 2013. "The Scientist as Sentinel," *Limn* 3: 69-71.
- Finley, Carmel and Naomi Oreskes, 2013. "Maximum Sustained Yield: A Policy Disguised as Science," *ICES Journal of Marine Science*, 70: 245-250. <http://icesjms.oxfordjournals.org/content/70/2/245>
- Oreskes, Naomi and Erik M. Conway, 2013. "The Collapse of Western Civilization: A View from the Future," *Daedalus* 142 (1) (Winter 2013): 40-58.
- Brysse, Keynyn, Naomi Oreskes, Jessica O'Reilly and Michael Oppenheimer, 2012. "Climate Change Prediction: Erring on the Side of Least Drama?" *Global Environmental Change*, 23: 327-337. <http://www.sciencedirect.com/science/article/pii/S0959378012001215>
- O'Reilly, Jessica, Michael Oppenheimer and Naomi Oreskes, 2012. "The Rapid Disintegration of Predictions: Climate Science, Bureaucratic Institutions, and the West Antarctic Ice Sheet," *Social Studies of Science*, 42 (5): 709-731 <http://sss.sagepub.com/content/early/2012/06/26/0306312712448130.abstract>
- O'Reilly, Jessica, Keynyn Brysse, Michael Oppenheimer and Naomi Oreskes, 2011. "Characterizing uncertainty in expert panel assessments," *Wiley Interdisciplinary Reviews: Climate Change* 2 (September/October): 728-743.
- Erik Conway and Naomi Oreskes, 2011. "Communicating the Science of Climate Change," Judy Lawrence, Alana Cornforth, Peter Barrett, eds., *Climate Futures: Pathways for Society*, New Zealand Climate Change Research Institute, December 2011.

- Oreskes, Naomi, 2011. "Metaphors of warfare and the lessons of history: Time to revisit a carbon tax?" *Climatic Change*, 104: 223-230.
- Oreskes, Naomi, Leonard Smith and David Stainforth, 2010. "Adaptation to global warming: Do climate models tell us what we need to know?" *Philosophy of Science*, 77 (December 2010): 1012-1028
- Oreskes, Naomi 2010. "Science, Technology, and Free Enterprise." *Centaurus* 52: 297-310.
- Aronova, Elena, Karen Baker, and Naomi Oreskes, 2010. "From the International Geophysical year through the International Biological Program to LTER: Big science and big data in biology, 1957-present." *Historical Studies in the Natural Sciences*, 40 (2): 183–224.
- Wang, Zuoyue and Naomi Oreskes, 2008. "History of Science and American Science Policy," *ISIS* 99 (2): 365-373.
- Oreskes, Naomi, Erik M. Conway, and Matthew Shindell, 2008. "From Chicken Little to Dr. Pangloss: William Nierenberg, Global Warming, and the Social Deconstruction of Scientific Knowledge," *Historical Studies in the Natural Sciences* 38 (1): 109–152.
- Oreskes, Naomi, 2004. "The scientific consensus on climate change," *Science* 306: 1686.
- Reprinted in Bill McKibben, 2012. *The Global Warming Reader: A Century of Writing about Climate Change* (New York: Penguin Books), pp. 75-80.
  - Reprinted in *Newsletter of Physicians for Social Responsibility*, December 2004.
- Oreskes, Naomi, 2004. "Science and public policy: What's proof got to do with it?" *Environmental Science and Policy* 7 (5): 369-383.
- Oreskes, Naomi, 2003. "A context of motivation: U.S. Navy oceanographic research and the discovery of sea-floor hydrothermal vents," *Social Studies of Science* 33 (5): 697-742.
- Oreskes, Naomi, 2001. "Getting oceanography done," *Earth Sciences History* 19: 37-43.
- Oreskes, Naomi, 2000. "Laissez-tomber? Women's work and military patronage in twentieth century oceanography," *Historical Studies in the Physical and Biological Sciences* 30: 373-392.
- Oreskes, Naomi and James R. Fleming, 2000. "Why Geophysics?" *Studies in the History and Philosophy of Modern Physics* 31B: 253-257.
- Oreskes, Naomi and Ronald Rainger, 2000. "Science and security before the atomic bomb: The loyalty case of Harald U. Sverdrup," *Studies in the History and Philosophy of Modern Physics* 31B: 309-369.
- Rhodes, A.L., Naomi Oreskes, Naomi, and Sossity Sheets, 1999. "Geology and REE geochemistry of the magnetite deposits at El Laco, Chile." *Economic Geology Special Publication No. 7: Geology and Ore Deposits of the Central Andes*: 299-332.
- Rhodes, A.L., and Naomi Oreskes, 1999. "Oxygen isotope composition of magnetite deposits at El Laco, Chile: Evidence of formation from isotopically heavy fluids," *Economic Geology Special Publication No. 7: Geology and Ore Deposits of the Central Andes*: 333-351.

- Oreskes, Naomi, 1998. "Evaluation (not validation) of quantitative models," *Environmental Health Perspectives* 106 (supp. 6): 1453-1460.
- Murray, Jessica R. and Naomi Oreskes, 1997. "Use and limits of cathodoluminescence in the study of apatite paragenesis." *Economic Geology* 92: 368-376.
- Oreskes, Naomi, 1996. "Objectivity or heroism? On the invisibility of women in science," *OSIRIS* 11: 87-113.
- 2000 History of Science Society Women in Science Prize
  - 1997 Forum for the History of Science in America Best Paper Prize
- Oreskes, Naomi, 1994. "Weighing the earth from a submarine: The S-21 expedition," in *The Earth, the Heavens, and the Carnegie Institution of Washington: Historical Perspectives after Ninety Years*, Gregory Good, ed., American Geophysical Union History of Geophysics Series 5: 53-68.
- Oreskes, Naomi, Kristin Shrader-Frechette and Kenneth Belitz, 1994. "Verification, validation, and confirmation of numerical models in the earth sciences," *Science* 263: 641-646.
- Reprinted in *Transactions of the Computer Measurement Group* 84: 85-92, 1994.
  - To be reprinted in "Climates and Cultures" edited by Mike Hulme, SAGE Library of the Environment, 2015.
- Rhodes, A.L., and Naomi Oreskes, 1994. The magnetite "lava flows (?)", El Laco, Chile: New evidence for formation by vapor transport. *7° Congreso Geológico Chileno Actas Volumen II*: 1501-1505; Universidad de Concepcion, Departamento de Ciencias de la Tierra.
- Oreskes, Naomi and M.W. Hitzman, 1993. "A model for the origin of 'Olympic Dam-type' deposits," in *Mineral Deposit Modeling*, Geological Association of Canada Special Paper 40: 615-633.
- Oreskes, Naomi and M.T. Einaudi, 1992. "Origin of hydrothermal fluids at Olympic Dam: Preliminary results from fluid inclusions and stable isotopes," *Economic Geology* 87 (1): 64-90.
- Hitzman, M.W., Naomi Oreskes, Naomi, and M.T. Einaudi, 1992. "Geologic characteristics and tectonic setting of Proterozoic Fe-REE deposits," *Precambrian Research* 58: 241-287.
- Mango, Helen, Half Zantop, Half, and Naomi Oreskes, 1991. "A fluid inclusion and isotope study of the Rayas Ag-Au-Cu-Pb-Zn mine, Guanajuato, Mexico," *Economic Geology* 86 (7): 1546-1553.
- Oreskes, Naomi and M.T. Einaudi, 1990. "Origin of LREE-enriched hematite breccias at the Olympic Dam, Cu-U-Au-Ag deposit, Roxby Downs, South Australia," *Economic Geology* 85 (1): 1-28.
- Einaudi, M.T., and Naomi Oreskes, 1990. "Progress towards an occurrence model for Proterozoic iron oxide (Cu,U,REE,Au) deposits—A comparison between the ore provinces of South Australia and SE Missouri," invited contribution to Pratt, Walden P., and Sims, P.K., eds., *The Midcontinent--Permissive Terrain for an Olympic Dam deposit?* U.S.G.S. Bulletin No. 1932: 58-69.
- Oreskes, Naomi, 1988. "The rejection of continental drift," *Historical Studies in Physical Sciences* 18 (2): 311-348.

## Book chapters

- Oreskes, Naomi, 2014. "Introduction," *Science and Technology in the Global Cold War* ed. by Naomi Oreskes and John Krige, pp 1-10, MIT Press.
- Oreskes, Naomi, 2014. "Science in the origin of the Cold War," *Science and Technology in the Global Cold War* ed. by Naomi Oreskes and John Krige, pp 11-30, MIT Press.
- Oreskes, Naomi, 2014. "Changing the Mission: From the Cold War to Climate Change," in *Science and Technology in the Global Cold War* ed. by Naomi Oreskes and John Krige, pp 141-188, MIT Press.
- Oreskes, Naomi 2012. "Les Marchands de Doute," in *Controverses Climatiques: Sciences et Politique*, Edited by Edwin Zaccai, Francois Gemmene, and Jean-Michel Decroly, Les Presses de Sciences Po, Paris.
- Oreskes, Naomi, 2011. "Seeing Climate Change," in *Survival Does Not Lie in the Heavens* (An Exhibition by Dario Robleto), edited by Gilbert Vicario, Des Moines Art Center.
- Oreskes, Naomi, 2011. Forward to *Climate Change Denial: Heads in the Sand*, Haydn Washington and John Cook (London, Earthscan Press), pp. xi-xviii.
- Oreskes, Naomi, 2011. "Working with Uncertainty: 'Unitisation and Renegotiation' as a Model for Science and Environmental Policy," in *The Politics of Science Advice: Institutional Design for Quality Assurance*. Edited by Justus Lentsch and Peter Weingart, Cambridge University Press, pp. 36-53.
- Oreskes, Naomi, 2010. "My facts are better than your facts: Spreading good news about global warming." in *How Well Do Facts Travel?* Edited by Mary S. Morgan and Peter Howlett, Cambridge University Press, pp. 135-166.
- Oreskes, Naomi, and Erik Conway, 2008, "Challenging Knowledge: How Climate Science became a Victim of the Cold War," *Agnotology: The Making and Unmaking of Ignorance*, edited by Robert N. Proctor and Londa Schiebinger, Stanford University Press, pp. 55-89.
- Oreskes, Naomi, 2007, "From scaling to simulation: Changing meanings and ambitions of models in the Earth sciences," in *Science without Laws: Model Systems, Cases, and Exemplary Narratives*, edited by Angela N.H. Creager, Elizabeth Lunbeck, and M. Norton Wise, Duke University Press, pp 93-124.
- Oreskes, Naomi, 2007, "The scientific consensus on climate change: How do we know we're not wrong?" *Climate Change: What It Means for Us, Our Children, and Our Grandchildren*, edited by Joseph F. C. DiMento and Pamela Doughman, MIT Press, pp. 65-99.
- Munk, Walter, Naomi Oreskes, and Richard Muller, 2004. "Gordon J.F. MacDonald," *National Academy of Sciences Biographical Memoirs* 84: 3-26.
- Oreskes, Naomi, 2003. "The role of quantitative models in science," in *Models in Ecosystem Science*, edited by Charles D. Canham, Jonathan J. Cole, and William K. Lauenroth (Princeton: Princeton University Press), pp. 13-31.

- Oreskes, Naomi and Ronald E. Doel, 2002. "Physics and chemistry of the earth," in *The Cambridge History of Science, Volume V: Modern Physical and Mathematical Sciences*, edited by Mary Jo Nye, (Cambridge: Cambridge University Press), 538-552.
- Oreskes, Naomi, 2002. "Gravity surveys in the 'permanent' ocean basins: An instrumental chink in a theoretical suit of armor," in *Oceanographic History: The Pacific and Beyond*, edited by Keith R. Benson and Philip F. Rehbock (Seattle: University of Washington Press), pp. 502-510.
- Oreskes, Naomi and Kenneth Belitz, 2001. "Philosophical Issues in Model Assessment," in *Model Validation: Perspectives in Hydrological Science*, edited by M.G. Anderson and P.D. Bates (London: John Wiley and Sons, Ltd.), pp. 23-41.
- Oreskes, Naomi, 2000. "Why believe a computer? Models, measures, and meaning in the natural world," in *The Earth Around Us: Maintaining a Livable Planet*, edited by Jill S. Schneiderman (San Francisco: W.H. Freeman and Co.), pp. 70-82.
- Oreskes, Naomi, 2000. "Why predict? Historical perspectives on prediction in the earth sciences," in *Prediction: Science, Decision-making and the Future of Nature*, edited by Daniel Sarewitz, Roger Pielke, Jr., and Radford Byerly, Jr. (Washington, D.C.: Island Press), pp. 23-40.
- Reprinted as Oreskes, Naomi, 2003. "The changing role of prediction in the earth sciences," in *History and Philosophy of Science for African Undergraduates*, edited by Helen Lauer (Ibadan, Nigeria: Hope Publications), pp. 358-368.
- Oreskes, Naomi, 1997. "Testing models of natural systems: Can it be done?," in *Structures and Norms in Science: Volume Two of the Tenth International Congress of Logic, Methodology, and Philosophy of Science*, edited by M.L. Chiara et al. (Dordrecht: Kluwer, 1997) pp. 207-217.
- Reeve, J.S., R.N. Smith, R.N., K.C. Cross, and N. Oreskes, 1990. "The Olympic Dam copper-uranium-gold-silver deposit," invited contribution to Hughes, Frank, ed., *Geology of Mineral Deposits of Australia and Papua New Guinea*, Australian Institution of Mining and Metallurgy Monograph 14: 1009-1035.

### **Conference Proceedings**

- Oreskes, Naomi, 2014. What Role for Scientists?  
<http://www.casinapioiv.va/content/accademia/en/publications/extraseries/sustainable.html>  
 Pontifical Academy of Sciences Workshop on Sustainable Humanity, Sustainable Nature, Our Responsibility, May 2014, Vatican City.

### **Book reviews, encyclopedia articles, letters & scholarly miscellany (excluding abstracts)**

- Oreskes, Naomi, 2013. "On the 'reality' and reality of anthropogenic climate change." *Climatic Change* 119:559-560.  
<http://link.springer.com/article/10.1007%2Fs10584-013-0779-3>

- Oreskes, Naomi, 2012. Review of “The Hockey Stick and the Climate Wars: Dispatches from the Front Lines,” Michael E. Mann, Columbia U. Press, *Physics Today* 65 (6): 54.  
<http://dx.doi.org/10.1063/PT.3.1607>
- Oreskes, Naomi and Erik M. Conway, 2012. "Perspectives on global warming: A Book Symposium with Steven Yearley, David Mercer, and Andy Pitman." *Metascience*: 21:531-559.  
 DOI 10.1007/s11016-011-9639-9.  
<http://www.springerlink.com/content/g653442642418157/>
- Conway, Erik and Naomi Oreskes, 2011. Author’s response (to four reviews of Merchants of Doubt),  
*H<sup>o</sup>C-Environment Roundtable Reviews 1 (2)* : 24-30.  
[www.h<sup>o</sup>C-net.org/~environ/roundtables](http://www.ho-net.org/~environ/roundtables)
- Oreskes, Naomi, 2011. “Models all the way down: Review of Paul N. Edwards: ‘A vast machine: Computer models, climate data, and the politics of global warming,’” *Metascience* 21 (1): 99-104. DOI 10.1007/s11016-011-9558-9
- Shrader-Frechette, Kristin and Naomi Oreskes, 2011. “Symmetrical Transparency in Science.” Letter, *Science*: 332, May 6 2011, <http://www.sciencemag.org/content/332/6030/663.citation>  
 Replies at [http://www.sciencemag.org/content/332/6030/663.citation/reply#sci\\_el\\_14539](http://www.sciencemag.org/content/332/6030/663.citation/reply#sci_el_14539)
- Aronova, Elena and Naomi Oreskes. (2010). Review of Oleg A. Godin; David R. Palmer (Eds.), “History of Russian Underwater Acoustics.” *Isis* 101/3: 662-663.
- Neier, Aryeh, Peter Galison, Victor Navasky, Naomi Oreskes, and Anthony Romero, 2010. “What We Have Learned about Limiting Knowledge in a Democracy?” *Social Research* 77(3): 1013-1048.
- Oreskes, Naomi, 2009. “Revelle and Global Warming,” response to letter to the editor, @UCSD, *the UC San Diego Alumni Magazine*, 6: 3-4.
- Oreskes, Naomi, 2009. "Rechauffement: La role du soleil," *La Recherche* 427 (Fevrier 2009): ---.
- Oreskes, Naomi, 2008. “The Devil is in the (Historical) Details: Continental Drift as a Case of Normatively Appropriate Consensus?” [Essay review of Miriam Solomon: *Social Epistemology*], *Perspectives in Science* 16 (2): 253-264.
- Oreskes, Naomi, 2007. Henry Melson Stommel, *Complete Dictionary of Scientific Biography*. Vol. 24. Detroit: Charles Scribner's Sons, 2008, p. 527-532.
- Oreskes, Naomi, 2006. “The humanistic and religious foundations of deep time,” [Review of *Bursting the Limits of Time* by Martin Rudwick], *Science* 314 : 596-597.
- Oreskes, Naomi, 2005. “Anti-realism in government” [Review of *The Republican War on Science* by Chris Mooney], *Science* 310: 56.
- Oreskes, Naomi, 2004. “A Call for a Collective” [Review of *Politics of Nature: How to Bring the Sciences into Democracy* by Bruno Latour], *Science* 305: 1241-1242.

- Oreskes, Naomi, 2004. "Shaking Up Seismology" [Review of *The Big One* by Jake Page and Charles Officer, *Nature* 431:1038.
- Oreskes, Naomi, 2003. "Letter to the Editor: Reply to Warren Hamilton," *Earth Sciences History* 22 (2): 139-141.
- Oreskes, Naomi, 2003. "Stepping Forward Too Far? [Review of *Prematurity in Scientific Discovery*, edited by Ernest B. Hook]. *Science* 300: 1094-1095, and Reply to Discussion by Hook, *Science* 301: 1045-1046.
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- Oreskes, Naomi 2002. "Global Plate Tectonics," *Encyclopedia of Global Environmental Change*, edited by Michael C. MacCracken and John S. Perry (Chichester: John Wiley and Sons), 410-411.
- Oreskes, Naomi 2002. "Continental Drift," *Encyclopedia of Global Environmental Change*, edited by Michael C. MacCracken and John S. Perry (Chichester: John Wiley and Sons), 321-325.
- Oreskes, Naomi, 2003. "Philip J. Pauly: 'Biologists and the Promise of American Life: From Meriwether Lewis to Alfred Kinsey' [review]. *Journal of the History of the Behavioral Sciences* 39 (4): 425-426.
- Oreskes, Naomi, 2001. "Reflections on the American Rejection of Continental Drift: A Reply to Ursula Marvin." *Metascience* 10: 217-222.
- Oreskes, Naomi, 2001. "Earth Matters: The Earth Sciences, Philosophy, and the Claims of Community [review]," *Geotimes* March, p. 34.
- Oreskes, Naomi, 2000. *MacMillan Encyclopedia of the Earth Sciences*: Entry: "Charles Schuchert."
- Oreskes, Naomi, 2000. *American National Biography*, J. Garrity, ed. Entries: "Joseph Barrell," "William Bowie," "John Hayford" and "Charles Schuchert."
- Oreskes, Naomi, 1999. "Living with uncertainty, learning from mistakes: Reply to Victor Baker and Mott Greene [review of *The Rejection of Continental Drift*]," *Earth Sciences History* 18 (2): 344-350.
- Oreskes, Naomi, 1998. "Gender and Scientific Authority," [Review]. *Isis* 89: 522-523.
- Oreskes, Naomi, 1998. *Garland Encyclopedia of the Geosciences*, G. Good, ed., Entries: "Isostasy," 488-491, and "The Scopes Trial," 731-732.
- Oreskes, Naomi, 1997. "Thinking about the Earth: One way or several?" [Review Symposium]. *Metascience*, New Series Issue 11: 11-15.
- Laporte, Leo F., Naomi Oreskes, and Kenneth L. Taylor, 1994. "Penrose Conference Report: From the inside and the outside: Interdisciplinary perspectives on the history of the earth sciences," *GSA Today* 4 (8): 203-204
- Oreskes, Naomi, 1993. "The Laws of Biology," Letter, *American Scientist* 81: 411.



- Oreskes, Naomi, 1993. "Victor Moritz Goldschmidt: Father of Modern Geochemistry" [Review]. *Economic Geology* 88 (4): 218-220.
- Oreskes, Naomi, 1991. "Drifting Continents and Colliding Paradigms" [Review]. *ISIS* 82 (4): 775-776.
- Oreskes, Naomi, 1990. "Drifting Continents and Shifting Theories" [Review]. *British Journal for the History of Science* 23 (1): 113-115.
- Oreskes, Naomi, 1989. "The Great Devonian Controversy," review of paperback edition, *Historical Studies in Physical Sciences* 19 (part 2): 411-412.
- Oreskes, Naomi, 1998. "Hydrothermal mineral deposits and hydrothermal alteration," *MacMillan Encyclopedia of the Earth Sciences*.
- Oreskes, Naomi, 1998. "Metamorphic mineral deposits," *MacMillan Encyclopedia of the Earth Sciences*.
- Oreskes, Naomi, 1996. "Mineral Resources, Economics, and the Environments: A Review," *Economic Geology* 90: 1350.
- Oreskes, Naomi, 1993. "Acceptance of the Lindgren Award for 1993," *Economic Geology* 88 (7): 1928-1929.

## COMPLETE LIST OF HONORS AND AWARDS

### Major honors

- Salem State University: Friend of the Earth, 2015.
- National Center for Science Education: Friend of the Earth, 2015.
- American Historical Association Herbert Feis Prize for Public History, 2014
- American Geophysical Union Presidential Citation for Science and Society, 2014.
- Max von Laue Lecture, Deutsche Physikalische Gesellschaft (German Physical Society), 2012.
- James Shea Award* of the National Association of Geoscience Teachers for "exceptional contributions in the form of writing and/or editing of Earth Science information that is of interest to the general public and/or teachers of Earth Science," 2011.
- Climate Change Communicator of the Year*, George Washington University Center for Climate Change Communication, 2011, for "fearless work ...to expose the non-scientific pressures climate scientists have encountered during the course of their research. Her courage and persistence in communicating climate science to the wider public have made her a living legend amongst her colleagues."
- Francis Bacon Medal* in recognition of outstanding scholarship in the history of science and technology, Francis Bacon Foundation and Caltech, 2009.

UCSD Chancellors Associates Faculty Excellence Award for Community Service, 2008

Finalist, Teacher of the Year, Scripps Institution of Oceanography, 2008

American Association for the Advancement of Science Fellow, 2007, for “for distinguished scholarship in the history of earth sciences, and for leadership in relating science and technology studies to contemporary scientific policy debates.”

*George Sarton Award Lecture*, American Association for the Advancement of Science, 2004

American Philosophical Society, Sabbatical Fellowship, 2001-2002.

National Science Foundation Young Investigator, 1994-1999.

National Endowment for the Humanities, Fellowship for University Teachers, 1993-94.

Society of Economic Geologists, Lindgren Prize (outstanding work by a young scientist) 1993.

Ritter Memorial Fellowship in History of Marine Sciences, Scripps Institution of Oceanography 1994.

Who’s Who in America, Who’s Who in American Science & Engineering, Who’s Who in the West.

### **Other honors and Awards**

- INTERNATIONAL: Member, International Academy of the History of Science.
- FACULTY: Indiana University, William F Patten Lecturer, 2015; Monfort Professor-in-Residence, Colorado State University 2013; John Muir Environmental Fellow, Muir College, UC San Diego, 2012; UCSD Humanities Center Fellowship, Autumn 2005; *Choice Magazine* Outstanding Academic Titles, 2003, and Library Journal “Best Science and Technology Books of 2002,” for *Plate Tectonics: An Insider’s History of the Modern Theory of the Earth*; History of Science Society, Women in Science Best Paper Prize, 2000; Forum for the History of Science in America, Best Paper Prize, 1997; Geological Society of America 29th International Geological Congress Travel Grant, Kyoto, Japan, 1992.
- GRADUATE: Mellon Foundation New Directions Fellowship to “encourage fresh contributions of knowledge and curricular activities [in] the arts and sciences,” Stanford University, 1988-1989; Geological Society of America, Penrose Grant, 1987; Chevron Fellowship, Stanford University, 1984-1986.
- UNDERGRADUATE: Imperial College, Watts Medal (Geology), 1981; University of London Sir Henry Miers Mineralogy Prize, 1981; Royal Society of Arts (London) Silver Medal for Scholarship and Service, 1981; Imperial College Geology Department Jonathan Callaghan First Year Prize, 1979.

## **EXPERT TESTIMONY**

U.S. Senate Hearing, Bicameral Task Force on Climate Change, Senator Sheldon Whitehouse and Representative Henry Waxman, sponsors, September 18, 2014, Washington, D.C.

Belgian House of Representatives, Special Committee on Climate Change and Sustainable Development, June 29, 2012.

U.S. Senate, Committee on Environment and Public Works, Washington, D.C., December 6, 2006, <http://epw.senate.gov/epwmultimedia/epw120606.ram>

U.S. Nuclear Waste Technical Review Board, U.S. Nuclear Waste Technical Review Board, “Developing a Repository Safety Strategy With Special Attention to Model Validation” Washington, D.C., September 14, 1999. <http://www.nwtrb.gov/meetings/990914.pdf>.

California State Senate, Select Committee on Government Oversight, Sacramento, California., 31 January 2001, Hearings on Gender Equity in the University of California.

## **BOARDS**

ClimateCommunication.Org 2015- <http://www.climatecommunication.org/who-we-are/advisors/>

Climate Change Legal Defense Fund, Founding Board Member, 2014--.

Protect Our Winters, Jeremy Jones, CEO, 2011-- .

Climate Accountability Institute 2011-2015

## **PROFESSIONAL SOCIETIES**

American Association for the Advancement of Science; American Geophysical Union; American Meteorological Society; Geological Society of America (Fellow); Society of Economic Geologists; History of Earth Sciences Society; History of Science Society; International Commission for the History of Geology; Society for the Social Studies of Science, International Academy of the History of Science, Corresponding Member.

## **PROFESSIONAL ACTIVITIES (selected)**

*Panel Member*, IPCC Steering Committee on studies of the IPCC process, 2014- .

*Panel Chair*, MISTRA-FORMAS Proposal Evaluation, Environmental Humanities, December 5-8, 2014, Stockholm Sweden.

*Panel Member*, expert panel on *Harnessing Science and Technology to Understand the Environmental Impacts of Shale Gas Extraction*, Council of Canadian Academies, 2012-2014

*Deputy Editor*, *Climatic Change*, 2011-2013.

*Panel Member*, European Research Commission, Synergy Grant program, Peer Review Panel 2012.

*President*, History of Earth Sciences Society, 2007-2009

*President-Elect*, History of Earth Sciences Society, 2005-2007.

*Member*, American Meteorological Society History of the Atmospheric Sciences Committee, 2008-11.

*Member*, National Academy of Sciences/National Research Council Committee on the Use of Models in Regulatory Decision-Making, 2004-2007.

*Member*, Director’s Review Committee, Energy and Environmental Directorate, Lawrence Livermore National Laboratory, 2006-2007.

*Member*, History of Science Society Executive Council, 2003-2006.

*Editorial Boards* ISIS, 2001- 2004 ; Reviews of Geophysics (Associate Editor) 2001-2003; Earth Sciences History 1998-2001, Economic Geology 1993-1998.

*Councillor* History of Earth Sciences Society, 1998-1999.

*Consultant* U.S. National Academy of Sciences, Workshop, “Principles and Operational Strategies for Repository Staging Systems,” September 2001; U.S. Nuclear Waste Technical Review Board, September 1999; U.S. Environmental Protection Agency, Lead Model Validation Project, 1996-1997.

*Committees* American Institute of Physics, Advisory Committee on History of Physics, 2008-2011; American Association for the Advancement of Science, History Committee, 1996-1999; American Geophysical Union, History Committee, 1996- present; U.S. National Committee on Geology, National Research Council, Member, 1994-96; U.S. National Committee for the History of Geology, National Research Council, Secretary, 1994-96; National Science Foundation, Education and Human Resources Committee of Visitors, 1994-95

*Visiting Committee* to review Harvard University History of Science Department, Spring 2003, and follow up panel, October 2007.

*Panel Member, National Science Foundation History of Science and Technology, Spring 2000.*

*Consulting Historian* WGBH, *Lives in Science*, 1999-2001; Oxford Companion to the History of Science 1999-2000; American Institute of Physics Collaboration Project, 1990-1999; WGBH Science Odyssey Series, 1997-1998.

*External Examiner* Melbourne

*Conference Organizer* Geological Society of America Penrose Conference: “From the inside and the outside: Interdisciplinary Perspectives on the History of the Earth Sciences.” March 1994.

*Seminar Leader* Dibner Foundation for the History & Philosophy of Science, Summer Institute 1994.

*President* De la Beche Club (Imperial College Geological Society), 1979-1980.

## **UNIVERSITY SERVICE (selected)**

### *University of California*

Member, Search Committee for Senior Vice Chancellor for Academic Affairs (2010), Member, Office of Research Affairs Research Advisory Council (2009- ); Member, Center for Marine Biodiversity and Conservation, (2006- ) Director, Science Studies Program, (2003 -2006); University Search Committee, Vice Chancellor for Research (2006); UCSD Humanities Center, Executive Committee (2004-2006 ) ; History Department Representative, Faculty Senate (2003-04); Faculty co-chair, Chancellor’s Advisory Committee on the Status of Women (1999-2001); Member, Vice-Chancellor’s Task Force on Gender Equity (2001); Center for Environmental Research and Training (1999-2003); Scripps Institution of Oceanography Heritage Committee (1999- ), Scripps Institution of Oceanography Ritter Fellowship Selection Committee (1999- ).

### *New York University*

Gallatin Curriculum Committee, 1996-97; s and Sciences NSF initiative on undergraduate science and math education reform, 1997; Gallatin Dean Search Committee, 1997-98.

### *Dartmouth College*

Ethics Institute Faculty Advisor (1994-95); Women in Science Program Faculty Sponsor (1992-93); Women’s Studies Steering Committee (1992-1994); University Seminars: Feminist Inquiry (1990-1995); Two Cultures (1990-1995); Teaching Science (1993-1995); Sloan Foundation Summer Science Teaching Institute (1994); Dartmouth College Committee on Organization and Policy (1996-97).

## MANUSCRIPTS, GRANTS, AND PAPERS REVIEWED

*Manuscripts, Presses:* AGU Press; Johns Hopkins University Press; Blackwell Press; University of Chicago Press; University of California Press, Columbia University Press.

*Manuscripts, Journals:* Climatic Change; Ecological Modeling; Geology; Economic Geology; Global Environmental Change; ISIS; History of Earth Sciences; Hyle; Mineralium Deposita; International Association on the Genesis of Ore Deposits; Science; Nature; Science Communication; Science and Public Policy; Social Studies of Science.

*Grants:* National Science Foundation (Geochemistry and Petrology, Science and Technology Studies, Instrumentation and Facilities, and Education and Human Resources); National Endowment for the Humanities; National Environment Research Council (U.K.); Social Sciences and Humanities Research Council of Canada.

*Papers for National Meetings:* Geological Society of America.

## SPONSORED RESEARCH

*Title:* Assessing Assessments: Historical and Philosophical Study of Scientific Assessments for Environmental Policy in the Late 20<sup>th</sup> Century

*Funding agency:* National Science Foundation SES 09-57270

*Duration of Support:* 2010-13

*Title:* Climate, Technology and Culture: Providing Content and Context in Undergraduate Global Climate Education

*Funding agency:* NASA: Global Climate Change Education Program.

*Duration of Support:* 2009-2011.

*Title:* IGERT: Global Change, Marine Ecosystems, and society, Co-PI with Richard Norris (PI), Jeremy Jackson, Dale Squires, Joel Watson, co-PIs. (\$3,191,896)

*Funding agency:* National Science Foundation DGE 09-03551

*Duration of Support:* 2009-2014

*Title:* Doctoral Dissertation Research: Harold Urey: Scientist, Atheist, and Defender of Religion (with graduate student Matthew Shindell).

*Funding Agency:* National Science Foundation, SES 08-48435.

*Duration of support:* 2008-2010.

*Title:* Doctoral Dissertation Research: "The Bravo Medical Program: Radiation Standards, Scientific Uncertainty, and the Legacy of the Cold War, 1954-the Present" (with graduate student Laura Harkewicz).

*Funding agency:* National Science Foundation, SES 08-22480

*Duration of Support:* 2008-2010.

*Title:* Conference and Workshop Support: Models and Prediction: A Research Workshop, University of California, San Diego; May 26-28, 2006,

*Funding agency:* National Science Foundation, SES 05-51355

*Duration of Support:* 2006

*Title:* Proof, Persuasion, and Policy: A Research and Training Grant for the UCSD Science Studies Program

*Funding agency:* National Science Foundation: SES 03-49956

*Duration of Support:* 2004-2009

*Title:* A Historical Analysis of the Collapse of Pacific Groundfish: U.S. Fisheries Science, Development, And Management, 1945-1995

*Funding agency:* California Sea Grant/ National Oceanic and Atmospheric Agency

*Duration of Support:* 2004-2006

*Title:* The Military Roots of Basic Science: American Oceanography in the Cold War and Beyond

*Funding agency:* National Science Foundation, SBE 01-15260

*Duration of Support:* 2002-2004.

*Title:* Sabbatical Fellowship

*Funding agency:* American Philosophical Society

*Duration of Support:* Spring 2002.

*Title:* National Science Foundation Young Investigator Award for Geology and History of Science.

*Funding agency:* National Science Foundation EAR 93-57888, EAR 97-96022

*Duration of Support:* 1994-1999. (Awarded 1993).

*Title:* Acquisition of cathodoluminescence, spectrophotometry, and microsampling capabilities for the study of large-scale ore-forming systems.

*Funding agency:* National Science Foundation, EAR 93-17213.

*Duration of support:* 1994-1996.

*Title:* The Rejection of Continental Drift.

*Funding agency:* National Science Foundation, SBE 92-22597.

*Duration of support:* April 1994-June 1995.

*Title:* The Rejection of Continental Drift.

*Funding agency:* National Endowment for the Humanities, Fellowship for University Teachers

*Duration of support:* September 1993-April 1994.

*Title:* Origin of magnetite deposits at El Laco, Chile: An analogue for giant Fe-REE deposits of the Proterozoic? with Research Experience for Unders [REU] Supplements (1993, 1994)

*Funding agency:* National Science Foundation EAR 92-19887.

*Duration of support:* 1993-1995.

*Title:* Sphalerite geochronometry at the Lisheen Zn-Pb deposit, Ireland.

*Funding agency:* Chevron Corporation of Ireland.

*Duration of support:* 1992-1993.

*Title:* Reading materials for innovative approaches to introductory geology.

*Funding Agency:* New England Consortium for Undergraduate Science Education (NECUSE).

*Duration of Support:* 1990-1991.

## **TEACHING ACTIVITIES I. University Courses**

University of California Controlling Life; Atomic Age, Atomic Angst (both in Sixth College general education sequence); Science and Technology in the 20th Century; Scientists and Atomic Age; The Darwinian Legacy; Introduction to Science Studies; Gender and Science; Science and Politics of Climate Change; and various graduate seminars in science studies and history of science, and guest lectures in the Center for Marine Biodiversity and Conservation on science and public policy.

New York University The Quest for Knowledge; Origins of the Atomic Age; The Notion of Truth; The Darwinian Legacy; Fate of the Earth.

Dartmouth College *Earth Sciences*: Fate of the Earth; Materials of the Earth; Geochemistry of Ore Deposits; Philosophy of Natural Sciences; *History* Origins of the Atomic Age; *Women's Studies* Sex, Gender, and Scientific Discovery.

## **TEACHING ACTIVITIES II. Short courses and informal education**

Vienna International Summer University “Consensus in Science, July 2007 (two week intensive), Vienna Circle Institute, Vienna, Austria.

UCSD Osher Institute (UCSD extension), Autumn 2006, “Climate Change,” (Five lectures).

Marine Biological Laboratory-Dibner Institute “Oceans and Atmospheres,” May 17-24, 2006.

## **TEACHING ACTIVITIES III. Graduate Research Advising (Principal Advisor)**

Krystal Tribbett, UCSD Ph.D., 2014. “RECLAIMing Air, Redefining Democracy: A History of California’s Regional Clean Air Incentives Market, Environmental Justice and Risk 1960 – present.”

Minakshi Menon, UCSD Ph.D., 2013, "Imperial Nature, Imperial Culture: British Orientalism, Colonial Policy, and the Making of an Indian Natural History, 1784-1845"

Elena Aronova, UCSD Ph.D. 2012. “Studies of Science before “Science Studies”: The Cold War and Politics of Science in the U.S., U.K., and U.S.S.R., 1950s-1970s

Matt Shindell, UCSD Ph.D., 2011. “Harold Urey and the Origins of Planetary Science.”

Laura Harkewicz, UCSD Ph.D., 2010, “The Character of Radiation Standards: The Bravo Medical Program, Radiobiology, and American Nuclear Policy, 1954 - 2005

Jesse Richmond, UCSD Ph.D. 2009. “Experts and Australopithecines: Credibility and Controversy in the Study of Human Evolution, 1924-1959,”

Matthew Crawford, UCSD Ph.D. 2009, co-advised with Professor John Marino, European history. “Empire's Experts: The Politics of Knowledge in Spain's Royal Monopoly of *Quina* (1751-1808)”

M. Carmel Finley, UCSD Ph.D. 2008, "The Tragedy of Enclosure: Science, Politics, and Marine Fisheries Policy, 1945-1995."

Barbara DeFelice, Dartmouth College, Master of Arts, Liberal Studies, (2000) "Geological theory and arctic exploration in the early 20th century."

Sossity Sheets, Dartmouth M.S. (1997) "Chemistry of fluid inclusions at El Laco, Chile: Implications for ore genesis."

Maria Bundy, Dartmouth M.S. (1996) "REE content of apatites at Ophir, Colorado: A source of aqueous REEs in acid mine drainage?"

Melody Brown, Dartmouth M.S. (1995) "Geological and numerical analysis of paleofluid-flow in carboniferous Ireland: Developing a genetic model for the carboniferous carbonate-hosted Irish Zn-Pb ores."

Katherine Bateman, Dartmouth M.A.L.S. (1994). "Built around a uterus: Historical Origins of the 'Limited Energy Theory' of Women's Physiology."

Amy Larson, Dartmouth M.S. (1994), Ph.D. (1996). "Evidence of pneumatolytic processes in the genesis of magnetite deposits at El Laco, Chile."

Helen Mango, Dartmouth Ph.D. (1992) "Origin of epithermal Ag-Au-Cu-Pb-Zn mineralization on the Veta Madre, Guanajuato, Mexico."

Victoria Carlson-Foszcz, Dartmouth M.S. (1991) "Mobility of rare earth elements in the Ophir region, San Juan Mountains, Colorado."

### **TEACHING ACTIVITIES III. Undergraduate Research Advising (Principal Advisor)**

Randall Nicholson, UCSD B.A. Senior Honors thesis (2000). Advisor: "Creating a climate of public opinion in support of the bombings of Hiroshima and Nagasaki."

Jessica Murray, Dartmouth B.A. Senior Honors thesis (1996). Advisor: "Controls on the use of cathodoluminescence in the study of apatite." Published as:

- Murray, J. and Oreskes, N., 1997. "Uses and Limitations of Cathodoluminescence in the study of apatite paragenesis." *Economic Geology* vol. 92, pp. 368-376.

Rachel Roisman, Dartmouth B.A. Senior Fellow Honors Program (1995-96). Advisor: "Victimizing choices? Prenatal sex determination and sex selective abortions in India."

Rosalie Kaslowki, Dartmouth B.A. Senior Honors thesis (1995). Advisor: "Cathodoluminescence of apatite from El Laco, Chile."

Sossity Sheets, Dartmouth B.A., Senior Honors thesis (1995) Advisor: "SEM analysis of apatites from El Laco, Chile." Published as part of:



- Oreskes, N., Rhodes, A.L., Sheets, S. A., and Espinoza, S., 1995. “Evidence for formation of magnetite by metasomatic alteration of host rock andesite: El Laco, Chile, Part I: Field relations and alteration assemblages,” *Geological Society of America Abstracts with Programs*, vol. 27, no. 6, p. A-467.

Jessica Murray, Dartmouth B.A. Dartmouth Presidential Scholar (1994-95) Advisor: “Petrography of iron deposits at El Laco, Chile.”

Keith Rainville, Dartmouth B.A., Honors thesis (1994) Advisor: “Geothermometry of fluid inclusions at El Laco, Chile.” Published as part of:

- Oreskes, N., Rhodes, A.L., Rainville, K., Sheets S., Espinoza, S., and Zentilli, M., 1994. “Origins of magnetite deposits at El Laco, Chile: New evidence from field studies, fluid inclusions, stable isotopes, and fission track dating. *Geological Society of America Abstracts with Programs*, vol. 26, no. 7, p. A-379.

Jeffrey Furr, Dartmouth B.A., Honors thesis (1994) Co-advisor: “Gravity evidence for the sub-surface morphology of magnetite deposits at El Laco, Chile.”

Sossity Sheets, Dartmouth B.A., Dartmouth Presidential Scholar (1993-94) Advisor: “Characterization of fluid inclusions at El Laco, Chile.” Published as part of:

- Oreskes, N., Rhodes, A.L., Rainville, K., Sheets S., Espinoza, S., and Zentilli, M., 1994. “Origins of magnetite deposits at El Laco, Chile: New evidence from field studies, fluid inclusions, stable isotopes, and fission track analysis.” *Geological Society of America Abstracts with Programs*, vol. 26, no. 7, p. A-379.

David Kaiser, Dartmouth B.A. Waterhouse Research in history of science, published as:

- “More roots of complementarity,” *Studies in the History and Philosophy of Science*, 23: 213-239, 1992.
- “Neils Bohr's conceptual legacy in contemporary particle physics,” *Neils Bohr and Contemporary Philosophy*, Jan Faye and Henry Folse, eds., pp. 257-268.
- “Bringing the human actors back on stage: The personal context of the Einstein-Bohr debate.” *British Journal for the History of Science*, December 1994.

## OUTREACH

### Popular articles and opinion pieces

Frumhoff, Peter and Naomi Oreskes, 2015. **Fossil Fuel Companies, Still Sowing Climate Doubt, Should Pay for Climate Damages,**  
 ---- need link here

Oreskes, Naomi 2015. “Playing Dumb on Climate Change,” *The New York Times, Sunday Review*, January 3, 2015, p. SR2.

[http://www.nytimes.com/2015/01/04/opinion/sunday/playing-dumb-on-climate-change.html?\\_r=0](http://www.nytimes.com/2015/01/04/opinion/sunday/playing-dumb-on-climate-change.html?_r=0) Syndicated on many additional web sites.

- Oreskes, Naomi 2014. "In Defense of NIMBY-ism," *The Conversation*, US launch, Foundation Essay, October 21, 2014, <http://theconversation.com/in-defense-of-nimbyism-32470>; re-posted at WashingtonPost.com and several other web sites.  
<http://www.washingtonpost.com/posteverything/wp/2014/10/23/stop-hating-on-nimbys-theyre-saving-communities/>
- Oreskes, Naomi 2014. "Wishful thinking about natural gas: Why fossil fuels can't solve the problems created by fossil fuels."  
[http://www.tomdispatch.com/post/175873/tomgram%3A\\_naomi\\_oreskes,\\_a\\_%22green%22\\_bridge\\_to\\_hell/](http://www.tomdispatch.com/post/175873/tomgram%3A_naomi_oreskes,_a_%22green%22_bridge_to_hell/) Syndicated on many additional web sites.
- Oreskes, Naomi 2014. "Fourteen concepts that will be obsolete after catastrophic climate change." *The Washington Post*, Saturday, July 26, 2014  
[http://www.washingtonpost.com/opinions/14-concepts-that-will-be-obsoleteafter-catastrophic-climate-change/2014/07/25/04c4b1f8-11e0-11e4-9285-4243a40ddc97\\_story.html](http://www.washingtonpost.com/opinions/14-concepts-that-will-be-obsoleteafter-catastrophic-climate-change/2014/07/25/04c4b1f8-11e0-11e4-9285-4243a40ddc97_story.html)  
Reposted on numerous web sites.
- Oreskes, Naomi 2014. "The pragmatic case for fossil fuel divestment,"  
<http://www.nakedcapitalism.com/2014/06/pragmatic-case-fossil-fuel-divestment-address-climate-change.html>
- Oreskes, Naomi and Clara Belitz, 2014. "Universities must end financial ties to climate-denying fossil fuel giants," *The Guardian*, April 17, 2014.  
<http://www.theguardian.com/commentisfree/2014/apr/17/universities-end-financial-ties-fossil-fuel-industry-now>
- Adam Sobel and Naomi Oreskes, 2013. "Monitoring a Climate Epidemic: When Is a Super-Typhoon More than Just a Super-Typhoon?" *Los Angeles Times*, November 15, 2013.  
<http://articles.latimes.com/2013/nov/15/opinion/la-oe-oreskes-typhoon-climate-change-20131115>
- Oreskes, Naomi, 2013. "We need a new Manhattan Project," *The New York Times*, Room for Debate, November 11, 2013.  
<http://www.nytimes.com/roomfordebate/2013/11/14/is-nuclear-power-the-answer-to-climate-change/we-need-a-new-manhattan-project-to-deal-with-climate-change>
- Stephen Lewandowsky, James Risbey and Naomi Oreskes, 2013. "Climate change is not all disaster and uncertainty," *The Conversation*, September 19, 2013.  
<http://theconversation.com/climate-change-is-not-all-disaster-and-uncertainty-18299>
- Oreskes, Naomi, 2013. "Mobilizing scientists on climate change," *The Washington Post*, January 17, 2013.  
[http://articles.washingtonpost.com/2013-01-17/opinions/36410396\\_1\\_climate-change-alternative-energy-scientists](http://articles.washingtonpost.com/2013-01-17/opinions/36410396_1_climate-change-alternative-energy-scientists)
- Conway, Erik M. and Naomi Oreskes, 2012. "Why conservatives turned against science," *The Chronicle of Higher Education*, November 5, 2012.  
<http://chronicle.com/article/The-Conservative-Turn-Against/135488/>
- Oreskes, Naomi, 2012. "The Verdict Is In on Climate Change," *Los Angeles Times*, Sunday January 22, 2012

<http://articles.latimes.com/2012/jan/22/opinion/la-oe-oreskes-judging-climatechange-20120122>

Oreskes, Naomi, 2012. “Und sie bewegt sich doch (and yet it moves),” *Frankfurter Allgemeine Sonntagszeitung*, 8 January NR 1.

Oreskes, Naomi, 2011. “Merchants of Doubt,” *Cosmos*, April/ May 2011, pp. 36-43.  
<http://www.cosmosmagazine.com/features/print/4376/merchants-doubt>

Frumhoff, Peter and Naomi Oreskes, 2011. “The Limits of Doubt-Mongering,” *The Hill*, February 23, 2011. <http://thehill.com/blogs/congress-blog/energy-a-environment/145669-the-limits-of-doubt-mongering>

Oreskes, Naomi and Erik M. Conway, 2010. “Where to from here?” *The Climate Spectator*, November 15, 2010, <http://www.climatespectator.com.au/commentary/where-here>.

Oreskes, Naomi and Erik M. Conway, 2010. “Will we ever get action on climate change?” September 8, 2010. <http://minnesota.publicradio.org/display/web/2010/09/08/oreskes/>

Oreskes, Naomi and Erik M. Conway, 2010. “Distorting Science While Invoking Science,” *Science Progress*, August 10, 2010. <http://www.scienceprogress.org/2010/08/distorting-science-while-invoking-science-2/>

Oreskes, Naomi and Richard Littlemore, 2010. “Climate Change Deniers Doing a Diservice to Legitimate Science,” *Vancouver Sun*, June 18, 2010.  
<http://www.vancouversun.com/technology/Climate+change+deniers+doing+disservice+legitimate+science/3169693/story.html>

Oreskes, Naomi and Erik M. Conway, 2010. Shadow Elite: Merchants of Doubt—Do Scientific Denialists Have No Shame? *Huffington Post*, June 17, 2010.  
<http://www.huffingtonpost.com/naomi-oreskes>

Oreskes, Naomi and Erik M. Conway, 2010. “Global Warming Deniers and their Proven Strategy of Doubt,” *Environment 360*, June 10, 2010.  
<http://e360.yale.edu/content/feature.msp?id=2285>

Oreskes, Naomi and Erik M. Conway, 2010. “Defeating the Merchants of Doubt,” *Nature* 465: 686-687, June 10, 2010. <http://www.nature.com/nature/journal/v465/n7299/full/465686a.html>

Oreskes, Naomi and Erik M. Conway, 2010. “Attack on Climate Scientist just Latest in a Long Line.” *CNN.com* June 9, 2010.  
<http://edition.cnn.com/2010/OPINION/06/07/oreskes.climate.change/index.html>

Oreskes, Naomi and Erik M. Conway, 2010. “Seeds of Doubt Against Climate Science,” *Los Angeles Times*, June 8, 2010, print edition and on line at  
<http://articles.latimes.com/2010/jun/08/opinion/la-oe-oreskes-20100608>

Oreskes, Naomi and Erik M. Conway, 2010. “Climate Change Denial: A History,” *The New Statesman*, June 1, 2010, on line at  
<http://www.newstatesman.com/global-issues/2010/05/climate-scientists-science>

Oreskes, Naomi and Erik M. Conway, 2010. "Scientists Who Favor Ideology over Fact," *The Washington Post*, May 28 2010, on line at [http://voices.washingtonpost.com/political-bookworm/2010/05/scientists\\_who\\_favor\\_ideology.html](http://voices.washingtonpost.com/political-bookworm/2010/05/scientists_who_favor_ideology.html)

Oreskes, Naomi, 2009. "The Scientific Consensus on Climate Change," *Climate Change: Picturing the Science*, edited by Gavin Schmidt and Joshua Wolfe, pp. 153-155.

Oreskes, Naomi and Jonathan Renouf, 2008. "JASON and the Secret Climate Change War," *The Sunday Times* (London), September 7, 2008 and Times online: <http://www.timesonline.co.uk/tol/news/environment/article4690900.ece>

Oreskes, Naomi, 2007 "Things We Can All Do to Stop Global Warming," *The Union Tribute*, July 13, 2007

Oreskes, Naomi, 2007. "The Long Consensus on Climate Change," *The Washington Post*, Thursday, February 1, 2007; A15

Oreskes, Naomi, 2006. "Global Warming: Signed, Sealed and Delivered." *The Los Angeles Times*, July 24, 2006.

Oreskes, Naomi, 2005. "Fear-mongering Michael Crichton is wrong," *The San Francisco Chronicle*, February 16, 2005, p. B11.

Oreskes, Naomi, 2004. "Undeniable Global Warming," *The Washington Post*, Sunday December 26, 2004, B07.

Oreskes, Naomi and Bjorn Lomborg, 2004 "Er klimaskeptikere nu domt ude?" [Have climate skeptics been ruled out of bounds?] A debate with Bjorn Lomborg, moderated by Morten Jastrup, *Politiken* (Copenhagen), Sunday, December 5, 2004, p. 2, section 4.

Oreskes, Naomi, 2004. "A Humanities Policy?" (Forum), *Issues in Science and Technology* Winter 2004: 17.

Oreskes, Naomi and James Fleming, 2003. "An ill wind blows toward an even more inhospitable climate," *The Los Angeles Times* Commentary Section, Thursday October 30: B17.

Oreskes, Naomi and Rebecca Oreskes, 2001. "Controlling Nature: Is Science to Blame?" *International Journal of Wilderness* 7 (1): 35-38.

Oreskes, Naomi, 1998. La lente plongée vers le fond des océans," *Science et Vie* March: 84-90.

### **Media appearances**

WGBH television, "A Science Odyssey: Origins," aired nationwide on January 15, 1998.

UCSD television, "Guestbook" interview with Dr. Helen Caldicott, April 21, 1999.

KPBS radio, San Diego, "These Days," with Tom Fudge, March 8, 2001.

InTeleCom Video, “The Endless Voyage: Exploring the Marine Environment,” A teleweb course on oceanography, 2003, aired on PBS affiliates in January 2004.

KLSD radio, San Diego, “Air America” with Craig Elsten, December 11, 2004; and October 23, 2005.

Voice of America, “Nightline Africa” with Joe DeCapua, January 2, 2005.

WCCO Radio (Minneapolis), Live with Jack Rice, June 9, 2005.

Voice of America, “Talk to America” with Doug Bernard, November 28, 2005.

UCSD Television Interview with Chris Mooney, May 2006.

BBC World Service, “The World Today,” taped interview, broadcast Thursday July 20, 2006.

Hawaii Public Radio, KIPO 89.3 FM, “ThinkTech” with Jay Fidell, Wednesday July 26, 2006, and Wednesday February 21, 2007.

Greenlex Town Meeting PodCast, Lexington, Kentucky, Thursday September 21, 2006.

“Ecotalk with Betsey Rosenberg,” KQKE-960AM San Francisco, CA and several dozen affiliates nationwide, September 26, 2006.

Wisconsin Public Radio, Conversations with Joy Cardin (90.7 and 09.9 FM, 970 AM), January 6, 2007

“For the record,” WISC-TV/ My Madison TV 14, CBS Affiliate, Madison, Wisconsin, February 11, 2007; on line at [www.c3ktogo.com](http://www.c3ktogo.com)

BBC World Service, “The World Today,” brief interview, March 15, 2007.

KPBS radio, San Diego, “These Days,” with Tom Fudge, October 8, 2007, Full hour interview with listener calls.

[www.ambiente.tv](http://www.ambiente.tv) and [www.arpacampania.it](http://www.arpacampania.it), link ‘revista’, Interview in Naples, Italy, October 23, 2008

Science Studio Podcast, Arizona State University, April 4, 2008.

Climate Change: Separating Fact from Fiction, WNNT-TV, Huntsville, Alabama, September 24, 2008.

KPBS Radio, San Diego, “These Days” with Tom Fudge, “Science and Politics,” September 29, 2008.

BBC World Service, “The World Today,” brief interview, January 26, 2009.

KGUN National Public Radio, Boulder, CO brief interview in conjunction with the World Affairs Conference, April 5, 2010.

WNYC Radio, The Leonard Lopate Show, May 26, 2010

KPCC, The Patt Morrison Show, June 1, 2010

WORT-FM Perpetual Notion Machine. June 3rd, 2010 also at [www.wort-fm.org](http://www.wort-fm.org)

Wisconsin Public Radio, The Joy Cardin Show, Interview and listener call-in, June 3, 2010

KSWB-TV Fox News, San Diego, Interview, June 7, 2010.

KPBS Radio “These Days” with Tom Fudge, Interview and listener call-in, June 7, 2010

CW 6- XETV, interview, June 8, 2010

The Bob Edwards Show, (Satellite Radio), June 29, 2010.

My work on climate science has been widely cited in print media, including *Newsweek*, *The Economist*, *The New Scientist*, *United Press International*, *The Seattle Times*, *The New Yorker*, *USA Today*, *Parade*, *The New York Times*, *La Recherche*, *Politiken* (Copenhagen), *Corriere della Sera* (Italy), *The Irish Times*, *The Daily Telegraph*, *The Guardian*, *The Times* (London), *Frankfurter Allgemeine*, *Le Monde*, *Le Soir* (Brussels), *La Libre* (Brussels), *Agence France-Presse* and *Reuters*, and featured in the Academy-Award winning film, “An Inconvenient Truth,” and the Mockmentary, “Sizzle.” It is also cited by the lead character in Ian McEwan’s novel, *Solar*.

In 2010, I did approximately five dozen additional radio, newspaper, and internet interviews and podcasts, in association with the release of *Merchants of Doubt*. I did over a dozen interviews with Australian and New Zealand Press, including the widely-watch evening news program, *Lateline*, during an Australian tour in November 2010.

I have done dozens of podcasts with e-journalists across the country, and several of my lectures are now on YouTube. *The American Denial of Global Warming* has over 250,000 hits  
[http://www.youtube.com/watch?v=2T4UF\\_Rmlio](http://www.youtube.com/watch?v=2T4UF_Rmlio)

### **Selected additional media appearances, 2011 onwards**

Doug Fabrizio Radio West, 24 February 2011

[http://www.publicbroadcasting.net/kuer/news.newsmain/article/184/0/1767090/RadioWest.\(M-F..11AM..and..7PM\)/22411.Merchants.of.Doubt](http://www.publicbroadcasting.net/kuer/news.newsmain/article/184/0/1767090/RadioWest.(M-F..11AM..and..7PM)/22411.Merchants.of.Doubt)

Fourth Street Forum with Denise Calloway, Milwaukee Public Television, 10 March 2011

<http://www.milwaukeeeturners.org/fourth-street-forum/>

“State of Things” with Frank Stasio, North Carolina Public Radio, WUNC-FM, Raleigh-Durham, North Carolina.

“More Talk Radio” with Cecil Prescod and Celeste Carey, KBOO-FM, <http://kboo.fm/MoreTalkRadio>

“Virtually Speaking Science”, <http://www.blogtalkradio.com/virtuallyspeaking/2011/10/20/naomi-oreskes-tom-levenson-virtually-speaking-science-1>

"Talk of the Nation" with Neil Conan, National Public Radio, January 24, 2012

<http://www.npr.org/2012/01/24/145732719/op-ed-the-verdict-is-in-on-climate-change>

National Public Radio, All Things Considered, February 22, 2012

<http://www.npr.org/2012/02/22/147263862/climate-scientist-admits-to-lying-leaking-documents>

French Public Radio, Science Publique, March 30, 2012.

“A Chronicler of Warnings Denied,” A profile by Claudia Dreifus, New York Times, October 28, 2014.

[http://www.nytimes.com/2014/10/28/science/naomi-oreskes-imagines-the-future-history-of-climate-change.html?ref=science&\\_r=0](http://www.nytimes.com/2014/10/28/science/naomi-oreskes-imagines-the-future-history-of-climate-change.html?ref=science&_r=0)

[http://www.nytimes.com/2015/02/17/opinion/animated-life-pangaea.html?\\_r=0](http://www.nytimes.com/2015/02/17/opinion/animated-life-pangaea.html?_r=0)

### **TED TALK**

Why we should trust scientists, Originally presented May 2014, New York City.

[https://www.ted.com/talks/naomi\\_oreskes\\_why\\_we\\_should\\_believe\\_in\\_science?language=en](https://www.ted.com/talks/naomi_oreskes_why_we_should_believe_in_science?language=en)

### **INVITED LECTURES**

“Geology of the Olympic Dam Copper-Uranium-Gold Deposit,”

- U.S. Geological Survey, Branch of Western Mineral Resources, Menlo Park, CA. Jan. 1986.
- U.S. Geological Survey Branch of Central Mineral Resources, Denver, CO. Feb. 1988.

- Peninsula Geological Society, Palo Alto, California, Nov. 1989.
- Geology Department Lecture Series, University of Vermont, Burlington, VT, Nov. 1990.
- Friends of Ore Deposits Lecture Series, U.S. Geological Survey, Reston, VA Nov. 1990.
- Gold Geology of Maar Diatremes, Randol at MinExpo '92, Las Vegas, NV Oct. 1992.

“The Rejection of Continental Drift: Theory and Method in American Earth Science.”

- History of Science Society Annual Meeting, Pittsburgh, PA, October 1989.
- Department of Geology, University of Maryland, August 1990.
- Ritter Memorial Lecture, Scripps Institution of Oceanography, March 1994.
- University of California, San Diego, screened on UCSD television station, March 1994.
- University of Washington, Department of Geological Sciences, March 1995.
- University of Oklahoma, Department of History of Science, March 1995.
- Princeton University, Department of Geological Sciences, March 1996.
- Five Colleges Lecture, Smith College, Northampton Massachusetts, February 1999.
- Cascade Volcano Observatory, Portland, Washington, May 2001
- U.S. Air Force Research Laboratory, Hanscom Air Force Base, MA, January 2002.
- Quay-Hebrew Endowed Lecture, Brigham Young University, March 2006.
- 15<sup>th</sup> Herbert Morowetz Lecture, Polytechnic University, Brooklyn, New York, March 2007.

“From Fact to Theory: American Geological Practice, 1922-1933,”

- Department of History, University of California at Los Angeles, March 1991.
- Department of Earth and Planetary Sciences, Harvard University, May 1991.

“The Right Choice? Historical Perspectives on Women in Science,” invited speaker,  
Women in Science Project Kick-Off meeting, Dartmouth College, September 1991.

“Unity, Gender, and the Authority of Science: Case studies from American Geology, 1922-1933,”  
Science, Technology and Society Lecture Series, Franklin and Marshall College, Feb. 1992.

“Gravity Surveys in the ‘Permanent’ Ocean Basins: An Instrumental Chink in a Theoretical Suit of  
Armor,” invited speaker, Plenary Session, *Continents vs. Oceans in the Earth Sciences Revolution*, Fifth Intl.  
Congress on the History of Oceanography, La Jolla, CA, July 1993.

“Objectivity or Heroism? On the Invisibility of Women in Science,”

- Department of Science and Technology Studies, RPI, Troy, NY, Sept. 1993.
- Feminist Inquiry Seminar, Dartmouth College, March 1994;
- University of California, San Diego, Science Studies Program, March 1994.

“Why Believe a Computer? Verification, Validation, and Confirmation of Numerical Models in the  
Earth Sciences”

- Scripps Institution of Oceanography, March 1994.
- Dept. of Computer Science and Electrical Eng., George Washington University, Nov. 1994.
- Georgia Institute of Technology, Dept. of Earth and Atmospheric Sciences, April 1995.
- Carleton College, Luce Lecture Series on Human Dimensions of Global Change, Feb. 1996.

- “Did Science Kill Nature? Sex, Gender, and the Scientific Revolution,” Dartmouth Alumni College, August 1994.
- “Work or Glory? The Image and Reality of Women in Science” Chancellor’s Advisory Committee on the Status of Women, University of California, San Diego, Feb. 1995.
- “Looking for a Few Good Women: Military Patronage and Scientific Labor at the Scripps Institution of Oceanography.” U.S. Naval Research Laboratory, Washington, DC, April 1997
- “Evaluation (Not Validation) of Quantitative Models.” U.S. Environmental Protection Agency, Lead Model Validation Workshop, Research Triangle Park, NC, Oct. 1996.
- “Truth or Consequence? Trade-offs in Building Computer Models of Complex Natural Systems.” U.S. Geological Survey, Menlo Park, CA, March 1997.
- “When Good Models Turn Out to be False: Sobering Examples from the History of Science,” Santa Fe Institute, Santa Fe, NM, January, 1998.
- “Model Assessment: Where Do We Go from Here?” Keynote speaker, U.S. Environmental Protection Agency, National Research Center for Statistics and the Environment, Workshop on Quality Assurance of Environmental Models, University of Washington, Sept. 1999.
- “Conceptual Issues in Model Assessment: What can we learn from past mistakes? “
- Los Alamos National Laboratory, Los Alamos, NM, January 2000.
  - U.S. Army Conference on Applied Statistics, Houston, TX, October 2000.
- “Science and Security Before the Atomic Bomb: The Loyalty Case of Harald Ulrik Sverdrup”
- University of California, Los Angeles, History Department, March 2000
  - Oregon State University, Horning Lecture Series, Corvallis, OR., May 2000
  - Santa Fe Institute Public Lecture Series, Santa Fe, NM, March 2001
  - Physics Department, New Mexico State University, Las Cruces, NM, March 2001
  - Caltech Science and Society Lecture Series, Pasadena, CA, June 2001.
  - Cornell University, Department of Science and Technology Studies, October 2001.
  - Keynote speaker: SOURCE [Symposium on Undergraduate Research and Creative Expression], Central Washington University, May 2003.
  - Penn State University, History Department, January 2005.
  - SPAWAR Systems Center, Summer Seminar Series, U.S. Department of Defense, Point Loma, California, July 2005.
- “From Scaling to Simulation: Changing Meanings and Ambitions of Models in the Earth Sciences”
- History of Science Society Annual Meeting, Vancouver, Canada, November 2000.
  - Princeton University, Workshop on Models & Model Systems, Princeton NJ, February 2001.
  - Harvard University, History of Science Department, Cambridge MA, March 2001.
  - Max Planck Institut für wissenschaftsgeschichte, “Digital Workbench” workshop, Berlin, Germany, December 2001.



“The Rise of Prediction in the Earth Sciences,” Department of Earth Sciences, University of California, Riverside, January 2001.

“Nuclear Waste Disposal: Bridging the Gap between Science and Policy”  
Invited Panelist, Geological Society of America, Reno NV, November 2000

“The Role of Quantitative Models in Science.” Keynote speaker, Cary conference IX: Understanding Ecosystems: The Role of Quantitative Models in Observation, Synthesis, and Prediction, Millbrook NY, May 2001.

“From Hydrogen Bombs to Hydrothermal Vents: The Discovery of Black Smokers on the Sea Floor”

- Cornell University, Peace Studies Workshop on Science and the Military, October 2001
- Harvard University, History of Science, Physical Sciences Research Group, November 2001
- Penn State University, Program in Science, Technology, and Medicine, January 2002
- Max Planck Institut für Chemie, Mainz, Germany, October 2002.
- Princeton University, History Dept. Workshop on *Science across the Seas*, March 2003.
- Columbia University, Earth Institute, Science, Technology, and Global Development Seminar, March 2003.
- University of Pittsburgh, History and Philosophy of Science Department Colloquium Series, April 2003.
- University of Minnesota, Program in History of Science and Technology, September 2005.
- University of California, Berkeley, May 2006

“Cold War Secrecy and the Development of Plate Tectonics”  
GEO2002, Würzburg, Germany, October 2002.

“Proof is over-rated,” Symposium on “The Politicization of Science: Learning from the Lomborg Affair,” American Association for the Advancement of Science, Denver, CO, February 2003.

“Proof, Persuasion, and Public Policy: Three Examples from the History of the Earth and Environmental Sciences;” *London School of Economics Workshop on the Practices of Objectivity in the Natural and Social Sciences*, London, England, October 2003.

“Decision-making under Uncertainty: Is there any other kind?” Keynote speaker, *European Commission Workshop on Science-Society Interfaces*, Milan, Italy, November 2003.

“Consensus in Science: How Do We Know We’re Not Wrong?” *2004 George Sarton Award Lecture*, American Association for the Advancement of Science, Seattle, WA, February 2004.

Also presented at

- UCSD Humanities Center, February 2004
- Department of Petroleum & Geosystems Engineering, University of Texas, Austin, March 2004
- Department of Earth Sciences, University of California, Riverside, California, April 2004
- Department of Geology, University of California, Davis, California, May 2004.
- Rock Ethics Institute, Penn State University, April 2005.
- Department of Geological Sciences, University of Minnesota, September 2005.
- NOAA (National Oceanic and Atmospheric Agency), Silver Spring, Maryland, July 2006.
- “Capital Science Evening,” Carnegie Institution of Washington, March 2007.

“Why There is Always (Some) Dissent in Science (and How to Think About It): A post-Kuhnian model”, European Commission Group of Policy Advisors, Workshop on *Risk, Uncertainty and Dissent: Dealing With “Chancy” Science and “Chancy” Society*, Seville, Spain, June 2004

“From Weather Modification to Climate Change: The Work of Gordon J.F. MacDonald” International Commission on History of Meteorology, *From Beaufort to Bjerknes and Beyond: Critical Perspectives on Observing, Analyzing, and Predicting Weather and Climate*, July 2004, Weilheim, Germany.

“Writing *Plate Tectonics*”

- Presentations to ERESE (Enduring Resources for Earth Science Education) Summer workshop for high school earth science teachers, Scripps Institution of Oceanography, July 2004 and July 2005.
- Palomar College, San Marcos, California, September 26, 2007.

“Strategies of Dissent over Climate Change”

- London School of Economics, Workshop, *Improving Policy Decisions in Areas of Risk and Scientific Uncertainty*, December 12-13, 2004,
- University of California, San Diego, Patrick Ledden Memorial Lecture Series, February 2005.
- University of California, San Diego, Climate Research Division, June 2005.

“The Misrepresentation of Climate Science.” John F, Kennedy School of Government, Harvard University, Workshop: *Machineries of Representation*, April 8, 2005.

“Deny, Deny, Deny: How to Sow Confusion over Climate Change,” Stanford University, Agnotology: A Workshop on The Cultural Production of Ignorance, October 2005.

“Dissent or Denial: Sorting out the Epistemic and the Political in Climate Change,” Workshop on Contingency and Dissent in Science, London School of Economics, December 2005.

“Reconciling Representations with Reality: Unitization as an Example for Science and Public Policy,” Workshop on Quality Control and Assurance in Scientific Policy Advice, Berlin-Brandenburg Academy of Sciences and Humanities, January 2006

“Science and Public Policy: What's proof got to do with it?” Scripps Institution of Oceanography, Center for Marine Conservation and Biodiversity, August 2006.

“Who’s Confused about Climate Change?”

- 3rd Annual Jack F. Ealy Workshop on Science Journalism, Institute of the Americas, University of San Diego, California, July 2006.
- “Doubt” Seminar, Organized by Professors Martha Minow and Peter Galison, Harvard University, December 6, 2006.

“Media Coverage of Climate Science: Panel Discussion,” Woodrow Wilson Center for Scholars, Washington, D.C., July 2006.

“Opportunities and Opportunism: How Cold War military oceanographers tried (and failed) to become environmental scientists who would resolve the question of global warming.”

- Harvard University, Department of History of Science Colloquium Series, December 5, 2006.

- University of Wisconsin, Madison, Department of History of Science Colloquium Series, February 8, 2007.

“Deflecting Disinformation about Climate Change”

- American Geophysical Union, Union Session, “Communicating Science Broadly,” December 14, 2006.
- U.S. Geological Survey, Menlo Park, California, February 20, 2007.

“The Scientific Consensus on Climate Change: How Do We Know We’re Not Wrong?” Cal Poly Pomona Campus Forum Distinguished Lecture Series, January 24, 2007

“Cold War Scientists and the Denial of Global Warming,”

- University of Wisconsin, Madison, Department of Geosciences, February 9, 2007.
- Stanford University, Woods Institute for the Environment, Stanford, California, February 20, 2007.
- Department for History, Philosophy and Theory of Science, Roskilde University, Roskilde, Denmark, September 7, 2007.

“Telling the Truth about Global Warming,” Madison Civics Club, Madison, Wisconsin, February 10, 2007.

“The tobacco road to global warming,” American Association for the Advancement of Science Symposium on The Socio-Political Construction of Ignorance: Agnotology, San Francisco, California, February 18, 2007.

“The Crucial Experiment that Wasn’t: Acoustic Tomography of Ocean Climate,”

- Keynote lecture, Knowing Global Environments: A Conference in Honor of Robert Kohler, University of Pennsylvania, May 10, 2007.
- Neils Bohr Institute, Copenhagen, Denmark, September 6, 2007.
- Schools of Life Sciences, Arizona State University, Tempe, Arizona, April 4, 2008.
- Science Studies Program, UC Davis, February 20, 2009.
- Keynote Lecture, Oregon State University, American Oceanography at Mid-Century, Corvallis, Oregon, May 14, 2009.
- University of Southern California, History Department Program in Science and Technology Studies, October 13, 2011.
- Harvard University, Department of History of Science, December 12, 2011.
- Yale University, Program in History of Science, January 30, 2012.

“Against disciplining Inter-disciplinarity,” Keynote Speaker, Critical Conversations: Methods and Practices in Interdisciplinary Science Studies, Patrick Suppes Center for the Interdisciplinary Study of Science and Technology, Stanford University, May 18, 2007.

“The Rejection of Continental Drift: Historical Reflections on Scientific Method,” Geological Society of London Bicentenary Celebration (Invitation only conference), September 11, 2007.

“Moving Beyond Crisis: Toward Sustainable Knowledge,” Keynote Speaker, Lewis and Clark 10<sup>th</sup> Annual Environmental Affairs Symposium, Lewis and Clark College, Portland, Oregon, October 3, 2007.

“The American Denial of Global Warming,” Scripps Institution of Oceanography/ Birch Aquarium, Jeffrey B. Graham Lecture Series: Perspectives on Ocean Science,” La Jolla, California, October 8 2007. [http://www.youtube.com/watch?v=2T4UF\\_Rmlio](http://www.youtube.com/watch?v=2T4UF_Rmlio)

“Science and Politics in the USA: Historical and Personal Perspectives,” Ambiente e Salute, Primo convegno internazionale, *Autonomia della scienza dal potere politico: Rischi e Danni di una dipendenza*. Istituto Italiano per gli Studi Filosofici, Naples, Italy, 24 October 2007.

“You can argue with the facts: A political history of climate change”

- British Academy, “Enquiry, Evidence and Facts: An Interdisciplinary Conference,” December 13, 2007, London, England.
- “Dissent in science,” Workshop, March 3, 2008, University of California, San Diego.
- Department of Land, Air, and Water, University of California, Davis, March 7, 2008.
- STS Distinguished Lecture, Dean’s Lecture Series, School of Natural Resources and the Environment, and Ford School of Public Policy, University of Michigan, Ann Arbor, April 7, 2008.
- Department of Geology, Stanford University, Stanford, California, April 17, 2008.
- “History that Matters: A Conference in Honor of Spencer Weart,” American Institute of Physics, May 9, 2008.
- Colby College, 20<sup>th</sup> Anniversary Celebration, Science and Technology Studies Program, Family Weekend, October 17, 2008

“The Denial of Global Warming,”

- Dublin Institute of Advanced Studies, Annual Statutory Public Lecture, September 3, 2008, Dublin, Ireland.
- Bates College, College Lecture Series, Lewiston, Maine, October 20, 2008.
- Franklin and Marshall College, Bonchek Lecture, Lancaster, Pennsylvania, November 10, 2008.

“Disagreement, Dissent, and Denial: The Social Destruction of Scientific Knowledge,” ScienceFutures conference, ETH, Zurich, Switzerland, February 6-8, 2008.

Moving Beyond Carbon? The U.S. Situation.” Keynote Lecture: *Towards Post-Carbon Societies*, Centre for energy and society, Department of interdisciplinary studies of culture, Norwegian University of Science and Technology (NTNU), September 5, 2008.

Politics in Science: Who Decides What Gets Done and What it Means? Presentation and Panel Discussion, Reuben H. Fleet Science Center, San Diego, CA October 1, 2008.

Chancellor’s Pre-Election Briefing, San Diego Civic Center, October 14, 2008.

“My facts are better than your facts”

- Symposium on “Traveling Facts,” History of Science Society Annual Meeting, Pittsburgh, Pennsylvania, November 2008.
- Intellectual History Seminar, The Royal Library, Copenhagen Denmark, March 13, 2009

“Adaptation to global warming: Do climate models tell us what we need to know?”

- Philosophy of Science Association Annual Meeting, Symposium on Climate Models, Pittsburgh, Pennsylvania, November 2008.
- National Science Foundation, Distinguished Lecture Series on Global Systems Science, Washington, DC June 1, 2009.

“The Social Deconstruction of Scientific Knowledge,” Workshop on Knowledge of Doing, Max Planck Institut für wissenschaftsgeschichte, Berlin, Germany, March 7, 2009

“The trouble with supply-side science,”

- Steno Institut, Aarhus University, Aarhus Denmark, March 9, 2009
- Climate Change: Global Risks, Challenges, and Decisions, Copenhagen, Denmark, March 12, 2009.

“Science, Technology, and Free Enterprise.” Special Session: Meet the Author of American Hegemony and the Postwar Reconstruction of Science in Europe, History of Science Society Annual Meeting, Phoenix, Arizona, November 21, 2009.

“Is Consensus the Goal of Science (and Should it Be)?”

- 10<sup>th</sup> Swiss Global Change Day, 31 March 2009, Berne, Switzerland, Swiss Academy of Sciences.
- Penn State University, Climate Policy Seminar and Symposium: Addressing Cross-disciplinary Challenges and Solutions, April 7, 2009.

Creativity in the Face of Climate Change: The Role of Humanities in Awakening Societal Change Panel Discussion In conjunction with the exhibition: Human/Nature: Artists Respond to a Changing Planet, Berkeley Art Museum and Pacific Film Archive, Friday, April 24, 2009

“Climate Conversations”, Moderator, [A series of evening lectures on Climate Change, 2009-2010.] Reuben H. Fleet Science Center, San Diego, California.

“Of Heroes, Villians, and Ordinary Men: Right-sizing Roger Revelle,” Reflections on the History of the Biological and Oceanographic Sciences, A Symposium in Honor of Professor Ronald Rainger, Lubbock, Texas, January 11, 2010.

“A New View of Science: Title Search Realism”

- Zucker Fellowship Lecture, Yale University, New Haven Connecticut, October 21, 2009,
- C. P. Snow Lecture Series, University of Maryland, Baltimore Country, Baltimore Maryland, November 2, 2009.
- Birch Aquarium, Scripps Institution of Oceanography, January 13, 2010
- AAAS Climate Literacy Forum, February 17, 2010.

“Merchants of Doubt: How a Handful of Scientists Obscured the Truth about Climate Change”

- University of Rhode Island Vetlesen Lecture Series, People and Planet 2010: Global Environmental Change, March 2, 2010. <http://www.youtube.com/watch?v=XXyTpY0NCp0>
- Geography Department, University of California, Berkeley, March 11, 2010.

“History (of Climate Science) as a Resource for Decision-Making,

University of California, Berkeley, *Conference on History as a Resource for Decision-Making*, March 12-14, 2010.

“Communicating Climate Science: Why is This So Hard? “  
NCAR/UCAR 50<sup>th</sup> Anniversary Lecture sponsored by TIAA-CREF, Conference on World Affairs,  
Boulder, CO, April 5, 2010.

“What have we learned about limiting knowledge in a democracy?” A panel discussion, *Conference on Limiting Knowledge in a Democracy*, The 21st *Social Research* conference at The New School Thursday, May 27, 2010

“Objectivity in a World of Truthiness,” *Conference on Objectivity in Science*, University of British Columbia, Vancouver, BC, Canada, June 18, 2010.

“Merchants of Doubt: How a Handful of Scientists Obscured the Truth on Issues from Tobacco Smoke to Global Warming” [Book Tour, talks and/or readings]

- New York Academy of Sciences, May 26, 2010
- Santa Monica Library, Santa Monica, CA, June 1, 2010
- Warwick’s Books, La Jolla, CA June 7 2010
- Reuben H. Fleet Science Center, San Diego California, June 8, 2010
- Climate and Sustainability: Moving By Degrees, a Media Forum sponsored by National Public Radio, Pasadena, California, June 9, 2010.
- Deutsche Welle Media Forum, Panel on dealing with climate “skepticism” Bonn, Germany, June 21, 2010.
- Science Chairs Seminar, University of Southern Denmark, Odense, Denmark, June 24, 2010
- Public Lecture, Copenhagen University, Copenhagen, Denmark, June 24, 2010
- National Press Club, Washington, DC, June 28, 2010
- Pew Center on Climate Change, Business Executives Leadership Council Washington, DC, July 15, 2010
- Netroots Nation, Panel, “Supporting Science, Benefitting Society”  
<http://www.sumofchange.com/video.php?vid=5b5114ad8>
- Hubert H. Humphrey Institute for Public Affairs, Minneapolis, Minnesota, August 11, 2010
- Will Steger Foundation Summer Institute for Climate Change Education and on-line Webinar, Minneapolis, Minnesota, August 12, 2010
- Long Beach Aquarium, August 26, 2010.
- Greater Yellowstone Coalition 27<sup>th</sup> Annual Meeting, Jackson Hole, Wyoming, September 24, 2010.
- Institute for History and Philosophy of Science and Technology, University of Toronto, Toronto, Canada, September 29, 2010.
- Inaugural Lecture, Program in Science and Technology Studies, York University, Toronto, Canada, September 30, 2010.
- Kansas State University, Manhattan, Kansas, October 18, 2010
- University of Kansas, Lawrence, Kansas, October 19, 2010.
- Fort Hays State University, Hays, Kansas, October 20, 2010.
- Brussels, Belgium: Controverses Climatiques : sciences et politique, October 27, 2010
- Brussels, Belgium, American Embassy Speaker Series, October 28, 2010
- Paris, France, Controverses climatiques : sciences et politique, October 29 2010
- Briefing with California State Senators, California State House, Sacramento, California, January 27, 2011

- UCSD Near You, Sacramento, California, January 27, 2011
  - Keynote Speaker, Carbonundrums: From Science to Headlines, Oslo, Norway, 8 February, 2011.
  - McGill University School of Environment Annual Lecture Series, Montreal, Canada, 10 February 2011.
  - Smith College, Five College-University Geology Lecture Series and Howard Hughes Medical Institute Lecture Series on Health, Water and Climate, Northampton, Massachusetts, February 17, 2011.
  - Wallace Stegner Center, University of Utah, February 28, 2011.
  - Gaylord Nelson Lecture Series, University of Wisconsin, Madison, March 8, 2011
  - Green Energy Summit, Plenary Session, “The Carbon Imperative,” Milwaukee, Wisconsin, March 10, 2011.
  - City of Aspen Canary Initiative and Aspen Ski Company, Limelight Lodge, Aspen Colorado, March 18, 2011.
  - Michael Polanyi Memorial Lecture, University of North Carolina, Chapel Hill, March 30, 2011.
  - University of California, San Diego, Department of Medicine, Grand Rounds, May 4, 2011.
  - Keynote Speaker, National Hydrologic Warning Council, San Diego, California, May 11, 2011.
  - Sir Michael King Memorial Lecture, Auckland Readers’ and Writers’ Festival, New Zealand, 14 May 2011, <http://events.nzherald.co.nz/2011/may/auckland-cbd/naomi-oreskes-and-the-merchants-of-doubt>
  - University of California, Los Angeles, Law School, May 25, 2011
  - University of California, San Diego, Emeritus Association, San Diego, CA, June 8, 2011.
  - Woodrow Wilson Center, Washington, DC, Climate Change communicator of the Year Award Ceremony (via web cast), June 8, 2011.
  - Google, Science Communication Innovation Workshop, Google, Mountain View, California, June 14, 2011.
  - Pacific Institute for Climate Solutions, University of Victoria, British Columbia, Canada June 27, 2011.
  - Pacific Institute for Climate Solutions, Simon Fraser University, Vancouver, British Columbia, Canada June 28, 2011.
  - Powell’s Bookstore, Portland, Oregon, June 29, 2011.
  - Microsoft Research, Visiting Speaker Series, Seattle, Washington, June 30, 2011.
  - International Energy Program Evaluation Conference, Annual Meeting, Boston, Massachusetts, August 16, 2011.
  - AREDAY (Annual Renewable Energy Day), Aspen, Colorado, August 21, 2011
  - Brigham Young University, David M. Kennedy for International Studies, Environmental Ethics Initiative Lecture Series, March 9, 2012.
  - Keynote Lecture, Facts, Artifacts, and the Politics of Consensus: A Midwest Conference for Science and Technology Studies, Northwestern University, Evanston, Illinois, May 4, 2012.
  - Keynote Lecture, Sustainability Day, California State University, Northridge, October 25, 2012.
  - Keynote Lecture, Earth Week, Salem State University, April 15, 2015
  - Keynote Lecture, History weekend, North Carolina State University, April 18, 2015.
- “Why we resist the results of climate science,”
- Philosophy of Science Association, Montreal, Canada November 4, 2010.
  - Steve Schneider Memorial Celebration, December 12, 2010 Stanford University, Stanford, California.

“Neo-liberalism, resistance to climate science, and the legacy of the Cold War,”

- History of Science Society, Montreal Canada, November 6, 2010.

“Merchants of Doubt: How a Handful of Scientists Obscured the Truth on Issues from Tobacco Smoke to Global Warming” [Australian Book Tour]

- University of New South Wales, Sydney, Australia, sponsored by Climate Change Research Center and Faculty of Arts and Social Science, November 15, 2010
- University of Queensland, Brisbane, Australia, sponsored by the Global Change Institute, November 16, 2010.
- Experimedia, The State Library of Victoria, Melbourne, Australia sponsored by the Monash Sustainability Institute and the Melbourne Sustainable Society Institute, , November 17, 2010.
- The Royal Institution of Australia, Adelaide, Australia, sponsored by the Royal Institution of Australia, November 18, 2010.
- The University of Western Australia, Perth, Australia, sponsored by the Institute of Advanced Studies, University of Western Australia, November 22, 2010.
- Environment Institute of Australia and New Zealand, Climate Change Leadership Forum, Perth, Australia, November 23, 2010.

“If the predictions of climate models have come true, then why don't people believe them?” American Geophysical Union Annual Meeting, San Francisco, California, December 15, 2010.

“Are debatable scientific questions debatable? “ Special Session on “Best-selling AGU Authors,” American Geophysical Union Annual Meeting, San Francisco, California, December 15, 2010.

“Facts and Trust, Uncertainty and Doubt: Lessons from the History of Science.” Oslo University Science Studies Seminar, February 7, 2011.

“On Mavericks and Mules: Diversity and Dissent in Science.” American Association for the Advancement of Science, Washington, D.C., February 19, 2011.

“Truth, Trust, and Peer Review: The Case of the 1983 Acid Rain Peer Review Panel,” Center for Culture, History and the Environment, University of Wisconsin, Madison, March 9, 2011.

Inconvenient Truths (A Panel Discussion), Los Angeles Times Book Festival, April 30, 2011.

Saving the World (A Panel Discussion), Auckland Readers' and Writers' Festival, Auckland, New Zealand, May 15, 2011.

Women Warriors for the Environment (A Panel Discussion) Sydney Writers' Festival, May 19, 2011

*The Merchants of Doubt*: Conversation with Robyn Williams, Sydney Writers' Festival, May 20, 2011

“You've Been Warned” (A Panel Discussion) Sydney Writers' Festival, May 20, 2011

“Blinded by the Right: Ideology, Ignorance, and Agnotology,” Conference on Agnotology: Ways of Producing, Preserving, and Dealing with Ignorance, Center for Interdisciplinary Research, Bielefeld University, May 30-1, Bielefeld, Germany.



Panel discussion of the future of radioactive waste management, Standards and Regulations for Deep Geological Disposal of Radioactive Waste, Center for International Security and Cooperation (CISAC), Stanford University, June 6<sup>th</sup>, 2011

“*Erring on the Side of Least Drama*: A Source of Confusion in Communicating Climate Science,” 2011 Stephen Henry Schneider Symposium, National Center for Atmospheric Research, Boulder Colorado, August 26, 2011.

“Moving Beyond Doubt: History, Truth, and Anthropogenic Climate Change”

- Rice University, Humanities Research Center, Houston, Texas, September 30, 2011.
- Bard College, Annandale-on-Hudson, New York, Hannah Arendt Center Conference: *Truthtelling: Democracy in an Age Without Facts*. October 28, 2011.
- Washington and Lee University, WS<sup>2</sup> : Women Scientists and Women in Science Lecture Series, Lexington, Virginia, November 14, 2011
- College, Alfred E. Golz Memorial Lecture, November 15, 2011
- Edwin Hay Teale Lecture Series, University of Connecticut, Storrs, Connecticut, November 17, 2011.
- Grace Tanner Lecture in Human Values, Snow College, Ephraim, Utah, March 17, 2014.

“What is the meaning of policy failure on climate change?” Climate Change 2011: When Policymakers Fail, Knight Science Journalism Fellowship Program, Massachusetts Institute of Technology, October 4, 2011.

“How does the slow motion nature of climate change affect our ability to address it?”

*Catastrophe and the Development of Environmental Law*, Yosemite Environmental Law Conference, Tenaya Lodge, California, Saturday, October 22, 2011

“ELSD (Erring on the Side of Least Drama): A Source of Under-Estimation in the Communication of Societal Risk.” Can We Trust Science? A Conference Sponsored by the Norwegian Ministry of Education, November 9-10, 2011, Oslo, Norway.

“Information, Disinformation, and Technological Responses to Climate Change”

- Plenary Session, Partners in Environmental Technology Technical Symposium and Workshop, The Strategic Environmental Research and Development Program and the Environmental Security Technology Certification Program, U.S. Department of Defense, November 29, 2011. <http://symposium2011.serdp-estcp.org/Plenary-Session>
- White House Office of Science and Technology Policy, Washington, DC, December 1, 2011.

“Rachel Was Not Wrong: Why the Science Surrounding DDT Matters Now More than Ever”

- UNAVCO Science Workshop, February 29, 2012.
- Wallace Stegner Center, University of Utah, S.J. Quinney School of Law, March 10, 2012.
- University of Nevada, Reno, Discover Science Public Lecture Series, April 17, 2012.
- Connecticut College, Five Decades after Silent Spring (Keynote Panelist), October 19, 2012.
- University of Connecticut, Keynote Speaker, Day in the Humanities, April 5, 2013, Storrs, Connecticut.

From Nuclear Winter to Climate Change: The Political Uses of Scientific Dissent,” Berlin Brandenburg

Academy of Sciences, Berlin, Germany March 20, 2012.

“Changing the Mission: American Oceanography at the End of the Cold War,” *Politics and Contexts of Science Studies in the Cold War and Beyond*, Alfred Krupp Wissenschaftskolleg, Greifswald, Germany, March 22, 2012.

“Les Marchands de Doute: Bataille de l’information et controverses sur les changements climatiques,” Catholic University of Louvain, Louvain-la-Neuve, Belgium, March 26, 2012.

“The Scientific Consensus on Climate Change: Where Do We Go From here?” Max von Laue Lecture, Deutsche Physik Gesellschaft, March 26, 2012, Berlin, Germany.

“Neo-liberalism and the Denial of Global Warming”

- Science Writing in An Age of Denial Conference, University of Wisconsin, Madison, Wisconsin, April 23, 2012.
- University of Chicago Franke institute for the Humanities, May 4, 2012
- Joseph Gentili Memorial Lecture, University of Western Australia, Perth, Australia, August 8, 2012.
- Lecture Discussion, Curtin University Sustainability Policy Institute, Fremantle, Australia, August 9, 2012.
- Lecture Discussion, Centre for Learning Technology, University of Western Australia, August 10, 2012.
- PLAN-Boulder Annual Dinner, Keynote Speaker, May 4, 2013, Boulder, Colorado.

“Science and Environmental Policy: How Do Scientists Assess Scientific Knowledge for Action” Karbank Symposium in Environmental Philosophy, Boston University, May 3, 2012.

“When Knowledge Isn’t Power: Science, Technology and the Environment in the 21st Century.”

- Cal Western Law School, June 7, 2012, San Diego, California.
- Invited paper in session GC33F “Countering Denial and Manufactured Doubt of 21<sup>st</sup> century Science,” American Geophysical Union Annual Meeting, December 3, 2012.
- Keynote Lecture, ‘Beyond Climate: Knowledge Production about Planet Earth and the Global Environment as Indicators of Social Change,’ University of Berne, Berne, Switzerland, 23 January 2013.
- Monfort Professor-in-Residence Lecture, Colorado State University, Fort Collins, Colorado, 2-3 May, 2013.

“Understanding the Climate Change Debate for Pacific People,” Regional Conference on Local Governments for Climate Change, July 18, 2012, University of the South Pacific, Suva, Fiji.

“The Scientific Consensus on Climate Change: Where Do We Go From Here?”

Keynote Speaker, North Dakota EPSCoR (Experimental Program to Stimulate Competitive Research) 2012 State Conference, University of North Dakota, September 18, 2012.

“Building Scientific Knowledge: The Story of Plate Tectonics” and “Climate Change: How Do We Know We’re Not Wrong?” Howard Hughes Medical Institute, 2012 Holiday Lectures on Science, November 15-16, 2012, Bethesda, Maryland.

- “Rethinking Uncertainty: What Does the Public Need to Know?” Invited paper in session GC22B “Communicating Climate Science, Seeking the Best of Old and New Paradigms,” American Geophysical Union Annual Meeting, December 4, 2012.
- “The Role of Uncertainty in Climate Science,” invited paper in Session PA13B “Construing Uncertainty in Climate Science,” American Geophysical Union Annual Meeting, December 5, 2012.
- “Historians as Expert Witnesses where Scientific Controversy is Alleged,” American Historical Association Annual Meeting, January 4, 2013, New Orleans.
- “How Earth Science Became a Social Science,” invited contribution, “Beyond Climate: Knowledge Production about Planet Earth and the Global Environment as Indicators of Social Change,” University of Berne, Berne, Switzerland, 23-25 January 2013.
- “Fix or Fail on Climate? An Open Conversation with Naomi Oreskes,” Limelight Dialogues, February 4 2013, Aspen, Colorado.
- “Who’s Responsible for Climate Change?”
- University System of Taiwan International Workshop on “Crises and Opportunities in Environmental Study,” February 20-21, 2013, Taipei, Taiwan.
  - Arizona State University, Wrigley Lecture Series, Global Institute of Sustainability, Earth Day (April 22) 2013.
- “Rachel Was Not Wrong: Why the Science Surrounding DDT Still Matters,” Keynote speaker, University of Connecticut Day of Humanities, April 5, 2013.
- “The Boundary between Science and Policy,” Comment on Session III “Climate Change,” U.S. National Academy of Sciences Arthur Sackler Symposium, The NAS at 150: Celebrating Service to the Nation, October 17, 2013.
- Science Teller Conference, Dunedin, New Zealand, October 25-27, 2013
- “Telling the Truth through Fiction,” October 24. ([Keynote])
- “The Fallacy of Rationality,” October 25.
- Reading from “The Collapse of Western Civilization,” Closing talk at Literature and Lager, [Final conference event] October 27.
- “The Limits of Symmetry,” American Anthropological Association, November 21, 2013. Chicago, Illinois.
- “What voice for science?” Invited paper, *An Open World: Science, Technology and Society in the Light of Neils Bohr’s Thought*, [Illness prevented my attendance, paper read on my behalf by Finn Asserud.]
- “Uncertainty Assessment: A Form of Seepage?,” invited paper in Session GC0039 “Assessing and Conveying Uncertainty,” American Geophysical Union Annual Meeting, December 11, 2013.
- “Scientists as Sentinels” Invited paper in Union Session U001 *400 ppm CO<sub>2</sub>: Communicating Climate Science*, American Geophysical Union Annual Meeting, December 13, 2013.

- “The University and the Public Good: What Should We Be Doing on Climate Change?”  
UC Davis Provost’s Forum on the Public University and the Social Good, February 21, 2014,  
Davis, California.
- “The Collapse of Western Civilization.” A Panel Discussion on Navigating Climate Futures, Pacific  
Northwest College of Art, Portland, Oregon, March 14, 2014.
- “The Role of Scientists: What Is our Responsibility?” Pontifical Academy of Sciences and Pontifical  
Academy of Social Sciences Joint Workshop on Sustainable Humanity, Sustainable Nature, Our  
Responsibility, Vatican City, May 2-6, 2014.
- “Merchants of Doubt: The Movie,” Panel discussion on Climate Change Denial, WGBH, Jackson Hole  
Wildlife Film Festival Bring Science Media Awards & Symposium to Boston September 18, 2014.
- “How to stop disastrous climate change,” Week of environmental awareness" sponsored by  
Departments of Earth and Oceanographic science, Environmental Studies, and History, Bowdoin  
College, Brunswick, Maine, October 3, 2014
- “Historical and Normative Perspectives on the,” Keynote lecture, The Anthropocene Project, Haus der  
Kulturen der Welt, Berlin, Germany, October 16, 2014; ·*The Anthropocene: a confrontation of scientific  
and political realities*”, *idem*. October 17, 2014, and “Petrogeology and Denial,” a conversation with Colin  
Summerhayes, *idem*, October 17, 2014.
- “Personal and Political Perspectives on Climate Change,” The Wellfleet Seminar, Wellfleet, MA,  
October 25, 2014.
- “Why I am a Presentist,” History of Science Society, Forum for American Science Distinguished  
Lecture, November 2014, Chicago, Illinois, USA.
- “Science, Religion, and Climate Change,” invited speaker, American Academy of Religion Annual  
Meeting, San Diego California, November 24, 2014.
- “Confronting Climate Change,” A conversation with Robert Jay Lifton and Naomi Oreskes, moderated  
by Tom Englehardt, TomDispatch.com, The Center for Public Scholarship at The New School,  
December 4, 2014.  
<http://www.newschool.edu/pressroom/pressreleases/2014/ConfrontingClimateChange.htm>
- World Economic Forum, Davos, Switzerland: January 20-24, 2015. Various sessions on science,  
technology, and the environment. <http://www.weforum.org/contributors/naomi-esther-oreskes>
- “Technofideism and Climate Change,” Keynote Speaker, PACITA (Parliaments and Civil Society in  
Technology Assessment), Berlin, Germany, February 25, 2015.
- William T. Patten Lectures, Indiana University, Bloomington, Indiana:
- “From Crying Wolf to Fiddling while Rome Burns: Historical Perspectives on Scientists’ Social  
Responsibility,” March 9, 2015.
  - “Merchants of Doubt: How a Handful of Scientists Obscured the Truth on Issues from Tobacco  
Smoke to Global Warming,” March 11, 2015.

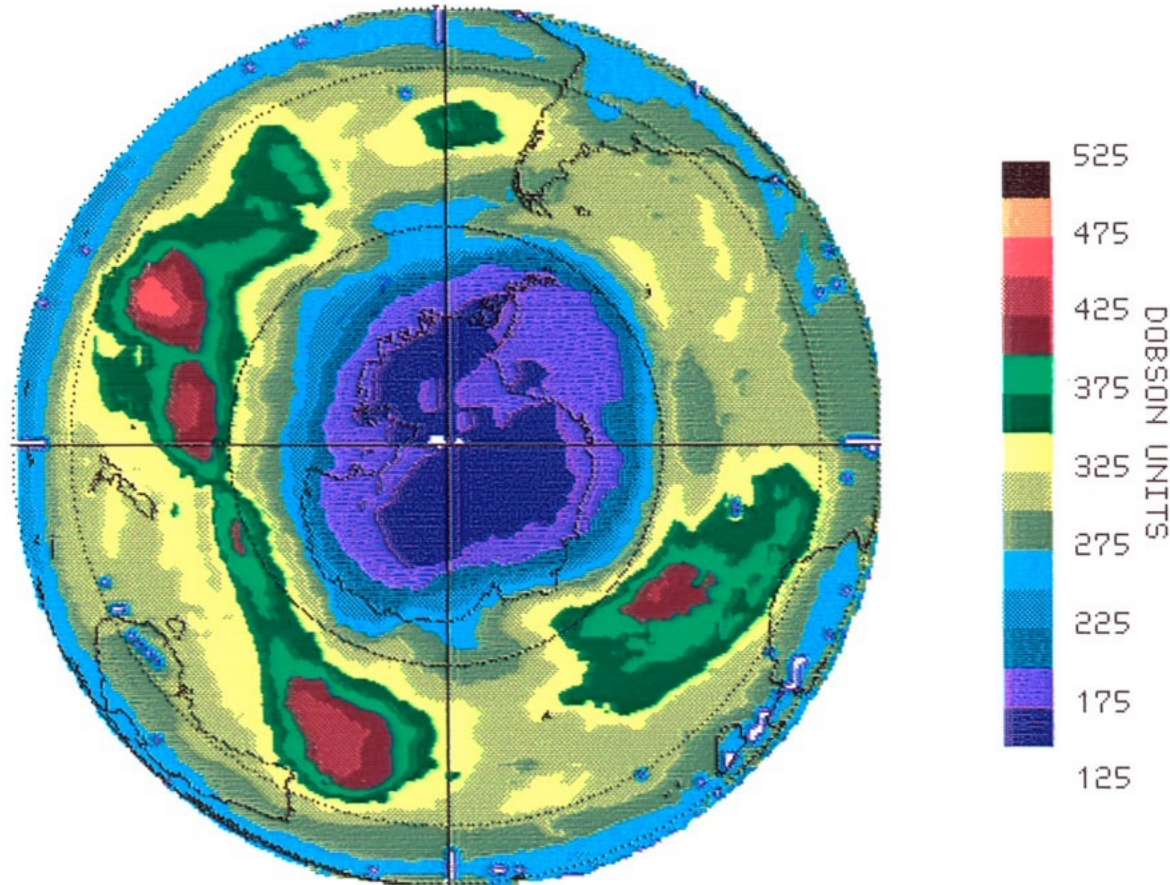
“From Crying Wolf to Fiddling while Rome Burns: Historical Perspectives on Scientists’ Social Responsibility,” March 9, 2015, Keynote Lecture, Columbia History of Science Group, Friday Harbor, WA, March 13, 2015.

“Why should we trust climate science?” Orcas Currents Lecture Series, Orcas Island, WA, March 15, 2015.

“What kind of world will musicians inherit in the year 2050? A view from the future with Naomi Oreskes,” New England Conservatory, March 31, 2015.

# Ozone Loss in Southern Hemisphere from Satellite

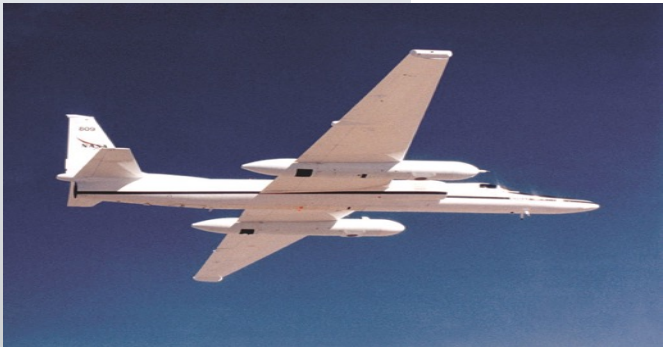
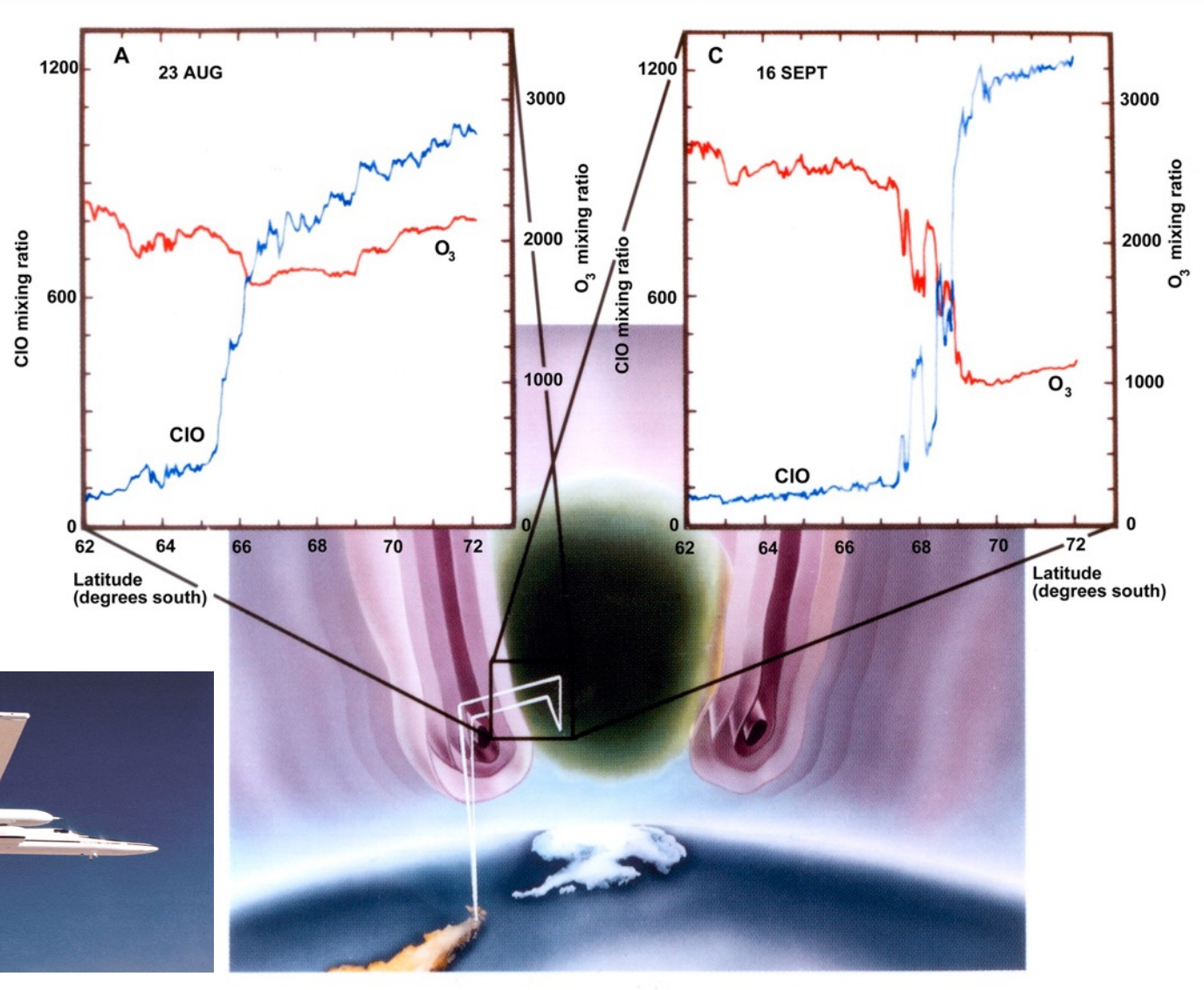
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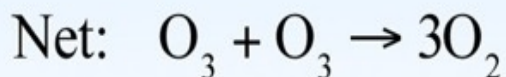
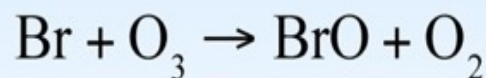
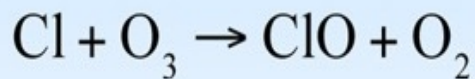
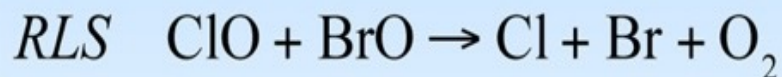
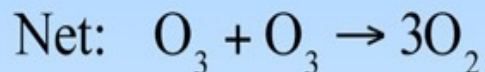
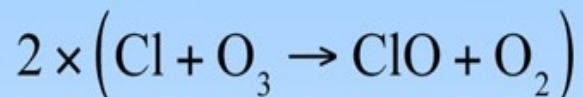
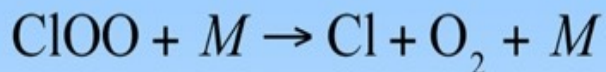
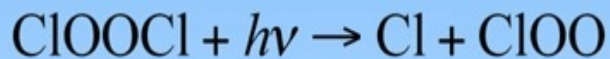


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## Ozone Concentration

