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# Climate scientists not cowed by relentless climate change deniers

Groups that provide moral support, legal counsel, and swift rebuttals of misinformation are sprouting up.

Receiving an email with a statement like “You should resign, and if you don’t, I’ll work to see that you are fired” or “I know where your kids go to school” would be unsettling enough. But they “pale compared to what other climate scientists are getting,” says Raymond Orbach, director of the Energy Institute at the University of Texas at Austin, at whom the first threat above was aimed.

Now climate scientists—in atmospheric physics and chemistry, geophysics, meteorology, hydrology, and oceanography, among other disciplines—have begun to fight back. “I think the community is finding a voice,” says Ben Santer of Lawrence Livermore National Laboratory, whose work has largely focused on identifying the human influence on global climate, and who once answered a late-night knock to find a dead rat on his doorstep.

Climate scientists overwhelmingly agree that climate change is happening, although details of how it will play out are uncertain. Every few years, the Intergovernmental Panel on Climate Change (IPCC) issues a report prepared by hundreds of scientists and government officials from around the world; the next is due out in 2014. The latest, published in 2007, says that warming of the climate system is unequivocal, that most of the observed increase in globally averaged temperatures since the mid 20th century is due to human activities, and that past and future anthropogenic carbon dioxide emissions will contribute to warming and sea-level rise for more than a millennium. Yet deniers have hampered efforts to tackle climate change, and their actions, especially in North America, the UK, and Australia, have led to climate researchers being investigated by their governments, suffering nervous breakdowns, and spending time and money defending their rights and reputations.

## Successful tactics

Harassment of climate scientists by climate-change deniers goes back at least to 1995, after the IPCC published its Second Assessment Report. Santer

was the lead author of chapter 8, which looked at the causes of climate change. “The single sentence ‘The balance of evidence suggests a discernible human influence on global climate’ changed my life,” he says. “I was the guy who was associated with this sentence. Those who did not like that finding did everything not only to undermine the finding but also to undermine my scientific reputation.”



**Ben Santer testified** in May 2010 before the now-defunct House Select Committee on Energy Independence and Global Warming about the harassment of climate scientists.

The harassment has ramped up in recent years, says Michael Mann of the Pennsylvania State University, whose book *The Hockey Stick and the Climate Wars: Dispatches from the Front Lines*, due to be published by Columbia University Press in early March, includes a retelling of his own ongoing experiences with harassment. “Political intimidation, character attacks, what appear to be orchestrated phone and email campaigns, nasty and thinly veiled threats, not just to us but to our families, are what it means in modern American life to be a climate scientist,” says Mann.

Even this magazine, after publishing last October articles on the science of climate change—about its being under fire and about communicating that science to the public—received an abundance of letters with the tenor, “How could PHYSICS TODAY print such a one-sided portrayal of climate science when many reputable scientists disagree?”

Fossil-fuel interests, says Gavin Schmidt, a climate researcher at NASA, “have adopted a shoot-the-messenger approach. It’s been a very successful strategy. They have created a chilling effect, so other [scientists] won’t say what they think and the conversation in public stays bereft of anyone who knows what they are talking about.” Schmidt cofounded RealClimate.org, a forum for climate scientists to “provide a quick response to developing stories and provide the context sometimes missing in mainstream commentary.” Meanwhile, the Competitive Enterprise Institute, a vocal opponent to limiting greenhouse gas emissions, is suing NASA for the release of Schmidt’s personal emails.

Kevin Trenberth of the National Center for Atmospheric Research says he has seen young scientists get a surge of nasty emails when they publish on climate change. “They are flabbergasted. A lot of the community is unaware this is happening.” And, he notes, the people who send the emails have “gotten off scot-free.”

Although direct correlation is difficult to prove, climate scientists point to governmental inaction to exemplify deniers’ successes. The US never signed on to the Kyoto Protocol, the international agreement to reduce emissions of greenhouse gases, and in December Canada became the first country to withdraw from the agreement. Public concern about climate change is volatile, and the US and many other governments have dragged their feet on requiring emissions reductions. “Burning fossil fuels has consequences for air quality, acid rain, climate change,” says Trenberth. “The biggest problem is that [the US] has not put a price on carbon. There ought to be a cost attached [to emissions] to compensate future generations for all the environmental and health damages, especially those damages yet to come.”

US HOUSE OF REPRESENTATIVES



GARY WAGNER PHOTOS

**Climate scientist Gavin Schmidt** in December 2011 receiving the first annual American Geophysical Union Climate Communications Prize.

“We as a society have suffered lost opportunities due to the climate change denial movement,” says Mann. “If their goal has been to mortgage the lives of their children and grandchildren, then the campaign has been successful. It has certainly set back efforts to curtail emissions.” It hasn’t helped, he says, that the media have often been one-sided or inaccurate in their coverage of deniers’ attacks on climate change.

Still, climate scientists say they don’t think the denier movement has discouraged people from doing climate-related research. “I hope not,” says Santer. “It would be a sad outcome if it deterred people from working on these critically important issues.”

### Denying the deniers

Santer’s approach to false claims is to set the record straight. For example, when some scientists claimed that global warming has stopped and that computer models cannot simulate decade-long periods with little or no warming, Santer and colleagues showed that simulations can indeed produce such hiatus periods. Santer says, “I have tried to do the science necessary to address extraordinary and incorrect claims of no warming or no human influence. I don’t think we have the luxury of letting such false claims go unchallenged. If our elected representatives are to take wise decisions on how to address climate change, they need access to the best scientific information, not to wishful thinking and misinformation.”

Debunking the myths by summarizing the science “should be the ultimate tool to push back,” says Eelco Rohling, a paleoclimatologist at the UK’s University of Southampton. “But at the moment it’s a losing battle.” Rohling is involved in efforts to create a uniform framework for analyzing and reporting paleoclimate research results. “What we need for both science and for outreach to the public is to all sing from the same hymn sheet,” he says. “Hopefully [the framework] will create more uniformity in the numbers that come out, so deniers can’t cherry pick the numbers they use.”

Rather than trying to change people’s minds, Orbach, who served as undersecretary for science at the US Department of Energy under President George W. Bush, says he is focusing on “adaptation”—on practical responses to climate change. “There is an area of disagreement—the anthropogenic contribution to climate change—but evidence points to an increase in global temperature, whether or not people are responsible. Now let’s find a way to deal with the situation we face—houses in areas that flood, lack of water, and so on.”

### Throwing punches

Climate scientists have gotten some good publicity. Most prominent was the Nobel Peace Prize in 2007, which was shared by Al Gore and the IPCC “for their efforts to build up and disseminate greater knowledge about man-made climate change, and to lay the foundations for the measures that are needed to counteract such change.” New annual prizes for climate change communication were created last year by the American Geophysical Union and Climate One, a radio and TV program from the Commonwealth Club of California. And the board of directors of the American Association for the Advancement of Science (AAAS) in June issued a rare statement saying they were “deeply concerned” by the attacks on climate scientists. The “hostile environment” created by the attacks, the statement continued, “both impedes the progress of science and interferes with the applications of science to the solution of global problems.” The AAAS statement was a way to “fight back,” says Orbach, who is on the board of directors.

One new development is the Climate Science Rapid Response Team, which features more than 140 climate scientists plus a few historians and economists on call to provide information to journalists and lawmakers. Trenberth, a member of

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the team, says, “[We] provide rebuttal, response, and clarification” to misleading reports in the media.

This past September, rapid response team cofounder Scott Mandia and others launched the Climate Science Legal Defense Fund. The nonprofit group raises money for climate scientists embroiled in legal battles. As of Decem-

ber, it had raised more than \$20 000 for Mann, who is fighting Freedom of Information Act demands by the American Tradition Institute think tank for 5000 pages of his email correspondence. The fund also offers informal counseling to harassed climate scientists and plans to hire a staff attorney to offer quick and experienced help. “Many sci-

entists think they can win by blocking punches. You have to throw them,” says Mandia, who teaches physical sciences at New York’s Suffolk County Community College. “The main thing is that the world understands there is a group that will defend climate scientists who are being harassed.”

Toni Feder

## Small business technology program gains new lease on life

Six-year extension of grants act will give small companies a leg up in the scramble for increasingly scarce federal research dollars.

Although the federal science and technology budget is expected to shrink in the coming years, one of the largest federal R&D programs should continue to thrive: Congress took action last month to extend the \$2.3 billion Small Business Innovation Research program for six years. The SBIR’s reauthorization will increase from 2.5% to 3.2% the amount of money that goes to small businesses from the so-called extramural—that is, externally performed—R&D budgets of 11 federal agencies. But it will also shrink the amount of money available for universities, the major external performers of federal basic research.

The agencies participating in the SBIR program range in size from the Department of Defense and the National Institutes of Health, which handed out SBIR grants totaling \$1.2 billion and \$616 million, respectively, in fiscal year 2010, to the Environmental Protection Agency, which issued \$4.8 million in grants that year. Taken together, the SBIR programs are larger than the R&D budgets of all but six departments—DOD, NIH, NSF, NASA, and the US Departments of Agriculture and Energy.

Eligible small businesses, with 500 or fewer employees, compete for funds by responding to annual solicitations.

### Program gets high marks

Charles Wessner of the National Research Council, who has headed exhaustive reviews of the SBIR projects of the five largest agencies, says they are generally fulfilling agency missions. An NRC assessment of the DOD program, for example, concluded that it was “contributing directly to enhanced capabilities . . . and the needs of those charged with defending the country.”

Equally important, he notes, the SBIR program also provides a direct route for small businesses to compete for federal technology dollars. Practically, the only other option for a small company to get federal development funding is to subcontract for a large corporation.

All SBIR awardees must begin with a phase-one feasibility study, for which a maximum of \$150 000 over six months is available. Only then are they eligible for a phase-two grant. The program is highly competitive, says Wessner. Only 20% of applicants receive a phase-one

award, and just half of those succeed in getting a phase two. Although guidelines call for those grants to be limited to \$1 million over two years, NIH, in particular, has awarded some multi-million-dollar grants; the reauthorized program caps them at \$2 million.

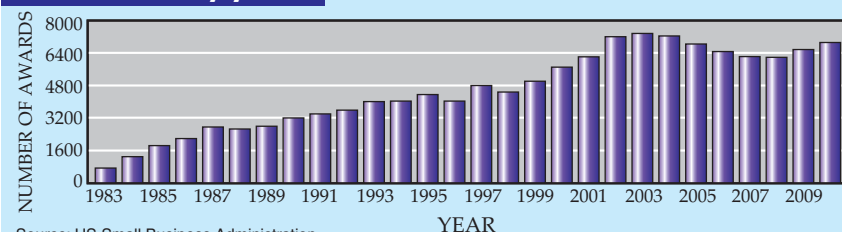
A new feature of the reauthorized program makes companies that are majority owned by US venture capital firms eligible to receive SBIR awards. But as before, no limit is placed on the number of awards a company may receive. A few companies have amassed hundreds over the years. For example, Physical Optics in Torrance, California, got its start in 1985 with an SBIR grant; through FY 2010 it had been awarded 1243 grants from seven different agencies. The company has introduced more than 100 products and created six spinoff companies. Its products are in use at dozens of military and DOE installations.

Some large companies, such as cell-phone manufacturer Qualcomm and internet security provider Symantec, originated from SBIR grants. More recently, A123 Systems, an MIT spinoff, had help from at least four SBIR grants in developing lithium-ion battery technology now being manufactured in the US for electric vehicles. ViewPlus, a company founded by Oregon State University physics professor John Gardner, developed a line of Braille printers and expanded the applications for its products with the help of 15 SBIR grants from NSF and NIH. The company has collaborated with the American Physical Society to make APS journals more accessible to visually impaired users.

### Room for improvement

The NRC reviews have found that SBIRs have stimulated patents, publications, and technology transfer at universities and have encouraged the formation of new businesses. The review

### SBIR awards by year



Source: US Small Business Administration

Through fiscal year 2010, the Small Business Innovation Research program has awarded more than \$29 billion in 118 000 grants to help small companies develop new technologies.