

PART III

**THE POLITICAL ECONOMY
OF CLIMATE SCIENCE**

The State of Climate Science
Roy Spencer

The Political Economy of Climate Science
Roger Bate

Media Coverage of Climate Change
David Murray

1. THE STATE OF CLIMATE SCIENCE

ROY SPENCER

Global Warming: Science or Politics?

Within the science of global warming it is often difficult to separate what the data show from what the scientists want the data to show. In a sense, it is usually not the facts that are in question, but the interpretation of those facts. Politics, world views, and the pressure to publish and secure research funding all act to compromise scientific objectivity. Add to these complications the cost of being wrong on such an important issue, and we have a scientific problem with which science has a difficult time dealing. The theory of global warming will probably never be validated or falsified since we can not put the Earth in a laboratory and run experiments on it. About all we can hope for is that sufficient measurements can be accumulated in support and in opposition to the theory to eventually make some generalized statements reflecting our uncertainty of the existence and magnitude of global warming.

Despite this uncertainty, after the 1995 Second Assessment of the Intergovernmental Panel on Climate Change (IPCC) there were widespread claims that over 2,000 of the world's climate scientists had come to a "consensus" on the threat of global warming. The IPCC statement, "the balance of evidence suggests that there is a discernible human influence on global climate," seems potent at first sight, but its language is artfully hedged with words such as "balance," "suggests," and "discernible." There is evidence to suggest that this statement was pushed to help accomplish the political agendas of those in control of the IPCC process, and in particular to further the progress of the Framework Convention on Climate Change. This has led some scientists to the conclusion that the U.N. is corrupting the scientific process. Yet we should not be surprised to find a political body pushing for answers to a question of such great potential importance to humanity.

The climate system is immensely complex. Unfortunately, it is in the human nature of scientists to be most sure of the problems we know the least about. Typically, the more we learn about a problem, the less we find we really understand. The fact that the magnitude of global warming projections has steadily been revised downward over the last ten years is some evidence for this. Also, a scientist's faith in his scientific position on an issue will be strengthened if he believes there is little risk if he is wrong. Indeed, if there was a solution to the global warming threat which cost nothing to implement, I would be willing to say there is suffi-

**The more we learn
about a problem, the
less we find we really
understand.**

cient evidence in favor of global warming to go ahead and implement that solution. Thus, we also have the scientist's understanding of economics influencing his scientific opinions.

Remaining Uncertainties: Water Vapor

I believe that there is still great uncertainty about the climate system response to increasing levels of greenhouse gases. While many IPCC scientists study the complexities of the highly uncertain effects of aerosols and clouds (which are no doubt legitimate problems to study), they have long ago stopped questioning the largest source of global warming in general circulation models (GCMs): positive water vapor feedback (Zhang et al., 1994). This is the supposed process whereby a small amount of warming induced by increasing CO₂ leads to increases in the water vapor content of the atmosphere. Since water vapor is by far the most important greenhouse gas in the atmosphere, this causes further warming, which causes further moistening, and thus a positive feedback cycle. While it is true that warmer air tends to be moister near the Earth's surface, it is much less certain whether this is the case higher in the atmosphere, where the processes controlling the water vapor distribution are much more complex and not well handled by GCMs. The lower the humidity in this "free-tropospheric" region, the more important those processes become due to the great efficiency with which dry air radiates infrared energy to outer space (Lindzen, 1995).

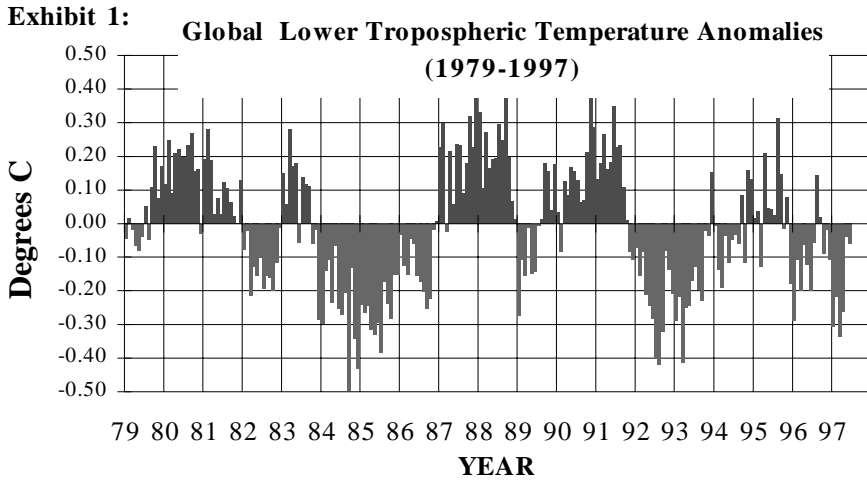
New measurements of the warmest part of the Earth, the tropics, has revealed that the relative humidity is exceedingly low over the vast oceanic deserts called the subtropical high pressure zones (Spencer and Braswell, 1997). This dry air overlays very moist air in the layer closest to the surface, called the boundary layer. It is important to understand how these dry areas are maintained, and especially how they respond to anomalous warmth in the tropics, in order to validate positive water vapor feedback in GCMs (Pierrehumbert, 1995; Sun and Lindzen, 1993). Because the processes controlling the dryness of these regions are related to rain cloud microphysics, it is the opinion of a few scientists that we might never be able to adequately represent these processes in GCMs (Renno et al., 1994).

Global Temperatures: Warming or Cooling?

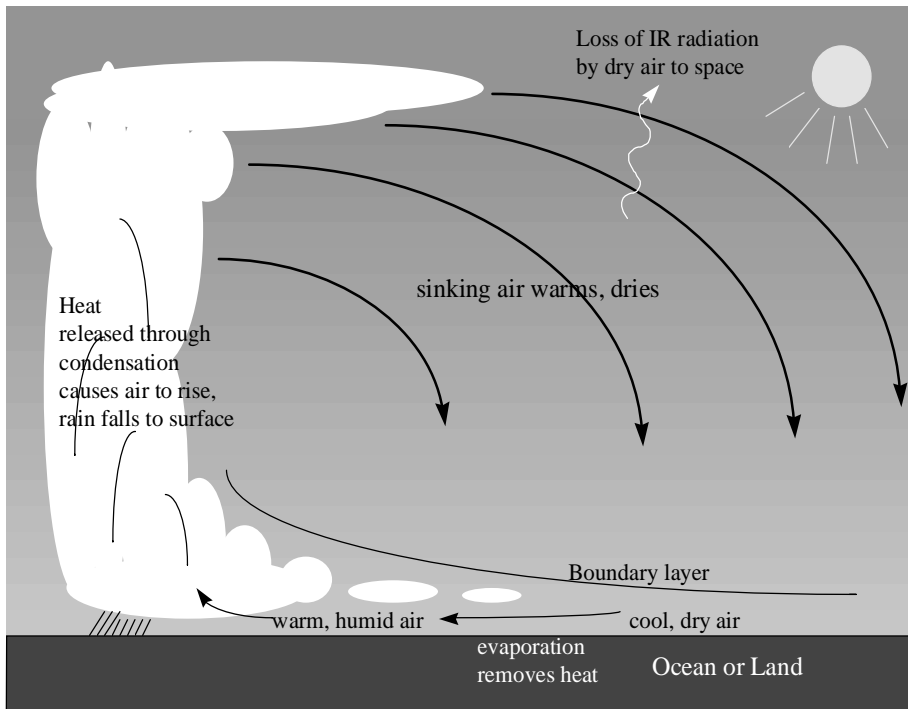
Sometimes the facts themselves are open to debate, let alone their interpretation. The satellite record of global lower tropospheric temperatures (Spencer and Christy, 1992) have revealed a slight cooling trend of -0.10 degrees Centigrade in the tropics since the satellite record began in 1979. This has been found to be at variance with sea water temperatures measured by scattered ships and buoys, which show a warming trend of about the same magnitude over the same period (Hurrell and Trenberth, 1997). Such a disagreement appears to the public as if scientists can not agree on what global temperatures have done in the past, and to some extent this is true. One possibility is that both are correct, since the processes controlling the two separate phenomena are not perfectly coupled. While Hurrell

and Trenberth utilized a GCM to argue that the two trends should be nearly the same, until now science has never had the data to validate whether tropospheric temperatures should track sea water temperatures over two decades to the level of 0.2 degrees C (see Exhibit 1). Again, the microphysics of rain clouds are important to this problem, and the rain physics in GCMs are known to be suspect. This issue will continue to be debated in the scientific literature (Christy et al., 1997).

Global Temperatures and The Second Law



What we do know for sure is that weather systems are always acting to rid the Earth of excess heat. This is an example of the Second Law of Thermodynamics: that energy will flow from areas with higher concentrations to those with lower concentrations. This law is so fundamental that we might consider this to be the weather systems’ most important role in the climate system. Excess solar heating in the tropics, or over certain sub-regions, is continually causing the atmosphere to convectively overturn, dumping heat high in the atmosphere where the excess energy can radiate out to space more efficiently (see Exhibit 2). Much of this heat is removed from the surface through the evaporation of water, the Freon of the climate system. Low and high pressure areas, and their wind systems, transport heat from areas of temperature excess to regions of temperature deficit. The whole process not only helps to cool the warm regions, but also helps to warm the polar regions. This “big picture” is not often discussed because climate scientists are usually caught up in the study of a specific process, for example, the warming or cooling effects of a certain type of cloud. This focus on details is out of necessity because each process is so complex that we have time in our careers to thoroughly understand only a small part of the whole system, sometimes missing the forest for the trees. Despite the complexity of the individual processes which make up the totality of the climate system, we know from the Second Law that all of these

Exhibit 2:

myriad processes are tied together to ultimately achieve one goal: the rejection of excess heat.

While I would not argue that all of the additional heat that is being trapped by increasing greenhouse gas concentrations will be rejected fast enough to prevent any global warming whatsoever, I do believe that GCMs predictions of global warming will only be tenable when all of the negative feedbacks in the climate system are adequately represented. These are the processes which cause the climate system to return to a state of balance when it is perturbed. That GCMs typically do not have enough of these processes is evidenced by their tendency to drift toward unrealistically warm or cold states. Even for those models that are now adjusted not to drift, it is likely that the adjustments made are not the correct ones to realistically stabilize the model. As an example of the stability of the climate system, satellites often reveal a sudden warming of the tropical troposphere by an amount equivalent to 100 years of global warming in only two weeks. However, the system rapidly returns to a normal state, often overshooting into an unusually cool state, only to begin a warming phase again. Thus, tropical temperatures act like a weight hanging from a coiled spring, constantly oscillating about a mean state. Why don't these sudden warmings cause positive water vapor feedback, and push the climate system warmer? Probably because a variety of negative feedbacks act to keep the system in check.

How Sensitive is the Climate System?

Some scientists believe that the non-linear nature of the components of the climate system can cause a sudden shift into a new state of equilibrium, disrupting regional weather patterns after decades or centuries of apparent stability. There is some small amount evidence to support this view. The El Nino/Southern Oscillation, which has a time scale of a few years, seems to behave in this manner. However, it is quite a leap of faith to believe that human influence can result in a sudden shift in climate. I am often amazed at the lengths to which scientists will carry the “butterfly effect” analogy — that the wings of a butterfly in Japan can make the difference between a storm developing or not in the United States. If a butterfly can do this, then how much more might we expect the climate system to push itself into new states of equilibrium? For instance, the 1991 eruption of Mount Pinatubo in the Philippines was estimated to reduce the amount of sunlight entering the troposphere by two to four percent. Hurricanes and super-typhoons are dramatic events, releasing amounts of energy far greater than the world’s nuclear arsenals. Why do we not worry that these events will disrupt the climate system as well?

The Future of Global Warming Knowledge

The coming years will continue to see improvements in our understanding of how the climate system operates, which will be translated into improvements in GCMs. However, as mentioned above, these will no doubt be accompanied by new questions which will arise as a result of that research. The myriad and complex roles of water in the climate system, e.g. water vapor, clouds, rainfall, snow and sea ice, and the oceanic circulation, will continue to amaze scientists through its ability to maintain an equitable temperature on Earth. The non-linear ways in which many water processes interact will continue to make them particularly difficult to understand and quantify. As a result, I predict that policy decisions regarding climate change issues will always have to be made with great uncertainty, no matter what the “consensus” of the research community is.

The views expressed in this article are the author’s and should not be construed as being those of NASA or the federal government.

Notes

- Christy, J.R., R.W. Spencer, and W.D. Braswell, 1997: Satellites are quite accurate. Submitted to *Nature*.
- Hurrell, J.W., and K.E. Trenberth, 1997: Spurious trends in the satellite MSU temperature record arising from merging different satellite records. *Nature*, 386, 164-167.
- Intergovernmental Panel on Climate Change, 1995: *Climate Change 1995: The Second IPCC Assessment*. University Press, Cambridge, Great Britain, p. 572.
- Lindzen, R.S., 1995: The importance and nature of the water vapor budget in nature and models in *Climate Sensitivity to Radiative Perturbations: Physical Mechanisms and their Validation*, NATO ASI Series 1: Global Environmental Change, 34, H. Le Treut (editor), Springer-Verlag, Deidelberg, 331.
- Pierrehumbert, R.T., 1995: Thermostats, radiator fins, and the local runaway greenhouse. *Journal of Atmosphere Science*, 52, 1784-1806.
- Renno, N. O., K.A. Emanuel, and P. H. Stone, 1994: Radiative-convective model with an explicit hydrologic cycle 1. Formulation and sensitivity to model parameters. *Journal of Geophysical Research*, 99, 14,429-14,441.
- Spencer, R.W., and W.D. Braswell, 1997: How dry is the tropical free troposphere? Implications for global warming theory. *Bulletin of the American Meteorological Society*, June 1997.
- Spencer, R.W., and J.R. Christy, 1992: Precision and radiosonde validation of satellite gridpoint temperature anomalies, Part II: A tropospheric retrieval and trends during 1979-90. *Journal of Climate Science*, 5, 858-866.
- Sun, D.-Z. and R.S. Lindzen, 1993: Distribution of tropical tropospheric water vapor. *Journal of Atmosphere Science*, 50, 1643-1660.
- Zhang, M.H., J.J. Hack, J.T. Kiehl, and R.D. Cess, 1994: Diagnostic study of climate feedback processes in atmospheric general circulation models. *Journal of Geophysical Research*, 99, 5525-5537.

2. THE POLITICAL ECONOMY OF CLIMATE SCIENCE

ROGER BATE

The general public seems to believe that the climate is changing due to human activities. They hear from environmental groups and the media that those changes will be harmful and that we should be doing something about it. However, within the scientific community, things are not so clear cut. This paper suggests that the existing scientific evidence does not support the call for urgent action, and the conventional picture of climate science is a false one. While the media deserves its fair share of the blame for common misperceptions, it is only partially to blame. The scientists, or more accurately, the science bureaucracy, are in large part to blame as well. In the area of climate, political and economic pressures have corrupted the science. The main concern of this paper is to explain why this has occurred in the climate debate.

Corrupted Science

Science is a discovery process in which hypotheses are put forward, tested through empirical research and the gathering of data, and then revised to reflect the findings. Corrupted science, however, is science that does not move from hypothesis to data to conclusion, but from mandated or politically acceptable conclusion back to selected data in order to reach the mandated or acceptable conclusion. It is a backwards method in which the right answers are known before the right questions are asked.

Corrupted science not only misrepresents the true state of knowledge, but also the scientific process itself. The selectivity of its process is denied and dissenting perspectives are excluded due to the need for “approved” conclusions. There is little doubt that this tendency is extremely dangerous, for it undermines the scientific process and threatens the ability of science to provide insights and answers about the world around us. Insofar as science becomes a tool for political agendas of any stripe, its value as a social institution is diminished.

The Model of the Future

Climate science is about the future and what will happen there, so that is where my discussion begins.

Any successful strategist, from a chess player to a world leader, will think ahead, use “what if” scenarios, and second guess others’ reactions or feedbacks. In short, we seek to plan for the events that lie ahead. Thus scientists and other academics seek to develop models of the future to address the need to know what comes ahead.

Economics, for example, has great analytical value where inputs are known, or can be reasonably estimated. But to try to produce a definitive socio-economic forecast is tricky. Making bold predictions about future trends when even the direction of change is unknown can only damage the credibility of the discipline in the long run. Thus, economists give best and worse case scenarios and lay out their premises — some of which they know may be wrong — and acknowledge their uncertainties. Were they to do otherwise, uncertainties would become assumptions, which would be used as a basis for economic computer models, which produce concise answers which look authoritative. The basic assumptions would be inevitably forgotten and the answers swallowed whole without the required amount of salt.

Most climate modelers have followed a similar course, making predictions with the requisite caveats and underlining the uncertainties. Others have not been so circumspect, which is exactly how the global warming scare started. The level of uncertainty in climate science is such that it is unable to predict even the direction, let alone the magnitude, of a physical change. Scientists still do not know much about feedback mechanisms within the climate, and the myriad variables that they can affect.

Take the example of regional rainfall. Primitive computer models of the mid-1980s predicted meters of inundation coinciding with whole degrees of temperature rise. The picture was of a climate catastrophe. Yet with every improvement in modeling technique, these predictions have become more modest: meters have become centimeters; degrees, tenths of degrees; and so on. The models are still not up to the job of “simulating” past weather, but the genie is out of the bottle. Global warming is a political issue and thus has a life of its own, outside and beyond science. Climate change, as we must call it, has become a juggernaut, both in the policy process, but in the scientific community as well.

Look to Motives

Despite the shortcomings of economic forecasting — economic trends are no less uncertain than climatic trends — there is a branch of economics that offers insight into the climate change debate. Public choice theory explains why an understanding of the incentive structures facing scientists, politicians, pressure groups and businessmen is important to understanding the political dynamic on a given issue. Although public choice is often ignored by policymakers and economists alike, it has a strong rigorous founding; one of its originators, James Buchanan, won the Nobel Prize in 1986 for his work in this area. Public choice theory can provide important insights about the actions of all the players in the climate debate, and I have documented elsewhere this analysis. ¹

Public choice theory recognizes that individuals act in their own interest. It is conventional wisdom (at least in Europe) that public servants apply their professional training and expertise in the public interest and not in their own; that government works on behalf of the people for the people.

Public choice theorists argue that this view is naive. They examine the individuals involved in the making and executing of public policies and the incentives they face. Public choice finds that most people, most of the time, find it impossible to argue against their own perceived manifest interests for any sustained period. Although one's self interest may include family interests and even community interest, it also includes economic interest. The bottom line of public choice is that bureaucrats are just like everyone else: they respond to incentives and pursue their perceived self-interest.

The public choice model of political decision-making divides society into four groups: voters, politicians, bureaucrats and interest groups. All these actors are assumed to want something from the system. Voters want better government; politicians want votes; bureaucrats want job security and enlarged budgets; interest groups want income. Politicians, bureaucrats and interest groups have distinct advantages over the voters. All of them are professionals who will know more about their specialist subject than the average voter, who remain rationally ignorant on most policy issues. The global warming issue presents all these actors, vying in a game of competing interests.

According to economists Mitchell and Simmons, politicians and public figures, "find it highly rational to engage in obfuscation, play-acting, myth-making ritual, the suppression and distortion of information, stimulation of hatred and envy, and the promotion of excessive hopes."² A satirical explanation is given by David Friedman: "Special interest politics is a simple game. A hundred people sit in a circle, each with his pocket full of pennies. A politician walks around the outside of the circle, talking a penny from each person. No one minds; who cares about a penny? When he has gotten all the way round the circle, the politician throws fifty cents down in front of one person, who is overjoyed at the unexpected windfall. The process is repeated, ending with a different person. After a hundred rounds, everyone is a hundred cents poorer, fifty cent richer, and happy."³ (This may appear a cynical analytical technique, but I contend that it explains the actions of various groups in the climate change debate.)

Climate Interest Groups

Because of the numerous groups acting in the climate change debate, the result is a political process driven by perverse incentives. Climate change could affect everyone. However, most individuals are not, nor can they be, directly involved in the policy debate, which is why they remain uninformed. Those with a direct interest include energy suppliers, sectors indirectly affected (insurance, banking, transport etc.); those whose business is the protection of the natural environment; and those with more subtle incentives. These include the scientists, the science-led bureaucracies and political entrepreneurs. They are treated less critically by the media, and as a result their credibility is enhanced, even though their interests are not necessarily any more pure.

That businessmen face incentives on climate change is obvious. Solar power and nuclear power executives want it to be real, so their businesses can proliferate.

Oil and coal executives hope talk of climate change is nothing but hot air. Other businesses have mixed positions but most back the coal and oil position, if not as strongly. Evidence for this is the strong public stance taken by the CEOs of the American Business Roundtable against a climate treaty.

Similarly, green pressure groups can gain kudos and budgets for promoting climate change. Nothing raises money like publicity and crisis. As U.S. Interior Secretary Bruce Babbitt, himself the former head of the League of Conservation Voters, remarked, "The bottom line for environmentalists is how do you induce people to send money to sustain the movement."⁴ Thus, environmental groups issue direct mail appeals and take out advertisements hyping fears of a greenhouse catastrophe, demonstrating the need for their continued vigilance. After all, if there is no crisis, what need do people have for Greenpeace?

Politicians also have much to gain. Facing credibility problems at home, they seek to become statesmen in the international arena — an arena in which they are less accountable for their actions. They can sign treaties that their citizens have heard little about, and which will not take effect for years to come, after the political leaders are safely out of office. Those politicians fortunate enough to be representing countries that will meet their targets can score additional green points from acting in their national interest anyway. Many mistakenly believe global trade to be a zero sum game, and that by demanding urgent action on global warming from other countries they will benefit at home where measures are not yet in place. Thus, at the July United Nations "Rio plus-5" summit in New York, British Prime Minister Tony Blair admonished the U.S. for its energy profligacy, as did German Chancellor Helmut Kohl. Left unsaid is that the U.K. and Germany will meet their emission reduction targets because of non-environmental factors. The demise of the coal industry in the U.K. due to Margaret Thatcher's market liberalization, and the failure of East German industry have more to do with declining emissions than any environmental leadership in Europe.

The above incentives are rather clear. Yet academics have remained above suspicion, especially in Europe. Objectivity in science comes from open debate, credibility comes from peer-review. Scientists' integrity rests on this debate and peer-review process. Anything which damages these precious, if not unique, qualities, surely threatens the public's trust in science's pronouncements. One would therefore assume that scientists would be relatively immune to public choice pressures, and they may be less subject to such incentives than other groups, but they are still human nonetheless.

Climate change involves myriad scientific disciplines, but is dominated by just a few. The most important being dynamic mathematical modeling. Not because it is more important to knowledge than other sciences, but because it is the one discipline that purports to provide the vision of the future wanted by the media, and the political system.

Unlike international trade, short-run government science funding is often a zero sum game. Determining who gets what slice of the pie is a decision based upon many criteria, including political relevance of the science. There is no doubt that dynamic modeling can be more relevant to policy than paleobotany, and it has

received the lion's share of climate funding in recent years at the expense of other disciplines, increased overall funding notwithstanding. There is only so much research money to go around.

Scientists cannot but be aware of this fact. If there is less need for their discipline or their research, there will be less money to fund their endeavors. The Hadley Centre at the U.K. Meteorological Office exists largely because of climate change and the money it brings in. If climate change were suddenly to disappear as an issue, Hadley might even close, with its \$20 million annual budget allocated to other research. The Max Planck Institute in Germany and the University of East Anglia in the U.K., are two other major European research centers that have benefitted from climate change.

Scientists lucky enough to be in disciplines related to global warming, and there are lots of them, have benefitted greatly in the last ten years, much to the chagrin of scientists in less fashionable fields whose work may well be of more immediate and certain importance. More is spent on climate research in the U.K. than is spent on cancer research, for example. So those at the mercy of the fickle funder are wise to keep doubts to themselves. All these incentives and reactions to them are predictable by public choice theory.

In short, big science, such as big computer models, requires big money. Competition for funding is intense. In this environment, publicity and "policy relevance" help in the scramble for funds — climate change has both. Due to their success in capturing funding many climate scientists' careers now depend on global warming. As Dr. Matt Ridley, writing in the *Sunday Telegraph* put it: "Imagine that you have been toiling away at atmospheric physics for 30 years and suddenly along comes global warming. Next thing you know the United Nations is paying you hundreds of pounds a day to sit in Madrid sampling room service and appearing on Newsnight. Would you admit that the whole thing was nothing to worry about?"⁵

So scientists, along with business and political players (and the media, another interest group that merits a discussion all its own) have an interest in how information about climate change is presented. In such an environment, formal scientific procedures and peer review become that much more important, and deviations from accepted procedural norms become inherently suspect.

Peer Review Problems

The issue of peer review itself is an important one which shows the biases inherent in modern science. Scientists often blame the media for exaggerating stories of alarm, but of course it is not just the media that like exciting 'positive' results. Scientific journals like the attention that publication of exciting or ground-breaking research can bring.

A recent paper in the science journal *Oikos* explained how research which is important, but not exciting or innovative, seldom makes it into the more prestigious scientific journals. Those journals rarely carry papers where the findings are largely "negative." For example, a researcher might analyse the data relating to the link between pesticide residues in apples and bladder cancer and conclude that his

results indicated no correlation. One would think that the information discovered by the researcher would be useful for those working in similar fields. But the results are not exciting, and the chance of the paper being published in a top journal like *Nature* is remote. To come to this conclusion, the study's authors analyzed 1,812 scientific papers published between 1989 and 1995 picked at random from 40 biology journals. Only nine percent of the papers contained "non-significant" results; the figure was even lower for the most prestigious journals.⁶

Given the pressure on university researchers to publish in good journals, the bias against publishing "negative" results has some worrying implications. First, it is likely that the hypotheses to be tested will be conservative, because positive results will seem more likely in such cases. More outlandish hypotheses — ones that might broaden the scientific picture — will not be entertained. Second, researchers are likely to select carefully the data in search of a significant correlation. If the chance of being published is increased by showing a positive result, researchers will be tempted to trawl through the data until they find one — ignoring all the negative correlation they encounter on the way. Careers may depend on such things.

So while the media want alarming or positive-result stories, so do the best journals. Saying that an ice-shelf has gotten larger, tree lines and temperatures were higher in the past, or that uncertainties remain, is simply not good enough to attract attention to ones research. Is it any wonder that university refutations of the climate thesis are so rare. A fair representation of the peer-reviewed literature would therefore be biased in favor of global warming, so there is even less of a need to fiddle with reports.

Climate Consensus?

Prompted by funding applications from U.S. climate modellers in the late 1970s, two United Nations bodies — the World Meteorological Organization (WMO) and the U.N. Environment Programme (UNEP) — embraced climate research. In 1988, as global warming was fast becoming a prominent issue, these two bodies set up the Intergovernmental Panel on Climate Change (IPCC) as a "mechanism aimed at providing the basis for the development of a realistic and effective internationally accepted strategy for addressing climate change." Note that even then there was an underlying assumption that "climate change" was a given that needed to be "addressed" by international action.

With its assumptions in hand, the machine trundled on, commissioning research, holding international meetings in exotic locations and producing a series of reports on the state of climate science and various policy options. The hallmark of these reports, according to Massachusetts Institute of Technology meteorology professor, Richard Lindzen, were "waffle statements which don't say anything, which nobody can disagree with."⁷

Things changed with the IPCC's Second Assessment Report in 1995. It stated that "[t]he balance of the evidence suggests that there is a discernible human influence on global climate." This statement was seized upon by environmental interest groups and the press as final evidence of a scientific consensus on climate change.

This statement, environmental leaders announced, was definitive proof that urgent action was warranted. However, was the “scientific consensus” supporting this view politically engineered? The contributing scientists themselves were expressing quiet but firm uncertainty.

The credibility of the source of scientific information is important. Most commentators assume that scientific documents are based on science, not politics, and, hence, are objective. The IPCC is seen as providing a politically relevant consensus view, in part because it relies upon the scientific peer-review process. Everything is read, discussed, modified and approved by a panel of experts. Its reputation hangs on this critical approach and its adherence to strict governmental review procedures. But as one IPCC lead author, Dr. Keith Shine of Reading University, described the process of producing the IPCC Policymakers summary: “We produce a draft, and then the policymakers go through it line by line and change the way it is presented. . . . They don’t change the data, but the way its represented. It is peculiar that they have the final say in what goes into a scientists’ report.”⁸ The science is scientific, but the spin placed upon it is political.⁹

The main report approved by the world’s governments at the IPCC plenary in Madrid 1995, but published in July 1996, included alarmist post-plenary changes that did not allow wide scrutiny. Gone from the final report is any meaningful emphasis of the uncertainties about man-made climate change and gone are concerns about unwarranted conclusions being drawn from the studies. In November 1995, the underlying report did not state that human-induced climate change had occurred; now, with no new data to consider, it does.¹⁰

Sentences, such as the following, were deleted from the report: “None of the studies has shown clear evidence that we can attribute the observed changes to the specific cause of increases in greenhouse gases.” This statement was replaced with: “If the observed global mean changes over the last 20 to 50 years cannot be fully explained by natural climate variability, some (unknown) fraction of the changes must be due to human influences.”¹¹ The draft conclusion to the report was completely deleted as well.

Some scientists are absolutely outraged at these alterations and a slanging match has ensued in the journals *Science* and *Nature* and the quality press. Dr. Frederick Seitz, former head of the U.S. National Academy of Sciences considers that: “In my more than 60 years as a member of the American scientific community. . . . I have never witnessed a more disturbing corruption of the peer-review process than the events that led to this IPCC report.”¹²

It is worth noting that the 1995 IPCC report also allowed unpublished papers to be the basis of its conclusions. For example, Chapter 6 of the *Second Assessment Report* contains 22 references to papers which had not passed peer-review at the time of publication. I asked the head of the scientific working group of the IPCC about peer-review and post-plenary changes when I debated him in December 1996. His answer reveals a lot. He acknowledged that they were not peer reviewed but they were readily available to all IPCC reviewers. But IPCC reviewers would have had to know about these papers — which most didn’t — and then request them. Any wider comment on the papers was impossible.

The timing of the deletions and alterations suggests that liberties were taken with procedure, perhaps in order to achieve the required consensus. Policymakers, and the plethora of impacts and socio-economic specialist advisors, welcomed the IPCC conclusions and glossed over the irregularities. Instead they concentrated on attacking the industry lobbyists who pointed the changes out, invoking what is known in the U.K. as the well worn Keeler principle — “well they would say that wouldn’t they” — or dismissing critics as practitioners of “tobacco science.”

The IPCC has become one of the less credible U.N. agencies because country officials rely on the exact wording of the report they sign their names to, hence reports should be finished when they are final drafts. It should be clear that post plenary alterations actually undermine the entire IPCC negotiating process. Government officials will be less likely to approve documents in the future if they are under the impression that it will be tampered with later.

It is interesting to note that the breaches of climate treaty protocol were noticed first in the U.S., not in Europe. From my personal research I think there is a greater trust in Europe of hierarchies, especially those that are professional. Trust of officialdom and the United Nations may be low in Europe, but it is much higher than it is here. Consequently, science debate is much less open in Europe than in the U.S. IPCC officials and other senior scientists can pull rank on any doubters, so that hierarchy determines policy. This is what makes continuing analysis of the various subjects and open debate so important.

Coalitions

One of the more disturbing manifestations occurring recently, which public choice theory would also predict, is the formation of unusual alliances — coalitions between parties whose short term and narrow interests coincide — the most egregious example in Europe is between some environmental NGOs and insurance companies. The former want business action and support for their initiatives while the insurers want the world’s government’s to underwrite dangerous loans in physically sensitive locations. Ironically, one of the things that public choice would also predict is that although actions, such as the removal of subsidies to fossil fuels, are deemed sensible by most policymakers, economists and environmentalists, they are only slowly removed because of entrenched interests — the bureaucracy overseeing subsidies, and the subsidy recipients such as German miners or multinational energy companies. Thus, fossil fuel energy subsidies remain remarkably resilient in the United States, despite political pressure to find a way to balance the federal budget..

Conclusion

For the past decade the debate has centered on climate forecasts and some climate science. Obfuscation and myth-making have flourished. Consensus is now equated with truth. The source of the science has become more important than the content, and peer-review has been used as a political weapon. Those from business

have been decried as special pleaders unless they back green claims, and have even spawned their own fifth columnists (environmental managers) whose own jobs depend on the climate business. But, nevertheless the debate continues. Thus, the European Science and Environment Forum (ESEF) seeks to keep the scientific debate alive in Europe, so that there is not a premature rush to implement costly policies. Given the pro-warming biases in funding, publication, presentation and in policy, we think this a vitally important action to be undertaken.

Notes

¹ See Bate.

² Mitchell and Simmons, pp. 63-64.

³ Friedman, p. 107.

⁴ Adler, p. xxii. See also the discussion therein on the falling fortunes of environmental organizations.

⁵ Ridley.

⁶ Csada, et. al., p. 591.

⁷ Quoted in Wilkie.

⁸ Quoted in Winton.

⁹ See Grubb.

¹⁰ Singer.

¹¹ IPCC *Second Assessment Report*, 1995, section 8.4.2.1.

¹² Seitz.

References

Adler, Jonathan, *Environmentalism at the Crossroads* (Washington, D.C.: Capitol Research Center, 1995).

Bate, Roger. "The Political Economy of Climate Change Science," IEA Environment Briefing No. 1. (London: Institute of Economic Affairs, July 1996).

Boehmer-Christiansen, Sonja, "Political Pressure in the Formation of Scientific Consensus," *The Global Warming Debate: The Report of the European Science*

and Environment Forum, John Emsley, ed., (London: ESEF, 1996).

Csada, R.D., P.C. Jams and R.H.M. Espie, "The 'file drawer problem' of non-significant results: does it apply to biological research," *Oikos*, vol. 76, no. 3.

Financial Times, *Climate Change 1995*, Energy Economist Briefings, (London: FT Energy Publishing, 1996).

Friedman, David, *The Machinery of Freedom*, 2nd ed. (La Salle, IL: Open Court Press, 1989).

Grubb, Michael, "Purpose and function of IPCC," *Nature*, vol. 379, 108, 1996.

IPCC, Summary for Policymakers of the Contribution of Working Group I to the Second Assessment Report to the Intergovernmental Panel on Climate Change, 1996, United Nations.

IPCC Second Assessment Report, 1995. Approved at the fifth session of IPCC WGI, Madrid, 27-29 November 1995, United Nations.

Mitchell, W.C. and R.T. Simmons, *Beyond Politics* (Colorado: Westview Press, 1994).

Ridley, Matt, "Down to Earth: Climate debate is overheated and full of holes," *Sunday Telegraph*, December 10, 1995.

Seitz, Frederick, "A Major Deception on 'Global Warming'," *Wall Street Journal*, June 12, 1996.

Singer, S. Fred, "A Preliminary Critique of IPCC's Second Assessment of Climate Change," *The Global Warming Debate: The Report of the European Science and Environment Forum*, John Emsley, ed. (London: ESEF, 1996).

Wilkie, Tom, "Science 'using language of the adman'," *The Independent* (London), December 1, 1995.

Winton, Neil, "Global warming theory just hot air, some experts say," *Reuters World Service*, December 20, 1995.

3. PRINT MEDIA AND CLIMATE CHANGE COVERAGE

DAVID MURRAY

Is there a problem with the reportage involving global warming? Is a fair and accurate portrait of the scientific issues, and the dominant opinion of the scientific community, being conveyed to the consuming public? During the last two years, Statistical Assessment Service (STATS) has asked this question and investigated the possibilities by an examination of newspapers, news magazines, and science journals.

There appear to be two evaluations about the media process, and while both agree that there is a problem, they arrive at different conclusions as to just what has gone wrong. According to journalist Ross Gelbspan, there is a problem with media and climate change — the problem is that the handful of minor skeptics backed by industry are getting altogether too much coverage and credibility. Gelbspan himself, meanwhile, actually makes news with the claim that skeptics are dominating the media debate. The skeptics are successful, Gelbspan argues, because they pitch their campaign to “older, less-educated men and young low-income women.”¹ (In fact, studies of climate skeptics among readers show them to be more educated than the general population).

Interestingly, Gelbspan’s argument that the problem with media coverage is simply that skeptics are allowed to suggest an absence of consensus and conclusiveness on the part of climate scientists is shared by Colin Macilwain of *Nature*. In a personal communication, Macilwain complained that too many journalists had succumbed to the notion that there was even a dispute any longer about anthropogenic warming, and he echoed Gelbspan’s charge that the cause was bad-faith lobbying by industry, as well as there being “too many liars on both sides.”

Also agreeing with Gelbspan is Bud Ward, editor of *Environment Writer*. Ward explains what it is about journalists that creates this imbalanced coverage accorded the climate minority: “skeptics have an impact disproportionate to their numbers,” he said, because of American journalists’ “tendency to accentuate extremes so as to get both sides of the story. In this area of journalism, balance is the enemy of accuracy.”²

Yet others argue that the problem of media coverage lies elsewhere. In fact, they see a pattern opposite to the one described by Gelbspan, whereby the dominant media have been not only neglectful of the full story, but they have actively muzzled contrary information at the same time they have credulously swallowed and amplified tenuous positive evidence. These critics perceive a one-way ratchet that shows the media less as a balanced reference and more in the role of an advocate in a courtroom. Indeed, many journalists are accused of serving as a prosecuting attorney, seeking always for confirmatory evidence, parrying always doubt or uncertainty, or evidence that fails to convict.

In our experience with journalists, many seem to be practicing a version of what is termed “rational ignorance:” the use of stereotype and prejudice as a rational response to a world overwhelming in detail or too challenging in scientific appraisal. In order to make sense of a landscape too changing and too technically challenging, many journalists have adopted the expedient of awarding black hats and white hats, of choosing villains and heroes, so as to save themselves the trouble and the confusion that independent evaluation on its merits each new scientific report would otherwise command. The news media, it seems, could not operate without such a filtering system that screens stories, in a largely unconscious manner.

In this respect, reporters are like trout in a media stream, watching up river for what tasty morsel the current will bring to them, occasionally actively foraging under a root or lily pad. Fishermen there are many, though the sight of a hat rim over the bank’s edge will likely spook the fish. The skill in acquiring media coverage lies, as any good public relations officer knows, in how you tie your flies.

In the global warming debate, some bait has been taken, some bait rejected. Most intriguing, however, is that bait presented to reporters that they do not perceive to be bait at all, but rather just a sample of their natural food. Let us examine a particular piece of reportage to see what can go wrong. Respected columnist Fred Hiatt of the *Washington Post*, writing on June 11, 1997, states as uncontested fact without qualification what many scientists regard as enormously uncertain; “Human industrial activity — particularly the burning of oil, gas, and coal — is slowly but steadily warming the earth.”³ It is apparent that for Hiatt, the matter has been amply established and needs no nuance, not even a clause such as “the balance of evidence suggests” a role for human industrial activity, which is how the Intergovernmental Panel on Climate Change (IPCC) hedges its most recent bets.

A further sample of a journalist avoiding complexity is provided by John Fialka of the *Wall Street Journal* on August 26, 1997. The focus of the story was on the difficulty that Vice President Al Gore is having convincing the public about the dangers of global warming. Perversely, however, Fialka provides in a single sentence a sample of just why the public might well be confused: “*While the majority of climate scientists now predict the economic damage from the man-made output of this pollutant (carbon dioxide) — largely from burning fossil fuels — will be severe, it is expected to come on gradually as the sea level inches upward, as storms become more violent, and as agricultural land begins to dry out.*”

Observers close to the issue should realize that several dimensions of the global warming story have here been collapsed into a single indictment. First, there is the question as to whether warming has occurred and over which time scale — the last 100 years (most probably) or over the last 50 years (not at all clear). Though we have a sense of what the IPCC participants believe, no one has established what the “majority of climate scientists” actually think on this score. Mr. Fialka, in a personal interview, states that he meant to refer to the “2,700 climate scientists who recently signed a letter to the President on the economic impact of climate change.” Unfortunately, the document in question, a project of Ozone Action, contains nowhere near that number of actual climate scientists.

Second, if there has been warming, there is the question of anthropogenicity — are man-made greenhouse gases implicated in a causal role, or is that “signal” against the background of natural variation still ambiguous? Again, there is not a firm consensus, though Fialka confidently asserts that “damage . . . largely from burning fossil fuels,” must therefore be anthropogenic.

Third (and I will bypass the accuracy of referring to carbon dioxide as an environmental “pollutant”), there is the question of the specific weather effects of presumed warming — more violent storms, rising sea levels, and drying agricultural lands are not uniformly predicted by all models (for instance, many models show, rather than drying, an increase in vegetative density in key agricultural areas).

Fourth and finally, establishing the economic consequence of these changes, itself an ambiguous exercise, is the province not of the IPCC climate scientists’ panel, but of a separate working group. Again, we simply have no idea what the majority of climate scientists predict about “economic damage.”

But Mr. Fialka, a most able environmental journalist, has had lots of “official” help arriving at his condensed and misleading version of where things stand in climate change. Not only are journalists vulnerable to the editorial choices of science journals and the spin offered by pressure groups and their public relations allies, they also find themselves at the mercy of information provided by government agencies.

Surely most environmental journalists have at this point heard and accepted the 1995 IPCC declaration that “the balance of evidence suggests a discernible human influence” on climate change. But few indeed are likely to have read the sentences from the notorious “amended” Chapter 8 of the IPCC report that were deleted. For instance, following the statement, “To date, pattern-based studies have not been able to quantify the magnitude of a greenhouse gas or aerosol effect on climate,” the IPCC *had* contained the following lines; “No study to date has positively attributed all or part [of the climate changes observed to date] to anthropogenic causes. None of the studies cited above has shown clear evidence that we can attribute the observed (climate) changes to the specific cause of increases of greenhouse gases.” If the IPCC report were in fact expurgated with an eye to media sound bites, it certainly has worked.

An additional example of how misleading information can be fed to journalists from a seemingly reputable government source can be found in the U.S. Global Change Research Program document “Our Changing Planet,” a report on the 1998 fiscal year by the subcommittee on global change research, Committee on Environment and Natural Resources of the National Science and Technology Council. The document touts on its back cover two maps of the U.S. showing increases in vegetation density under two separate global warming scenarios — the NOAA Geophysical Fluid Dynamics Laboratory (GFDL) and the United Kingdom Meteorological Office (UKMO).

The projections are devastating, suggesting that, for instance, large portions of Texas and California would experience a warming-induced vegetation increase of greater than 200 percent, while Minnesota and Michigan would experience a 75

percent decrease. The reason these changes are so dramatic, however, is revealed by the model assumptions underlying the two scenarios. Based upon an assumed doubling of CO₂, the GFDL model produces an average increase in temperature of 4.3 degrees C (7.7 degrees F); the UKMO model predicts an even higher effect of 6.7 degrees C (12 degrees F).

Both of these models are well known to make predictions much higher than current generation models, and are widely considered by climate scientists not only out-of-date but misleadingly high in their temperature projections. When asked about the choice of such model projections, project coordinator Rick Piltz of the White House Office of Science and Technology Policy answered that there was “a time-lag between the climate science and the ecological and economic analyses.” Not only are journalists provided misleading information from official political sources, they may also find that the scientific journals themselves provide a selective portrait of research. A good example of how tenuous science has become irrefutable wisdom can be found in an August 1996 *Nature* correspondence by researcher Camille Parmesan arguing that butterfly extinction within its westcoast range was plausibly a function of global warming.

Demurrals, contrary information, and challenges by many researchers were ignored by *Nature*, and never received media coverage. In fact, I received a letter in response to my statistical reanalysis of the Parmesan data from a *Nature* reviewer asserting that while I was right, the issue was moot, since “no one now thinks that her argument is sustainable.” Yet the butterfly claims are now, nearly a year after the fact, surely embedded in conventional journalistic wisdom. They were most recently asserted without qualification by *Associated Press* science writer Matt Crenson in a July 13, 1997, special article on the effects of warming. He argues that the signs of climate change are everywhere more visible: “From Alaska to Mexico, ecologists are finding provocative signs that global warming may be altering North America’s flora and fauna. Seabirds in California and Oregon have been devastated by a slight warming of the water off the Pacific coast . . . vigorous tree growth threatens alpine meadows; in Montana, glaciers are melting at an alarming rate . . . And they worry . . . that plants and animals will be pushed to the limit. *On the West Coast, the range of Edith’s checkerspot butterfly seems to be gradually moving northward.* . . .”⁴

It is worth examining the butterfly research in detail, for rarely has a piece of research gotten the immediate and widespread publicity that this modest study did. In August 1996 Camille Parmesan, a biologist at the University of California at Santa Barbara, published a brief discussion in the famous British science journal her observations of the movements of the Edith’s checkerspot butterfly found in the American west.⁵ Parmesan observed that overall the butterfly had moved north by about 100 miles; she suggested that the northward movement resulted from climatic warming. She found that the butterfly was now extinct in a number of more southerly locations in which it had previously been found: “Sites where previously recorded populations still existed were on average 2 degrees [Celsius] further north than sites where populations were extinct. Populations in Mexico were four times more likely to be extinct than those in Canada.”⁶

Parmesan did not make outlandish claims for the significance of her finding about one sort of butterfly. Instead, she declared, “conclusive evidence for or against the existence of the predicted biological effects of climate change will come . . . from replication of this type of study with additional taxa [that is, varieties of animals] in other regions.” On the other hand, she did argue that the evidence to which she pointed “suggests climate change as the cause of the observed range shift [of the checkerspot].” And she concluded by declaring that “the evidence presented here provides the clearest indication to date that global climate warming is already influencing species’ distributions.”⁷

In short, Parmesan made an interesting and provocative claim about the possible implications of the movement of a single species of butterfly. Still, the attention that her study received is surprising. *Nature*, in whose pages her research finding appeared, is a weekly offering an excellent overview of developments throughout the scientific world. Every issue contains many interesting and provocative claims, but few are ever reported on by major news outlets. Parmesan’s communication, however, was covered in a lengthy story (lengthier, in fact, than the communication itself) in the *New York Times*’ weekly science section.⁸ And her finding was also reported in newspapers like the *Atlanta Constitution* (in a front-page article),⁹ *Baltimore Sun*,¹⁰ *Los Angeles Times*,¹¹ and *Washington Post*.¹²

In other words, major news outlets heavily publicized a suggestive finding that by the researcher’s own admission needed to be replicated to be at all conclusive. If one swallow does not a summer make, it is at least as true that one butterfly does not a global warming prove. Nevertheless, Parmesan’s preliminary finding became an important news story.

Furthermore, Parmesan’s finding was not only preliminary, but also questionable. Most notably, she took it for granted that the climate had warmed in the locales in which the checkerspot was now extinct. In fact, however, West Coast temperatures do not appear to have warmed at all between 1909 and 1994, once one adjusts for growing urbanization: A temperature increase resulting from the construction of pavement, heated buildings, and night lights is not attributable to greenhouse gases. Thus a recent communication in the *Bulletin of the American Meteorological Society* concluded that “the apparent ‘global warming’ is in reality urban waste heat affecting only urban areas” in California, Oregon, Washington, and British Columbia.¹³

It should be clear that these temperature records squarely contradict Parmesan’s interpretation of the evidence. For regardless of whether Edith’s checkerspot thinks globally, it must act locally. So even if warming is occurring on a global basis, it cannot explain the butterfly’s range shift unless it has also taken place locally, and a warming that has not affected rural southern California cannot explain the butterfly’s departure from sites there. It cannot, unless we assume that the Edith’s checkerspot is an avid newspaper reader. In that case, perhaps media reports of the reality of warming convinced it to ignore the evidence of its own senses.

Furthermore, it is not clear that warming — assuming for the moment that it occurred — would be the factor responsible for the butterfly’s range shift. In Parmesan’s understanding, warming is the proximate cause of the butterfly’s range

shift; but the direct cause is the alteration of suitable plants — caused by warming — that had formerly hosted it.¹⁴ Thus Parmesan took pains to exclude from consideration sites from which the butterfly had departed, when the host plant had disappeared as a result of “human activities such as land-clearing construction, overgrazing and introduction of exotic plants.”¹⁵

But human activities, rather than warming, could arguably still be responsible for much of the range shift in the sites that Parmesan did consider.¹⁶ Even if development did not harm the host plants, changes in air quality or the impact of agricultural chemicals might still account for the butterfly’s extinction in sites that were being developed. It is at least suggestive that many of the southern sites from which the checkerspot has departed are adjacent to San Diego and Los Angeles.

Finally, it is hard to know what to make of Parmesan’s finding, because her communication did not include anything like a baseline for the number of extinctions that would be expected in the absence of any warming — assuming once again that warming actually took place. Was warming responsible for many of the local extinctions? It’s hard to be certain, unless we have a sense of how many extinctions would have occurred normally, even in the absence of warming.

For all of these reasons, Parmesan’s conclusion about the impact of warming, while interesting, is eminently debatable. Yet preliminary research subjected to a debatable interpretation was unquestioningly reported in major newspapers. Although a few of the stories explained that some scientists were unsure of the impact of the climate on the checkerspot,¹⁷ for the most part the media raised no doubts while publicizing Parmesan’s finding widely.

The interesting question, of course, is what would have happened had Parmesan’s finding called into question — rather than seeming to confirm — the impact of global warming. Suppose that Parmesan had found that the checkerspot was shifting southward rather than northward. That would have been an equally important observation. Would it have been covered in the *New York Times*? For that matter, would her research have appeared in *Nature* in the first place?

We obviously cannot answer that question conclusively, but it is still worth raising. Certainly one can suspect that research conforming to the global warming scenario is greeted more favorably in many newsrooms than research contradicting it. Be that as it may, disproportionate coverage of a preliminary research finding is always unwelcome, no matter what belief the finding may seem to bolster.

The question remains, is there a selective filter in operation with regard to global warming research? Those unhappy with media coverage of warming issues have several theories of how journalists operate. A perceived imbalance could result from a variety of problems, ranging from laziness to outright ideological bias on the part of reporters. Many critics think of journalists as contrarians by nature, inclined to run stories that challenge conventional wisdom. If this were true, however, greenhouse skeptics should have little trouble getting their point of view in print, since the majority view seems to be that warming is a settled issue.

But an examination of which scientific facts get selected and which ignored in press coverage shows that a contrarian approach explains little. Journalists seem to operate in many instances with selective filters whose exact outline is difficult to

determine, but which serve to screen some stories from view while accelerating others into prominence. Some lessons about journalistic practice can be learned from comparing in juxtaposition stories that “made the cut” or did not.

The first example is a June 1997 press release from the Science and Environmental Policy Project (SEPP) announcing that “Global Warming, If It Occurs, Could Lower Sea Levels.” The news could very well have attracted attention, since it is clearly “contrarian” and journalists are supposed to appreciate challenges to conventional wisdom. But in fact there was virtual silence on the part of the media. A journalist who declined to report the press release could plausibly argue that the analysis was only “in submission” to a journal, and hence had not achieved standing in the scientific community. Yet other pieces of contrarian evidence that were published in reputable journals were comparably ignored if they failed to sustain the dominant interpretation of climate change.

A recent example would be an article that appeared in *Geophysical Research Letters* by Yale University researchers Michael E. Mann and Jeffrey Park entitled “Greenhouse Warming and Changes in the Seasonal Cycle of Temperature: Model Versus Observation.”¹⁸ Mann and Park examine the claim that the greenhouse effect may be altering the seasonal cycle, and note that contrary to expectations, “Significant phase delays (i.e., later seasonal transitions) are found in the simulations, opposite to the phase advances isolated in the observations. . . . Much of the variability in the observational data is not predicted in the models.”

The burden of the piece is to note the incompatibility of model outcomes with observational data, suggesting the inadequacy of modeling assumptions. So here is published science appearing in a reputable journal and authored researchers with impeccable credentials. Yet the paper received not a single media reference. What did receive coverage was a piece of research arriving at nearly opposite conclusions. That is, an article suggesting that the earlier onset of seasons *confirmed* global warming predictions was featured prominently in the *New York Times*¹⁹ and the *Washington Post*.²⁰ Interestingly, even this research by Ranga Myneni, appearing in *Nature*, presents an anomaly in that northern latitudes are said to be ten percent greener, while the increase in atmospheric carbon dioxide, presumably the stimulus to the growth, was observed to have increased by only four percent.²¹

Another interesting case involves research on satellite temperature measurements by James W. Hurrell and Kevin E. Trenberth, which appeared in *Nature*.²² Since satellite data are often cited by skeptics to show the absence of conclusiveness on warming, journalists had good grounds to be interested. The story led to headlines such as, “New Analysis Fans Debate Over Global Warming Data; Skeptics Challenged by Recalculation of Satellite Readings”²³ and “Satellite Cooling Data Disputed”²⁴ where Hurrell is quoted as saying that “the satellite data have been misused . . . to make it appear there is no global warming” by skeptics.

But specific refutations of the Hurrell/Trenberth recalculations offered at a meteorological society meeting and presented in Washington at the Marshall Institute by University of Alabama satellite researcher John Christy, the effect of which is to sustain the validity of data showing an upper-atmosphere cooling over the last 17 years, was not covered by any major media. (Christy is allowed to comment on

the Hurrell/Trenberth thesis in some news accounts of their research.) Hence, there was a clear asymmetry of coverage, and rather than a quest for “balance,” journalists seemed to be attuned to only one kind of story. So embedded now is the Hurrell/Trenberth argument that Eugene Linden of *Time* magazine uses it in public forums to dismiss anyone who mentions satellite data, apparently unaware that Christy and others have rebutted the argument (interestingly, when Linden authored a September 27, 1997, *New York Times* editorial supporting the political activities surrounding the upcoming Kyoto negotiations, he declined to identify himself as a *Time* reporter on environmental issues).

Even science that is treated negatively by prominent climatologists can receive positive media attention if the “take” is right. For instance, Robert Kaufmann of the Center for Energy and Environmental Studies at Boston University and David Stern of Australian National University published an article in *Nature*²⁵ that NCAR’s Tom Wigley dismissed as “a simplification of what has been done. . . . I’m totally underwhelmed by their results.”²⁶ Nevertheless, the *Associated Press* reported the research under the headline, “Study: Humans Cause Global Warming.”

In addition to science stories about the status of warming claims, journalists seem to operate selectively when confronted by stories about the impact of warming on human affairs. And the story line is predictable — disaster prevails over other scenarios. For instance, on May 22, 1997, researchers Roger Pielke of the National Center for Atmospheric Research (NCAR) and Christopher Landsea of the National Oceanic and Atmospheric Administration (NOAA) presented a paper at the American Meteorological Society Conference on Hurricanes and Tropical Meteorology entitled “Normalized Hurricane Damages in the United States: 1925 to 1995.”

The principle finding was that, despite “sources from the U.S. Senate to *Newsweek* magazine hav(ing) linked global warming to the past decade’s rise in hurricane damages . . . most Atlantic hurricane seasons since 1970 have seen tropical cyclones occurring at a less frequent rate than the century-long average.” The reason for increased insurance pay-outs? Pielke and Landsea conclude it is “the continued flocking of Americans to vulnerable coastal locations . . . inflation . . . (and) increase in material wealth held by average household.” Though the paper was summarized in the science news postings available to environmental journalists, it made no news.

Instead, just three days later on May 25, 1997, Ross Gelbspan wrote in the *Washington Post* that “For the past few years, the ravages of the changing climate have been sending shock waves through the executive suites of international insurance companies.... In just the five years between 1990 and 1995, hurricanes, cyclones and floods across the globe have cost more than \$30 billion a year.”²⁷

The Gelbspan piece was followed two weeks later in the *New York Times* by a report on June 3, 1997, from William K. Stevens headlined “Storm Warnings: Bigger Hurricanes and More Of Them.” The story reported on predictions from some climatologist of what *may* happen *were* the summer of 1997 to experience more hurricanes than normal, and *were* they to be of greater magnitude. Thus, an actual analysis of the meteorological record was displaced by a piece about specula-

tive disaster in the future. Mr. Stevens followed on June 21 in the *Times* with a further piece the title of which is even more alarming; “El Nino Is Back, Scientist Says, With Threat of Global Havoc.” Again, the story is based not on actual conditions or damages but on predictions of El Nino’s potential future strength and its potential impact.

An equaling striking juxtaposition featuring Ross Gelbspan occurred in the *Washington Post*, May 25, 1997 (so significant, apparently, that it was repeated verbatim in the *Sacramento Bee*, July 13, 1997). Gelbspan editorialized, “In January 1995, a vast section of the ice the size of Rhode Island broke off the Larsen ice shelf in Antarctica. . . . it was one of the most spectacular and nightmarish manifestations yet of the ominous changes occurring on the planet. Two months later, a second shelf collapsed, leaving only a plume of fragments in the Weddell Sea as evidence of its 20,000 year existence. Scientists had predicted as early as the 1970’s that the melting of Antarctica’s ice shelves would signal the accelerating heating of the planet. They were not wrong. . . . The Antarctic ice thaw may be the most dramatic evidence of global warming.”²⁸ Mr. Gelbspan, of course, is responsible for the positively breathtaking claim in the *Minneapolis Star-Tribune* (later corrected) that the “temperature in the Antarctica has risen 20 degrees over the past 20 years.”²⁹

None of the papers carrying Gelbspan’s alarm, however, noted that, according to the National Science Foundation’s Amundsen-Scott South Pole Station, “The South Pole has been experiencing the coldest weather since record keeping began 40 years ago . . . the average South Pole temperature during July was minus 86.8 degrees F, breaking the previous record of 83.7” (a piece of information relayed only by Malcolm Browne in a *New York Times* Science Watch column).³⁰

More significantly, every newspaper but the *Washington Post* (which provided a Science Notebook comment on the issue) completely ignored pertinent research on the Antarctic ice sheet that made the cover story of the July 31, 1997 *Nature*. “Will global warming melt the big Antarctic ice shelves? On the contrary, a study shows that moderate warming might actually thicken them. . . . The findings suggest that moderate climate warming would bring cooler waters in contact with the ice shelf and so cause it to thicken. Such a counter-intuitive result highlights the complexity of the ocean-atmosphere-cryosphere system.”³¹ The article by K.W. Nichols, British Antarctic Survey, Natural Environment Research Council, Cambridge, concludes, “the response of the ice shelf to a warming of the climate will be for it to thicken, reinforcing rather than threatening its longevity.”

Some research, if it supports warming conclusions, is so compelling that its arguments can even be recycled after a decent interval — in this next case, 16 years — and still make big news. On September 4, 1997, Curt Suplee of the *Washington Post* reported a story from *Nature* of the same day arguing that the amount of sea ice surrounding the Antarctic region may have shrunk as much as 25 percent. Researcher William K. de la Mare “examined whaling records dating back nearly 60 years to infer changes in the approximate extent of the sea ice, using recordings of the location of each whale catch kept since 1931, the longitude and latitude of which usually occurred within six to 22 miles of the ice edge, hence providing a “surrogate measure of sea ice extent.”³²

But a search of science news shows that a remarkably comparable story had already run in the *New York Times*. The date? October 19, 1981. With a headline of “Evidence is Found of Warming Trend,” Robert Reinhold reports “new evidence that supports the theory that carbon dioxide pollution is causing a potentially dangerous warming of the earth’s climate has been detected by scientists at Columbia University.”³³

The study by George J. Kukla and Joyce E. Gavin appeared in the October 30, 1981 issue of *Science* (embargo-jumping was a problem in those days), and measured changes in the Antarctic ice pack by comparing “recent satellite photographs of the extent of the ice pack with . . . whaling ship reports from 1929 to 1938. They found that the typical summer ice pack had decreased about 35 percent”³⁴ (taking the percentage change from the both stories it would appear that the big news should have been “Antarctic ice sheet recovers ten percent from earlier shrinkage”).

To understand the media’s engagement with the story of global climate change, we need to recognize certain general features of modern media. First, the question of coverage generates a subsidiary question of whether the coverage of global warming is different in kind from the coverage of all other stories, or even other science stories. In general, what one finds is that certain types of science stories, of which global warming is one, get treated in approximately the same manner by the mainstream press, while the majority of science stories do not.

For example, research involving air or water pollution, endocrine disruptors, mad cow disease, silicone gel implants, deformed frogs, and food safety are very often portrayed in the media in a manner very comparable to climate change issues. But other science stories, such as those involving chloride-ion transport at the cell surface, do not.

What are the characteristics of stories that receive a special treatment? In general, they involve a claimed urgent threat to health or well-being, they reinforce the need for regulatory action or increased government intervention in human activities, and they are perceived to advantage one faction in partisan political disputes. Most importantly, they are stories that acquire symbolic value over and above their scientific substance. That is, one’s stance with respect to a particular subject, certain or uncertain, committed to action or qualified by reservations, becomes a referendum regarding one’s stance in some other domain, such as the political or the compassionate. To accept or reject a bit of science, then, becomes a signal of what kind of person you are, and of whether your motives are pure or crass.

Hence, the common maneuver on the part of antagonists is to resort to the *ad hominem*. Ross Gelbspan’s dismissals of climate skeptics are well-known, but sometimes researchers and not just journalist advocates join in. Ben Santer of Lawrence Livermore claimed that his integrity as a scientist was in question after a *Wall Street Journal* piece criticized his role in producing the IPCC document. Alternatively, Kevin Trenberth, author of a study dismissing satellite data, has characterized skeptic Pat Michaels as being “similar to a scientist working for a tobacco company who found there was no link between smoking and cancer.” Moreover, he was said to have published “only a couple of papers in the last five years . . . and they were not key papers.”³⁵

Journalists, following the pattern of “rational ignorance,” will often depend upon the outcome of a previous science story as a template or emblematic episode that they bring wholesale to a new and complex story. Sometimes this template is treated as broadly instructive about the likely shape of new stories that they encounter. For many greenhouse skeptics, for instance, the Alar story provides a cautionary model of how a spurious alarm was driven by weak science harnessed to an effective media campaign. The “lesson” they derive is that global climate change should likewise be scrutinized skeptically, especially once they sense that political and media pressure appears to be pushing for action that may prove to be precipitous.

In contrast, journalist Eugene Linden of *Time* magazine, who is receptive to global warming stories, does not rely on the Alar model. Instead, Linden explained that he analogizes global warming to his experience with ozone depletion. As he stated in a public forum at the Smithsonian Institution, the ozone debate showed that had journalists listened to people such as Andrew Molina and Sherwood Rowlands of the University of California at Irvine (subsequent Nobel laureates for their work on atmospheric chemistry which in 1974 had proposed the theoretical possibility of ozone damage), “we could have stopped ozone depletion in the late 1970s, but the political climate changed and President Ronald Reagan allowed Dupont to obfuscate and delay and raise doubts and point out uncertainties. Hence, that is how we should see the current global climate debate . . . farsighted scientists being hindered by interested industry apologists.”³⁶

A recent, and rather nasty, extension of the template model is the suggestion that climate change skeptics are no better than tobacco company lackeys who obfuscate the link between their product and cancer. This is the burden of a recent focus group and poll conducted by Mark Mellman for the World Wildlife Fund, released on September 29, where we learn, “In focus groups, participants on their own jumped to compare these scientists to those who work for the tobacco industry, saying ‘you have to look at . . . how they’ve distorted the data . . . and understand that you can’t trust their (fuel industry) scientists.’” Only by digging through the report, by the way, does one learn that the comment was offered by a World Wildlife Fund member who happened to be in a Mellman focus group. (Though the Mellman poll was an extreme form of what is called a “push poll,” both *The Economist* and *Nature* reported the dubious results.)

Journalists are certainly subject to pressure, but it does not always, as Linden has it, derive from industry sources. For instance, Boyce Rensberger of the *Washington Post* states that the reaction of environmental activists to his 1992 coverage of global warming issues was to apply pressure on him to more closely mirror their views. Rensberger stated that the response of “organized environmentalism” to his pieces was for Michael Oppenheimer of the Environmental Defense Fund to “call a meeting with him to discuss his coverage.” According to Rensberger, the problem was not related to charges of factual errors, but rather that the “tone” of the pieces had not sufficiently conveyed alarm.³⁷

Over time the pressure does seem to have its intended effect, visible when even relatively benign or ambiguous research that does not necessarily advance warming

alarm will be “mined” for an interpretation that does. For example, the *Wall Street Journal’s* John Fialka forwarded the Environmental Defense Fund’s projection of the impact of climate change on New Hampshire, showing how warming trends could damage the state’s tourism industry, “driving the sugar maple farther north . . . (and) making autumn coloration more gradual and less attractive.”³⁸

Another example of a journalist apparently “spun” by those who can provide alarming insights from most any climate development would be Richard Monastersky of *Science News*. His July 1997 article, “Global Warming Lurks Principally at Night,” reported research that was not inherently frightening; most of the effects of warming would be confined to slight temperature increases at night, rather than elevating daytime maximums.³⁹ But Monastersky found an interpretation that conveyed danger by interviewing the right commentator: “Scientists who study climate and agriculture, however, point out that warmer nights can stimulate the growth of harmful insects and weeds. They can also reduce yields by spurring plants to burn energy faster at night. Moreover, such climate change further limits the places where farmers can plant winter wheat, which requires cold temperatures, says Cynthia Rosenzweig of NASA’s Goddard Institute for Space Studies in New York.”

Our commonplace assumption that the news functions as a window on the world, transmitting images from reality into headlines, is regularly belied by any careful examination of events and their subsequent treatment. Rather than a purely translucent medium passing events through to the reader, news appears to operate more as a combination of filter and prism.

That is, a selection is always operating in news coverage, picking out certain events in the world and ignoring others, and the ones selected for transmittal are always subject to some sort of alteration, the events being cut and shaped by a variety of considerations until they fit.

Hence, news is an active process of construction, as well as a passive medium of transport. Moreover, while we may naively expect the news to be “newsworthy,” that is, the presentation of something novel, we should recognize that aspect as only one dimension of what makes news worthy of “selection” and transmission. The other aspect has more in common with a mythos, or a steady reiteration and validation that the world is just exactly as we have always thought it should be, and today’s news is best when it re-confirms us in our most deep-seated beliefs about the way things really are.

Many media analysts speak of this second aspect, the mythos dimension, by using terms like cultural template, scenario, or controlling narrative. That is, by analogy, we should conceive of our cultural world as composed of certain deeply embedded narrative shapes and stories, perennial tales and accounts with recognizable plot lines and character evaluations — that is, with various morals that express our valued commitments.

A moral world filled with heroes and villains, dangers and triumphs, greed and disinterested heroism, alarms and escapes, dastardly cover-ups by the powerful and heroic unmaskings, and in general plucky underdogs successfully fighting city hall, is one embedded in the American landscape. Journalists, often refugees of hu-

manities training in college, are primed to expect such narratives by Ibsen's Dr. Stockman in "Enemy of the People," or Eugene O'Neill's Hickey in the "Ice Man Cometh," Arthur Miller's stalwart in "The Crucible," or history's examples such as Galileo and the church. News that alerts us to dangers, thereby demanding our attention, and that can be shaped so as to confirm the moral world, thereby commanding our affirmation, is a surefire hit (let us not forget the characterization of the journalist's calling by one of Washington's most important publishers — "to right society's wrongs").

Science stories that can be constructed in one of these template shapes become enduring and appealing, helping us to hold a moral referendum on a variety of seemingly unrelated issues by virtue of the stance we take on the scientific question. In addition to specific templates brought to stories from the experience of previous scientific episodes, reporters also work with certain broad cultural themes. For instance, the controlling narrative that often catches reporters' interest is to pitch a story involving bought lackeys confronted by white knights of the public interest. Increasingly, rather than the cogency of one's argument, the number of publications, prestige of appointment held, political leanings, and especially, funding sources, become the chips in the battle of legitimacy. Reporters, practicing their rational ignorance, learn to treat these signs as convenient substitutes for the task of delving into arcane science.

A reporter for the *Arizona Republic* sums up this perspective by quoting with approval Carl Sagan, who advised all journalists to ask: "In whose interest is it to minimize these concerns? The answer is there is an industry that would be severely affected." Hence, the reporter concludes, greenhouse critics like Arizona's own Dr. Robert Balling "should continue to be heard, but they should not counterbalance the overwhelming consensus of scientific opinion."⁴⁰

Other narrative templates involve plucky underdogs confronting massive corporate cover ups, or the use of vivid, personal, and imagistic writing. Thus, Ross Gelbspan's controlling narrative in his *Harper's* piece opens with a vivid scene of personal conflagration, hitched to implication of a deliberate cover-up of the truth: "After my lawn had burned away to straw last summer. . . . I wondered how long we can go on pretending that nothing is amiss with the world's weather."⁴¹

Gelbspan, anything but shy, escalates the stakes somewhat in his March 19, 1995 *Washington Post* piece written with Harvard University Public Health specialist Epstein; he is no longer worried just about his lawn but the whole of humanity; "Should we fear global plague? Yes — Disease is the Deadliest Threat of Rising Temperatures."

A more important question may not be why certain stories of alarm get published; that is very likely the natural response of the medium. Rather, what must be accounted for is why some stories are ignored, even studiously, given what we hear the press say about itself. In particular, we must ask why one very significant story, with all the right wrappings and colorful presentations, went unchomped — I speak of Richard Kerr's *Science* piece on the uncertainties in climate modeling.⁴² Until the matter was insistently pushed by some think tanks, the entire article went unremarked by the mainstream press. Part of the answer for why journalists ig-

nored the article is that the uncertainty stressed by the piece leaves them checked; what to do for tomorrow's lead? The piece is of no more value to journalists than would be a weather report that consisted of "uncertain today, uncertain tomorrow, and our five-day forecast is for continued uncertainty."

What we really have to account for is how a story such as Richard Kerr's now famous piece in *Science* could have ended so prophetically: "The last thing he and his colleagues want is a rash of headlines saying the threat is over," concluded Kerr, speaking of Gerald North of Texas A&M. And no headlines is exactly what he got.

Notes

¹ Ross Gelbspan, *The Heat is On: The High Stakes Battle Over Earth's Threatened Climate* (New York: Addison-Wesley Publishing Company, 1997), p. 34.

² Scott Allen, "Are skeptics critics winning debate on warming? Tiny minority has undue influence, book says," *Boston Globe*, April 28, 1997.

³ Fred Hiatt, "No Credible Goal for Global Warming," *Washington Post*, June 11, 1997.

⁴ Matt Crenson, "Ecologists seeing signs of climate change, but is it humans' fault?" *Associated Press*, July 7, 1997.

⁵ Camille Parmesan, "Climate and species' range," *Nature*, vol. 382, August 29, 1996, pp. 765-766.

⁶ *Ibid.*, p. 765.

⁷ *Ibid.*, p. 766.

⁸ William K. Stevens, "Western Butterfly Shifting North as Global Climate Warms," *New York Times*, September 3, 1996.

⁹ Mike Toner, "Butterfly exodus: Global warming may be pushing species northward," *Atlanta Constitution*, August 29, 1996.

¹⁰ "Butterflies flee north from global warming, Calif. ecologist finds," *Baltimore Sun*, August 29, 1996.

¹¹ Robert Lee Hotz, "Butterflies Head North to Beat the Rising Heat; Climate: Researchers Say They Have Found the First Biological Consequence of Global Warming as Insects Shift to Cooler Habitats," *Los Angeles Times*, August 29, 1996.

¹² Robert Lee Hotz, "Global Warming is Forcing Butterflies to Flee, Study Con-

cludes,” *Washington Post*, August 30, 1996. The *Post* published an abridged version of the *Los Angeles Times* article.

¹³ See James D. Goodridge, “Comments on ‘Regional Simulations of Greenhouse Warming Including Natural Variability,’” *Bulletin of the American Meteorological Society*, vol. 77 (1996), pp. 1588-89. In Goodridge’s words, “the rate of increase in temperature commonly attributed to greenhouse warming was 3.14°F...for 29 stations located in counties with over one million people and 0.04°F...for 27 stations located in counties with fewer than 0.1 million people.” Thus no greenhouse warming is detected by measuring stations unaffected by urbanization.

¹⁴ The causation is actually explained more clearly in the *New York Times*’ summary of Parmesan’s research than in her *Nature* communication. See “Western Butterfly Shifting North,” which points out that “gradual climate change affects not the butterfly itself but the host plants: by changing the growing period of the plants, it interferes with the butterflies’ reproduction schedule.”

¹⁵ Parmesan, p. 765.

¹⁶ Note that Parmesan is quoted in the *Los Angeles Times* to this effect: “I was interested in natural extinctions [meaning extinctions caused by warming], not extinctions caused by mankind [meaning those resulting from development].” See “Butterflies Head North.”

¹⁷ In particular, the *Los Angeles Times*’ account included the somewhat skeptical reaction of University of California at Berkeley biologist John Harte: “Harte, however, believes that most plants and animals rely on too many local factors, from soil microbes to air quality, to simply shift northward.” Harte described Parmesan’s work as “exciting [and] provocative,” but he also spoke of “the conventional picture...of how plants and animals will respond to climate change”—that is, by moving north—as “implausible.” See “Butterflies Head North.”

¹⁸ Michael E. Mann and Jeffrey Park, *Geophysical Research Letters*, vol. 23, No. 10, May 15, 1996.

¹⁹ William K. Stevens “Greener Green Belt Bears Witness to Warming Trend,” *New York Times*, April 22, 1997.

²⁰ Joby Warrick “Spring Sprouting Earlier... Climate Report... Heats Up Debate Over Global Warming,” *Washington Post*, April 17, 1997.

²¹ R.B. Myneni, “Increased plant growth in the northern high latitudes from 1981-1991,” *Nature*, vol. 396, April 17, 1997, p. 698.

²² James W. Hurrell and Kevin E. Trenberth, “Spurious trends in satellite MSU

temperatures from merging different satellite records,” *Nature*, vol. 386, March 13, 1997, pp. 164-167.

²³ “New Analysis Fans Debate Over Global Warming,” *Washington Post*, March 13, 1997.

²⁴ David L. Chandler, “Satellite cooling data disputed,” *Boston Globe*, March 13, 1997.

²⁵ Robert K. Kaufmann and David I. Stern, “Evidence for human influence on climate from hemispheric temperature relations,” *Nature*, vol. 388, July 3, 1997, pp. 39-44.

²⁶ “Study pins warming of climate on humans,” *The Chattanooga Times*, July 3, 1997.

²⁷ Ross Gelbspan, “Hot Air, Cold Truth: Why Do We Pay Attention to Greenhouse Skeptics?” *The Washington Post*, May 25, 1997.

²⁸ Ibid.

²⁹ “The Heat is On: Accept the Facts of Global Warming,” *Star Tribune* (Minneapolis), May 22, 1997.

³⁰ Malcolm Browne, “South Pole Gets Colder,” *New York Times*, August 26, 1997.

³¹ K.W. Nicholls, “Predicted reduction in basal melt rates of an Antarctic ice shelf in a warmer climate,” *Nature*, vol. 388, July 31, 1997, pp. 460-461.

³² William K. de la Mare, “Abrupt mid-twentieth-century decline in Antarctic sea-ice extent from whaling records,” *Nature*, (389) September 4, 1997, pp. 57-58.

³³ Robert Reinhold, “Evidence is Found of Warming Trend,” *New York Times*, October 19, 1981.

³⁴ “Summer ice and carbon dioxide,” vol. 214, pp. 497-503.

³⁵ Rob Drent, “Scientist’s theories too simple,” *The Sunday Star-Times* (Auckland), May 12, 1996.

³⁶ Eugene Linden, “Global Warming: How Journalism Covers the Question,” *Global Warming: Understanding the Forecast*, A speech delivered at The National Museum of Natural History, July 22, 1997.

³⁷ Boyce Rensberger, “Global Warming: How Journalism Covers the Ques-

tion,” *Global Warming: Understanding the Forecast*, A speech delivered at The National Museum of Natural History, July 22, 1997.

³⁸ John Fialka, “Gore Faces Cool Response to Issue of Global Warming,” *Wall Street Journal*, August 26, 1997.

³⁹ Richard Monastersky, “Global warming lurks principally at night,” *Science News*, vol. 152, July 19, 1997, p. 38.

⁴⁰ Steve Wilson, “Can We Take The Chance Global Warming is a Sham?” *Arizona Republic*, November 24, 1995.

⁴¹ Ross Gelbspan, “The Heat is On,” *Harper’s*, December 1995.

⁴² Richard A. Kerr, “Greenhouse Forecasting Still Cloudy,” *Science*, vol. 276, May 16, 1997, pp. 1040-1042.

