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Extreme weather events do not increase political parties' environmental attention

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Exposure to extreme weather events can make people more aware of environmental changes; however, it remains unclear how such events influence politicians' behaviour. Combining supervised learning algorithms on over 260,000 press releases by European parties with a difference-in-differences design, we find that apart from Green parties, extreme weather events do not increase attention towards environmental issues. This suggests the consequences of climate change might not directly increase political attention.

Climate change increases the severity and frequency of extreme weather events[1]. The summer of 2023—with its dramatic wildfires in Canada and historic droughts across Europe—painfully showcased the consequences of the climate crisis. Addressing the consequences of climate change requires political leadership. In the wake of extreme weather events, where voters tend be more concerned about relief than with long-term prevention[2] and overemphasize these recent and salient experiences[3], it falls upon political leaders to prioritize environmental issues and maintain this commitment.

There is a growing literature on the consequences of extreme weather events for voters. This work tends to find that exposure to these events can make people more aware of and more progressive on environmental issues[3–5]. Nevertheless, these effects tend to be very short-lived[5] and in some cases practically non-existent[2,6].

Less is known about the consequences of extreme weather events for elite behaviour, and it remains unclear whether they serve as a wake-up call for politicians. In the United States, studies have found a correlation between temperature anomalies and climate change bill sponsorship among Democrats[7], whereas linking wildfires to climate change might backfire for Republicans[8]. Studies elsewhere point out electoral considerations as a key factor shaping political responses to climate change[8,9], but extreme weather events have been shown not to increase climate policies[10]. The extent to which politicians recognize the gravity of climate change and the need for policies in response to extreme weather events remains a critical topic requiring further examination.

In this study, we ask whether political parties pay more attention to environmental issues in the aftermath of extreme weather events. We collected a dataset of over 260,000 press releases from 68 parties in nine countries from 2010 to 2020. A party can publish several press statements per day, which are regularly covered by the media. This allows for a dynamic measure of party communication[11].

We follow previous research on party politics (for example, ref. 9) and focus on the share of press releases each party devotes to the Environment. This category refers to climate, sustainability and environmental policies, allowing us to include a broad array of ways through which parties discuss climate change (Supplementary Information Section 1.4 includes coding instructions). Attention is the process through which politicians allocate their scarce time and resources to a certain policy issue over other issues (for example, ref. 12).

Our measure of attention captures the share of press releases a party issues on environmental matters, reflecting its emphasis and priority on environmental policies.

To measure the occurrence of extreme weather events, we use data on fatal storms, floods, wildfires and spells of extreme temperatures[13]. These are types of event that increase with climate change[1,14] and invite a political response. We use a difference-in-differences design to estimate the causal effect of these events on parties' attention to the environment.

Results

We illustrate one of the events we study in Fig. 1. In 2016, a harrowing flood resulted in multiple deaths and immense damages in Germany[13]. While the flood is unfolding, there is one press release acknowledging the need for climate action. However, there is no systematic increase in the attention towards environmental issues in the following six weeks compared with the six weeks before the flood.

The estimates for our main analysis are presented in Fig. 2: the average effects of extreme weather events on an exposed party's weekly

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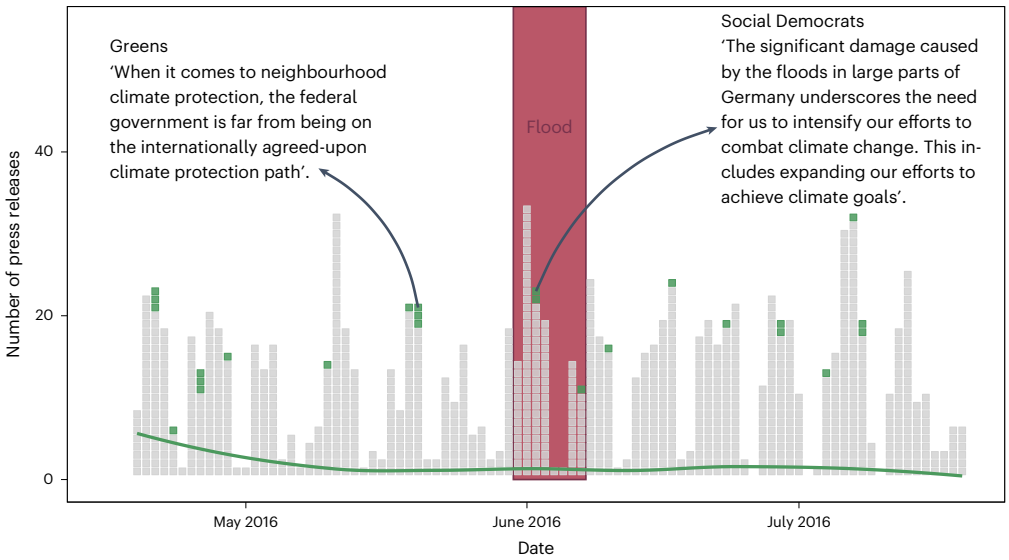

Fig. 1 | Example of attention to environmental issues around extreme weather events. Daily number of press releases in Germany six weeks before and after the 2016 flood. Green boxes indicate press release categorized as Environment. The green curve represents LOESS (locally estimated scatterplot smoothing) applied to daily average attention toward the environment. Of all press releases in this time frame (n = 1,093), 2.3% fall into category 7: Environment.

share of press releases from the category Environment. From the week the event takes place and up to six weeks after, the estimates are close to and indistinguishable from zero. In the weeks before an extreme weather event, there is also no evidence of significant differences between exposed and unexposed parties, providing support for parallel trends, the main causal identification assumption of difference-in-differences designs.

We explore heterogeneity across a number of likely scenarios for when parties should react to extreme weather events. First, we limit the analysis to Green parties, the party family prioritizing environmental issues most and usually considered most competent in handling environmental challenges[9]. Here we find an increase (6.1 percentage points) in the attention to environmental issues during the week of the event. However, one week later, Green parties revert to the baseline. Neither other left-leaning parties (communist, liberal and socialist) nor right-leaning parties (agrarian, Christian, conservative and radical right) show any change in their attention to environmental issues. Second, parties in the opposition might be more prone to react to these events and point to issues in the government's action. Yet, opposition parties also do not register any change in their attention to the environment. The same is true for government parties. Finally, the null results are not driven by different event types. There is no systematic change in parties' issue attention after floods, storms, wildfires or extreme temperatures.

Because extreme weather events might take longer to create a shift in the attention of parties to environmental issues, we re-run the the analysis from above across six months, rather than six weeks. Again, we find no effects (Extended Data Fig. 1).

Our main classification scheme might pick up environmental issues that are not directly related to climate action. We therefore created a dictionary following ref. 15 to look at press releases that specifically mention climate change or climate action and re-ran our main analysis with this categorization. The results support our findings from the main analysis (Extended Data Fig. 2).

We furthermore rule out spillover effects (Extended Data Fig. 3) and the lack of Green party representation (Extended Data Fig. 4) as the drivers of this null effect. Finally, we see a sharp increase in relief-related communication in the week of an extreme weather event (Extended Data Fig. 5), indicating that parties do address these events without addressing climate change.

Discussion

We show that political parties do not prioritize environmental issues following extreme weather events. Analysing more than 260,000 press releases from 68 parties in nine countries throughout 2010–2020, we only find short-lived effects for Green parties. For all other subgroups and specifications, we find persistent unresponsiveness. These results are especially concerning as we investigate parties' responsiveness to extreme weather events in conditions that should make effects likely. First, this study focuses on Europe where voters and politicians have been sensitized to environmental concerns for decades. Second, we focus on particularly severe extreme weather events that resulted in fatalities, increasing the signal effect for urgent action. Third, we analyse political speech that can register quicker responses compared with legislation. Finally, we focus on a broad category of environmental issues that would allow parties to react in numerous ways. Yet, we find no evidence of a response across different contexts.

Highly salient extreme weather events can influence opinions on climate change[3] and voting behaviour[16], though these impacts are modest[2,6,17,18]. This limited effect may provide little incentive for parties to prioritize climate change discussions or politicians might underestimate the actual support for climate policies[19,20]. However, unlike in the United States[8], political parties in the United Kingdom benefit electorally from discussing climate change in the aftermath of extreme weather events[21], suggesting this strategy can gain votes in Europe. Our research centres on whether extreme weather generally elevates attention to climate issues, prioritizing this broad enquiry over the analysis of specific contexts of party reactions. Future studies should delve into these dynamics, the conditions prompting party responses to extreme weather and extend this research to other contexts.

Our research extends previous work on climate politics in different ways. First, it moves beyond focusing on the consequences of extreme weather events for voters[5] by shedding light on how parties react to extreme weather events. Second, it contributes to the mixed evidence on the relationship between extreme weather events and politicians' behaviour. We do so by extending the contexts we study to a cross-country analysis, and by using a more robust and fine-grained empirical approach. Finally, we test these effects outside the United States where most studies on this topic have been conducted so far[7,8]. Our findings reveal important insights into the politics of climate

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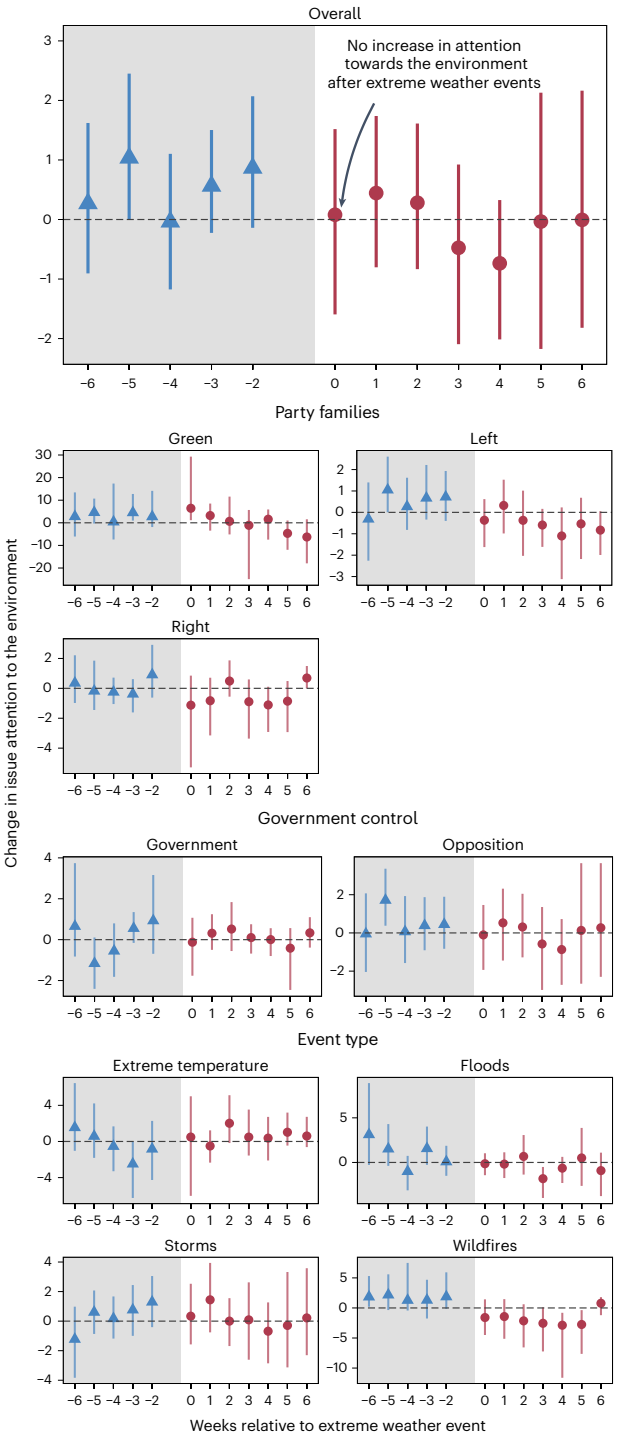

Fig. 2 | Estimated average treatment effects on the treated across different specifications. Red circles indicate the estimated effect (average treatment effect on the treated). For all specifications, we report the contemporaneous effects while the event is unfolding ($t = 0$) and effects for up to six weeks after the event occurred ($t = 6$). Blue triangles indicate placebo estimates for up to six weeks before the event ($t = -6$). Shaded area indicates pre-treatment time frame. The lines indicate the 95% bootstrapped confidence intervals. A coefficient greater than zero indicates that parties increased the weekly share of press releases dedicated to the category Environment. We report changes in percentage points. Overall shows the overall effect across all party-week observations ($n = 39{,}910$). Green ($n = 4{,}912$), Left ($n = 18{,}420$), Right ($n = 15{,}350$), Opposition ($n = 24{,}116$) and Government ($n = 10{,}572$) limit the analysis to parties with the respective party characteristics. Floods ($n = 39{,}910$), storms ($n = 39{,}910$), wildfires ($n = 39{,}910$) and extreme temperatures ($n = 39{,}910$) retain all observations but change the treatment definition to capture the effect of the respective event type in isolation.

change and suggest that even fatal extreme weather events are not increasing attention to the issue of climate change.

Online content

Any methods, additional references, Nature Portfolio reporting summaries, source data, extended data, supplementary information, acknowledgements, peer review information; details of author contributions and competing interests; and statements of data and code availability are available at https://doi.org/10.1038/s41558-024-02024-z.

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Methods

Measurement

We collect information on extreme weather events from the Emergency Events Database (EM-DAT)[13]. We restrict our sample to extreme weather events that reportedly resulted in fatalities ($n = 69$). For party characteristics and government participation, we use the ParlGov database[22].

We collected press releases from all nationally represented parties in nine countries (Austria, Denmark, Germany, Ireland, the Netherlands, Poland, Spain, Sweden and the United Kingdom), mainly by scraping their official websites. We applied supervised machine learning algorithms to classify our corpus of all press releases from these parties. Building on the Comparative Agendas Project (CAP)[23], we created a codebook with detailed coding instructions that separate issue areas including example press releases to train native speaker coders (Supplementary Information Section 1.4 provides more information). We evaluate the database and the use of supervised machine learning approaches elsewhere (ref. 24 and Supplementary Information Section 2), showing that the data have good coverage and that the approach measures parties' dynamic issue agendas well. We then created daily counts and shares of press release categories for every party, merged these data with party-level information and aggregated these for calendar weeks and months.

Statistical modelling

We used a difference-in-differences estimator proposed by ref. 25, allowing for both staggered and repeated treatment exposure. After constructing a set of control units with identical pre-treatment history for every treated unit and consequently refining it through matching procedures, a difference-in-differences estimator is applied. The average treatment effect on the treated (ATT) is thus defined as

$$\delta(F,L) = \mathbb{E}\left\{ \begin{array}{c} Y_{i,t+F}\left(X_{it}=1, X_{i,t-1}=0, \sum_{\ell=2}^{L} X_{i,t-\ell}\right) \\ -Y_{i,t+F}\left(X_{it}=0, X_{i,t-1}=0, \sum_{\ell=2}^{L} X_{i,t-\ell}\right) \\ |X_{it}=1, X_{i,t-1}=0 \end{array} \right\} \quad (1)$$

where i indexes a party exposed to an extreme weather event in week t. The pool of potential control units consists of parties not exposed to an extreme weather event from the same time period with identical pre-treatment history of L lagged weeks. $Y_{i,t+F}(X_{it}=1, X_{i,t-1}=0, \sum_{\ell=2}^{L} X_{i,t-\ell})$ defines the potential outcome for parties exposed to extreme weather events whereas $Y_{i,t+F}(X_{it}=0, X_{i,t-1}=0, \sum_{\ell=2}^{L} X_{i,t-\ell})$ denotes the potential outcome for parties outside of extreme weather events. Our outcome is the weekly share of press releases from the category Environment at the party level. For our main analysis, we specify $L = 6$ and $F = 6$, to identify ATTs until six weeks after an event occurred, conditioning on a six-week pre-treatment history. We use exact matching for party family and apply Mahalanobis distance matching to condition on the lagged outcome. We rely on blocked bootstrapping procedures to estimate standard errors (1,000 iterations). The key causal identification assumption (parallel trends) appears plausible in our case, as there are no systematic differences between the treatment and control units before treatment (blue triangles in Fig. 2).

Reporting summary

Further information on research design is available in the Nature Portfolio Reporting Summary linked to this article.

Data availability

All data and materials on party characteristics and extreme weather events are deposited at the Harvard Dataverse website[26]. Due to copyright restrictions, we are able to share only aggregates of press release categories, not the content of individual press releases.

Code availability

The analysis code (completed in R) is openly available on the Harvard Dataverse[26] website.

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Author contributions

T.W. designed research, performed research, analysed data and wrote the paper. A.V. wrote the paper. H.K. designed research, performed research and wrote the paper. L.F.S. designed research, performed research and wrote the paper.

Competing interests

The authors declare no competing interests.

Additional information

Extended data is available for this paper at https://doi.org/10.1038/s41558-024-02024-z.

Supplementary information The online version contains supplementary material available at https://doi.org/10.1038/s41558-024-02024-z.

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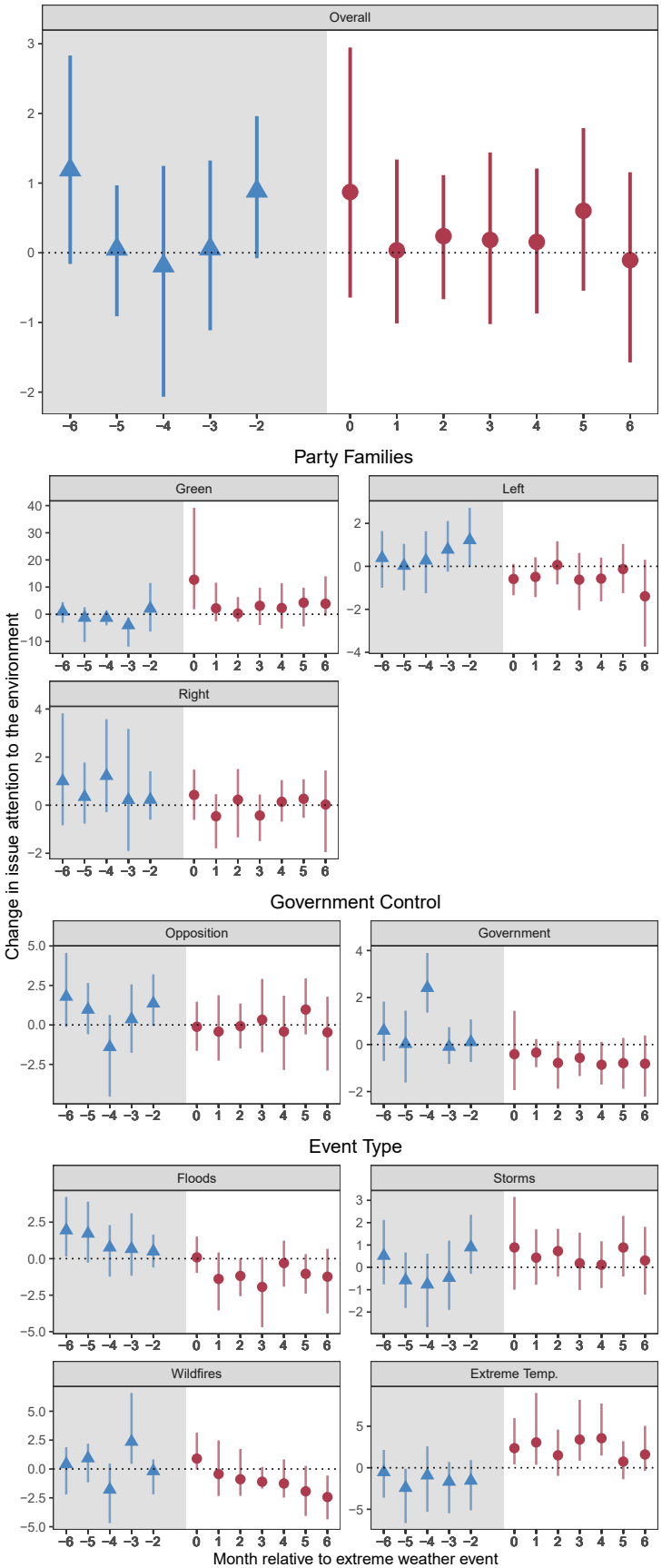

Extended Data Fig. 1 | See next page for caption.

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Extended Data Fig. 1 | Effect on monthly environmental attention. Circles indicate the estimated effect (average treatment effect on the treated). For all specifications, we report the contemporaneous effects while the event is unfolding (t = 0) and effects for up to six months after the event occurred (t = 6). Triangles indicate placebo estimates for up to six months before the event (t = − 6). The lines indicate the 95% bootstrapped confidence intervals. A coefficient greater than zero indicates that parties increased the monthly share of press releases dedicated to the category *Environment*. We report changes in percentage points. Overall shows the overall effect across all party-week observations (n = 9100). Green (n = 1120), Left (n = 4200), Right (n = 3500), Opposition (n = 5469), and Government (n = 2433) limit the analysis to parties with the respective party characteristics. Floods (n = 9100), Storms (n = 9100), Wildfires (n = 9100), and Extreme Temp. (n = 9100) retain all observations but change the treatment definition to capture the effect of the respective event type in isolation.

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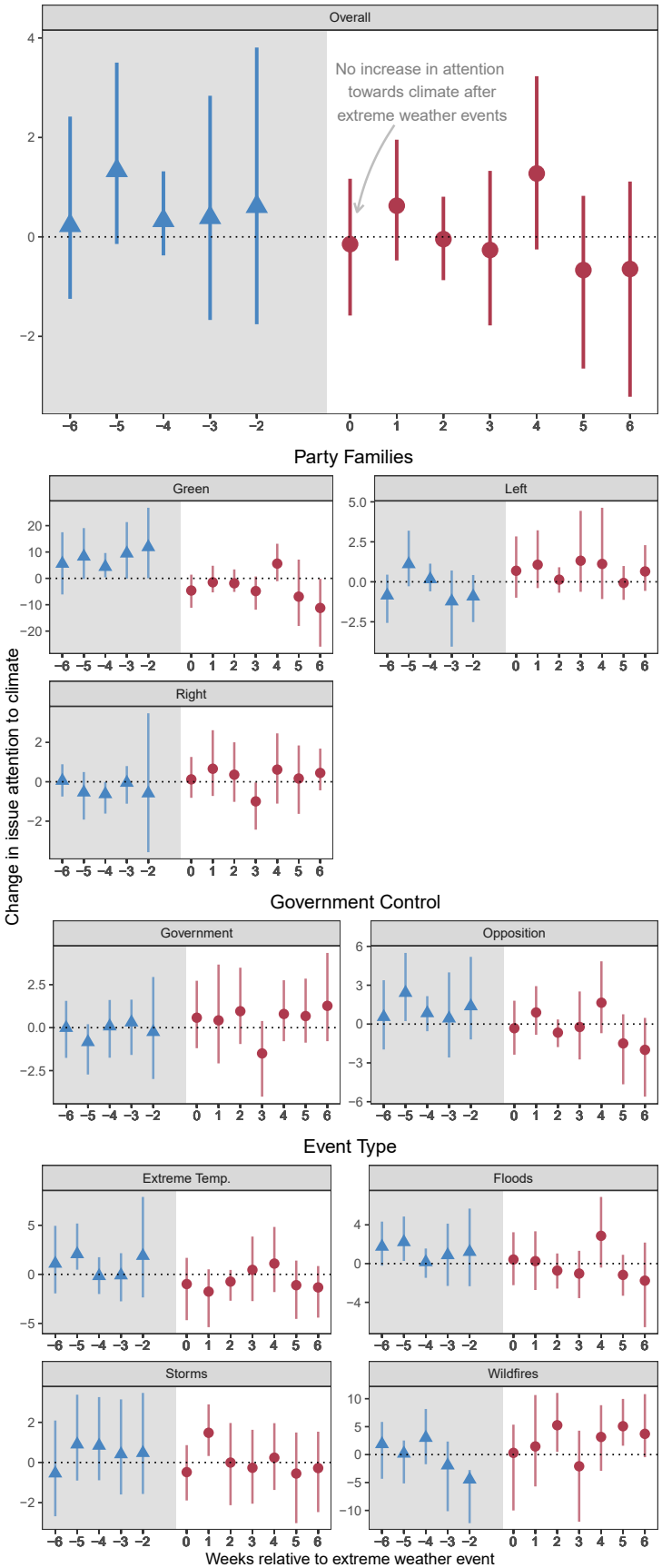

Extended Data Fig. 2 | See next page for caption.

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Extended Data Fig. 2 | Dictionary approach. Circles indicate the estimated effect (average treatment effect on the treated). For all specifications, we report the contemporaneous effects while the event is unfolding (t = 0) and effects for up to six weeks after the event occurred (t = 6). Triangles indicate placebo estimates for up to six weeks before the event (t = − 6). The lines indicate the 95% bootstrapped confidence intervals. A coefficient greater than zero indicates that parties increased the weekly share of press releases identified with the dictionary presented above. We report changes in percentage points. Overall shows the overall effect across all party-week observations (n = 39910). Green (n = 4912), Left (n = 18420), Right (n = 15350), Opposition (n = 24116), and Government (n = 10572) limit the analysis to parties with the respective party characteristics. Floods (n = 39910), Storms (n = 39910), Wildfires (n = 39910), and Extreme Temp. (n = 39910) retain all observations but change the treatment definition to capture the effect of the respective event type in isolation. See SI 5.2 for more information.

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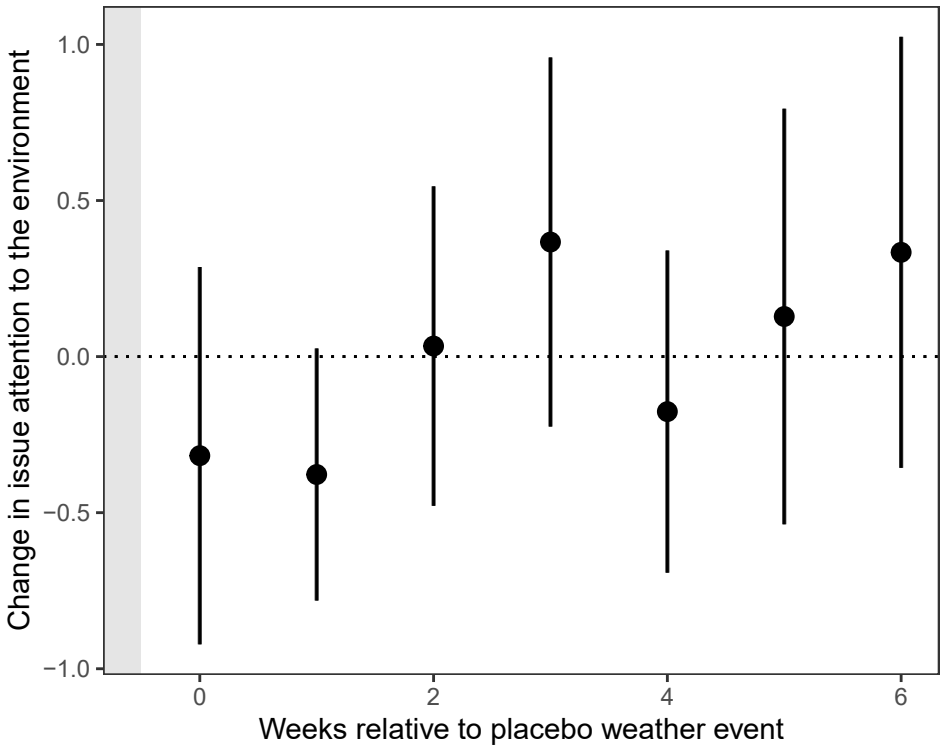

Extended Data Fig. 3 | Spillover. Point estimates from fixed effects regressions, analyzing the within-changes of parties' environmental attention relative to their six-week trend preceding the external (placebo) event (n = 39757). We report the contemporaneous effects while the event is unfolding (t = 0) and effects for up to six weeks after the event occurred (t = 6). The lines indicate the 95% confidence intervals. A coefficient greater than zero indicates that parties increased the weekly share of press releases dedicated to the category *Environment*. We report changes in percentage points. See SI 5.3 for more information.

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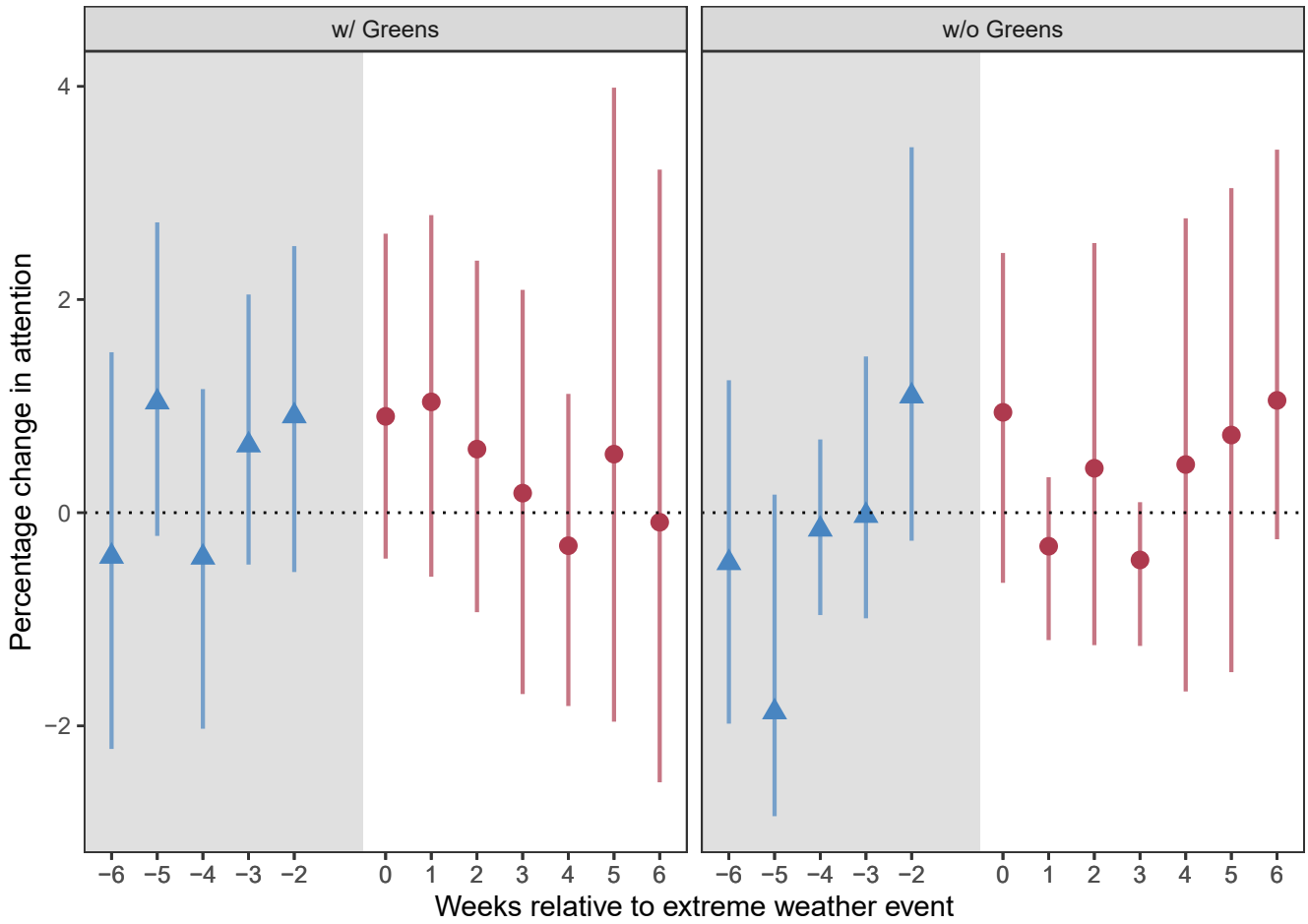

Extended Data Fig. 4 | Green party representation. Circles indicate the estimated effect (average treatment effect on the treated). For both specifications, we report the contemporaneous effects while the event is unfolding (t = 0) and effects for up to six weeks after the event occurred (t = 6). Triangles indicate placebo estimates for up to six weeks before the event (t = − 6). The lines indicate the 95% bootstrapped confidence intervals. A coefficient greater than zero indicates that parties increased the weekly share of press releases dedicated to the category *Environment*. We report changes in percentage points. w/Greens limits the analysis for parties from party-systems with Green party representation (n = 27630), w/o Greens to those without Green party representation (n = 3958). See SI 5.4 for more information.

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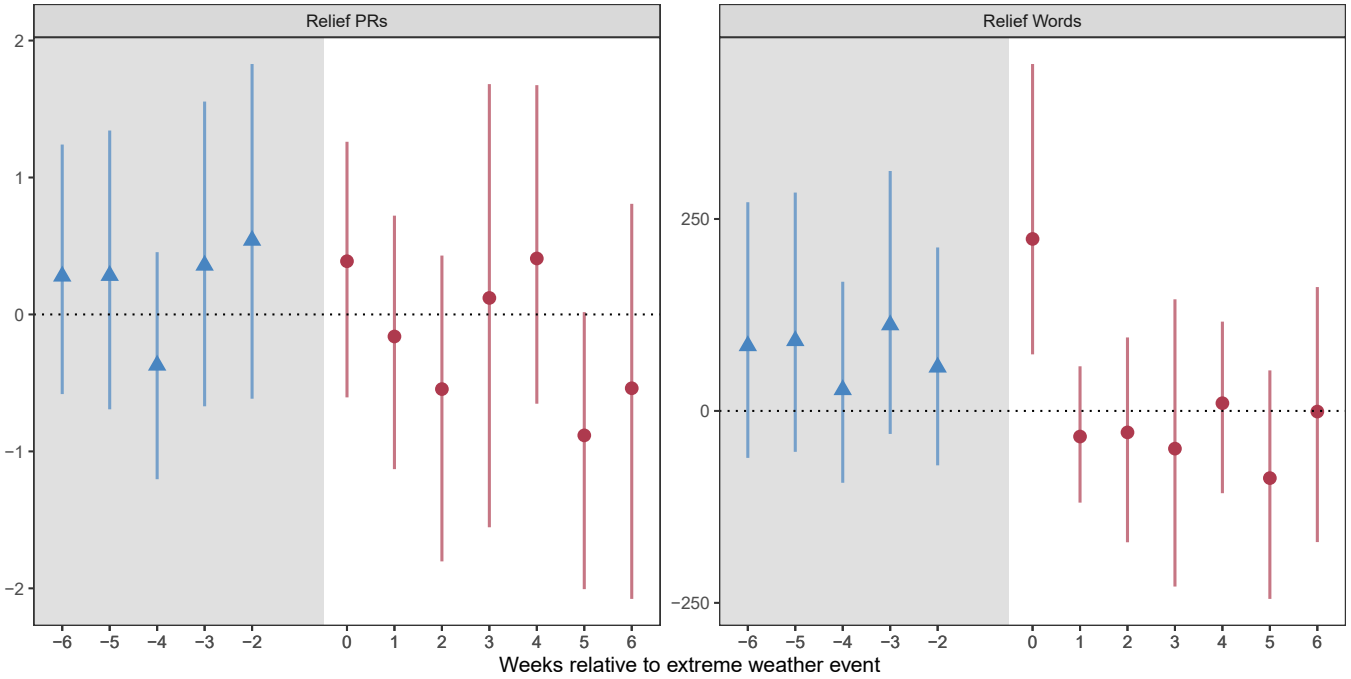

Extended Data Fig. 5 | Relief dictionary. Circles indicate the estimated effect (average treatment effect on the treated). For both specifications, we report the contemporaneous effects while the event is unfolding (t = 0) and effects for up to six weeks after the event occurred (t = 6). Triangles indicate placebo estimates for up to six weeks before the event (t = − 6). The lines indicate the 95% bootstrapped confidence intervals. Relief PRs analyzes the changes in the absolute number of press releases categorized according to our relief dictionary per week (n = 39910), Relief Words reports the changes in total relief words used per week (n = 39910). See SI 5.5 for more information.

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Study description	quantitative study
Research sample	all press releases from nationally represented parties in nine European countries
Sampling strategy	webscraping and direct contact with parties to access all officially issued press releases
Data collection	webscraping
Timing	2010-2020
Data exclusions	no data were excluded
Non-participation	-
Randomization	-

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We require information from authors about some types of materials, experimental systems and methods used in many studies. Here, indicate whether each material, system or method listed is relevant to your study. If you are not sure if a list item applies to your research, read the appropriate section before selecting a response.

Materials & experimental systems

n/a	Involved in the study
☒	☐ Antibodies
☒	☐ Eukaryotic cell lines
☒	☐ Palaeontology and archaeology
☒	☐ Animals and other organisms
☒	☐ Clinical data
☒	☐ Dual use research of concern
☒	☐ Plants

Methods

n/a	Involved in the study
☒	☐ ChIP-seq
☒	☐ Flow cytometry
☒	☐ MRI-based neuroimaging

Plants

Seed stocks -

Novel plant genotypes -

Authentication -