

**Between Consensus and Denial:  
Climate Journalists as Interpretive Community**

Michael Brüggemann and Sven Engesser

*Final manuscript accepted for publication in  
Science Communication (2014)*

**Contact:**

Dr. Michael Brüggemann / Dr. Sven Engesser

Institute of Mass Communication and Media Research, University of Zurich

Andreasstrasse 15, 8050 Zürich, Switzerland

E-mail: Michael@bruegge.net; s.engesser @ipmz.uzh.ch.

**Between Consensus and Denial:  
Climate Journalists as Interpretive Community**

Abstract

This study focuses on climate journalists as key mediators between science and the public sphere. It surveys journalists from five countries and from five types of leading news outlets. Despite their different contexts, journalists form an interpretive community sharing the scientific consensus on anthropogenic climate change and agreeing on how to handle climate-change skeptics. This consensus is particularly strong among a core of prolific writers while climate-change skepticism persists among a periphery of occasional writers. The journalists' attitudes towards climate change are connected to their usage of sources indicating that interpretive communities include journalists and scientists.

*Keywords:* climate change, science journalism, environmental journalism, interpretive community, climate-change skepticism

### **Between Consensus and Denial: Climate Journalists as Interpretive Community**

Science, policy, and the media diverge in their discourses about climate change (Weingart et al., 2000). While the idea of anthropogenic climate change has been common ground in scientific research for at least a decade (Oreskes, 2004), denial of anthropogenic climate change prevails in some segments of public opinion, particularly in the US (Maibach et al. 2011). In Europe, outright denial is rare but citizens' perception of climate change varies over time. Also, climate change is regarded as a distant problem rather than as a policy priority for the EU (Commission of the European Communities, 2011, 2013, p. 48).

One explanation for the gap between scientific and public perceptions of climate change may be the way journalists cover this issue. Boykoff and Smith (2010) claim that "media treatments of climate change frequently result in illusory, misleading and counterproductive debates" (p. 215). Particularly, the salience of climate change "skeptics" or "deniers" in media coverage has been a matter of concern (Boykoff & Boykoff, 2004).

Therefore, this study focuses on *climate journalists* as key mediators between the sphere of science and the public sphere. It cuts across beats and includes journalists from different types of media outlets and countries. We surveyed journalists from five countries with high CO<sub>2</sub> emissions and different levels of climate-change skepticism (Germany, India, Switzerland, UK, and USA), as well as from five different types of news outlets (liberal upmarket, conservative upmarket, midmarket, and regional press, and online outlets). The survey aimed at finding out, whether, in spite of all the differences between journalists working in vastly different contexts, there is a common ground with regards to interpretations of climate change, assessment and handling of climate-change skeptics, expertise in climate coverage, and usage of sources.

### **Mapping and Understanding Climate Journalists**

We conceive climate journalists as the authors of news items that focus on climate change and are published in leading national news outlets. The definition is thus based on: (a) journalistic practice and (b) the context of a newsroom that is trusted to provide a certain degree of editorial independence. Scientists, lobbyists, or environmentalists may also act as climate journalists if they publish pertinent articles in established journalistic media. This broad understanding of climate journalists allows us to grasp the whole diversity of authors shaping public debates on climate change.

Research on climate journalists has been often based on studies in single countries. Berglez (2011) interviewed climate journalists in Sweden who struggled to overcome the constraints of media logic in order to adequately cover climate change. Peters and Heinrichs (2005) surveyed climate journalists in Germany and found that they formed a heterogeneous group that cut across beats.

Some studies explored the knowledge of journalists about climate change. Wilson (2000) surveyed environmental journalists and found substantial deficits in their knowledge about the consensus and the debates among climate researchers. If journalists underestimate the consensus in the research community, their coverage may overrepresent skeptical voices (Boykoff & Boykoff, 2004). In Wilson's study, the climate journalists' level of knowledge depended on whether they were employed full-time and on their use of scientific sources. The practice of recycling information from other mass media which Wilson (2000, p. 4) labeled "food-chain journalism", was widespread among the respondents and may have led to misinformation on climate change.

A recent study on climate journalists in Sweden drew a more positive picture (Sundblad et al., 2009). It found knowledge of climate change among journalists ranking second behind experts but ahead of policy makers and laypersons. In another qualitative

study, journalists expressed their awareness of climate change but identified ignorance about the issue as a major problem among their colleagues (Harbinson, 2006). Elsasser and Dunlap (2013) showed that the conservative newspaper columnists in the US questioned anthropogenic climate change in their pertinent columns.

While studies focusing on climate journalists are rare, there is an abundance of research on science or environmental journalists (e.g. Detjen et al., 2000; Fahy & Nisbet, 2011; Giannoulis et al., 2010; Sachsman et al., 2006, 2010) and on the interactions between journalists and scientists (Ivanova et al., 2013; Maillé et al., 2010; Schneider, 2010; for an overview see Peters et al., 2008; Peters, 2013).

The first finding relevant to our research endeavor concerns working conditions: Sachsman et al. (2010) found that in the early 2000s every third US newspaper featured a reporter dedicated to environmental coverage. However, with the crisis of the newspaper industry, the “golden years” of environmental reporting seemed to be over (Sachsman, 2010, p. 179). While the numbers of science and environmental reporters have decreased (Russel, 2010), interest in science stories has increased. Thus, time pressure and dependence on information subsidies from public relations are likely to have grown (Fahy & Nisbet, 2011). This is likely to apply to climate journalism as well.

Other findings point at the coexistence of two groups among journalists: First, there may be a core of journalists with high expertise and autonomy. Dunwoody (1980, p.14) argued that in science journalism, a small “inner club” of writers who knew each other and cooperated over a long period, had a strong influence on US-American readers. Journalists with a high degree of specialization may enjoy greater freedom in choosing topics and angles for their reporting. Personal preferences, role conceptions, and interpretations might thus exert a stronger influence on their reporting (Detjen et al., 2000, p. 4). McCluskey (2008) showed that environmental reporters provided more positive coverage of environmental NGOs than

their colleagues from other beats. This could be criticized as “beat parochialism” (Sigal, 1973, p. 47). At the same time, more experienced and specialized reporters know more about their topics (Wilson, 2000). Thus, beat parochialism and better informed reporting seem to be two sides of the same coin and reveal the ambiguity of journalistic specialization.

Second, there is a wide periphery of journalists who write on the environment or science regularly but not very often. On average, environmental reporters spend more than half of their time covering other issues (Detjen et al., 2000). They might therefore not enjoy the kind of expert status and room for maneuver attributed to the traditional science journalist. This also explains why, empirically, environmental journalists do not clearly stand out as a group. Rather, they reflect the diversity of journalists working for different beats. Sachsman et al. (2010) find that the average US environmental journalist, on almost all variables, did *not* substantially differ from the average US journalist. Despite these findings, there may be an undiscovered core of specialists among the environmental journalists, who almost exclusively write on the topic. This group may diverge from the average journalist.

This phenomenon of core and periphery is likely to also exist in the case of climate journalism: there may be a core of a few *prolific* climate reporters who really specialize on this area of reporting. They are likely to produce a substantial amount of coverage and thereby play an important role in shaping public opinion. At the same time, there may also be a much larger outer circle of journalists who occasionally write stories about climate change because the issue cuts across beats.

### **Climate Journalists as Interpretive Community**

Climate journalists may form a group that is connected not by personal acquaintance or direct interactions but by common interpretations about climate change and how to cover it as a journalist. Zelizer (1993) has introduced the concept of *interpretive community* into journalism research and it is similar to the ideas of “discursive community” (Pan & Kosicki,

2003) or “epistemic communities” (Haas, 1992). All three stress that communities may be integrated by common ideas and discourses. They may be connected by reading the same newspaper, watching the same TV channel, or following the same Twitter accounts.

Zelizer (1993) envisaged journalists as members of a community that evolved through discourses about key events, such as the Watergate scandal. This community is continuously consolidated through communicative challenges, as Zelizer (2010) illustrates by the case of Saddam Hussein’s hanging. Journalists are a likely case for the emergence of interpretive communities as there is no formal membership in professional journalism in most countries. High-degrees of co-orientation among journalists and processes of inter-media agenda setting (Reinemann, 2004) and phenomena coined as “pack journalism” (Crouse, 1973) indicate that common interpretations play an important role in defining journalists as a group.

Climate change poses unique challenges to journalistic routines, most importantly due to its procedural nature and the uncertainty attached to scientific models and risk assessments. It is therefore interesting to find out whether journalists develop common assessments about climate change, and how to deal with it as a reporter and thus form interpretive communities.

Berkowitz and TerKeurst (1999) extended the concept of interpretive communities to include not only journalists but also their sources. Leiserowitz (2007) applied the concept to public opinion on climate change in the US. In his first assessment, Leiserowitz (2007) distinguished the “alarmists” and the “naysayers”, and later on developed a more refined typology differentiating “six Americas” (Maibach et al., 2011). Finally, the idea of interpretive communities should be refined by looking at differences within the community, e.g. a hierarchy between opinion leaders and followers.

The concept of interpretive community may thus include journalists, sources, and audience members who are united around certain interpretations on a broader issue and connected by means of direct *or* mediated interactions. Such interpretive communities, if they

exist across national borders, may be strong influencing factors not only on media coverage but also on the wider public and political debates about issues such as climate change.

## **Hypotheses**

### **Affirmation of IPCC Consensus**

Climate change differs from most other issues in science by the fact that there is an international organization, the IPCC (Intergovernmental Panel on Climate Change), with the sole purpose of consolidating and summarizing the consensus of leading scientists around the world on this issue. Furthermore, the annual UN climate summits create multiple occasions for meetings between climate scientists, policy makers, and journalists (Adolphsen & Lück, 2012). As a result of direct and indirect interactions between climate journalists and scientists, as well as due to trickle-down effects between prolific and occasional climate writers, we expect an interpretive community among climate journalists which is built around the main propositions of the IPCC. We will refer to this as the *IPCC consensus* – knowing that in science there will never be a full consensus among all scientists on any given issue. This relatively broad consensus can analytically be split up into the following four core statements:

1. **Global Warming:** the average global temperature has been rising for about 150 years
2. **Anthropogenity:** global warming has been largely caused by humans through CO<sub>2</sub> emissions and greenhouse gases
3. **Major Problems:** the impact of global warming will most likely create major problems for our global ecosystem
4. **Emission Reduction:** humankind must strongly reduce CO<sub>2</sub> emissions in order to limit future global warming

We expect a majority of climate journalists to share the IPCC consensus (H1).

Sharing the view on climate change as propagated by the IPCC should not be confounded with supporting the IPCC as an organization or political actor.

### **Assessment and Handling of Climate-Change Skeptics**

Climate-change skepticism is a multi-dimensional concept (Boykoff, 2013; Engels et al., 2013). Groups of skeptics may be classified according to their objection to the statements listed above. Rahmstorf (2004) distinguishes *trend skeptics*, *attribution skeptics*, and *impact skeptics*. Skeptics who reject the necessity of immediate CO<sub>2</sub> reduction form a fourth group of *mitigation skeptics*. Elsasser and Dunlap (2013) demonstrate that all four types of skepticism are present in the texts of conservative US columnists.

However, one issue should be analytically separated from climate-change skepticism: the *uncertainty* of climate models. Probability and statistical error are always part of scientific projections and the complexities of climate-change models multiply them. Therefore, journalists who write about these phenomena do not necessarily belong to the community of skeptics who doubt the fundamentals of climate science.

It is possible that journalists do not agree with skeptical positions but, nevertheless, include them in their coverage because of their professional role perceptions and norms. The norm of balance is part of the wider concept of objectivity (Bennett 1996). It is also associated with the role model of the detached observer, which is shared by journalists across the globe (Hanitzsch et al., 2011). Therefore journalists may feel obliged to present controversial debates in a “balanced” fashion and allow speakers from both sides to express their opinion. This “tyranny of balance” (Revkin, 2006, p. 225) may partly explain the prominence of climate-change skeptics in US media coverage (Boykoff & Boykoff, 2004). Consequently, there are two possible explanations for climate-skeptical coverage: climate journalists may agree to skeptical positions or they may follow the norm of balanced

reporting. While we assume that the majority of climate journalists agree to the IPCC consensus rather than with the skeptics, we still expect *a majority of climate journalists to include climate-change skeptical actors or positions in their coverage (H2)*.

### **Prolific versus Occasional Writers**

We assume, as argued above, that climate journalists can be divided into a core of prolific writers and a larger circle of occasional writers. We also argue that these two groups differ in the affirmation to the IPCC consensus and the handling of climate-change skeptics. It appears plausible that journalists who regularly write on scientific issues are, from the outset, likely to have positive attitudes towards science. The continuous exposure to the scientific consensus on climate change may also influence their personal assessment of the topic. This may be viewed as a process of *self-selection, learning and co-orientation*. Skeptical writers may come from outside a scientific or journalistic background and make rather sporadic appearances in professional news outlets. Based on this reasoning, we formulate the hypothesis that *support for the IPCC consensus will be higher among prolific writers than among occasional writers (H3)*.

### **Influence of Demographics and Personal Attitudes**

Past research (Engels et al., 2013; Leiserowitz et al., 2013; Poortinga et al. 2011) showed that belief in global warming is strongly correlated to demographics, personal attitudes, and political ideologies. In the US, the proto-typical climate-change denier would be conservative, evangelical, white, and male (Dunlap & McCright, 2011; Smith & Leiserowitz, 2013). The gap between US conservatives and liberals concerning climate change has even been growing in recent years (Hoffman, 2011). Among people who reject changes to the current carbon-based economy, a disbelief in climate change might form a convenient way to deal with a challenge to their world view. This is a form of what Kahan et al. (2007) call “identity-protective cognition” (p. 467), which is a “motivated cognition through which

people seek to deflect threats to identities they hold” (see also: Dunlap & McCright, 2011, p. 1164-1165). In line with correlations observed in the broader public we assume that *demographics and personal attitudes (e.g. being male, conservative, religious, and not ecology-oriented) will influence climate-change skepticism among journalists (H4).*

### **Interpretive Communities and Sources**

Following Berkowitz and TerKeurst (1999), we argue that interpretive communities among climate journalists also include their sources. For instance, the community established around the IPCC consensus is more likely to rely on scientific sources. Therefore, our final hypothesis states that *journalists who approve the IPCC consensus use other sources than their climate-skeptical colleagues (H5).*

## **Method**

### **Sample**

The study included five countries: Germany, India, Switzerland, the UK, and the US. As climate change is a global issue, we tried to find out whether there is a *transnational* community of climate journalists. We combined a most similar and most different systems design (Przeworski & Teune, 1982).

The countries under study share high amounts of CO<sub>2</sub> emissions, either in terms of total emissions or per capita (Clark, 2011). Thus, they are all likely to feature vivid debates on climate change. They differ in their degree of climate-change skepticism as represented in media coverage, which is relatively high in the US, medium in the UK, and low in Germany and Switzerland (Grundmann & Scott, 2012). Beside these Western countries we included an emerging economy. India has proven to be a very interesting case in terms of climate-change coverage (Billett, 2010; Boykoff, 2010).

We selected leading professional news outlets from different sectors of the media landscape: two upmarket newspapers (preferably one conservative and one liberal), one

tabloid or midmarket newspaper, one regional newspaper from a metropolitan area, and one predominant online player (see Table 1). Our selection of news outlets was also inspired by previous studies on climate-change coverage (e.g. Boykoff & Nacu-Schmidt, 2013). Since media outlets, in our digital world, are no longer confined to print distribution we included both the print and online editions in our sample.

[Table 1 about here]

### **Data Collection**

As the target population or universe of climate journalists, we defined all people who published articles on climate change in professional news outlets on a more or less regular basis. In order to find the climate journalists we first analyzed the websites of the news outlets by using a Google site search. We used the search string “climate change” OR “global warming” OR “greenhouse effect” (and the equivalent terms in German). The validity of these strings was tested in previous studies (e.g. Schmidt et al., 2013). We complemented the Web search by searching the print versions of the news outlets in the *LexisNexis* and *Factiva* databases.

Subsequently, we manually identified all articles focusing on climate change and including author names. From the resulting list of names we excluded all people who published less than two pertinent articles during a one-and-a-half year period (1 January 2011 – 1 August 2012) in order to eliminate authors that only coincidentally wrote about climate change. We researched the e-mail addresses of the remaining authors. We tested the reliability of the whole author search procedure on a sub-sample consisting of the articles from one news outlet. Two coders achieved a satisfactory agreement of 89 %.

The author search generated a survey population of 170 climate journalists, which we invited by e-mail to participate in our bilingual (English and German) online survey. The survey period lasted two weeks (27 September – 10 October 2012). We sent two e-mail

reminders to the journalists and, wherever possible, also reminded them by phone. A sample of 64 people completed the questionnaire, which corresponds to a response rate of 38 %. This can be considered satisfactory for a cross-national online survey among journalists.

### **Findings**

The prototypical climate journalist in our sample is male, 43 years old, has a Master's degree, is employed full-time, and publishes in both the print and online edition of his news outlet (see Table 2). Our sample contained only seven free-lance journalists and eight climate authors who are not professional journalists, but are academics, work for NGOs or represent corporate interests. Thus, the traditional professional journalist still seems to dominate climate journalism, at least as represented within our sample.

He regards himself as science or environment journalist. On average, he can look back upon eight and a half years of professional experience with climate change and he published around 14 articles on the topic in our one-and-a-half-year period of investigation, which is roughly one article every six weeks.

[Table 2 about here]

As a form of soft response control we compared the structure of our sample to the one of the total survey population of 170 climate journalists identified in the news outlets under analysis. We found no significant differences in terms of gender and number of published articles. The top three beats were also the same on both sides. The only major difference between sample and population was the slight overrepresentation of journalists from Germany and Switzerland, while reporters from the UK and the US were underrepresented (see also the section on limitations). The gender and age distributions of our sample proved to be very similar to US-American environmental journalists (Sachsman et al., 2010, p. 61–62). With regard to these demographics, our sample seems to be representative, but we cannot be sure if this is the case for the other variables as well.

The education level in our sample is relatively high. More than half of the climate journalists received a Masters' degree (56 %). This large proportion is joined by another fifth (19 %) that completed a PhD. Thus three out of four respondents hold a post-graduate degree, whereas this proportion is only 17 % for US-American environmental journalists (Sachsman et al., 2010, p. 64). Freelancers and external authors display a higher level of education with large share of writers with a PhD (share among non-journalists: 50%; freelancers: 29%; journalists working almost exclusively for one media outlet: 11%). In comparison to the 15 years of expertise reached by US-American environmental journalists (Sachsman et al., 2010, p. 61–62) our sample contains journalists with less working experience: Almost half of our sample (47 %) had worked five years or less as a climate journalist. This may reflect the importance that climate change gained from 2007 to 2010, driven by the 4th IPCC report, the UN summit in Copenhagen, and the Nobel peace prize awarded to Al Gore and the IPCC.

Besides the two predominating beats, science (25 %), and environment (17 %) there is a variety of other backgrounds that climate journalists come from. Respectively around a tenth of the sample (9 %) assigned itself to the political, economics, or general-news beats. A similarly small share (8 %) regarded itself as bloggers.

### **High Affirmation to IPCC Consensus**

On average, the survey participants rated all four IPCC statements as scientifically well-founded (see Table 3). The respective mean scores ranged from 4.4 to 4.7 on the 5-point scale. Across statements, around nine out of ten respondents reached values of 4 or 5. The “global warming” statement was most strongly agreed to, while the item implying major problems received the least support. So, “trend skepticism” is least common and “impact skepticism” most widespread in our sample, although the difference is not statistically significant.

[Table 3 about here]

The different kinds of skepticism correlate highly and can be combined into an IPCC affirmation index, which reached a satisfactory level of internal consistency (Cronbach's  $\alpha = .67$ ). The index's mean was relatively high ( $M = 4.5$ ). If we look at its distribution of values we see only a total of eight respondents (13 %) scoring more than *one* standard deviation below the mean ( $< 3.9$ ). Just four journalists are located more than *two* standard deviations below the mean ( $< 3.3$ ). Nevertheless, on our five-point scale, these values still express very moderate skepticism towards the IPCC. Only one respondent regarded the IPCC positions as scientifically untenable by reaching an index value of 2.3.

Overall, this shows a strong affirmation of the IPCC consensus, accompanied by different degrees of moderate skepticism and only one outlier that could be counted as an outright denier of climate change. Therefore Hypothesis 1 is clearly supported.

### **Dealing with Climate-Change Skeptics**

Climate-change skepticism cannot only be conceptualized as absence of affirmation of the IPCC consensus, but also as explicit support for climate-change skeptics. In order to measure this, we asked climate journalists to assess the statement that climate-change skeptics provided "important alternative viewpoints" and the statement that skeptics' positions were "scientifically proven". Journalists clearly rejected these statements attributing scores of 2.0 and 2.1 on the 5-point scale. Only one out of seven respondents agreed (see Table 4). In this way, the findings from the previous section are cross-validated: climate-change skepticism remains a rare phenomenon in our sample.

[Table 4 about here]

*Assessing* climate-change skeptics and *handling* them in journalistic practice are different matters. More than two thirds of the respondents say that climate-change skeptics should be critically assessed. A large majority of the respondents agree with the statement that climate-change skeptics should not be excluded from the mass media. Finally, around one

third of them state that climate-change skeptics should be treated *equally* to all other voices in the debates (see Table 5). So we conclude that Hypothesis 2 is supported.

It is interesting to note that the group of authors without a journalistic background displays about the same support for the IPCC statements as the professional journalists (with an index value of 4.6). Yet, it differs in terms of support for providing climate skeptics equal space in coverage (with an agreement of only 1.8 on the five point scale). Perhaps due to the small number of external authors the difference is not statistically significant.

Overall we observed that only one out of ten climate journalists does not agree with the IPCC consensus; yet one out of three claimed to handle climate-change skeptics no differently to other actors. It is apparently no contradiction that climate journalists on the one hand approve the IPCC consensus and disagree with climate-change skeptical positions, while on the other hand still give climate-change skeptics room in their daily coverage.

Beside personal attitudes towards climate change and skepticism there has to be another intervening variable explaining the handling of climate-change skepticism. We have already argued that this is the influence of journalistic role perceptions and professional norms. Among these, the notion of balanced reporting probably plays a particularly important role (Boykoff and Boykoff, 2004). Some climate journalists do not take climate-change skeptics into account because they agree with them, but because they intend to reflect social reality and to present both sides of the story.

### **Three Clusters of Climate Journalists**

We hypothesized that IPCC support will be higher among prolific writers than among occasional writers. However, we could not identify any significant linear correlation between sharing the IPCC consensus and the number of articles published on climate change ( $r = .05$ ,  $p = .705$ ,  $N = 64$ ). The underlying pattern is more complex than expected. If we display the

values as a scatter plot we see that they do not form a straight line but a loose triangle. They densely populate the upper left quadrant and spare the lower right one (see Figure 1).

[Figure 1 about here]

Given this distribution of values, we conducted a hierarchical cluster analysis. We used Ward's algorithm and the Squared Euclidean distance as heterogeneity measure (Breckenridge, 2000). We chose the three-cluster solution for three reasons. First, agglomerating the clusters beyond the third would result in a too heterogeneous solution (see Table 6). This is reflected by a strong elbow at the third cluster on the scree plot. Second, the dendrogram for the three-cluster solution is very clear and highly interpretable. Third, we checked the clarity, interpretability, and case numbers of alternative solutions and found that they could not compete with the three-cluster solution.

[Table 6 about here]

The first cluster is located in the upper-left quadrant of the scatter plot (see Figure 1) and is by far the largest ( $n = 37$ ). The journalists in this cluster score significantly higher on the IPCC information index than the other two clusters ( $M = 4.8$ ). They also write significantly fewer articles ( $M = 6.3$ ) than the second cluster. Therefore we named this cluster *affirmative occasional writers*. The second cluster can be found in the upper-right corner of the figure. It is less than half the size of the first cluster ( $n = 16$ ). The IPCC affirmation index value of this cluster can be found in-between the values of the other two clusters ( $M = 4.5$ ). Members of this cluster write far more articles ( $M = 37.2$ ) than the other journalists in our sample, so we labeled this cluster *prolific writers*. The third cluster is situated in the lower-left segment of the plot and is the smallest ( $n = 11$ ). Journalists from this cluster are significantly less affirmative of the IPCC ( $M = 3.5$ ) than the other two clusters and write far fewer articles than the prolific writers ( $M = 5.8$ ). This explains why we labeled them *skeptical occasional writers*. By assessing standard deviations, we identified a hard core of skeptics within this

cluster. Members of this very small group share IPCC affirmation index values of less than two standard deviations below the mean and can be considered climate-change *deniers*.

If we take a look at the amount of articles published by the journalists in our sample during the one-and-a-half year of investigation ( $N = 891$ ), the differences in journalistic output between the three clusters become evident. While *affirmative occasional writers* constitute more than half (58 %) of the climate journalists in our sample they write only a fourth (26 %) of the articles. For the *prolific writers*, the relation is the other way round: they are only a fourth of the journalists (26 %) but produce two thirds (67 %) of the news items. The *skeptical occasional writers* form only less than a fifth (17 %) of the sample and account for a mere 7 % of the coverage.

The three clusters are the reason why there is no linear correlation between the IPCC affirmation index and the number of published articles. If we average the IPCC affirmation index values of both occasional writers clusters ( $M = 4.5$ ) and compare it to the mean of the *prolific writers* ( $M = 4.5$ ) we cannot find any difference. The cluster analysis, however, reveals that there are very few skeptics and no true deniers among the prolific writers.

The three clusters also differ by other variables (see Table 7). Both groups of occasional writers, on average, tend to assess the climate-change skeptics' positions as more scientifically proven than the prolific writers do. For *affirmative occasional writers* this opinion may be built on lacking expertise, while *skeptical occasional writers* may base it on personal conviction. *Prolific writers*, presumably through their continuous exposure to science and the results of numerous empirical studies, come to a different conclusion. The findings for the handling of skeptics point in the same direction: *skeptical occasional writers* tend to be more inclined towards treating skeptics equally than *prolific writers*. *Affirmative occasional writers* assume a middle position between them. Overall, *prolific writers are less affirmative of the IPCC positions than some of the occasional writers but they stand out as the*

*group that most clearly opposes the idea that climate skeptics should be provided with equal voice in climate coverage.*

[Table 7 about here]

In terms of professional roles, *prolific writers* differ from *skeptical occasional writers* by attaching more importance to analysis and interpretation, and from *affirmative occasional writers* by a stronger emphasis on investigation and criticism. When it comes to the usage of sources, *skeptical occasional writers* rely less on scientific sources, such as scientists and their publications. Given the overwhelming scientific consensus on anthropogenic climate change this is a highly plausible behavior.

It is an insightful finding that *affirmative occasional writers* consider emphasizing scientific uncertainty significantly less important than members from the other two clusters. As they write only occasionally about climate change, they may be overburdened by the complexities of climate science and thus neglect the question of uncertainty. *Skeptical occasional writers* may stress uncertainty because pointing to the weaknesses of scientific models promotes their cause. *Prolific writers*, on the other hand, may regard the emphasis on uncertainty as important part of their analytical and investigative journalistic role-conception. We can conclude that taking scientific uncertainty into account is not always an indicator of being a climate-change skeptic.

The three clusters not only differ in terms of the variables displayed in Table 7 but also with regard to some other factors: Nine out of ten *prolific writers* (88 %) work as full-time journalist while this is only the case for 71 % of the *affirmative occasional writers* and 73 % of the *skeptical occasional writers*. In the skeptical cluster there is a comparatively high share of freelancers (18%), while the affirmative cluster displays the highest share of authors with other jobs than journalist (18 %). When it comes to educational levels, nine out of ten

*skeptical occasional writers* (91 %) received a MA or PhD while only 70 % of the *affirmative occasional writers* and 75 % of the *prolific writers* hold a postgraduate degree.

The three groups also diverge in terms of dominant beats. While science journalists form the largest group (38 %) among *prolific writers*, environmental journalists have the largest share (24 %) among *affirmative occasional writers* and economic journalists are particularly strong (27 %) among *skeptical occasional writers*.

In sum, we reject the idea of a linear relation between volume of journalistic output and climate-change skepticism. Instead, we found three groups of journalists with characteristic stances on climate change and how to handle climate skeptics. The most important finding is that there are hardly any skeptics and no deniers among the *prolific writers*. *Prolific writers* tend to consider the climate-change skeptics' positions as less scientifically proven and are more reluctant to treat them equally to other voices in the debate. Therefore, we regard Hypothesis 3 as, by and large, supported.

### **Factors Influencing Climate-Change Skepticism**

In the theoretical section of this paper, we formulated two hypotheses that dealt with factors influencing climate-change skepticism. Hypothesis 4 postulated an effect of demographics and personal attitudes, while Hypothesis 5 implicated a connection with the use of certain types of sources. In order to test these hypotheses we conducted bivariate correlations with these variables on the one hand, and affirmation of the IPCC consensus and equal treatment of climate change on the other (see Table 8).

[Table 8 about here]

In terms of demographics, we could not identify any significant influence of gender and age. With regard to personal attitudes, we found that the more ecologically-aware a respondent, the more affirmative of the IPCC consensus *and* the more tolerant towards climate-change skeptics he was. This counterintuitive result shows that the norm of providing

all actors equal access to the debate works independently of other personal convictions: Even ecology-oriented journalists seem to advocate equal treatment for climate skeptics.

There are indications (not statistically significant) that being conservative correlates with opposing the IPCC consensus. Also, there was a relatively strong and significant relation to the handling of climate-change skeptics: the more conservative a journalist was, the more he or she was inclined to grant climate-change skeptics equal treatment in the public debate.

Furthermore, bloggers ( $M = 5.0$ ,  $SD = 0.0$ ,  $n = 5$ ) and environmental journalists ( $M = 4.7$ ,  $SD = .2$ ,  $n = 11$ ) were most affirmative of the IPCC consensus, followed by political, science, and general-news journalists. Economic journalists ( $M = 4.1$ ,  $SD = 1.1$ ,  $n = 6$ ) and the only local journalist in the sample ( $M = 3.0$ ) were least affirmative. This is roughly mirrored by the attitudes towards skeptics, where the science journalists ( $M = 1.8$ ,  $SD = .9$ ,  $n = 15$ ) and bloggers ( $M = 1.0$ ,  $SD = 0.0$ ,  $n = 5$ ) were least willing to give equal voice to skeptics.

Overall, we found no influence of demographics on climate-change skepticism, but influences of ecological awareness and political alignment. Hypothesis 4 is only partly supported.

A more straight-forward finding concerns the use of sources. The more climate journalists are affirmative of the IPCC consensus the more they use a triad of sources: environmentalists, scientific sources (e.g. researchers and their publications), and mass media reports. Journalists that want to give equal voice to skeptics use less scientific sources. In terms of scientific sources, the bivariate correlations cross-validate the findings of the cluster analysis, where *skeptical occasional writers* and *prolific writers* also differ in their use of scientific sources. We found no relation to the use of companies and weblogs as sources. This could be because, among both groups, there are those who propagate the IPCC consensus and those who doubt it.

Nevertheless, we can argue that the interpretive community that evolved around the IPCC consensus tends to include certain types of sources (environmentalists, mass media, and scientific sources), while the climate-change skeptical community avoids scientific sources. Consequently, Hypothesis 5 is supported.

### Discussion

Starting out from the observed gap between scientific and public debates about climate change, this study has focused on the interpreters of climate change for the wider public: climate journalists working for leading print and online media.

The first endeavor of this study was to map climate journalists transnationally across different types of media. First and in line with findings on environmental journalism (Detjen et al. 2000; Sachsman et al., 2010), climate journalism cuts across beats and mobilizes a diversity of different writers, some of them bloggers but most of them professional, full-time journalists. Second and according to the literature on science journalism (Dunwoody, 1980), there is a small group of prolific writers, mostly working for the science section, which contributes a large share of climate coverage.

We can also conclude that climate journalists constitute an interpretive community. In spite of different national and editorial contexts, journalists display a broad consensus. First, the journalists largely agree to all four statements of the IPCC consensus. Second, they agree on the assessment of climate-change skeptics: their contributions are seen as hardly scientifically proven. Third, journalists argue that skeptics should be given the chance to make their points, provided that what they say is critically assessed. Most of the journalists do not want to provide skeptics with space *equal* to the one granted to other voices. Yet, it is apparently no contradiction that climate journalists, on the one hand, approve the IPCC consensus and disagree with climate-change skeptical positions, while, on the other hand, give climate-change skeptics some room in their daily coverage.

This study illustrates how climate skeptics get into the news: It is hardly the fact that journalists share their skepticism towards the basic assumptions of climate science. Rather, it is the norm of balanced reporting which draws them towards giving skeptics a voice. Our finding that *occasional skeptical writers* tend to have a MA or PhD reveals another way how the skeptics, at least occasionally, get the chance to publish in leading news outlets: Their academic titles – even if unrelated to climate science – may open doors that otherwise would remain locked.

Common interpretations both about climate change and how to deal with its denial indicate an emerging interpretive community among climate journalists. Obviously it is not a community of direct interaction and personal acquaintance and in this way it is different from the kind of community of “the boys on the bus” where a “pack” of journalists continuously follows the same candidate in US elections (Crouse, 1973). It is unlikely that a climate journalist working for the *Wall Street Journal* directly interacts with the online editor of the *Hindustan Times*, or that they know each other. Rather, they follow the same kinds of sources: scientific journals, IPCC reports, and climate scientists from their respective national contexts. This way, and in contrast to findings by Wilson (2000), the journalists’ stance on climate change does properly reflect at least the main assumptions of international climate science. We find that sharing the IPCC consensus correlates with a preference for scientific and environmentalist sources. This is a first indication that not only journalists but also their scientific sources form an interpretive community.

Another indication is the very similar levels of agreement with the IPCC views between professional journalists and external authors writing on climate change. The norm of balance, however, turns out to set the former apart from the latter: Professional journalists intend to provide climate skeptics with equal voice to a much larger extent than external authors.

We have argued above that the more journalists write about climate change, the more they become part of the interpretive community centered on the IPCC consensus. This assumption has to be qualified as we find a large group of *occasional writers* who do not write many climate-change articles but still fully support all IPCC statements. Yet, among the occasional writers there also exists a small group of skeptics with distance to the IPCC consensus. The *prolific writers* differ from the occasional writers by not having any denial of anthropogenic climate change among their ranks. Prolific writers have gained the expertise to be able to evaluate the validity of different claims raised by different actors. Thus, they also feel less bound by the norm of balance to quote skeptics just because skeptical voices are salient in public debates thanks to their backing by the echo chamber of skeptic blogs, think-tanks and industry sponsors.

However, this opposition to climate-change denial should not be confounded with an ever-growing uncritical support for climate science. The prolific writers support all IPCC statements, but they differ from the large group of affirmative occasional writers in showing a dose of distance as indicated by ticking a four on our five point scale of support for the different statements.

Prolific writers see their job – more so than the occasional writers – as critical, investigative and interpretive journalists. Even though they regard the claims of the skeptics as scientifically untenable, they also support the idea that climate journalism should expose the uncertainties related to climate science. In this respect they agree more with the skeptics than with the affirmative occasional writers. Getting to know climate science seems to imply sharing the IPCC consensus, but also becoming aware of the uncertainties related to science and thus also regaining some professional distance from the scientists' statements. Thus immersion in climate science as part of becoming a prolific writer explains the differences in the assessment of climate change, but in a more complex way than originally expected.

Explaining climate skepticism by drawing on socio-demographic and attitudinal variables turned out to be less successful than expected. We might thus conclude that either variables that proved relevant in the US context (such as religiousness and gender) do not apply to the same degree in other countries when explaining skepticism, or they do not apply to journalists to the same degree as to the more general public. More powerful correlations evolved among journalists and certain types of sources: The use of environmentalist and scientific sources proves highly predictive of support for the IPCC statement. This reaffirms our earlier point that sources are part of interpretive communities among journalists.

The correlation between political right-wing orientation and the intention to provide an equal forum for skeptical voices is evidence of another phenomenon familiar from journalism research: journalists quote sources instrumentally as “opportune witnesses” when they write their articles (Hagen, 1993; Kepplinger et al., 1991). Our study adds to this by showing that journalists do not only quote certain sources. They also tend to focus their search behavior to sources that are likely to provide consonant information, thus establishing bonds that are based on common interpretations: interpretive communities that include both journalists and their sources.

### **Limitations**

While this study extends our knowledge on climate journalists, we also would like to point out two limitations: first, our sample suffered from a limited number of cases; and second, the journalists from some countries are underrepresented.

The small  $N$ , most of all, is due to the fact that the universe of climate journalists was per se not as large as other target populations in the social sciences. We tried to compensate for this by expanding the universe to five different countries and five news outlets in each country, and by taking measures to enhance the response rates in our survey. However, the limited  $N$  prevented us from conducting substantive quantitative international comparisons

among the five countries. This would have resulted in very small subgroups, especially because the UK and the US are underrepresented in our sample (see below). This problem also applied to the cluster analysis, albeit to a lesser degree because there were only three subgroups. Nevertheless, some practical differences between the clusters did not reach conventional levels of statistical significance probably due to limited case numbers. Finally, the limited number of cases was the main reason why we did not include the factors correlating with support for the IPCC statements and the handling of climate-change skeptics into a multivariate regression model. Due to missing values, the  $N$  would have dropped significantly below the number of 50, which is considered the minimum by many scholars (Hayes, 2005, p. 354). Therefore, we tested the factors' influence by means of bivariate correlations.

Second, our sample may not be completely representative of the target population. Both are highly congruent in terms of some descriptive variables (e.g. gender and number of articles). However, in the survey population, climate journalists from the UK and the US form larger groups than in our sample. Therefore the descriptive results of our study should be interpreted with caution. We cannot be sure that there is no hypothetical group of Anglo-Saxon *skeptical prolific writers* in reality, which we did not cover in our study. However, Elsasser and Dunlap (2013) have shown that even the most prolific conservative climate-skeptic newspaper columnists in the US produce only moderate numbers of articles on climate change, which makes them fall into our group of occasional writers.

## **Outlook**

Finally, we would like to come back to the observed gap between public and scientific debates on climate change. This study shows that the journalist's convictions about climate change can hardly be seen as the cause of the divide between science and public opinion. Rather journalists writing on climate change clearly share at least the basic assumptions of the

IPCC consensus on climate change. Nevertheless, this survey provides three hints to why and how journalists may unwillingly contribute to the persistent or even growing alienation between the broader public and climate science.

First, journalists may have the intention to quote climate-change skeptics *and* assess them critically. Yet in practice, they often quote skeptics without critical assessment. Quoting skeptics provides conflict, an important news value. Yet, a critical assessment of skeptics bears the risk of being accused of bias. Consequently, science coverage sometimes lacks contextualization. A prime example of this are “unexplained flip-flops” (Stocking, 1999): one week a study finds that glaciers are melting less than expected, the next week another study finds that glaciers are melting more than expected. The audience is left with the impression of contradictory science. This allows skeptics to claim that anthropogenic climate change is a heavily contested hypothesis. Second, the emphasis among prolific writers on exposing the uncertainties of science may unwillingly result in a general distrust towards science among the audience. Third, the affirmative view of many occasional writers on climate change may ignore scientific uncertainties and caveats. In the case of scientific models that need to be readjusted, this may raise fundamental doubts about climate science in general.

Thus, this study adds to the understanding of a public debate where an elite interpretive community of scientists and journalists and a competing interpretive community of contrarians seem to drift apart further and further. Furthermore, journalists may sometimes unwillingly foster climate skepticism among the audiences. However, the hypotheses discussed above need to be subjected to future research that connects interviews among climate journalists to an analysis of their coverage in order to see whether their views of climate change are indeed reflected in their articles.

## References

- Adolphsen, M., & Lück, J. (2012). Non-routine interactions behind the scenes of a global media event: How journalists and political PR professionals coproduced the 2010 UN climate conference in Cancún. *Medien & Kommunikationswissenschaft (Special issue: „Grenzüberschreitende Medienkommunikation“)*, 141–158
- Bennett, W. L. (1996). An introduction to journalism norms and representations of politics. *Political Communication*, 13(4), 373–384. doi:10.1080/10584609.1996.9963126
- Berglez, P. (2011). Inside, outside, and beyond media logic: journalistic creativity in climate reporting. *Media, Culture & Society*, 33(3), 449–465. DOI: 10.1177/0163443710394903
- Berkowitz, D., & TerKeurst, J. V. (1999). Community as interpretive community: rethinking the journalist-source relationship. *Journal of Communication*, 49(3), 125–136. DOI: 10.1111/j.1460-2466.1999.tb02808.x
- Billett, S. (2010). Dividing climate change: Global warming in the Indian mass media. *Climatic Change*, 99(1), 1–16. DOI: 10.1007/s10584-009-9605-3
- Boykoff, M. T. (2010). Indian media representations of climate change in a threatened journalistic ecosystem. *Climatic Change*, (99), 17–25. DOI: 10.1007/s10584-010-9807-8
- Boykoff, M. T. (2013). Public enemy No. 1? Understanding media representations of outlier views on climate change. *American Behavioral Scientist*, 57(6), 796–817, DOI: 10.1177/0002764213476846
- Boykoff, M. T. & Boykoff, J. (2004). Balance as bias: Global warming and the US prestige press. *Global Environmental Change*, 14(2), 125–136
- Boykoff, M. T. & Nacu-Schmidt, A. (2013). Media coverage of climate change/global warming. Retrieved from [http://sciencepolicy.colorado.edu/media\\_coverage/index.html](http://sciencepolicy.colorado.edu/media_coverage/index.html)
- Boykoff, M. T., & Smith, J. (2010). Media presentations of climate change. In C. Lever-Tracy (Ed.), *Routledge handbook of climate change and society* (pp. 210–218). New York: Routledge
- Breckenridge, J. N. (2000). Validating cluster analysis: Consistent replication and symmetry. *Multivariate Behavioral Research*, 35, 261–285
- Clark, D. (2011, 21. April). Which nations are most responsible for climate change? *Guardian*, Retrieved from <http://www.theguardian.com/environment/2011/apr/21/countries-responsible-climate-change>
- Commission of the European Communities. (2011). *Special Eurobarometer 372*. Retrieved from [http://ec.europa.eu/public\\_opinion/index\\_en.htm](http://ec.europa.eu/public_opinion/index_en.htm)
- Commission of the European Communities. (2013). *Eurobarometer 79*. Retrieved from [http://ec.europa.eu/public\\_opinion/archives/eb/eb79/eb79\\_en.htm](http://ec.europa.eu/public_opinion/archives/eb/eb79/eb79_en.htm)
- Crouse, T. (1973). *The boys on the bus*. New York: Random House

- Detjen, J., Fico, F., Li, X., & Kim, Y. (2000). Changing work environment of environmental reporters. *Newspaper Research Journal*, 21(1), 2–11
- Dunlap, R. E., & McCright, A. M. (2011). Organized climate change denial. In J. S. Dryzek, R. B. Norgaard, & D. Schlosberg (Eds.), *Oxford handbook of climate change and society* (pp. 144–160). Oxford: Oxford University Press
- Dunwoody, S. (1980). The science writing inner club: A communication link between science and the lay public. *Science, Technology, & Human Values*, 5(30), 14–22. DOI: 10.2307/689304
- Elsasser, S. W., & Dunlap, R. E. (2013). Leading voices in the denier choir: Conservative columnists' dismissal of global warming and denigration of climate science. *American Behavioral Scientist*, 57(6), 754–776. DOI: 10.1177/0002764212469800
- Engels, A., Hüther, O., Schäfer, M., & Held, H. (2013). Public climate-change skepticism, energy preferences and political participation. *Global Environmental Change*. DOI: 10.1016/j.gloenvcha.2013.05.008
- Fahy, D., & Nisbet, M. C. (2011). The science journalist online: Shifting roles and emerging practices. *Journalism*, 12(7), 778–793. DOI: 10.1177/1464884911412697
- Giannoulis, C., Botetzagias, I., & Skanavis, C. (2010). Newspaper reporters' priorities and beliefs about environmental journalism: An application of q-methodology. *Science Communication*, 32(4), 425–466
- Grundmann, R., & Scott, M. (2012). Disputed climate science in the media: Do countries matter? *Public Understanding of Science*. DOI: 10.1177/0963662512467732
- Haas, P. M. (1992). Introduction: Epistemic communities and international policy coordination. *International Organization*, 46(1), 1–36
- Hagen, L. M. (1993). Opportune witnesses: An analysis of balance in the selection of sources and arguments in the leading German newspapers' coverage of the census issue. *European Journal of Communication*, 8(3), 317–343. DOI: 10.1177/0267323193008003004
- Hanitzsch, T., Hanusch, F., Mellado, C., Anikina, M., Berganza, R., Cangoz, I.,... (2011). Mapping journalism cultures across nations. *Journalism Studies*, 12(3), 273–293
- Harbinson, R. (2006). *Whatever the weather: Media attitudes to reporting climate change*. London: Panos Institute Report
- Hayes, A. F. (2005). *Statistical methods for communication science*. Mahwah, NJ: Lawrence Erlbaum Associates
- Hoffman, A. J. (2011). The growing climate divide. *Nature Climate Change*, 1, 195–196. Retrieved from <http://www.nature.com/natureclimatechange>
- Ivanova, A., Schäfer, M. S., Schlichting, I., & Schmidt, A. (2013). Is there a medialization of climate science? Results from a survey of German climate scientists. *Science Communication*. DOI: 10.1177/1075547012475226
- Kahan, D. M., Braman, D., Gastil, J., Slovic, P., & Mertz, C. K. (2007). Culture and identity-protective cognition: Explaining the white-male effect in risk perception. *Journal of Empirical Legal Studies*, 4(3), 465–505. DOI:10.1111/j.1740-1461.2007.00097.x

- Keppinger, H. M., Brosius, H.-B., & Staab, J. F. (1991). Instrumental actualization: A theory of mediated conflicts. *European Journal of Communication*, 6(3), 263–290. DOI: 10.1177/0267323191006003002
- Leiserowitz, A. (2007). Communicating the risks of global warming: American risk perceptions, affective images and interpretive communities. In S. C. Moser & L. Dilling (Eds.), *Creating a climate for change: Communicating climate change and facilitating social change* (pp. 44–63). Cambridge: Cambridge University Press
- Leiserowitz, A. A., Maibach, E. W., Roser-Renouf, C., Smith, N., & Dawson, E. (2013). Climategate, public opinion, and the loss of trust. *American Behavioral Scientist*, 57(6), 818–837. DOI: 10.1177/0002764212458272
- Maibach, E. W., Leiserowitz, A., Roser-Renouf, C., & Mertz, C. K. (2011). Identifying Like-Minded Audiences for Global Warming Public Engagement Campaigns: An Audience Segmentation Analysis and Tool Development. *PLoS ONE*, 6(3). doi:10.1371/journal.pone.0017571
- Maibach, E., Leiserowitz, A., Cobb, S., Shank, M., Cobb, K. M., & Gullett, J. (2012). The legacy of climategate: Undermining or revitalizing climate science and policy? *Wiley Interdisciplinary Reviews: Climate Change*, 3(3), 289–295. DOI: 10.1002/wcc.168
- Maillé, M.-È., Saint-Charles, J., & Lucotte, M. (2010). The gap between scientists and journalists: The case of mercury science in Québec's press. *Public Understanding of Science*, 19(1), 70–79. DOI: 10.1177/0963662509102690
- McCluskey, M. (2008). Reporter beat and content differences in environmental stories. *Journalism & Mass Communication Quarterly*, 85(1), 83–98
- Oreskes, N. (2004). Beyond the ivory tower: The Scientific consensus on climate change. *Science*, 306, 1686
- Pan, Z., & Kosicki, G. (2003). Framing as a strategic action in public deliberation. In S. Reese, O. Gandy, & A. Grant (Eds.), *Framing public life* (pp. 35–65). Mahwah, NJ: Lawrence Erlbaum Associates
- Peters, H. P. (2013). Gap between science and media revisited: Scientists as public communicators. *Proceedings of the National Academy of Sciences*, 110(Supplement 3), 14102–14109. DOI: 10.1073/pnas.1212745110
- Peters, H. P., Brossard, D., Cheveigné, S. de, Dunwoody, S., Kalfass, M., Miller, S., & Tsuchida, S. (2008). Science-media interface: It's time to reconsider. *Science Communication*, 30(2), 266–276
- Peters, H. P., & Heinrichs, H. (2005). *Öffentliche Kommunikation über Klimawandel und Sturmflutrisiken: Bedeutungskonstruktion durch Experten, Journalisten und Bürger*. Jülich: Forschungszentrum Jülich
- Poortinga, W., Spence, A., Whitmarsh, L., Capstick, S., & Pidgeon, N. F. (2011). Uncertain climate: An investigation into public scepticism about anthropogenic climate change. *Global Environmental Change*, 21(3), 1015–1024. DOI: 10.1016/j.gloenvcha.2011.03.00
- Przeworski, A., & Teune, H. (1982). *The logic of comparative social inquiry*. Malabar, FL: Krieger

- Rahmstorf, S. (2004). *The climate skeptics: In weather catastrophes and climate change - Is there still hope for us?* Retrieved from <http://www.pik-potsdam.de/~stefan/Publications/>
- Reinemann, C. (2004). Routine reliance revisited: Exploring media importance for German political journalists. *Journalism and Mass Communication Quarterly*, 81(4), 838–856.
- Revkin, A. C. (2006). The daily planet: Why the media stumble over the environment. In D. Blum (Ed.), *A field guide for science writers* (2nd ed., pp. 222–228). Oxford: Oxford University Press
- Russel, C. (2010). Covering controversial science: Improving reporting on science and public policy. In D. Kennedy & G. Overholser (Eds.), *Science and the media* (pp. 13–43). Cambridge, MA: American Academy of Arts & Sciences
- Sachsman, D. B., Simon, J., & Myer Valenti, J. (2006). Regional issues, national norms: A four-region analysis of U.S. environment reporters. *Science Communication*, 28(1), 93–121
- Sachsman, D. B., Simon, J., & Myer Valenti, J. (2010). *Environment reporters in the 21st century*. Piscataway, NJ: Transaction
- Schmidt, A., Ivanova, A., & Schäfer, M. S. (2013). Media attention for climate change around the world: A comparative analysis of newspaper coverage in 27 countries. *Global Environmental Change*, 23(5), 1233–1248. DOI: 10.1016/j.gloenvcha.2013.07.020
- Schneider, J. (2010). Making space for the “nuances of truth”: Communication and uncertainty at an environmental journalists’ workshop. *Science Communication*, 32(2), 171–201
- Sigal, L. V. (1973). *Reporters and officials: The organization and politics of newsmaking*. Lexington, MA: D.C. Heath
- Smith, N. & Leiserowitz, A. (2013). American evangelicals and global warming. *Global Environmental Change*. DOI: 10.1016/j.gloenvcha.2013.04.001
- Stocking, H. S., & Holstein, L. W. (2009). Manufacturing doubt: journalists’ roles and the construction of ignorance in a scientific controversy. *Public Understanding of Science*, 18, 23–42
- Sundblad, E.-L., Biel, A., & Gärling, T. (2009). Knowledge and confidence in knowledge about climate change among experts, journalists, politicians, and laypersons. *Environment and Behavior*, 41(2), 281–302. DOI: 10.1177/0013916508314998
- Weingart, P., Engels, A., & Pansegrau, P. (2000). Risks of communication: Discourses on climate change in science, politics, and the mass media. *Public Understanding of Science*, 9(3), 261–283. DOI: 10.1088/0963-6625/9/3/304
- Wilson, K. M. (2000). Drought, debate, and uncertainty: measuring reporters’ knowledge and ignorance about climate change. *Public Understanding of Science*, 9, 1–13
- Zelizer, B. (1993). Journalists as interpretive communities. *Critical Studies in Mass Communication*, 10(3), 219–237
- Zelizer, B. (2010). Journalists as interpretive communities revisited. In S. Allan (Ed.), *The Routledge companion to journalism and the news* (pp. 181–190). New York: Routledge

## Tables

Table 1: Sampling by Countries and News Outlets

News Outlet	Country					Total
	CH	DE	IN	UK	US	
Upmarket newspaper	NZZ	FAZ	Hindustan Times	Daily Telegraph	WSJ	11
	Tages-Anzeiger	SZ	Indian Express	Guardian	NYT	24
Midmarket newspaper	Blick	BILD	MidDay <sup>d</sup>	The Sun	USA Today	3
Regional newspaper <sup>a</sup>	Berner Zeitung <sup>c</sup>	Berliner Zeitung	The Hindu	Manchester Evening News <sup>c</sup>	LA Times	10
Online player <sup>b</sup>	News.ch	Spiegel Online	Times of India <sup>e</sup>	BBC News	Huffington Post	16
Total	12	18	13	7	14	64

*Note:* <sup>a</sup> The regional newspaper should come from another metropolitan area than the other papers; <sup>b</sup> The online player should have a certain degree of financial and editorial independence from its parent news outlet; <sup>c</sup> Only one author could be identified; <sup>d</sup> No authors could be identified; most other Indian midmarket newspapers are written in Hindi languages and could not be analyzed; <sup>e</sup> Times of India is mainly a quality newspaper but also a relevant online player

Table 2: Sample of Climate Journalists and Comparison to Survey Population

Item	Sample			Survey Population		
	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>
Age	43	10.8	59	N/A		
Published articles <sup>b</sup>	13.9	15.0	64	12.0	12.5	170
Years of experience	8.4	7.6	61	N/A		
	Most frequent category		<i>N</i>	Most frequent category		<i>N</i>
Beat	1. Science	(25 %)	61	1. Environment	(26 %)	170
	2. Environment	(17 %)		2. Science	(24 %)	
	3. General	(9 %)		3. General	(17 %)	
Employment <sup>a</sup>	Full-time	(72 %)	61	N/A		
Gender <sup>a</sup>	Male	(72 %)	64	Male	(71 %)	170
Nationality	1. DE	(28 %)	64	1. US	(29 %)	170
	2. US	(22 %)		2. GB	(22 %)	
	3. IN	(20 %)		3. DE	(21 %)	
	4. CH	(19 %)		4. IN	(18 %)	
	5. GB	(11 %)		5. CH	(11 %)	
Print/online edition <sup>a</sup>	Both	(36 %)	54	N/A		
University degree <sup>a</sup>	MA	(56 %)	64	N/A		

*Note:* <sup>a</sup> For the marked categorical variables the mode is displayed; <sup>b</sup> The number of articles refers to the one-and-a-half-year period of investigation

Table 3: IPCC Affirmation

IPCC Statement	<i>M</i>	<i>SD</i>	<i>N</i>	Min	Max	“Scientifically well-founded” (values $\geq 4$ )
Global warming	4.7	0.9	64	1	5	92 %
Emission reduction	4.5	0.9	64	1	5	88 %
Anthropogenicity	4.5	0.8	64	1	5	88 %
Major problems	4.4	0.8	64	2	5	91 %
IPCC affirmation index	4.5	0.6	64	2.3	5.0	88 %

*Note:* Mean values range from 1 (= scientifically untenable) to 5 (= scientifically well-founded); Cronbach's  $\alpha$  for the four items of the index = .67

Table 4: Skeptics Assessment

Item	<i>M</i>	<i>SD</i>	<i>N</i>	Min	Max	“I agree” (values $\geq 4$ )
Important alternative viewpoints	2.1	1.2	63	1	5	14 %
Scientifically proven	2.0	1.2	62	1	5	15 %

*Note:* Mean values range from 1 (= I do not agree at all) to 5 (= I fully agree)

Table 5: Skeptics Handling

Item	<i>M</i>	<i>SD</i>	<i>N</i>	Min	Max	“I agree” (values $\geq 4$ )
Critical assessment	4.0	1.3	64	1	5	69 %
No exclusion	3.8	1.3	63	1	5	60 %
Equal treatment	2.7	1.5	62	1	5	34 %

*Note:* Mean values range from 1 (= I do not agree at all) to 5 (= I fully agree)

Table 6: Increase of Heterogeneity by Agglomeration of Clusters

Agglomeration Stage	Number of Clusters	Sum of Squared Distances	Change in Sum of Squares ( $\Delta SS$ )
...	...	...	...
54	10	6.8	1.2
55	9	8.2	1.4
56	8	9.7	1.5
57	7	11.4	1.7
58	6	14.4	3.0
59	5	19.3	4.9
60	4	24.6	5.3
61	3	33.0	8.4
62	2	72.1	39.1
63	1	126.0	53.9

*Note:* While agglomerating  $N > 3$  clusters results in small changes of heterogeneity ( $\Delta SS \leq 8.4$ ), merging cluster 2 and 3 increases heterogeneity significantly more ( $\Delta SS = 39.1$ ).

Table 7: Comparison of Climate Journalist Clusters

Item	Climate Journalist Cluster									<i>F</i>
	Affirmative Occasional Writers			Skeptical Occasional Writers			Prolific Writers			
	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>	
<i>Cluster variables</i>										
Number of articles	6.3 <sup>a</sup>	3.7	37	5.8 <sup>a</sup>	6.2	11	37.2 <sup>b</sup>	8.5	16	180.1 <sup>***</sup>
IPCC affirmation index	4.8 <sup>a</sup>	0.3	37	3.5 <sup>b</sup>	0.6	11	4.5 <sup>c</sup>	0.4	16	50.0 <sup>***</sup>
<i>Skeptics assessment</i>										
Scientifically proven	2.2 <sup>a</sup>	1.3	35	2.1 <sup>ab</sup>	1.3	11	1.4 <sup>b</sup>	0.5	16	2.4 <sup>+</sup>
<i>Skeptics handling</i>										
Equal treatment	2.7 <sup>ab</sup>	1.6	36	3.5 <sup>a</sup>	1.4	11	2.1 <sup>b</sup>	1.2	15	2.7 <sup>+</sup>
<i>Journalistic roles</i>										
Analysis/interpretation	4.4 <sup>ab</sup>	1.0	33	3.9 <sup>a</sup>	0.7	10	4.7 <sup>b</sup>	0.6	16	2.7 <sup>+</sup>
Investigation/criticism	4.3 <sup>a</sup>	1.0	33	3.9 <sup>ab</sup>	1.4	10	4.8 <sup>b</sup>	0.4	14	2.7 <sup>+</sup>
<i>Sources</i>										
Scientific sources	4.6 <sup>ab</sup>	0.6	35	4.1 <sup>a</sup>	0.8	10	4.7 <sup>b</sup>	0.7	15	3.1 <sup>+</sup>
<i>Caveat</i>										
Uncertainty	3.2 <sup>a</sup>	1.2	35	3.9 <sup>b</sup>	0.7	11	4.1 <sup>b</sup>	0.9	16	4.8 <sup>**</sup>

*Note:* Mean values range from 1 to 5; marked *F*-values are (or tend to be) statistically significant (<sup>+</sup> $p < .1$ , \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ ); mean values in the same row marked with different letters are (or tend to be) significantly different (Hochberg, Games-Howell,  $p < .1$ )

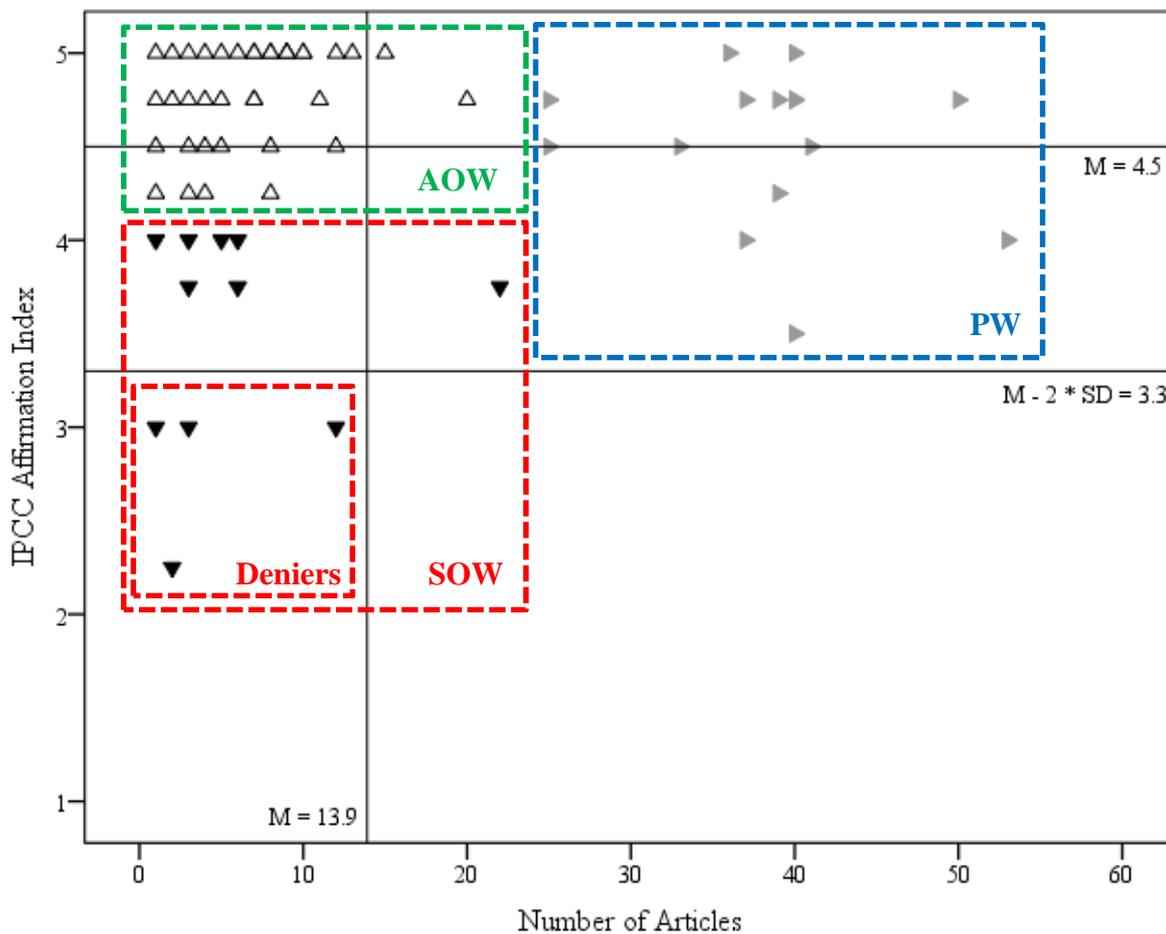
Table 8: Bivariate Correlations to IPCC Affirmation and Equal Treatment of Skeptics

Category	Item	IPCC Affirmation		Equal Treatment of Skeptics	
		<i>r</i>	<i>N</i>	<i>r</i>	<i>N</i>
Demographics	Age	.11	59	-.14	57
	Gender (female)	.06	62	.05	60
Personal attitudes	Ecological awareness	.22 <sup>+</sup>	59	.22 <sup>+</sup>	59
	Political orientation (right-wing)	-.20	51	.38**	51
	Religiousness	-.19	58	.20	57
IPCC affirmation	IPCC affirmation index			-.22 <sup>+</sup>	62
Skeptics assessment	Important alternative viewpoints	-.25 <sup>+</sup>	63	.42**	62
	Scientifically proven	.06	62	.16	61
Journalistic roles	Investigation/criticism	.24 <sup>+</sup>	57	.12	56
	Analysis/interpretation	.30*	59	-.12	58
	Advocacy/partisanship	-.04	59	.10	58
Working profile	Specialization	.17	58	-.29*	56
Sources	Environmentalists	.36**	62	.17	58
	Scientific sources	.29*	60	-.26*	58
	Mass media	.23 <sup>+</sup>	62	.04	58
	Companies	.13	60	.10	58
	Weblogs	.19	59	.15	57

Note: Marked values are (or tend to be) statistically significant (<sup>+</sup> $p < .1$ , \* $p < .05$ , \*\* $p < .01$ )

Figures

Figure 1: Scatter Plot of Climate Journalist Clusters



*Note:* IPCC affirmation index values range from 1 (= scientifically untenable) to 5 (= scientifically well-founded); the number of articles refers to the one-and-a-half-year period of investigation; AOW = Affirmative Occasional Writers; PW = Prolific Writers; SOW = Skeptical Occasional Writers

**Acknowledgements:**

Both authors have contributed equally to this paper. The study is part of the research project “Framing Climate Change (FCC)” directed by Michael Brüggemann at the Institute of Mass Communication and Media Research, University of Zurich.

We wish to thank our research assistants Diego Bühler, Hannah Freese, Laura Schacht, Sandra Haberthür for their help in conducting this study. For supporting us with the survey in India, we would like to thank Sharma Aradhana and Vibodh Parthasarathi at the Centre for Culture, Media, and Governance of the Jamia Millia Islamia, New Delhi. We would also like to thank the editor and reviewers of Science Communication as well as Mike Schäfer for inspiring feedback on prior versions of this article.

**Funding:**

This study is funded by a post-doc credit from the University of Zurich.

**Author biographies:**

Michael Brüggemann (PhD, University of Hamburg, 2007) is Senior Teaching and Research Associate at the Institute of Mass Communication and Media Research, University of Zurich. His research explores the transformations of journalism, political and science communication from a comparative perspective. For more information see URL: [www.bruegge.net](http://www.bruegge.net).

Sven Engesser is Senior Research and Teaching Associate at the Institute of Mass Communication and Media Research at the University of Zurich. He received his PhD from LMU Munich. His research interests include climate communication, journalism, and political communication.