NOTES

FLIPPING *DAUBERT*: PUTTING CLIMATE CHANGE DEFENDANTS IN THE HOT SEAT

BY

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Can climate change plaintiffs use Daubert *challenges to exclude testimony by defense experts? Since the Supreme Court announced the standard in* Daubert v. Merrell Dow Pharmaceuticals, Inc.*, it has been used almost exclusively to the benefit of defendants. There is no theoretical reason, however, why plaintiffs could not use* Daubert *challenges to exclude testimony by defense witnesses in a scientific field in which the great weight of scientific research supports the plaintiffs' claims. It is likely that in many cases climate change litigation will present such a situation. This Note considers four ways in which plaintiffs may use the* Daubert *standard and the Federal Rules of Evidence to exclude and restrict defense testimony: challenge the witness, challenge the reliability of the evidence, challenge the fit of the evidence to the case, and challenge the conclusions a witness may draw from otherwise admissible evidence.*

Part II of this Note examines the field of climate change litigation and considers the kinds of scientific disputes that are likely to arise in future litigation. Part III looks at the Daubert *standard and Rule 702 of the Federal Rules of Evidence. Part IV applies the* Daubert *standard to*

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actual cases of "experts" and scientific assertions that prominent climate change skeptics have publicly advanced in the debate over climate change. Part V considers what conclusions can be drawn from this analysis, both for the future of climate change litigation and for the broader public debate over climate change.

This Note suggests that Daubert *challenges by climate change plaintiffs may impact not only climate change lawsuits, but could also provide a blueprint for* Daubert *challenges by plaintiffs in other litigation contexts. The Note also suggests that changing the debate over climate change in the courtroom could improve the quality of the debate in the public arena. Even if every climate change plaintiff loses his or her case, climate change litigation may still have beneficial consequences if these lawsuits can help steer the national discourse away from spurious debates over uncertainty and toward a more honest evaluation of what is going on and what we can do about it.*

I. INTRODUCTION

Can plaintiffs in climate change lawsuits use the *Daubert* standard to exclude testimony by defense experts? Since the United States Supreme Court announced the standard in *Daubert v. Merrell Dow Pharmaceuticals, Inc.*,[1] it has been used almost exclusively to the benefit of defendants.[2] There is no theoretical reason, however, why plaintiffs could not use *Daubert* challenges to exclude testimony by defense witnesses in a scientific field in which the great weight of scientific research supports the plaintiffs' claims. It is likely that in many cases climate change litigation will present such a situation. An overwhelming body of evidence now supports the conclusions

1 509 U.S. 579 (1993).

2 *See* LLOYD DIXON & BRIAN GILL, RAND INST. FOR CIVIL JUSTICE, CHANGES IN THE STANDARDS FOR ADMITTING EXPERT EVIDENCE IN FEDERAL CIVIL CASES SINCE THE *DAUBERT* DECISION 71 (2001).

that human activities are increasing atmospheric levels of greenhouse gases (GHGs), that these increased levels of GHGs are leading to warming of the atmosphere, and that this warming will have widespread effects on climate.[3] This Note refers to those conclusions and the research behind them as the consensus model. In recent years, parties opposed to GHG regulations have attacked the consensus model in the public arena and in the political process with scientific assertions that could probably not withstand a *Daubert* challenge in the courtroom.[4] This Note examines how such assertions might arise in the litigation process, and considers four ways in which plaintiffs may use the *Daubert* standard and the Federal Rules of Evidence to exclude and restrict defense testimony: challenge the witness, challenge the reliability of the evidence, challenge the fit of the evidence to the case, and challenge the conclusions a witness may draw from otherwise admissible evidence.

Part II of this Note examines the field of climate change litigation and considers the kinds of scientific disputes that are likely to arise in future litigation. Part III looks at the *Daubert* standard and Rule 702 of the Federal Rules of Evidence. Part IV applies the *Daubert* standard to actual cases of "experts" and scientific assertions that prominent climate change skeptics have publicly advanced in the debate over climate change. Part V considers what conclusions can be drawn from this analysis, both for the future of climate change litigation and for the broader public debate over climate change.

This Note suggests that *Daubert* challenges by climate change plaintiffs can have significant effects in three ways. First is the impact on climate change litigation itself. *Daubert* challenges will most likely allow plaintiffs to exclude experts, evidence, and conclusions from the courtroom that climate change skeptics have been able to advance successfully in the public arena. By excluding evidence of dubious reliability and relevance, these challenges will focus the courtroom debate on the actual scientific issues involved, and could be enormously valuable to plaintiffs in establishing the legal elements

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[3] *See* RICHARD B. ALLEY ET AL., INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2007: THE PHYSICAL SCIENCE BASIS: CONTRIBUTION OF WORKING GROUP I TO THE FOURTH ASSESSMENT REPORT OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE 3 (S. Solomon et al. eds., 2007), *available at* http://www1.ipcc.ch/pdf/assessment-report/ar4/wg1/ar4-wg1-spm.pdf ("The understanding of anthropogenic warming and cooling influences on climate has improved since the [Third Assessment Report], leading to very high confidence that the global average net effect of human activities since 1750 has been one of warming . . . ." (emphasis omitted) (footnote omitted)); *see also* AM. ASS'N FOR THE ADVANCEMENT OF SCI., AAAS BOARD STATEMENT ON CLIMATE CHANGE 1 (2007), *available at* http://www.aaas.org/news/press_room/climate_change/mtg_200702/aaas_climate_statement.pdf ("The scientific evidence is clear: global climate change caused by human activities is occurring now, and it is a growing threat to society."); THE NAT'L ACADS., UNDERSTANDING AND RESPONDING TO CLIMATE CHANGE: HIGHLIGHTS OF NATIONAL ACADEMIES REPORTS 2 (2008 ed. 2008), *available at* http://dels.nas.edu/dels/rpt_briefs/climate_change_2008_final.pdf ("Most scientists agree that the warming in recent decades has been caused primarily by human activities that have increased the amount of greenhouse gases in the atmosphere." (citation omitted)).

[4] *See infra* Part IV.A.

of their claims. The second impact is on other types of litigation. Although *Daubert* challenges have in the past been employed primarily by defendants,[5] the successful use of *Daubert* challenges by plaintiffs in climate change litigation could provide a blueprint for evidentiary challenges by plaintiffs in other fields of scientifically complex litigation.

The third impact, and perhaps the most significant, is that changing the debate inside the courtroom may alter the debate outside the courtroom as well. A central conclusion of this Note is that many of the scientific claims advanced by climate change skeptics in the public arena and in the political process would not even be admitted into a courtroom. If this conclusion is correct, it suggests that there is something inadequate in the way the political process addresses scientifically complex issues, and that perhaps the Federal Rules of Evidence present a superior means of analyzing at least certain types of scientific disputes. While a reform of the evidentiary practices of government is beyond the scope of this Note, this Note does suggest that a clearer focus on the actual scientific issues of climate change within the courtroom may help focus the debate outside of the courtroom as well. Even if every climate change plaintiff loses his or her case, climate change litigation may still have beneficial consequences if these lawsuits can help steer the national discourse away from spurious debates over uncertainty and toward an honest evaluation of what is going on and what we can do about it.

II. WHAT SCIENTIFIC DISPUTES ARE LIKELY TO EMERGE IN CLIMATE CHANGE LITIGATION?

This Note is based on three premises: first, that plaintiffs will continue to bring climate change lawsuits; second, that some will successfully make it to trial; and third, that a direct conflict over the science of climate change will eventually emerge in the courtroom. Regarding the first premise, much has been written about climate change lawsuits that have been filed and that could theoretically be filed.[6] There are a huge number of obstacles that

[5] DIXON & GILL, *supra* note 2, at 71 tbl.A.4.

[6] *See, e.g.*, Duane Desiderio, *Climate Change Litigation Overview*, *in* LAND USE INSTITUTE: PLANNING, REGULATION, LITIGATION, EMINENT DOMAIN, AND COMPENSATION 687, 694–703 (A.L.I.-A.B.A. Course of Study, No. CN005, 2007) (listing dozens of lawsuits addressing climate change); Daniel A. Farber, *Tort Law in the Era of Climate Change, Katrina, and 9/11: Exploring Liability for Extraordinary Risks*, 43 VAL. U. L. REV. 1075, 1128–29 (2009) (arguing that tort liability can be an important component of society's response to climate change because of its elements of deterrence, risk-spreading, and corrective justice); Kevin Haroff & Jacqueline Hartis, *Climate Change and the Courts: Litigating the Causes and Consequences of Global Warming*, 22 NAT. RESOURCES & ENV'T 50, 50 (2008) (reviewing climate change lawsuits brought under the Clean Air Act, 42 U.S.C. §§ 7401–7671q (2006), the National Environmental Policy Act of 1969, 42 U.S.C. §§ 4321–4347 (2006), and common law actions); Alice Kaswan, *The Domestic Response to Global Climate Change: What Role for Federal, State, and Litigation Initiatives?*, 42 U.S.F. L. REV. 39, 104 (2007) (arguing that climate change litigation has an important role in the absence of meaningful federal regulation); Melissa A. Orien & Theresa Laughlin Silver,

climate change plaintiffs will need to surpass in order to reach trial, including establishing a duty[7] and surmounting such jurisdictional bars as standing, preemption, and political question.[8] This Note assumes that some plaintiffs will be able to surpass such obstacles to reach the point where a challenge to scientific evidence will be relevant. If climate change lawsuits reach that stage, it seems inevitable that some will wrestle with the scientific evidence for the biggest climate change questions: Is it happening? What is causing it? What changes will it bring to how people live, and what can we do to slow it down or adapt to it?

Given the early stage of this novel litigation, cases so far have focused more on questions of standing rather than the scientific issues involved. The first climate change lawsuit brought on the common law action of public nuisance was *Connecticut v. American Electric Power Co.*[9] The state of Connecticut brought this case against five public utility companies, seeking caps on carbon emissions by the defendants as well as a schedule for future reductions.[10] The United States District Court for the Southern District of New York dismissed this case in 2005 as a nonjusticiable political question before any scientific evidence could be presented.[11] On September 21, 2009, however, the Second Circuit vacated the lower court's decision and determined that the political question doctrine did not bar consideration of

Legislative Update: Climate Change Is Heating Up the Construction Industry, CONSTRUCTION LAW., Winter 2008, at 36, 36 (discussing significant climate change lawsuits and the legal issues involved).

7 *See* David Hunter & James Salzman, *Negligence in the Air: The Duty of Care in Climate Change Litigation*, 155 U. PA. L. REV. 1741, 1746 (2007) (exploring how plaintiffs may establish duty in tort actions).

8 *See, e.g.*, Randall S. Abate, *Automobile Emissions and Climate Change Impacts: Employing Public Nuisance Doctrine as Part of a "Global Warming Solution" in California*, 40 CONN. L. REV. 591, 624 (2008) (arguing that climate change lawsuits brought for public nuisance will be able to overcome preemption and political question obstacles); Shi-Ling Hsu, *A Realistic Evaluation of Climate Change Litigation Through the Lens of a Hypothetical Lawsuit*, 79 U. COLO. L. REV. 701 (2008) (considering the issues of standing, choice of law, preemption, redress, causation, and separation of powers in a hypothetical climate change lawsuit); Matthew F. Pawa & Benjamin A. Krass, *Global Warming as a Public Nuisance:* Connecticut v. American Electric Power, 16 FORDHAM ENVTL. L. REV. 407, 456–73 (2005) (arguing that climate change plaintiffs can overcome political question, standing, and preemption issues); Amelia Thorpe, *Tort-Based Climate Change Litigation and the Political Question Doctrine*, 24 J. LAND USE & ENVTL. L. 79, 86 (2008) (arguing that the political question doctrine should not be used as a judicial bar in climate change litigation); Christopher L. Muehlberger, Comment, *One Man's Conjecture Is Another Man's Concrete: Applying the "Injury-in-Fact" Standing Requirement to Global Warming*, 76 UMKC L. REV. 177, 179 (2007) (arguing that many climate change plaintiffs already meet the injury-in-fact requirement for standing); Sarah Olinger, Comment, *Filling the Void in an Otherwise Occupied Field: Using Federal Common Law to Regulate Carbon Dioxide in the Absence of a Preemptive Statute*, 24 PACE ENVTL. L. REV. 237, 240 (2007) (arguing that preemption will not bar the use of public nuisance to obtain injunctions limiting carbon emissions); Jessica L. Powers, Comment, *Reduce, Reuse, Resort to Litigation: Global Warming Lawsuits and What They Mean for Texas*, 40 TEX. TECH L. REV. 123, 148 (2007) (arguing that climate change plaintiffs will be able to overcome the jurisdictional impediments of standing and political question to bring cases in public nuisance and product liability).

9 406 F. Supp. 2d 265 (S.D.N.Y. 2005), *vacated*, 582 F.3d 309 (2d Cir. 2009).

10 *Id.* at 267, 270.

11 *Id.* at 271–74.

the case; the case has been remanded to the district court to hear the nuisance claims.[12] Another high-profile public nuisance case that the court dismissed at the district level on political question and standing grounds prior to any debate over scientific evidence was *Comer v. Murphy Oil USA*,[13] in which the court dismissed nuisance claims brought by victims of Hurricane Katrina alleging that the GHG emissions of the defendant oil and gas companies exacerbated the damage caused by the hurricane.[14] In a decision that surprised many observers, on October 16, 2009, the Fifth Circuit partially reversed the district court in *Comer*, ruling that the plaintiffs had standing to bring claims for nuisance, trespass, and negligence, and that the political question doctrine did not bar these claims.[15]

The courts dismissed on political question grounds two prominent cases in California. In *California v. General Motors Corp.*,[16] a public nuisance claim seeking damages from several automakers on behalf of the people of California, the district court dismissed the case without prejudice as a nonjusticiable political question.[17] Another intriguing case is *Kivalina v. ExxonMobil*,[18] a suit brought by an Inupiat village in Alaska against ExxonMobil and other energy industry companies alleging that the defendants' activities have contributed to rising sea levels in the Arctic that have threatened the existence of the coastal village.[19] The U.S. District Court for the Northern District of California dismissed the case on September 30, 2009, on political question and standing grounds.[20] The Ninth Circuit has not yet issued an opinion in either of these cases; it remains to be seen whether the Ninth Circuit will join the Second and Fifth Circuits in holding that the political question doctrine does not bar consideration of climate change tort claims.

The administrative law cases that have addressed climate change so far have likewise avoided much debate on the scientific evidence for climate change. While administrative law cases are not subject to *Daubert* and the Federal Rules of Evidence, and are therefore outside of the main scope of this Note,[21] they do help make up the backdrop of climate change litigation

12 Connecticut v. Am. Elec. Power Co., 582 F.3d 309, 314–15 (2d Cir. 2009).

13 No. 1:05-CV-436-LG-RHW (S.D. Miss. Aug. 30, 2007), *rev'd*, 585 F.3d 855 (5th Cir. 2009).

14 *Comer*, 585 F.3d 855, 859–60 (5th Cir. 2009).

15 *Id.*

16 No. C06-05755 MJJ, 2007 WL 2726871 (N.D. Cal. Sept. 17, 2007).

17 *Id.* at *16.

18 No. C08-1138 SBA, 2009 WL 3326113 (N.D. Cal. Sept. 30, 2009).

19 *Id.* at *1.

20 *Id.* at *15.

21 Courts have held that *Daubert* does not apply to administrative proceedings. Sierra Club v. Marita, 46 F.3d 606, 622–23 (7th Cir. 1995); Stewart v. Potts, 996 F. Supp. 668, 678 (S.D. Tex. 1998). The Seventh Circuit has held, however, that the "spirit of *Daubert*" applies to proceedings before administrative agencies. Pasha v. Gonzales, 433 F.3d 530, 535 (7th Cir. 2005). The potential application of *Daubert* to administrative proceedings is controversial. Some scholars have argued that extending the coverage of *Daubert* to regulatory proceedings would result in a higher level of quality in the scientific evidence relied on by administrative agencies. *See* Alan Charles Raul & Julie Zampa Dwyer, *"Regulatory* Daubert*": A Proposal to Enhance Judicial Review of Agency Science by Incorporating* Daubert *Principles into Administrative Law*, 66 LAW

in which common law actions proceed. The most influential of these cases so far, and the only climate change lawsuit heard to date by the U.S. Supreme Court, was *Massachusetts v. Environmental Protection Agency* (*Massachusetts v. EPA*).[22] In this case, a group of states brought suit to compel the Environmental Protection Agency (EPA) to regulate carbon dioxide (CO_2) as a pollutant under the Clean Air Act (CAA).[23] The court determined that CO_2 is a pollutant as defined by the CAA.[24] Although the Court did not specifically command EPA to regulate CO_2, it did state, "EPA can avoid taking further action only if it determines that greenhouse gases do not contribute to climate change or if it provides some reasonable explanation as to why it cannot or will not exercise its discretion to determine whether they do."[25] The science of climate change was never directly disputed in this case because "EPA does not dispute the existence of a causal connection between man-made greenhouse gas emissions and global warming."[26] The case was litigated, rather, on grounds of standing, interpretation of the CAA, and the administrative discretion of EPA.[27]

Although climate change litigation to date has focused little on the scientific questions of climate change, it seems inevitable that future

& CONTEMP. PROBS. 7, 8 (2003). Other scholars, however, have suggested that extending *Daubert* to administrative agencies such as the U.S. Environmental Protection Agency would compromise the effectiveness of regulatory agencies in protecting the public by exposing the agencies' scientific determinations to the scrutiny of judges who lack the training or knowledge necessary to evaluate the scientific evidence. *See, e.g.*, Wendy E. Wagner, *Importing* Daubert *to Administrative Agencies Through the Information Quality Act*, 12 J.L. & POL'Y 589, 591–92 (2004) (arguing that the use of the Information Quality Act, Fiscal Year 2001 Consolidated Appropriations Act § 515, Pub. L. No. 106-554, 114 Stat. 2763A-73 (codified at 44 U.S.C. § 1316 (2006)), to provide a *Daubert*-like screen on the use of scientific evidence by agencies will compromise congressionally-directed policies of erring on the side of protection); Wendy E. Wagner, *The "Bad Science" Fiction: Reclaiming the Debate over the Role of Science in Public Health and Environmental Regulation*, 66 LAW & CONTEMP. PROBS. 63, 63–64 (2003) (arguing that administrative "good science" reforms target a problem that does not exist, and will impede the agencies' ability to evaluate evidence effectively); Thomas O. McGarity, *On the Prospect of "Daubertizing" Judicial Review of Risk Assessment*, 66 LAW & CONTEMP. PROBS. 155, 156 (2003) ("Assigning a *Daubert*-like gatekeeper role to courts engaged in judicial review of agency risk assessments is a profoundly bad idea.").

22 549 U.S. 497 (2007).

23 42 U.S.C. §§ 7401–7671q (2006); *Massachusetts v. EPA*, 549 U.S. at 505.

24 *Massachusetts v. EPA*, 549 U.S. at 528–29.

25 *Id.* at 533.

26 *Id.* at 523.

27 A number of administrative law cases involving the National Environmental Policy Act of 1969 (NEPA), 42 U.S.C. §§ 4321–4370 (2006), have likewise been decided on grounds of statutory interpretation and compliance rather than on direct examination of scientific evidence. *See, e.g.*, Mayo Found. v. Surface Transp. Bd., 472 F.3d 545, 554–56 (8th Cir. 2006) (holding that the California Surface Transportation Board adequately considered reasonably foreseeable significant adverse effects on the environment of a new rail line's increased coal consumption); N. Slope Borough v. Minerals Mgmt. Serv., No. 3:07-cv-0045-RRB, 2007 WL 1106110, at *13–14 (D. Alaska Apr. 12, 2007) (denying injunction to halt the sale of oil and gas leases in the Beaufort Sea on the grounds that "it is unlikely that Plaintiffs could prevail on the merits, especially in light of NEPA's purpose to ensure that environmental considerations are taken into account, but not necessarily elevated over other appropriate considerations").

litigation will focus on such questions. One likely path is in the follow-up to *Massachusetts v. EPA*. The Supreme Court directed EPA to either regulate CO_2 or provide a reasonable explanation for why it will not do so.[28] While EPA under the Bush Administration generally pursued a policy of ignoring this directive, the Obama Administration's EPA Administrator, Lisa Jackson, has formally declared CO_2 a pollutant, subject to regulation under the CAA.[29] The regulations promulgated by EPA may or may not be preempted by a cap-and-trade bill that the House of Representatives passed in June 2009, but which, as of December 2009, had yet to pass the Senate.[30] Given the stakes involved in the regulation of CO_2, it is perhaps inevitable that any regulation—whether initiated by an act of Congress or promulgated independently by EPA under the CAA—will be subjected to a legal challenge when the time comes to enforce it, either from regulated parties claiming the enforcement is too stringent or from environmental groups claiming it is insufficient.[31] Such a challenge will likely involve an evaluation of the evidence for climate change.

It is also likely that scientific challenges will arise in climate change lawsuits based on common law actions, should they ever make it to court. Scholars have argued that climate change plaintiffs may be able to prevail on a wide range of tort theories, such as public and private nuisance, negligence, and product liability.[32] If climate change progresses as predicted by the consensus position, the damages and costs of adaptation will be enormous; the interest in finding parties to pay those costs will likewise be enormous.[33] A wide array of scholars, attorneys, and possible plaintiffs are

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[28] *Massachusetts v. EPA*, 549 U.S. at 533.

[29] John M. Broder, *E.P.A. Clears Path to Regulate Heat-Trapping Gasses for First Time in the U.S.*, N.Y. TIMES, Apr. 18, 2009, at A15.

[30] *See generally* Editorial, *Some Bad Climate News and Some Good*, N.Y. TIMES, Sept. 16, 2009, at A26 (describing EPA's plans relative to Congress's actions as of September 2009).

[31] *See* Desiderio, *supra* note 6, at 692 (suggesting that litigation ensuing from *Massachusetts v. EPA* will likely also include the regulation of GHGs from off-road engines under CAA section 213(a)(4), and the possible regulation of GHGs as criteria pollutants under CAA section 108, which could result in state-by-state implementation plans like those used to combat ozone).

[32] *See* Matthew F. Pawa, *Global Warming: The Ultimate Public Nuisance*, 39 Envtl. L. Rep. (Envtl. Law Inst.) 10,230 (2009) (arguing that the plaintiffs in *Connecticut v. American Electric Power Co.* presented a valid public nuisance claim); Hunter & Salzman, *supra* note 7, at 1745 (examining how climate change plaintiffs could establish a duty of care in negligence, products liability, and nuisance actions); Christine A. Klein, *The New Nuisance: An Antidote to Wetland Loss, Sprawl, and Global Warming*, 48 B.C. L. REV. 1155, 1220–33 (2007) (arguing for the use of public nuisance lawsuits as a catalyst for legislative action); Dan Mensher, Comment, *Common Law on Ice: Using Federal Judge-Made Nuisance Law to Address the Interstate Effects of Greenhouse Gas Emissions*, 37 ENVTL. L. 463, 467–68, 487 (2007) (arguing that in the absence of legislative and administrative action on GHGs federal common law remedies must be available).

[33] *See* Daniel A. Farber, *Adapting to Climate Change: Who Should Pay*, 23 J. LAND USE & ENVTL. L. 1, 2 (2007) (examining the legal issues in paying for climate change adaptation and concluding that emitters should pay); Daniel J. Grimm, Note, *Global Warming and Market Share Liability: A Proposed Model for Allocating Tort Damages Among CO_2 Producers*, 32 COLUM. J. ENVTL. L. 209, 211 (2007) (proposing a variant of market share liability to apportion tort damages among CO_2 emitters).

looking into the viability of common law actions on climate change,[34] and it seems likely that, in the absence of express legislative preemption, some of them will make it to court. This Note assumes that this will happen.

For the purposes of this Note, I will consider a hypothetical common law suit between a generic plaintiff—e.g., a coastal community seeking damages for their lost coastline from rising seas, a mountain community seeking damages for their lost water supply from diminished snowfall, or an Arctic community seeking damages for a lost way of life from an altered ecosystem—and a generic defendant—e.g., a utility company or an automobile manufacturer. This Note asks what evidence that defendant might present in order to establish that its actions contributing to GHG emissions—e.g., constructing a new coal-burning power plant or manufacturing and marketing a nine-mile-per-gallon SUV—are reasonable. I chose the standard of reasonableness because it is central to the common law actions available to climate change plaintiffs. For example, a public nuisance is "a substantial and *unreasonable* interference with a right held in common by the general public, in use of public facilities, in health, safety, and convenience."[35] Plaintiffs seeking recovery under a products liability theory of defective design must show that "the foreseeable risks of harm posed by the product could have been reduced or avoided by the adoption of a *reasonable* alternative design . . . and the omission of the alternative design render[ed] the product not *reasonably* safe."[36] Thus, the standard of reasonableness provides a framework for considering a wide range of scientific evidence that defendants could present to defend against the plaintiffs' claims. While this Note considers reasonability in particular, the scientific claims considered in this Note might also be relevant in disputing other legal issues such as causation or damages.

Determining whether the defendant's actions were reasonable or unreasonable will be key to determining liability in common law actions, and this consideration is also relevant in disputes over regulatory actions. A court can find that an agency abused its discretion if, in the absence of clear statutory language, its actions were arbitrary and capricious.[37] While this standard is not precisely the same as reasonability, the same sorts of evidence and arguments will be advanced to prove or disprove either standard.[38] The concept of reasonability will also loom large outside of the courtroom. Climate change lawsuits are taking place as part of a larger

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[34] *See, e.g.*, Timothy D. Lytton, *Using Tort Litigation to Enhance Regulatory Policy Making: Evaluating Climate-Change Litigation in Light of Lessons from Gun-Industry and Clergy-Sexual-Abuse Lawsuits*, 86 TEX. L. REV. 1837, 1869–70 (2008) (quoting Alice Kaswan, *The Domestic Response to Global Climate Change: What Role for Federal, State, and Litigation Initiatives?*, 42 U.S.F. L. REV. 39, 104–05 (2007)).

[35] 2 DAN B. DOBBS, THE LAW OF TORTS § 467 (2001) (emphasis added).

[36] RESTATEMENT (THIRD) OF TORTS: PRODUCTS LIABILITY § 2(b) (1998) (emphasis added).

[37] Chevron U.S.A. Inc. v. Natural Res. Def. Council, Inc. (*Chevron*), 467 U.S. 837, 843–44 (1984); Administrative Procedure Act, 5 U.S.C. § 706(2)(A) (2006).

[38] *See Chevron*, 467 U.S. at 844–45 (explaining that the arbitrary and capricious standard of review includes considering the reasonableness of agency action).

social and political debate over what to do about global warming,[39] and for purposes of public relations and politics, both plaintiffs and defendants will want their side to appear more reasonable.

To make this exercise realistic, I only consider actual claims that have been publicly put forth by prominent climate change skeptics. It would be easy to knock down flimsy strawmen with the *Daubert* hammer, and for this reason it would be pointless to do so. The parties that are likely to be defendants in climate change lawsuits will be sophisticated litigants, and they will know better than to present obviously "junky" science to the fact finder. Climate change skeptics have publicly put forth a wide range of scientific claims that could be relevant to the question of whether our hypothetical defendant's actions are reasonable. The scientific claims of climate change skeptics generally take one of three approaches: 1) global warming is not happening, 2) if it is, it is not caused by humans, or 3) if it is, that is a good thing.[40] Any of these three conclusions could make the defendants' actions appear reasonable. I examine some of these claims in Part III. I have attempted to choose scientific claims that accurately and fairly represent the skeptics' position.

III. *DAUBERT* AND FEDERAL RULE OF EVIDENCE 702—JUDGES AS GATEKEEPERS

In the 1993 case of *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, the United States Supreme Court announced a new standard for the admissibility of scientific expert testimony that positioned federal judges as gatekeepers to scientific evidence in the courtroom.[41] *Daubert* replaced the previous *Frye* standard of "general acceptance in the field" with a two-prong test derived from Federal Rule of Evidence 702, which addresses "Testimony

[39] *Compare* Theodore J. Boutrous, Jr. & Dominic Lanza, *Global Warming Tort Litigation: The Real "Public Nuisance,"* 35 ECOLOGY L. CURRENTS 80, 81 (2008) (arguing that the global warming public nuisance litigation model is not appropriate in addressing larger national and international policies), *with* Kirsten H. Engel, *Harmonizing Regulatory and Litigation Approaches to Climate Change Mitigation: Incorporating Tradable Emissions Offsets into Common Law Remedies*, 155 U. PA. L. REV. 1563, 1564–65 (2007) (asserting that climate change issues should be litigated at the state level in the absence of federal action).

[40] Joel Achenbach, *The Tempest*, WASH. POST, May 28, 2006, http://www.washingtonpost.com/wp-dyn/content/article/2006/05/23/AR2006052301305.html (last visited Jan. 24, 2010). Achenbach provides a fairly balanced journalistic take on the arguments advanced by climate change skeptics. Achenbach notes a fourth line of argument—if global warming is happening, there is nothing we can do about it—but this argument tends to be economic and political rather than scientific. *Id.* For a more polemical statement of the skeptical position, see CHRISTOPHER HORNER, THE POLITICALLY INCORRECT GUIDE TO GLOBAL WARMING AND ENVIRONMENTALISM (2007). Horner is a Senior Fellow with the Competitive Enterprise Institute, one of the most prominent skeptic think tanks. Competitive Enter. Inst., Christopher C. Horner, http://cei.org/people/christopher-c-horner (last visited Jan. 24, 2010). The Competitive Enterprise Institute's position on climate change is available at Competitive Enter. Inst., Climate Change, http://cei.org/issue/48 (last visited Jan. 24, 2010).

[41] 509 U.S. 579 (1993).

by Experts."[42] To be admissible under *Daubert*, expert testimony must be both reliable and relevant. A court first must ask whether the scientific methodology underlying the testimony is reliable—is it "ground[ed] in the methods and procedures of science" and "supported by appropriate validation."[43] The Court provided a series of factors that courts may consider in determining whether a methodology is reliable: 1) testability: "whether [the] theory or technique . . . can be (and has been) tested";[44] 2) peer review: "whether the theory or technique has been subjected to peer review and publication";[45] 3) error rate: "the court ordinarily should consider the known or potential rate of error";[46] 4) control standards: "the court ordinarily should consider . . . the existence and maintenance of standards controlling the technique's operation";[47] and 5) general acceptance: "[w]idespread acceptance can be an important factor in ruling particular evidence admissible."[48] The Court emphasized that "[t]he inquiry envisioned by Rule 702 is . . . a flexible one," and thus compliance or noncompliance with any of the listed factors is not necessarily determinative of admissibility.[49] The second prong of *Daubert* is whether the testimony is relevant to the questions at hand—does it "'assist the trier of fact to understand the evidence or to determine a fact in issue.'"[50] The Court described this prong as a question of "fit," and gave an example of testimony about the phases of the moon; such testimony might be relevant if darkness is an issue in the case, but not if the issue is whether an individual was unusually likely to behave irrationally on a given night.[51]

In replacing a well-established, if unsatisfactory, test with a new multifactor test dealing with issues with which many judges were unfamiliar, *Daubert* unleashed a torrent of questions about which types of expert testimony would be admissible under the new standard.[52] The Supreme Court offered some clarity in subsequent decisions. In *General Electric Co. v. Joiner*,[53] the Court made two important clarifications. First, the Court stated that federal district judges have wide discretion in determining whether expert testimony meets the *Daubert* standard, and that their

42 FED. R. EVID. 702. The Federal Rules of Evidence were adopted in 1975. Act of Jan. 2, 1975, Pub. L. No. 93-595, 88 Stat. 1926. For background on the *Daubert* decision, see David G. Owen, *A Decade of* Daubert, 80 DENV. U. L. REV. 345, 354–56 (2003). The *Frye* standard asked whether proposed testimony was "sufficiently established to have gained general acceptance in the particular field in which it belongs." Frye v. United States, 293 F. 1013, 1014 (D.C. Cir. 1923).

43 *Daubert*, 509 U.S. at 590.

44 *Id.* at 593.

45 *Id.*

46 *Id.* at 594.

47 *Id.* The court's statement appears to group error rate and control standards together, but it is probably preferable to view these as distinct criteria. *See, e.g.*, Owen, *supra* note 42, at 358 n.83 ("[T]he separation of these two different considerations clarifies analysis.").

48 *Daubert*, 509 U.S. at 594.

49 *Id.*

50 *Id.* at 591 (quoting FED. R. EVID. 702).

51 *Id.*

52 *See, e.g.*, Lisa Gonzalez, *The Admissibility of Scientific Evidence: The History and Demise of* Frye v. United States, 48 U. MIAMI L. REV. 371, 395–96 (1993).

53 522 U.S. 136 (1997).

determinations are subject only to a permissive "abuse of discretion" standard of review.[54] Second, the Court stated that judges are free to consider the validity of the conclusions experts draw from otherwise reliable data, and may exclude testimony when "there is simply too great an analytical gap between the data and the opinion proffered."[55] In *Kumho Tire Co., Ltd. v. Carmichael*,[56] the Court stated that the *Daubert* standard applies to admissibility of all expert testimony, not just testimony on scientific or technical matters.[57] The Court also reaffirmed that the *Daubert* inquiry is flexible, and that trial courts have wide latitude in how to apply the factors.[58]

In 2000, the Supreme Court approved amendments to the Federal Rules of Evidence that brought the rules governing expert testimony in line with the *Daubert* standard.[59] In addition to minor changes to Rules 701 and 703, the amendments to Rule 702 incorporated the *Daubert* emphasis on the reliability of scientific methodology. Rule 702 now reads:

> If scientific, technical, or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue, a witness qualified as an expert by knowledge, skill, experience, training, or education, may testify thereto in the form of an opinion or otherwise, if (1) the testimony is based upon sufficient facts or data, (2) the testimony is the product of reliable principles and methods, and (3) the witness has applied the principles and methods reliably to the facts of the case.[60]

The advisory committee to the 2000 amendments voiced support for the five reliability factors listed in *Daubert*, and also pointed to five other factors that courts might consider in evaluating the reliability of an expert's scientific testimony:

> (1) Whether experts are "proposing to testify about matters growing naturally and directly out of research they have conducted independent of the litigation, or whether they have developed their opinions expressly for purposes of testifying."
>
> (2) Whether the expert has unjustifiably extrapolated from an accepted premise to an unfounded conclusion.
>
> (3) Whether the expert has adequately accounted for obvious alternative explanations.
>
> (4) Whether the expert "is being as careful as he would be in his regular professional work outside his paid litigation consulting."

54 *Id.* at 141–43.
55 *Id.* at 146.
56 526 U.S. 137 (1999).
57 *Id.* at 147–49.
58 *Id.* at 149–53.
59 FED. R. EVID. 702 advisory committee's note to the 2000 amendment.
60 FED. R. EVID. 702.

> (5) Whether the field of expertise claimed by the expert is known to reach reliable results for the type of opinion the expert would give.[61]

The combination of *Daubert* and its progeny with the Rule 702 amendment Committee's Note means that a district court judge has great discretion in determining whether to admit or deny expert testimony.

While *Daubert* dealt specifically with Rule 702, other rules can also be important in challenging expert testimony. Probably the most important of these is Rule 403, which applies with as much force to expert opinion testimony as it does to any other evidence.[62] Rule 403, labeled "Exclusion of Relevant Evidence on Grounds of Prejudice, Confusion, or Waste of Time," states, "Although relevant, evidence may be excluded if its probative value is substantially outweighed by the danger of unfair prejudice, confusion of the issues, or misleading the jury, or by considerations of undue delay, waste of time, or needless presentation of cumulative evidence."[63] Rule 403 has a broad reach; evidence that may be otherwise relevant and admissible may be excluded if its probative value is outweighed by the danger of unfair prejudice and confusion.[64] In a *Daubert* challenge, Rule 403 provides a further means of excluding expert testimony that might pass *Daubert*'s relevance and reliability requirements.

Other federal rules that are relevant to *Daubert* challenges are Federal Rules of Civil Procedure 26(a)(2)(B) and 26(e)(1), which require an expert witness to submit an expert report describing all of the opinions about which he or she will testify,[65] and Federal Rule of Civil Procedure 37(c)(1), which provides for the exclusion of expert testimony that has not been described in the expert report.[66] In the context of a *Daubert* challenge, the expert report required by Rule 26 will most likely provide the basis for the challenge, and Rule 37 provides litigators with a means of excluding evidence that was not considered in the challenge. While these rules are tangential to the central focus of this Note, they provide part of the procedural backdrop through which a litigator can use *Daubert*.

The outcome of any *Daubert* challenge is hard to predict.[67] Trial judges have broad discretion in applying a number of rules and factors, and scientific testimony on complex subjects is, by its nature, difficult to anticipate. One trend about these challenges, however, is clear: *Daubert* challenges are far

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61 FED. R. EVID. 702 advisory committee's note to the 2000 amendment (citations omitted).

62 *See* 2 JACK B. WEINSTEIN & MARGARET A. BERGER, WEINSTEIN'S FEDERAL EVIDENCE § 403.02[1][a] (Joseph McLaughlin ed., 2d ed. 2009).

63 FED. R. EVID. 403.

64 *Id.*

65 FED. R. CIV. P. 26(a)(2)(B), (e)(1).

66 FED. R. CIV. P. 37(c)(1).

67 *See* Cassandra H. Welch, Note, *Flexible Standards, Deferential Review:* Daubert*'s Legacy of Confusion*, 29 HARV. J.L. & PUB. POL'Y 1085, 1086 (2006) (arguing for a more specific admissibility standard to remedy confusion inherent in *Daubert*); *see also* A. Leah Vickers, Daubert*, Critique and Interpretation: What Empirical Studies Tell Us About the Application of* Daubert, 40 U.S.F. L. REV. 109, 114 (2005) (suggesting that most judges do not consistently apply the *Daubert* factors).

more likely to result in the exclusion of a plaintiff's proffered testimony than of that proffered by a defendant.[68]

Professor D. Michael Risinger studied the effects of *Daubert* challenges in hundreds of federal civil cases between 1993 and 2000 and concluded that around ninety percent of reported *Daubert* challenges are brought by defendants, with around two-thirds of those challenges successfully excluding the plaintiff's expert testimony, whereas in the small number of cases in which a plaintiff challenged a defense expert, the challenge was successful less than half of the time.[69] A study by the RAND Institute for Civil Justice found in 2002 that the percentage of federal civil cases resulting in summary judgment doubled after *Daubert*, and that over ninety percent of summary judgments involving *Daubert* challenges were decided against the plaintiff.[70] One explanation for this trend is that plaintiffs are naturally more susceptible to *Daubert* challenges because they bear the burden of proof, and are therefore in the position first to present scientific evidence that can be challenged.[71] This factor can present a substantial obstacle in scientifically complex areas such as environmental or toxic tort cases, particularly where the plaintiff relies on novel scientific theories or evidence.[72] Another obstacle for plaintiffs is that the reliability standards outlined in *Daubert* can require substantial resources to meet, even where claims are strong, and thus *Daubert* often favors the party with the greater resources, which usually means the defendant.[73] It has also been suggested that scientists and medical professionals have grown more reluctant to testify for plaintiffs since *Daubert* because of concerns that their scientific qualifications and methods will be challenged in court.[74]

Although *Daubert* challenges have generally worked to the benefit of defendants, some plaintiffs have been able to challenge defense experts effectively. In *Edwards v. Safety-Kleen Corp.*,[75] a case involving challenges to both plaintiff and defense experts, the court found that an oncologist's testimony for the defense was unreliable because his assertion that a worker

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68 Owen, *supra* note 42, at 365 ("[T]he fact remains that only infrequently do courts invoke *Daubert* to exclude expert testimony proffered by defendants."); McGarity, *supra* note 21, at 155 ("In the decade following the Supreme Court's decision, it has become quite clear that *Daubert* has had a profoundly negative impact on plaintiffs' attorneys' use of common-law torts to hold companies accountable for the adverse effects of their products and byproducts on human health and the environment.").

69 D. Michael Risinger, *Navigating Expert Reliability: Are Criminal Standards of Certainty Being Left on the Dock?*, 64 ALB. L. REV. 99, 108–10, 145–47 (2000).

70 DIXON & GILL, *supra* note 2, at 56.

71 *See* Michel F. Baumeister & Dorothea M. Capone, *Admissibility Standards as Politics—The Imperial Gate Closers Arrive!!!*, 33 SETON HALL L. REV. 1025, 1045 (2003).

72 *Id.*

73 Margaret A. Berger, *What Has a Decade of* Daubert *Wrought?*, 95 AM. J. PUB. HEALTH S59, S64–65 (Supp. 1 2005) (suggesting that *Daubert* has likely discouraged plaintiffs with strong claims but insufficient resources from pursuing just compensation for injuries in court).

74 *DAUBERT*: THE MOST INFLUENTIAL SUPREME COURT RULING YOU'VE NEVER HEARD OF 4, 13 (2003), *available at* http://www.defendingscience.org/upload/Daubert-The-Most-Influential-Supreme-Court-Decision-You-ve-Never-Heard-Of-2003.pdf.

75 61 F. Supp. 2d 1354 (S.D. Fla. 1999).

could not have had benzene-induced leukemia because he did not exhibit certain chromosomal aberrations relied on an untested theory that was supported neither by peer-reviewed publications nor by general acceptance in the field of oncology.[76] Another example is *Harris v. General Motors Corp.*,[77] in which the Sixth Circuit overruled a summary judgment for a defendant manufacturer in a product liability case on the grounds that the expert affidavits relied on by the trial court did not establish undisputed physical facts, but merely presented the manufacturer's alternative theory of the case.[78] Although the plaintiff in *Harris* had not raised a *Daubert* challenge at the trial level, the appeals court ordered the trial court to conduct a *Daubert* hearing on the defendant's evidence on remand, and suggested that the testimony of one of the experts might fail *Daubert*'s reliability component.[79] And in *Cook v. American Steamship Co.*,[80] the Sixth Circuit ruled that a defense expert's testimony should not have been admitted at trial because the expert had not performed any scientific tests on a rope that he concluded, on visual inspection alone, had been damaged by burning.[81]

Thus, while *Daubert* challenges have primarily worked to the benefit of defendants, there is no reason why plaintiffs cannot use them in areas in which the plaintiff's position is supported by the weight of the scientific evidence.[82] As we shall see, climate change litigation appears to be such an area.

IV. HOW CLIMATE CHANGE PLAINTIFFS CAN USE *DAUBERT* TO EXCLUDE DEFENSE EXPERT TESTIMONY

A. Challenging the Witness—Can a Weatherman Predict the Climate?

The most direct way to exclude a witness's testimony is to exclude the witness himself. In order to testify as an expert, a witness must qualify for the status of expert by means of "knowledge, skill, experience, training, or

76 *Id.* at 1359–60. *Edwards* is also an example of a court permitting an expert to testify but limiting his conclusions to those supported by reliable scientific methods. *Id.* at 1359.

77 201 F.3d 800 (6th Cir. 2000).

78 *Id.* at 803–04.

79 *Id.* at 804 n.2 ("Certainly, nothing in the record as it now exists evinces either the reliability or validity of [the expert's] testimony . . . .").

80 53 F.3d 733 (6th Cir. 1995).

81 *Id.* at 739–40 ("[The expert's] causation opinion, adorned as it was in the dress of scientific or technical expertise and fortified by the court's later instruction to the jury calling it 'expert opinion,' was not expert testimony under Rule 702.").

82 *See* Lissy C. Friedman et al., *How Tobacco-Friendly Science Escapes Scrutiny in the Courtroom*, 95 AM. J. PUB. HEALTH S16, S17 (Supp. 1 2005) (arguing that much of the scientific testimony used by tobacco companies in past litigation would not pass *Daubert*); *see also* Anthony Z. Roisman, *Taming the* Daubert *Tiger*, *in* ENVIRONMENTAL LITIGATION 543, 557–58 (A.L.I.-A.B.A. Course of Study, No. SP059, 2009) (arguing that the economics of contingent legal fees should make plaintiff lawyers actually less likely to assert dubious scientific claims than defense lawyers, who will be paid their hourly rate regardless of whether their case is based on faulty science).

education."[83] If in the eyes of the trial judge the proposed expert fails to meet this qualification, the judge can exclude the witness's testimony.[84] This facet of Rule 702 may be particularly relevant in a field in which many "experts" have been put forth in the public arena who lack substantial expertise in climatology.

Climate change skeptics have taken pains to establish that scientists support their position. Senator James Inhofe (R-Okla.), a former chair and current member of the Senate's Environment and Public Works (EPW) Committee, issued a Senate report on December 20, 2007, titled "Over 400 Prominent Scientists Disputed Man-Made Global Warming Claims in 2007."[85] Inhofe, who stated on the Senate floor in 2003 that global warming might be "the greatest hoax ever perpetrated on the American people,"[86] has been one of the most prominent opponents in Congress of any GHG emissions regulations.[87] Inhofe pointed to the "400 Prominent Scientists" as evidence that there could not be a consensus on climate change as reported in the Intergovernmental Panel on Climate Change (IPCC) 2007 report.[88] Inhofe added new names to the list in 2008 and 2009, bringing the claimed total to over 700.[89] Critics have suggested that Inhofe's report misrepresents the views of many of the scientists cited, and that a large percentage are neither prominent nor scientists.[90]

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83 FED. R. EVID. 702.

84 29 CHARLES ALAN WRIGHT & VICTOR JAMES GOLD, FEDERAL PRACTICE AND PROCEDURE § 6265 (1997).

85 MINORITY STAFF OF S. ENV'T & PUB. WORKS COMM., 110TH CONG., OVER 400 PROMINENT SCIENTISTS DISPUTED MAN-MADE GLOBAL WARMING CLAIMS IN 2007: SCIENTISTS DEBUNK "CONSENSUS" (Comm. Print 2007) (primarily the work of Sen. Inhofe), *available at* http://epw.senate.gov/public/index.cfm?FuseAction=Files.View&FileStore_id=bba2ebce-6d03-48e4-b83c-44fe321a34fa [hereinafter MINORITY STAFF COMM. PRINT].

86 149 CONG. REC. S10,022 (daily ed. July 28, 2003) (statement of Sen. Inhofe).

87 *See, e.g.*, Traci Watson, *Senate Climate Bill Would Speed Emissions Reductions*, USA TODAY, Sept. 30, 2009, http://www.usatoday.com/weather/climate/2009-09-29-senate-climate-bill_N.htm (last visited Jan. 24, 2010).

88 MINORITY STAFF COMM. PRINT, *supra* note 85, at 2–3.

89 *See* MINORITY STAFF OF S. ENV'T & PUB. WORKS COMM., 111TH CONG., MORE THAN 700 INTERNATIONAL SCIENTISTS DISSENT OVER MAN-MADE GLOBAL WARMING CLAIMS: SCIENTISTS CONTINUE TO DEBUNK "CONSENSUS" IN 2008 & 2009 (Comm. Print 2009) (primarily the work of Sen. Inhofe), *available at* http://epw.senate.gov/public/index.cfm?FuseAction=Minority.Blogs&ContentRecord_id=2674E64F-802A-23AD-490B-BD9FAF4DCDB7.

90 Andrew Dessler, *The 'Inhofe 400': Busting the 'Consensus Busters': Today: Thomas Ring*, GRIST, Dec. 27, 2007, http://gristmill.grist.org/story/2007/12/26/1971/6517 (last visited Jan. 24, 2010) (initiating a series of critical profiles of the skeptic of the day); Dan Shapley, *Inhofe's 400 Global Warming Deniers Debunked: List of "Scientists" Includes Economists, Amateurs, TV Weathermen and Industry Hacks*, DAILY GREEN, Jan. 11, 2008, http://www.thedailygreen.com/environmental-news/latest/inhofe-global-warming-deniers-47011101 (last visited Jan. 24, 2010) (asserting that, of the 400 global warming "deniers," 84 have taken money from the energy industry, 49 are retired, 44 are television weathermen, 20 are economists, and 70 have no apparent expertise in climate science); Joseph Romm, *The Cold Truth About Climate Change*, SALON.COM, Feb. 27, 2008, http://www.salon.com/news/feature/2008/02/27/global_warming_deniers (last visited Jan. 24, 2010) ("[T]he list is both padded and laughable, containing the opinions of TV weathermen, economists, a bunch of non-prominent scientists who aren't climate experts, and, perhaps surprisingly, even a number of people who actually believe in the consensus.")

One of the report's listed "prominent scientists," Chris Allen, is a television weatherman for the Kentucky Fox affiliate WBKO.[91] Chris Allen was also cited as an authority in an earlier press release from the EPW Committee.[92] The EPW website notes that "Allen has the Seal of Approval of the National Weather Association and is the chairman of the Kentucky Weather Preparedness Committee."[93] The website goes on to quote Allen as saying, "As I have stated before, not only do I believe global climate change exists—it has always existed. There have been times of global warming *and* cooling."[94] The website provides a link to WBKO's website, which contains Allen's blog in which he explained his view that recent observations of rising world temperatures are explained entirely by natural cycles and that theories of anthropogenic global warming are implausible.[95] Allen does not have a college degree, he is mostly self-taught in meteorology, and his main argument against anthropogenic global warming is that God would not allow it.[96]

Could the defendant in our hypothetical climate change lawsuit present Allen as an expert in the courtroom to debunk claims of anthropogenic global warming? Senator Inhofe apparently believes that Allen is sufficiently authoritative to present him as a climate expert in press releases and on Senator Inhofe's blog on the website for the EPW Committee. A senator's website, however, is not governed by the Federal Rules of Evidence. It is likely that Allen would not withstand a *Daubert* challenge as an expert witness.

A trial judge has a great deal of discretion in weighing a proffered expert's "knowledge, skill, experience, training, or education."[97] In this analysis, Allen's lack of an advanced degree is not in itself dispositive. A witness without formal education may still qualify as a witness on the basis

91 MINORITY STAFF COMM. PRINT, *supra* note 85, at 2, 227–28.

92 Posting of Marc Morano to The Inhofe EPW Press Blog, Panel of Broadcast Meteorologists Reject Man-Made Global Warming Fears—Claim 95% of Weathermen Skeptical, http://epw.senate.gov/public/index.cfm?FuseAction=PressRoom.Blogs&ContentRecord_id=CC160863-802A-23AD-4B10-571FFE8F3B76 (Feb. 16, 2007, 14:48 EST) (last visited Jan. 24, 2010).

93 *Id.*

94 *Id.*

95 *Id.*; *see also* Chris Allen, Chris' Corner, http://www.wbko.com/blogs/chriscorner/ (last visited Jan. 24, 2010) (blog of Chris Allen). The WBKO website no longer presents Allen's blogs prior to 2008, which contained the discussion on global warming. The relevant passages of the blog were, however, discussed at length in a number of websites criticizing the inclusion of Allen on the list. *See, e.g.*, Andrew Dessler, *The 'Inhofe 400' Skeptic of the Day: Today: Chris Allen*, GRIST, Dec. 30, 2007, http://www.grist.org/article/the-inhofe-400-skeptic-of-the-day (last visited Jan. 24, 2010).

96 *See* Robert Parham, *Sen. Inhofe Lists Creationists as Prominent Scientists in Global Warming Report*, ETHICSDAILY.COM, Apr. 20, 2009, http://ethicsdaily.com/news.php?view Story=14084 (last visited Jan. 24, 2010) ("'My biggest argument against putting the primary blame on humans for climate change is that it completely takes God out of the picture . . . . It must have slipped these people's minds that God created the heavens and the earth and has control over what's going on. (Dear Lord Jesus . . . did I just open a new [P]andora's box?) Yeah, I said it. Do you honestly believe God would allow humans to destroy the earth He created?'" (quoting Chris Allen's blog)); Dessler, *supra* note 95 (quoting Chris Allen's blog).

97 FED. R. EVID. 702; 29 WRIGHT & GOLD, *supra* note 84, § 6265.

of experience or independent study,[98] and the seal of approval of a national organization can be indicative of expertise.[99] On the basis of these factors, Allen would probably qualify as an expert on local weather forecasting—but weather and climate are not the same thing.[100] While weather forecasts rarely look forward past two weeks, climate forecasts consider a time span of centuries.[101] While weather forecasts tend to be local, or at most regional, in focus, climate considers the world as a whole.[102] Climate also considers a range of disciplines—atmospheric chemistry, oceanography, ecology, physics—that only tangentially come into play in meteorology as practiced by local weather forecasters.[103] Considering this distinction, the trial judge will have to determine whether Allen's tangential knowledge of climatology can assist the trier of fact.[104] A judge may exclude a witness if it is determined that the witness's expertise is not relevant to the questions at hand.[105] Our hypothetical plaintiff could make a compelling argument that expertise in the field of weather forecasting does not make a witness competent to provide expert testimony on whether GHG-induced climate change is occurring or will occur. In this case, it is likely that what counts as an expert in the political process would not cut it in the courtroom.

98 *See, e.g.*, Lauria v. Nat'l R.R. Passenger Corp., 145 F.3d 593, 599 (3d Cir. 1998) (allowing a track foreman to testify as expert in injured rail yard worker's action under the Federal Employers Liability Act, 45 U.S.C. §§ 51–60 (2006), in light of the foreman's 20 years of experience in track maintenance, operations, and safety); United States v. Velasquez, 64 F.3d 844, 851 (3d Cir. 1995) (allowing expert testimony regarding handwriting where witness had engaged in eight years of self-directed research on handwriting analysis); Thomas v. Newton Int'l Enters., 42 F.3d 1266, 1269–70 (9th Cir. 1994) (allowing expert testimony concerning proper safety procedures on a ship by a longshoreman with 29 years of experience).

99 *See, e.g.*, Frazier v. Cont'l Oil Co., 568 F.2d 378, 383 (5th Cir. 1978) (allowing engineer to testify as to improper design of gas tank and venting system where witness was a member of the Mississippi Engineering Society, the National Society of Professional Engineers, and a fellow in the American Society of Civil Engineers).

100 Nat'l Aeronautics & Space Admin., What's the Difference Between Weather and Climate?, http://www.nasa.gov/mission_pages/noaa-n/climate/climate_weather.html (last visited Jan. 24, 2010).

101 *See id.*

102 WEBSTER'S THIRD NEW INTERNATIONAL DICTIONARY 2590 (3d ed. 2002) (defining "weather" as the "state of the atmosphere at a definite time and place"); *see* Nat'l Aeronautics & Space Admin., *supra* note 100.

103 SPENCER WEART, THE DISCOVERY OF GLOBAL WARMING 33 (2008) (listing disciplines that relate to climate science).

104 *See* Wilson v. City of Chicago, 6 F.3d 1233, 1238–39 (7th Cir. 1993) ("If the judge is not persuaded that a so-called expert has genuine knowledge that can be genuinely helpful to the jury, he should not let him testify.").

105 Berry v. City of Detroit, 25 F.3d 1342, 1351 (6th Cir. 1994) ("The issue with regard to expert testimony is not the qualifications of a witness in the abstract, but whether those qualifications provide a foundation for a witness to answer a specific question."); Carroll v. Otis Elevator Co., 896 F.2d 210, 212 (7th Cir. 1990) ("Whether a witness is qualified as an expert can only be determined by comparing the area in which the witness has superior knowledge, skill, experience, or education with the subject matter of the witness's testimony."); Aloe Coal Co. v. Clark Equip. Co., 816 F.2d 110, 114 (3d Cir. 1987) (holding that trial court erred in permitting witness to testify as to cause of a tractor-shovel fire where he had no training as a mechanic nor experience operating construction machinery, but was merely a salesman who at times prepared equipment-damage estimates).

This disconnect between standards of expertise in the courtroom and in the public arena is illustrated even more strikingly by a man that Senator Inhofe presented as a climate change expert before the United States Senate—the novelist Michael Crichton.[106] Crichton, who died in November 2008,[107] derived his status as an expert among climate change skeptics from his 2004 science fiction novel *State of Fear*, in which environmental terrorists stage fraudulent disasters in order to help their fundraising, and the novel's hero spends much of the book debunking global warming.[108] Many of Crichton's scientific assertions in the novel have been challenged as misleading or inaccurate.[109] In 2005, Senator James Inhofe invited Crichton to speak to the Senate EPW Committee on the issue of climate change, and stated in his introduction that he had made *State of Fear* required reading for the members of the committee.[110] President Bush later invited Crichton to the White House to share his views on climate change.[111] Crichton delivered speeches on the subject to groups such as the American Enterprise Institute and the Brookings Institution.[112] Clearly, Crichton was more than willing to express his views on climate change, and a senator and the President of the United States were willing to look to him as an expert, but could he have testified about climate change in a courtroom?

It is likely that Crichton would not have qualified as an expert on the subject of climate change. While Crichton did have a degree from Harvard Medical School, he did not have any formal training in a climate-related field,

106 Michael K. Janofsky, *Michael Crichton, Novelist, Becomes Senate Witness*, N.Y. TIMES, Sept. 29, 2005, at E1.

107 Michael Crichton In Memoriam, http://www.crichton-official.com/aboutmichaelcrichton-inmemoriam.html (last visited Jan. 24, 2010).

108 MICHAEL CRICHTON, STATE OF FEAR (2004). The novel ends with several pages of footnotes that purport to substantiate the hero's scientific claims. *Id.* at 581–603. In the preface, Crichton remarks that although the novel is a work of fiction, the "[f]ootnotes are real." *Preface* to *id.* Indeed.

109 *See, e.g.*, Bruce Barcott, *Not So Hot*, N.Y. TIMES BOOK REVIEW, Jan. 30, 2005, at 12, 12 (reviewing CRICHTON, *supra* note 108) (criticizing Crichton's claims not so much for their inaccuracy as for the manipulative way in which he presents them); Chris Mooney, *Checking Crichton's Footnotes*, BOSTON GLOBE, Feb. 6, 2005, http://www.boston.com/news/globe/ideas/articles/2005/02/06/checking_crichtons_footnotes (last visited Jan. 24, 2010) (quoting scientists who state that Crichton misrepresented their work); Posting of Gavin A. Schmidt to RealClimate, Michael Crichton's State of Confusion, http://www.realclimate.org/index.php?p=74 (Dec. 13, 2004) (last visited Jan. 24, 2010) (stating that many of Crichton's assertions have been disproven or do not accurately reflect the evidence).

110 *The Role of Science in Environmental Policy Making: Hearing Before the S. Comm. on Environment and Public Policy*, 109th Cong. 2 (Sept. 28, 2005) (statement of James M. Inhofe, Chairman, S. Comm. on Environment and Public Policy) [hereinafter *Role of Science Hearing*]; Janofsky, *supra* note 106.

111 Michael Janofsky, *Bush's Meeting With Novelist Distresses Environmentalists*, N.Y. TIMES, Feb. 19, 2006, at 28.

112 Peter Evans & Helen Evans, *Michael Crichton on Science Policy*, INTELLECTUAL CONSERVATIVE, Feb. 3, 2005, http://www.intellectualconservative.com/2005/02/03/michael-crichton-on-science-policy (last visited Jan. 24, 2010); Michael Crichton, Speech at the Joint Session, AE1-Brookings Institution: Science Policy in the 21st Century (Jan. 25, 2005), http://www.michaelcrichton.com/speech-sciencepolicy.html (last visited Jan. 24, 2010).

nor had he ever worked in the field aside from his research for *State of Fear*.[113] Crichton's medical degree and years of writing about scientific subjects might have made him competent to testify about science generally, but they did not make him competent to testify about any scientific specialty.[114] Crichton's research on climate change prior to writing the book could theoretically have made him an expert on the subject,[115] but the question for the judge would be whether a person with medical training who had spent a few years independently reviewing the science and policies surrounding climate change is really enough of an expert to assist the trier of fact in understanding the complicated subject matter.[116] Our plaintiff could make a good argument that Crichton lacked sufficient training in the more rigorous scientific disciplines of climate change to form expert opinions on the science, and that he was in effect nothing more than an educated layman on the subject of climate change. This argument could be strengthened by the fact that Crichton conducted his research in order to flesh out a novel about murderous ecoterrorists; one could infer that his research may have been less about the disinterested search for the truth than about gathering material for the story he wanted to tell. The plaintiff could further argue that Crichton's testimony, due to his stature as a public figure, would have a prejudicial effect disproportionate to any probative value it would provide.[117] There is a good chance that a judge would disqualify him as an expert.

Challenging a proposed witness's qualifications could be an effective tactic for climate change plaintiffs. As the above examples illustrate, prominent skeptics such as Senator Inhofe have relied on the authority of individuals, such as Allen and Crichton, who would probably not withstand *Daubert* challenges as expert witnesses. These examples may be subject to

113 About Michael Crichton, http://www.michaelcrichton.com/aboutmichaelcrichton-biography.html (last visited Jan. 24, 2010).

114 *See, e.g.*, Mattke v. Deschamps, 374 F.3d 667, 671 (8th Cir. 2004) (holding that a physician specializing in sleep and pulmonary disorders was not qualified to offer opinion on aspect of pathology); O'Conner v. Commonwealth Edison Co., 807 F. Supp. 1376, 1391 (C.D. Ill. 1992), *aff'd*, 13 F.3d 1090 (7th Cir. 1994) (holding that an ophthalmologist was prohibited from testifying in action alleging radiation exposure caused plaintiff's cataracts because ophthalmologist was not qualified in field of radiation-induced cataracts); Brassette v. Burlington N., Inc., 687 F.2d 153, 158 (8th Cir. 1982) (holding that an expert in hydraulic engineering and accident reconstruction was prohibited from offering opinions relating to warning issues since expert was not qualified to testify with regard to warnings); Fireman's Fund Ins. Co. v. Videfreeze Corp., 540 F.2d 1171, 1180 (3d Cir. 1976) (precluding a geologist from testifying about earthquake damage where geologist was qualified to testify about rock formation or slippage but had no training in seismology).

115 *See Velasquez*, 64 F.3d 844, 851 (3d Cir. 1995) (holding that trial court did not err in receiving expert testimony regarding handwriting where witness had engaged in eight years of self-directed research on handwriting analysis).

116 FED. R. EVID. 702.

117 FED. R. EVID. 403; Porter v. Whitehall Labs., Inc., 791 F. Supp. 1335, 1345 (S.D. Ind. 1992), *aff'd*, 9 F.3d 607 (7th Cir. 1993) (stating that expert testimony that attempted to relate inferential causal relationship between drug and disease was not probative; however, even if testimony was minimally probative, risk that jury would rely on expert's stature instead of reliability of his testimony outweighed any probative value).

the criticism that they are too easy—would a savvy defendant really put forth a television weatherman as a climate change expert in the courtroom? Most likely they would not, but in a way that is the whole point. The possibility of expert challenges under Rule 702 will be enough by itself to create a substantial difference between the debate on climate change in the courtroom and what has passed for a debate in the political process. Climate change defendants, knowing that science fiction writers and weathermen will not pass muster under Rule 702, will be forced to rely on the testimony of qualified scientists, who will be more likely to focus on the actual scientific issues involved. The fact that a United States senator has publicly relied on witnesses like Allen and Crichton suggests the difficulty that defendants may have in finding experts who are both opposed to the consensus model and qualified to testify about it. Such scientists do exist, however.

Sitting next to Crichton at Inhofe's Senate Committee hearing was another meteorologist who would likely fare better than Allen in an expert witness challenge. Bill Gray, a Professor Emeritus in Atmospheric Science at Colorado State University, spoke out against "the bogus science and media-hype" that he feels is behind the consensus model of anthropogenic global warming.[118] Gray stated at the hearing that any measured warming in recent decades has been due to natural changes in the thermohaline circulation of the ocean, and that this same natural cycle will lead to global cooling within the present decade.[119] Inhofe and other opponents of GHG regulations have enthusiastically embraced Gray's theories, in part because, unlike Allen and Crichton, Gray is a practicing scientist with a Ph.D. in geophysical sciences and a list of peer-reviewed scientific publications spanning more than four decades.[120] Gray was one of the pioneers of the seasonal forecasting of hurricanes and has been recognized for decades as one of the most influential teachers and accurate forecasters in the study of hurricanes.[121] Although his specialty is not climatology, he has training in and experience with many of the subdisciplines and quantitative methods employed by climatologists.[122] He is unquestionably an expert in large-scale weather systems, and in recent years he has increasingly focused on the issues of climate change.[123] In sum, he has knowledge, skill, experience, training, *and*

118 *Role of Science Hearing*, *supra* note 110, at 57 (statement of William Gray, Ph.D., Professor, Department of Atmospheric Science, Colorado State University).

119 *Id.* at 26.

120 Colo. State Univ., The Tropical Meteorology Project, http://typhoon.atmos.colostate.edu (last visited Jan. 24, 2010). Copies of many of Gray's publications are available on the website of the Tropical Meteorology Project at Colorado State University, Tropical Meteorology Project Publications Available in PDF Format, http://typhoon.atmos.colostate.edu/Includes/Documents/Publications.html (last visited Jan. 24, 2010).

121 A detailed portrait of Gray's career and current stance on climate change is provided in CHRIS MOONEY, STORM WORLD: HURRICANES, POLITICS, AND THE BATTLE OVER GLOBAL WARMING 59–79 (2007). A profile in the *Washington Post* identified Gray as "the World's Most Famous Hurricane Expert." Achenbach, *supra* note 40.

122 *See* MOONEY, *supra* note 121, at 64–65 (describing Gray's training and his empirical approach to hurricane research).

123 *Id.* at 58.

education in fields highly relevant to climate change issues. There would be little point in arguing that Gray is not an expert for the purposes of Rule 702. To challenge Gray effectively, an attorney would need to dig deeper into the *Daubert* standard and look to the reliability of his theories and techniques.

B. Challenging Reliability: How Many Peers Does It Take to Review a Paper?

A judge will almost certainly let Gray testify on certain climate change issues, but in other areas he is vulnerable to a challenge. As one of the nation's premier experts on hurricane formation, Gray would certainly be allowed to offer his opinions on the connection between global warming and increased hurricane activity (he believes there is no connection).[124] A judge would also most likely allow Gray to testify as to areas of uncertainty and possible weaknesses in the consensus model. But not all of Gray's publicly stated opinions would necessarily pass *Daubert* scrutiny. His testimony before the Senate Committee and other public statements have focused on what he sees as the true cause of perceived global warming—the thermohaline circulation (THC).[125] The THC is a circulation pattern of water among the oceans driven by temperature (thermo) and salinity (haline), which together determine the density of the water.[126] The THC, while widely recognized as a fundamental component of the world's climate systems, is not very well understood due to the difficulty of measuring a worldwide deep ocean system that operates on an extremely long time scale (it is thought that the circulation takes around 1600 years to complete its circuit of the world's oceans).[127] Gray has often stated that the THC provides the explanation for recent perceived warming, and also that it will inevitably lead to global cooling in the near future.[128] His skepticism of the consensus model is inextricably linked to his belief that this alternate factor plays a far

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124 *Role of Science Hearing*, *supra* note 110, at 63 (statement of William M. Gray, Ph.D., Professor, Department of Atmospheric Science, Colorado State University).

125 *Id.* at 60; *see also* William M. Gray, *Viewpoint: Get Off Warming Bandwagon*, BBC NEWS, Nov. 16, 2000, http://news.bbc.co.uk/2/hi/in_depth/sci_tech/2000/climate_change/1023334.stm (last visited Jan. 24, 2010) ("These small global temperature increases of the last 25 years and over the last century are likely natural changes that the globe has seen many times in the past. This small warming is likely a result of the natural alterations in global ocean currents which are driven by ocean salinity variations.").

126 *See* Stefan Rahmstorf, *Ocean Circulation and Climate During the Past 120,000 Years*, 419 NATURE 207, 208 (2002); Stefan Rahmstorf, *The Current Climate*, 421 NATURE 699, 699 (2003); Michael Vellinga & Richard A. Wood, *Global Climatic Impacts of a Collapse of the Atlantic Thermohaline Circulation*, 54 CLIMATIC CHANGE 251, 251 (2002).

127 François Primeau, *Characterizing Transport Between the Surface Mixed Layer and the Ocean Interior with a Forward and Adjoint Global Ocean Transport Model*, 35 J. OF PHYSICAL OCEANOGRAPHY 545, 556 (2005) (estimating oldest water in Pacific and Atlantic Oceans to be approximately 1600 years old).

128 WILLIAM M. GRAY, GLOBAL WARMING AND HURRICANES 2 (2006), *available at* http://ams.confex.com/ams/pdfpapers/107533.pdf.

larger role in controlling climate than do GHG emissions.[129] But can Gray testify about his THC theory in a courtroom?

There is reason to think that Gray's theory would fail the *Daubert* test for reliability. As discussed in Part III, the five reliability factors are testability, peer review, error rate, control standards, and general acceptance.[130] Gray's theory founders badly on the criteria of peer review and general acceptance. Courts have found that lack of support in peer-reviewed publications can be decisive in excluding testimony under *Daubert*.[131] Although Gray has published widely in the field of atmospheric science, he has never published in a peer-reviewed journal his theory of the role of the THC in controlling climate.[132] It is not clear whether this is because Gray has never submitted this theory for publication or because it has never been accepted. If the explanation is the former, then the obvious question is why not? If a widely-published senior scientist publicly and stridently avows a theory, why would he not seek to publish it in the accepted forums of his field? There is no answer to that question that argues in favor of the theory's reliability. On the other hand, if no journals have chosen to publish it, again the question is why not? Either the papers failed to meet the journal's standards—which would argue against a finding of reliability—or, as the community of climate change skeptics would likely argue, Gray's papers were rejected because his theory differs from the climate change model that is accepted by the scientific majority that runs these journals. But if that is the case, then Gray's theory fails the fifth *Daubert* criterion of general acceptance in its field.[133] It is worth noting that, in a study of 928 scientific papers dealing with climate change published in peer-reviewed journals between 1993 and 2003, seventy-five percent of the papers explicitly or implicitly accepted the consensus model while not a

129 Gray's theory of the thermohaline circulation is discussed in MOONEY, *supra* note 121, at 218–19.

130 *Daubert*, 509 U.S. 579, 593–94 (1993).

131 Chikovsky v. Ortho Pharm. Corp., 832 F. Supp. 341, 345–46 (S.D. Fla. 1993) (excluding physician's testimony that the acne cream Retin A is a teratogen where the physician was not aware of any published article or treatise reporting that Retin A causes birth defects); United States v. Jones, 24 F.3d 1177, 1179–80 (9th Cir. 1994) (excluding criminal defense expert's testimony based on a novel voice identification technique that had never been published or submitted to peer review).

132 Achenbach, *supra* note 40 ("[W]hen you press him on his theory of how thermohaline circulation has caused recent warming of the planet and will soon cause cooling, he concedes that he hasn't published the idea in any peer-reviewed journal. He's working on it, he says."). While Gray has not published his theory in a peer-reviewed journal, he did submit a meeting paper outlining the theory at the 2006 Conference on Hurricanes and Tropical Meteorology. GRAY, *supra* note 128, at 2. Gray's theory and the scientific assertions in this Note are criticized in Posting of Group to RealClimate, Gray and Muddy Thinking about Global Warming, http://www.realclimate.org/index.php/archives/2006/04/gray-on-agw (Apr. 26, 2006) (last visited Jan. 24, 2010).

133 *See, e.g.*, Summers v. Mo. Pac. R.R. Sys., 897 F. Supp. 533, 535 (E.D. Okla. 1995) (excluding expert's testimony regarding the plaintiff's "multiple chemical sensitivity" where the theory of multiple chemical sensitivity had not been generally accepted by representative medical organizations such as the American Medical Association and the American College of Physicians).

single paper explicitly rejected it.[134] While this result could be the product of a corrupt bias by the scientific majority, a court has only limited discretion to second-guess the judgment of the scientific majority.[135] The *Daubert* factors of peer review and general acceptance recognize that at some level a court has to trust that the majority of scientists know what they are doing.

A further problem for Gray's theory is that it relies on premises that are not widely accepted by climatologists. A principal component of his theory is that the THC primarily upwells in the tropics, but recent studies have suggested that upwelling in the tropics is independent from the THC.[136] Gray's theory also rejects a positive feedback loop between CO_2 and water vapor that will lead to increased atmospheric warming, but this positive feedback loop has been confirmed by direct observational data and has been accepted by most climatologists for decades.[137]

Gray's theory does not get any more support from the remaining *Daubert* factors of testability, error rate, and control standards. The theory is difficult to test because it is a multicentury circulation pattern through the world's oceans. One way to test such a theory would be to see how well it conforms with past observations of the THC, but the effectiveness of this test is limited by the paucity of such observations. Also, matching the theory to past data is not very useful for testing the predictive capacity of the theory—particularly given changing atmospheric chemistry—which is really the point of any theory regarding climate change.[138] The only way to test the predictive capacity of the model is to see how it plays out on computer-simulated global climate models—such as those relied on by the scientists of the IPCC[139]—but Gray has repeatedly stated his conviction that computer models are essentially worthless at predicting future climate.[140] In effect, the

134 Naomi Oreskes, *Beyond the Ivory Tower: The Scientific Consensus on Climate Change*, 306 SCI. 1686, 1686 (2004).

135 *Daubert*, 509 U.S. at 580 (requiring consideration of "whether the theory or technique in question can be (and has been) tested, whether it has been subjected to peer review and publication, its known or potential error rate and the existence and maintenance of standards controlling its operation, and whether it has attracted widespread acceptance within a relevant scientific community" in determining whether to admit expert scientific testimony into evidence).

136 Posting of Group to RealClimate, *supra* note 132. *See generally* Syukuro Manabe & Ronald J. Stouffer, *Coupled Ocean-Atmosphere Model Response to Freshwater Input: Comparison to Younger Dryas Event*, 12 PALEOCEANOGRAPHY 321 (1997) (evaluating the impacts of freshwater discharges in the North Atlantic Ocean relative to subtropical areas); Jochem Marotzke, *Abrupt Climate Change and Thermohaline Circulation: Mechanisms and Predictability*, 97 PROC. NAT'L ACAD. OF SCI. 1347 (2000) (discussing the mechanisms and predictability of THC).

137 *See generally* Raymond T. Pierrehumbert et al., *On the Relative Humidity of the Atmosphere*, *in* THE GLOBAL CIRCULATION OF THE ATMOSPHERE 143, 143 (Tapio Schneider & Adam H. Sobel eds., 2007) (describing the role of the positive feedback loop); Brian J. Soden et al., *The Radiative Signature of Upper Tropospheric Moistening*, 310 SCI. 841 (2005) (providing empirical support for the positive feedback loop).

138 A.P.M. Baede et al., *The Climate System: An Overview*, *in* CLIMATE CHANGE 2001: THE SCIENTIFIC BASIS 87, 87 (J.T. Houghton et al. eds., 2001) [hereinafter CLIMATE CHANGE 2001].

139 B.J. McAvaney et al., *Model Evaluation*, *in* CLIMATE CHANGE 2001, *supra* note 138, at 473, 475.

140 *See, e.g.*, *Role of Science Hearing*, *supra* note 110, at 25 (statement of William M. Gray, Ph.D., Professor, Department of Atmospheric Science, Colorado State University) ("It is

only test Gray has proposed for his theory is the one we are conducting today by pumping several billion tons of carbon into the atmosphere every year—wait and see what happens. There are no ways to assign error rates or control standards to such a test. Since the factors of testability, error rates, and control standards are inherently difficult to apply to a field such as long-term climatological predictions, the inability of Gray's theory to satisfy these criteria may not be fatal, but the inability to satisfy these factors does suggest a general reason to question the reliability of the theory.

The plaintiff could make a strong argument that Gray's theory does not pass any of the five reliability factors articulated in *Daubert*. The likely effect of a *Daubert* challenge would be that Gray might be permitted to testify generally about hurricane formation, but he would not be able to present his theory about the connection between THC and climate to the fact finder.

Daubert reliability challenges may be an effective tool for plaintiffs to use to restrict the testimony of scientists who, like Gray, clearly are experts in their field, but subscribe to theories outside of the climatological mainstream. This is relevant to climate change litigation because the relatively small number of practicing climatologists that challenge the consensus model often adhere to alternative theories that are, almost inescapably, not generally accepted in the field. While the *Daubert* standard is in theory more forgiving of unorthodox theories than was the old *Frye* test, it still retains the *Frye* criterion of widespread acceptance,[141] and thus experts who wish to testify against the consensus model are walking in the door with a strike already against them. As Gray's example shows, plaintiffs will have strong arguments for exclusion if the expert has not published the theory in a peer-reviewed journal. This could apply to the work of quite a few climate change skeptics, as much of the research that has challenged the consensus model in recent years has been published not by peer-reviewed journals but by conservative "think tanks" that do not follow standards of objective review.[142] But will a reliability challenge work if a proffered expert has published his theories in a peer-reviewed journal?

Sherwood Idso would make a good test case of such an expert. Idso, who has served as a research physicist with the United States Department of Agriculture and as an adjunct professor in Geology and Botany at Arizona State University, is the president of the Center for the Study of Carbon Dioxide and Global Change, an organization that promotes the view that

impossible to write code, numerical code for all these processes and integrate this hundreds of thousands of time steps in the future."). The proponents of computer-based climate models respond that while substantial uncertainty remains in the prediction of specific climate events, these models are able to predict the foreseeable range of future climates with substantial accuracy. *See* Daniel A. Farber, *Modeling Climate Change and Its Impacts: Law, Policy, and Science*, 86 TEX. L. REV. 1655, 1665–66 (2008).

141 *Daubert*, 509 U.S. 579, 579, 594 (1993).

142 *See, e.g.*, Michael Shnayerson, *A Convenient Untruth*, VANITY FAIR, May 2007, at 142, 156, 158. For an example of such a publication from the Cato Institute, see Patrick J. Michaels, *Is the Sky* Really *Falling? A Review of Recent Global Warming Scare Stories*, *in* POL'Y ANALYSIS 2 (Cato Inst., No. 576, 2006), *available at* http://www.cato.org/pubs/pas/pa576.pdf.

heightened CO_2 levels are a good thing because of their beneficial effects on plant growth.[143] Idso has energy industry connections: The Center for the Study of Carbon Dioxide and Global Change has been reported to have received funding from ExxonMobil,[144] and in 1991 Idso produced a video extolling the agricultural benefits of heightened CO_2 for the Western Fuels Association, a coal industry association.[145] While Idso's connections to energy interests have led some to question his work as biased,[146] his research on the effects of CO_2 on plant growth has been published several times in peer-reviewed journals. His research on the effects of heightened CO_2 in boosting growth in eldarica pine trees (*Pinus eldarica*), for example, was published in the *Journal of Experimental Botany*, an Oxford University Press publication.[147] He published peer-reviewed papers in 2001 and 2004 on the long-term effects of CO_2 on the growth of sour orange trees.[148] Since Idso is a published scientist who has publicly promoted the benefits of CO_2 and has shown a willingness to accept money from energy companies, it is not unthinkable that climate change defendants could turn to him for expert testimony about his research. But would he be allowed to testify?

It is likely that Idso would pass a *Daubert* reliability challenge. First, there is little question that Idso would qualify as an expert in some aspects of climate change: He is a published scientist who has worked specifically with the biological effects of heightened CO_2.[149] Idso's acceptance of energy company money is irrelevant to this question, as no part of Rule 702 or *Daubert* suggests that corporate funding diminishes an expert's qualifications or the reliability of his or her work.[150] While some might argue

143 C.D. IDSO AND K.E. IDSO, CTR. FOR THE STUDY OF CARBON DIOXIDE AND GLOBAL CHANGE, ENERGY, CARBON DIOXIDE AND EARTH'S FUTURE: PURSUING THE PRUDENT PATH (1999), http://www.co2science.org/about/position/energy.php (last visited Jan. 24, 2010). Information about the Center is available at their website at Center for the Study of Carbon Dioxide and Global Change, CO2 Science, http://www.co2science.org (last visited Jan. 24, 2010).

144 ROSS GELBSPAN, BOILING POINT: HOW POLITICIANS, BIG OIL AND COAL, JOURNALISTS, AND ACTIVISTS ARE FUELING THE CLIMATE CRISIS—AND WHAT WE CAN DO TO AVERT DISASTER 54 (2004); ExxonSecrets Factsheet: Center for the Study of Carbon Dioxide and Global Change, http://www.exxonsecrets.org/html/orgfactsheet.php?id=24 (last visited Jan. 24, 2010).

145 Katharine Mieszkowski, *The Triumph of Fringe Science*, SALON.COM, Aug. 7, 2003, http://dir.salon.com/story/tech/feature/2003/08/07/global_warming/index.html (last visited Jan. 24, 2010); Ross Gelbspan, U.S. Coal Industry: Global Warming Is Good for Us, http://www.heatisonline.org/contentserver/objecthandlers/index.cfm?id=3046&method=full (last visited Jan. 24, 2010).

146 *See* Mieszkowski, *supra* note 145.

147 S.B. Idso & B.A. Kimball, *Effects of Atmospheric CO_2 Enrichment on Biomass Accumulation and Distribution in Eldarica Pine Trees*, 45 J. OF EXPERIMENTAL BOTANY 1669 (1994).

148 Neal R. Adam et al., *Photosynthetic Down-Regulation over Long-Term CO_2 Enrichment in Leaves of Sour Orange (*Citrus Aurantium*) Trees*, 163 NEW PHYTOLOGIST 341, 341–42 (2004); S.B. Idso & B.A. Kimball, *CO_2 Enrichment of Sour Orange Trees: 13 Years and Counting*, 46 ENVTL. & EXPERIMENTAL BOTANY 147, 147–53 (2001).

149 *See, e.g.*, Adam et al., *supra* note 148, at 342; Idso & Kimball, *supra* note 148, at 148.

150 *See generally* Allan Kanner & M. Ryan Casey, Daubert *and the Disappearing Jury Trial*, 69 U. PITT. L. REV. 281, 289–91 (2007) (explaining expert witness evidence requirements under Rule 702 and *Daubert*, which do not include any requirement that the expert not receive corporate funding).

that this is a blind spot in *Daubert*,[151] it would probably be unreasonable to institute a rule that prohibits scientists from testifying on behalf of their employees or sponsors. The Committee Notes to the Rule 702 amendments do allow judges to consider whether an expert is "proposing to testify about matters growing naturally and directly out of research they have conducted independent of the litigation, or whether they have developed their opinions expressly for purposes of testifying."[152] This analysis would likely weigh in favor of admitting Idso's testimony, since he began researching the effects of CO_2 on plants years prior to any climate change litigation. And even if Idso is a paid shill of the energy industry in some aspects of his career, he has also published several papers in independent, peer-reviewed journals. To the extent that Idso's testimony is based on the results of his peer-reviewed studies and other similar publications, it would be difficult to challenge his testimony on the *Daubert* five-factor reliability test. Testability can be established because the publications describe the tests that Idso conducted to advance his theories.[153] The fact that the papers were accepted for publication in respected journals suggests that the methodologies of the tests involved—including error rate and control standards—were sufficiently rigorous that other scientists would accept them as reliable for publication. While all of Idso's conclusions may not be widespread in the scientific community, it is generally accepted among ecologists that heightened CO_2 can promote plant growth.[154] If Idso's testimony sticks to the information contained in his peer-reviewed publications, a *Daubert* challenge to his reliability would probably fail.

Reliability alone, however, is not sufficient for *Daubert*. The plaintiff should argue that Idso's testimony is irrelevant, and can in no way assist the trier of fact.

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151 Substantial research suggests that corporate funding of research can bias the results, either by directing the researchers toward desired outcomes or by suppressing results that are inconsistent with the desired outcome. *See* Marcia Angell, *Is Academic Medicine for Sale?*, 342 NEW ENG. J. MED. 1516, 1516–17 (2000) (considering conflicts of interest inherent in the funding of pharmaceutical research); Sheldon Krimsky & L.S. Rothenberg, *Conflict of Interest Policies in Science and Medical Journals: Editorial Practices and Author Disclosures*, 7 SCI. & ENGINEERING ETHICS 205, 206–10 (2001); Sheldon Krimsky, *The Funding Effect in Science and Its Implications for the Judiciary*, 13 J.L. & POL'Y 43, 44–46 (2005) (examining the effects of academic funding and financial conflicts of interest on the integrity of scientific research, and the resulting consequences for courtroom testimony); Barry Meier, *Contracts Keep Drug Research Out of Reach*, N.Y. TIMES, Nov. 29, 2004, at A1 (describing how drug companies can suppress publication of unfavorable results); Susan Okie, *A Stand for Scientific Independence: Medical Journals Aim to Curtail Drug Companies' Influence*, WASH. POST, Aug. 5, 2001, at A1.

152 FED. R. EVID. 702 advisory committee's note to the 2000 amendments (quoting Daubert v. Merrell Dow Pharm., Inc., 43 F.3d 1311, 1317 (9th Cir. 1995)).

153 *See* Adam et. al., *supra* note 148, at 342–43; Idso & Kimball, *supra* note 147, at 1670.

154 *See, e.g.*, Ramakrishna R. Nemani et al., *Climate-Driven Increases in Global Terrestrial Net Primary Production from 1982 to 1999*, 300 SCI. 1560 (2003) (analyzing the factors, including rising CO_2, that led to increased plant productivity between 1982 and 1999).

C. Challenging Relevance: Plants May Love CO_2, But So What?

To pass *Daubert*, Idso's testimony must be both reliable and relevant.[155] The key question for *Daubert*'s relevance test is whether the testimony "will assist the trier of fact to understand the evidence or to determine a fact in issue."[156] The Supreme Court has stated, "Rule 702's 'helpfulness' standard requires a valid scientific connection to the pertinent inquiry as a precondition to admissibility."[157] The Court also described this connection as "fit."[158] The Sixth Circuit interpreted "fit" to mean that "there must be a connection between the scientific research or test result being offered and the disputed factual issues in the case in which the expert will testify."[159] The Ninth Circuit in the *Daubert* remand interpreted "fit" to mean that the testimony "logically advances a material aspect of the proposing party's case,"[160] and stated that federal judges must exclude proffered scientific evidence "unless they are convinced that it speaks clearly and directly to an issue in dispute in the case, and that it will not mislead the jury."[161]

Will Idso's testimony about his research on the effects of heightened CO_2 on plant growth assist the trier of fact? The answer depends on what facts the evidence is supposed to help them determine. Idso's testimony might fit the case if future agricultural production is an issue in dispute; one could imagine this issue coming up if the plaintiff were an agricultural producer or a community that was suing for potential future crop losses due to drought or storms brought on, in part, by the defendant's contribution to climate change (although if drought made farming impossible, then any beneficial effects of heightened CO_2 would be beside the point). More likely, however, agricultural losses will be at most a tangential issue to the plaintiff's claims. If, for example, the plaintiff is an Arctic community claiming that the defendant's unreasonably inefficient automobiles contributed to the destruction of the community's village and way of life through rising sea levels and loss of sea ice, how is it relevant that a farmer unrelated to either side might theoretically benefit? The same question would apply to plaintiffs seeking damages for loss of coastal property, loss of freshwater supply from melting glaciers, loss of ski business from a shortened winter season, and a wide variety of other foreseeable claims. In all of these cases, the plaintiff should point out that future agricultural productivity is not at issue in the case.

The defendant should argue that Idso's testimony is relevant, even if agricultural productivity is not explicitly at issue in the case, because it demonstrates the reasonability of the defendant's actions by establishing a benefit of higher CO_2 emissions to weigh against the negative aspects of CO_2

155 *Daubert*, 509 U.S. 579, 597 (1992).
156 FED. R. EVID. 702.
157 *Daubert*, 509 U.S. at 591–92.
158 *Id.* at 591.
159 Pride v. BIC Corp., 218 F.3d 566, 578 (6th Cir. 2000).
160 Daubert v. Merrell Dow Pharm., Inc., 43 F.3d 1311, 1315 (9th Cir. 1995).
161 *Id.* at 1321 n.17.

emissions. The plaintiff should respond that theoretical benefits to unrelated third parties are simply irrelevant to determining whether the defendant's actions were reasonable. For climate change defendants to argue that their actions are justified because of possible benefits to future farmers is somewhat akin to tobacco companies arguing that the benefits of their tax dollars and charitable giving should be taken into account in the risk-benefit analysis of their products; courts have excluded such testimony as irrelevant.[162] If the judge were to determine that theoretical agricultural benefits are at issue in the case, the plaintiff should argue that Idso's testimony is still irrelevant because his research does not establish that CO_2 emissions will actually result in agricultural benefits, but his testimony could confuse the fact finder into thinking that it does.[163] The Ninth Circuit in the *Daubert* remand refused to allow the plaintiffs' experts to testify because their evidence, while suggesting that Bendectin *might* cause birth defects, could not prove that it *does* cause birth defects.[164] The Ninth Circuit disallowed the testimony out of fear that it could mislead the jury;[165] that same risk is present with Idso's testimony. Opponents of GHG regulations have for many years promoted the idea that heightened CO_2 and climate change in general will be beneficial for agriculture because the storyline seems to make sense.[166] Plants use CO_2 in photosynthesis and many plants grow better in warmer weather,[167] so it is logical that higher CO_2 and higher temperatures could have some kind of fertilizer effect. But do Idso's studies actually show that climate change will benefit agriculture? The connection is more tenuous than it might at first appear. What Idso's studies demonstrate is that certain plants accumulate biomass faster under the conditions in

162 *E.g.*, Cipollone v. Liggett Group, Inc., 644 F. Supp. 283, 286–90 (D.N.J. 1986) (rejecting, in product liability lawsuit, an attempt by a cigarette manufacturer to present evidence regarding "profits made, employees hired, benefits to suppliers of goods and services, taxes generated and even charitable activities or contributions made by the defendant manufacturer").

163 *See* Habecker v. Clark Equip. Co., 36 F.3d 278, 289–90 (3d Cir. 1994) (excluding expert's testimony about his simulation of an accident where the simulation differed from the real accident in a number of important ways, such that conclusions could not validly be drawn about the real accident from the simulation); *In re* TMI Litig. Cases Consol. II, 910 F. Supp. 200, 203 (M.D. Pa. 1996) (excluding testimony regarding a scientifically reliable dendrometric study about effects of radiation on trees where the study could not assist jury in determining whether persons in affected area were exposed to radiation).

164 *Daubert*, 43 F.3d at 1320.

165 *Id.* at 1321.

166 In 1998 the Western Fuels Association, a coal cooperative, funded a nonprofit organization called the Greening Earth Society to promote the beneficial effects of heightened CO_2. Henry Norr, *Energy Debate Heats Up*, S.F. CHRON., Aug. 14, 2000, http://www.sfgate.com/cgi-bin/article.cgi?file=/chronicle/archive/2000/08/14/BU70391.DTL (last visited Jan. 24, 2010). The Society opposed regulations in part because "[o]ur use of fossil fuels is helping give plants the extra CO_2 they need to grow more lush and green worldwide." *Id.* (internal quotation marks omitted) (quoting the Greening Earth Society). In 1991, the Western Fuels Association produced with Sherwood Idso a video titled *The Greening of the Planet Earth*, extolling the agricultural benefits of CO_2 emissions. Gelbspan, *supra* note 145.

167 B.A. Kimball & S.B. Idso, *Increasing Atmospheric CO_2: Effects on Crop Yield, Water Use and Climate*, 7 AGRIC. WATER MGMT. 55, 56 (1983), *available at* http://www3.bio.uu.nl/palaeo/Azolla/Intranet_Azolla/Literature/Azolla_CO2/Kimball1983.pdf.

which he conducted the studies.[168] There are a number of issues here for the plaintiff to probe.

The plaintiff should point out the logical gaps that lie between Idso's research and the conclusion that GHG emissions will benefit agriculture. First, are the effects on the tested plant species similar to what will happen to the thousands of other plant species used in agriculture, and the hundreds of thousands of plants in different ecosystems?[169] In the *Daubert* remand, the Ninth Circuit ruled that evidence of the drug Bendectin's teratogenic effect on animals was not relevant to a case involving humans because the extrapolation of that data from animals to humans had not been established as valid.[170] On the same grounds, evidence about the effects of CO_2 on eldarica pines may be irrelevant to the effects of CO_2 on a tropical crop like manioc (*Manihot esculenta*), or a nitrogen-fixing plant like clover (*Trifolium*). Second, is faster accumulation of biomass always a good thing? Some studies have suggested that plants grown in higher CO_2 may have a lower nutritional value due to their faster growth, resulting in malnutrition among insects and animals that feed on such plants.[171] Also, could faster-growing plants lead to faster depletion of soil nutrients? Plant growth is a complicated thing; as any gardener knows, it takes a lot more than air, sunlight, and water to make plants grow.[172] You need soil rich in a variety of minerals, such as magnesium, phosphorus, potassium, and, most importantly, nitrogen.[173] Fostering an environment in which crops exhaust soil nutrients faster than natural cycles can replace them could lead to severe problems in areas in which artificial fertilizers are unavailable or prohibitively expensive. Studies have shown that artificial fertilization can lead to loss of plant species diversity,[174] that climate change can alter species

168 *Id.*

169 *See* Ghillean T. Prance, *Discovering the Plant World*, 50 TAXON 345, 352 tbl.4 (2001) (discussing plant diversity and estimates of the number of plant species).

170 *Daubert*, 43 F.3d at 1320–21.

171 Clenton E. Owensby et al., *Effects of Elevated Carbon Dioxide on Forage Quality for Ruminants*, *in* CARBON DIOXIDE, POPULATIONS, AND COMMUNITIES 363, 369 (Christian Körner & Fakhri A. Bazzaz eds., 1996); G.L. Brooks & J.B. Whittaker, *Responses of Three Generations of a Xylem-Feeding Insect,* Neophilaenus lineatus *(Homoptera), to Elevated CO_2*, 5 GLOBAL CHANGE BIOLOGY 395, 395 (1999); Tina Hesman, *Greenhouse Gassed: Carbon Dioxide Spells Indigestion for Food Chains*, 157 SCI. NEWS 200, 200 (2000) (describing research suggesting that heightened CO_2 levels "could spell disaster for plant eaters, from caterpillars to antelope, as well as the animals that dine on these herbivores . . . . Fast growth often leads to poor nutritional value"); Peter Stiling et al., *Decreased Leaf-Miner Abundance in Elevated CO_2: Reduced Leaf Quality and Increased Parasitoid Attack*, 9 ECOLOGICAL APPLICATIONS 240 (1999).

172 *See* Fakhri A. Bazzaz, *Allocation of Resources in Plants: State of the Science and Critical Questions*, *in* PLANT RESOURCE ALLOCATION 1, 1 (Fakhri A. Bazzaz & John Grace eds., 1997) ("Plant biologists have long recognized that in order for a plant to complete its life cycle, it must function as a balanced system in terms of resource uptake and use.").

173 *See generally id.* at 8–10 (discussing how nitrogen, phosphorous, potassium, and magnesium are allocated as plant resources); *id.* at 6 (discussing how nitrogen levels affect both photosynthesis and plant uptake of other nutrients).

174 Katharine N. Suding et al., *Functional- and Abundance-Based Mechanisms Explain Diversity Loss Due to N Fertilization*, 102 PROC. NAT'L ACAD. SCI. 4387, 4387 (2005) ("Extensive research

composition in local areas,[175] and that climate change can disturb the timing of plant reproduction.[176] Other studies have suggested that drought resulting from climate change may cancel out any growth-enhancing aspects of heightened CO_2.[177] Furthermore, there is evidence that long-term exposure to heightened CO_2 results in diminishing growth benefits over time due to changes in the plant's photosynthetic processes.[178] Idso's own research supports this finding of diminishing returns.[179]

The point of all this is that plant ecology is complicated, and the long-term response of plants to heightened CO_2 will likewise be complicated. While Idso's studies provide a reason to think that heightened CO_2 *might* benefit agriculture, it would not be scientifically valid to say that the studies establish that heightened CO_2 *will* benefit agriculture, or even that such benefits are more likely than not. The connection between the data and the intended conclusion is too tenuous, although a fact finder, uneducated in the complexity of plant ecology, could be misled into finding Idso's results conclusive on the question of agricultural benefits. The plaintiff has a strong argument that Idso's testimony should be excluded under Rule 403 because its probative value is exceeded by its potential to mislead the jury.

While a plaintiff can make a strong argument on relevance when testimony relates to a tangential issue such as the possible agricultural benefits of heightened CO_2, what argument can she make when testimony appears to confront the consensus model directly? Take, for example, the problem of the melting glaciers. One of the most frequently invoked dangers of global warming is the potential to melt glaciers around the world, reducing supplies of freshwater in many areas and leading to increases in sea level that swamp coastal areas.[180] Observations of retreating glaciers have been some of the most notable direct confirmations of a currently

demonstrates that local plant species diversity generally declines in response to nutrient enrichment . . . .").

175 Jerry M. Melillo, *Warm, Warm on the Range*, 283 SCI. 183, 183 (1999) ("[C]limate change can alter the mix of plant species in land ecosystems such as grasslands.").

176 Rebecca A. Sherry et al., *Divergence of Reproductive Phenology Under Climate Warming*, 104 PROC. NAT'L ACAD. SCI. 198 (2007).

177 A. Angert et al., *Drier Summers Cancel Out the CO_2 Uptake Enhancement Induced by Warmer Springs*, 102 PROC. NAT'L ACAD. SCI. 10,823 (2005) (suggesting that climate change is resulting in higher plant productivity in spring but lower productivity in summer due to drier conditions).

178 Steven J. Crafts-Brandner & Michael E. Salvucci, *Rubisco Activase Constrains the Photosynthetic Potential of Leaves at High Temperature and CO_2*, 97 PROC. NAT'L ACAD. SCI. 13,430, 13,430 (2000).

179 Adam et al., *supra* note 148, at 341 ("These results indicate that long-term CO_2 enrichment can result in photosynthetic down-regulation in leaves of trees, even under nonlimiting N conditions.").

180 *See, e.g.*, INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2007: SYNTHESIS REPORT: SUMMARY FOR POLICYMAKERS 2, 11 tbl.SPM.2, 20 (2007), *available at* http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr_spm.pdf (suggesting widespread potential harms from loss of glaciers and sea ice).

warming atmosphere.[181] The problem of the melting glaciers is one of the most understandable effects of climate change for the general public, so it has received a large amount of coverage in the press.[182] Climate change skeptics have a very direct response to the glacier problem, however: How can the glaciers really be shrinking if we know that glaciers in parts of Greenland and Antarctica are actually getting thicker?[183]

This assertion is not based on junk science. A report published in *Science* in 2005 by an international team of researchers headed by Ola Johannessen concluded after analyzing satellite data from 1993 to 2003 that the ice sheet in the interior of Greenland had increased in height during that period.[184] Another study published in *Science* in 2005 by a team led by Curt Davis concluded from analysis of similar satellite studies over Antarctica that the interior ice sheet in East Antarctica had also thickened between 1992 and 2003.[185] Not surprisingly, climate change skeptics embraced these studies as evidence that the consensus model must be wrong. The Competitive Enterprise Institute, a conservative think tank that has received substantial funding from energy companies,[186] produced a television commercial featuring these two studies that aired in fourteen American cities in May 2006.[187] The commercial stated, "You've seen those headlines about global warming. The glaciers are melting. We're doomed! That's what several studies supposedly found. But other scientific studies found exactly the opposite. Greenland's glaciers are growing, not melting. The Antarctic ice sheet is getting thicker, not thinner."[188] This storyline has a visceral appeal—if some glaciers are melting but others are growing, what are we worrying about? Crichton and Inhofe have both pointed to evidence of expanding glaciers to "debunk" climate change.[189] The skeptic pop-treatise

181 Mark B. Dyurgerov & Mark F. Meier, *Twentieth Century Climate Change: Evidence from Small Glaciers*, 97 PROC. NAT'L ACAD. SCI. 1406, 1410 (2000); Johannes Hans Oerlemans, *Extracting a Climate Signal from 169 Glacier Records*, 308 SCI. 675, 677 (2005).

182 *See, e.g.*, Howard W. French, *A Melting Glacier in Tibet Serves as an Example and a Warning*, N.Y. TIMES, Nov. 9, 2004, at F3; David Shukman, *Antarctic Glacier 'Thinning Fast,'* BBC NEWS, Aug. 13, 2009, http://news.bbc.co.uk/2/hi/8200680.stm (last visited Jan. 24, 2010).

183 *See infra* footnotes 184–85 and accompanying text.

184 Ola M. Johannessen et al., *Recent Ice-Sheet Growth in the Interior of Greenland*, 310 SCI. 1013 (2005).

185 Curt H. Davis et al., *Snowfall-Driven Growth in East Antarctic Ice Sheet Mitigates Recent Sea-Level Rise*, 308 SCI. 1898, 1901 (2005).

186 The Competitive Enterprise Institute has reportedly received funding from the Alliance of Automobile Manufacturers, ExxonMobil, General Motors, the American Petroleum Institute, the American Plastics Council, and Arch Coal. Achenbach, *supra* note 40.

187 *"Glaciers"* (Competitive Enterprises Institute television commercial 2006), *available at* http://www.youtube.com/watch?v=Wq_Bj-av3g0 (last visited Jan. 24, 2010).

188 *Id.*; COMPETITIVE ENTER. INST., GLOBAL WARMING/"GLACIERS" (2006), *available at* http://cei.org/pdf/GWGlaciers-annotatedscript.pdf (providing the text of the commercial with accompanying footnotes citing the Johannessen et al., *supra* note 184, and Davis et al., *supra* note 185, studies).

189 CRICHTON, *supra* note 108, at 193–94, 362–63; Posting of Marc Morano to The Inhofe EPW Press Blog, Latest Scientific Studies Refute Fears of Greenland Melt, http://epw.senate.gov/public/index.cfm?FuseAction=Minority.Blogs&ContentRecord_id=175B568A-802A-23AD-4C69-9BDD978FB3CD (July 30, 2007, 09:39 EST) (last visited Jan. 24, 2010).

The Politically Incorrect Guide to Global Warming devotes a chapter to the expanding glacier story.[190]

It would be difficult for a plaintiff to exclude the Johannessen and Davis studies under *Daubert*. In terms of reliability, *Science* is one of the most prestigious scientific journals in the world.[191] Publication by *Science* is a stamp of approval by the editors that the research methods relied on in the paper were scientifically sound. In terms of relevance, if the occurrence of global warming is a relevant issue in the trial, it is hard to suggest that evidence apparently contradicting the consensus model is not relevant to the inquiry. And since the rise in sea levels resulting from the melting of the Greenland and Antarctic ice sheets is routinely listed as one of the worst-case scenarios of future climate change,[192] evidence that the melting will not occur is surely relevant. Is our plaintiff doomed to fight this damning evidence in cross-examination?

The answer is yes and no. The plaintiff will probably have to address the evidence in cross-examination, since *Daubert* provides no reasonable grounds on which to exclude it. But the plaintiff is not doomed, and the evidence is not damning. The plaintiff should challenge the defense expert's conclusions so that only those conclusions that are validly supported by the studies can be presented to the fact finder.

D. Challenging Conclusions: If a Glacier Grows in Greenland, Is Climate Change Debunked?

A plaintiff can use a *Daubert* challenge to restrict the conclusions that defendants may draw about the Johannessen and Davis studies. A trial judge in a *Daubert* hearing may admit an expert's testimony but restrict the expert from voicing his or her conclusions if those conclusions are not merited by the evidence.[193] Although *Daubert* focused on the scientific merits of theories and techniques rather than conclusions, the Supreme Court in *General*

190 *See* HORNER, *supra* note 40, at 141–68.

191 *Science* has been publishing since 1880, it has the largest paid circulation of any peer-reviewed general science journal, and its peer-review process accepts less than eight percent of the papers submitted each year. Sci., About Science and AAAS, http://www.sciencemag.org/help/about/about.dtl (last visited Jan. 24, 2010).

192 *See, e.g.*, *Greenland and Antarctic Ice Sheet Melting, Rate Unknown*, SCIENCEDAILY, Feb. 25, 2009, http://www.sciencedaily.com/releases/2009/02/090216131158.htm (last visited Jan. 24, 2010); Michael McCarthy, *Sea Levels Rising Twice as Fast as Predicted: Melting Ice Sheets in Greenland and Antarctica Force UN Scientists to Issue Dramatic Warning*, INDEP., Mar. 11, 2009, http://www.independent.co.uk/environment/climate-change/sea-levels-rising-twice-as-fast-as-predicted-1642087.html (last visited Jan. 24, 2010).

193 *See, e.g.*, Alcan Aluminum Corp. v. BASF Corp., 133 F. Supp. 2d 482, 493 (N.D. Tex. 2001), *aff'd*, 51 F. App'x 482 (5th Cir. 2002) ("Proposed expert testimony need not be considered, for purposes of *Daubert* analysis, as a monolithic whole; it is certainly possible to analyze separately and reach separate conclusions concerning the bulk of an expert's analysis and the final conclusion which he reaches."); Edwards v. Safety-Kleen Corp., 61 F. Supp. 2d 1354, 1359 (S.D. Fla. 1999) (permitting an expert to testify but limiting his conclusions to those supported by reliable scientific methods).

Electric Co. v. Joiner[194] stated that a trial judge may consider the merits of an expert's conclusions, and may exclude the conclusion if "there is simply too great an analytical gap between the data and the opinion proffered."[195] One form of such a gap is where an expert has failed to account for obvious alternative explanations.[196] Should our hypothetical defendant attempt to vault that gap with the glacier studies, our hypothetical plaintiff should draw a line in the ice over what conclusions those studies can or cannot be said to support. Climate change skeptics have used these studies primarily to support two propositions. First, the studies have been used to support the assertion that for every shrinking glacier there's one that's growing—i.e., you don't need to worry about sea levels rising.[197] Second, the studies are given as evidence that the consensus model must be wrong.[198] These studies do not in fact support either proposition.

Skeptics get a number of benefits from the "for every shrinking glacier there's one that's growing" storyline. First, it seems to contradict concerns about sea level rise. Second, it's an antidote to the frankly distressing visual evidence that the media frequently shows of receding glaciers in places like Alaska and Mount Kilimanjaro.[199] Third, it allows skeptics to push their metanarrative that the media and the scientific establishment do not want you to know the truth about global warming. The problem with the "for every shrinking glacier" storyline, however, is that it is simply not an accurate statement about total world accumulation and loss of glacial ice. Although there is evidence that some glaciers are gaining mass, research suggests that substantially more ice is being lost from melting glaciers than is accumulating in the expanding glaciers.[200] The Johannessen and Davis

194 522 U.S. 136 (1997).

195 *Id.* at 146.

196 FED. R. EVID. 702 advisory committee's note to the 2000 amendment (citing as grounds for inadmissibility "[w]hether the expert has adequately accounted for obvious alternative explanations"); *see* Claar v. Burlington N. R.R. Co., 29 F.3d 499, 502–03 (9th Cir. 1994) (holding that testimony is excluded where the expert failed to consider other obvious causes for the plaintiff's condition).

197 *See generally* Press Release, U.S. Senate Comm. on Env't & Pub. Works, Renowned Scientist Defects from Belief in Global Warming—Caps Year of Vindication for Skeptics (Oct. 17, 2006), http://epw.senate.gov/pressitem.cfm?party=rep&id=264777 (last visited Jan. 24, 2010) (citing Johannessen et al., *supra* note 184, as evidence that the Greenland ice sheet is not melting); Doug L. Hoffman, Greenland's Ice Armageddon Comes to an End, http://www.theresilientearth.com/?q=content/greenlands-ice-armageddon-comes-end (Jan. 24, 2009, 17:03) (last visited Jan. 24, 2010) (using evidence of the growth of Greenland's ice sheet to support the assertion that sea levels will not rise); Keith Sherwood & Craig Idso, *The East Antarctic Ice Sheet Has Accumulated Mass Over the Past Decade*, CO2 SCI., June 15, 2005, http://www.co2science.org/articles/V8/N24/EDIT.php (last visited Jan. 24, 2010) (citing Davis et al., *supra* note 185, to refute "the climate-alarmist claim of dramatic global flooding of earth's coastal areas").

198 *See generally* Press Release, U.S. Senate Comm. on Env't & Pub. Works, *supra* note 197 (citing Johannessen et al., *supra* note 184, as part of several studies debunking consensus view of global warming).

199 AN INCONVENIENT TRUTH (Paramount Classics 2006), Al Gore's documentary about global warming, prominently features images of melting glaciers.

200 Mark F. Meier et al., *Glaciers Dominate Eustatic Sea-Level Rise in the 21st Century*, 317 SCI. 1064, 1066 (2007); Tavi Murray, *Greenland's Ice on the Scales*, 443 NATURE 277 (2006);

papers never suggest that their results contradict the general trend of a net loss of ice; their focus is rather on understanding the overall dynamics of glaciers in these regions.[201] Moreover, the "for every shrinking glacier" storyline glosses over the fact that the location of glacial ice can be significant, particularly to communities that depend on glaciers for their water, such as in many parts of India.[202] An expert could testify accurately that the overall loss of ice in some glaciers is partially offset by the growth of glaciers in other regions, but any suggestion that the losses are canceled out should be excluded as unsupported by the evidence.

The second claim the skeptics advance with the glacier studies is the assertion that if glaciers are growing, the world cannot be warming, so the consensus model must be wrong.[203] The problem with this claim is that it builds a paper tiger—it misstates the consensus model so that it can then disprove it. The consensus model does not suggest that temperatures will constantly rise everywhere in the world at the same rate.[204] Climate is complicated, and GHG-forced global warming is a long-term process that interacts with the myriad of other factors that make up climate in different regions.[205] Different rates of warming, or even cooling, in different areas at different times cannot disprove the consensus model; thus, the statement that on average, the world is getting warmer, is not inconsistent with a finding that one area has apparently gotten cooler in recent years, or that a certain set of glaciers have expanded. Thus, to say that studies showing expansion of some glaciers in Greenland and Antarctica disproves the consensus model is to misrepresent the consensus model and to misrepresent the studies. Such misrepresentation would appear to be the kind of "analytical gap" denounced in *Joiner*.

Andrew Shepherd & Duncan Wingham, *Recent Sea-Level Contributions of the Antarctic and Greenland Ice Sheets*, 315 SCI. 1529, 1529 (2007) ("As global temperatures have risen, so have rates of snowfall, ice melting, and glacier flow. Although the balance between these opposing processes has varied considerably on a regional scale, data show that Antarctica and Greenland are each losing mass overall."); *Greenland Has Experienced a Significant Loss of Ice, NASA Research Shows*, SCIENCEDAILY, May 30, 2007, http://www.sciencedaily.com/releases/2007/05/070530132357.htm (last visited Jan. 24, 2010).

201 *See* Davis et al., *supra* note 185; Johannessen et al., *supra* note 184.

202 Pallava Bagla, *Big Melt Threatens India's Water*, SCIENCENOW, Jan. 12, 2007 (on file with Environmental Law).

203 John Cook, Do Growing Glaciers Disprove Global Warming?, http://www.skepticalscience.com/Do-growing-glaciers-disprove-global-warming.html (Sept. 6, 2007, 19:13) (last visited Jan. 24, 2010); *The Consensus on Kilimanjaro Is Wrong*, SCI. REV., Summer 2004, *available at* http://ff.org/centers/csspp/pdf/CSPP-PP-Summer-04.pdf.

204 *See generally* ALLEY ET AL., *supra* note 3, at 5–6 & fig.SPM.3, 15 (discussing the impact of climate change on "average" global temperatures).

205 Massachusetts Institute of Technology atmospheric scientist Kerry Emanuel has said:

> There is this misperception that global change is a spatially uniform and smooth in time process . . . . In fact that's not true. There's all kind of variability. You can find places in the world where the temperature has gone down for the past 50 years. When you're looking for a signal in a very noisy record you do as much averaging as possible.

Achenbach, *supra* note 40 (internal quotation marks omitted) (quoting Kerry Emanuel).

While this argument might succeed in having such conclusions by the defense expert excluded, there is something unsatisfying about the defensive argument that just because glaciers are growing does not mean the standard climate model is wrong. After all, it would be hard to blame a fact finder for thinking that growing glaciers might be inconsistent with claims of a warming planet. Fortunately for our plaintiff, thickening interior glaciers in Greenland and Antarctica are not just *not inconsistent* with the consensus model, they are actually consistent with it and might be further evidence that global warming is happening.

As the Johannessen and Davis papers report, glaciers in the interiors of Greenland and Antarctica are getting thicker because these regions are getting more snow.[206] Climate change models have been predicting this result for decades.[207] The air over the interiors of Greenland and Antarctica is very cold and extremely dry; it is so dry that under ordinary conditions precipitation is rare, as in a desert.[208] As the seas around these regions warm, however, the moisture level in the air increases, which leads to more precipitation, usually in the form of snow.[209] As the snow accumulates in these interior regions, the ice sheet thickens.[210] Curt Davis, the lead author of the Antarctica glacier study,[211] said, "It's been long predicted by climate models . . . . This is the first observational evidence."[212] This phenomenon of warmer water leading to thicker glaciers is good news, to a degree. For the present, it is apparently slowing down the rise of sea level.[213] The models also predict, however, that at a certain point of warming the volume losses from melting will exceed the gains from snowfall, with the result that these interior glaciers, like those on the coast, will make a net contribution to rising sea levels.[214] Thus, while it would be valid to conclude from the glacier

206 Davis et al., *supra* note 185; Johannessen et al., *supra* note 184, at 1014.

207 J.A. Church et al., *Changes in Sea Level*, *in* CLIMATE CHANGE 2001, *supra* note 139, at 639, 647–54; Posting of Group to RealClimate, Antarctica Is Cold? Yeah, We Knew That, http://www.realclimate.org/index.php/archives/2008/02/antarctica-is-cold (Feb. 12, 2008) (last visited Jan. 24, 2010).

208 *See, e.g.*, Antarctic Connection, The Antarctic Climate, http://www.antarcticconnection.com/antarctic/weather/climate.shtml (last visited Jan. 24, 2010).

209 Patrick Michaels, a climatologist at the University of Virginia and prominent climate change skeptic, concedes that the reported expansion of glaciers is due to climate change, but suggests that the phenomenon will mitigate rising sea levels. Antarctic Ice: A Global Warming Snow Job?, http://www.worldclimatereport.com/index.php/2005/05/27/antarctic-ice-a-global-warming-snow-job/#more-113 (May 27, 2005) (last visited Jan. 24, 2010) ("Climate scientists have long suspected that warming the oceans around a very cold continent is likely to dramatically increase snowfall. Consider Antarctica. It's plenty chilly, dozens of degrees below freezing, and it's surrounded by water. The warmer the water, the greater the evaporation from its surface, and, obviously, the more moisture it contributes to the local atmosphere.").

210 *Id.*

211 *See supra* note 185 and accompanying text.

212 Kenneth Chang, *Warming Is Blamed for Antarctica's Weight Gain*, N.Y. TIMES, May 20, 2005, at A22 (internal quotation marks omitted) (quoting Dr. Curt H. Davis, Professor of Electrical and Computer Engineering at the University of Missouri).

213 *Id.*

214 Shepherd & Wingham, *supra* note 200, at 1531; *see also* European Space Agency, ERS Altimeter Survey Shows Growth of Greenland Ice Sheet Interior, http://www.esa.int/esaCP/

studies that sea level increases will be mitigated in the near term, the studies in no way support the assertion that the consensus model is incorrect.

If a defendant attempts to offer expert testimony regarding the Johannessen and Davis studies, the plaintiff should challenge any conclusion offered by the expert that interprets the evidence in an unsupported or prejudicial way. The plaintiff can make a strong argument that any assertions that growing glaciers cancel out contributions to sea level rise from melting glaciers, or that the evidence of glacial growth contradicts the consensus model, present "too great an analytical gap between the data and the opinion proffered."[215] While this form of challenge would not exclude the presentation of the evidence itself, it would prevent the defendant from presenting the evidence in a scientifically unsupported way that could confuse the fact finder about the most valid conclusions to draw from the evidence.[216]

V. CONCLUSION

It is likely that climate change plaintiffs will be able to use *Daubert* challenges to exclude and restrict the testimony of defense experts. If climate change defendants put forth the same types of "experts" and scientific assertions that opponents of GHG regulations have embraced so far in the public debate over global warming, plaintiffs will be able to exclude or restrict the defendants' expert testimony by employing the Federal Rules of Evidence in the four methods I have described: challenging the witness, challenging reliability, challenging relevance, and challenging conclusions. This Note addresses only a handful of the many lines of argument that climate change skeptics have put forth. The examples chosen in this Note are fairly representative of the quality of skeptics' arguments, however, and the illustrated methods of challenge are generally applicable. Many of Senator Inhofe's 400 "prominent scientists," for example, would be vulnerable to challenge on their qualifications.[217] Testimony about evidence of climate change in the distant past, if delivered as part of an argument that evidence of current warming is no cause for alarm,[218] might be subject to

SEMILF638FE_index_0.html (last visited Jan. 24, 2010) ("Modelling studies of the Greenland Ice Sheet mass balance under greenhouse global warming have shown that temperature increases up to about 3ºC lead to positive mass balance changes at high elevations—due to snow accumulation—and negative at low elevations—due to snow melt exceeding accumulation.").

215 *Gen. Elec. Co.*, 522 U.S. 136, 146 (1997).

216 *See id.* at 146–47 (holding that while experts extrapolate conclusions from existing data, there is nothing in *Daubert* that requires a district court to allow into evidence unsupported conclusory opinions by experts).

217 *See* discussion *supra* at Part IV.A.

218 *See, e.g.*, *If "Global Warming" Is Real, What Could Be Causing It?*, JUNKSCIENCE.COM, June 2006, http://www.junkscience.com/Greenhouse/cause.html (last visited Jan. 24, 2010) (suggesting that the record of the Medieval Warm Period, a period of unusually warm temperatures documented in Europe approximately one thousand years ago, demonstrates that there is nothing unusual about current warm temperatures). There are a number of problems with the ways in which skeptics have used evidence about the Medieval Warm Period, most notably that the warming appears to have been a northern Atlantic phenomenon rather than a

challenge both for relevance and for invalid conclusions. Some skeptic arguments are better than others, and savvy defendants will undoubtedly be able to get much of their testimony admitted, but rigorous use of *Daubert* challenges should eliminate the most misleading skeptic arguments.

I propose three general observations about the significance that *Daubert* challenges by climate change plaintiffs could have. First is the effect on climate change litigation itself. *Daubert* challenges brought by plaintiffs will not result in summary judgments, as they often do for defendants,[219] but they will hopefully focus the courtroom debate on the actual scientific issues of climate change, as opposed to the smoke-and-mirrors evidence and conclusions that have so often prevailed in the public debate. A rigorous weighing of the evidence on both sides will show that the proponents of the consensus model have by far the stronger case.[220] While this scientific advantage may not necessarily result in courtroom victories for plaintiffs—the issues of specific causation and damages still loom as obstacles to recovery—it should improve plaintiffs' odds by foreclosing defense arguments that could confuse or mislead the jury. Control of the scientific terrain by plaintiffs may also lead to pretrial settlements and, hopefully, changes in defendants' conduct in efforts to avoid future litigation.

My second general observation is that the use of *Daubert* by climate change plaintiffs could provide a blueprint for similar offensive challenges in other contexts. The scientific case for the consensus model of climate change is particularly strong, but it is not the only area of litigation in which defendants make dubious scientific assertions. While those who have complained loudest about "junk science" in the courtroom have focused on the evidence presented by plaintiffs,[221] there has been little movement in the courts to restrict the manipulation of scientific claims by corporate defendants. This is not because corporate defendants rely only on "sound science"; the examples of tobacco and asbestos litigation make abundantly clear that past corporate defendants have extensively manipulated scientific claims in order to suit their legal purposes.[222] These defendants and those in

global one, and the fact that evidence of natural warming in the past does not make current GHG-driven warming any less of a problem. P.D. Jones & M.E. Mann, *Climate Over Past Millennia*, 42 REVS. GEOPHYSICS RG2002, at 19–20 (2003). Issues of historical climate are addressed in Jones & Mann, *supra*.

219 *See* DIXON & GILL, *supra* note 2, at xvi, 55–56.

220 *See supra* note 3 and accompanying text.

221 *See, e.g.*, PETER W. HUBER, GALILEO'S REVENGE: JUNK SCIENCE IN THE COURTROOM 159–67 (1991).

222 *See, e.g.*, MICHAEL BOWKER, FATAL DECEPTION: THE UNTOLD STORY OF ASBESTOS: WHY IT IS STILL LEGAL AND STILL KILLING US 161–73 (2003) (describing the efforts by asbestos manufacturers to manufacture doubt about the role of asbestos in causing disease, and how their claims were exposed in the courtroom); RICHARD KLUGER, ASHES TO ASHES: AMERICA'S HUNDRED-YEAR CIGARETTE WAR, THE PUBLIC HEALTH, AND THE UNABASHED TRIUMPH OF PHILIP MORRIS 478–83 (1996) (documenting the tobacco industry's manipulation of scientific claims about the health effects of tobacco); Lisa A. Bero et al., *Publication Bias and Public Health Policy on Environmental Tobacco Smoke*, 272 J. AM. MED. ASS'N 133, 134–35 (1994) (studying 65 symposium articles and 49 peer-reviewed articles concerning tobacco smoke and finding

other industries have sponsored research specifically to manufacture uncertainty about plaintiffs' claims so that they can label those claims as "junk science."[223] One way corporations can do this is to fund the research they want; substantial evidence suggests that corporate funding can tilt the odds that research will provide results favorable to the sponsor.[224] It is an unfortunate aspect of *Daubert* that it is poorly designed to weed out junky claims made by a party with the resources to dress them up in scientific clothes with tests, paid experts, and friendly publications. But if the legal system allows the *Daubert* standard to be no more than a tool of the party with the greater resources, then it allows litigants to make a mockery of both science and justice. If trial lawyers are able to use the scientifically hospitable terrain of climate change litigation to reclaim some *Daubert* territory from the hands of defendants, they may create precedents that will be valuable to other litigants in scientific disputes. They may also reinvigorate *Daubert*, not as a tool for the party with the greater resources, but as a lens for honing in on the answer that science and justice supports.

My third observation is that *Daubert* challenges by climate change plaintiffs may have a beneficial effect on the dialogue over climate change outside of the courtroom. Whether or not climate change plaintiffs ever prevail in their legal claims, a focused debate in the courtroom on the science of climate change will hopefully help focus the public debate on the subject as well. Proponents of GHG regulations may be able to point to the fact that their opponents' evidence was not even allowed inside the courtroom door. The general public may take note of the cases and see how a court, with strict rules of evidence, sifts through the competing claims.[225] As in many forms of impact litigation, the most significant effects of the lawsuit may happen entirely apart from the actual litigants in the case.[226]

sponsorship can influence results); Elisa K. Ong & Stanton A. Glantz, *Constructing "Sound Science" and "Good Epidemiology": Tobacco, Lawyers, and Public Relations Firms*, 91 AM. J. PUB. HEALTH 1749 (2001) (examining the use of the "sound science" defense by tobacco companies).

223 David Michaels & Celeste Monforton, *Manufacturing Uncertainty: Contested Science and the Protection of the Public's Health and Environment*, 95 AM. J. PUB. HEALTH S39, S39–43 (2005); *see also* Thomas O. McGarity, *Our Science Is Sound Science and Their Science Is Junk Science: Science-Based Strategies for Avoiding Accountability and Responsibility for Risk-Producing Products and Activities*, 52 U. KAN. L. REV. 897, 899 (2004) ("[M]any industrial targets of toxic tort lawsuits and federal regulations had been recasting self-interested appeals to economics as appeals to science for more than two decades.").

224 *See supra* note 151 (discussing the effects of corporate funding on scientific research); *see also* Shireen A. Barday, Note, *Punitive Damages, Remunerated Research, and the Legal Profession*, 61 STAN. L. REV. 711, 711–12 (2008) (discussing how ExxonMobil and other corporate defendants have funded legal publications critical of punitive awards that have then been cited approvingly by courts considering punitive awards).

225 David Hunter has suggested that the use of climate change science in support of legal claims may increase the prominence of that science in the public discourse. David Hunter, *The Implications of Climate Change Litigation for International Environmental Law-Making*, *in* ADJUDICATING CLIMATE CHANGE 357, 363–64 (H. Osofsky & W. Burns eds., 2009).

226 The use of impact litigation to affect broad changes outside of the courtroom is controversial. Some scholars have argued that courts lack the technical competence, the flexibility of remedies, and the democratic legitimacy to address broad social issues, which are

The political discourse on climate change over the last decade has generally been less than a model of intellectual integrity. The official policies of the Bush administration were precisely what we should have expected if the scientific evidence suggested that climate change was a myth. The federal government refused to join the Kyoto Protocol, it failed to create a nationwide mandate or cap-and-trade program to reduce GHG emissions, and it otherwise failed to take any step that could be expected to lead to meaningful reduction of GHG emissions.[227] This failure to act occurred in the face of powerful and unambiguous statements by the IPCC, the National Academy of Sciences, and other scientific organizations that the evidence strongly suggests that GHG emissions are warming the planet and will continue to do so.[228] The political discourse seems to have taken some steps forward recently, with the House of Representatives passing a (somewhat anemic) cap-and-trade bill in June of 2009, although at the time of this writing the odds of even an anemic bill passing the Senate are fading rapidly.[229] Still, it seems likely that the political branches will come up with some kind of meaningful policy on climate change eventually. We can only hope that when they do, the goals and means will be based on the best science available. If climate change litigation can play a part in sifting through the evidence on this thorniest of problems, then it will have made an important and lasting contribution to the national discourse.

As I hope these conclusions suggest, climate change litigation is an important legal development that could have substantial consequences both in other areas of the law and outside of the courtroom. *Daubert* challenges by climate change plaintiffs can play a key role in shaping those consequences.

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more appropriately addressed with regulatory measures and through political processes. *See, e.g.*, Richard A. Epstein, *Class Actions: Aggregation, Amplification, and Distortion*, 2003 U. CHI. LEGAL F. 475, 516–18 (criticizing the use of class action litigation to achieve results that are more appropriately achieved through direct administrative remedies); Edward T. Schroeder, Note, *A Tort by Any Other Name? In Search of the Distinction Between Regulation Through Litigation and Conventional Tort Law*, 83 TEX. L. REV. 897, 897–98 (2005) (summarizing the positions of many critics of impact litigation). Other scholars have argued that impact litigation plays a critical role in shoring up the deficiencies of administrative agencies and the political process. *See, e.g.*, Lytton, *supra* note 34, at 1838, 1870, 1873 (arguing that impact litigation has produced important advances in some areas of regulatory inaction and may do so in climate change litigation as well); Wendy Wagner, *When All Else Fails: Regulating Risky Products Through Tort Litigation*, 95 GEO. L.J. 693, 694–95 (2007) (arguing that impact litigation can help remedy regulatory shortcomings resulting from the insufficiency of information available to agencies); *see also* Thomas O. McGarity, *The Complementary Roles of Common Law Courts and Federal Agencies in Producing and Using Policy-Relevant Scientific Information*, 37 ENVTL. L. 1027, 1027 (2007) (arguing that common law litigation can produce scientific information useful to regulators).

227 LOREN R. CASS, THE FAILURES OF AMERICAN AND EUROPEAN CLIMATE POLICY: INTERNATIONAL NORMS, DOMESTIC POLITICS, AND UNACHIEVABLE COMMITMENTS 210–17 (2006); GELBSPAN, *supra* note 144, at 41.

228 *See* ALLEY ET AL., *supra* note 3, at 2, 5; AM. ASS'N FOR THE ADVANCEMENT OF SCI., *supra* note 3; THE NAT'L ACADS., *supra* note 3, at 2.

229 Editorial, *Some Bad Climate News and Some Good*, N.Y. TIMES, Sept. 16, 2009, at A30; *see also* Paul Krugman, Op-Ed, *Cassandras of Climate*, N.Y. TIMES, Sept. 28, 2009, at A21 (noting the difficulty of keeping the political discourse focused on climate change when its effects are not immediately apparent).