Spring 5-15-2020

Time for a Political Climate Change?: How Elected Leaders Influence Constituent Climate Change Attitudes

Lexi Jackson
Washington University in St. Louis

Karen Villalba-Acosta
Washington University in St. Louis

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Alexis Jackson and Karen Villalba-Acosta, Washington University in St. Louis

Dr. Tat Chan, Advisor

Abstract: *Among the counties bearing the greatest costs of climate change and natural disasters, belief in global warming is lower. Our research explores this counterintuitive relationship between experience of climate change and belief in climate change using Yale Climate Change Project, elected officials rosters, and FEMA data from 2014 - 2019. Our difference-in-difference regression model measures the county-level interaction effect of five types natural disasters (hurricanes, wildfires, winter storms, severe storms, earthquakes) and the partisanship of elected officials. We predict that the partisanship of a county's elected officials has a greater effect on the county's belief in climate change than the experience of climate change itself through FEMA-recognized natural disasters. This analysis raises questions of how political parties discuss, portray, and weaponize climate change to shape voting behavior and political attitudes toward the subject.*

Replication Materials:

Bohr, Jeremiah. (2014). "Public views on the dangers and importance of climate change: predicting climate change beliefs in the United States through income moderated by party identification." Climatic Change 126: 217–227, doi: 10.1007/s10584-014-1198-9

Howe, Peter D., et al. (2015). "Geographic variation in opinions on climate change at state and local scales in the USA." Nature Climate Change, doi:10.1038/nclimate2583.

"Disasters." FEMA.gov, www.fema.gov/disasters.

"GovTrack.us." GovTrack.us, www.govtrack.us/.

According to a recent study conducted by the Pew Research Center, the United States ranks among the bottom in the percentage of residents who view climate change as a pressing issue. Out of 26 countries, the United States placed 21st above only Indonesia, Poland, Russia, Nigeria and Israel (Poushter and Huang 2019).

Moreover, among the Americans surveyed in the study, Republicans and those who lean Republican are 56 percent less likely to believe that global climate change is a major threat to their country than Democrats and those who lean Democrat (Poushter and Huang 2019).

Academic research also supports the relationship between Republican party affiliation and belief in climate change. Irrespective of income and education level, Republicans are less likely to believe in climate change (Hamilton 2009; Bohr 2014).

Despite rejecting the notion of climate change, Republicans often reside in the counties most effected by climate change itself. The Brookings Institution quantified the monetary impacts of climate change damage at the county level and determined that the counties that will incur the greatest costs from climate change damage tend to lean Republican (Muro et. al. 2019).

Using the Brookings data, we constructed a simple linear regression to measure the effect of a county's projected climate change cost on its average climate attitude. This regression shows a significant, inverse relationship between climate change cost and belief (Appendix 1). Our simple regression boasts a low correlation coefficient, signaling that other factors are needed to explain this seemingly counterintuitive relationship between the variables (Appendix 2). As the Brookings data appears to suggest, perhaps partisanship is a better predictor of climate attitudes than experiencing climate change itself.

Political behavior research demonstrates that the average partisan forms their issue-based beliefs by aligning with the platform their political party promotes (Converse 1964). Instead of updating their opinions when new information is received, partisans tend to adjust their interpretation of the information to match their preexisting beliefs on the issue (Gaines et. al. 2007).

This raises an important question about the role of elected officials and political parties in sharing consistent, factual information about climate change in an effort to increase belief in the phenomenon among constituents of all political stripes. The disconnect between the two political parties on the issue can present a challenge for policymakers striving to mitigate the looming effects of climate change, particularly in the most vulnerable counties.

Our study assesses the effects of partisanship of elected officials on the climate change attitudes of their constituents, and whether or not that effect is greater than when a constituent experiences a climate-related disaster.

Using data from the Yale Climate Change Project from 2014 – 2019 and FEMA, we construct a difference-in-difference regression to test the county-level effects of both partisanship of elected officials, presence of a climate-related disaster, and the interaction effect between these elected officials and various disasters.

We find that Republican leadership has an inverse effect on climate attitudes following a natural disaster, on average. We also observe a decline in overall climate attitudes between 2016 – 2019.

Climate Change Attitudes

There is a robust body of work measuring climate change attitudes of Americans along different demographic factors. Most studies include income, age, gender, and education level in their analysis.

There is an inverse relationship between belief in climate change and income level (Bohr 2014). This relationship is also true with education level (Hamilton 2009). The effects of age and gender on climate change belief are more muted (Hornsey et. al. 2016).

The effects of an American's geographic location on their belief in climate change varies greatly depending on the region surveyed. Proximity to the coast tends to lead to higher believes in climate change (Brody et. al. 2012). However, even after suffering a severe drought in 2012, Midwestern residents in the United States did not demonstrate a heightened belief in climate change (Carlton et. al. 2016).

Another important measure is the effect of unseasonal weather on Americans' belief in climate change. From a sample of 5,000 phone calls to New Hampshire residents, respondents were more credulous about climate change on unseasonably warm days than on unseasonably cold days (Hamilton and Stampone 2013).

Nearly all of these studies include a moderating variable for a respondent's political affiliation. Accounting for partisanship, Bohr, Hamilton, and Carlton et. al. find a decreased belief in climate change among self-identified Republicans,

irrespective of the other variables in the analysis (Bohr 2014; Hamilton 2009; Hornsey et. al. 2016).

As partisanship emerges as the variable most predictive of climate change attitudes, the research paradigm must shift away from identifying 'who' believes in climate change to explaining 'why' one might believe in the phenomenon, and vice versa (Hornsey et. al. 2016).

Influence of Elected Leaders

One force that may be driving individual attitudes toward climate change is the issue position of their elected official. Political behavior research demonstrates that elected officials and political party leaders play a significant role in shaping the issue-based attitudes of the general electorate.

Political scientist Philip Converse first introduced the idea that party identification is the best predictor of voting behavior. Converse demonstrated that while the issue-based attitudes of Americans shifted over time, their party affiliations remained constant. Converse attributed the shift in issue positions to Americans' attempt to align with their political parties as the issue positions of the parties evolved (Converse 1964).

Converse's findings suggest that Americans are more likely to choose their issue positions based on their political party than choose their party based on their issue positions. Once party allegiance is established, Americans are less likely to accept new information that would counter the issue positions of their party. Rather, partisans tend to interpret information in a way that affirms their preexisting beliefs (Gaines et. al. 2007). This behavior complicates the process of disseminating factual information to Americans of all partisan stripes.

Recent response to the COVID-19 pandemic illustrates the severity of the partisan divide in America. In a NPR poll from March 2020, over 50 percent of Republicans considered the threat of the coronavirus to be 'exaggerated,' compared to less than 20 percent of Democrats (NPR/PBS Newshour/Marist Poll 2020).

Much of the variance in partisan response to the virus can be attributed to the rhetoric of elected officials in each party. Until recently, President Donald Trump downplayed the severity of the virus, comparing it to the 'seasonal flu.' Republican representative Devin Nunez of California even encouraged constituents to continue to dine out after health officials recommended the opposite. Conversely, Democratic governors in states like California and New York quickly declared states of emergency and urged residents to shelter in place (Brownstein 2020).

While the geographical outbreak of the virus certainly plays a role in its partisan response, elected officials are also at fault. Just as Converse predicted in 1964, many Americans have formed their attitude about the virus from those of their party leaders.

Hypothesis

Belief in climate change may follow a similar trend as COVID-19. As the parties take clear and distinct stances on the issue, Americans could be following suit, regardless of how climate change may be affecting their everyday lives.

Our regression model will explore this phenomenon by testing the effect of party leadership and climate disasters on constituents' climate attitudes. Following the results of prior research on climate attitudes, we predict that party leadership will have a greater effect on constituents' attitudes than experiencing climate change itself.

We believe that our research will be valuable to policymakers and organizational

leaders seeking to align the message on climate change and spur policy action.

Data

Climate Change Sentiment

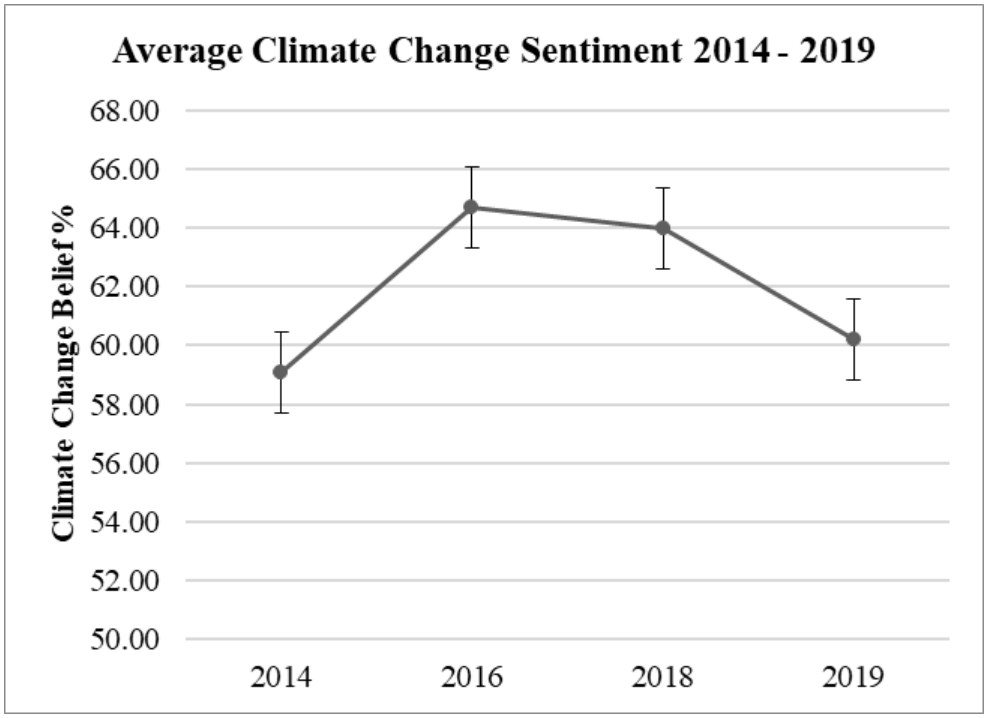
Our source of climate change sentiment data was Yale Climate Change Project from 2014 – 2019 (Howe et al. 2015). In this study, the average value of percentage belief in climate change per county was 61.99 with a 6.11 standard deviation.

Figure 1: Climate Change Sentiment Throughout Experiment

Climate Change Sentiment

Year	Average of Climate Sentiment %
2014	59.09
2016	64.68
2018	63.99
2019	60.19
Grand Total	61.99

Figure 2: Average Climate Change Sentiment 2014-2019



Federal Elected Officials

We used publicly available data through govtrack.gov to gather information on each county's Senators and Member(s) of Congress.

After overlaying the climate change sentiment data with partisan senatorial data, political trends emerged. Over the course of the years studied, counties with two Democratic Senators showed a higher percentage of climate change belief.

Figure 3: Average Climate Change Sentiment by Elected Senators 2014-2019

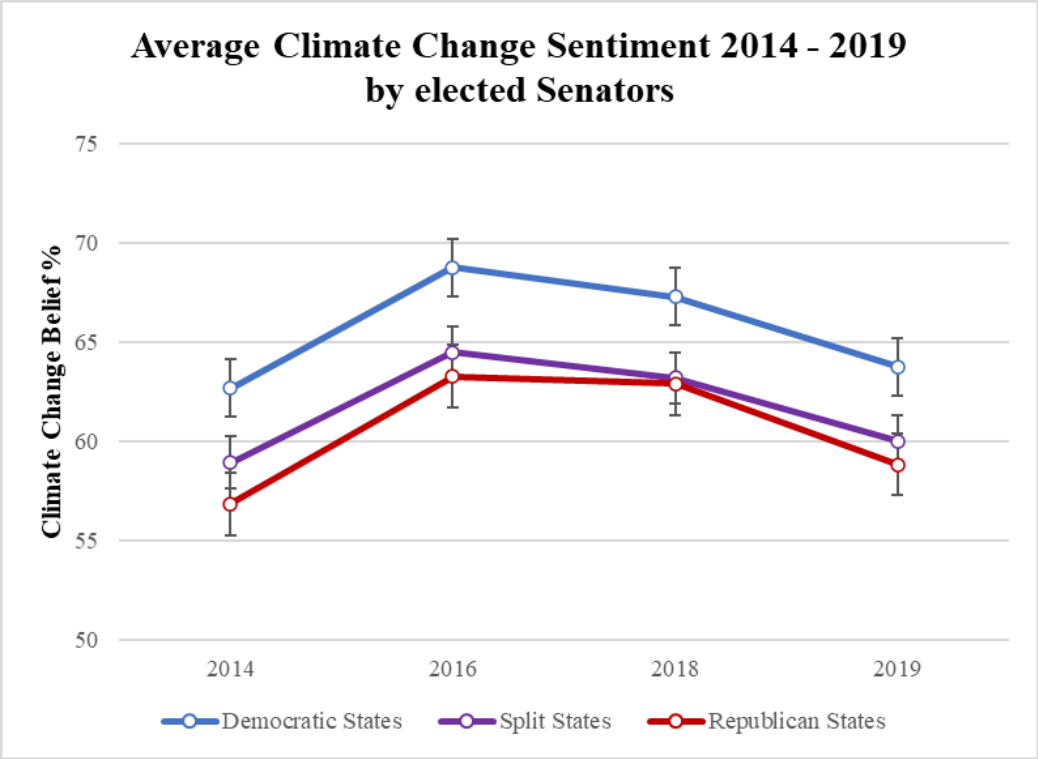
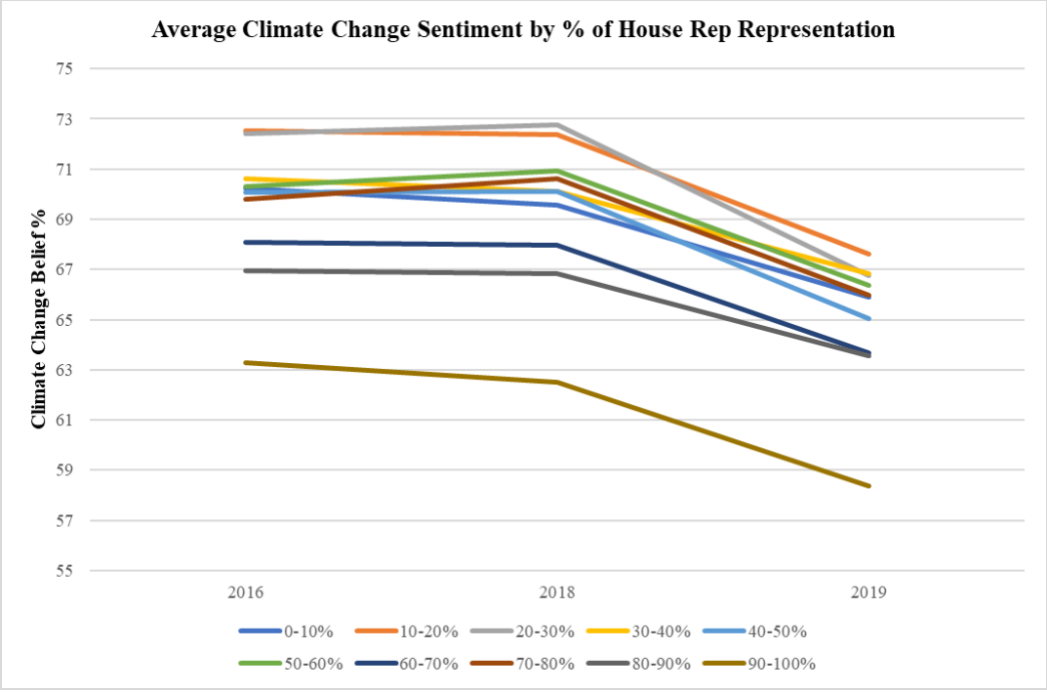


Figure 4: Average Climate Change Sentiment by Percentage of House Representation 2014-2019

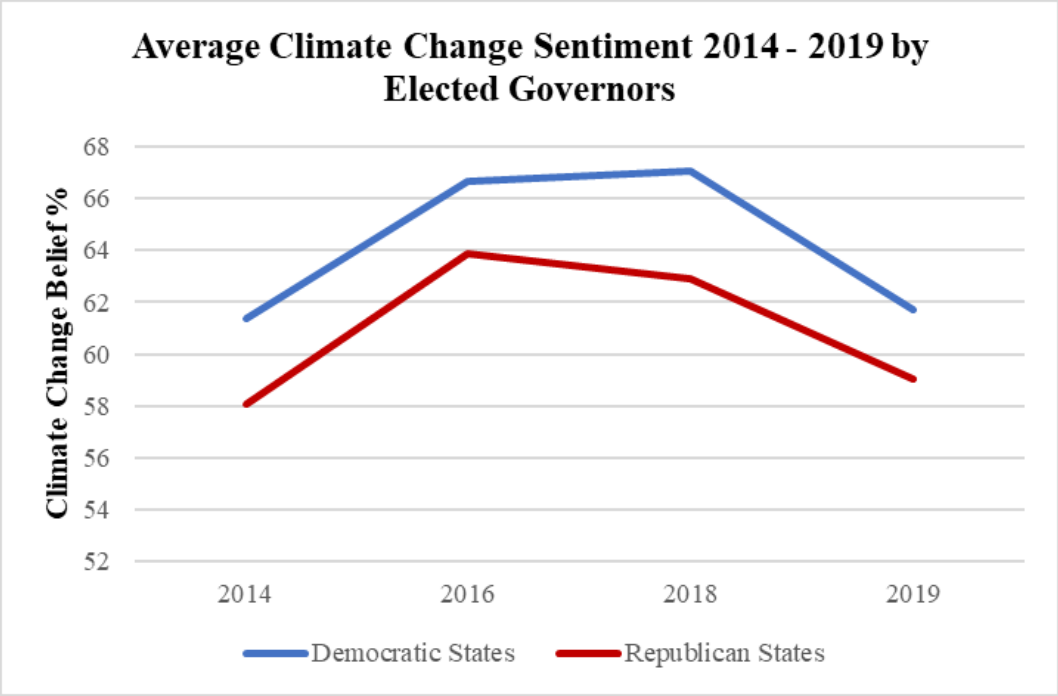


Governors

Due to the lack of a centralized database of State Governors, we manually gathered data on Governors through State websites.

Similar to the data for federal officials, the gubernatorial data demonstrated an increased belief in climate change over the course of our study in states with a Democratic Governor.

Figure 5: Average Climate Change Sentiment by Elected Governors 2014-2019



Natural Disasters

Our climate disaster data encompassed four years and five types of disasters as categorized by the Federal Emergency Management Agency. Over the course of the years we studied, there were 135 wildfires, 63 earthquakes, 3,320 severe storms, 411 winter storms, and 1,267 hurricanes in the United States. The table below details the distribution of disasters across the years we studied.

Figure 6: Natural Disasters Total 2016-2019

Natural Disasters

Year	Hurricane	Wildfire	Winter Storm	Severe Storm	Earthquake
2016	359	0	237	807	0
2018	472	135	21	1291	5
2019	436	0	153	1222	58
Grand Total	1267	135	411	3320	63

Figure 7: Total Natural Disasters by Type 2014-2019

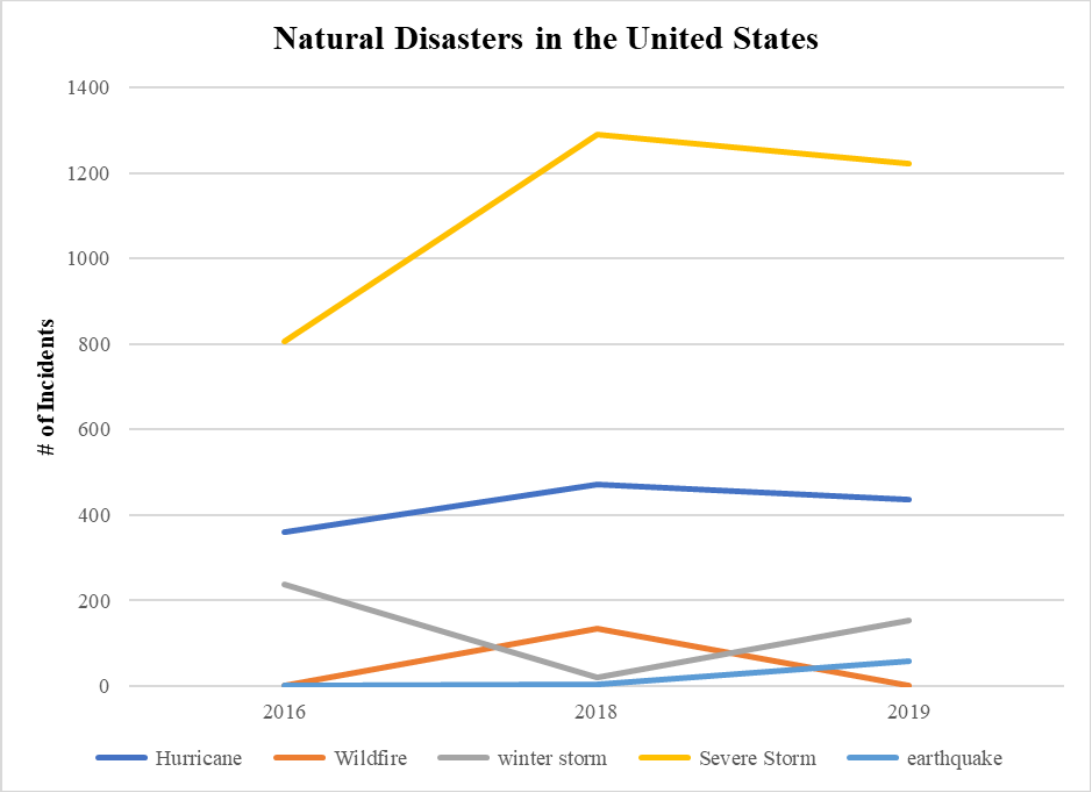


Figure 8: Climate Change Sentiment by Occurrence of Hurricane 2014-2019

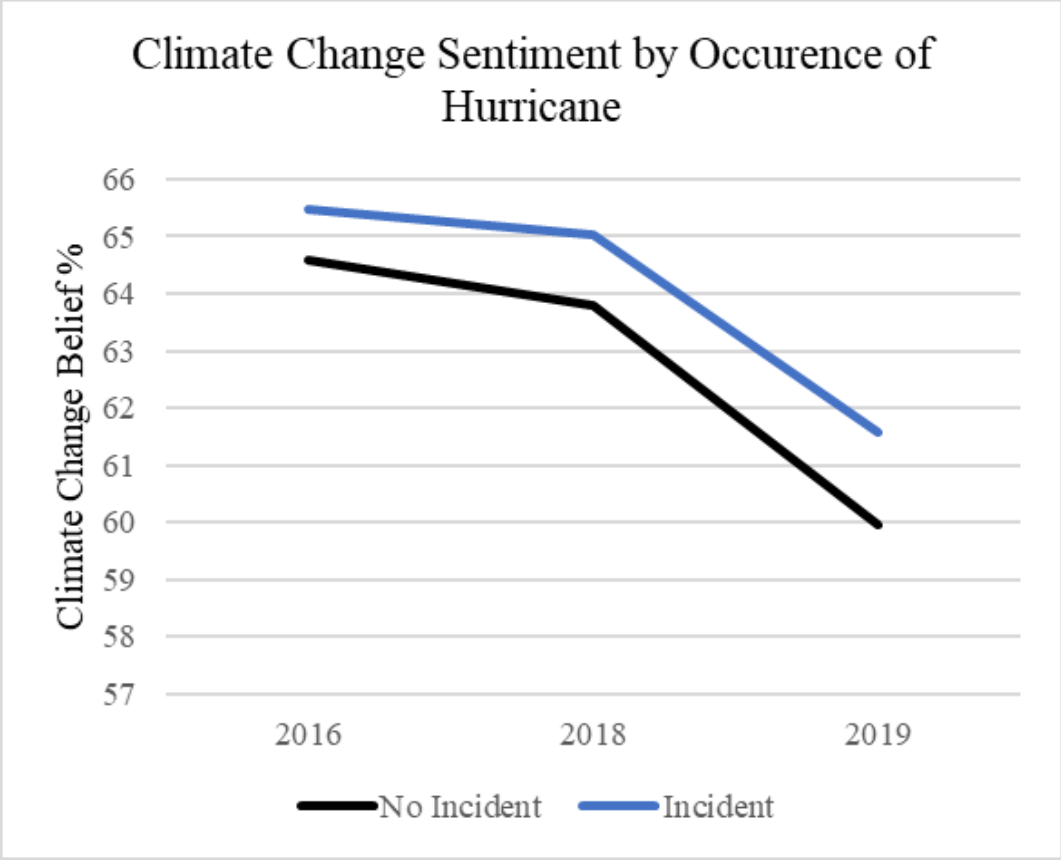


Figure 9: Climate Change Sentiment by Occurrence of Winter Storm 2014-2019

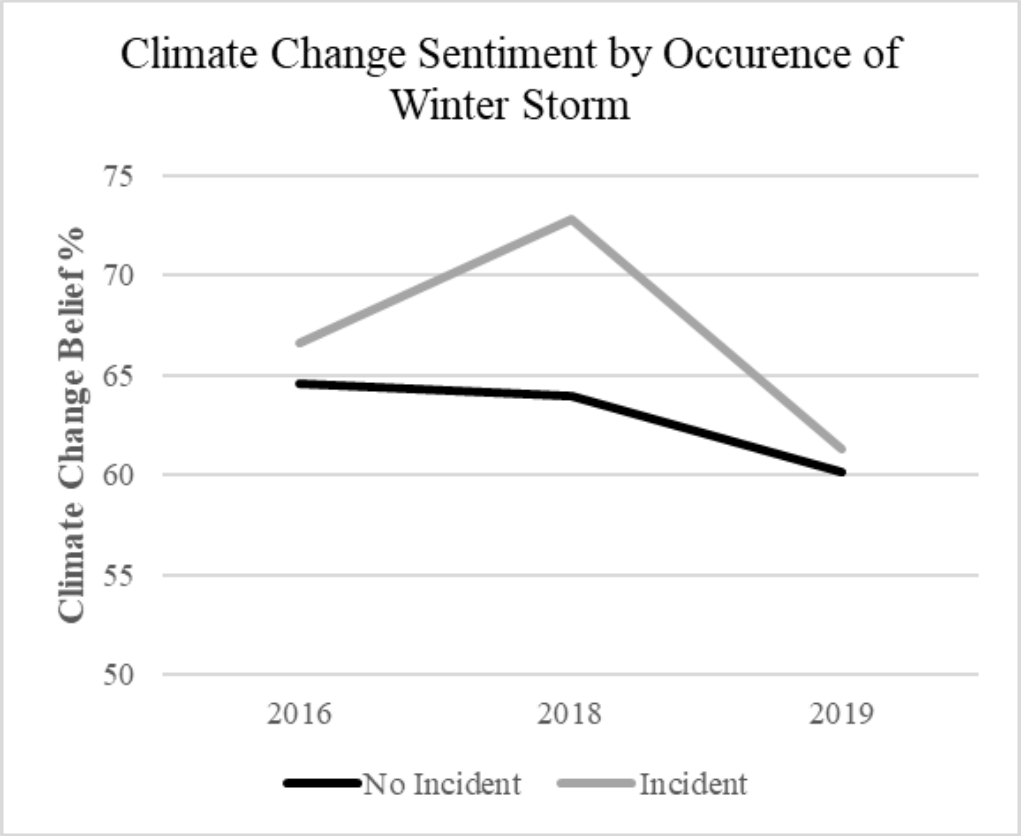


Figure 10: Total Natural Disasters by Type 2014-2019

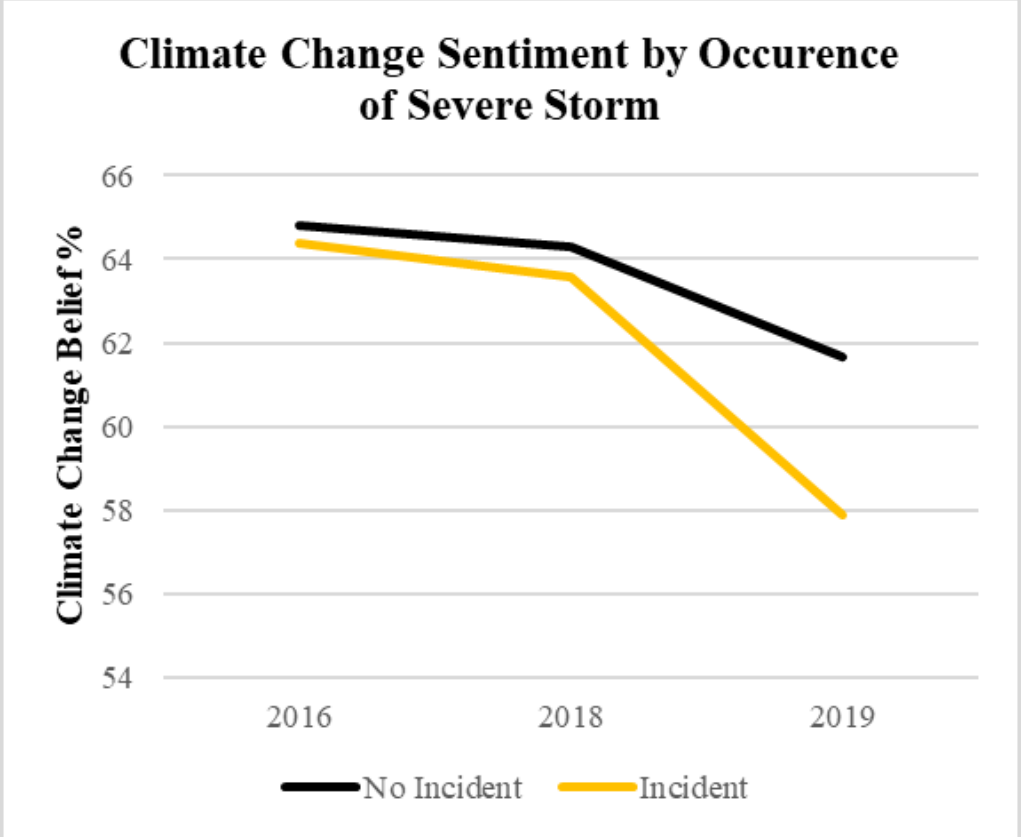
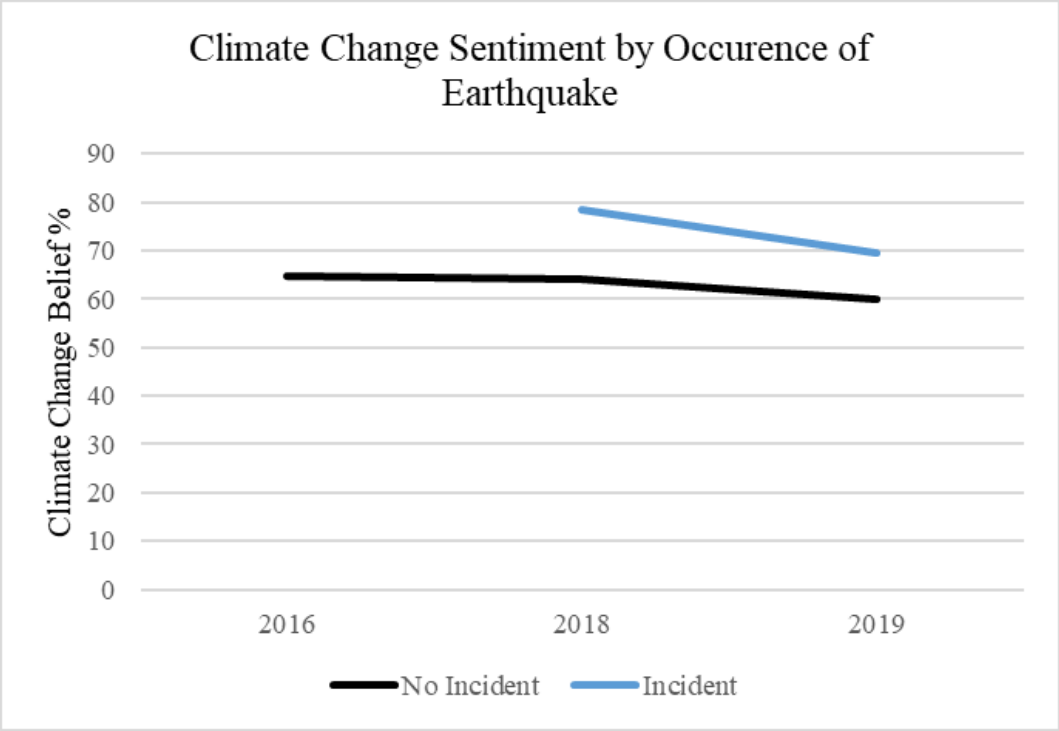


Figure 11: Climate Change Sentiment by Occurrence of Earthquake 2014-2019



Methods

Variables

To select our dependent variable from the Yale climate data, we conducted a Two-Factor Analysis.

Figure 12: Two-Factor Analysis Component Matrix

Component Matrix[a]

Variable Name	Component
happening	**0.965**
human	0.957
worried	0.955
harmUS	0.949
devharm	0.943
futuregen	0.935
timing	0.921
consensus	0.91
CO2limits	0.902
supportRPS	0.89
personal	0.842
fundrenewables	0.795
regulate	0.721

Extraction Method: Principal Component Analysis.[a]

a. 1 components extracted.

This procedure analyzed the variability between responses to each survey question. The question, "Do you believe climate change is happening?" explained 96.5 percent of the variability in the responses. Therefore, we believe that this survey question alone captures the general climate change sentiment of the population across the range of the survey questions.

To select our independent variables, we began with sorting the FEMA natural disasters data. We chose to include wildfires, earthquakes, severe storms, winter storms, and hurricanes in our analysis because instances of these natural disasters have been linked to climate change. The FEMA data was the only data set in our analysis not available on a county-level, meaning that any county in a state with a FEMA-recognized natural disaster was assigned a "1" for that disaster type in a given year.

To code for the partisanship of elected officials, we used an indicator variable. Republican Senators received a 0.5 for each county they represent. Republican Congressmembers were assigned to a county through a weighted average based on the population distribution of each congressional district.

To analyze the way in which each category of elected officials interacted with the FEMA-recognized natural disasters, we included fifteen interaction terms. These terms indicate if the effect of one independent variable on the dependent variable is different at each value of the other independent variable.

Regression

To construct our regression, we used a difference-in-difference approach to account for the county fixed effect. With this model, every independent variable and interaction term is equal to the difference between that year's value and the value of the previous year.

We also accounted for the year fixed effect to mitigate any causality issues with our regression. To ensure that our regression measured the effect of elected officials on climate attitudes and not the reverse, we included two indicator variables. With only four years to measure, we are working in differences. This means that the intercept represents the differences in climate attitudes observed between 2014 – 2016; 2016 – 2018 represents the difference between 2016 – 2018; and 2018 – 2019 represents the difference between 2018 – 2019.

We used an Ordinary Least Squares (OLS) regression to test our hypothesis because our independent variable was continuous.

Figure 13: Regression Results

Regression Results

Variables	Estimate	Std. Error	t value	Pr(>|t|)	
2014-2016	5.53046	0.04575	120.873	< 2e-16	***
2016-2018	-6.13525	0.0616	-99.597	< 2e-16	***
2018-2019	-9.46385	0.06508	-145.417	< 2e-16	***
Hurricane	1.14405	0.20999	5.448	5.22E-08	***
Wildfire	0.67081	0.35345	1.898	0.05774	.
Severe Storm	0.42857	0.11842	3.619	0.0003	***
Winter Storm	0.15706	0.24045	0.653	0.51365	
Earthquake	1.60044	0.41696	3.838	0.00013	***
Republican Senator	1.3612	0.14354	9.483	< 2e-16	***
Republican Rep	0.89115	0.12586	7.08	1.54E-12	***
Republican Governor	-0.46664	0.08154	-5.723	1.08E-08	***
Senator * Hurricane	0.45964	0.2101	2.188	0.02871	*
House Rep * Hurricane	-1.59286	0.19277	-8.263	< 2e-16	***
Governor * Hurricane	-0.6331	0.19896	-3.182	0.00147	**
Senator * Wildfire	-1.21148	0.47161	-2.569	0.01022	*
House Rep * Wildfire	0.28224	0.55937	0.505	0.61387	
Governor * Wildfire	NA	NA	NA	NA	
Senator * Severe Storm	0.29488	0.11855	2.487	0.01289	*
House Rep * Severe Storm	-1.39982	0.12007	-11.658	< 2e-16	***
Governor * Severe Storm	0.31289	0.10111	3.095	0.00198	**
Senator * Earthquake	NA	NA	NA	NA	
House Rep * Earthquake	-0.13711	0.77832	-0.176	0.86017	
Governor * Earthquake	NA	NA	NA	NA	
Senator * Winter Storm	1.04087	0.32871	3.166	0.00155	**
House Rep * Winter Storm	1 -1.37403	0.31105	-4.417	1.01E-05	***
Governor * Winter Storm	0.35601	0.20546	1.733	0.08317	.

Notes:

Signif. codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 2.213 on 9400 degrees of freedom

Multiple R-squared: 0.7601, Adjusted R-squared: 0.7595

F-statistic: 1354 on 22 and 9400 DF, p-value: < 2.2e-16

Results

Our results present several important findings for understanding political behavior as it relates to climate change. To best interpret our coefficients, we will begin with the results by each natural disaster category, followed by the year fixed effects, and finishing with a discussion of the implications of our findings.

Hurricane

The Hurricane coefficient can be interpreted as the increase in climate change belief following a hurricane in a county where all elected leaders are Democrats (all indicator variables are equal to zero). With a Republican Senator, counties report a 0.45 percent increase in climate change belief. However, with a Republican Congressmember and/or Governor, it decreases climate change belief by 1.59 and 0.63 percent, respectively. Therefore, in a county that has a Republican in each post included in our analysis, the overall effect on climate attitudes following a hurricane would be a decline of 0.62 percent.

Wildfire

The Wildfire coefficient is not statistically significant. One possible explanation for this result could be the recent California wildfires caused by the poor maintenance of a P&G electric line (not a climate-related cause). The human cause of this disaster could have influenced the way in which constituents relate wildfires to climate change.

Because the coefficient is not statistically significant, we must assume an effect of zero as a starting point from which we can compare the wildfire interaction effects. With a Republican Senator, belief in climate change decreases by 1.21 percent. Republican Congressmembers do not have a statistically significant impact. Republican Governors show an effect of "N/A" because no wildfire was registered under a Republican Governor's term throughout the years of our study. Therefore, in a county that has at least one Republican Senator, the overall effect on climate attitudes following a wildfire would be a decline of 1.21 percent.

Severe Storm

For a severe storm, climate sentiment increases by 0.43 percent with a Democrat in every post we included. With a Republican Senator and/or Republican Governor, this belief increases by 0.29 and 0.31 percent, respectively. However, with a Republican Congressmember, belief in climate change decreases by 1.40 percent. Therefore, in a state that has a Republican in each post included in our analysis, the overall effect on climate attitudes following a severe storm would be a decline of 0.37 percent.

Winter Storm

The Winter Storm coefficient is also not statistically significant. Winter storms are often the most politically polarizing disaster, used as an argument against the Earth's warming. In fact, many of President Trump's attacks on global warming are related to the increase of snowstorms in the U.S. (Cheung 2020). The conflicting discussion on the cause of winter storms could be responsible for the statistically insignificant result.

Starting from an assumption of zero effect, having a Republican Senator increases a county's climate change belief by 1.04 percent following a winter storm. With a Republican Congressmember, climate change belief decreases by 1.37 percent. For a Republican Governor, the interaction term is not statistically significant. Therefore, with a Republican

Senator and Congressmember, a county has a 0.33 percent overall decline in climate change belief following a winter storm.

Earthquake

After an earthquake, belief in climate change increases by 1.60 percent with a Democratic leader in every post we included. The earthquake interaction term is not significant with a Republican Congressmember and is not observable under Republican senatorial or gubernatorial leadership. We cannot make a decisive conclusion about the interaction effect of Republican leadership and an earthquake, likely due to the rarity of the event.

Year Fixed Effect

Perhaps the most striking trend in our data is the decreased climate sentiment observed between 2014 – 2019. Our intercept represents a 5.53 percent increase in climate change belief between 2014 – 2016. After 2016, belief in climate drops by 6.13 percent between 2016 – 2018 and by 9.46 percent between 2018 – 2019. These values signal an overall decline in climate change sentiment across the country, despite an increase in climate-related disasters during the same time frame.

One explanation of this trend could be the election of President Trump in 2016. The President's climate policy departs markedly from that of President Obama. President Trump has called climate change "a hoax" and repeatedly denied global warming through tweets (Cheung 2020). With a difference-in-difference model, we cannot test the effect of a Republican presidency on county-level climate change belief, as the indicator variable would be uniform across our model. However, if we were able to gather a greater expanse of climate change sentiment data spanning several presidential administrations, we could observe a greater variation in general climate attitudes under different parties. If former Vice President Joe Biden wins the 2020 presidential election, future Yale Climate Change Survey Data should be able to capture the "Election Effect" of a Democratic President compared to the tenure of President Trump.

Hypothesis Revisited

Our hypothesis conjectured that the partisanship of elected officials would have a greater effect on climate attitudes than the experience of a natural disaster. Our research results confirm our hypothesis when analyzing the difference in climate change belief following a natural disaster under Republican leadership (the interaction term in our model). Across all interaction terms, counties report a 0.69 percent average decrease in climate change belief following a natural disaster under Republican leadership. Therefore, it follows that two counties who experience the same natural disaster under all-Democratic leadership and all-Republican leadership will report a 0.69 lower climate change belief in the Republican treatment condition.

This result is consistent with that of political behavior research. As the two political parties establish their distinct positions on climate change, individual partisans will assume the issue position of their party, and will interpret the significance of a climate-related event in a way that aligns with their party's position on climate change itself. In this sense, our hypothesis is correct. Elected officials have a greater effect on climate attitudes than the experience of climate change itself, as it is the partisanship of elected officials that determines the way in which an individual responds to the presence of a climate-related disaster.

This logic best explains the results of our simple regression using the Brookings climate change cost data. Counties with the

highest projected climate costs are less likely to consider climate change a threat. These counties are also overwhelmingly Republican. Therefore, as our paper suggests, the ability for partisan leaders to influence the way in which climate events are interpreted is likely what drives this difference in climate attitudes, not the increased occurrence of climate change disasters in these regions.

It is worth noting, however, that the 0.69 percent difference in climate attitudes between all-Republican and all-Democratic counties following a natural disaster is quite minimal. While elected officials in each party take a distinctly different average position on the issue, these leaders are still confined to the norms of their position as elected officials. In the wake of a natural disaster, playing partisan politics is generally considered to be inappropriate. Therefore, the minimal difference in climate attitudes between Republican and Democratic constituents is likely a reflection of the small—but observable—difference in the disaster response of elected partisans.

Conclusion

Our data paints a complicated picture of climate attitudes in America. On average, climate attitudes decrease following a natural disaster under Republican leadership relative to Democratic leadership. As the threat of climate change continues to grow, elected officials of all partisan stripes have the responsibility to unite the American people on the issue and mitigate the environmental, economic, and health-related harm that may result from a denial of its impact.

Further research should employ textual analysis to explore the climate change rhetoric of elected officials before and after a natural disaster to better understand what drives the difference between climate attitudes under Republican and Democratic leaders. As counties accumulate costs from climate-related disasters, elected leaders must ask themselves: what is the value of my issue position and how much am I willing to let my constituents sacrifice to maintain that position?

Further, the declining belief in climate change from 2016 – 2019 presents another challenge for elected leaders. Whether or not future research finds a causal link between the President's climate change position and decreasing climate attitudes, tomorrow's leaders bear a considerable burden in reversing this decline.

If political behavior research holds true, the decline in climate attitudes among the general public is influenced by the lackluster response to climate disasters across elected leaders. If the United States truly seeks action on climate change, it might be time for a political change as well.

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Appendix 1: Regression Results County Damages on Climate Sentiment

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	60.34065442	0.137132251	440.0179669	0
TotalPop	8.44708E-06	4.12984E-07	20.45377161	2.17144E-87
Total damages (% county income)	-0.175213818	0.018304921	-9.571951645	2.05044E-21

Appendix 2: Summary Statistics County Damages on Climate Sentiment

Regression Statistics	
Multiple R	0.378447864
R Square	0.143222785
Adjusted R Square	0.142676894
Standard Error	5.76699166
Observations	3142