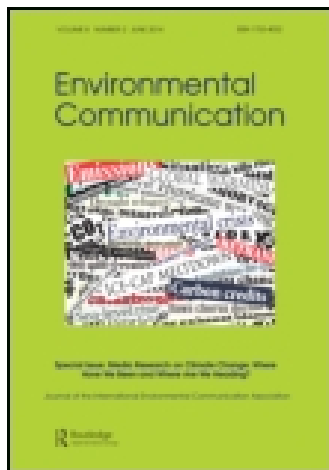


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Publisher: Routledge

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Environmental Communication

Publication details, including instructions for authors and subscription information:

<http://www.tandfonline.com/loi/renc20>

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Published online: 08 May 2014.



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To cite this article: Mike S. Schäfer & Inga Schlichting (2014) Media Representations of Climate Change: A Meta-Analysis of the Research Field, *Environmental Communication*, 8:2, 142-160, DOI: [10.1080/17524032.2014.914050](https://doi.org/10.1080/17524032.2014.914050)

To link to this article: <http://dx.doi.org/10.1080/17524032.2014.914050>

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Media Representations of Climate Change: A Meta-Analysis of the Research Field

Mike S. Schäfer & Inga Schlichting

A flurry of studies in recent years has analyzed the role of media in climate change communication. This article provides a systematic, large-scale, and up-to-date overview of the objects and characteristics of this research field through a meta-analysis. It identifies 133 relevant studies and analyzes them empirically. The results show that research activity has risen strongly over time, and that the analytical spectrum has expanded to include an increasing number of countries, more types of media including online and social media, and different methodological approaches. The analysis also demonstrates, however, that scholarship in the field still concentrates strongly on Western countries and print media.

Keywords: *climate change; media; communication; meta-analysis; science communication; Internet*

Aim and Relevance of a Meta-Analysis

Climate change is an “un-obtrusive” (e.g. Rogers & Dearing, 1988) issue that most people are unable to grasp first-hand. This is due to a number of reasons. First, climate change is usually described on large temporal and spatial scales; the World Meteorological Organization proposes to speak of “climate” only when referring to average weather indicators over at least 30 years (e.g. Claussen, 2003, p. 21), and spatially, “climate” is mostly described for entire continents, hemispheres, or the entire world (e.g. Intergovernmental Panel on Climate Change [IPCC], 2007, p. 11). For most people, such dimensions lie far beyond their lifeworld and biographical horizons.

Mike S. Schäfer is Professor of Science Communication at the Institute of Mass Communication and Media Research, University of Zurich. Inga Schlichting is a Senior Business Analyst in the Corporate Strategy Department of Deutsche Bahn AG, Berlin. Correspondence to: Dr. Mike S. Schäfer, IPMZ—Institute of Mass Communication and Media Research, University of Zurich, Andreasstrasse 15 Zurich 8050, Switzerland. Email: m.schaefer@ipmz.uzh.ch

Second, descriptions of the climate and its changes are primarily produced by science, in a way too complex to understand for many people: a growing number of disciplines participate in climate science, each with their own measures, models, and heuristics (Schützenmeister, 2008). Climate models include increasingly more variables and interrelations between these (e.g. Heffernan, 2010), and even though there seems to be a widely shared consensus within the scientific community about the basic features of anthropogenic climate change (cf. Hoffman, 2011; Oreskes, 2004), dissent and uncertainty can be found in many of the field's more detailed questions (e.g. van der Sluis, 2012).

Third, apart from climate change itself being unobtrusive and complex, the same can be said about many of its (potential) effects and the measures to act upon them: many, and particularly the more severe, consequences of climate change lie in the future and are likely to hit some countries harder than others (cf. DARA Vulnerability Monitor, 2013). The gratifications for action taken are distant and delayed or even absent (Moser, 2010, p. 34). Climate politics is largely a supranational endeavor, taking place at international meetings such as the Conferences of the Parties (COPs) to the United Nations Framework Convention on Climate Change (UNFCCC) process. Furthermore, very different ways of action are advocated by various stakeholders based on rationales and justifications that are also often complex and difficult to understand (e.g. Gupta, 2010).

As a result, climate change and its manifold implications are not directly and easily perceivable. Most people learn about it from the media, which constitute the main source of information about the issue for “lay” people as well as for stakeholders and decision-makers (e.g. Arlt, Hoppe, & Wolling, 2011; Schäfer, 2012a, p. 69ff.; Stamm, Clark, & Eblacas, 2000) and have been described as “important arenas and important agents in the production, reproduction, and transformation of the meaning” of climate change (Carvalho, 2010, p. 172).

The scientific community has long acknowledged the importance of media communication on climate change. Since the early 1990s, many studies have appeared which analyze how media present climate change to various audiences. The number of these studies has risen to a point at which a systematic review of the research field is warranted. While a few introductory articles in the field already exist—such as Susanna Moser's (2010), which includes a history of climate change communication and spans media as well as other kinds of communication, Alison Anderson's (2009) more programmatic paper, formulating a research agenda for further analyses on mediated climate change communication, or Anabela Carvalho's (2010) description of the political aspects of media coverage—an exhaustive and up-to-date overview of the research field, its objects and characteristics is still missing.

Following similar analyses in other fields, such as media coverage of science (Schäfer, 2012c), risk communication (Gurabardhi, Gutteling, & Kuttschreuter, 2004), and public health communication (Snyder & Hamilton, 2002), we will present such an overview by means of an empirical meta-analysis of studies on media portrayals of climate change. We will analyze the quantitative and qualitative development of the

characteristics of the research field in four basic, yet relevant dimensions: we will analyze *when* the respective studies were published, *where* their geographical focus lay (i.e. which countries they focused on), *what* media they analyzed, and *how* these studies were conducted methodologically.

In doing so, we will analyze to what extent we find growth and diversification in the research field. Both are common by-products of the functional differentiation of research fields (e.g. Stichweh, 1994, p. 15ff), but, at the same time, both seem particularly relevant for studies of media portrayals of climate change: a growth of scholarly attention would correspond to the fact that in recent years climate change has become an important issue for the mass media in many countries (cf. Boykoff, 2011; Schäfer, Ivanova, & Schmidt, 2014) and a relevant concern for citizens and decision-makers as well (cf. Lorenzoni & Pidgeon, 2006; Nisbet & Myers, 2007). Furthermore, a diversification in its objects and methodologies seems appropriate for several reasons: as anthropogenic climate change is a global problem, caused by human activity around the world—affecting countries on all continents and being dealt with on a supranational political level with close to 200 countries participating in the UNFCCC process—it would seem relevant and necessary to analyze the media portrayals in a diverse set of countries worldwide, with specific emphasis on the countries that are most responsible for climate change as well as on those most affected by it. In addition, as many different media are used by audience members in today's mediatized world (e.g. McQuail, 2005, p. 455ff), it would seem appropriate to analyze how various media portray climate change, particularly those that are known to be the most important sources for people's information about climate change. And as social sciences, including those focusing on media communication, are multi-paradigmatic and employ different methods that have complementary strengths and weaknesses, a variety of approaches should be used in the research field in order to paint a more detailed picture of media representations of climate change.

Methods

Media are means of communication that distribute content—such as text, pictures, and sound—to an anonymous and spatially diverse public via technical means (cf. McQuail, 2005). This includes printed media such as newspapers, magazines, or books; broadcast media such as radio, television, or film; publicly accessible websites of various media outlets and other societal stakeholder organizations such as political parties, non-governmental organizations (NGOs), or companies, as well as social media.

The meta-analysis at hand aims to include any scholarly publication that presents an original empirical analysis of media representations of climate change. This includes media representations of the science of climate change, media portrayals of the alleged effects of climate change such as extreme weather events (as long as those are, correctly or not, described to be as a result of climate change), as well as fictional representations of the issue. It also includes studies that do not focus solely or primarily on media representations, as long as they analyze them at least to some extent.

In turn, this definition excludes a number of studies and publications. First, it does not include publications that do not offer an original empirical analysis of their own such as reviews of the field, introductory texts, or essays. Second, the meta-analysis does not incorporate studies analyzing media representations of natural phenomena, such as flooding and storms, if these phenomena are not connected to climate change, or studies on environmental reporting in general. Third, the meta-analysis does not incorporate studies focusing on the agenda-building or public relations efforts of stakeholders that try to get into the media, and it also excludes studies analyzing the effects of media representations (if they do not also analyze the nature of media coverage itself). The latter decision was made because media representations are a particularly relevant aspect of climate change communication, as most studies in the field focus on these representations (instead of agenda-building or media effects). Also, these fields use theoretical models and heuristics that differ strongly from one another, which would make comparison and analysis in one coherent framework much more difficult.¹

In order to acquire scholarly publications that present original analyses of media representations of climate change, two sampling strategies were employed.

- On the one hand, we extracted articles from the ISI Web of Knowledge (WoK) database provided by Thompson Reuters (<http://wokinfo.com>). This multidisciplinary database contains full-text articles from some 1700 scientific journals, spanning 50 disciplines as diverse as oceanography, meteorology, physics, anthropology, sociology, and communication sciences. Using WoK for our analysis has several advantages: it includes the leading interdisciplinary journals such as *Nature* and *Science* as well as the most relevant journals of arguably every scientific field, such as the *American Journal of Sociology*, the *Journal of Communication*, and the *American Political Science Review*. Furthermore, it serves as a point of reference for information and orientation for scholars, committees, and funding agencies, and is thus very relevant for the scientific community. Publications from WoK were retrieved using a full-text search amongst all available scientific articles, books, and letters. The search terms operationalized the phenomenon of climate change as well as different kinds of media: we searched for articles mentioning “(climate change) OR (global warming) OR (greenhouse effect)” (following the search terms used in many other studies, such as Boykoff & Boykoff, 2007; Brossard, Shanahan, & McComas, 2004; Grundmann & Scott, 2012; Sampei & Aoyagi-Utsui, 2009) in combination with “media OR press OR news OR Internet OR web OR online OR television OR TV OR radio OR broadcast OR movie OR film OR cinema.” We did not restrict our search to certain dates of publication, languages, or countries of origin. Hence, all texts from 1956 to 2013 were included. Based on this search, we produced a preliminary sample containing 13,768 publications. These were then sorted by “relevance” and manually screened individually. The screening continued until no relevant publications could be found among 100 consecutive search hits, which was the

case after the first 176 hits. The remaining list was then screened randomly to ensure that all relevant publications were acquired.

- On the other hand, we used a complementary second sampling strategy to address some of the shortcomings of the WoK, which does not represent all disciplines equally well and whose coverage of the English language and US- or UK-based journals is better than that of other publications. In order to address this disadvantage,² we systematically screened existing overview publications on climate change communication—such as Anderson (2009), Carvalho (2010), Moser (2010), Neverla and Trümper (2012), and Smith (2005)—including those focusing on specific aspects such as issue attention cycles (Schmidt, Ivanova, & Schäfer, 2013), the role of celebrities (Anderson, 2011), and online communication (Schäfer, 2012b). From these texts, we extracted all relevant publications—books, book sections, and journal articles—that were not already included in WoK.

The combination of these search strategies yielded more than 200 potentially relevant publications. After additional manual relevance checks, a final sample of 133 publications was included in the meta-analysis. One hundred of these are journal articles, 25 are book chapters, and 8 are books; 80 of those were sampled from WoK and 53 stem from review articles. A full list is available as Supplementary Material, accessible via the article webpage.

To ensure the robustness of our sampling, we checked whether both sampling strategies yielded different sample characteristics: we used cross-tabulations and chi-square tests to assess whether the publications sampled from WoK and the review articles differed systematically in any of the dimensions of interest in the following analysis, but no significant differences were found.

Information about these 133 publications was coded using parts of an electronic code-sheet that was pretested and employed in a previous study (Schäfer, 2012c). The code-sheet was adapted for the purpose of this analysis and contained 51 standardized variables (see Table 1 for an overview). It included information about the publication itself (author(s), title, journal, and publication date), its research objects (media types, countries of focus, and periods of analysis), and methodology (cross-sectional, longitudinal, case study, qualitative vs. quantitative, random, or other sampling strategy).

Results

The following section describes the results, i.e. the characteristics and objects of the existing research on media representations of climate change, focusing on the four dimensions introduced above: *when* the respective studies were published, *where* their country focus was, *what* media they analyzed, and *how* they proceeded methodologically.

Table 1. Overview of the coded variables.

Variable name	Var. type	Variable codes
Author names	Text	Last names of all authors
Year of publication	####	Year in which it was published
Title of publication	Text	Title of publication
Place of publication	Text	Name of journal or publishing house
Type of publication	##	“Journal article;” “book section;” “book;” “other”
Number of authors	###	Number of all authors
Country of author’s home institution (coded separately for each author; maximum number of coded countries was 6)	##	45 different country codes + “other”
How many kinds of media were analyzed in the representations of climate change?	##	Number of different media types + “not clear”
Which media were analyzed in the representations of climate change? (coded separately for each mass media type; maximum number of coded mass media was 5).	##	18 different media type codes + “other mass media” + “not clear”
How many countries were analyzed in the representations of climate change?	###	Number of different countries + “not clear”
Which countries were analyzed in the representations of climate change? (coded separately for each country; maximum number of coded countries being 21)	##	31 different country and continent codes + “not clear”
Representations of climate change over what time span were analyzed?	#	“Up to 1 week;” “up to 1 month;” “up to 1 year;” “up to 3 years;” “up to 5 years;” “up to 10 years;” “more than 10 years” + “not clear.”
First year of the coded study’s sampling period.	####	Year + “not clear”
Final year of the coded study’s sampling period.	####	Year + “not clear”
Sampling strategy used in coded study.	#	“Random sampling” (probability based sampling strategy); “deliberate sampling” (purposive, non-probability based sampling strategy); “other sampling” + “not clear.”
Methodology used in coded study.	#	“(Predominantly) quantitative” (usually large (<i>r</i>) samples, emphasis on numeric data, statistical analysis such as univariate tables, cross-tabulations, multivariate regression analysis); “(predominantly) qualitative” (usually small(er) samples, emphasis on textual data, interpretative analysis using hermeneutic, discourse analytical and other analyses); “equally quantitative/qualitative” + “not clear.”
Research design of coded study.	#	“Case study” (focus on describing/explaining one case in depth); “Comparative study” (focus on comparing different countries or issues); “Longitudinal study” (focus on analyzing developments over time); “Longitudinal comparative study” + “other” + “not clear.”

When were the studies published?

A look at the quantitative development of the research field indicates a clear growth: there has been a strong rise in scholarly attention for media coverage of climate change over the last few decades (Figure 1). Research activity started in the early 1990s. With up to five studies published per annum, it remained at a moderate level until the mid-2000s. From 2008 onwards, however, annual publication numbers rose considerably: 10 studies were published in 2008, 31 in 2009, 19 in 2010, and 20 in 2011.

Clear growth is also visible when we look beyond the years of publication, at the years from which media portrayals of climate change were analyzed. While a small number of studies focus on media coverage from as early as the 1960s (such as Djerf-Pierre, 2012 or Liu, Lindquist, & Vedlitz, 2011), scholarly interest in the following years and decades was more extensive and rose continuously. A first peak year occurred in 1987, when the so-called “Brundtland Report” was published by the United Nations World Commission on Environment and Development, headed by Gro Harlem Brundtland. Scholarly attention rose further for the years around 1992, when the UN’s first “Earth Summit” took place in Rio de Janeiro, where climate change was debated as an international political issue for the first time and where, among other results, the UNFCCC was first opened for signature. Out of the 133

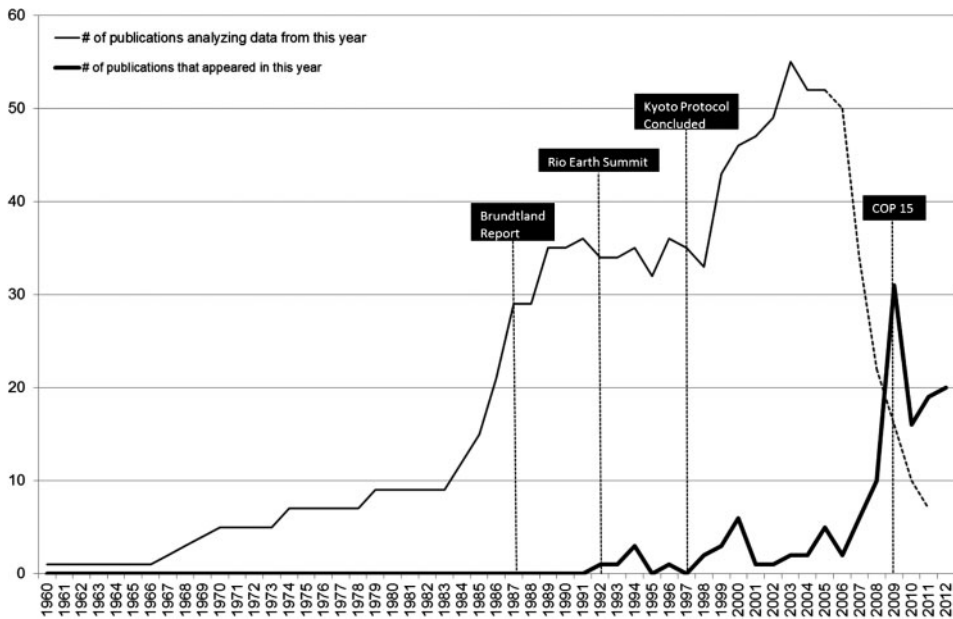


Figure 1. When were the studies published? (Number of relevant articles published in a given year and number of relevant articles analyzing media data from a given year, $n = 133$). Note: As scientific analyses and their publication take a certain time, the number of publications analyzing data from 2008 onwards cannot yet be determined. Therefore, the respective graph is dotted for recent years.

studies included in our meta-analysis, 27% (36) analyze media coverage from this year. The following years, during the mid- and late 1990s, were analyzed by approximately the same number of studies. Research attention for media coverage in the 2000s rose again, with a (preliminary) peak in 2004, a year which has been analyzed by 41% (55) of the studies included in our sample. Research interest has remained on a high level ever since, with a considerable number of studies analyzing the years in which the Stern Review (2006) was released, when Al Gore published his documentary “An Inconvenient Truth” and subsequently won the Nobel Peace Prize together with the Intergovernmental Panel on Climate Change (IPCC, 2007), or in which the COP 15 conference was held in Copenhagen (2009).

Which countries have been analyzed?

When looking at the geographical origin of the media analyzed in the studies about media coverage on climate change, a first finding is connected to the overall rise in the number of studies: scholarly attention to media from all continents has risen over time. Between 1957 and 1989, North American countries were analyzed in 30 studies, whereas they were present in 56 studies after 1990. The growth rate was even higher in European (from 25 until 1989 up to 97), Asian (from 4 up to 37), Oceanian (from 7 up to 24), African (from 1 up to 11), and Latin American (from 0 up to 12) countries.

A look at the relative proportions of the continents and the individual countries within the research field (Table 2) demonstrates, however, that the different regions are not taken up equally often.

Overall, European countries received the largest share of scholarly attention, which slightly increased over time. In the early decades, 37.3% of the analyzed countries were European, and in the 2000s this proportion grew to almost 41%. Amongst these countries, the UK clearly dominated (as it was taken up in studies such as Boykoff, 2008; Carvalho & Burgess, 2005; Jeffries, 2012) and increased its share of all studies. A growing trend can also be found for Sweden (e.g. Berglez, Højjer, & Olausson, 2010; Olausson, 2009, 2010), whereas German and French media received less attention over time.

North American countries—Canada, Mexico, and the USA—account for the second largest share of analyses overall. But it is notable that over time, research attention has shifted away from a previously strong focus on these countries. Their share sank from 44.8% up until the 1980s to 23.6% in the 2000s, mainly due to a large and continuous drop in research attention for the USA (which fell from 29.9% to 15.6%) and Canadian media coverage (from 13.4% to 6.3%).

In contrast, the number of analyses of Asian countries' media coverage of climate change—which account for 14.2% of all studies—has risen sharply over time. While Asian countries received only a small amount of research interest in the early decades (6%), their share of the research field has almost tripled, rising to more than 15% during the last decade when more studies on countries like India (e.g. Aram, 2011; Billett, 2010; Boykoff, 2010) or China (Tolan, 2007) appeared.

Table 2. Which countries have been analyzed? (% of analyzed countries).

	All (<i>n</i> = 273)	1957–1989 (<i>n</i> = 67)	1990–1999 (<i>n</i> = 129)	2000–2010 (<i>n</i> = 236)
Europe	39.4	37.3	36.2	40.9
UK	16.1	14.9	10.8	16.0
Germany	4.0	6.0	5.4	3.4
France	3.6	4.5	4.6	3.8
Sweden	2.9	1.5	1.5	3.4
Russia	2.2	1.5	3.1	2.5
Others	10.6	9.0	10.8	11.8
North America	28.1	44.8	34.6	23.6
USA	19.3	29.9	23.8	15.6
Canada	6.9	13.4	8.5	6.3
Mexico	1.8	1.5	2.3	1.7
Asia	14.2	6.0	13.8	15.6
India	3.3	0.0	2.3	3.4
Middle East	2.6	1.5	2.3	3.0
China	2.2	0.0	2.3	2.5
Japan	1.8	3.0	3.1	1.7
Others	4.4	1.5	3.8	5.1
Oceania	9.9	10.4	9.2	10.1
Australia	5.8	6.0	6.9	6.3
New Zealand	2.9	4.5	1.5	2.5
Others	1.1	0.0	0.8	1.3
Latin America	4.4	0.0	1.5	5.1
Brazil	1.5	0.0	0.8	1.7
Argentina	1.1	0.0	0.8	1.3
Others	1.8	0.0	0.0	2.1
Africa	4.0	1.5	4.6	4.6
South Africa	2.2	1.5	2.3	2.5
Others	1.8	0.0	2.3	2.1
No. of countries per study	2.2	2.1	2.7	2.4

Note: As one publication often analyzes more than one country, we coded multiple response sets. Therefore, the total number of coded countries (*n* = 274) exceeds the number of analyzed publications (133). The overall percentage reported under “all” may exceed the respective percentages within the individual time periods, as the corresponding time of analysis for some studies could not be determined.

Scholarly interest in Oceanian countries received a moderate yet stable amount of attention over time, with Australia (6%), New Zealand (3%), and other countries accounting for about 10% of all countries selected for analyses. Also, while interest in Latin American and African countries is relatively small over the entire period of our meta-analysis, with only about 5% of all analyzed countries belonging to these continents, their share of the research field rose in the latter decades.³

Which media have been analyzed?

Probably the most striking finding of our meta-analysis is that more than two-thirds of all analyzed media (67.5%) are print media (Table 3), even though their proportion decreases over time. The share of print media was extraordinarily high in the early decades until the 1990s, when they accounted for more than 80% of all analyzed

Table 3. Which media have been analyzed? (% of analyzed media).

	All (<i>n</i> = 199)	1957–1989 (<i>n</i> = 30)	1990–1999 (<i>n</i> = 66)	2000–2010 (<i>n</i> = 155)
Print media	67.5	85.1	83.5	66.9
National newspaper	41.0	53.2	52.2	41.6
Regional newspaper	12.0	6.4	14.9	13.4
Magazines	7.5	17.0	11.9	5.1
Print other	6.0	6.4	3.0	6.4
Newswire	1.0	2.1	1.5	0.6
TV and Radio	15.5	14.9	10.4	16.6
TV News	8.5	12.8	10.4	8.3
TV Other	3.5	2.1	0	3.8
Radio	2.0	0	0	2.5
Film/documentary	1.5	0	0	1.9
Internet	17.0	0	6.0	16.0
Media websites	5.0	0	0	6.4
Social media	4.0	0	0	4.5
Search engines	3.0	0	1.5	3.2
Websites of NGOs	3.0	0	4.5	1.3
No. of media per study	1.6	1.6	1.4	1.5

Note: As one publication often analyzes more than one medium, we coded multiple response sets. Therefore, the total number of coded mass media (*n* = 200) exceeds the number of analyzed publications. The overall percentage reported under “all” may exceed the respective percentages within the individual time periods, as the corresponding time of analysis for some studies could not be determined.

media, but shrank in the 2000s. Even then, however, print media still accounted for two-thirds of all analyzed media.

During all decades, this dominance of print media analyses is mostly due to a strong focus of scholars on national quality broadsheets like *The New York Times* (USA), *The Guardian* (UK), the *Neue Zürcher Zeitung* (Switzerland), or the *Frankfurter Allgemeine Zeitung* (Germany); e.g. in studies like Ahchong & Dodds, 2012; Carvalho & Burgess, 2005; Dotson, Jacobson, Kaid, & Carlton, 2012. They are, by far, the most commonly analyzed type of media, accounting for more than 40% of all analyzed cases. Over time, however, their share decreases. The same is true for news magazines such as *The Economist* (UK), *Newsweek* (USA), or *Der Spiegel* (Germany), which were rather intensively researched until the late 1980s (e.g. by Ungar, 1992), but have not gained as much research interest since. In contrast, regional newspapers have increased in importance (e.g. Brown, Budd, Bell, & Rendell, 2011; Liu, Vedlitz, & Alston, 2008; Peters & Heinrichs, 2005). While they only account for 6.4% of all analyzed media until the late 1980s, their share rose to 14.9% in the 1990s and 13.4% during the 2000s.

In contrast to the strong and enduring focus on print media, only 15% of all analyzed media over all the decades were broadcasting media, such as TV and radio. Even though it is the most often analyzed one amongst the broadcast media, TV is still clearly subordinate to print media in the research field. Also, over time no clear rise in research on TV representations of climate change can be found.

Due to their late emergence in the media landscape, online media only started to attract research attention in the 1990s (for an overview see Schäfer, 2012b), during

which a small number of studies analyzed online sources—mainly the websites of NGOs, political, corporate, and scientific actors (6%; e.g. Rogers & Marres, 2000). Since then, research interest in online portrayals of climate change grew fast and strong: during the last decade more than 16% of all analyzed media were online media. Within this group, analyses of news media websites (mostly those of broadsheet newspapers) are the most common (6.4%; e.g. Carneiro & Toniolo, 2012; Holliman, 2011; Wardekker, Petersen, & van der Sluijs, 2009), with studies on climate change communication in social media and Web 2.0 formats such as blogs, discussion forums, and video platforms like YouTube being second (4.5%; e.g. Boykoff, 2011; Koteyko, 2010; Tereick, 2011).

Which methods and research designs were used?

When analyzing media portrayals of climate change in the outlined countries and media, scholars have used different methods and research designs. Our analysis shows that both quantitative and qualitative approaches are represented equally strong in the literature, and that their share amongst studies remained roughly constant over time (Table 4). Approximately half of the publications use quantitative methods (47.8%), whereas 44.8% adopt a qualitative approach. And while only 7.1% of all publications combine both research strategies in the same study, the respective trend points upward.

With regard to research design, we distinguished case studies (which typically focus on coverage in one national context and within a given, mostly short period of time and do not compare findings over time or with other country cases), longitudinal studies (which analyze the temporal development of media coverage over time), cross-sectional studies (which compare different countries and/or different media types), as well as publications that combine both cross-sectional and longitudinal elements.

Table 4. Which methods and research designs have been applied? (% of analyzed studies).

	All (<i>n</i> = 133)	1957–1989 (<i>n</i> = 32)	1990–1999 (<i>n</i> = 50)	2000–2010 (<i>n</i> = 105)
<i>Method</i>				
Predominantly quantitative	47.8	46.9	54.0	49.5
Predominantly qualitative	44.8	50.0	40.0	41.0
Balance of quantitative and qualitative	7.5	3.1	6.0	9.5
<i>Design</i>				
Case study	39.6	31.3	22.0	37.1
Longitudinal study	23.9	9.4	6.0	23.8
Comparative study	20.9	40.6	46.0	24.8
Comparative and longitudinal study	10.4	18.8	20.0	11.4
Other	5.2	0.0	6.0	2.9

Note: The overall percentage reported under “all” may exceed the respective percentages with in the individual time periods as the corresponding time of analysis for some studies could not be determined.

Among these, case studies represent the largest group. Almost 40% of all studies use such a design and this figure even increases over time. Longitudinal studies account for almost 24% and are slightly more common than cross-sectional studies (20.9%).

While the share of case studies remained constant over the decades (with a slight dent in the 1990s), longitudinal studies gained in relevance starting with 9.5% in the early decades and reaching a share of almost one quarter (23.8%) in the 2000s. Cross-sectional comparisons in turn significantly decreased, starting with more than 40% and only accounting for 24.8% in the 2000s. The same is true for combined longitudinal/comparative studies, which made up about one-fifth of all articles in the early decades and the 1990s, but only account for 11.4% of the sample in the 2000s.

Discussion and Conclusion

Media representations of climate change are the main source of information for many individuals—“ordinary” citizens and decision-makers alike. Accordingly, a large number of studies in recent years have analyzed how climate change is portrayed in the media. The meta-analysis at hand has provided a synopsis of the development and the characteristics of this research field. It identified 133 relevant studies, analyzed when they were published, what countries and media they analyzed, and what methodological approaches and research designs they employed. In doing so, the analysis made it possible to assess the growth and diversification of the field.

It demonstrated, first of all, a *clear growth* in research attention for media representations of climate change. Increasingly, more studies were published in recent years, particularly since the mid-2000s. Furthermore, media coverage from recent years has received much more scholarly attention compared to earlier media portrayals. This clear, and in both dimensions largely continuous, growth of scholarly attention mirrors the growing amount of media attention that climate change receives worldwide (Schmidt et al., 2013) and corresponds to the fact that the issue has become an important issue for citizens (Nisbet & Myers, 2007) and decision-makers (Gupta, 2010).

Apart from the growth of the field, the meta-analysis focused on the characteristics and objects of the respective research. It showed some signs of an ongoing diversification of the field, but also a number of consistent and—depending on the observer’s normative standpoint—potentially problematic points of emphasis.

With regard to the *geographical focus of the studies*, i.e. the countries and continents that were analyzed, our analysis showed that scholarly attention for media representations from all continents has expanded. The different continents, however, are not analyzed equally often: European countries receive most research attention and their share has increased over time. North American countries account for the second most analyses, but their share shrank in recent years. In contrast, research interest in Asian, Latin American and African countries’ media coverage of climate change has increased considerably. Therefore, a trend toward more geographical diversification in the objects of study is visible in the research landscape—and as

climate change is a global problem that is currently being tackled largely in an international political framework, such a trend can be seen as generally necessary and welcome. After all, studies have shown that countries around the globe differ in the amount of coverage they devote to climate change (Schmidt et al., 2013), in the degree of controversy about the science underlying it (Painter & Ashe, 2012), and in the frames used to interpret it; with some non-Western countries like India exhibiting unique interpretations from a (post)colonial perspective (Billett, 2010). Against this backdrop, more diverse scholarly research may help to properly grasp the varying understandings of, and perspectives on, climate change that exist around the globe and to feed them into political decision-making.

In turn, however, it is notable that research interest in media portrayals from the “global south” only grows at a low level and in the case of Latin America and Africa a very low level. Until now, most studies have focused on developed Western countries, and despite the trend toward diversification, the research field is still rather one-sided. While many studies focus on countries that are (or were) responsible for climate change, only few studies focus on the countries that are most vulnerable to, or most affected by, the negative effects of climate change. Table 5 demonstrates that the majority of studies focus on the 10 strongest CO₂ emitting countries (which account for more than 56% of all selected countries) or on the 38 Annex-B countries of the Kyoto Protocol (which are obliged to reduce greenhouse gas emissions and account for over 78%), respectively. In stark contrast, vulnerable countries are hardly represented at all. The 31 countries “acutely” threatened by climate change according to DARA’s Climate Vulnerability Index (2013) make up only 5.2% of all analyzed

Table 5. What types of countries have been analyzed?

	%
<i>Responsibility</i>	
Ten countries with the largest total CO ₂ emissions (in order from highest to lowest: China, USA, India, Russia, Japan, Germany, Canada, Iran, UK, and South Korea; according to United Nations Statistics Division (2013)).	56.2
All 38 Annex-B countries to the Kyoto protocol (in alphabetical order: Australia, Austria, Belgium, Bulgaria, Canada, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Italy, Ireland, Japan, Latvia, Liechtenstein, Lithuania, Luxemburg, Monaco, Netherlands, New Zealand, Norway, Poland, Portugal, Romania, Russia, Slovakia, Slovenia, Spain, Sweden, Switzerland, UK, Ukraine, and USA; according to United Nations Framework Convention on Climate Change [UNFCCC] (2013)).	78.8
<i>Vulnerability</i>	
All 31 countries acutely threatened by climate change (in alphabetical order: Afghanistan, Armenia, Bolivia, Bosnia and Herzegovina, Cambodia, China, Croatia, Cuba, El Salvador, Gambia, Georgia, Greece, Guyana, Hungary, Iran, Lithuania, Mauritius, Moldova, Morocco, Mozambique, Namibia, Nicaragua, Peru, Portugal, Romania, South Africa, Spain, Tajikistan, Uruguay, Vietnam, and Zimbabwe; according to DARA Vulnerability Monitor (2013)).	5.2
Ten countries most affected by negative impacts of climate change between 1992 and 2011 (in order of risk from highest to lowest: Honduras, Myanmar, Nicaragua, Bangladesh, Haiti, Vietnam, DPR Korea, Pakistan, Thailand, and Dominican Republic; according to Climate Risk Index, see Harmeling and Eckstein (2013, p. 6)).	0.0

countries, and the 10 countries most affected by negative impacts of climate change between 1992 and 2011, according to the Climate Risk Index provided by Germanwatch and insurance company Munich Re (Harmeling & Eckstein, 2013), have not been analyzed at all. Analyses of these countries would make a very worthwhile and necessary contribution to the field.

With regard to another dimension, the *type of media* that are analyzed in the field, the meta-analysis revealed a clear emphasis among existing studies: More than two-thirds of all analyzed media are print media, mostly due to a strong focus on national quality newspapers. In contrast, only 15% of all analyzed media were broadcasting media such as TV and radio, with no increasing trend over time. Online media, however, which only came into scholars' view in the 1990s, have quickly risen and already overtaken the share of broadcasting media.

Overall, the diversification of research in this dimension is less pronounced than the geographical diversification. This is problematic for two reasons: first, audience members nowadays often use a repertoire of various media to inform themselves about issues. Second, recent studies have shown that audiences in the USA (Synovate, 2009), Germany (Arlt et al., 2011; Schäfer, 2012a, p. 69ff) and India (Leiserowitz & Thaker, 2012) use television as their main source of information about climate change, and that they also trust TV coverage more than those from other media (Schäfer, 2012a; Synovate, 2009). Against this backdrop, the research field's strong and persistent (albeit somewhat shrinking) focus on print media misses out on the most relevant source of people's information about climate change.

Methodological aspects of the research field represented our final analytical dimension. We could demonstrate that the studies in our sample use different and varied methods. Both quantitative and qualitative approaches are represented equally often, and even though only a small (but rising) share of studies combines both approaches in the same project, the research field as a whole seems diversified and balanced. This is also true for the research designs that are chosen—although case studies on individual countries are the most commonly used approach, other designs such as longitudinal studies, cross-sectional comparisons, or combined longitudinal/comparative studies are also quite strongly represented. We see these results as a positive: as most social sciences—and certainly those that are concerned with media analyses—are multi-paradigmatic disciplines, such a balance between the different paradigms and approaches should be welcome as it helps to balance out the complementary strengths and weaknesses of different approaches.

We think that these results are interesting in their own right, from an academic standpoint, because they show the growth and diversification of a fairly young research field that navigates between different disciplines, analyzing an object that is globally relevant. It would certainly be interesting to repeat this kind of analysis in several years in order to continually map the development of this dynamic research field. Such future analyses should also strive to overcome the limitations of the study at hand: even though we covered a large amount of studies and have included the most relevant peer-reviewed journals of the field, our sampling strategy has certainly

missed a number of publications. Further meta-analyses might also try to go beyond our basic dimensions and try to describe other facets of the research field, such as their theoretical foundations, their analytical dimensions, or their results—and the development of these features over time.

In addition to academia, we also think that a number of normative, science-political consequences may and should be derived from this meta-analysis.

First, we think that researchers should draw a number of conclusions from our findings. For the reasons outlined above, we think that a stronger diversification of current research in terms of the countries and media analyzed is needed. Therefore, research on these neglected cases should be encouraged. Even though analysis of print media coverage is relatively easy to do given the availability of large databases like LexisNexis, Factiva, ProQuest, or PressDisplay, and also given that moving images and other more complex content is largely absent from their coverage, researchers should make conscious efforts to provide more studies of TV coverage or film, radio, and online media. In doing so, they could make more use of existing but probably lesser-known databases for these media such as the Vanderbilt Television News Archive (<http://tvnews.vanderbilt.edu>), the Internet Movie Database (<http://imdb.org>), or the Internet Archive (<http://archive.org>). We also hope that our findings encourage researchers from countries that are most vulnerable to climate change and its effects to offer more research on their own national situations in order to broaden the knowledge base of the field. Furthermore, researchers from Western countries, which often have more resources at their disposal, should make a conscious effort to collaborate with colleagues from other countries, and/or to pick cases for their analyses that have been neglected so far. Moreover, they might consider making common, best-practice codebooks, and methods available in open-access formats in order to enable more colleagues to analyze and, subsequently, compare media representations of climate change around the world.

In our view, such endeavors would not just come with additional efforts, nor would they “only” be a scientific equivalent for developmental aid. After all, studies on under-researched cases, i.e. on lesser known media or countries, should have a better chance to provide new insights for the field and, therefore, to merit publication in high-ranking journals.

Secondly, we believe that programs and initiatives for the funding of science should be aware of, and respond to, our findings and provide funding with an eye on improving our knowledge about these neglected cases in particular. While this also applies to funding from national agencies, it seems particularly relevant for transnational institutions such as the European Union or the UN. Research on lesser-known cases may broaden their knowledge about the characteristics and particularities of media representations about climate change. This may then help them to assess the communication about, and acceptance of, their politics in other parts of the world, and to then feed this knowledge back into the policy-making process.

Acknowledgments

The research presented in this paper was funded by the German Science Foundation (DFG) through the German Federal Cluster of Excellence “Climate System Prediction and Analysis” (EXC 177). The authors would like to thank Corinna Ballweg and Lea Borgmann for their invaluable help with data acquisition and coding the analyzed publications, Carola Kauhs from the University of Hamburg’s ZMAW library for her support, Andreas Schmidt for comments on an earlier version of the manuscript, Rajiv Saunders for proofreading the manuscript, and the editors and anonymous reviewers for their helpful suggestions.

Notes

1. For example, an analysis of the countries that were analyzed in a given set of studies (as it is presented later) cannot be applied to studies on media effects, as many of them assume that media effects transcend national boundaries.
2. An alternative sampling strategy would have been to employ a broader set of databases, for example, for scientific literature in Spanish (using databases like www.latindex.org or <http://bddoc.csic.es:8080>) or in French (in databases such as like www.openaire.eu/fr or www.rechercheidore.fr). While this would have partially negated the ISI WoK’s over-representation of English language publications, it would have also caused new problems because each database differs in scope and relevance of the publications it covers. Therefore, we decided against using these databases.
3. These results are mostly mirrored when looking at the institutions with which the publications’ authors are affiliated: more than 36% come from North American universities, 28% from the USA, and scholars working in the UK make up 27% of all authors. In contrast, hardly any scholars in the sample are affiliated with Latin American or African institutions.

References

- Ahchong, K., & Dodds, R. (2012). Anthropogenic climate change coverage in two Canadian newspapers, the Toronto Star and the Globe and Mail, from 1988 to 2007. *Environmental Science & Policy*, 15(1), 48–59. doi:10.1016/j.envsci.2011.09.008
- Anderson, A. (2009). Media, politics and climate change: Towards a new research agenda. *Sociology Compass*, 3, 166–182. doi:10.1111/j.1751-9020.2008.00188.x
- Anderson, A. (2011). Sources, media, and modes of climate change communication: The role of celebrities. *WIREs Climate Change*, 2, 535–546. doi:10.1002/wcc.119
- Aram, I. A. (2011). Indian media coverage of climate change. *Current Science*, 100, 1477–1478.
- Arlt, D., Hoppe, I., & Wolling, J. (2011). Climate change and media usage: Effects on problem awareness and behavioural intentions. *International Communication Gazette*, 73(1–2), 45–63. doi:10.1177/1748048510386741
- Berglez, P., Höjjer, B., & Olausson, U. (2010). Individualization and nationalization of the climate change issue: Two ideological horizons in Swedish news media. In T. Boyce & J. Lewis (Eds.), *Climate change and the media* (pp. 211–224). Oxford: Peter Lang.
- Billett, S. (2010). Dividing climate change: Global warming in the Indian mass media. *Climatic Change*, 99(1–2), 1–16. doi:10.1007/s10584-009-9605-3
- Boykoff, M. (2010). Indian media representations of climate change in a threatened journalistic ecosystem. *Climatic Change*, 99(1–2), 17–25. doi:10.1007/s10584-010-9807-8
- Boykoff, M. T. (2008). The cultural politics of climate change discourse in UK tabloids. *Political Geography*, 27, 549–569. doi:10.1016/j.polgeo.2008.05.002
- Boykoff, M. T. (2011). *Who speaks for the climate? Making sense of media reporting on climate change*. Cambridge: Cambridge University Press.

- Boykoff, M. T., & Boykoff, J. M. (2007). Climate change and journalistic norms: A case-study of US mass-media coverage. *Geoforum*, 38, 1190–1204. doi:10.1016/j.geoforum.2007.01.008
- Brossard, D., Shanahan, J., & McComas, K. (2004). Are issue-cycles culturally constructed? A comparison of French and American coverage of global climate change. *Mass Communication & Society*, 7, 359–377. doi:10.1207/s15327825mcs0703_6
- Brown, T., Budd, L., Bell, M., & Rendell, H. (2011). The local impact of global climate change: Reporting on landscape transformation and threatened identity in the English regional newspaper press. *Public Understanding of Science*, 20, 658–673. doi:10.1177/0963662510361416
- Carneiro, C. D. R., & Toniolo, J. C. (2012). “Hot” earth in the mass media: The reliability of news reports on global warming. *Historia Ciências Saude-Manguinhos*, 19, 369–389. doi:10.1590/S0104-59702012000200002
- Carvalho, A. (2010). Media(ted)discourses and climate change: A focus on political subjectivity and (dis)engagement. *WIREs Climate Change*, 1, 172–179. doi:10.1002/wcc.13
- Carvalho, A., & Burgess, J. (2005). Cultural circuits of climate change in UK broadsheet newspapers, 1985–2003. *Risk Analysis*, 25, 1457–1469. doi:10.1111/j.1539-6924.2005.00692.x
- Claussen, M. (2003). Klimaänderungen: Mögliche Ursachen in Vergangenheit und Zukunft [Climatic changes: Potential causes in the past and in the future]. *UWSF – Umweltchem Ökotox*, 15(1), 21–30. doi:10.1065/uwsf2003.02.053
- DARA Vulnerability Monitor. (2013). *Climate vulnerability monitor 2012: The state of the climate crisis*. Retrieved from <http://daraint.org/climate-vulnerability-monitor/climate-vulnerability-monitor-2012>
- Djerf-Pierre, M. (2012). When attention drives attention: Issue dynamics in environmental news reporting over five decades. *European Journal of Communication*, 27, 291–304. doi:10.1177/0267323112450820
- Dotson, D. M., Jacobson, S. K., Kaid, L. L., & Carlton, J. S. (2012). Media coverage of climate change in Chile: A content analysis of conservative and liberal newspapers. *Environmental Communication*, 6(1), 64–81. doi:10.1080/17524032.2011.642078
- Grundmann, R., & Scott, M. (2012). Disputed climate science in the media: Do countries matter? *Public Understanding of Science*, 23, 220–235. doi:10.1177/0963662512467732
- Gupta, J. (2010). A history of international climate change policy. *WIREs Climate Change*, 1, 636–653. doi:10.1002/wcc.67
- Garabardhi, Z., Gutteling, J. M., & Kutttschreuter, M. (2004). The development of risk communication: An empirical analysis of the literature in the field. *Science Communication*, 25, 323–349. doi:10.1177/1075547004265148
- Harmeling, S., & Eckstein, D. (2013). *Global climate risk index 2013. Who suffers most from extreme weather events? Weather-related loss events in 2011 and 1992 to 2011*. Bonn: Germanwatch.
- Heffernan, O. (2010). Earth science: The climate machine. *Nature*, 463, 1014–1016. doi:10.1038/4631014a
- Hoffman, A. J. (2011). Sociology: The growing climate divide. *Nature Climate Change*, 1, 195–196. doi:10.1038/nclimate1144
- Holliman, R. (2011). Advocacy in the tail: Exploring the implications of “climategate” for science journalism and public debate in the digital age. *Journalism*, 12, 832–846. doi:10.1177/1464884911412707
- IPCC (Intergovernmental Panel on Climate Change). (2007). *IPCC fourth assessment report: Climate change 2007*. Geneva: Author.
- Jeffries, L. (2012). Representations of climate change: News and opinion discourse in UK and US quality press: A corpus-assisted discourse study. *Functions of Language*, 19, 302–310. doi:10.1075/fo1.19.2
- Koteyko, N. (2010). Mining the Internet for linguistic and social data: An analysis of “carbon compounds” in web feeds. *Discourse & Society*, 21, 655–674. doi:10.1177/0957926510381220

- Leiserowitz, A., & Thaker, J. (2012). *Climate change in the Indian mind*. New Haven, CT: Yale Project on Climate Change Communication.
- Liu, X., Lindquist, E., & Vedlitz, A. (2011). Explaining media and congressional attention to global climate change, 1969–2005: An empirical test of agenda-setting theory. *Political Research Quarterly*, 64, 405–419. doi:10.1177/1065912909346744
- Liu, X., Vedlitz, A., & Alston, L. (2008). Regional news portrayals of global warming and climate change. *Environmental Science & Policy*, 11, 379–393. doi:10.1016/j.envsci.2008.01.002
- Lorenzoni, I., & Pidgeon, N. F. (2006). Public views on climate change. European and USA perspectives. *Climatic Change*, 77, 73–95. doi:10.1007/s10584-006-9072-z
- McQuail, D. (2005). *McQuail's mass communication theory*. London: Sage.
- Moser, S. C. (2010). Communicating climate change: History, challenges, process and future directions. *WIREs Climate Change*, 1, 31–53. doi:10.1002/wcc.11
- Neverla, I., & Trümper, S. (2012). Journalisten und das Thema Klimawandel [Journalists and the issue of climate change]. In I. Neverla & M. S. Schäfer (Eds.), *Das Medien-Klima. Fragen und Befunde der kommunikationswissenschaftlichen Klimaforschung* [The media climate. Question and results of communication research on climate change] (pp. 95–118). Wiesbaden: Springer VS.
- Nisbet, M., & Myers, T. (2007). The polls-trends. Twenty years of public opinion about global warming. *Public Opinion Quarterly*, 71, 444–470. doi:10.1093/poq/nfm031
- Olausson, U. (2009). Global warming-global responsibility? Media frames of collective action and scientific certainty. *Public Understanding of Science*, 18, 421–436. doi:10.1177/0963662507081242
- Olausson, U. (2010). Towards a European identity? The news media and the case of climate change. *European Journal of Communication*, 25, 138–152. doi:10.1177/0267323110363652
- Oreskes, N. (2004). The scientific consensus on climate change. *Science*, 306, 1686. doi:10.1126/science.1103618
- Painter, J., & Ashe, T. (2012). Cross-national comparison of the presence of climate scepticism in the print media in six countries, 2007–10. *Environmental Research Letters*, 7(4), 1–8. doi:10.1088/1748-9326/7/4/044005
- Peters, H. P., & Heinrichs, H. (2005). *Öffentliche Kommunikation über Klimawandel und Sturmflutrisiken* [Public communication about climate change and flooding risk]. Jülich: Forschungszentrum Jülich.
- Rogers, E., & Dearing, J. (1988). Agenda-setting research: Where has it been, where is it going? *Communication Yearbook*, 11, 555–594.
- Rogers, R., & Marres, N. (2000). Landscaping climate change: A mapping technique for understanding science and technology debates on the World Wide Web. *Public Understanding of Science*, 9, 141–163. doi:10.1088/0963-6625/9/2/304
- Sampei, Y., & Aoyagi-Usui, M. (2009). Mass-media coverage, its influence on public awareness of climate-change issues, and implications for Japan's national campaign to reduce greenhouse gas emissions. *Global Environmental Change-Human and Policy Dimensions*, 19, 203–212. doi:10.1016/j.gloenvcha.2008.10.005
- Schäfer, M. S. (2012a). Hacktivism? Online-medien und social media als Instrumente der Klimakommunikation zivilgesellschaftlicher Akteure [Hacktivism? Online media and social media as instruments of civil society's communication about climate change]. *Forschungs-journal Soziale Bewegungen*, 25(2), 68–77.
- Schäfer, M. S. (2012b). Online communication about climate change and climate politics. A literature review. *WIREs Climate Change*, 3, 527–543. doi:10.1002/wcc.191
- Schäfer, M. S. (2012c). Taking stock: A meta-analysis of studies on the media's coverage of science. *Public Understanding of Science*, 21, 650–663. doi:10.1177/0963662510387559
- Schäfer, M. S., Ivanova, A., & Schmidt, A. (2014). What drives media attention for climate change? *International Communication Gazette*, 76, 152–176. doi:10.1177/1748048513504169

- 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, 1233–1248. Retrieved from <http://www.sciencedirect.com/science/article/pii/S095937801300126X>
- Schützenmeister, F. (2008). *Zwischen Problemorientierung und Disziplin. Ein koevolutionäres Modell der Wissenschaftsentwicklung* [Between problem orientation and discipline. A co-evolutionary model of scientific development]. Bielefeld: Transcript.
- Smith, J. (2005). Dangerous news: Media decision making about climate change risk. *Risk Analysis*, 25, 1471–1482. doi:10.1111/j.1539-6924.2005.00693.x
- Snyder, L. B., & Hamilton, M. A. (2002). A meta-analysis of U.S. health campaign effects on behavior: Emphasize enforcement, exposure and new information, and beware the secular trend. In R. C. Hornik (Ed.), *Public health communication* (pp. 357–384). Mahwah, NJ: Erlbaum.
- Stamm, K. R., Clark, F., & Eblacas, P. R. (2000). Mass communication and public understanding of environmental problems: The case of global warming. *Public Understanding of Science*, 9, 219–237. doi:10.1088/0963-6625/9/3/302
- Stichweh, R. (1994). *Wissenschaft. Universität. Profession* [Science. University. Profession]. Frankfurt: Suhrkamp.
- Synovate. (2009). *Climate change global study 2009*. Frankfurt: Synovate Germany.
- Tereick, J. (2011). YouTube als Diskurs-Plattform. Herausforderungen an die Diskurslinguistik am Beispiel “Klimawandel” [YouTube as a discursive platform. Challenges for discourse linguistics. The case of “Climate Change”]. *Hamburger Hefte zur Medienkultur*, 13, 59–68.
- Tolan, S. (2007). *Coverage of climate change in Chinese media* (Human Development Report Office, Occasional Paper 2007/38). New York: UNDP.
- UNFCCC (United Nations Framework Convention on Climate Change). (2013). *Kyoto Protocol*. Retrieved from http://www.unfccc.int/kyoto_protocol/items/3145.php
- Ungar, S. (1992). The rise and (relative) decline of global warming as a social problem. *The Sociological Quarterly*, 33, 483–501. doi:10.1111/j.1533-8525.1992.tb00139.x
- United Nations Statistics Division. (2013). *Millennium development goals indicators. CO₂ emissions*. Retrieved from <http://mdgs.un.org/unsd/mdg/SeriesDetail.aspx?srid=749&crid=>
- van der Sluis, J. (2012). Uncertainty and dissent in climate risk assessment. A post-normal perspective. *Nature and Culture*, 7, 174–195. doi:10.3167/nc.2012.070204
- Wardekker, J. A., Petersen, A. C., & van der Sluijs, J. P. (2009). Ethics and public perception of climate change: Exploring the Christian voices in the US public debate. *Global Environmental Change*, 19, 512–521. doi:10.1016/j.gloenvcha.2009.07.008