Mapping the discourse of climate change in four western countries

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Abstract
This paper analyses climate change discourse in legacy newspapers from France, Germany, the UK, and the US between 2005 and 2022. Using corpus linguistics and named entity recognition, we develop a robust methodology to build and analyse a large-scale corpus of relevant news articles. We focus on the question: *Who speaks about climate change?* The paper has five aims: (1) to introduce a method for creating a comprehensive and focused corpus of climate-related news; (2) to analyse this corpus using specialised tools; (3) to compare the most visible individuals and organizations across four countries from 2005 to 2022; (4) to analyse cross-national similarities and differences over time; and (5) to compare our findings to previous research.

Introduction

In this article we examine the discourse of climate change in selected legacy newspapers of France, Germany, the UK and the US. We present an analysis based on corpus linguistics methodology, using a full text database spanning 18 years (2005–2022). We developed an innovative method to include all relevant news items, while excluding duplicates and irrelevant texts. We ask which voices are prominent in climate change

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discourse by identifying key reference points in media reports. By reference points we mean claims makers, whether persons or organizations, without distinguishing between citation and mention. We use a typology distinguishing politicians, scientists and activists at the person level, and domestic, international and foreign organizations, business organizations, and environmental NGOs at the organizational level. This enables observation of cross-national patterns of influence. We present our findings systematically and relate them to previous research.

Previous research

Previous research on climate change discourse has focused on the construction, use, and dissemination of claims, frames, and narratives (Blanco-Castilla et al., 2018; Coan et al., 2021; Dirikx and Gelders, 2010; Guenther et al., 2023; Lück et al., 2018). Much of this work is based on large-scale news text databases and employs computational methods. Some studies have included comparative perspectives (e.g., (Barkemeyer et al., 2017; Brossard et al., 2004; Hase et al., 2021; Nerlich et al., 2012; Schmidt et al., 2013; Song et al., 2022; Vu et al., 2019), though countries from the Global North are significantly overrepresented (Schäfer and Schlichting, 2014).

Another line of research, also partially relying on computational tools, investigates *who* speaks for climate (Boykoff, 2011; Trumbo, 1996; Wetts, 2023). Much attention has been given to tracking climate scepticism, which questions the science or protects vested interests—sometimes referred to as a 'countermovement' (Brulle, 2013; Farrell, 2016). In contrast, research on climate activism has been limited but is growing, particularly with the emergence of the climate youth movement (Fisher, 2019; Mede and Schroeder, 2024; Pavenstädt, 2024).

The link between public discourse—including media coverage—and policymaking is crucial to understanding climate politics. Some studies have looked at how actors and organizations try to influence policy (e.g Fisher et al., 2013). However, as Ylä-Anttila et al., (2018) note, 'social science research on climate change has typically focused on either the media sphere or the political sphere,' with few attempts to integrate both into a unified analytical framework. We do not claim to offer such a synthesis here.

Findings are often difficult to generalize, partly due to the dominance of US-based research. A common finding is political polarization: supporters of left-liberal ideologies typically favour strong climate policies, while conservatives tend to resist them (Kahan, 2012; Newman et al., 2018). However, this pattern does not hold everywhere— conservative parties in Germany and the UK have at times supported ambitious climate initiatives (Carter and Pearson, 2024; Eckersley et al., 2023).

Some studies using news archives fail to adequately assess data quality. While duplicates or off-topic content are known issues, few attempts have been made to clean these datasets rigorously (Song et al., 2022). As we demonstrate below, many articles initially retrieved from archives are not actually about climate change.

This paper does not examine specific claims or frames in the discourse. Instead, we focus on *who* is visible in traditional print media. Our aim is to offer a detailed and systematic account of the most prominent claims makers.

Grundmann and Scott (2014) conducted a related study but relied on a targeted search for predefined actors. By contrast, we present the first inductive, large-scale analysis using Named Entity Recognition (NER) to identify prominent individuals and organizations across an extended time period. While previous work often focused on actor *types* and short time frames, we identify *specific* actors and their frequency of appearance over 18 years. We assume that in a media system where attention equates to influence, higher visibility signals authority.

Based on these introductory remarks we identify five aims for this article: (1) to develop a robust corpus of relevant news reports for France, Germany, the UK, and the US; (2) to extract claims makers using NER; (3) to compare the most visible individuals and organizations across four countries from 2005 to 2022; (4) to analyse cross-national similarities and differences over time; and (5) to compare our findings to previous research.

Comparative analysis

It is well established that political institutions vary across nation states. Similar variation can be seen in political styles of public debate and in the role of different actors and institutions within those debates. To understand these differences, scholars have developed various approaches—two of which are particularly relevant here: one rooted in political cultures and systems, the other focused on forms of journalism.

Political cultures have been prominently thematised in Science and Technology Studies (STS) where the concept of *civic epistemology* denotes national differences in debating and regulating risk issues. It refers to the institutionalized practices by which 'members of a given society test and deploy knowledge claims used as a basis for making collective choices' (Jasanoff, 2005: 255). Terms like consensus, pragmatism, and confrontation have been used to describe the styles of Germany, the UK, and the US respectively (Jasanoff 2005).

In journalism studies, scholars have proposed comparative typologies to capture differences in media systems (Brüggemann et al., 2014; Hallin and Mancini, 2017; Norris, 2009; Siebert et al., 1984). Hallin and Mancini's influential typology distinguishes between three models: the *liberal model* (e.g., USA, UK, Canada), the *democratic corporatist model* (common in Northern Europe, including Germany and Switzerland), and the *polarized pluralist model* (typical of Mediterranean countries such as France, Italy, and Spain).

Both STS and journalism research draw from comparative welfare state literature (e.g., (Esping-Andersen, 1990; Lijphart, 1999), although this has been criticized for its Western and especially US-centric bias (Norris, 2009; Ringen and Ngok, 2013). Whether these typologies are still useful for empirical analysis remains a valid question.

Häussler et al. (2016) applied Lijphart's consensus/majoritarian distinction in a comparative study of parliamentary debates in Germany, Switzerland, the UK, and the US. They found that in majoritarian systems like the US and UK, more non-political actors—such as scientists and civil society representatives—were able to express their

views than in consensus democracies like Germany and Switzerland, where debates were more elite-centred. This provides a useful hypothesis to test with our dataset.

In journalism research, the concepts of *domestication* and *global journalism* have been influential. Domestication refers to how national cultures serve as interpretive frameworks for global issues. This concept has been applied in climate change reporting studies (Eide and Kunelius, 2010; Olausson, 2014; Rabitz et al., 2021).

Comparative studies have identified national reporting differences. For instance, Brossard et al. (2004) compared climate coverage in *The New York Times* and *Le Monde*. They concluded that US reporting tends toward a 'ritual of objectivity,' while French journalism follows a norm of opinion. This may make French journalists less inclined to adopt a factual approach. *The New York Times* emphasized negative climate impacts, whereas *Le Monde* focused more on political rather than scientific aspects. In the US, the ritual of objectivity can also mean presenting opposing views equally.

Grundmann and Scott (2014) argued that UK and French political cultures shape the framing of climate issues. France emphasizes institutions like the IPCC, aiming for scientific authority and avoiding sensationalism, yet sceptical voices still appear prominently.

Contrasting with domestication, *global journalism* addresses transnational issues like climate change. Berglez (2008: 853) defines it as journalism concerned with universal identities and causes beyond national boundaries: 'the greater the emphasis on the universal dimension of a political identity or struggle, its existence in different countries and continents, the more global the journalism.'

We will return to these findings in the discussion section.

Method and data collection

This section outlines the construction of our news corpus. We retrieved articles from LexisNexis and ProQuest between 1 January 2005 and 31 December 2022, focusing on quality newspapers in France, Germany, the UK, and the US. These papers are also referred to as prestige press and generally write for an educated, informed readership. Where possible, regional newspapers were included. Search terms were tailored by language (based on previous research, see Grundmann and Scott (2014)): for France, *changement climatique*, *effet de serre*, *réchauffement de la planète*, and *réchauffement climatique*; for Germany, *Klimawandel*, *globale Erwärmung*, *Treibhau-seffekt*, *Klimaschutz*, and *Klimakatastrophe*; and for the UK and US, *climate change*, *global warming*, and *greenhouse effect*. We included seven papers for France and Germany, and six for the UK and US to balance coverage. Nevertheless, UK and US papers contributed roughly twice as many articles as their French and German counterparts.

The initial dataset comprised around 200,000 articles. However, many were duplicates or only tangentially related to climate change. Given the inconsistent formatting across sources, we implemented a filtering method to remove duplicates and irrelevant content (see Supplemental Information, SI). This process reduced the corpus to about 60,000 articles.

   Coverage varied across countries and newspapers. UK papers, especially *The Guardian*, had the highest volume. In the US, *The New York Times* and *Washington Post* dominated. *Le Monde* led in France, while German reporting was more evenly distributed among *FAZ*, *taz*, *Spiegel*, and *Welt*. Across all countries, leading prestige newspapers consistently engaged with climate change. As shown in Supplemental Information, SI, reporting intensity increased sharply from 2016 onward.

   A timeline of aggregate frequencies of articles contained in our corpus is provided in Figure 1.

   The news coverage on climate change is higher in the UK and US than in France and Germany. There are some peaks which occur at the same time across all four countries (2007: Nobel Peace Prize to the IPCC; 2009: COP15 Copenhagen; and 2021: COP 26 Glasgow). However 2015 (COP 21 Paris) does not show a peak in the US, and 2019 (Fridays for Future) does not in France. Germany and the US show a sharp rise from 2016 to 2019.

   The final corpus was analysed using Named Entity Recognition and Corpus Linguistics software, especially collocation analysis. We used the collocation software WordSmith Tools, for concordancing, determining key words and corpus clean-up and parsing.

Named entities

Our aim was to identify claims makers inductively. This should eliminate possible bias in search terms which rest on preconceived ideas about who is important in the debate. We used the spaCy platform to extract named entities from our corpus. spaCy is a natural language processing software, freely available and accessible using the Python language.
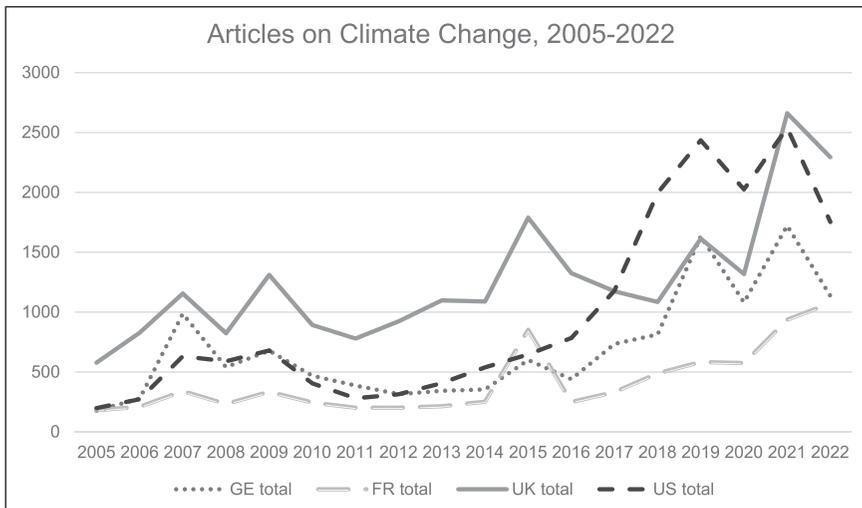

Figure 1. Climate change reporting 2005–2022.

We used Python therefore to access spaCy's NLP resources to identify named entities. The output contains categories like Person, Organization, Place or Geographical Political Entity. We were only interested in Persons and Organizations. The application of this program is not trivial, as we show in Supplemental Information, SI. In many instances we had to make a judgement about the meaning of a word in a specific context which is a labour intensive and time-consuming process.

The final step in this process involved building a database showing all the named persons and organisations, merging names like Donald or Trump with Donald Trump, sorting them and listing each with their frequencies normalised per million words of text.

Persons

Below we show the results for the most visible persons and organisations in all four countries. We do this by looking at the 25 most frequently cited persons and organisations, followed by an examination of the top 100. We present the names according to their roles, classifying them as domestic politician, foreign politician, scientist, activist or journalist (Table 1).

The most visible actors are politicians, mainly heads and former heads of state, and government ministers. France has a high degree of foreign politicians, the US a very low degree. There are some activists visible in France, Germany and the UK (mostly Greta Thunberg), but not in the US. Only two scientists show up in the top 25, Tubiana in France and Rahmstorf in Germany, both are academics active at the science-policy interface.

We also performed an analysis of the top 100 persons and organisations (see Supplemental Information, SI). Here several scientists are visible. The only one mentioned in all four countries is James Hansen. Michael Mann is also mentioned in Germany, the UK and the US, but not in France. Nicolas Stern is mentioned in France, Germany, and the UK, but not in the US. Furthermore, countries tend to quote their own scientists. For example, France mentions Valérie Masson-Delmotte, Hervé Le Treut, or Claude Allègre. Germany mentions Stefan Rahmstorf, Hans von Storch, Hans-Joachim Schellnhuber, Ottmar Edenhofer, or Mojib Latif. The UK mentions Nicholas Stern, James Lovelock or David King. The US only mentions James Hansen and Michael Mann in the top 100. Regarding so-called climate sceptics we note that only Bjorn Lomborg has some visibility in Germany and the UK.

The US has the highest proportion of domestic politicians, and the lowest proportion of foreign politicians. Journalists and activists are most visible in France. We did not differentiate between different categories among the persons which are uncoded. They include celebrities like Taylor Swift and Pope Francis, but mainly billionaires like Musk, Gates, Branson, or Bloomberg which are more visible in the UK and US. Bloomberg poses an additional coding problem as it is not clear if it refers to Michael Bloomberg or the media platform. Similar ambiguities were encountered with Bush, Clinton and Miliband. In these cases, we managed to code most of them. We coded politicians according to their function, not their nationality. Therefore Ursula von der Leyen and Martin Schulz appear as foreign politicians in the German dataset.

Table 1. Mentions of top 25 persons in the press. Italic = domestic politician; Bold = foreign politician; Bold + underline = scientist; Bold + italic = activist or journalist.

FR	DE	UK	US
Barack Obama	*Angela Merkel*	**Donald Trump**	*Donald Trump*
Donald Trump	**Barack Obama**	*Boris Johnson*	*Joe Biden*
Emmanuel Macron	**Donald Trump**	**Joe Biden**	*Barack Obama*
Joe Biden	*Sigmar Gabriel*	*David Cameron*	*George W. Bush*
Nicolas Hulot	**George W. Bush**	**Barack Obama**	*Bernie Sanders*
François Hollande	*Robert Habeck*	*Jeremy Corbyn*	*Clinton*
Nicolas Sarkozy	**Al Gore**	*Gordon Brown*	*Scott Pruitt*
George Bush	*Winfried Kretschmann*	*Tony Blair*	*McCain*
Angela Merkel	*Cem Özdemir*	**Vladimir Putin**	*Al Gore*
Laurent Fabius	***Greta Thunberg***	**George W. Bush**	*Elizabeth Warren*
Vladimir Poutine	*Jürgen Trittin*	**Al Gore**	*Hillary Clinton*
Xi Jinping	*Annalena Baerbock*	*Liz Truss*	**Vladimir Putin**
Ségolène Royal	*Katrin Göring-Eckardt*	*George Osborne*	*Mitch McConnell*
John McCain	*Olaf Scholz*	**Angela Merkel**	*Kamala Harris*
Hillary Clinton	*Christian Lindner*	**Emmanuel Macron**	*John Kerry*
Al Gore	**Wladimir Putin**	*Theresa May*	**Xi Jinping**
Audrey Garric	*Barbara Hendricks*	***Greta Thunberg***	*Manchin*
<u>**Laurence Tubiana**</u>	<u>**Stefan Rahmstorf**</u>	*Rishi Sunak*	**Boris Johnson**
Antonio Guterres	*Renate Künast*	*Keir Starmer*	**Macron**
Jean Jouzel	**Emmanuel Macron**	**Xi Jinping**	*Robert Mueller*
Jacques Chirac	*Armin Laschet*	*Ed Davey*	*Chuck Schumer*
Greta Thunberg	**Tony Blair**	*Mark Carney*	*Pete Buttigieg*
Ban Ki-moon	*Claudia Roth*	*Michael Gove*	*Bloomberg*
Pascal Canfin	*Norbert Röttgen*	**John Kerry**	*Mike Pence*
Yannick Jadot	*Peter Altmaier*	*Ed Miliband*	*Mitt Romney*

Organizations

News reports not only quote persons, but also organizations. The most visible organizations are shown in Table 2. In our analysis we distinguish between business organisations, NGOs, and domestic, international and foreign organisations. Domestic organisations refer to political parties and institutions, i.e. state funded bodies.

We note that the French press mentions international organizations most frequently, closely followed by Germany. State-owned utility company EDF is a major reference point. The *Verts* (Greens) are the only political party which appears in this list.

In Germany domestic political parties are dominant. The UK shows a mix of everything including foreign political parties as the case of the Australian 'Labor' indicates. It also has a strong focus on US political institutions. The US gives most emphasis to its constitutional bodies and government administration. US news reports quote domestic

Table 2. Mentions of top 25 organisations in the press. Italic = domestic; Italic + underline = international; Bold = foreign; Bold + underline = business; Italic + bold + underline = environmental NGO.

FR	DE	UK	US
ONU	*Die Grünen*	**EU**	*Senate*
UE	**EU**	**UN**	*White House*
<u>EDF</u>	*SPD*	*Labour*	*Congress*
GIEC	*CDU*	**IPCC**	*EPA*
AIE	*FDP*	**<u>Shell</u>**	**UN**
Commission européenne	**IPCC**	**<u>BP</u>**	*GOP*
G20	**UN**	*<u>White House</u>*	*NAICS*
<u>Total</u>	*Bundestag*	*Treasury*	**<u>Exxon</u>**
Verts	**EU-Kommission**	*Congress*	*Supreme Court*
Banque mondiale	*AfD*	*<u>EPA</u>*	**EU**
<u>Greenpeace</u>	*CSU*	**Amazon**	*NOAA*
OCDE	**RWE**	**Exxon**	**Twitter**
OMC	***<u>Greenpeace</u>***	*NHS*	*Medicare*
G7	*PIK*	***<u>Greenpeace</u>***	**Amazon**
CNRS	**Weltbank**	*<u>Senate</u>*	*NASA*
Sénat	**EU-Staaten**	**G20**	*FED*
CCNUCC	***<u>WWF</u>***	**EDF**	*Department of Energy*
<u>WWF</u>	**UN-Klimakonferenz**	*Met Office*	*Democratic Party*
Parlement	**Vattenfall**	*Bank of England*	*State Department*
FMI	**Europaparlament**	*<u>XR</u>*	**NATO**
Parlement européen	**Nato**	**World Bank**	*Interior Department*
Conseil fédéral	**WTO**	**IEA**	*<u>Shell</u>*
G8	**EPA**	*FTSE*	*FBI*
<u>Shell</u>	*<u>BUND</u>*	*<u>Nasa</u>*	*Republican Party*
BCE	*DWD*	*<u>Labor</u>*	*Interior*

institutions far more often than France, Germany and the UK. Only the UN, EU and NATO are visible international organisations in the US press.

All four countries have similar presence of business organizations. The top spots are taken by fossil fuel companies except for Germany where utility companies dominate. The proportion of environmental NGOs is similar in France, Germany and the UK with the US showing a blank in the top 25. The larger list of the top 100 shows similar proportions across the board (see Supplemental Information, SI).

Analysis of peaks

Here we present the summary results of the press coverage over time. We do this by analysing the persons and organisations, grouped for each country and looking only at the

top 25 (see Supplemental Information, SI for more detailed data underlying our analysis, based on the top 100).

Germany

The German press mentions German politicians frequently, but also US presidents. It is also remarkable that Greta Thunberg is in the top 25. George W. Bush and Al Gore were prominent in 2005 and 2006. Thereafter Merkel and Obama came into the limelight, due to their taking office. Media attention shifted to new actors after 2016. Trump shows the highest value in 2017, a year in which also Merkel is very visible again. Climate activist Thunberg has peak attention in 2019. The only persons mentioned throughout this period are Angela Merkel, Sigmar Gabriel, George W. Bush, Wladimir Putin, Al Gore, Jürgen Trittin and Hans-Joachim Schellnhuber.

German political parties dominate, but also international organisations like the EU, UN, or IPCC. Two environmental NGOs are very prominent (Greenpeace and WWF). The Green Party gets by far the most mentions, with a peak in 2017. Most political parties are a constant reference point, even the AfD which started to become visible after its foundation in 2013. The German press prominently mentions utility companies Vattenfall and RWE.

France

As we have seen above, in France foreign politicians receive much attention. Its own politicians pale in comparison. Obama is the most frequently mentioned person (in 2008), followed by Trump in 2017. Former French presidents Macron, Sarkozy and Hollande receive a fraction of their attention. Apart from Greta Thunberg there are two journalist activists, Nicolas Hulot and Audrey Garric. Hulot was minister for the environment from 2017 to 2018. The only persons visible throughout the whole period are Nicolas Hulot, Nicolas Sarkozy, George Bush, Angela Merkel, Al Gore, Jean Jouzel, and Jacques Chirac.

The French media landscape is dominated by international organisations, with a few domestic institutions. France is the only country in our corpus where G7, G8 and G20 receive significant attention. It also mentions the World Bank and the International Monetary Fund. Only the Greens appear as political party. Like in Germany, Greenpeace and the WWF are present, also fossil fuel and utility companies EDF, Total and Shell.

UK

Turning to the UK we see a strong presence of US presidents, but also of UK political leaders. Trump is by far the most frequently mentioned person (peaking in 2017), followed by Boris Johnson (in 2019). Greta Thunberg is the only visible activist. The following persons are present throughout the time span under investigation: Boris Johnson, David Cameron, Gordon Brown, Tony Blair, Vladimir Putin, George W. Bush, Al Gore, George Osborne, and Angela Merkel.

The EU is by far the most visible organisation in the British press (peaking in 2016), followed by the UN, the Labour Party and the IPCC. The British press also mentions the World Bank and the International Energy Agency (IEA) prominently. Among the domestic organisations the Treasury and Bank of England are noteworthy. The equivalent of these financial institutions is nowhere to be seen in the other countries in our sample. Greenpeace and Extinction Rebellion (XR) are in the top 25 with XR present after its foundation in 2018.

US

Donald Trump occupies the top spot in the US press, with a peak in 2017. He has three times as many mentions as Obama achieved in two terms of office. Biden gets some visibility during his start of term. All persons in the top 25 are US politicians, except Putin, Boris Johnson, Macron and Xi Jinping. No scientist or activist is visible. The peaks for these politicians is not normally during an election year which indicates that climate change was not an important topic during the campaigns (exceptions are McCain, Clinton and Bernie Sanders). The following persons are a constant reference point over the whole period: George W. Bush, Clinton, McCain, Al Gore, Hillary Clinton, John Kerry, Boris Johnson, and Mitt Romney.

The US press mentions only the UN, EU and NATO as international organisations. No financial institutions are visible. 2010 appears to be a crucial year for US climate politics as mentions of Senate, White House and Congress show a near doubling. The UN shows a peak in 2015 (Paris Agreement). In 2018 the Environmental Protection Agency (EPA) and the North American Industry Classification System (NAICS) are in the limelight. This may have to do with the new classification system for industries which was updated in 2018 and which had implications for industries related to climate action and environmental sustainability. The Republican Party (GOP) is quoted much more frequently than the Democratic Party—it did not show at all in 2005. The FBI is in the top 25 as it investigated environmental NGOs under the scare term 'eco-terrorism' which the media covered after 2017 (Bitar, 2018).

Collocation analysis

We now explore word collocations of key actors. In Table 3 we show the top five persons in each country (giving their time in office where applicable) and the words which are used in close proximity (five words to the left or right). We compare these profiles across persons and countries after identifying and ranking the collocates by Z-score and the overall frequency of their appearance.

The top persons in media coverage are primarily government ministers, heads of state, or government leaders—except Bernie Sanders. Only Trump and Obama appear in the top five across all four countries. In the US, all top five figures are domestic; in Germany, France, and the UK, only two are domestic. Noun collocates dominate, typically names of institutions and political figures. Verb collocates (e.g., *say*, *announce*, *promise*) highlight their speech-related activity.

Table 3. Most frequent word collocations of the top 5 persons in each country, 2005-2022. In brackets time in office, where applicable.

DE	Gabriel (2005-2009; 2013-2018)	Merkel (2005-2021)	Bush (2001-2009)	Obama (2009-2017)	Trump (2017-2021)
	UMWELTMINISTER	KANZLERIN	SENIOR	MICHELLE	PRÄSIDENT
	FELBERMAYR	CDU	BLAIR	XI	PUTIN
	SPD	KLIMAKANZLERIN	PRÄSIDENT	AMTSZEIT	BIDEN
	BUNDESWIRTSCHAFTSMINISTER	ÄRA	CLINTON	MERKEL	XI
	GLOS	SAGTE	HEILIGENDAMM	SAGTE	GEWÄHLT
	WIRTSCHAFTSMINISTER	MACRON	REGIERUNG	CLINTON	USA
	SCHULZ	UMWELTMINISTERIN	PUTIN	UNTER	PARISER
	MINISTER	GABRIEL	SPRACH	REPUBLIKANER	AMERIKA
	MERKEL	OBAMA	SEINER	REDE	SEINER
	WILL	WOLLTE	SAGTE	WOLLTE	SEINEN

FR	Biden (2021-2025)	Hulot (2017-2018)	Macron (2017-)	Obama (2009-2017)	Trump (2017-2021)
	L'ADMINISTRATION	FONDATION	PRÉSIDENT	PRÉSIDENT	PRÉSIDENT
	PRÉSIDENT	DÉMISSION	ANNONCÉ	CLINTON	RETRAIT
	VICTOIRE	SOLIDAIRE	PROMIS	MCCAIN	POUTINE
	ÉLU	ENVOYÉ	MERKEL	HILLARY	AMÉRICAIN
	AMÉRICAIN	ÉCOLOGIQUE	VOULOIR	AMÉRICAIN	L'AMÉRIQUE
	XI	PACTE	VISITE	CANDIDAT	BIDEN
	PROMET	SPÉCIAL	ENGAGÉ	XI	MANDAT
	PROMIS	MINISTRE	PROMESSE	VICTOIRE	DÉCISION
	PLAN	PROCHE	CAMPAGNE	PRÉSIDENCE	ANNONCÉ
	ANNONCÉ	TRANSITION	FRANÇAIS	DÉMOCRATE	PROMIS

Table 3. (continued)

UK	Biden (2021-2025)	Cameron (2010-2016)	Johnson (2019-2022)	Obama (2009-2017)	Trump (2017-2021)
	ADMINISTRATION	DAVID	FLEXES	XI	REALDONALDTRUMP
	PRESIDENT	MAY	BORISJOHNSON	CLINTON	TWEETED
	SANDERS	TORY	MUSCLES	CONGRESS	WITHDRAW
	PRESIDENCY	BROWN	SAYS	UNDER	MACRON
	HARRIS	CONSERVATIVE	CORBYN	FORMER	PULLED
	PLEDGED	CLEGG	ALAN	SAID	PUTIN
	DEMOCRATS	JAMES	HUNT	HOUSE	BIDEN
	MACRON	GEORGE	HIS	SPEECH	XI
	PROMISED	PROMISED	RESIGN	ANNOUNCED	TARIFFS
	WANTS	WANTS	MAYOR	HAS	ACCUSED

US	Biden (2021-2025)	Bush (2001-2009)	Sanders	Obama (2009-2017)	Trump (2017-2021)
	HUNTER	JEB	WARREN	MICHELLE	TOWER
	PLEDGED	FIRES	VERMONT	UNDER	IVANKA
	TEAM	CUTS	HUCKABEE	FORMER	MELANIA
	PROMISED	IRAQ	ELIZABETH	CLINTON	TWEETED
	CAMPAIGN	GOVERNOR	SENATOR	ADVISER	REPEATEDLY
	SIGNED	SIGNED	BUTTIGIEG	RULES	IMPEACH
	VOWED	WON	INDEPENDENT	MCCAIN	REALDONALDTRUMP
	HARRIS	MCCAIN	SUPPORTERS	REGULATIONS	IMPEACHING
	WANTS	CLINTON	ENDORSED	STANDARDS	WON
	SANDERS	TAX	BIDEN	XI	CLAIMED

Trump has the highest overall visibility. His collocation profiles differ: in Europe, names like *Putin*, *Biden*, and *Xi* are prominent; in the US, *tower*, *Ivanka*, and *Melania* dominate. The UK and US press both reference Trump's Twitter activity, with *RealDonaldTrump* and *tweeted* appearing frequently. Obama is closely associated with *Xi* and *Clinton* (Hillary), while in the US, his top collocates—*rules*, *regulations*, *standards*—suggest a focus on policy.

Biden is absent from Germany's top five but appears in France with collocates like *promet*, *annoncé*, and in the UK/US with *promised* and *pledged*. Sanders appears only in US media, accompanied by other domestic politicians. Bush features in German and US coverage, linked to *Heiligendamm*, *fires*, *cuts*, and *tax*.

European figures show up only in domestic coverage: Gabriel and Merkel (Germany), Hulot and Macron (France), Cameron and Johnson (UK). Merkel is often called *Klimakanzlerin* and is linked to Obama and Macron. Macron is frequently collocated with *annoncé* and *promis*. Hulot appears mainly with *démission*. Cameron is associated with other UK politicians and words like *promised*. Johnson is linked to *flexes*, *muscles*, and his Twitter handle.

Heads of state are central in their own countries and sometimes abroad. Notably, Obama and Xi are linked in all four countries, while Trump is consistently associated with Putin. Twitter communication is most prominent for Trump and Johnson in the US press.

Discussion

From science to politics, to global power politics

The climate change discourse in the four countries we analysed—France, Germany, the UK, and the US—shows notable similarities. It is dominated by politicians, some of whom maintain a long-term presence across the entire observation period. In contrast, scientists and activists play a relatively minor role.

Media coverage has shifted over time. Initially focused on scientific findings in the early 1990s, the discourse has increasingly emphasized the political and economic dimensions of climate change, echoing broader societal trends. As Schäfer and Schlichting (2014) noted, science remains present but has declined in prominence as climate change has become a political and social issue. We confirm this shift and argue that climate change is now also a matter of global power politics.

Earlier studies, such as Trumbo (1996) and Chinn et al., (2020), show declining scientific presence and growing politicization in US media. Our data indicates that this trend applies across all four countries. The prominence of Chinese and Russian leaders in the discourse further highlights climate change as a topic of global governance (Allan, 2017). Under President Xi, China has increased its engagement, likely driven by concerns over regime legitimacy (Li et al., 2024; Lian and Li, 2024; Teng and Wang, 2021). In contrast, Russia's early support in the 2000s has faded, as noted by (Kaczmarski, 2020: 104), 'Back in 2004, the EU supported Russia's bid for WTO membership in exchange for Moscow's participation in tackling climate change. This turned out to be Russia's last contribution to the climate change regime.'

China went in the opposite direction. Having refused to agree to binding reductions of greenhouse-gas emissions at COP15 in Copenhagen in 2009, it now portrays itself as a leader in climate mitigation, especially after the US announced its withdrawal from the Paris Agreement under President Trump in 2017.

Interestingly, representatives from developing countries—including other BRICS members—are largely absent from our corpus and collocation analysis, suggesting limited media visibility in Western outlets. This is notable given their longstanding divergence from the interests of richer nations. Other G8 members like Italy and Japan also receive little attention.

Lastly, no highly visible individuals from fossil fuel or renewable energy companies appear in the corpus, though such firms are present in the list of analysed organisations.

Domestication and global journalism

Our results reveal notable differences in the attention given to prominent claims makers across the four countries studied. This connects to our initial question: are we witnessing the rise of globalized journalism, or rather processes of domestication? Vu et al., (2019), in a comparative analysis of 45 countries, found that 'media from richer countries are more likely to frame climate change as an issue of domestic politics.' Similar findings were reported by (Schäfer and Schlichting, 2014; Kukkonen et al., 2018), based on more detailed analyses. While our sample includes only countries from the Global North, our findings suggest that domestication occurs in different forms even among wealthy nations.

The US media is markedly inward-looking, whereas France, Germany, and the UK give significant attention to US leaders—an asymmetry worth noting. This casts doubt on the idea of balanced global journalism. Although all four countries tend to prioritize domestic voices, French, German, and British media also quote American figures extensively. The reverse, however, does not hold: foreign scientists, activists, and political leaders are almost entirely absent from US coverage. Notably, George W. Bush and Al Gore are the only two individuals appearing annually in the top 25 most mentioned figures across all four countries, underscoring the US's centrality in Western media networks.

In terms of organisations, the US refers to international bodies like the UN and EU but rarely to non-US organisations. France, in contrast, frequently references international institutions—possibly reflecting its tradition of strategic autonomy and resistance to US-centric global politics (Franke and Varma, 2019). France's emphasis on cooperative diplomacy aligns with this broader political stance.

Germany focuses primarily on domestic political parties. This may be rooted in Germany's constitutional framework, which formally integrates parties into its democratic structure. The Grundgesetz and the 1967 Party Act mandate that parties promote democratic values, setting Germany apart from more informal systems like that of the US, where parties operate with fewer legal constraints (Lehmbruch, 1977).

The UK, meanwhile, stands out for its frequent mentions of both international and non-UK organisations. Additionally, domestic financial institutions appear more prominently in UK coverage than in the other countries. This aligns with the UK's economic structure,

where financial services account for nearly 9% of GDP and London remains a major global financial hub.

Lastly, the US system of government, with its separation of powers among executive, legislative, and judicial branches, may contribute to the visibility of high-profile political figures. The president has broad authority, including issuing executive orders, nominating key officials, and influencing federal agencies—though these powers are subject to checks by Congress and the courts (U.S. Government, 2025).

Comparative politics and journalism

These findings highlight key differences in how four Western democracies report on climate change. They contribute to ongoing debates about national styles and norms of journalism. How do our results compare with the literature reviewed earlier?

Scholars in STS and communication studies often rely on broad typologies—such as pluralism versus corporatism, or Westminster versus consensus models—or categories like civic epistemologies (consensus, pragmatism, confrontation). However, these frameworks are too abstract to be directly applied to our data (see also Norris, 2009). Nevertheless, our findings allow for an evaluation of these typologies.

Contrary to previous claims, we found no strong evidence that sceptical voices are more visible in the US and France compared to Germany and the UK. The notion that journalists once gave equal attention to mainstream and sceptical scientists (Boykoff and Boykoff, 2004) seems outdated. Prestige newspapers now focus far more on political actors than scientists, and even the UK's right-wing press has reduced its coverage of climate scepticism (Gabbatiss et al., 2022; Wakim, 2024).

We also challenge assertions that US journalism emphasizes objectivity while French media follows a more opinionated style. Nor did we find that *The New York Times* focuses more on negative consequences and *Le Monde* more on politics. In all four countries, political dimensions dominate climate reporting. France shows a slightly higher emphasis on scientific aspects than the US, but not dramatically so.

Our data contradicts Häussler et al. (2016), who argued that majoritarian systems (like the US and UK) better amplify scientific and civil society voices than consensus democracies (like Germany). In contrast, we found scientists and civil society actors more prominent in German news coverage than in the UK or US. This may reflect methodological differences: Häussler et al. analyzed parliamentary debates from 2012 to 2013, while our study examined newspaper coverage from 2005 to 2022. The climate youth movement, a major civil society force, only gained prominence after 2019.

News coverage remains elite-centered in another way: prestige outlets show the most sustained and rising attention, especially after 2019. Tabloids like the *Daily Mail* declined after 2018, while elite papers like *The Guardian*, *Washington Post*, *Spiegel*, and *Le Monde* now treat climate change as a central topic (Bolstad and Victor, 2024; Gabbatiss et al., 2022; Wakim, 2024). The *Washington Post* expanded its team of reporters and editors dedicated specifically to climate and environmental issues. In 2019 it launched a 'climate team' within its newsroom, a signal of its commitment to elevating the topic (Covering Climate Now, 2023).

Lastly, France continues to rely heavily on the IPCC and other international institutions as authoritative sources (Table 2). Across all countries, we observe little visibility for sceptical voices—a trend consistent with the growing institutionalization of climate reporting.

Challenging the elites

In their classical study on the discourse on nuclear power, Gamson and Modigliani distinguished between an official and a challenger discourse, the latter 'providing packages that are intended to mobilize their audiences for some form of collective action… they invent their own clever catchphrases, drawing on a popular culture that they share with their audience.' (Gamson and Modigliani, 1989).

In our case the phenomenal rise of President Trump's visibility in all four countries makes him the most frequently quoted person. But he seems to undermine the typology presented above: as president he is in an official function, yet at the same time he is a challenger to the official climate change discourse, rejecting some central elements of the official framing and narrative. In this sense he is the most prominent actor, and the most prominent climate sceptic.

The other prominent challengers are new climate activist groups such as Fridays for Future or XR. Greta Thunberg shot to fame in 2019. What these challengers share is their rapid rise to massive public attention. Trump and the climate movement are at different ends of the political spectrum, and advocate different climate policies. Both want to disrupt the consensus of 'the center', represented by international organisations like the UN, IPCC, World Bank, and politicians from Bush to Merkel, from Obama to Macron. The press in all four countries was keen to cover their messages which resulted in sudden bursts of attention.

Limitations

Corpus analysis moves along the surface of media reports and tries to delve deeper through linguistic analysis, and contextual information. While the analysis can show the prominence of claims makers it cannot hope to discover political influence or effectiveness.

Our sample was limited to legacy newspapers which may explain some of the findings. Studies using social media data have highlighted strong polarisation, with climate scepticism aligning with right-wing politics and activism with left-wing politics. Cann et al. (2021: 20) note 'polarisation and segregation with a large left-wing/environmentalist grouping and a smaller right-wing/sceptic grouping'. Much of this research focuses on the U.S, and to a lesser extent the UK and Australia.

Another limitation is our exclusive focus on prestige press in the Global North. While some regional papers were included, this was not systematic. Our analysis focused solely on claims makers in four Western countries. Ideally, future work would include the Global South and link actors to specific claims or frames. We do not suggest generalizing from

our limited dataset. However, some of the empirical findings warrant further investigation, developing hypotheses based on the present research.

Summary

The climate change discourse in France, Germany, the UK, and the US is dominated by political actors, while scientists and activists play minor roles. Media coverage has shifted from scientific findings in the early 1990s to political and economic dimensions, reflecting broader societal trends and the rise of global power politics. Leaders from China and Russia now highlight the global governance aspect, especially after the US withdrawal from the Paris Agreement under President Trump. Developing countries and most G8 members receive little media attention, as do actors from fossil fuel or renewable energy sectors.

National differences in reporting reveal the tension between globalized journalism and domestication. US media are inward-looking, rarely quoting foreign actors, whereas France, Germany, and the UK frequently reference US leaders and international institutions. France emphasizes international cooperation, Germany focuses on domestic political parties, and the UK highlights international organizations and domestic financial institutions. Differences also reflect political systems: the US presidential system amplifies individual political figures, while Germany's party-centered constitutional framework highlights parties as key actors.

Contrary to previous claims, sceptical voices are now marginal across all four countries, and political issues dominate climate coverage. The visibility of scientists and civil society actors varies, with Germany showing higher prominence than the US or UK. Media attention has increasingly concentrated in elite outlets after 2019, coinciding with the rise of prominent challengers such as President Trump and climate movements like Fridays for Future and Extinction Rebellion. Both disrupt dominant discourse, generating bursts of media attention while challenging international organizations and mainstream political actors.

Concluding remarks

In conclusion, we would like to emphasize three points.

First, we have made a contribution to methodology by proposing a set of procedures to construct a valid corpus on the discourse of climate change in four Western countries. To do that required a mix of corpus analysis and manual inspection, in an iterative process of refinement. As a result, we can offer a new method of potential interest to the numerous researchers who carry out computer assisted investigations using large scale textual databases. We also showed how to identify and analyse the actors shaping the discourse, using named entity software.

Secondly, our results show that the discourse of climate change has become a topic of global power politics. The most visible actors are government figures from the countries in our sample, but also from China and Russia. There are very few visible scientists, even climate activists are more salient than climate scientists. The US is an exception as it does

not show any climate activist or scientist prominently. It also has the lowest proportion of foreign politicians.

The analysis of organisations shows a diversity of what counts as authority. France gives most prominence to international organizations (UN, EU, IPCC, World Bank and G8), Germany to domestic political parties. The UK is open to foreign influences, but also to financial considerations, given the prominence of financial institutions in its economy. In the US only domestic political bodies are relevant, most importantly Congress and Senate, the EPA and the White House.

These different patterns of reporting could be interpreted to reflect national political cultures. It makes a difference if constitutional bodies, or political parties, international organisations, or financial institutions are regarded as important authorities. Climate change, while being a global issue, is strongly embedded in national cultures. Its domestication seems to put a question mark behind the claims made about global journalism.

Thirdly, climate change has become a topic of the prestige press. Coverage is much higher compared to regional or tabloid papers, especially after 2019. The rise of claims makers challenging the elites, personified in Donald Trump and Greta Thunberg, has galvanized the elite papers in all four countries.

Author contributions

RG: Development of research questions; theoretical framework; additional data collection; interpretation of data; presentation of data; writing of paper; writing Supplementary Information. MS: Preparing downloaded data for analysis; conducting corpus analysis using WordSmith and NER software; writing Supplementary Information; editing main paper.

Declaration of conflicting interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Supplemental material

Supplemental material for this article is available online.

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