Climate Change Consensus and Skepticism:
Mapping Climate Change Dialogue on Twitter and Facebook

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ABSTRACT

Concerns are growing about the polarization of the climate change debate. Despite broad consensus among scientists that climate change is both occurring and anthropogenic, a vocal movement expresses skepticism about the validity of the scientific consensus. In this data memo, we analyze the climate change dialogue and news shared over Twitter and Facebook. We find that (1) most of the content and commentary shared on both platforms espouses the scientific consensus; (2) the greatest share of content on Twitter (33%) and Facebook (49%) comes from professional news sources; (3) businesses drive a lot of the conversation on Twitter, while civil society content gets more traction on Facebook; (4) audiovisual content like YouTube videos plays an important part in polarizing and conspiracy content; (5) on Facebook, accounts promoting skepticism seem significantly less integrated with the broader community than consensus accounts; and (6) there is little evidence of automated tweeting.

INTRODUCTION

The dialogue around climate change sits at the intersection of science, politics, and news media. Research has indicated the increasing politicization of the issue; this is particularly true in English-speaking countries like the United States and Australia, where political party affiliation is a strong predictor of climate change opinion.[1,2,3] Meanwhile, experts cite an increasingly diverse set of actors contributing to climate change dialogue across various forms of media.[4] The lack of certainty around the power structures and persuasion dynamics within the field makes it particularly critical to study the content being shared and any coordinated attempts being made to modify the flow of public dialogue.

Citizens use online social media platforms to share and consume substantial amounts of news and information during key moments of political life. Meanwhile, political actors and certain Internet subcultures continue to leverage computational resources to disseminate information among citizens in a way that may distort political discourse. News posted to social media ranges from legitimate reporting that follows journalistic standards to emotionally charged and intentionally polarizing junk content. During critical moments of public life in recent months, junk news and conspiratorial content have spread virally over social media platforms. This has increased concerns about the manipulation of public opinion and the spread of decontextualized, false, or intentionally misleading information.[5] Scholars have identified climate change dialogue as one area where such misinformation efforts may be taking place.[6]

Peer-reviewed research estimates 97% of published scientists to be in agreement that climate change is occurring, that it is caused by human activity, and that atmospheric emissions of carbon dioxide contribute to its development.[7] For the purpose of this memo, we call this the "Consensus" stance on climate change. Simultaneously, research shows that less than 50% of US adults believe anthropogenic climate change is taking place, and less than 40% believe that scientists can be trusted to give accurate information on the topic.[8] We call this the "Skeptic" stance on climate change. Notably, the skepticism investigated in this study includes all facets of disagreement with the scientific consensus, including the denial of climate change overall, the denial of its anthropogenic origins, or attribution of climate change to organized government conspiracy.

We have undertaken the research reported in this memo in order to understand the role of social media in both the Consensus and Skeptic narratives. Our research questions are: (1) What groups are involved in the English-language climate change dialogue on Twitter and Facebook? (2) What types of content do they share on Twitter and Facebook? (3) Did the Consensus or Skeptic narrative lead the conversation? (4) Are there signs of automation being used by Consensus or Skeptic accounts on Twitter?

This memo is intended to serve as a starting point for subsequent social media analysis. As such, it makes a broad assessment of social media trends and dialogue relevant to climate change. Future memos on the topic may embrace a more bounded approach, focusing on the social media activity surrounding a specific movement, community, or event.

SAMPLING AND METHODS

Twitter Sampling Method

Our Twitter dataset contains 869,065 tweets posted by 288,855 unique Twitter accounts, collected over a two-week period between 29 March and 11 April, 2018 using a grounded hashtag methodology. The list of hashtags was compiled through a multistep process. First we identified 70 hashtags relevant to both Consensus and Skeptic narratives. In addition, a combination of journalistic accounts and NGO reports was used to compile a list of 250 prominent accounts that engage in either Consensus or Skeptic commentary. Additional collection and analysis on both these seed lists led to a final list of 52 hashtags (see supplement for details).

We then used this list of hashtags to capture publicly available tweets using Twitter's Streaming API. Twitter does not disclose the API's precise sampling method, but reports that data available through the API represents up to 1% of overall global public Twitter traffic at any given time.[9] We collected original tweets or retweets that: (1) contained at least one of the relevant hashtags; (2) were a retweet of a message that contained the hashtag in the original message; or (3) were a quoted tweet with a URL referring to the original tweet with the hashtag.

This method captured 869,065 total tweets from 288,855 unique accounts. From this, we extracted a randomly selected sample of 5,000 tweets to enable manual classification of the content shared. These tweets had shared a total of 1,287 total links, each of which was classified through an established methodology described in a section below. Links that pointed to other social media platforms like YouTube or Facebook were classified based on content rather than platform (see Table 1).

We also randomly selected 1,000 of the 5,000 tweets for manual analysis aiming to discern if the text of each tweet expressed Consensus or Skeptic sentiment (see Table 2). Many tweets did not take an explicit stance on climate change, but addressed the issue indirectly. Such tweets were ascribed to a topical category based on their subject area (see Table 3). This gave us a broad understanding of the topics surfaced within the broad climate change dialogue on Twitter.

Finally, we assessed the 288,855 accounts for signs of automation. Previous research defined signs of automation as posting at least 50 times a day using one of the hashtags from the seed list, meaning 700 or more tweets on at least one of these hashtags during our two-week data collection period.[10] We selected such accounts and analyzed them qualitatively to discern their affiliation with either Consensus or Skeptic opinions. We further selected accounts that tweeted at least 100 times during the collection period and scored them using the Botometer API (see supplement for details).[11,12] If an account received a high Botometer score indicating a high chance that it might be automated, we again assessed it qualitatively. This multipronged approach combined quantitative methods for identifying automation and qualitative analysis for assessing Consensus or Skeptic affiliation.

Facebook Sampling Method

Our Facebook dataset contains 1,595 posts made by 13,330 public Facebook pages, collected using an algorithm-driven snowball sampling methodology. We collected public Facebook pages relevant to climate change based on: (1) The same seed list of 250 accounts used for our Twitter sampling; (2) a snowball sample of additional pages connected to those seeds by direct likes, collected using the Facebook Graph API; (3) iterations of political, media, and culture clusters previously generated by Graphika, a social media science firm and our partner in this research effort.

We subsequently used the Graphika visualization suite to develop a map of public Facebook pages interested in the topic of climate change. We created a visualization of the network map with a Fruchterman–Reingold algorithm, drawing a graph representing the patterns of social connections between these Facebook pages.[13] Each page comprised a node in the network map. The algorithm arranged the nodes through a centrifugal force that pushed nodes to the edge, and a cohesive force that pulled strongly connected nodes together.

The map was then segmented into distinct communities, or *groups*, using an hierarchical agglomerative clustering algorithm (see supplement for details). Social media platforms have different attributes that have proven effective in identifying communities that persist over time; for Facebook, we clustered pages by the *like* relationship. Supervised machine learning generated labels for the resulting *clusters* based on a training set created by human experts. After the labels were assigned, human experts performed manual verification to check for accuracy and consistency. The clusters were then organized into *groups* based on shared characteristics (see supplement for details).

Next, we calculated a heterophily score for each combination of group pairings. The heterophily score is a measure of the connections between groups

in a network, calculated as a ratio of the actual number of ties between two groups to the expected number of ties between them, if network ties were distributed evenly. We calculated Facebook ties from the *like* relationship (see supplement for details).

Segmenting and grouping pages, labeling them, and generating broad observations about their associations is an iterative process drawing on qualitative and quantitative methods. We iterated between the quantitative process of network generation, clustering, and labeling, and the qualitative evaluation of the resulting map by a subject matter expert, in order to identify stable and consistent communities within a broad network of social media accounts (see Figure 1).

This process resulted in a dataset of 13,330 public Facebook pages. We then used the Facebook Graph API to extract links to news sources that 10 or more of these pages had shared at least once between 19 January and 17 April, 2018. This led to a dataset of 1,595 links. We classified these links using the same typology applied to our Twitter dataset, described in detail in the following section.

Link Classification Method

Our classification process involved evaluating each link as a source of news and information through rigorous manual coding, using a typology that was developed and refined through our previous studies of eight political elections around the world (see Table 1).[14,15] The typology was originally developed to assess political content; Business News was added as a category to accommodate content from private-sector industries relevant to climate change. The details of our typology explaining each classification category are given below.

Professional News Content

- Major News Brands. This is political news and information by major newspapers, broadcasting or radio outlets, as well as news agencies.
- Local News. This content comes from local and regional newspapers, broadcasting and radio outlets, or local affiliates of major news brands.
- New Media and Start-ups. This content comes from new media and digitally native publishers, news brands and start-ups.
- Tabloids. This news reporting focuses on sex, crime, astrology and celebrities, and includes yellow press publications.

Professional Content

- Government. These links are to websites of branches of government or public agencies.
- Experts. This content takes the form of white papers, policy papers or scholarship from researchers based at universities, think tanks or other research organizations.

Polarizing and Conspiracy Content

- Junk News and Information. These sources deliberately publish misleading, deceptive or incorrect information purporting to be real news about politics, economics or culture. This content includes various forms of propaganda and ideologically extreme, hyper-partisan or conspiratorial news and information. To be classified as Junk News and Information, the source must fulfill at least three of these five criteria:
    - *Professionalism*: These outlets do not employ standards and best practices of professional journalism. They refrain from providing clear information about real authors, editors, publishers and owners. They lack transparency and accountability, and do not publish corrections on debunked information.
    - *Style*: These outlets use emotionally driven language with emotive expressions, hyperbole, ad hominem attacks, misleading headlines, excessive capitalization, unsafe generalizations and logical fallacies, moving images, and lots of pictures and mobilizing memes.
    - *Credibility*: These outlets rely on false information and conspiracy theories, which they often employ strategically. They report without consulting multiple sources and do not fact-check. Sources are often untrustworthy and standards of production lack reliability.
    - *Bias*: Reporting in these outlets is highly biased, ideologically skewed or hyper-partisan, and news reporting frequently includes strongly opinionated commentary.
    - *Counterfeit*: These sources mimic established news reporting. They counterfeit fonts, branding and stylistic content strategies. Commentary and junk content is stylistically disguised as news, with references to news agencies and credible sources, and headlines written in a news tone with date, time and location stamps.

Other Political News and Information

- Online Portals, Search Engines, and Aggregators. Includes online portals like Google News and Apple News, AOL, Yahoo! and MSN that do not themselves have editorial policies, and have no or limited original news content.
- Citizen, Civil Society and Civic Content. These are links to content produced by independent citizen, civic groups, civil society organizations, watchdog organizations, fact-checkers, interest groups and lobby groups representing specific political interests or agendas. This includes blogs and websites dedicated to citizen journalism, personal activism, and other forms of civic expression that display originality and creation that goes beyond curation or aggregation. This category includes Medium, Blogger and WordPress, unless a specific source hosted on either of these pages can be identified.
- Lifestyle. Includes lifestyle and special interest publications like women's and men's magazines, and content focused on art and fashion, fitness, food and health, nature and tourism, or hunting, fishing and automobiles.
- Business News. This content comes from newspapers, broadcasting or radio outlets, and business associations that publish news relevant to a specific industry.
- Political Commentary Blogs. Political blogs employ standards of professional content production such as copy-editing, as well as employ writers and editorial staff. These blogs typically focus on news commentary rather than neutral news reporting on a news cycle and are often opinionated or partisan.

Other Non-Political

- Shopping, Services and Applications. Encompasses links to commercial company websites, auction websites or sales platforms, such as pages like eBay and Amazon, including

software-as-a-service applications (except for cloud applications as specified above), analytics tools and content optimization and monetization tools. This also includes applications and browser extensions.

- Other Non-Political. Refers to sites that have no political content such as spam, gambling and brand advertising.

This typology was developed by a team of researchers working with a large English-language dataset. The existing literature suggests than a Krippendorff's alpha of 0.80 or higher provides a high level of inter-coder reliability.[16,17] Three experienced coders tested this typology on a prior data set and achieved an $\alpha = 0.89$, indicating that the typology could be used effectively by many different coders. For this analysis, the typology was used by one experienced coder with subject matter expertise in climate change communications. The team also maintains a standardized process for resolving any complexities in the classification of a specific source.

FINDINGS AND ANALYSIS

Twitter Analysis

For our analysis of Twitter data, we examined evidence of automation and the type of content shared during the data collection period. We extracted links shared in our Twitter data sample and classified them according to our typology (see Table 1).

Professional News Content comprised 33% of the links classified, with Major News Brands (12%), New Media and Start-ups (11%), and Local News (9%) being shared at comparable rates. This shows local news having a greater role than in recent political elections studied.[18] Business News also comprised 7% of links classified, illustrating significant presence for content from the private sector. Just 3% of links pointed to Expert content like scientific articles.

Government content accounted for 10% of links classified, including content from international organizations like the World Health Organization and the United Nations Development Programme. Civil Society content accounted for 9% of links, and included content from various NGOs, conservation organizations, and environmental advocacy groups. Taken together, Government and Civil Society content accounted for 19% of the content shared, which was considerably less than the 33% accounted for by Professional News.

Only 4% of links were classified as Polarizing and Conspiracy Content. Within this, nearly a third of links pointed to content on YouTube. Content promoting conspiracy theories like chemtrails or intentional government manipulation of the environment featured prominently in this category. Notably, links in this category espoused both Skeptic and Consensus viewpoints, though links to Skeptic content were more numerous.

Table 1: Types of News and Information Shared on Twitter

Type of Source	*N*	*%*
Professional News Content		
Major News Brands	160	12
New Media & Start-ups	134	11
Local News	113	9
Tabloids	14	1
Subtotal	421	33
Professional Content		
Government	133	10
Experts	34	3
Political Party or Candidate	3	0.2
Subtotal	170	13
Polarizing & Conspiracy Content		
Junk News & Information	48	4
Subtotal	48	4
Other Political News & Information		
Online Portals	133	10
Citizen, Civil Society & Civic Content	118	9
Business News	87	7
Lifestyle	31	2
Political Commentary Blogs	27	2
Remaining Categories	31	2
Subtotal	427	33
Other Non-Political		
Shopping, Services & Applications	135	10
Other Non-Political	60	5
Remaining Categories	26	2
Subtotal	221	17
Total	1,287	100

Source: Authors' calculations from Twitter data sampled 29/03/18—11/04/18. Percentages have been rounded to the nearest whole number unless they were below one percent, in which case they were rounded to one decimal place. In some cases, categories were collapsed into Remaining Categories groups as they represented a low percentage of total links analyzed. These categories are as follows: Under Other Political News & Information – Political Humor & Entertainment; Video/Image Sharing & Content Subscriptions; Fundraising & Petitions; Lifestyle; Religion; Other Political. Under Other – Social Media Platform; Not Available; Link Shorteners; Language.

We further performed qualitative analysis on 1,000 randomly selected tweets to discern their topical content and alignment with either Consensus or Skeptic sentiment (see Table 2). Only tweets that overtly stated an opinion on climate change were classified as Consensus or Skeptic; of these, the ratio of Consensus to Skeptic tweets was nearly 5:1.

Table 2: Sentiment Analysis of Collected Tweets

Sentiment	*N*	*%*
Consensus	265	27
Skeptic	58	6
Neither	584	58
Not Relevant	93	9
Total Analyzed	1,000	100

Source: Manual analysis of Twitter data sampled 29/03/18—11/04/18. Percentages have been rounded to the nearest whole number unless they were below one percent, in which case they were rounded to one decimal place. The Not Relevant category includes tweets not related to climate change and tweets that could not be classified due to translation issues.

The majority of analyzed tweets did not overtly state an opinion on climate change; these tweets were then ascribed to a topical category (see Table 3). 39% of these tweets fell into the Energy category, announcing innovations or advertising energy products and services. Sustainability (14%), wildlife and environmental conservation (14%), and vegan activism (9%) were also frequent topics. 7% of tweets commented on the US Environmental Protection Agency (EPA) and the administration of Scott Pruitt. These findings illustrate the diversity of interests and voices related to climate change dialogue on social media.

Table 3: Topical Analysis of Tweets Stating No Overt Opinion on Climate Change

Category	*N*	*%*
Energy	230	39
Sustainability	82	14
Environment & conservation	79	14
Vegan activism	55	9
International development	45	8
Politics - EPA	40	7
Health & lifestyle	28	5
Politics - Other	25	4
Total Analyzed	584	100

Source: Authors' qualitative analysis of Twitter data sampled 29/03/18—11/04/18. Percentages have been rounded to the nearest whole number unless they were below one percent, in which case they were rounded to one decimal place.

Finally, we assessed our entire Twitter dataset for signs of automation. Automated accounts can be fully automated, or curated and maintained by people that employ scheduling algorithms and other applications. We define automated accounts as those that post at least 50 times a day using one of the hashtags from our seed list. Just 26 of 288,855 total accounts in our dataset fit this criterion. A qualitative analysis found 24 (92%) of these accounts to display general Consensus sentiment, with the majority promoting sustainable products and services. The two remaining accounts took no stance on climate change. From this assessment, no automated accounts espousing Skeptic sentiment appeared to be captured in our dataset, despite a balanced seed list sourced partly from Skeptic hashtags and accounts.

Further analysis assessed accounts that received high scores from the Botometer API. High Botometer scores did not always correlate with an account's daily tweet frequency. The scores showed a trimodal distribution, with the greatest number of accounts receiving scores of 3.5, 1.3, or 0.6-0.7. We performed qualitative analysis on the 70 accounts that received a score of 4.0 or above, just three of which had also posted 50 times or more on one of our hashtags. Of the 70 accounts, 31 (44%) were found to display Consensus sentiment, while 38 (54%) took no stance on climate change. Just one account posting primarily on political topics displayed Skeptic leanings. This confirmed that our dataset captured very little evidence of automation being used overall, and almost no evidence of automation being used by Skeptic accounts.

Facebook Analysis

For our Facebook analysis, we classified all the news sources that had been shared by 10 or more pages at least once according to our typology (see Table 4).

Table 4: Types of News and Information Shared on Facebook

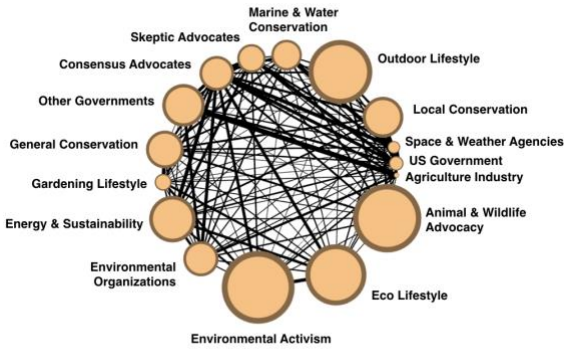
Type of Source	*N*	*%*
Professional News Content		
Major News Brands	452	28
New Media & Start-ups	261	17
Local News	57	4
Tabloids	5	0.3
Subtotal	775	49
Professional Content		
Government	34	2
Experts	29	2
Political Party or Candidate	2	0.1
Subtotal	65	4
Polarizing & Conspiracy Content		
Junk News & Information	23	1
Subtotal	23	1
Other Political News & Information		
Citizen, Civil Society & Civic Content	341	21
Lifestyle	262	16
Online Portals	18	1
Business News	9	0.6
Remaining Categories	14	1
Subtotal	644	40
Other Non-Political		
Shopping, Services & Applications	33	2
Social Media Platform	30	2
Not Available	25	1
Subtotal	88	6
Total	1,595	100

Source: Authors' calculations from Facebook data sampled between 19/1/18—17/4/18. Percentages have been rounded to the nearest whole number unless they were below one percent, in which case they were rounded to one decimal place. In some cases, categories were collapsed into Remaining Categories groups as they represented a low percentage of total links analyzed. These categories are as follows: Under Other Political News & Information – Political Commentary Blogs; Political Humor & Entertainment; Video/Image Sharing & Content Subscriptions; Fundraising & Petitions; Religion; Cloud; Other Political.

Professional News Content was shared most often, comprising 49% of total shares, while Polarizing and Conspiracy content made up just 1% of total shares (see Table 4). This aligns with the Twitter findings above. Unlike on Twitter, however, Major News Brands (28%) were shared at significantly higher rates on Facebook than New Media and Start-ups (17%) or Local News (4%). Business News also accounted for a significantly smaller portion of total shares (0.6%) compared to Twitter, suggesting that the high volume of messaging originating with the private sector is specific to the Twitter platform. Expert content again comprised few of the links classified (2%).

Other Political News and Information comprised 40% of total Facebook shares. Within this, Civil Society (21%) and Lifestyle (16%) content was shared most often. Both of these categories accounted for a significantly greater portion of shares on Facebook than on Twitter. Facebook's Lifestyle category included content from many wildlife and animal enthusiast groups, as well as groups dedicated to outdoor sports. Our findings suggest that within the broad climate change dialogue, such communities are more active on Facebook than on Twitter.

Figure 1: Climate Change Audience Groups on Facebook



Source: Authors' calculations from data sampled between 19/1/18—17/4/18. Note: Groups are determined through network association. This is a basic visualization (see online supplement for a full visualization).

Our Facebook network map revealed a diverse set of stakeholders discussing climate change (see Figure 1). We calculated a heterophily score for each combination of group pairings (see online supplement). A heterophily score of 1.0 indicates a perfectly neutral connection, with anything higher indicating a strong tie and anything lower indicating a lack of connection. A high heterophily score for a group to itself indicates a high number of within-group connections.

We noticed high heterophily scores between the Environmental Activism and Eco Lifestyle groups (1.8). Consensus Advocates showed heterophily scores greater than 1.0 with all groups except Outdoor Lifestyle (0.9) and Wildlife Advocacy (1.0). However, Skeptic Advocates showed high heterophily only with the US Government (1.7), Energy and Sustainability (1.4), and Space and Weather Agencies (1.1). This suggests that Consensus Advocates are highly integrated with the community discussing climate change on Facebook, while Skeptic Advocates seem integrated with few segments of that community. The Skeptic Advocates group also had one of the highest heterophily scores to itself (12.7), signaling many within-group ties. Finally, Consensus and Skeptic Advocates shared a high heterophily score with each other (2.0).

We also assessed the prevalence of video- and image-based content shared across our Facebook map (see Table 5). While 43% of links classified pointed to primarily text-based content like news articles, 41% of links pointed to videos and 14% pointed to images. Within the Polarizing & Conspiracy Content category, 15 of 23 (65%) links pointed to videos. This aligns with our findings on Twitter, where a third of polarizing content consisted of YouTube videos.

Table 5: Types of Content Shared on Facebook

Content Type	*N*	*%*
Text-based	687	43
Video	653	41
Image	228	14
Not Available	25	1
Podcast	1	0.6
Total Analyzed	1595	100

Source: Authors' qualitative analysis of Facebook data sampled 19/1/18—17/4/18. Percentages have been rounded to the nearest whole number unless they were below one percent, in which case they were rounded to one decimal place. Text-based content includes articles, websites, and Facebook group landing pages.

CONCLUSIONS

This research allowed us to draw several conclusions about the broad social media dialogue on climate change. Our findings are that (1) most of the content and commentary shared espouses the scientific consensus; (2) the majority of news shared on both platforms comes from professional news sources; (3) on Twitter, business content was shared on par with civil society content, but civil society content outperformed business content on Facebook; (4) audiovisual content plays an important part in polarizing and conspiracy content; (5) on Facebook, Skeptic accounts are more isolated than Consensus accounts; and (6) little evidence of automation was captured in this dataset.

The ratio of tweets espousing Consensus sentiment to those espousing Skeptic sentiment was

approximately 5:1. On Facebook, Consensus advocates were far more integrated than Skeptics with the communities we studied. Skeptic advocates also had a high number of ties within their group, suggesting a community that is densely interconnected but relatively isolated from the rest of our network map. Such communities often use their own distinct language, symbols, and hashtags whose meaning may not be obvious to those outside the group. As a result, future analyses aimed at understanding their narrative and information flow may need to start with qualitative approaches before attempting to study their behavior at scale.

Only 4% of content shared on Twitter and 1% of content shared on Facebook was classified as polarizing and conspiracy content. Though most such content showed Skeptic leanings, some espoused Consensus sentiment as well. In our Twitter dataset, nearly a third such links pointed to YouTube, and on Facebook, 15 of 23 such links pointed to Facebook videos. This suggests that intentional misinformation efforts on climate change may favor audiovisual content.

A lot of content shared on Twitter came from business news sources, while proportionally more civil society and lifestyle content was shared on Facebook. This suggests that private sector content is either more successful or more popular on Twitter compared to Facebook. Content from public interest and activist communities, meanwhile, gets far more traction on Facebook (21%) than on Twitter (9%). Expert scientific content was shared rarely both on Twitter (3%) and on Facebook (2%), suggesting that content produced directly by the scientific community receives little traction on these platforms.

Though professional news content was shared widely on both platforms, it should not be assumed that such content encourages Consensus sentiment exclusively. Experts have noted that the efforts of mainstream media to provide unbiased coverage may legitimize factually incorrect narratives about climate change in some cases.[19] Further analysis of specific news articles and audience responses would be needed to conclude that little misinformation about climate change takes place on social media.

ABOUT THE PROJECT

The Project on Computational Propaganda (COMPROP) based at the Oxford Internet Institute is an interdisciplinary team of social and information scientists researching how political actors manipulate public opinion over social networks. This work includes analyzing the interaction of algorithms, automation, politics and social media to amplify or repress political content, disinformation, hate speech and junk news. Data memos are designed to present quick snapshots of analysis on current events in a short format, and although they reflect methodological experience and considered analysis, they have not been peer-reviewed. Working papers present deeper analysis and extended arguments that have been collegially reviewed and engage with public issues. COMPROP's articles, book chapters and books are significant manuscripts that have been through peer review and formally published.

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