



Climate change in news media across the globe: An automated analysis of issue attention and themes in climate change coverage in 10 countries (2006–2018)

Valerie Hase^{a,*}, Daniela Mahl^a, Mike S. Schäfer^a, Tobias R. Keller^b

^a Department of Communication and Media Research, University of Zurich, Switzerland

^b gfs.bern, Bern, Switzerland

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ABSTRACT

Climate change poses a challenge to countries across the world, with news media being an important source of information on the issue. To understand how and how much news media cover climate change, this study compares coverage in ten countries from the Global North and the Global South between 2006 and 2018 ($N = 71,674$). Based on a panel analysis, we illustrate that news media attention varies across countries and is often associated with political, scientific, and (partly) societal focusing events. Based on an automated content analysis, we also find that news media do not only cover ecological changes or climate science, but that they focus predominantly on the societal dimension of climate change: They emphasize how humans are aware of, affected by, battle, or cause climate change. Overall, the study illustrates important differences between the Global North and the Global South. While countries from the Global North cover climate change more frequently, countries from the Global South focus more on its challenges and implications for society at large, i.e., the societal dimension of climate change.

1. Introduction

Climate change challenges countries across the world. Its primary impacts include changing temperatures, ocean acidification, or detrimental effects on biodiversity (IPCC, 2014). However, climate change also has far-reaching societal implications, including shrinking habitable spaces, economic stress, or health threats (Dryzek and Norgaard, 2011). These adverse consequences are borne disproportionately by less industrialized countries in Africa, Asia, or Latin America (Althor et al., 2016; Bathiany et al., 2018; United Nations Framework Convention on Climate Change, 2007). Despite debates over the term and the classification of respective countries (Koch, 2020; Nguyen and Tran, 2019), less industrialized countries are frequently grouped under the umbrella of the "Global South". In contrast, the "Global North" is assumed to consist of more industrialized nations such as Australia, the UK, or the US.

Despite its implications for society at large, climate change is "difficult to perceive and understand for most lay audiences" (Moser, 2010, p. 36). As a complex and unobtrusive issue, people often encounter it via news media (Newman et al., 2020). By increasing levels of news media attention to climate change, news can thus influence public

concern about climate change (Sampei and Aoyagi-Usui, 2009). Journalists can also portray climate change as a more pervasive issue through the *content of news* – for example, by emphasizing the societal dimension of climate change and illustrating how humans are aware of, affected by, battle, or cause climate change (Painter and Schäfer, 2018; Schäfer, 2015). Focusing on how climate change impacts public health (Nisbet, 2009) or on actions humans can take (Hart and Feldman, 2016) may thereby foster public engagement.

However, countries across the globe differ in how and how much they cover climate change (Grundmann and Scott, 2014; Schmidt et al., 2013; Vu et al., 2019). Schäfer and Painter (2020) argue that these differences are especially prevalent when comparing the Global North and South. However, the latter is often neglected as policies, research, and communication concerning climate change are dominated by the Global North (Blicharska et al., 2017; Schäfer and Schlichting, 2014). Moreover, existing cross-national studies mostly analyze either levels of news media attention or the content of coverage (Barkemeyer et al., 2017; Schäfer et al., 2014; Vu et al., 2019; but see Wozniak et al., 2021) although both are decisive for engaging the public. We aim to fill this gap by asking: *How do countries from the Global North and South compare*

* Corresponding author at: Department of Communication and Media Research, University of Zurich, Andreasstrasse 15, 8050 Zurich, Switzerland.

E-mail address: v.hase@ikmz.uzh.ch (V. Hase).

in terms of news media attention to and themes/dimensions in coverage of climate change?

2. Communication about climate change in the Global North & South

Climate change is a “global crisis” (Cottle, 2009, p. 506) that can only be addressed by a global community. However, it affects countries to very different degrees (Althor et al., 2016; Bathiany et al., 2018). Accordingly, coverage about the issue is characterized both by domestic and global perspectives on what causes climate change, who is affected, or how it can be addressed (Konieczna et al., 2014; Kunelius et al., 2017; Olausson, 2009). Related to discussions about global or domestic perspectives in public debates, studies have analyzed whether and why issue attention or the content of coverage are (dis-)similar across the globe (Barkemeyer et al., 2017; Schmidt et al., 2013; Vu et al., 2019). Wozniak et al. (2021) argue that cross-national similarities in how (much) climate change is covered could indicate the emergence of a public sphere as “an enduring structure that enables political debate and opinion formation for and with a global audience” (p. 689, see further Wessler et al., 2008). While global events such as the Conferences of the Parties (COPs) lead to some convergence in cross-national coverage, studies mostly find differences to persist (Lück et al., 2016; Wessler et al., 2016; Wozniak et al., 2021).

These differences may be due to macro-level aspects such as countries’ political or economic contexts that influence news media coverage (Reese, 2001; Shoemaker and Reese, 1991). For instance, distinct national responsibilities for climate actions, policies, or vulnerabilities may influence attention to and coverage of climate change (Barkemeyer et al., 2017; Schmidt et al., 2013; Vu et al., 2019).

Countries from the Global North and the Global South differ in many of these macro-level aspects (Koch, 2020) and, correspondingly, journalistic cultures (Kalyango et al., 2017; Nassanga et al., 2017; Nguyen and Tran, 2019; Schäfer and Painter, 2020). Journalistic resources are scarce in many countries from the Global South and therefore, scientific issues are covered less. Also, journalists more strongly adhere to what has been called developmental journalism: Journalists from the Global South pay more “attention to reporting policies, agendas, activities, and events that affect the developmental issues and are committed to the improvement of the life of the people” (Chattopadhyay, 2019, no page) than their colleagues in the Global North. In particular, they are interested more in aiding national development and social change and less in acting as detached, adverse observers (Kalyango et al., 2017). These distinct national contexts and related journalistic cultures may influence both: issue attention to and themes/dimensions in coverage of climate change.

2.1. Issue attention to climate change

News media are a central arena for raising awareness about climate change (Carvalho, 2010). According to Schmidt et al. (2013), issue attention as “the amount of attention given to one issue in relation to the amount of attention given to other issues at the same time” is the outcome of issues competing for this limited resource and, thus, an “indicator for social problem construction” (p. 1234). In terms of issue attention, Barkemeyer et al. (2017) argue that “climate change has emerged as a truly global problem that is not merely confined to affluent or well-educated regions of the global North” (p. 1046). While comparative studies including the Global South are scarce, research indicates that attention is still higher in the Global North (Kunelius et al., 2017; Oonk et al., 2021; Schmidt et al., 2013). This may be due to a lack of resources for science and, in particular, climate journalism in the Global South (Nguyen and Tran, 2019; Schäfer and Painter, 2020). Since studies that explicitly compare the Global North and South are largely absent, we ask:

RQ1: How does the level of issue attention towards climate change differ

between countries from the Global North and South?

Studies also indicate that issue attention has increased since the 1990s, especially in the mid-2000s (Schäfer et al., 2014; Schmidt et al., 2013). However, conflicting results have emerged for the development since: While analyses for the US as a country from the Global North illustrate that coverage of climate change has increased in recent years (Bohr, 2020), different or inconsistent trends have been indicated for other countries (Boussalis et al., 2016; Schmidt et al., 2013; Wozniak et al., 2021). We ask:

RQ2: How do countries from the Global North and South differ in their development of issue attention over time?

Bødker and Neverla (2012) argue that “since climate change is often remote in time it somehow needs other concrete events – like extreme weather or summits – to be made the object of journalism” (p. 153). Most importantly, focusing events are associated with peaks in attention (Pralle, 2009). They are “sudden, attention-grabbing events” (Birkland, 1998, p. 53) which direct public attention towards specific issues. For example, unplanned, negative incidents like extreme weather events disrupt the news flow. Moreover, staged events concentrate public attention (Couldry et al., 2010; Katz and Liebes, 2007). COPs or the release of reports by the Intergovernmental Panel on Climate Change (IPCC) invite global “audiences to recognize and acknowledge [...] environmental change” (Cottle, 2009, p. 507). Staged events cannot only be organized “top down” by elites such as politicians, but also “bottom up” by actors associated with civil society such as the Fridays for Future movement (Wozniak et al., 2021).

Based on previous studies (Holt and Barkemeyer, 2012; Sampei and Aoyagi-Usui, 2009; Thorson and Wang, 2020; Wozniak et al., 2021), we argue that political, economic, scientific, and societal focusing events play a role. Political focusing events include COPs, G7/G8 summits, or policy decisions such as the non-ratification of the Kyoto protocol by the US (Bohr, 2020; Grundmann and Scott, 2014; Wozniak et al., 2021). One far-reaching economic focusing event was the publication of the Stern report in October 2006 which stoked concerns about the costs of climate change (Boykoff, 2007; Grundmann and Scott, 2014). Scientific focusing events include the publication of IPCC reports (Schäfer et al., 2014) but also the science-related “Climate Gate” scandal where emails from the Climate Research Unit seemed to suggest that scientists had manipulated data (Leiserowitz et al., 2013). Studies have also considered the role of civil actors and movements related to societal focusing events, including the release of the movie “An inconvenient truth” (Grundmann and Scott, 2014), the Earth Hour, or climate protests (Thorson and Wang, 2020; Wozniak et al., 2021). Celebrity-related events such as the Nobel Prize for Al Gore and the IPCC, the publication of the pope’s “Laudato Si” encyclical, or Leonardo di Caprio’s Academy Award speech are considered similarly important (Anderson, 2011; Leas et al., 2016; Thorson and Wang, 2020). However, studies rarely analyze whether focusing events direct public attention across the globe (but see Schäfer et al., 2014; Wozniak et al., 2021). We ask:

RQ3: Which focusing events are associated with peaks in issue attention across countries from the Global North and South?

2.2. Themes & dimensions in coverage of climate change

Apart from the amount of coverage, its content also matters for mobilizing collective action in terms of climate change (Nisbet, 2009). Thus, studies have identified and analyzed the spectrum of frames, themes, and topics in coverage. Table 1 depicts the ten most-cited studies in this line of research. These were retrieved from the Web of Science database using the search terms “(climate change* OR global warming* OR greenhouse effect*) AND (news* OR mass media* OR journalis*)”. Again, most studies focus on the Global North, especially the US (see also Schäfer and Schlichting, 2014). While themes (or related concepts such as frames) cannot always be clearly distinguished across studies, existing research indicates that news revolves around climate science, environmental impacts/changes, climate politics, economic impacts,

Table 1
Frames, Themes, and Topics in Coverage of Climate Change.

Author(s)	Countries	Outlets	Concepts
Billett (2010)	India (Global South)	Newspapers	"Themes" (e.g., causes, impacts of climate change)
Boykoff (2008)	UK (Global North)	Newspapers	"Frames" (e.g., culture and society, ecological/meteorological)
Dirikx and Gelders (2010)	France, the Netherlands (Global North)	Newspapers	"Frames" (e.g., attribution of responsibility, (economic) consequences)
Dotson et al. (2012)	Chile (Global South)	Newspapers	"Foci" (e.g., climate change, problem/solution)
Hart and Feldman (2014)	USA (Global North)	TV programs	"Frames" (e.g., environment, public health)
Hoffman (2011)	USA (Global North)	Newspapers	"Issues" (e.g., economics, science)
Liu et al. (2008)	USA (Global North)	Newspapers	"Issues" (e.g., education, health)
McComas and Shanahan (1999)	USA (Global North)	Newspapers	"Themes" (e.g., domestic politics, new evidence or research)
O'Neill et al. (2015)	UK, USA (Global North)	Newspapers, TV programs	"Frames" (e.g., economic, health)
Shehata and Hopmann (2012)	Sweden, USA (Global North)	Newspapers	"Frames" (e.g., climate change, economic consequences)

or societal/cultural impacts.

We sort these themes into three overarching dimensions: a *scientific dimension*, i.e., coverage discussing scientific evidence (Shehata and Hopmann, 2012) or processes (Boykoff, 2008) related to climate change; an *ecological dimension*, i.e., impacts on the environment, including the weather (McComas and Shanahan, 1999), or the occurrence of natural disasters (O'Neill et al., 2015); and a *societal dimension* illustrating how humans are aware of, affected by, battle, or cause climate change. Painter and Schäfer (2018) and Schäfer (2015) argue that the latter dimension is of particular importance for increasing public engagement. Coverage stressing the societal dimension of climate change may, for example, discuss anthropogenic causes of climate change, citizens' affectedness in terms of public health or the economy, or actions people might take to tackle climate change (for examples, see Billett, 2010; Boykoff, 2008; Dotson et al., 2012; O'Neill et al., 2015). As the content of coverage varies across countries (Vu et al., 2019; Wozniak et al., 2021), conclusions about which themes and dimensions prevail are scarce, especially for the Global South. Thus, we ask:

RQ4: Which themes and dimensions are prevalent in coverage of climate change across countries from the Global North and South?

RQ5: How does the prevalence of themes and dimensions differ between countries from the Global North and South?

3. Method

3.1. Sampling coverage

We analyzed coverage in countries from the Global North and South according to scholarly definitions of the Global South (Koch, 2020; Nguyen and Tran, 2019) with varying levels of vulnerability according to the Climate Risk Index (Eckstein et al., 2020). We only chose countries for which coverage was available across longer periods of time. Based on these criteria, we selected ten countries: Australia, Canada, Germany, New Zealand, the United Kingdom (UK), and the United States (USA) (representing the Global North) and India, Namibia, South Africa, and Thailand (representing the Global South). For each country, we retrieved all climate change-related articles from two leading national

quality newspapers, as such legacy media amplify public attention (Langer and Gruber, 2020). Articles were retrieved from newspaper databases (e.g., Nexis Uni) or archives of outlets if they featured the following, previously validated search terms (Supplementary Material, Appendix A) at least twice:

for English language outlets: "*climate change** OR *global warming** OR *greenhouse effect**"

for German language outlets: "*Klimawandel** OR (*global** AND *Erwärmung**) OR *Treibhauseffekt**"

We focused on the time period from 2006 to 2018 as full coverage for at least one outlet per country was only available throughout these years. Only English and German language newspapers were included. We sampled English language coverage in countries where English is not the (only) official language (India, Thailand) for two reasons: For analysis, we translated texts into English using the Google Translate API, an approach that delivers robust results for coverage of climate change (Reber, 2019) and beyond (de Vries et al., 2018; Windsor et al., 2019). The applicability of using machine-translated texts for automated analyses has been tested for German (Reber, 2019; Windsor et al., 2019), but not for Central Thai or Hindi. Our decision also enables us to compare our results to existing studies including the same English language outlets for the Global South (Schmidt et al., 2013; Wozniak et al., 2021).

Concerning corpus construction, Grundmann (2021) argues that computational analyses often introduce noise by not eliminating duplicate or irrelevant texts, i.e., articles that do not deal with climate change as their main topic. Thus, we removed duplicates and texts where climate change was not the main topic during corpus construction via manual validation (Supplementary Material, Appendix A). Our final corpus consists of $N = 71,674$ articles (Table 2).

3.2. Measuring issue attention

3.2.1. Operationalization of variables

To answer RQ1, we created a normalized measure of issue attention: *Issue Attention*_{*t,i*} describes the share of news on climate change compared to all news articles published in a given month *t* and a given country *i*. The *Number of All Articles*_{*t,i*} published by newspapers in a given country and month was retrieved via the same archives using "blank searches" (Schmidt et al., 2013). The *Number of Articles on Climate Change*_{*t,i*} was then related to the *Number of All Articles*_{*t,i*} to account for differences in the amount of overall coverage across countries and time (see Equation 1):

Table 2
Corpus ($N = 71,674$).

Country	Newspapers	Categorization	Articles
Australia	<i>The Australian</i>	Global North	8,886
	<i>Sydney Morning Herald</i>		5,509
Canada	<i>Globe & Mail</i>	Global North	4,286
	<i>Toronto Star</i>		4,361
Germany	<i>Süddeutsche Zeitung</i>	Global North	3,853
	<i>Frankfurter Allgemeine Zeitung</i>		2,477
India	<i>Hindu</i>	Global South	4,625
	<i>Times of India</i>		3,321
Namibia	<i>Allgemeine Zeitung</i>	Global South	129
	<i>The Namibian</i>		177
New Zealand	<i>NZ Herald</i>	Global North	3,436
	<i>The Press</i>		1,482
South Africa	<i>Sunday Times</i>	Global South	288
	<i>The Star</i>		1,075
Thailand	<i>Bangkok Post</i>	Global South	1,181
	<i>The Nation</i>		1,511
UK	<i>The Guardian</i>	Global North	11,013
	<i>The Times</i>		3,869
USA	<i>The New York Times</i>	Global North	6,086
	<i>The Washington Post</i>		4,109

$$\text{Issue Attention}_{t,i} = \frac{\text{Number of Articles on Climate Change}_{t,i}}{\text{Number of All Articles}_{t,i}} \times 100 \quad (1)$$

Related to RQ2, the variable *Time Trend_t* indicates the month of each observation in increasing order ($T = 1, 2, \dots, 156$). Related to RQ3, we coded for focusing events. Some variables were lagged due to indications of not an imminent but a lagged effect (Supplementary Material, Appendix B):

- Political focusing events: the share of days on which *COPs_t* occurred in a month (numeric value), whether *G7/G8 Summits_t* took place ($0 = \text{No}, 1 = \text{Yes}$), and whether the *US Withdrawal from the Paris Agreement_t* occurred ($0 = \text{No}, 1 = \text{Yes}$).
- Economic focusing events: whether the *Stern Report_{t-1}* was released in the month prior to the point of observation ($0 = \text{No}, 1 = \text{Yes}$). Because the report was published at the end of the month, we expect a lagged effect.
- Scientific focusing events: *Climate Gate_t* and *Climate Gate_{t-1}* describe whether the “Climate Gate” scandal occurred in the same month or the month prior to the point of observation ($0 = \text{No}, 1 = \text{Yes}$). We also analyzed whether an IPCC assessment or a working report, *IPCC Reports (Final)_t* and *IPCC Reports (Working)_t*, was published ($0 = \text{No}, 1 = \text{Yes}$).
- Societal focusing events: *Release of Movies_{t,i}* describes whether movies related to climate change, e.g., Al Gore’s “An inconvenient truth”, were released in a given country in a given month ($0 = \text{No}, 1 = \text{Yes}$). *Live Earth Concert_t* describes whether the concert took place in a given month ($0 = \text{No}, 1 = \text{Yes}$). We also measured whether the *Earth Hour_t* occurred ($0 = \text{No}, 1 = \text{Yes}$). *Celebrity Events_t* describes, for example, whether celebrities received prizes for their climate engagement in a given month ($0 = \text{No}, 1 = \text{Yes}$) and *Protests_t* whether climate protests took place ($0 = \text{No}, 1 = \text{Yes}$).

Although disasters rarely influence attention (Boussalis et al., 2016; Schäfer et al., 2014), we controlled for *National Deaths (log)_{t-1,i}*, *National Damages (log)_{t-1,i}*, *Worldwide Deaths (log)_{t-1}*, and *Worldwide Damages (log)_{t-1}*. These variables describe the number of deaths/missing people or financial damages due to natural disasters in a given country or worldwide in the month prior to the point of observation based on the International Disaster Database (Guha-Sapir, 2020). Due to their skewness, we log-transformed these variables (Bartlett, 1947) to reassure that they were approximately normally distributed. Otherwise, outliers may influence results. We also included *Country Fixed Effects_i* to control for time-invariant country-dependent influences. Lags of up to four months of issue attention, *Lags of Previous Media Attention_{t-1,t-2,t-3,t-4}*, i_b were included to control for autoregressive processes.

3.2.2. Analysis via panel model

Our data can be described as a balanced panel with country-months as the unit of analysis. To account for this nested structure, we applied a fixed effects model. We checked main assumptions based on a model only including controls (Beck and Katz, 1995; Beck and Katz, 2011). According to the Breusch-Pagan LM test, there is contemporaneous correlation, meaning errors are correlated across countries, for example due to common omitted shocks (Pesaran, 2021): $\chi^2(45) = 1,213.5$, $p < .001$. Pesaran’s test for unit roots found stationarity to apply: $CIPS = -5.46$, $p < .001$. This indicates, for example, that the mean of each country-month series is not affected by a change of time origin. Otherwise, we would need to differentiate the series, i.e., model differences between values at t and the previous point $t-1$ instead of values at t to remove trends. While the intercept-only model showed autocorrelation, meaning that errors are correlated over time, Woolridge’s test for autocorrelation indicated that including lagged issue attention solved this problem: $F(1,1511) = 1.7$, $p = .19$. Lastly, tests indicated panel-heteroscedasticity, meaning the error variance differs across countries: $\chi^2(8) = 990.81$, $p < .001$. To account for contemporaneous correlation

and panel-heteroscedasticity, we used panel-corrected standard errors (PCEs) (Beck and Katz, 1995).

First, we analyzed the effects of independent variables across the globe, for example whether COPs are consistently associated with media attention across countries (baseline model). Next, we analyzed country-specific effects of independent variables (interaction models) to illustrate, for example, in which countries specifically COPs are associated with media attention. To do so, we included interactions between country fixed-effects and independent variables. Brambor et al. (2006) stress that conditional effects, here country-specific differences, cannot be interpreted by simply inspecting interaction terms. We therefore used the Johnson-Neyman (J-N) technique (Bauer and Curran, 2005) to illustrate the consistency, direction, and size of effects for each country. This allows us to estimate country-specific slopes, for example the estimated effect of COPs in a specific country. Due to word limitations, we only report the baseline model in detail (Table 3) and summarize country-specific effects (Table 4). Readers interested in more details are referred to the Supplementary Material (Appendix E).

3.3. Identifying themes & dimensions in coverage

To identify themes and dimensions (RQ4–RQ5), we used structural topic modeling as a form of automated content analysis.

3.3.1. Preprocessing

First, we identified collocations related to noun phrases (“climate change”) or named entities (“United States”). We then reduced our corpus to nouns, proper nouns, verbs, and adjectives to eliminate features with little discriminative value. Subsequently, we applied lower-case conversion, tokenization to unigrams, removed punctuation, and eliminated stop words unique to our corpus. We then applied relative pruning to remove extremely rare or frequent words.

3.3.2. Topic modeling approach

Our automated analysis aims at identifying topics (e.g., the US withdrawing from the Paris agreement), which were then mapped to overarching themes (e.g., *Climate Politics*) and dimensions (e.g., the societal dimension). To identify topics, we applied structural topic modeling (STM) using the stm package (Roberts et al., 2019) in R (R Core Team, 2020). Given the lack of research on the Global South (Schäfer and Painter, 2020), we cannot deduce the entirety of topics that may be prevalent. Topic modeling allows us to explore coverage inductively across countries and time. STM identifies latent structures – called topics – characterized by word distributions. Texts are represented as distributions over topics, meaning that the model assigns several topics to a text and identifies the conditional probability θ with which they occur in a so-called mixed membership approach (Maier et al., 2018).

Before running the model, researchers have to decide on the number of topics K that should be estimated. Models with $10 > K > 150$ in increments of $K = 5$ were evaluated concerning the suitability of topics (e.g., internal coherence, exclusivity of topics), their substantivity, and robustness. In a discussion, the research team decided on a model with $K = 85$ topics. Next, members of the research team were supplied with information on each topic, for example its top terms, a random sample of articles representing the topic, and its robustness (Supplementary Material, Appendix C). They then coded which topics to keep and which to exclude ($\alpha = 0.71$). As we are interested in cross-national comparisons, we excluded topics driven by a single country based on the Hirschman-Herfindahl Index ($HH > 0.8$) (Maier et al., 2018). 46 topics were kept for further analysis.

In repeated rounds of discussions, we then decided on labels describing each topic. We also discussed overarching themes/dimensions each topic could be sorted into. Discussions were informed by previous studies, for example descriptions of the societal dimension (Painter and Schäfer, 2018) or themes such as climate science or

environmental impacts/changes (e.g., Boykoff, 2008; McComas and Shanahan, 1999; Hoffman, 2011). However, deduced themes/dimensions were extended and revised inductively through the material at hand in an interactive, interpretative process. Based on this process, each topic was sorted into one out of seven overarching themes and, as a more aggregated measure, one out of three dimensions: the scientific dimension consisting of one theme (*Climate Science*), the ecological

dimension consisting of another (*Climate Change & Impacts on the Ecosystem*), and the societal dimension consisting of five themes (*Causes of & Solutions to Climate Change, Climate Politics, Awareness & Education, Impacts on Humans, Economic Impacts*). While some call these aggregated categories frames, we consider frames to entail more complex theoretical concepts which can often not be easily identified automatically (Nicholls and Culpepper, 2020).

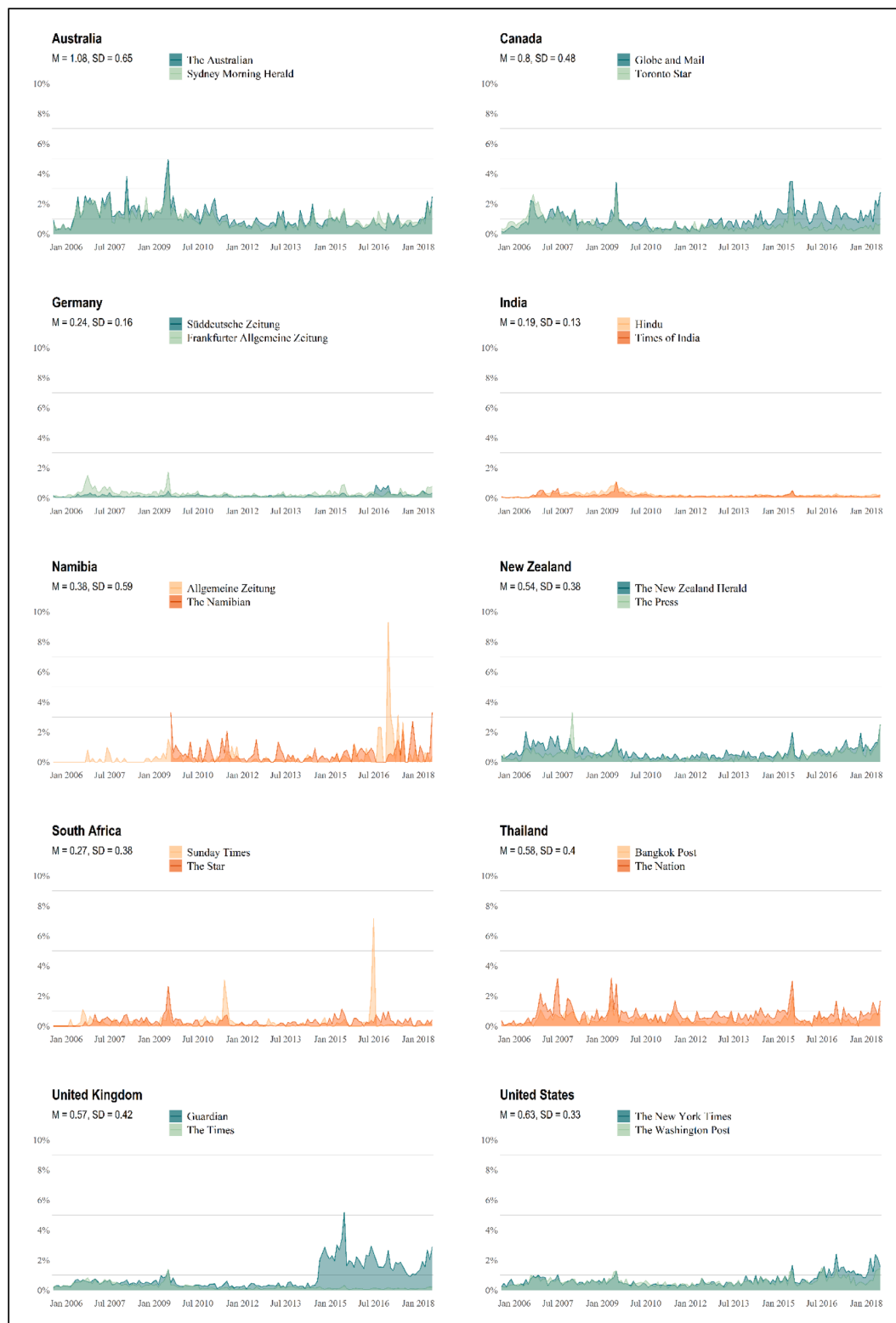


Fig. 1. Cross-National Attention to Climate Change. Note: Countries from the Global North are depicted in green, countries from the Global South in orange.

3.3.3. Validity & replicability

Scholars have pointed out important limitations of topic modeling (Brookes and McEnergy, 2019; Grundmann, 2021; Maier et al., 2018), for instance a lack of linguistic sensitivity. To reassure linguistic sensitivity, we followed recent recommendations (Brookes and McEnergy, 2019; Song et al., 2020). At least ten articles related to each topic were read by every member of the research team before labeling and interpretation. Moreover, results were validated manually based on two validation sets ($F_1 = 0.74$ and $F_1 = 0.76$ for classification of dimensions). Results showed not overly high, but sufficient validity scores except for the theme *Economic Impacts*, which should thus be interpreted with caution. Another limitation relates to the replicability and robustness of results, for instance models converging to different solutions. To reassure replicability, we employed spectral learning as a deterministic method for initialization (Roberts et al., 2016). We also checked the robustness of results independent of parameter settings, here topics being reproduced for other choices for K (Wilkerson and Casas, 2017). Detailed information on these tests can be found in the Supplementary Material (Appendix D). We agree that a final limitation – the theoretical underpinnings of topics – still applies (Brookes and McEnergy, 2019; Grundmann, 2021; Maier et al., 2018) as is discussed later.

4. Results

4.1. Issue attention to climate change

4.1.1. Levels of issue attention (RQ1)

Overall, 0.53% of all articles in a given month focused on climate change. However, issue attention varied across countries (Fig. 1). Many – but not all – countries from the Global North reported more frequently: Coverage of climate change took up more than one percent of coverage in Australia ($M = 1.08$, $SD = 0.65$) and more than half a percent in Canada ($M = 0.8$, $SD = 0.48$), New Zealand ($M = 0.54$, $SD = 0.38$), the US ($M = 0.63$, $SD = 0.33$), and the UK ($M = 0.57$, $SD = 0.42$) with Germany as an exception ($M = 0.24$, $SD = 0.16$). Climate change received less attention in countries from the Global South. Less than half a percent of news dealt with climate change in India ($M = 0.19$, $SD = 0.13$), Namibia ($M = 0.38$, $SD = 0.59$), and South Africa ($M = 0.27$, $SD = 0.38$). Again, this pattern does not hold for all countries from the Global South: Attention was higher in Thailand ($M = 0.58$, $SD = 0.4$).

4.1.2. Trends in issue attention (RQ2)

Table 3 displays the effects of independent variables across countries. Table 4 summarizes country-specific effects. Due to the overall low issue attention, β -coefficients were transformed to display a change in relative monthly attention by news outlets in 0.1% related to a one-unit change in independent variables. According to Table 3, there is no consistent linear *Time Trend*_{*t*} across countries ($\beta = -0.00$, $p = .79$). Issue attention did not increase or decrease in most countries. When inspecting country-specific effects in Table 4, this is supported: Issue attention increased in Namibia, the UK, and the US and decreased in Australia, with inconsistent trends elsewhere.

4.1.3. The role of focusing events (RQ3)

Related to RQ3, political events were correlated with peaks in attention – first and foremost, *COPs*_{*t*} ($\beta = 0.07$, $p < .001$). This effect was small, but consistent across several countries from the Global North and South. *G7/G8 Summits*_{*t*} were not consistently correlated with attention across countries ($\beta = 0.3$, $p = .51$) besides Australia. However, attention peaked related to the *US Withdrawal from the Paris Agreement*_{*t*} ($\beta = 9.45$, $p < .001$), with consistent effects in Australia, Namibia, the UK, and the US. Considering economic events, the *Stern Report*_{*t-1*} did not have a consistent effect in most countries ($\beta = 0.54$, $p = .74$), although it was associated with attention in Australia and New Zealand. Considering scientific focusing events, *Climate Gate*_{*t*} was associated with an immediate ($\beta = 3.81$, $p < .05$) and a one-month delayed increase in attention

in five countries (*Climate Gate*_{*t-1*}: $\beta = 9.84$, $p < .001$). Associations between IPCC reports and attention were inconsistent (*IPCC Reports (Final)*_{*t*}: $\beta = 0.76$, $p = .49$; *IPCC Reports (Working)*_{*t*}: $\beta = 1.02$, $p = .09$). Lastly, societal events were important: *Celebrity Events*_{*t*} were associated with attention in two countries from the Global North ($\beta = 1.66$, $p < .05$) similar to *Protests*_{*t*} ($\beta = 2.27$, $p < .01$). No consistent correlations were found for the *Release of Movies*_{*t,i*} ($\beta = 0.45$, $p = .45$), the *Live Earth Concert*_{*t*} ($\beta = -1.8$, $p = .28$), or the *Earth Hour*_{*t*} ($\beta = -0.3$, $p = .54$).

4.2. Themes & dimensions in coverage of climate change

4.2.1. Identification of themes & dimensions (RQ4)

Related to RQ4, Table 5 illustrates themes and dimensions in coverage. While one theme identifies an ecological (*Climate Change & Impacts on the Ecosystem*) and another a scientific dimension (*Climate Science*), five themes (*Causes of & Solutions to Climate Change*, *Climate Politics*, *Awareness & Education*, *Impacts on Humans*, *Economic Impacts*) capture the societal dimension, i.e., how humans are aware of, affected by, battle, or cause climate change.

Turning to the ecological dimension first, the theme *Climate Change & Impacts on the Ecosystem* was prevalent in 7.17% of all articles. It describes how climate is changing, e.g., higher temperatures and extreme weather events. The *Guardian*, for example, notes that the “past year has been marked by hurricanes of record ferocity, apocalyptic damage and thousands of deaths” (Milman, 2018, no page). The theme also describes animal extinction, biodiversity loss, glacial impacts, the pollution of seas, coral bleaching, or changes in arctic life.

Turning to the scientific dimension, the theme *Climate Science* (6.13%) includes scientific reports or technological advances, often concerning atmospheric science or space research. It also discusses the “Climate Gate” scandal where leaked emails seemed to suggest that

Table 3
Baseline Model: Issue Attention across the Globe.

Parameter	Model 1
	Unstandardized β (PCSE-adjusted SE)
Time trend	
<i>Time Trend</i> _{<i>t</i>}	−0.00 (0.00)
Political focusing events	
<i>COPs</i> _{<i>t</i>}	0.07 (0.01)***
<i>G7/G8 Summits</i> _{<i>t</i>}	0.3 (0.46)
<i>US Withdrawal from the Paris Agreement</i> _{<i>t</i>}	9.45 (1.54)***
Economic focusing events	
<i>Stern Report</i> _{<i>t-1</i>}	0.54 (1.61)
Scientific focusing events	
<i>Climate Gate</i> _{<i>t</i>}	3.81 (1.54)*
<i>Climate Gate</i> _{<i>t-1</i>}	9.84 (1.6)***
<i>IPCC Reports (Final)</i> _{<i>t</i>}	0.76 (1.09)
<i>IPCC Reports (Working)</i> _{<i>t</i>}	1.02 (0.61)
Societal focusing events	
<i>Release of Movies</i> _{<i>t,i</i>}	0.45 (0.6)
<i>Live Earth Concert</i> _{<i>t</i>}	−1.8 (1.65)
<i>Earth Hour</i> _{<i>t</i>}	−0.3 (0.49)
<i>Celebrity Events</i> _{<i>t</i>}	1.66 (0.78)*
<i>Protests</i> _{<i>t</i>}	2.27 (0.72)**
Controls	
<i>National Deaths (log)</i> _{<i>t-1,i</i>}	Included
<i>Worldwide Deaths (log)</i> _{<i>t-1</i>}	Included
<i>National Damages (log)</i> _{<i>t-1,i</i>}	Included
<i>Worldwide Damages (log)</i> _{<i>t-1</i>}	Included
<i>Country Fixed Effects</i> _{<i>i</i>}	Included
<i>Lags of Previous Media Attention</i> _{<i>t-1,t-2,t-3,t-4,i</i>}	Included
Adjusted R ²	0.58
Countries _{<i>i</i>}	10
Months _{<i>t</i>}	152
N	1,520

Note: Unstandardized β -coefficients (panel-corrected SEs). β -coefficients display change in attention in 0.1% based on a one-unit change in independent variables. * $p < .05$, ** $p < .01$, *** $p < .001$.

Table 4
Interaction Models: Issue Attention in Each Country.

Parameter	Global North	Global South
Time trend		
<i>Time Trend_t</i>	Australia (–), UK (+), US (+)	Namibia (+)
Political focusing events		
<i>COPs_t</i>	Australia (+), Canada (+), New Zealand (+), UK (+)	South Africa (+), Thailand (+)
<i>G7/G8 Summits_t</i>	Australia (+)	
<i>US Withdrawal from the Paris Agreement_t</i>	Australia (+), UK (+), USA (+)	Namibia (+)
Economic focusing events		
<i>Stern Report_{t-1}</i>	Australia(+), New Zealand(+)	
Scientific focusing events		
<i>Climate Gate_t</i>	Australia (+)	
<i>Climate Gate_{t-1}</i>	Australia (+), Canada (+)	Namibia (+), South Africa (+), Thailand (+)
<i>IPCC Reports (Final)_t</i>		
<i>IPCC Reports (Working)_t</i>		
Societal focusing events		
<i>Release of Movies_{t,i}</i>		
<i>Live Earth Concert_t</i>		
<i>Earth Hour_t</i>		
<i>Celebrity Events_t</i>	Australia (+), Canada (+)	
<i>Protests_t</i>	Canada (+), New Zealand (+)	

Note: (+) indicates positive consistent effects, (–) negative consistent effects.

scientists had manipulated data to exaggerate the threat of climate change.

The other five themes are part of the societal dimension: *Causes of & Solutions to Climate Change* (13.83%) describes political, economic, or individual causes of and solutions to climate change. Human-made causes are identified as greenhouse gas emissions or fracking. Solutions are mostly attributed to political actors, often in the form of carbon-related policies. For example, the *New Zealand Herald* summarizes three solutions for climate change: “Reduce emissions, offset them by an expanded forest estate, or import carbon credits” (Fallow, 2016, no page). Other solutions include clean energy, forest conservation, carbon capture technologies, living in a more sustainable way, or divestments.

The second theme related to the societal dimension, *Climate Politics* (11.49%), describes political decision-making: from broader policies (e.g., energy policies or European policies concerning climate change) to more specific issues (e.g., discussions about the Environmental Protection Agency or the keystone XL pipeline extension). It also includes political events like COPs, G20 meetings, or the US withdrawal from the Paris agreement.

The third societal theme, *Awareness & Education* (9.81%), describes individual awareness of climate change, including events such as the Earth Hour, the Science express as a mobile exhibition on climate change in India, or other education efforts. It also illustrates attitudes towards climate change in the form of polls, philosophical discussions about mitigating climate change, or calls for actions by stating that “we cannot continue to live as we do now” (Tutu, 2012, no page). Furthermore, articles describe civilian protests, public figures speaking out, or prizes for climate engagement.

The fourth theme in the societal dimension specifies *Impacts on Humans* (6.39%), including water scarcity, diseases, erratic weather conditions influencing agriculture, rising sea levels, or threats to habitable spaces. *The Toronto Star* exemplifies such impacts for residents in Senegal: “The rising sea levels pushing into the waters of Senegal’s Saloum Delta threaten to carve the rest of her grey cement home from its foundation, leaving her and 30 other relatives homeless” (Petesch, 2015,

Table 5
Themes & Dimensions.

Themes/Topics	Prevalence	Top terms
Societal Dimension (43.63%)		
<i>Theme: Causes of & Solutions to Climate Change</i> (13.83%)		
Topic: Carbon-related incentives & policies	2.75%	carbon price, carbon tax, trading
Topic: Clean energy	2.05%	nuclear power, solar, nuclear energy
Topic: Divestment	1.19%	investors, investment, divestment
Topic: Energy efficiency	1.12%	efficiency, efficient, heating
Topic: Oil drilling & fracking	1.09%	oil, fracking, shell
Topic: Greenhouse gases	1.02%	co2, carbon dioxide, methane
Topic: Forest conservation	1.07%	forest, forests, trees
Topic: Carbon capture	1.07%	coal, fired, carbon capture
Topic: Infrastructure & transportation	0.83%	city, urban, cities
Topic: Cars & driving	0.86%	cars, diesel, vehicles
Topic: Sustainability & consumption	0.78%	meat, coffee, organic
<i>Theme: Climate Politics</i> (11.49%)		
Topic: COPs	5.6%	copenhagen, binding, agreement
Topic: US court rulings	1.28%	court, pruit, legal
Topic: US withdrawal from the Paris agreement	1.18%	trump, donald trump, macron
Topic: Energy policies	1.16%	target, electricity, bhp
Topic: International summits	1.16%	summit, leaders, g20
Topic: Keystone pipeline	0.83%	obama, keystone, barack obama
Topic: European politics	0.27%	france, europe, european
<i>Theme: Awareness & Education</i> (9.81%)		
Topic: Philosophical & societal takes	3.11%	argument, seems, obvious
Topic: Calls for action	1.76%	planet, humanity, generations
Topic: Encyclical on climate change	1.2%	pope, religious, moral
Topic: Environmental education	1.06%	students, school, schools
Topic: Earth hour & similar events	0.86%	lights, awareness, earth hour
Topic: Protests & activism	0.6%	activists, protest, greenpeace
Topic: Attitudes towards climate change	0.53%	cent, per cent, survey
Topic: Prizes for climate change engagement	0.52%	gore, bush, al gore
Topic: Science express	0.18%	science, scientific, express
<i>Theme: Impacts on Humans</i> (6.39%)		
Topic: Agriculture	1.54%	crops, farmers, agricultural
Topic: Impacts on developing countries	1.33%	africa, development, south africa
Topic: Rising sea levels & impacts of flooding	1.12%	flood, flooding, coastal
Topic: Water scarcity	0.93%	water, rivers, river
Topic: Threats to habitable spaces	0.81%	island, village, islands
Topic: Diseases	0.66%	diseases, disease, health
<i>Theme: Economic Impacts</i> (2.11%)		
Topic: Energy & oil industry	0.84%	company, exxon, corporate
Topic: Travel industry	0.69%	airport, airlines, ski
Topic: Costs due to disasters	0.58%	report, risks, risk
Ecological Dimension (7.17%)		
<i>Theme: Climate Change & Impacts on the Ecosystem</i> (7.17%)		
Topic: Extinction of animals	1.99%	species, birds, extinction
Topic: Weather anomalies	1.25%	winter, summer, cold
Topic: Glacial impacts	0.97%	glaciers, glacier, antarctica
Topic: Impacts on arctic life	0.88%	arctic, polar bears, polar bear
Topic: Extreme weather events	0.8%	fire, hurricane, storm
Topic: Marine life	0.7%	fish, ocean, fishing
Topic: Coral bleaching	0.59%	reef, bleaching, great barrier reef

(continued on next page)

Table 5 (continued)

Themes/Topics	Prevalence	Top terms
Scientific Dimension (6.13%)		
<i>Theme: Climate Science (6.13%)</i>		
Topic: Climate gate & scientific dissent	2.53%	climate science, peer, emails
Topic: Scientific publications & reports	2.32%	warming, ipcc, degrees
Topic: Atmospheric science & space research	1.28%	space, clouds, nasa

p. WD6).

Lastly, *Economic Impacts* (2.11%) illustrates economic impacts such as costs due to disasters and impacts on the travel, energy, or oil industry. However, findings related to this theme should be interpreted with a grain of salt due to its low validity scores.

4.2.2. Differences in themes & dimensions (RQ5)

Related to RQ5, Figs. 2–3 illustrate the share of articles that displayed a specific theme as their most prevalent theme for each country (with the societal dimension depicted in color). To test for differences between the Global North and South, we compared the conditional probability θ with which themes and dimensions were prevalent. As topic modeling follows a mixed-membership approach, these probabilities better reflect that different themes can be prevalent in a single article. We compare θ probabilities between the Global North and South based on repeated measures ANOVAs with Bonferroni corrections, which adjust for multiple comparisons (see Supplementary Material, Appendix F for country-specific details).

Overall, 7.65% of all articles from the Global North focused on *Climate Change & Impacts on the Ecosystem*, i.e., the ecological dimension, compared to 6.16% from the Global South. Overall, there are no consistent differences in the conditional probability with which this dimension was prevalent in the Global North and South ($F(1,8) = 0.19$, $p = .67$), meaning that respective countries did not consistently discuss the ecological dimension more or less.

Moreover, 6.53% of all articles in the Global North focused on *Climate Science*, i.e., the scientific dimension, compared to 3.57% in the Global South. The conditional probability with which this dimension

was prevalent was significantly higher in the Global North ($F(1,8) = 7.24$, $p < .05$), meaning that climate science was consistently covered more in respective countries.

In contrast, countries from the Global South covered the societal dimension more often (55.17% across all five related themes) than those from the Global North (41.88%). However, the conditional probability with which this dimension was prevalent did not differ consistently between the Global North and South ($F(1,8) = 0.53$, $p = .49$). As Figs. 2–3 indicate, countries from the Global South did not emphasize *all* themes within the societal dimension more often. In fact, only the theme *Impacts on Humans*, which was covered in 21.3% of all articles from the Global South but only in 5.13% of those from the Global North, varies. This is supported by the significant differences in its conditional probability when comparing the Global North and South ($F(1,8) = 29.26$, $p < .001$).

5. Discussion

This study analyzed issue attention and themes/dimensions in news coverage of climate change across ten countries from the Global North and South between 2006 and 2018. Overall, countries from the Global North covered climate change more frequently. Countries from the Global South focused more on the societal dimension of climate change, in particular its impacts on humans.

5.1. Issue attention in the Global North & South

Related to RQ1, climate change was covered in more than half a percent of all articles in a given month in Australia, Canada, New Zealand, the UK, or the US as representatives of the Global North. While this sounds like a low number, other scientific issues receive far less attention (Painter and Schäfer, 2018; Schäfer, 2007). In contrast, less than half a percent of coverage dealt with climate change in India, Namibia, or South Africa as countries from the Global South. Here, a lack of journalistic resources and scientific issues being of less importance more generally (Nguyen and Tran, 2019; Schäfer and Painter, 2020) may lead to lower attention. However, this pattern does not hold for all countries: Issue attention was lower in Germany and higher in Thailand compared to other countries in the Global North or South.

News media attention to climate change did not increase (or

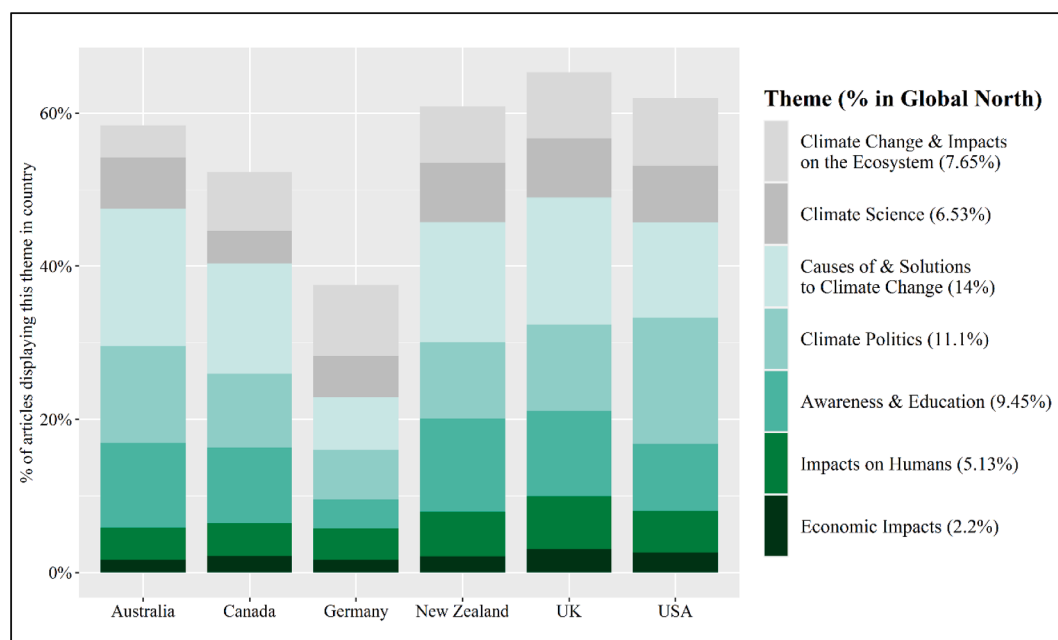


Fig. 2. Themes in the Global North.

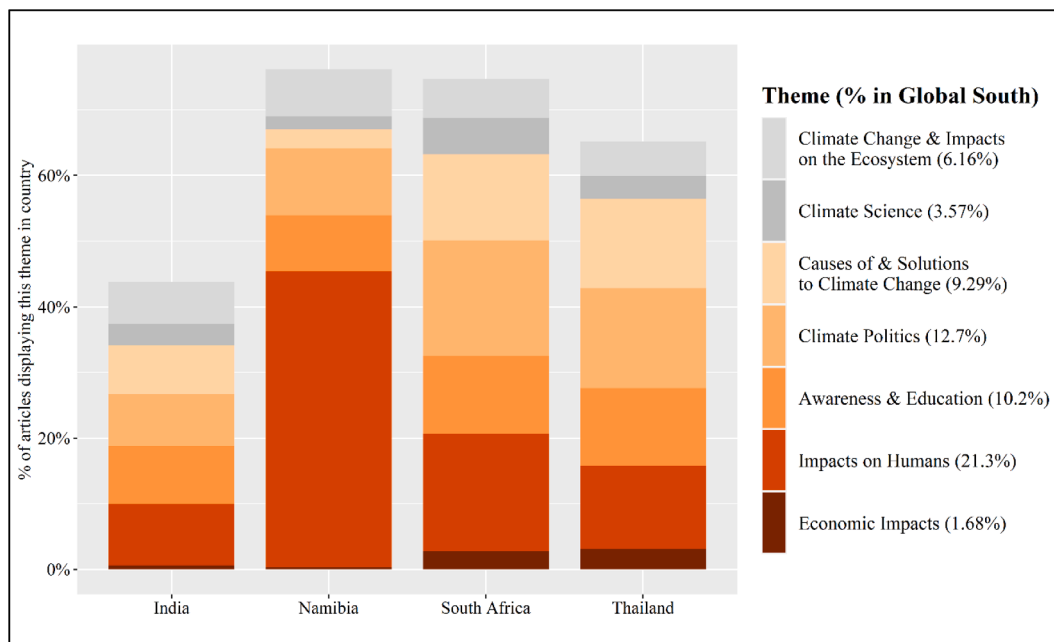


Fig. 3. Themes in the Global South.

decrease) in a linear fashion in most countries (RQ2). We only found consistent linear trends in Namibia, the UK, and the UK (increase in attention) as well as Australia (decrease in attention). Thus, countries from the Global North and the Global South did not share consistent differences (or similarities) concerning their development of attention to climate change between 2006 and 2018.

Moreover, focusing events were associated with consistent, yet small peaks in attention across the globe (RQ3). COPs, the Climate Gate scandal, and the US withdrawal from the Paris agreement were most often associated with increases in news media attention. However, effects related to the Climate Gate scandal should be considered with a grain of salt as the COP in Copenhagen took place at a similar time, which may partly explain respective peaks. In contrast, G7/G8 summits or the Stern report were only associated with spikes in few countries. This indicates that staged events directing public attention (Cottle, 2009; Couldry et al., 2010; Katz and Liebes, 2007) may also do so for the issue of climate change. Here, elites such as politicians are not the only influential actors. Grassroot movements connected to the Fridays for Future protest, for example, also initiated influential events, similar to celebrities (Anderson, 2011; Leas et al., 2016; Thorson and Wang, 2020; Wozniak et al., 2021). While focusing events mostly had similar effects in countries from the Global North and South, societal events are an exception: They were only associated with an increase in attention in the Global North. This may, partly, be due to their operationalization. For example, the protests included here often occurred in the Global North and celebrity events mostly involved US celebrities.

5.2. Themes & dimensions in coverage from the Global North & South

Turning to news content (RQ4), coverage of climate change included seven themes: a scientific (*Climate Science*), an ecological (*Climate Change & Impacts on the Ecosystem*), and a societal dimension (*Causes of & Solutions to Climate Change*, *Climate Politics*, *Awareness & Education*, *Impacts on Humans*, *Economic Impacts*). Many of these themes and dimensions had already been identified by other scholars (see e.g., Billett, 2010; Boykoff, 2008; Liu et al., 2008; McComas and Shanahan, 1999). By systematically grouping themes into overarching dimensions, however, this study illustrates that journalists across the world neither concentrated on the science behind climate change nor on abstract ecological changes. In contrast, news mostly focused on a societal

dimension by describing how humans are aware of, affected by, battle, or cause climate change. Journalists do not cover climate change as an abstract or unobtrusive issue but instead underline its far-reaching societal implications. This is something scholars suspected, but rarely showed empirically so far (Painter and Schäfer, 2018; Schäfer, 2015).

While themes and dimensions were prevalent in most countries across the globe, we also identified important differences (RQ5). In particular, countries from the Global North more often reported on climate science. This may not only be due the aforementioned lack of journalistic resources in the Global South (Nguyen and Tran, 2019). Climate skepticism is often given more space in the Global North (Painter and Ashe, 2012), which may lead to more frequent discussions about climate science (Schäfer and Painter, 2020). In contrast, countries from the Global South more strongly emphasized the societal dimension of climate change, in particular its effects on humans. All countries from the Global South – India, Namibia, South Africa, and Thailand – reported more frequently on this theme. Discussions included water scarcity, erratic weather conditions influencing agriculture, or threats to habitable spaces as adverse consequences of climate change. On the one hand, this may be due to the fact that these countries are more vulnerable to climate change (Althor et al., 2016; Bathiany et al., 2018). On the other hand, a strong focus on human affectedness may be an indicator of developmental journalism (Chattopadhyay, 2019): Compared to their colleagues in the Global North, journalists in the Global South more often want to aide social change and are interested less in acting as detached observers (Kalyango et al., 2017). By reporting on how (developing) countries and their citizens are affected by climate change, they fulfil role expectations more strongly related to journalistic cultures in the Global South.

5.3. Implications

Our study illustrates that both global and domestic factors influence coverage of climate change. On the one hand, political, scientific, and (partly) societal focusing events are associated with an increase in attention across the globe. While these effects should not be overestimated as they represent associations rather than causal relationships with small and often short-lived effects (Wozniak et al., 2021), this indicates some similarities in how issue attention is directed (and by whom) across the globe. Also, news media often reported on similar

themes and dimensions. For instance, adverse consequences of climate change on agricultural production or the lives of citizens in developing countries were not only mentioned in the Global South, but also the Global North. To some extent, this indicates a form of global journalism which emphasizes “how economic, political, social and ecological practices, processes and problems in different parts of the world affect each other, are interlocked, or share commonalities” (Berglez, 2008, p. 847; see also Löffelholz and Weaver, 2008; Reese, 2001). As such, similar patterns in cross-national attention to and coverage of climate change shape its perception as a global crisis.

On the other hand, distinct national contexts clearly influence how (much) climate change is covered. While events may partly be influential across the globe, both average levels of and trends concerning issue attention are distinct across countries. And while coverage does include similar themes and dimensions, their frequency differs cross-nationally, especially concerning the scientific and the societal dimension. This may be an indicator of the influence of macro-level aspects, for example distinct national responsibilities for climate actions or country-specific vulnerabilities. Such persistent differences further indicate a nationalization (Vu et al., 2019) or domestication (Kunelius et al., 2017) of the issue as national contexts are still decisive for how and how much climate change is covered.

By focusing both on levels of news media attention and the content of news, this study reveals that persistent similarities and differences in cross-national coverage of climate change co-exist. As such, national political, economic, or societal contexts still play a decisive role for how and how much climate change is covered – which at least casts doubt on the emergence of a global public sphere characterized by similar levels of issue attention or themes in coverage.

5.4. Limitations

Our results should be considered in light of several limitations. Differences between themes were not always clear-cut. Articles might, for example, describe solutions to climate change which should be realized by political actors and thus touch upon the political theme and the theme related to causes of and solutions to climate change. Both our automated and the manual classification only reached satisfactory reliability and validity scores, which underlines that neither humans nor computers can easily identify and differentiate between these latent concepts. The theoretical underpinnings of “topics” and, relatedly, themes/dimensions also need to be explored further (Brookes and McEnery, 2019; Grundmann, 2021). Moreover, not all articles in our corpus could be assigned a clear theme or dimension. Additionally, studies analyzing global/domestic perspectives in coverage or the emergence of a transnational public sphere often focus on more fine-grained indicators, for example references to domestic actors or frames/discourses (Olausson, 2014; Wessler et al., 2016; Wozniak et al., 2021). By analyzing issue attention and themes/dimensions, we can thus not show whether climate change has been discussed with a focus on domestic or global affectedness, causes, or solutions. Instead, we only illustrate similarities or differences in coverage on the broader level of issue attention, dimensions, and themes. Lastly, the overly simplistic dichotomy between “the” Global North and “the” Global South has been criticized for some time (Koch, 2020; Nguyen and Tran, 2019). Countries within both categories are distinct in many aspects. Accordingly, we found differences in how different countries from the Global North (or South) covered climate change, underlining that the North/South dichotomy does not fully explain cross-national similarities and differences. Moreover, Dutta and Pal (2020) criticize that there are “pressures for empirical investigations from the South to fit into the metropolitan, predominantly U.S.-based theories” (p. 356). This criticism also applies to our study as we mainly drew on frameworks developed within the realm of the Global North.

6. Conclusion

Notwithstanding these limitations, this study illustrates persistent similarities in coverage of climate change across the globe. Most importantly, political, scientific and (partly) societal focusing events were associated with small peaks in global news media attention. Countries from the Global North and South reported not only on ecological changes or climate science but also the societal dimension of climate change: Journalists often emphasized how humans are aware of, affected by, battle, or cause climate change, shaping public perceptions of climate change as a global “climate crisis”. All countries mentioned these three dimensions to some extent.

However, results also indicate persistent differences: Countries in the Global North covered climate change more frequently and focused more on climate science. In contrast, countries from the Global South more strongly underlined challenges and implications for society at large, especially how climate change impacts humans and their daily lives.

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CRediT authorship contribution statement

Valerie Hase: Conceptualization, Formal analysis, Investigation, Methodology, Software, Validation, Visualization, Writing - original draft, Writing - review & editing. **Daniela Mahl:** Conceptualization, Data curation, Investigation, Software, Validation, Visualization, Writing - original draft. **Mike S. Schäfer:** Conceptualization, Funding acquisition, Project administration, Resources, Supervision, Writing - original draft. **Tobias R. Keller:** Data curation, Investigation.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.gloenvcha.2021.102353>.

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