

CREATING SPACE FOR SCIENCE AND CELEBRITY  
IN THE PUBLIC DISCUSSION OF CLIMATE CHANGE

by

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## ABSTRACT

Climate change is one of the most prominent topics in news, politics, and popular culture today. For many years the topic has been presented as an unresolved debate between believers and skeptics, leading to a perpetual state of confusion and helplessness in the public eye. In the past eight months newspapers and magazines have begun to suggest that the climate change debate is over. The scientific consensus agrees that climate change is happening and it is the result of human influence on the Earth's atmosphere. Yet this consensus has not effectively translated into the public consciousness. This gap between scientific understanding and the public perception of climate change is partly a result of limitations in popular media. It also comes from scientific reluctance to embrace modern and popular cultural modes of communication such as feature films, television programs, books, and alternative news sources. This includes interaction with non-scientist communicators and spokespeople. By paying attention to popular culture events and spokespeople, being prepared to speak to a non-scientific audience, and reaching out directly to this audience, scientists can play a significant role in the evolving public dialogue on climate change.

## INTRODUCTION

Climate change and its implications for the American way of life are among the most prominent science-related topics in news, politics and popular culture today. The public media has become saturated with reports and debates on the state of the earth's climate. Although the news media is admittedly a fickle business, there is no indication that climate change itself, or the discussion of it, is going away anytime soon. This translates into a tangible, growing demand for informed, confident and inspiring spokespeople to answer the public's questions about climate change. Journalists and documentary filmmakers need more than just a talking head; they need and should demand someone who can explain the complex science while also instilling it with the passion of one who has personal experience with the subject - in other words, someone with a story to tell. Some scientists, with the proper incentive, training and support, are uniquely positioned to fill this need.

Many Americans are just now learning about climate change, and they're learning about it very quickly. Every day brings multiple, and often conflicting, news reports. The Discovery Networks and National Geographic Channel are brimming with programs on species extinction, habitat destruction, and an assortment of global catastrophes, all attributed to climate change. 2006 is poised to become the first year where three non-fiction films about climate

change see theatrical release.<sup>1</sup>

For some groups however, climate change is nothing new. Recently much of earth science has focused on some aspect of a changing climate, and our scientific understanding of the problem has increased by leaps and bounds during the past decade. Unfortunately, and for myriad reasons, this gain in scientific understanding has not translated well into the public consciousness.

If scientists are to succeed in affecting the public understanding, perception, and judgment of climate change, they need to pay close attention to the ongoing public dialog, including viewpoints espoused in popular films, books and alternative news sources. Scientists also need to be proactive and reach out directly to non-science communicators as well as to the public through the usual avenues of television news interviews and documentary films. A robust media training and outreach orientation program may be the best and most essential way to build confidence and motivation for scientists who take on the difficult task of communicating climate change to the public.

To develop a clearer picture of how climate change came to the forefront of science and popular culture, one must first review some key people and events from the past 15 years that have shaped our current understanding of the subject. It is not enough to simply look at the evolution of climate science, nor is it sufficient to monitor just the trends in popular culture and its media coverage. It is the intersection of these two timelines, and the people who have populated them, where patterns begin to emerge and ideas come to life.

## INTERSECTIONS OF SCIENCE AND POPULAR CULTURE

James Hansen, celebrity scientist

Dr. James Hansen, director of NASA's Goddard Institute For Space Studies, has been called "the world's leading researcher on global warming (Pelley)." He was the first scientist to bring the term "global warming" into public discourse when in 1988 he published and later presented the results of his early climate modeling efforts before the Senate Committee on Energy and Natural Resources (Hansen 1988). He pioneered the field of global climate modeling based on satellite observations and has spent the past two decades refining, scrutinizing and interpreting these models and their output.

Hansen's work has been cited by hundreds of climate researchers, science writers, policy makers, authors, filmmakers, journalists, and politicians around the world. Huge amounts of praise and criticism have befallen Hansen and his climate model, both inside and outside of the scientific community. Supporters have named him "The Paul Revere" and "The Elvis" of climate change science.<sup>2</sup> Critics have called him a "martyr" and an "alarmist."<sup>3</sup> Former Vice President Al Gore vocally criticized Hansen in another Senate testimony in 1989 for allowing government officials to edit his reports (An Inconvenient Truth), and nearly twenty years later called Hansen a "climate crusader" in *TIME* magazine's May 2006 special issue on the world's 100 most influential people

(78). In the same month *Vanity Fair* magazine published its special "Green Issue" with a glowing feature on James Hansen in the Hall of Fame category (Wolcott).

Hansen got his most recent boost in public visibility when he told *The New York Times* (Revkin 2/06) that White House officials and political appointees within NASA had censored him after his presentation "Is There Still Time to Avoid 'Dangerous Anthropogenic Interference' with Global Climate?" at the American Geophysical Union fall meeting in December 2005 (Hansen 12/05). He later appeared on CBS News' *60 Minutes* with the same declaration of censorship (Pelley). NASA and other agencies quickly responded with a new "Statement on Scientific Openness" (NASA 2/06) followed shortly thereafter by a statement of support for this policy, James Hansen, and all NASA scientists and engineers, signed by 362 NASA employees (NASA 3/06).

In reference to the controversy over his altered 1989 congressional testimony, James Hansen said in 2000:

The brouhaha may have helped keep attention on the global warming topic, but it failed to illuminate the scientific issues and uncertainties. And the public global warming "debate" continues to contrast opposite intransigent positions, rather than exemplifying how science research really works. I suggest to students that they view the debate in the media the way young Berenstain Bear viewed the botched bicycle lessons of Papa Bear: "this is what you should not do". A good scientist does not act like a lawyer defending the position of a client. (Hansen 2000)

Whether he is defending his position or simply stating the facts as he knows them, James Hansen is the closest thing climate change has to a "celebrity scientist" and his influence is incredibly widespread.

### The Day After Tomorrow

On May 28, 2004, writer-director Roland Emmerich released his feature film *The Day After Tomorrow* in the United States (2004). The fictional plot told the story of a climatologist who discovers that the world is about to undergo rapid climate change in the period of just a few days. The Atlantic thermohaline circulation system or "ocean conveyor belt" has slowed to a halt and causes an instant ice age in most of the Northern Hemisphere.

While many scientists laughed at the film because it grossly oversensationalized the science, Emmerich and his team were busy raking in the box office proceeds. The film's screenwriter, Jeffrey Nachmanoff, *did* consult climate experts, including those at NASA, when developing the script. The writers got some of the science right and some of it wrong but they made climate change happen in much too short a timeframe to make the film at all credible in the broader scientific community.

Widening the gap between science and fiction even more, some of the scientists who consulted with the film's writers were discouraged and even prohibited from publicly reviewing or discussing the film in interviews. NASA as an agency took a "no comment" stance on the film, with one exception. One journalist asked NASA oceanographer David Adamec to attend a sneak preview of the film and later discuss the validity of the science for an article in *USA Today* (Williams).

### State Of Fear

On December 7, 2004, bestselling science fiction writer Michael Crichton released *State Of Fear*, a novel that involves “a terrorist plot to manipulate the forces of nature and fool the world,” led by none other than “scientists and activists committed to the cause of environmental protection (12/04 press release). It reached #1 on the Amazon.com bestseller list and was popular even with the president of the United States. According to one presidential biographer, “Early in 2005, political adviser Karl Rove arranged for Crichton to meet with Bush at the White House. They talked for an hour and were in near-total agreement. The visit was not made public for fear of outraging environmentalists all the more (Barnes).” Later in 2005, Crichton was invited to testify before the Senate Committee on Environment And Public Works (Crichton 2005). The president was not the only person who picked up *State of Fear*. Many climate experts, including James Hansen, have published criticism of the novel's misrepresentation of their science.<sup>4</sup>

### Hurricanes and Climate Change

For many Americans, the arrival of Hurricane Katrina on August 29, 2005, was a wake-up call. Many analysts and journalists have described Katrina as the “tipping point” that caused Americans to finally acknowledge that our climate is changing.<sup>5</sup> Six months after the storm, 85% of Americans believed that the earth

was warming (Krosnick). The NASA image of Katrina moving across a bright red Gulf of Mexico became commonplace in magazines, websites, and television programs.<sup>6</sup> From CNN to *Rolling Stone* to NPR to NOVA to *The Washington Post*, and so on, the media - and the American consciousness - became saturated with the almost unanimously accepted statement, "global warming is causing more hurricanes."

Meanwhile the scientific community was, and still is, nowhere near unanimous on the subject. In fact, the link between climate change and hurricanes has instigated one of the most vicious scientific debates in recent history. The debate began when Kerry Emmanuel, a professor of atmospheric science at MIT, published the article, "Increasing destructiveness of tropical cyclones over the past 30 years" in the journal *Nature*, just three weeks before Katrina (686-688). This fueled not only the media storm, but also a slew of articles, essays, debates and science talks by numerous experts in the field, including Emmanuel's former teacher, Bill Gray, a.k.a. "The World's Most Famous Hurricane Expert (Achenbach)."

In January 2006, Emmanuel himself stated that it would be "absurd to attribute the Katrina disaster to global warming ([Wind.mit.edu](http://Wind.mit.edu))," and removed himself from public debates with Gray on the subject (Achenbach). Yet, in May 2006, *TIME* magazine was still naming Emmanuel the man "who helped us make the connection" between global warming and more hurricanes (Kluger). While the scientific jury is still out on a definitive cause-and-effect relationship between

global warming and hurricane activity, there is one thing that most scientists will agree on: more research is needed.

Although this select list of examples is by no means comprehensive of the many recent intersections between science and popular culture, it highlights some of the major hurdles that scientists face when communicating with the public. Fiction and nonfiction films, novels, television news and other media, rarely allow for direct interaction between science and the public. Limitations abound, whether it is the lens of a camera, the personality quirks of a fictional character, the preference for entertainment over education, or simply the limitations of time. These limitations act as filters through which science must pass before it reaches a non-scientific audience. They widen the gap between the increasing scientific understanding of climate change and the seemingly stagnant level of public understanding, perception and judgment on the subject. Public *awareness* may increase with these more frequent intersections, and that may ultimately lead to changes in perception and judgment simply as a result of visual saturation, but public *understanding* is left behind.

One final example of a recent intersection of climate change science and popular culture was the inspiration for writing this essay:

#### The Oprah Winfrey Show

In October 2005, a producer from *The Oprah Winfrey Show* asked NASA permission to use images showing 27 years of retreating Arctic sea ice (Bellue

10/20/05). NASA had released these images, along with a press release and an interview with a NASA researcher on national news the month prior (NASA 9/05), and in the course of just a few weeks the images appeared on *Good Morning America*, the front page of *The Washington Post*, *ABC World News Tonight*, *Saturday Night Live*, *US News And World Report*, and *The Daily Show*, to name a few. Oprah wanted to do a full hour special on global warming.

After sending the images and supporting climate change video materials to *The Oprah Winfrey Show*, NASA public affairs officers recommended an interview with a scientist based on their opinion of his ability to effectively communicate complex science to a daytime television audience. Oprah “went another route” and invited Leonardo DiCaprio to speak on the program (Bellue 10/24/05).

Many at NASA were disappointed with this outcome.<sup>7</sup> The program was willing to use NASA images, video, and science, but not NASA scientists. The selection of a well-known actor with no scientific background seemed like a blatant attempt to boost ratings. NASA later recognized the situation as an opportunity to examine the way that the agency uses its greatest resource - its people - to reach the public.

Actors are never going to be climate experts, and climate experts will never be actors, but that does not mean that they do not and cannot take part in the same public discussion of climate change, where scientists are often not heard - either for personal or political reasons. Why shouldn't scientists actively

stake their claim in this discussion by reaching out to other spokespeople and meeting them somewhere in the middle? If popular programs with millions of viewers nationwide are going to choose celebrity spokespeople over scientific experts to discuss climate change, the climate experts had better make sure that these spokespeople are well informed and able to *talk* about climate change, not just say that it's bad for polar bears. Scientists can meet celebrity spokespeople, and by extension the greater public, in the middle by:

- **Paying attention** to, listening to and observing the public discussion of climate change in popular films and books, as well as the wide variety of alternative news sources around the world.
- **Being prepared** for the inevitable and challenging questions that will come their way by taking part in a media training and outreach orientation program that raises the confidence and motivation of scientists who choose to discuss climate change outside of the scientific community.
- **Speaking out and reaching out** directly to non-scientist spokespeople and the public with their science.

In the end Oprah invited Dr. Michael Oppenheimer, a Princeton University scientist who has appeared on many television and radio programs over the years, to join DiCaprio on her program, and the segment was cut significantly due to breaking news of a child molester's capture ([Oprah.com](http://Oprah.com)).

## NECESSARY ASSUMPTIONS AND ACKNOWLEDGMENTS

Before making recommendations for how scientists can take a more active role in communicating climate change to the public, there are a few assumptions and acknowledgments that must be examined:

1. The terms "global warming" and "climate change" are not interchangeable. Some environmental reports have described the term "climate change" as a watered down catchphrase concocted by the U.S. government to diminish the seriousness of the global warming problem (Abbasi). While this may or may not be true, there is another more valid reason for using this term. Global warming is just one aspect of a changing climate. Depletion of the ozone layer, for example, is linked to greenhouse gas emissions and is dependent upon the temperature of the earth's atmosphere, but it is not solely a result of a warmer planet. Yet when asked, many Americans cannot tell the difference between global warming and depletion of the ozone layer.<sup>8</sup>

Additionally, climate models show that some short-term responses to a warming planet could include regional cooling in areas such as northern Europe, and increased snowfall in central parts of Greenland and Antarctica (IPCC). We have already begun to see some of these effects in observations (Zwally). So although global warming is at the root of the problem and would eventually override any short-term effects of a shift in ocean circulation, it is more accurate

to use the term "climate change" today, since warming temperature is not the only present indicator of a changing climate.

2. Second, the scientific consensus agrees that climate change is real. This is no small assumption. Scientists have spent decades documenting the changes in our planet's climate over hundreds of thousands of years using ice cores, tree cores, geologic stratigraphy, satellite data, ocean buoys, and countless numerical models to understand why it has changed and how it may continue to change in the future (IPCC). Hundreds of scientific papers have been published over the past twenty years providing new results and narrowing the uncertainty of climate change to the point where now, the scientific and even the political communities agree that climate change is happening and that it is the result of human influence.<sup>9</sup>

Yet one cannot ignore the still steady presence of climate change skepticism and contrarianism in the public media and policy arenas. In fact, there is a great deal that can be learned from listening to and engaging with those in the scientific and other politically influential communities who do not accept the scientific consensus that climate change is real. It would be foolish to think that just because the scientific consensus on climate change keeps growing, opposing beliefs are therefore diminishing. In fact, it's quite possible that the opposite is true. While the number of true scientific skeptics may be decreasing, the number of contrarians seems to be maintaining. James Hansen explains his view of the difference between a skeptic and a contrarian:

Skepticism, an inherent aspect of scientific inquiry, should be carefully distinguished from contrarianism. Skepticism, and objective weighing of evidence, are essential for scientific success. Skepticism about the existence of global warming and the principal role of human-made greenhouse gases has diminished as empirical evidence and our understanding have advanced. However, many aspects of global warming need to be understood better, including the best ways to minimize climate change and its consequences. Legitimate skepticism will always have an important role to play.

Hard-core global warming contrarians have an agenda other than scientific truth. Their target is the public. Their goal is to create an impression that global warming or its causes are uncertain. Debating a contrarian leaves an impression with today's public of an argument among theorists.

**Sophisticated contrarians do not need to win the scientific debate to win their cause.** (Hansen 6/26/2006, *emphasis added*)

3. Third, climate change is a highly charged political subject. Despite the fact that science, and particularly government-funded science, is supposed to remain neutral, this does not relieve *anyone* who desires to communicate climate science to the public from acknowledging and understanding the politics that prefer to cloak the subject. The moment that a climate change science report is released to the public, it is no longer exempt from political influence, scrutiny, interpretation, and manipulation. A recent survey shows a “noticeable growth in the partisan divide” of American opinion on climate change (Krosnick). Scientists and science communicators cannot fail to recognize that every one of their potential audiences - news media, educators and students, the general public - are by now already politically aligned.

4. Fourth, there is a need for effective communication of climate science to the public, and it is the obligation of the scientist to take part in this effort.

Now, this may be the hardest assumption to accept. Many scientists feel it is

their duty to perform scientific inquiries, narrow scientific uncertainty, and publish results in peer-reviewed journals. They do not take responsibility for communicating these results and this uncertainty to non-scientific audiences. Some scientists simply don't have the time, others don't trust the media, and still others see it as the responsibility of educators and communications specialists alone. There are many reasons fueling this mistrust and the "not my job" attitude and they can be traced back to the origins of the scientific culture using popular media to communicate discovery. There is not enough space in this essay to scrutinize the origins of scientific mistrust of media, but examining the challenges that scientists face when working with the media is a worthwhile exercise.

## RECOMMENDATIONS

To narrow the gap between scientific understanding and public understanding of climate change, scientists should consider stepping out of their usual role as investigators of knowledge and also embrace the role of communicator. This is a major challenge for many scientists. To make this transition easier, scientists may wish to carefully prepare and address the public discussion of climate change with answers to questions from the media and the public. While public scrutiny can be an uncomfortable prospect for anyone, scientists should understand and embrace their role as ambassadors to the larger scientific community and beyond.

### Pay Attention

The most important step a scientist can take in communicating science to the public is to pay attention, listen and observe: something integral to their normal methodology. From celebrity spokespeople to Hollywood blockbusters, the public's understanding of climate change is constantly being shaped by the influences of the public media discourse and the wise scientist will observe and prepare accordingly.

### Celebrities

One way for a scientist to prepare for the process of communicating the

issue of climate change to the public is by looking at who is already doing it and whether or not they are succeeding. Perhaps the most visible group of climate change communicators are celebrities, artists and social elites who are speaking to the press, producing films, appearing on talk shows, and so on. It is all too easy to dismiss these people based on lack of scientific background, but it is far more difficult and ultimately wise to take a close look at their actions, and the subsequent reactions of their fans. While it is no small effort to counter a celebrity with a fan base that translates into a built-in audience of millions, one cannot ignore the fact that a celebrity can relay information better than almost anyone else in the business. Whether or not these people are communicating the most current and accurate science to their massive fan bases is another question altogether, and the only way to find out is to *pay attention* and listen to their message. If their content is inaccurate the scientist may want to relay an easily assimilated “checklist” of correct information to that celebrity.

The question that many scientists will often ask next is, "Should these spokespeople even be talking about science in the first place?" or should they simply be mouthpieces, faces for a cause, or motivational figureheads? It is easy for a scientist to suggest that celebrities stick to what they know - inspiration and motivation, while scientists themselves stick to what they know - science. That suggestion is valid until someone like Thom Yorke, lead singer of the British rock band Radiohead, is invited to speak to British Prime Minister Tony Blair about climate change (Duerden). At that point Yorke becomes more than just a

face. He becomes a very high level spokesperson who had better know the science on which his chosen cause is based.

Incidentally, Yorke refused to meet with Blair on the basis that Blair has "no environmental credentials (Duerden)." He later invited leaders from all three major British political parties to attend his musical performance at "The Big Ask Live," an event put on by environmental group Friends Of The Earth (McLean). Yorke and many others in his position are often the first to diminish the effect they may have on a chosen cause, underestimating their influence on fans and especially young people.<sup>10</sup> Yorke, like many other celebrity spokespeople for climate change including Edward Norton, Matt Damon, Julia Roberts, Alanis Morissette, George Clooney, and Keanu Reeves, has millions of fans worldwide who pay very close attention to his words and actions. Climate change scientists who wish to communicate their work to the general public should consider the same approach with a carefully orchestrated public relations strategy.

### Hollywood

In addition to the words and actions of celebrity spokespeople, scientists should also listen to popular films, music, and books that address climate change. Let the popularity of *The Day After Tomorrow*, *State Of Fear*, and the subsequent reaction of climate experts stand as evidence that scientific silence is not an appropriate response when Hollywood makes mistakes. There is no reason that scientists cannot turn these mistakes into opportunities or "teaching moments." Outside of rules that prohibit government scientists from actually

publishing a formal *review* of a book or film, there is nothing stopping scientists from putting forth their own take on the science presented in popular works. Incidentally, James Hansen has taken the more direct approach of reviewing three recent climate change books and the Al Gore film *An Inconvenient Truth* for *The New York Review of Books* under the premise that he is speaking as a private citizen, and not a government scientist, and that his opinions are expressed “as personal views under the protection of the First Amendment of the United States Constitution (Hansen 7/06).” Such action is protected under the new “Policy on the Release of Information to News and Information Media” at NASA (NASA 3/06).

Of course, any such action requires that scientists actually *watch* the films and *read* the books. Over a month after its release, many scientists have still not seen, and have no intention of seeing, *An Inconvenient Truth*.<sup>11</sup> Reasons ranged from not having the time to declaring the film “irrelevant.” No matter how busy the scientist, for someone in the field of earth science to consider a major motion picture about climate change irrelevant is naive at best and irresponsible at worst.

In order to assist scientists in keeping up with popular culture releases, government agencies and universities should provide time in the work schedule for viewing films and television programs, and for reading books (or selected excerpts) having to do with climate change. For government agencies such as NASA, the office of public affairs should take responsibility for tracking significant

releases, providing critics' reviews, organizing field trips, selecting relevant text excerpts, gathering news clips, organizing brown-bag discussions among scientists, and so on.

The earth science segment of the NASA Goddard Space Flight Center office of public affairs has already begun such a program that provides a daily news digest and facilitates a monthly gathering of scientists in the field of hurricane research to discuss the latest developments in science and media coverage.

### News

It is extremely important for scientists to understand where Americans get their news. Reading the Sunday *Times* will not give a scientist the same news picture that most Americans have through their reading and watching television every day. More Americans get their daily news from local television than from any other single source including national television, local newspapers, national newspapers, and the Internet (Horrigan). Nearly 50 million Americans are informed by news that appears on the Internet every day (Horrigan). Climate change weblogs are everywhere. For any scientist who is preparing to speak to the media about climate change, it would be very wise to read up on these science news sources. Again, people specializing in communications and public media can and should help with this sometimes daunting task.

### Be Prepared

By paying closer attention to climate change spokespeople, popular culture, and alternative news sources, scientists become better prepared for the questions they can expect from the public and the media. It is imperative to know what ideas and debates are circulating in the mainstream public before attempting to speak out about one's own science. But educating oneself on current events and topics is not enough. A scientist must also prepare to make his or her communication clear and concise. This takes a great deal of practice.

One of the first recommendations to come out of a 2005 meeting of over 100 climate leaders and thinkers was to establish a bridging institution that will provide scientists with media training (Abbasi). This recommendation was based on the confession of several scientists at the meeting that they did not feel they had adequate training for providing quality media interviews. The response from journalists in attendance was that it isn't their job to make scientists better interview subjects... "that is what public relations firms are for (Abbasi)."

But public relations firms are not the only sources for media training and related courses. The Union of Concerned Scientists is one organization that has developed a media training program for its members. While an overarching entity could do a decent job of training many scientists in disparate fields to speak about climate change in a uniform way, scientists would be much better off with - and certainly more trusting of - an internal media training effort from their home institution.

One of the major concerns that many scientists share is that an overarching media training program would encourage scientists with differing results and views on climate change to conform to a single "message" or stance on the subject. Unfortunately, this would counteract the progress of science in varying fields and undermine the scientific method itself. Conversely, media training programs should actually encourage varying results and views on climate change in order to:

- More accurately present new science as it emerges
- Raise the level of trust that scientists have for the media and public communications experts at their home institutions
- Encourage more scientists – and especially *new* scientists in varying fields, to communicate their message effectively to the public

Agencies such as NASA often invite contracting groups from outside of the agency to conduct media training courses with scientists and engineers. This training is often geared towards the "worst-case scenario" interview in which the scientist is put on the spot with difficult questions about budget cuts, political inquiries, and so on. While this type of training is valuable in some situations, it can actually perpetuate and even exacerbate the fears and mistrust that many scientists have for the media. It often does not address science at all, and too often emphasizes the negative aspects of politics and media. The point of media training should be to *raise* the comfort level of scientists, as opposed to scaring them, and encourage them to stretch their own limits in communicating their

work.

The second concern when dealing with outside training contractors is that these people are often alarmingly unfamiliar with the science. The group hired to train earth scientists at NASA in 2005 asked practice questions about Mars, the moon, the International Space Station, and weather. When an inquiry was made about climate change and its effects, they recommended that the NASA earth scientists use polar bears to raise public interest in their science. While these techniques are adequate in a worst-case scenario, they are hardly realistic, and can even be misleading.

It is necessary for media trainers to have adequate knowledge of the science at hand. Media trainers for climate change, and indeed anyone in the field of climate change communications, should have a thorough understanding of the basics; i.e. the latest Intergovernmental Panel on Climate Change (IPCC) report, the nature of global climate models, the Kyoto Protocol, and the current pool of popular culture names and events addressing the issue, and their positions.

It is imperative that media trainers develop materials to work in conjunction with professional courses offered by outside contractors. They should consider hosting a few beginners' courses that include steps to make scientists more comfortable in the spotlight, such as:

- Advice on what clothing to wear for television cameras
- Individual consultations on makeup for camera lights

- A detailed tour of the television and radio recording facilities at the scientists' home institution
- Practice interview sessions scattered over several days, weeks or months to help scientists maintain a high comfort level

The program should also include advice on speaking techniques and scientific language, such as:

- Rigorous review of past interviews in the scientist's field
- Examples of good metaphors and human stories to help explain complicated science
- Introduction to animation and data visualization that helps explain complicated science
- Advice on how to avoid jargon, acronyms, and technical terms when speaking to general audiences

Lastly, the program aims to provide broad support for each scientist from:

- Public affairs officers who field interview requests, pay special attention to the scientist's busy schedule, and match interviewers up with experts in the correct field of research - acting almost as an agent for the scientist
- Managers who provide both financial and award-based incentives to scientists who communicate with media and educational audiences
- Fellow scientists with media experience who can act as mentors
- Video and image creators who develop graphics tailored to individual scientists and their research

The primary purpose of media training is, of course, to help scientists to speak well and appropriately to the media. But these are short-term solutions that are limiting and do not impart the long-term benefits of a continuous support system that lasts throughout a scientist's career. The benefit of a very well executed media training course that lasts longer than just one day, is led by people with scientific backgrounds and provides professional incentives, is that it can be applied to much more than just media interviews. Scientists who have a fully-developed support system around them can much more easily and willingly speak to students, educators, congressional committees, documentary filmmakers, science museums, other spokespeople, and so on. Hence the preference for the expanded term, "media training and outreach orientation."

### Stand Up And Be Heard

Any scientist who studies any aspect of the earth's climate needs to be prepared to answer the tough questions. This is not an option. Scientists cannot simply lock themselves in their office or lab and only occasionally publish in peer-reviewed journals. The demand for sound science from the public is expected to increase with active hurricane seasons and other extreme weather events waiting in the wings. Celebrity activists have the advantage of household name recognition and multi-million wide international fan bases all over the world. This puts scientists at an automatic "popularity" disadvantage when it comes to getting the word out about climate change. When given the choice between Brad

Pitt or “Dr. Who from the University of Wherever,” the public will most likely listen to Brad Pitt first and then turn to the scientist *only* if their interest and imagination are switched on long enough to not change the channel. Scientists need to take an active role in closing this gap, and the following are two possible ways of doing so.

### Reach Out

As mentioned above, there is a limit to which a non-scientist celebrity can communicate climate change to the public. On some level, most educated audiences will recognize that this person is not an expert; he or she is simply a mouthpiece. This often aggravates scientists who see celebrities misinterpret science, or simply not reference science at all when discussing climate change. But the reality for scientists is: these people are not going away, and they *are* effective. So rather than lamenting the lack of scientific integrity in the celebrity community, scientists should be proactive in getting the information out to these people. Why not meet them somewhere in the middle? This type of action could work to raise the profile of new science results, inform non-scientist communicators about the nuances and complexities of science, increase the credibility of non-scientist communicators, and narrow the gap between celebrities and scientists by showing public collaboration between them.

So far there is little evidence that celebrity spokespeople interact much with scientists on an individual basis. Edward Norton, narrator and host of National Geographic's *Strange Days on Planet Earth* was given a script advised

by nearly a dozen scientific experts in fields from marine biology to geology ([PBS.org](http://PBS.org)). It is not evident how much time, if any, that he spent face-to-face with these individuals to discuss the very subtle nuances of the language in the script.

As mentioned earlier, Leonardo DiCaprio was chosen to visit *The Oprah Winfrey Show* with Dr. Michael Oppenheimer of Princeton University, but how much time did the two have to discuss the actual science presented? The on-air segment was cut to just a few minutes. DiCaprio's environmental foundation has a very extensive list of resources on its website, but most are activist groups and publications easily gleaned in any web search. Only one source, a National Academy of Sciences study from 2002, comes from science ([Leonardodicaprio.org](http://Leonardodicaprio.org)).

Thom Yorke was recently named spokesperson for a green campaign "The Big Ask" in the United Kingdom ([Foe.co.uk](http://Foe.co.uk)). As mentioned earlier, he has reached out to politicians from all parties, but what is his access to the science that influences these people? In a recent interview, Yorke cited the most recent IPCC report as a major influence on his forthcoming solo album (McLean).

To find out more about these individuals' access to climate experts and their research, NASA is currently reaching out to celebrity spokespeople such as Norton, DiCaprio, and Yorke to find out: Have they had a chance to meet with individual scientists to discuss new research and results? Do they feel that scientific information is available to them in easy-to-digest formats? Are they seeking opportunities to learn more about specific science topics and questions

about climate change? Do they have access to educational materials such as data visualizations and animations? In June 2006, James Hansen agreed to meet with Thom Yorke at the NASA Goddard Institute For Space Studies in New York. Yorke was "thrilled" at the invitation, but was unable to attend the proposed meeting on June 13 (Hufford).

The one celebrity spokesperson that has certainly had close contact with a number of climate experts over the years is former Vice President Al Gore. Mr. Gore has had long-running relationships with scientists at NASA, NOAA, and many universities, and he cites them all in his recent book and film *An Inconvenient Truth* (2006). Gore is one of the few celebrity spokespeople for climate change who has actually been applauded for his knowledge of the science and ability to translate it into simple language and powerful metaphors.<sup>12</sup> But with all accolades comes dissenting views.<sup>13</sup>

Of course, one cannot ignore the obstacles that come with reaching out directly to celebrity spokespeople who are often linked to environmental groups that lobby governments. Government scientists are prohibited from lobbying and cannot appear to endorse, or be endorsed by, lobbying groups. But they are not prohibited from discussing published scientific results and methods of climate change communication. They can, for example, provide celebrity spokespeople with a climate change science "toolkit" as long as the same toolkit is available to all citizens. This kit should include tools that are helpful to scientists and non-scientists alike, such as data-based imagery and video with clear and concise

captions, definitions and suggested metaphors for complex scientific terminology, and illustrations of basic science concepts that support this terminology.

Reaching out directly to celebrity spokespeople is simply a way of getting the same information to an infinitely larger audience in a much shorter amount of time than what is normally reasonable for a busy scientist.

### Speak Out

Media training is only valuable if a scientist is willing and able to speak to the media. This may seem obvious, but it is actually quite a real challenge for communications specialists. Again it comes back to having adequate support, motivation, and incentive. While a scientist will logically become more comfortable with more experience, he or she also becomes more tired and busy. The more interviews an individual scientist does, the higher the demand for his or her time becomes. Former NASA scientist Marshall Shepherd, now at the University of Georgia, became a household name in some parts of the country based solely on the number of interviews he did with major television media. In just two hurricane seasons, he did over fifty television interviews and was on a first-name basis with Larry King and Lou Dobbs.

During his career at NASA, Shepherd spoke on the topics of hurricanes, wildfires, precipitation, urban heat islands, weather satellites, and general earth science. In addition to scheduling restraints, this is a concern that many scientists have about speaking to the media. They fear they will be questioned on topics outside of their field of expertise, and therefore discredited by their

colleagues in those fields. Unfortunately, this is inevitable when talking to a non-scientific audience, and is all the more reason for individual scientists to pay close attention to recent news stories and other worldwide events. It is especially important for climate change scientists to have a strong grasp on all aspects of the subject and what the public is currently interested in - hurricanes, drought, sea level rise, etc. The subject is simply too broad for one to expect a reporter to stick to a single topic.

Marshall Shepherd is someone who was able to speak on a variety of topics and maintain great respect from colleagues in all areas of earth science. This is almost certainly because Shepherd always managed to bring any subject back around to the positive impact that satellites have had on understanding the earth's climate. It was a simple message but one that, in Shepherd's opinion and that of many earth scientists, could not be said often enough.

Ideally, an earth scientist would never have to answer a question about climate change with, "I do not know the answer because it is not my field of expertise." A much better scenario would allow the scientist to say first, "That is not my area of expertise," but then follow with, "but I *can* tell you what the research shows and why it is important for understanding climate change."

## CHALLENGES

Being asked to speak on a foreign subject is a challenge that both scientists *and* celebrity spokespeople face when speaking about climate change. A 2005 science and culture survey showed that Americans trust scientists more than religious leaders and politicians, but they are still more interested in music and television than in science (Seed/JWT). The level of trust that Americans have for celebrities, however, seems to be largely dependent on the individual (McDonald). More and more of these celebrities are adding their name to the list of climate change spokespeople every day (Vergano). Not enough social study of specific celebrity groups (i.e. climate change spokespeople) has been done to determine the level of trust Americans have for them, but an informal poll of Radiohead fans shows that, while the majority applaud Thom Yorke for his role in “The Big Ask” climate change campaign, some still question whether he is the right ambassador for the cause ([Ateaseweb.com](http://Ateaseweb.com)). About the same number would just prefer that he stick to music rather than getting mixed up in politics and scientific debates.

Others have gone so far as to call artists hypocrites for preaching about cutting emissions and then flying around the world on musical tours and manufacturing millions of CDs in plastic cases, and by so doing, leaving a much larger negative ecological footprint than most average citizens.<sup>14</sup> Thom Yorke

has responded to such criticism by producing CDs with cardboard sleeves, and playing "green" festivals such as Glastonbury in England and Bonnaroo in the US, although he still calls himself "a hypocrite... as we all are (McLean)." Then there are the so-called "celebrity forests" that some actors and musicians have planted and paid for in an effort to counteract their individual ecological footprint. Critics have called them an "easy way out," and a quick solution to make carbon-emitting celebrities feel better about themselves and look good to their fans (Edwards). In a bizarre twist of logic, some global warming skeptics have even accused celebrity activists of adding *more* pollutants to the atmosphere via such forests (Milloy) after a study in *Nature* showed that trees actually emit methane, a greenhouse gas (Keppler). Scientists who gain public recognition through the media should be prepared for similar criticism.

Of course, scientists face greater criticism from within the scientific community than from the public when it comes to communicating climate science. As stated earlier, despite the relatively low public profile that many scientists keep, an overwhelming majority of Americans trust them to make good decisions and inform policy makers on behalf of the public.<sup>15</sup>

The majority of criticism comes from other scientists in three different categories:

### Integrity

The tradition, the language, and strict method of science have always

been exalted in the "ivory tower" sense of the word. Many older, more tradition-oriented scientists see any attempt to step out of this ivory tower as wasteful and even irresponsible. For many years it has been acceptable for scientists to simply produce results and publish with no expectation of a general public delivery. Some scientists see speaking to the public as "dumbing-down" the science and diminishing the integrity of the scientific method by placing too much emphasis on gee-whiz discoveries as opposed to the true complexity and uncertainty of science. Part of this comes from the assumption that any public delivery of science will inevitably get something wrong. The media will misinterpret and exaggerate results, journalists will dilute the message by playing both sides, and so on.<sup>16</sup>

### Fame

Not only do some scientists worry that the science itself will lose its integrity, but that the public-speaking scientist *himself* will become more of a "talking head" or even worse, a microphone-hungry "celebrity," than a respected researcher who sticks to his equations. Of course the most famous example of such criticism came onto the late Carl Sagan whom many saw as a brilliant leader in elevating the public interest in science. Sagan had just as many critics as fans, both as a scientist and as a popular figure.<sup>17</sup> Fame in the public realm of climate change in particular can unleash criticism from both sides of the debate. One could argue that James Hansen and other well-known climate

experts would probably not receive such vocal criticism if they weren't being heard in the first place.

### Pressure from above

Most scientists do not have a built-in incentive to communicate with non-scientific audiences. They often lack the time, money, and support necessary to do so. Those who are lucky enough to have the support often choose not to make the effort for lack of time set aside in their work contracts for outreach. Many scientists have said that they've been discouraged by their managers to take part in outreach campaigns because it takes away from critical research time.<sup>18</sup> Those who do take part often get no extra compensation or benefit for their efforts, even if it means working above normal hours to maintain productivity.

It is hard to tell whether this level of criticism will increase or decrease as more scientists step into the realm of public communication about climate change. Social scientists are beginning to look at the subject, as they predict a large increase in the number of climate change experts who leave the world of science behind in favor of advocacy (Priest 3/06, 6/06).

## CONCLUSION

Effective communication of science to the public cannot happen without significant action on the part of the scientist. I, along with many others in the communications field, would even go so far as to say it is the moral obligation of the scientist, especially when funded by taxpayer dollars, to take an active role in education and public outreach efforts on a regular basis.

The scientific community has traditionally taken a reactive stance when it comes to answering the public's questions about science. Most scientists only speak to journalists, documentary filmmakers and other public audiences when directly approached. This is adequate when working with a scientifically passive audience, but I believe that today's audience is becoming much more aware of and interested in issues relating to climate change than it might appear on the surface. The number of public inquiries I receive each week about climate change has nearly doubled in the past year. There is no doubt a major deficiency in public understanding of climate change, especially when compared to the scientific understanding of the subject. This does not mean, however, that there is not interest and demand for better information. Today's tech and media-savvy audience deserves more credit than it traditionally gets from journalists and documentary filmmakers. I hope that this audience is challenged with more detailed information from more trustworthy sources as scientists continue to

improve in communicating to non-scientific audiences.

I do not believe the evidence supports the theory that Hurricane Katrina was the climate change tipping point for Americans. I believe that Katrina was simply the catalyst that jumpstarted the climate change conversation in the public community. I believe the tipping point will come later when the majority of Americans are not only *aware* of climate change, but are also able to perceive its vastness in time and space, and understand its causes and effects worldwide. Unfortunately this may come too late for solutions to come as easily as they may now. According to Malcolm Gladwell, author of *The Tipping Point: How Little Things Can Make A Big Difference*, there are three factors needed to start an epidemic, or in the case of climate change, start a public reaction to the problem:

One factor is “stickiness” or how effectively a message makes an impact rather than going in one ear and out the other. The second factor is context. Gladwell suggests that, “The key to getting people to change their behavior, in other words, to care about their neighbor in distress, sometimes lies with the smallest details of their immediate situation... human beings are a lot more sensitive to their environment than they may seem (29).” The third factor in jumpstarting a public reaction to a situation is the people who carry the message. Gladwell writes, “There are exceptional people out there who are capable of starting epidemics. All you have to do is find them (132).”

Working with scientists at NASA on a daily basis for four years, I have come to know deeply the scheduling restraints and professional pressures that

scientists experience without the added stress of outreach requirements. I have also seen the great successes of many scientists as they make lasting impressions on students, teachers, and television viewers around the world. I know that it is possible for scientists to be effective communicators. They simply need the right tools and enough motivation and support from their colleagues to do it.

This is why a robust media training and outreach orientation program is so essential. If the program is built appropriately it can provide better and more frequent opportunities for scientists to speak freely about their work to a more receptive audience. This in turn paves the way for new scientists to have a better chance of being heard. By paying attention, being prepared, and reaching out to non-scientist communicators and the public, scientists can take the public discussion of climate change to the next level - where it *needs* to be.

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APPENDIX A

NOTES

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<sup>1</sup> An Inconvenient Truth (Gore), The Great Warming (Coshoff), Global Warning (DiCaprio)

<sup>2</sup> See Griscom-Little 2005 and Longworth 2006.

<sup>3</sup> See Michaels 2006 and Morano 2006.

<sup>4</sup> For example Hansen *et al.* “Early model predictions” (2006), Hansen 9/27/05, Schmidt 2004, Allen 2004, Natural Resources Defense Council 2004.

<sup>5</sup> For example Kluger 2006, Goodell 2005, Gore’s An Inconvenient Truth 2006, Carroll 2005.

<sup>6</sup> For example Goodell 2005, Gore’s An Inconvenient Truth 2006, NOVA ScienceNOW 2005, Discovery.com 2005.

<sup>7</sup> Based on discussions in the NASA Goddard Space Flight Center office of public affairs and department of earth sciences.

<sup>8</sup> For example Dotto pg. 283, Krosnick 2006, Abbasi 2006.

<sup>9</sup> For example IPCC 2001, Joint Academies’ Statement 2005, Temperature Trends in the Lower Atmosphere 2006, BAMS 2004, NRC 2006.

<sup>10</sup> For example Burton 2003, Dallach and Hoebel 2006, Valleley 2006.

<sup>11</sup> Based on conversations with scientists at the NASA Goddard Space Flight Center

<sup>12</sup> For example Hansen “The Threat to the Planet” 2006, Climatecrisis.net “Reviews” 2006.

<sup>13</sup> For example Harris 2006, Climatecrisis.net “Reviews” 2006, Gelbspan pg. 98.

<sup>14</sup> For example Elliott 2005, Monbiot 2005, Gigwise.com 2006.

<sup>15</sup> For example Gaskell *et al.* 2005, Dotto pp. 292-293, Krosnick 2006.

<sup>16</sup> For example Revkin “The Environment” 2006, Dotto pg. 277, Hansen 2000, Gelbspan pg. 67.

<sup>17</sup> For example essays in Terzian 1997, Gould 1997.

<sup>18</sup> Based on conversations with earth scientists at the NASA Goddard Space Flight Center