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Scientific advocacy, environmental interest groups, and climate change: are climate skeptic portrayals of climate scientists as biased accurate?

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Abstract Public discourse on climate change often refers to possible bias among climate scientists as a rationale for limited climate policy action by the United States. Part of this discussion is the association of scientists with environmental interest groups and whether such affiliations facilitate the perception that climate scientists lack objectivity. While surveys suggest that some climate scientists disapprove of affiliations with interest groups, recent research indicates that climate scientists are quite likely to be involved with environmental organizations. This paper compares the affiliations of scientists and the general public to discern whether scientists are uniquely likely to affiliate with interest groups or they simply share characteristics common to the public who also affiliate with these organizations. Our findings suggest that climate scientists are no more likely to donate money, but are less likely to sign a petition or attend a demonstration, when controlling for other factors. These results strengthen our understanding of the affiliations between scientists and interest groups and hold implications for the accuracy of popular perceptions of climate scientists.

1 Introduction

Climate scientists have uniquely suffered attacks on their objectivity from skeptics within politics, the media, and the public (McCright and Dunlap 2003). This is particularly true since the events known as "climategate," when e-mails between several prominent climate scientists suggesting possible bias and malfeasance became public. Research indicates that "climategate" created a level of distrust among the public for climate scientists specifically (Leiserowitz et al. 2013) and climate research in general (Stoutenborough et al. 2014b). In

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addition, advocacy by scientists may contribute to the perception that climate scientists are biased (Martin and Richards 1995). While this worry over trust is prominent for climate scientists, there is concern with appearing objective inside the profession more broadly.

Scientists play a significant role in shaping the discussion on climate change. This role varies from providing information through research to directly advocating for policy actions (Steel et al. 2004; Herrick 2004). As with the public, scientists have the option of affiliating with and supporting environmental interest groups. Environmental interest groups are defined here as organizations that serve to produce policy change concerning the protection and preservation of the natural environment. These affiliations may enable scientists to influence political decisions, though they may also further perceptions of scientists as political figures, rather than objective providers of information. Importantly, Bromley-Trujillo et al. (2014) find that a large percentage of climate scientists are engaging with environmental interest groups in a variety of ways, which could create the impression of impropriety.

Consequently, this study compares the interest group affiliations of scientists and the general public. We are particularly interested in whether climate scientists are uniquely likely to affiliate with an environmental interest group, controlling for other factors. Alternatively, do the same factors that lead the public to participate with interest groups apply to scientists who participate? This research is timely given the perception by some of bias among climate scientists (see e.g. Bromley-Trujillo et al. 2014). This study contributes to our understanding of the types of activities climate scientists engage in and how this compares to the activities of the general public.

The motivation for this project stems, in part, from the policy implications of scientists' involvement with interest groups. Engaging in the political arena, either through affiliation with interest groups, direct contact with policy makers, or other methods, has policy implications. Scholarly research indicates that trust in science, or scientists, affects the level of concern over scientific issues (Kellstedt et al. 2008; Leiserowitz 2006; Rabe and Borick 2010; Stoutenborough and Vedlitz 2014). This trust may erode further if the public feels scientists are not objective. While affiliations with interest groups are insufficient to sustain a charge of bias, such affiliations may lead to the appearance that scientists are more overtly political than expected. The public may feel that interactions between scientists and interest groups indicate bias on the part of scientists. From a practical perspective, though, advocacy by scientists may strengthen the credibility of interest groups and help guide decision making by policymakers (see Sabatier and Jenkins-Smith 1993). Bottom line, regardless of the reality of bias, if the public perceives bias, they are not likely to believe scientists when they communicate to the public on the risks associated with climate change (e.g. Wynne 1996).

This research is informed by work concerning the role of scientists in the policy process and by interest group theory. To investigate the relationship between scientists and interest groups more deeply, we pooled surveys of climate scientists and the general public and compared them on their choices to affiliate, or not, with environmental interest groups. We begin with a discussion on scientific advocacy and credibility. Next, we discuss the application of interest group membership theory to climate scientists juxtaposed to the general public. We then analyze environmental interest group affiliations. Our findings indicate that, when controlling for other factors, climate scientists are no more likely than the general public to donate money to environmental organizations; though, they are less likely to sign an environmental petition or participate in a demonstration or rally. This suggests little evidence in support of accusations of bias.

2 Scientific engagement and advocacy

While the choice to join an environmental interest group is open to both scientists and the public, there are some key differences between these groups that merit discussion. Research indicates that scientists play a key role in the policy process through agenda setting, providing information to advise policy decisions (see Liu et al. 2015) for an examination of this within the U.S. Congress), and coordinating with members of advocacy coalitions, which typically include interest groups (Sabatier and Jenkins-Smith 1993; Weible and Sabatier 2009). While scientific involvement in the policy process has evolved over time to incorporate a greater role for advocacy (Herrick 2004), there remains variation among scientists in how much engagement they deem appropriate (Anderson and Betsill 2010).

Pielke (2007) breaks down scientific involvement into four categories: pure scientists, science arbiters, honest brokers, and issue advocates. Pure scientists do not get involved in policymaking, choosing instead to focus on research and remain apolitical. On the other end of the spectrum, issue advocates use their research findings to encourage specific courses of action by policy makers. One way for scientists to advocate is through support of interest groups. Those who believe scientists have an obligation to present their information to the public and political figures, make arguments for such advocacy. This line of argument suggests that scientists have a responsibility to use their expertise to inform decision-making (Marris 2006). On the other hand, scientists may risk their credibility if they associate with political positions and interest groups. Some within the scientific community argue against such involvement because it may harm the integrity of all scientists (Lackey 2007). The issue of credibility is something that may directly influence a scientist's decision to engage with interest groups, which is less of a concern for the broader public.

Scientists have been called upon to provide answers to environmental and technological problems over the last 30 years; it was not uncommon for scientists to directly engage with policy makers and environmental groups to advocate for particular government strategies (Steel et al. 2004). While many scientists currently participate in such activities, climate scientists, in particular, are often wary of such engagement because they are treated differently than scientists with other specializations (see Bromley-Trujillo et al. 2014). Scholars note an organized climate change counter-movement in the United States that seeks to undermine scientific findings surrounding climate change (McCright and Dunlap 2010; Brulle 2014).

3 Interest group theory

Classic work on the organization of interest groups argues that individuals join groups out of a shared interest (Truman 1971). As such, the choice to engage with an environmental interest group likely stems from a level of concern or awareness of environmental issues. However, challenges associated with the collective action problem can stymie individuals from joining groups (Olson 1965). If individuals feel that others are championing the cause, they are incentivized to free ride on the efforts of others. To overcome this problem, some scholarly work indicates the need for groups to provide selective benefits such as medical insurance from the AARP or a monthly magazine from the Sierra Club (Olson 1965; Salisbury 1969; Cigler and Nownes 1995). These benefits are only provided to members of the organization and thus reduce the likelihood of free riding.

Despite the motivation to free ride, many interest groups do not rely on the provision of selective benefits. These groups instead appeal to substantive benefits or individual's

enthusiasm for the cause (Berry 1999; Schlozman et al. 1995; Salisbury 1984). Individuals who are highly concerned about a policy problem may choose to join an organization regardless of visible or material benefits (Frohlich and Oppenheimer 1970; Moe 1980, 1981). Those active with interest groups experience other rewards, including gratification from performing a civic action and feeling that they have helped achieve a purpose (Schlozman et al. 1995). In this case, organizations attract members by emphasizing their ability to achieve group goals (Moe 1980, 1988). This method highlights the importance of efficacy on behalf of the individual making the decision to affiliate. If potential members believe they can influence the problem they seek to solve, this indicates a high level of efficacy, making them more likely to engage with interest groups (Bandura 2000; Ainsworth 2000; Moe 1981). Importantly, this relationship is unlikely tautological, as Bies et al. (2013) find that environmental group membership does not predict the likelihood of an individual reporting higher levels of environmental efficacy.

This theoretical background applies to both climate scientists and the general public. Yet, climate scientists may be more likely to join environmental interest groups, given their concern over the issue of climate change. These scientists may have a unique passion and attachment to this policy issue. As is argued in the literature, passion can move an individual from a free rider to a committed organizational member (Berry 1999). On the other hand, scientists must contend with the possibility that affiliations with interest groups may harm their reputation.

Though unclear to what extent these motivations influence the public to engage with environmental interest groups, recent evidence suggests that climate scientists are motivated by purposive benefits, particularly efficacy, and not by a shared concern for climate change (Bromley-Trujillo et al. 2014). If climate scientists' engagement with environmental interest groups increases the likelihood that the public and policymakers view them as biased, which would further limit the likelihood of a comprehensive, federal climate policy, then it is essential to determine whether climate scientists' involvement differs from that of the public. If climate scientists are no more likely to engage than the public, when controlling for various influences, it suggests that the level of engagement found by Bromley-Trujillo et al. (2014) is just a natural process.

4 Analytical strategy

The remainder of this project examines our core research questions. Are climate scientists more likely to affiliate with an environmental interest group than the general public? Or, are climate scientists simply more likely to have the characteristics commonly found to predict interest group affiliation? While the percentage of climate scientists who engage in environmental group activities is high, they might more closely resemble the average person who affiliates with an environmental group and so climate scientists are not more likely to associate.

We will examine this subject from three perspectives of varying levels of commitment. The first, representing the easiest way to get involved, determines whether an individual has given money to an environmental group in the previous 5 years. Second, we examine the determinants of having signed an environmental petition in the previous 5 years. It is one thing to be one of many contributors to a group, but it is another to lend your name to a petition that champions a cause. Finally, we explore what may have motivated individuals to attend an environmental demonstration or rally in the previous 5 years.

We pool three surveys to empirically assess these three modes of involvement. The data were collected as a part of two larger National Oceanic and Atmospheric Administration (NOAA)

projects. Climate scientists were surveyed between March and September 2005 using several contact modalities including mail, Internet, and telephone surveys through a journals-based sampling frame. We identified 13 internationally renowned scientific journals that were the most cited within the study of climate change at that time. The journals were identified following consultations with climate scientists, examinations of impact factors, and other relevant data.[1] We examined all articles from these journals from 1995 through 2004 that related to climate change, and we identified 929 U.S. authors. We completed 514 scientist surveys, resulting in a 55 % response rate.

Two national, random sample public surveys are also used. The first was in the field from July 13 to August 10, 2004, with a total of 1093 surveys completed. The second was in the field from April 3 to July 18, 2007, which resulted in 935 completed surveys. Both telephone-based surveys utilized RDD and were administered by a professional CATI provider. Samples were provided by the sampling firm Survey Sampling International.[2]

The dependent variables are based on the three types of involvement with environmental interest groups discussed previously. Respondents were asked if they had: 1) "Donated money to an environmental organization within the last 5 years;" 2) "Signed an environmental petition or appeal within the last 5 years;" and 3) "Attended an environmental demonstration or rally within the last 5 years."[3] Respondents were given two response options – yes or no. Consequently, each of these dependent variables are coded 1 for "yes" responses, 0 for "no." Due to the coding scheme, the most appropriate analytical strategy is a logit regression with robust standard errors.

Two primary types of independent variables are of interest. First, we are interested in the determinants of two competing explanations for why individuals overcome the free rider problem to engage with environmental interest groups: concern and efficacy. The literature suggests that those with greater concern for climate change should be more likely to affiliate with environmental groups. Similarly, those who are more efficacious should be more likely to affiliate. As noted, Bromley-Trujillo et al. (2014) found that climate scientists were primarily motivated by efficacy, not concern.[4]

[1] The 13 journals sampled were *Global Environmental Change*, *Journal of Climate*, *Journal of Atmospheric Sciences*, *Journal of Geophysical Research*, *Climatic Change*, *Journal of Applied Meteorology*, *Monthly Weather Review*, *Journal of Atmospheric and Oceanic Technology*, *Weather and Forecasting*; *Journal of Hydrometeorology*; *Earth Interactions*; *Bulletin of the American Meteorological Society*, and *Meteorological Monographs*.

[2] Following the American Association for Public Opinion Research (AAPOR) conventions and algorithms, the 2004 response rate was 12 %, the cooperation rate was 18.6 %, and the completion rate was 69.1 %. The 2007 survey response rate was 6.9 %, the cooperation rate was 14.7 %, and the completion rate was 69.5 %. Lower AAPOR computed response rates have been the norm because of many factors, one being their inclusion of completely failed contacts in the computational denominator. Recent studies have significantly reduced the need to fear these lowered rates. For example, Merkle and Edelman (2002) find no relationship between response rate and survey accuracy, and Keeter et al. (2006) find that surveys with lower response rates are statistically indistinguishable from those with higher response rates. AAPOR itself has recently acknowledged this reality (See www.aapor.org/response_rates_an_overview1.htm).

[3] The 2007 national public survey only asked respondents about donating money to an environmental group in the previous one year. Consequently, this data is not included in the other analyses.

[4] Although there appears to be inconsistent scopes between the independent and dependent variables, this is out of necessity. While there were certainly niche groups that existed at the time of these surveys that focused primarily on climate change, climate change was not the sole objective of any of the largest environmental interest groups (e.g. Sierra Club, Nature Conservancy, or Environmental Defense) or groups that cross between wildlife and environmental interests (e.g. World Wildlife Fund, National Audubon Society, or Ducks Unlimited). This distinction is particularly important for the public surveys, where it is less likely that respondents would know of climate change niche groups, but would be familiar with the mainstream groups. If anything, the inconsistent scopes create a tougher test for the primary independent variables.

Second, when controlling for these competing explanations, are climate scientists more likely to affiliate with environmental groups? To test this, we include a dummy variable for those who participated in the climate scientist survey. Based on previous research (Bromley-Trujillo et al. 2014), we expect to find that scientists were more likely to donate and attend a demonstration, but less likely to sign a petition because this signature could be used as proof of advocacy.

We also control for the influence of various demographic indicators. Previous research indicates that individuals with certain characteristics are more likely to engage with environmental interest groups (e.g. Boehmke and Bowen 2010; McCright and Dunlap 2011). Surveys conducted by Leiserowitz et al. (2011) indicate that conservative individuals are more likely to be doubtful or dismissive of climate change and less likely to join environmental organizations. To adequately account for these characteristics, we control for gender, race, age, political ideology, income, education, and religious attendance. Furthermore, recent studies indicate that the influence of demographic indicators can vary based on the specifics of the issue, even when they address the same domain and the survey data are from the same respondents (e.g. Stoutenborough et al. 2014a, 2015). Consequently, it can be difficult to identify specific predictive relationships between specific demographic indicators and specific attitudes and behaviors, which results in an expectation that these characteristics will have an influence.

Finally, as indicated above, we estimate more than one model for each dependent variable. For all three dependent variables, we estimate a base model that omits a control for climate scientists. We also estimate a scientist model for all three, which includes a dummy variable for climate scientists, enabling us to determine whether scientists are uniquely likely to interact with environmental groups.

5 Results

First we consider descriptive statistics concerning environmental interest group engagement. Table 1 lists the results of the univariate comparisons between scientists and the public on these

Table 1 Environmental interest group activity by sample

	Donate	Did not donate	*n*
Climate Scientist	57.52 %	42.48 %	459
Public 2004***	36.89 %	63.11 %	1087
Public 2007***	40.69 %	59.31 %	929
	Sign petition	Did not sign petition	*n*
Climate Scientist	41.48 %	58.52 %	458
Public 2004***	53.59 %	46.41 %	612
	Attend demonstration	Did not attend demonstration	*n*
Climate Scientist	15.01 %	84.99 %	573
Public 2004†	10.87 %	89.13 %	460

The 2007 national public survey did not ask respondents about signing petitions or attending demonstrations. T-Tests comparing the means for the public survey(s) were conducted against the climate scientist surveys. Two-tailed test

† $p<.100$; * $p<.05$; ** $p<.01$; *** $p<.001$

interest group participatory behaviors. As seen in Table 1, there are statistically significant differences between the raw percentages; however, this is before inclusion of proper control variables. It is worth noting that despite the 2007 survey using a 1 year time frame, there is not a statistically significant difference between the 2004 and 2007 public surveys.

Next we examine the determinants of donating money to an environmental interest group within the previous 5 years, controlling for other factors. Table 2 presents the results of the logit analyses. As interest group theory suggests, those with greater concern for climate change and more personal efficacy are more likely to donate money. This differs from the Bromley-Trujillo et al. (2014) finding that climate scientists with greater concern are less likely to donate, suggesting that the public is much more driven by concern than scientists. We also find that climate scientists are no more or less likely to donate money than the public, which suggests they are no different from the public in terms of the likelihood of donating money to an environmental interest group. Additionally, those who are white, older in age, more liberal, have larger incomes, and more educated are more likely to donate.[5]

While donating money to an environmental interest group is a relatively easy activity, signing a petition is slightly more difficult, if for no other reason than an individual is infrequently presented with one. Presented in Table 3, we find that those who have more concern and efficacy are more likely to sign a petition. Climate scientists are less likely to sign a petition. This should not be surprising because signing a petition provides written evidence of advocacy, which scientists may seek to avoid to preserve impartiality. Additionally, those who are white, more liberal, have higher incomes, regularly attend religious activities, and more education are more likely to sign. The inclusion of the climate scientist dummy creates three substantively important differences between the two models. Specifically, females are no longer more likely to sign, while income and education become predictors.

Finally, we turn our attention to what is arguably the most difficult form of affiliation examined – attending a demonstration or rally. It is far easier to participate in the previous two manners, but attending a demonstration requires much greater effort by the individual, both in time and planning. Table 4 provides the results of these analyses. Given the rarity of such participation among the public and climate scientists, it is not surprising that these results are less robust.[6] However, we find that those who are more efficacious are more likely to attend a demonstration. Despite having a higher percentage attending demonstrations in Table 1, climate scientists are less likely to attend a demonstration when controlling for other potential determinants, which suggests that those who attend demonstrations happen to have the characteristics common within members of the public who attend demonstrations. Finally, those who are more liberal and white are more likely to attend a demonstration, though race only becomes a weak predictor following the inclusion of the climate scientist control.

[5] Although not presented in the analysis, we estimated a third model that sought to determine whether there was a temporal difference between the 2004 and 2007 survey respondents. Both dichotomous variables are statistically significant and negative, which suggests that there was not a large difference based on time or due to the limitation of only one year in the 2007 survey.

[6] We also estimated these models using a complementary log-log regression, which is designed to estimate better dichotomous dependent variables associated with rare events. With less than 15 % of the overall pooled cases having attended a demonstration, this is a relatively rare event, yet the results show no substantively important differences. Therefore, for consistency, we present the logit results.

Table 2 Determinants of donating money to an environmental group or cause

	Base Model	Scientist Model
Personal motivation indicators		
Concern for climate change	0.098 (0.022)***	0.097 (0.022)***
Personal efficacy	0.684 (0.108)***	0.690 (0.108)***
Demographic indicators		
Female	0.100 (0.114)	0.161 (0.121)
White	0.704 (0.162)***	0.713 (0.163)***
Age	0.008 (0.003)*	0.008 (0.003)*
Political ideology	−0.288 (0.036)***	−0.288 (0.036)***
Income	0.097 (0.018)***	0.094 (0.018)***
Religious attendance	0.060 (0.114)	0.041 (0.115)
Education	0.131 (0.030)***	0.111 (0.032)**
Climate scientist	–	0.245 (0.162)
Constant	−4.896 (0.647)***	−4.616 (0.670)***
Number of cases	1816	1816
Likelihood ratio Chi2	271.40***	274.21***
McFadden's R2	0.1454	0.1463
Log likelihood	−1062.102	−1060.978

Log odds reported. Robust standard errors in parentheses. Two-tailed test

† $p<.100$; * $p<.05$; ** $p<.01$; *** $p<.001$

Table 3 Determinants of signing an environmental petition

	Base Model	Scientist Model
Personal motivation indicators		
Concern for climate change	0.083 (0.032)**	0.096 (0.032)**
Personal efficacy	0.940 (0.177)***	1.017 (0.182)***
Demographic indicators		
Female	0.405 (0.188)*	−0.129 (0.219)
White	0.840 (0.213)***	0.874 (0.215)***
Age	−0.005 (0.006)	−0.004 (0.006)
Political ideology	−0.280 (0.054)***	−0.272 (0.055)***
Income	0.040 (0.029)	0.062 (0.030)*
Religious attendance	0.345 (0.174)*	0.501 (0.179)**
Education	−0.034 (0.051)	0.111 (0.058)†
Climate scientist	–	−1.288 (0.242)***
Constant	−1.854 (1.073)*	−4.334 (1.176)***
Number of cases	811	811
Likelihood Ratio Chi2	111.95***	125.42***
McFadden's R2	0.1260	0.1513
Log likelihood	−491.230	−477.024

Log odds reported. Robust standard errors in parentheses. Two-tailed test

† $p<.100$; * $p<.05$; ** $p<.01$; *** $p<.001$

Table 4 Determinants of attending an environmental demonstration

	Base Model	Scientist Model
Personal motivation indicators		
Concern for climate change	0.059 (0.048)	0.061 (0.049)
Personal efficacy	0.717 (0.240)**	0.748 (0.248)**
Demographic indicators		
Female	0.321 (0.263)	0.020 (0.272)
White	0.505 (0.308)	0.509 (0.307)†
Age	−0.009 (0.008)	−0.009 (0.008)
Political ideology	−0.167 (0.074)*	−0.153 (0.073)*
Income	−0.044 (0.039)	−0.035 (0.038)
Religious attendance	0.173 (0.243)	0.240 (0.241)
Education	0.001 (0.075)	0.079 (0.085)
Climate scientist	–	−0.724 (0.303)*
Constant	−2.827 (1.407)*	−4.046 (1.478)**
Number of cases	784	784
Likelihood ratio Chi2	26.84**	34.22***
McFadden's R2	0.0593	0.0679
Log likelihood	−302.462	−299.709

Log odds reported. Robust standard errors in parentheses. Two-tailed test

† $p<.100$; * $p<.05$; ** $p<.01$; *** $p<.001$

6 Discussion

This project was initially motivated by the unexpectedly high rate of climate scientists interacting with environmental interest groups (Bromley-Trujillo et al. 2014). The vast literature examining group participation suggests that the public is less likely to be active in these groups when compared to climate scientists, who have a direct interest in environmental issues. However, we find that the public is far more likely to overcome the free rider problem than we suspected. Consequently, the anticipated gap between climate scientists and the public is not particularly profound. Regardless, several implications emerge from this examination.

We find a significant difference in the likelihood of climate scientists to interact with environmental interest groups. Interestingly, climate scientists are less likely to be involved than previous research may have suggested. Specifically, climate scientists are no more or less likely to donate money to environmental causes, but are less likely to sign a petition or attend a demonstration than the general public.

While the raw percentages suggest that only one of these findings (signing petitions) are as expected, the likelihood of attending a demonstration and donating money differed. The raw percentages indicate that climate scientists are more likely to attend a demonstration. However, we find that an individual's environmental efficacy and political ideology are much better predictors than one's status as a climate scientist. Similarly, the raw percentages and t-tests indicate that scientists were much more likely to donate money. However, when controlling for alternative explanations, we find that they are no more or less likely to do so.

Additionally, these results provide support for the models of interest group behavior. Specifically, we find support for the theoretical expectations that individuals will overcome the free rider problem because of shared values and purposive benefits. From a shared values perspective, we find that those who are more concerned about climate change are more likely to donate money and sign a petition. However, we do not find support for this approach when it comes to attending demonstrations. This should not be too surprising considering environmental demonstrations may be difficult to attend due to the costs of traveling to their locations and timing. In addition, scientists concerned with their credibility may shy away from such a public demonstration of advocacy.

On the other hand, we find strong evidence that purposive benefits influence the likelihood of getting involved with an environmental group. Specifically, the evidence suggests that those with greater efficacy are more likely to become involved. Efficacy is often found to be a strong predictor of behavior, particularly the act of overcoming obstacles that may be in the way (e.g. Luszczynska et al. 2011). Clearly, individuals perceive some sort of emotional or psychological benefit from being active with environmental interest groups.

In the end, if climate scientists are biased advocates of a cause, as some suggest, we would find that they are significantly more likely to interact with environmental groups than the public. Instead, we find that they are less likely to do so in two of the three measured methods of interaction, and no more or less likely in the third. As climate scientists are less likely than the public to take part in more proactive efforts by environmental groups (i.e. signing petitions and attending demonstrations), this suggests that climate scientists are acutely aware of the implications of appearing too political. Their concern about climate change should cause them to want to overcome the free rider problem in some manner, but the expectation of scientific objectivity should cause them to avoid situations where this objectivity can be questioned.

Finally, these results indicate that accusations that climate scientists are biased, or issue advocates, may be overstated. While climate scientists are more active with environmental groups than the public in terms of raw percentages, which may create the perception of bias, our analyses suggest that climate scientists are actually less likely to engage in advocacy activities than the general public, when controlling for other determinants. While this does not speak directly to the validity of any particular research project or agenda, our results do not provide any strong indication that the scientific community is blurring the lines of scientific objectivity. This should not be taken to suggest that climate scientists should no longer worry about how their actions might be interpreted. There remains a risk that a significant increase in advocacy by scientists could be an unwelcome change to the public, which would decrease the likelihood that they would believe climate scientists as they discuss the risk of climate change.

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Appendix

Table 5 Variable definitions

Variable	Question	Coding
Dependent variables		
Give money	Have given money in support of an environmental group or cause within the last 5 years? Note: the 2007 public survey inserted this question into a battery of yes/no questions, and specified that the time frame was 1 year instead of five. As noted in Footnote 5, this did not present a significant difference in the analysis.	1=Yes, 0=No
Sign petition	Have you signed an environmental petition or appeal within the last 5 years?	1=Yes, 0=No
Attend demonstration	Have you attended an environmental demonstration or rally within the last 5 years?	1=Yes, 0=No
Independent variables		
Concern for climate change	Public: Rate these issues on how worried you are about them right now - Global warming and climate change. Climate scientists: How would you rate global climate change as a problem that affects the social, economic and public health aspects of the U.S.?	11-point scale: 0=Not a problem at all, and 10=Very significant problem
Personal efficacy	Measured as an index that average respondent efficacy for GW using a 4-point scale where 3=strongly agree and 0=strongly disagree, respondents were asked to state their agreement with (1) I believe my personal actions have an influence on global climate change; (2) My actions to reduce the effects of climate change in my community will encourage others to reduce their effects of global climate change through their own actions; and (3) My life is directly affected by global climate change. (Cronbach's alpha 0.6753) Note: The 2007 public survey reversed the wording for question 1, which read, "I believe my actions have little or no influence on global warming and climate change." The coding for this variable was adjusted to match the others in terms of directionality.	Average between 0 and 3
Climate scientist	Those who participated in the climate scientist survey	1=Yes, 0=No
Political ideology	Which of the following categories best describes your political views? Would you say that you are: Strongly Liberal, Liberal, Slightly Liberal, Middle of the Road, Slightly Conservative, Conservative, Strongly Conservative	0=Strongly Liberal through 6=Strongly Conservative
Income	What was the estimated annual income for your household for [Insert the appropriate year]?	Reported Income

Table 5 (continued)

Variable	Question	Coding
Female	As part of the survey, we are required to ask, are you male or female?	1=Female, 0=Male
Age	How old are you?	Reported Age
Religious attendance	Did you attend any type of religious service in the last 7 days?	1=Yes, 0=No
White	From the following options, do you consider yourself to be: Black or African American, White, Asian, American Indian, Native Hawaiian or other Pacific Islander, Other	1=White, 0=All Others

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