A Social Climate Sphere

Analysing the 2021 Glasgow Climate Summit (COP26) on Twitter

A Work-in-Progress Report

Risto Kunelius
Helsinki Institute for Social Sciences and Humanities
University of Helsinki

Matthew Tegelberg
Department of Social Science
York University

Matti Pohjonen
Helsinki Institute for Social Sciences and Humanities
University of Helsinki

HSSH Work-in-Progress Report. October 31, 2022, Helsinki Institute for Social Sciences and Humanities (HSSH). Helsinki: University of Helsinki.
https://www.helsinki.fi/en/helsinki-institute-social-sciences-and-humanities/work-progress

ABSTRACT

In November 2021, for two weeks, world news attention turned to the most fundamental and pressing global problem: the rapidly threatening climate crisis. Delegates from 194 countries, along with civil society actors, reporters and other stakeholders gathered at the 26th annual global UNFCCC climate summit to negotiate on joint actions that would ideally change the direction of global climate policy. This report offers an overview of how this event played out on Twitter, one of the key global social media platforms for political discourse.

The analysis is based on the harvesting of more than 11 million tweets during the active days of the summit (October 28 – November 12). We use the Louvain modularity community detection algorithm to map the major clusters of retweeting activity and identify eight major clusters in the dataset. The report provides a visualisation that reveals both the mutually relative proximity of these clusters and their distinctive inner structures.

Four of the major clusters are centered around singular accounts: 1) Greta Thunberg, 2) COP26 (the official UNFCCC event account), 3) US president Joe Biden and 4) Indian Prime minister Narendra Modi. An additional four clusters form around multiple user accounts with active mutual retweeting. We name these clusters as 5) Science-advocacy, 6) Mainstream media, 7) Contrarians, and 8) UK-Scotland event/politics.

The report provides preliminary analytical findings on each of these clusters. We focus on three empirical questions: 1) describing the most influential accounts (users) in each cluster, 2) identifying the most active retweeters, and 3) highlighting the most retweeted content within them.

The research aims to understand different forces at play in the shaping of these clusters. We suggest that these eight attention clusters show how different resources of social power shape the structures of climate change communication on social media (Twitter), creating distinctive types of "communities." Further analysis aims to identify major influencers in the Glasgow Twitter debate and their distinctive ways of communicating climate politics.

This report is a working document that continues to evolve as we develop our analysis further. We urge readers to check for the latest version of the document on our website before quoting details. The report will inform the work of an international research network that will develop further insights and investigations of our data-set.

Keywords: Climate change, Twitter, retweet analysis, community detection, mapping, social media, attention, political power, communicative power

Citation:
Kunelius, R., Tegelberg, M., & Pohjonen, M. (2022). *A Social Climate Sphere: Analysing the 2021 Glasgow Climate Summit (COP26) on Twitter*. Work-in-Progress Report**.** October 31, 2022. Helsinki Institute for Social Sciences and Humanities (HSSH). Helsinki: University of Helsinki. https://www.helsinki.fi/en/helsinki-institute-social-sciences-and-humanities/work-progress

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1. COP26 IN GLASGOW, SCOTLAND: THE EVENT

The twenty-sixth session of the Conference of the Parties (COP26) took place in Glasgow, Scotland in late 2021. The event commenced on October 31, after it was postponed for one year because of the Covid-19 pandemic (UNFCCC, 2020). Predictably, as has happened many times before,[1] the conference was extended into overtime on November 12 to help negotiators overcome substantial differences and reach a final agreement. Known as the Glasgow Climate Pact, the agreement was reached late in the evening on November 13.[2]

As a physical event, the summit took place in four distinct spatial areas, distributed around the city of Glasgow. The core arena for international diplomacy and political decision-making was the Scottish Event Campus Centre (SEC), Scotland's largest exhibition centre. A Green Zone, within the SEC, hosted a series of public exhibitions and events that displayed the work of civil society organizations, corporations and other social actors. Outside the SEC, the People's Summit for Climate Justice took place across 13 local venues around Glasgow City. Most broadly, COP26 took place across the city through the host of daily interactions that would transpire between local residents and the international visitors attending the summit.

Beyond such geographical limits, COP26 was, of course, a highly mediated event, attracting the attention of global audiences. Global newspaper coverage of climate change during the event reached almost an all-time peak in early November (MeCCO, 2021). These dominant mainstream news narratives mediated *between* the diverse network of actors who attended and participated, physically and virtually, in this event.

Actors on site

With a list of 39,509 accredited delegates, representing 194 countries (UNFCCC, 2021), *CarbonBrief* regarded *COP26 as the largest political gathering to occur in UK history*. With such accreditation numbers, COP26 was also recognized as the most highly attended COP since the annual climate conferences began in 1995 (McSweeney, 2021).

Decision-making at COPs is governed by a United Nation's environmental treaty that entered into force in 1994 and now identifies 197 nations as official "Parties" to the Convention (UN, 2021). Each of these "Parties" represents a nation-state, which can send a formally accredited delegation to the annual COP. The Convention further divides these "Parties" into three distinct groups of nations, based on differential sets of treaty commitments and expectations (UNFCCC, 2021: Parties and Observers). Outside the "Parties," formal participation at the COP is limited to a cross-section of non-Party actors that are designated as "Observers." While these Observer groups can oversee the ongoing negotiations, they have limited decision-making power. This concentration of decision-making power in the hands of nation-states is a source of ongoing tension and consternation among those who have felt historically marginalized and excluded (cf. Kunelius & Eide, 2012a; Kunelius & Eide, 2012b; Wozniak et al., 2021). Consequently, outside each COP large groups of civil society actors gather annually to condemn this exclusionary process by drawing attention to the *diverse voices of actors and*

[1] It is not unusual for these climate summits to run into overtime given the complexity of reaching a consensus among the 194 nations that participate in these negotiations.

[2] For an annotated version of the Glasgow Climate Pact by Washington Post, see: https://www.washingtonpost.com/climate-environment/interactive/2021/glasgow-climate-pact-full-text-cop26/. For a summary of the key outcomes agreed to at COP26, see: https://www.carbonbrief.org/cop26-key-outcomes-agreed-at-the-un-climate-talks-in-glasgow

groups that are consistently denied formal access to critical political decision-making arenas within the UNFCCC negotiations framework (cf. Roosvall and Tegelberg, 2015; 2018).

Agendas and themes

At COP26, formal proceedings followed the agenda set by the United Nations Framework Convention on Climate Change (UNFCCC, 2021). Two documents – the UNFCCC's Overview Schedule, and a Presidency Programme, set by the United Kingdom and Italy as host nations – *determined the daily structure of the conference.* The conference opened with a two-day World Leaders Summit which was proceeded by eight days of *high-level negotiations* and *side events* that were organized thematically. The daily themes were: Finance (November 3), Energy (November 4), Youth and Public Empowerment (November 5), Nature (November 6), Adaptation, Loss and Damage (November 8), Gender, Science and Innovation (November 9), Transport (November 10), and Cities, Regions and Built Environment (November 11). This cluster of *core themes* would inform how news media covered the event (MeCCO, 2021), with storytelling that centred around conflicting viewpoints and/or specific actions that intersected with each of these themes.

To enable simultaneous virtual participation, the UNFCCC developed an online platform. Webcast links provided users with access to live feed broadcasts for all public events listed in the daily conference schedule.[3] Similarly, the Presidency Programme developed a Green Zone Programme of Events that encouraged virtual and embodied public participation. This Programme included daily in-person events which took place at the Glasgow Science Centre; a part of the larger SEC Centre that was designated the COP26 Green Zone. The Green Zone Programme also included a daily schedule of virtual events broadcast live from the official COP26 YouTube channel. The agenda for the parallel "People's Summit for Climate Justice" was set by the UK-based COP26 Coalition. The People's Summit launched on Saturday, November 6 with a Global Day of Action for Climate Justice. This large, global demonstration was proceeded by a daily program of in-person and virtual actions and events (November 7 to November 10). These events sought to amplify the voices of civil society actors and challenge the exclusionary structures of the formal negotiations underway at COP26.

COP26 and global news media

Journalists are dispatched by legacy news outlets around the globe to cover the high-stakes international negotiations and civil society activism on display at annual UN climate summits. At COP26, thousands of these media professionals converged in Glasgow to cover both the formal negotiations and the demonstrations unfolding outside the summit. According to the UNFCCC website for press and media access, 3,866 individuals were granted formal media accreditation to attend COP26 (UNFCCC, 2021). The UNFCCC defines eligibility for such accreditation as "…strictly reserved for members of the press who represent a bona fide media organization" (UNFCCC, 2021).[4] Given this large presence of accredited journalists, it is

[3] These webcast links have remained accessible for asynchronous streaming on the UNFCCC platform: https://unfccc-cop26.streamworld.de/program

[4] This number does not, of course, account for a significant number of media professionals who covered COP26 without formal media accreditation; and who may have often done so for non-traditional sources of news and information, such as blogs, websites, social media and other hubs of online information. The UNFCCC outlines a process for freelance journalists and bloggers to pursue media accreditation, on a case-by-case basis, in an endeavor to "…take on board new forms of information dissemination and social networking that have evolved" (UNFCCC, 2021). However, the website does not indicate how many of the individuals who pursued access to COP26 on these grounds were granted accreditation.

perhaps not surprising that news coverage of COP26 largely followed the same trajectory as the agendas set by the UNFCCC, the UK COP26 Presidency, and the COP26 Coalition.

In global news media, a common storyline that emerged in the coverage underscored *competing visions, expectations and demands concerning outcomes of the summit*. This emphasis on division focused on outcomes for COP26 in particular, as a highly anticipated round of international climate negotiations, and on broader commitments to climate action across societies at large. In his opening speech, UK COP26 President Alok Sharma referred to the summit as "our last, best hope to keep 1.5C in reach" (Glasgow Times, 2021). He then urged delegates to step up ambitions to avoid confronting the most devastating impacts of climate change.

As civil society actors began arriving in Glasgow, they similarly expressed demands that underscored the need to "keep 1.5C alive." In these calls to action, responsibility for an ongoing climate emergency was placed in the hands of world leaders and global elites. Crafted by four leading youth climate activists, a widely circulated online petition that obtained over 1.8 million signatures, spoke of "betrayal" and condemned governments worldwide for "accelerating the [climate] crisis" (Avaaz, 2021). The petition outlines a core set of demands for leaders at COP26, emphasizing the urgent need for a wholesale transformation of existing social structures to avoid the worst consequences of the climate crisis. The youth leaders conclude that such an effort would demand "determined, visionary leadership" and "immense courage" (Avaaz, 2021). As COP26 unfolded as a media event, these competing visions of climate action and expected outcomes for the summit became a recurring theme across news media coverage of this event.

Attention dynamics of social media events

In addition to the physical event in Glasgow – a city, it must be noted, with a deep historical relationship to coal (cf. Malm, 2016) – and coverage in mainstream media, COP26 took place virtually online in diverse social media platforms and networks. Or, perhaps it is better to say that social media intervened in the event and vice versa. In today's media environment it is impossible to imagine the event *itself*, on the ground, running successfully (even logistically) without all the apps and platforms that coordinate thoughts, actions and plans. It is equally hard to think of so-called "mainstream media" as a sphere of its own; as natural as such thinking may have been just a couple decades ago. Nor does it make sense to ask once dominant questions, such as: to what extent the news coverage of COP26 reflected the event itself?

Today, physical political events are deeply interwoven with social media, and the so-called "mainstream media" operates inside of these online platforms and networks. Together this "hybrid media" (cf. Chadwick, 2013) environment forms a key element of the landscape where institutions and individuals operate. Thus, we have moved from concerns about how mass media "mediatizes" politics (or not) (cf. Strömbäck & Esser, 2014) to a far more complicated terrain where social media – and this may be its most important influence – has created new kinds of temporal and social (network) dynamics. A definitive characteristic of these new dynamics is the muddling of what were previously common sensical boundaries and operational logics between actors and institutions. Roughly put, liberal democratic societies once shared the believe that actors, such as scientists, politicians, activists, investors, administrators and so on, really acted on separate logics. Our modern imagination emphasized differentiated principles, traditions and logics of relatively autonomous social institutions; as well as their distinct resources of autonomy and social power. In the era of social media, these boundaries have effectively become much more blurred, and the distinct institutional logics

more complex and hybrid, especially as institutional actors have increasingly incorporated social media attention and network logics into their practices.

There are at least two different levels where such new kinds of power dynamics are introduced through social media. First, explicitly, we can point to the power developed on social media through practices of sharing; that is, sharing practices at the *individual level tice* enabled through social media platforms and applications (e.g. sharing, following, liking) (cf. Couldry, 2012). This everyday, micro level of sharing offers individual users the (partial) ability to shape their own communication menu, as well as influence the attention management of their social networks and peers. Of course, at the same time, they grant their peers and networks the power to curate their own attention. We know that systems of following, liking, recommending, sharing and so on (cf. van Dijck & Poell, 2013) lead to patterns of attention where a small number of messages or nodes in a network become central whereas a "long tail" of followers (cf. Benkler, 2006) enjoy very limited attention. In this sense, social media function less as an alternative and more as a parallel to mass media logics where there are clear distinctions between large "audiences" and "central" actors.

On a *systemic level*, social media attention dynamics are shaped in large part by computational forces and affordances. In addition to "connectivity" and "popularity" (recognizable at the individual user level), social media is simultaneously driven by "programmability" and "datafication": that is, individual user behavior is – by virtue of being partly a steering mechanism for the network – always tracked. In other words, the profiling and targeting of users situated in distinct network locations (communities or clusters), and the selling of this attention as a resource is the actual business model of such platforms. It is by combining multiple sources of data that the companies that run these social media platforms can increasingly operate independently from the "visible" social networking infrastructure that users themselves are involved in (cf. Zuboff, 2019; Couldry & Meijas, 2019; Wu 2016). Such markets of attention are increasingly run through complex algorithms, where the constant interaction between algorithms, machine learning and feedback loops of data make underlying "logic" of the system fuzzy to the actors who use them.

Twitter does not equal social media

In any analysis of "social media", one must remain mindful of the diversity and rapidly changing landscape encompassed by this term. Thus, our decision to focus on Twitter in this study is open to at least three main lines of relevant critique. For one, Twitter is by no means among the largest social media platforms globally. Indeed, at the time of our data gathering, the platform had approximately 436 million users, and ranked about 15th on lists of social media applications with more than 100 million active users (DataReportal, 2021). A list that is notably led by Facebook with 2.9 billion users. Second, Twitter is not a "global" platform. As even glimpse of at out data reveals, there are obvious geopolitical biases in the material, with the absence of Chinese and Russian voices being the most obvious one. Lastly, Twitter users do not represent (even where the platform is popular) demographics or "audiences" very well. In particular, there are obvious generational biases (tellingly, for instance, TikTok is already a much larger platform) and the Twitter user base is often said to be slanted toward elites and/or politically engaged users.

2. COP26 ON TWITTER: DATA, METHODS AND MATERIAL

Data collection

The research data in this social network analysis consists of all the available tweets that used the keywords "climate crisis," "climate change," "COP26," and "IPCC" between October 28 and November 12, 2021.[5] The Twitter Streaming Application Programming Interface (API) was primarily used for the data collection but, due to a server interruption, Twitter V2 API was used for the last two days.[6] This resulted in a total of *11,667,143 tweets,* of which *8,921,103* were retweets.

Data preprocessing, visualisation and analysis

The data was then uploaded into the ORA-PRO software,[7] which generates different network representations from Twitter data. A retweet network – who retweets whom in Twitter conversations – was chosen for the analysis as this is widely used in social and political sciences to map out influential users and communities in large-scale political Twitter discussions.

The retweet network generated from the full dataset (2,762,001 nodes/Twitter accounts and 5,526,295 edges/retweeting connections between accounts) was prohibitively large for effective network visualisations. Consequently, the data was filtered by removing all user accounts with a small number of daily retweets on average around four daily retweets. This resulted in a final retweet network composed of a total of *48,470 nodes* and *77,824 edges* that could be used for exploratory network visualisation purposes. In social network analysis, the term *node* refers to each of the Twitter users within a network with connections to other users. On the network map (see Figure 2.2), node sizes vary in accordance with the number of connections they have to other actors. The term *edge* refers to lines drawn to visually represent connections between distinct nodes within a given network.

This network data was then exported to *Gephi*,[8] a network visualisation software tool which was used to produce exploratory network visualisations to help the analysis. *Degree centrality*, which refers to the total number of direct links into and out of a specific node, was used to identify nodes with the most retweets in the Twitter network. Node sizes in the data visualisations reflect the sum total number of times a particular user has been retweeted (outdegree) and the number of times the same user has retweeted (indegree). Hence, each node size acts as a proxy for how active a particular account's relationships are within the network.

After establishing degree centrality, the *Louvain modularity community detection algorithm*[9] was used to assign a community membership to each of the nodes based on the similarity of their action with other nodes in the network. Louvain modularity is one of the

[5] The keyword search encompassed *all* tweets that used one or more of these search terms, and thus was not limited only to tweets which contained these search terms as hashtags.

[6] APIs are a standard way to request information from social media companies, which provide structured data to clients seeking it for commercial purposes or academic research. This is currently the way all Twitter data access for research works, and, thus, this sample is limited in terms of accessibility to what the Twitter API enables. Data from the Twitter Stream API was collected using a custom script, developed at the Oxford Internet Institute (Python - Tweepy library). Data from the Twitter Academic V2 API was gathered with the twarc2 Python package, which provides readymade functionality for downloading, searching and archiving Twitter data for research purposes: https://github.com/DocNow/twarc. Twarc2 is an open source digital research tool that was developed as part of the "Documenting the Now Project," supported by the Mellon Foundation.

[7] For an overview of how ORA-PRO software tools can be used to assess and analyze online social network dynamics see http://www.casos.cs.cmu.edu/projects/ora/

[8] Gephi is a free, open-source software tool for data visualization and exploration: https://gephi.org/

[9] For an overview of how the Louvain modularity algorithm works to detect community structures within large networks, see De Meo et al., 2012.

standard clustering algorithms that is used in social network analysis, including recent efforts to study climate change communication on Twitter (Williams et al. 2015; Vicari et al. 2019; Tien Vu et al, 2020; Mahl, Zeng & Schafer, 2021). The algorithm examines the network structure and infers communities based on their network relations. Each Twitter user (i.e. nodes) in the data set is assigned to a community, with the nodes and edges colourized in order to visually represent community membership and structure. For the visual layouts, a customised *ForceAtlas2 layout algorithm*[10] was used to position the nodes spatially and to differentiate the relevant Twitter users and communities for analysis.

Once relevant Twitter users and communities were identified and visualised with these tools, to facilitate the qualitative analysis, the full dataset was finally subset based on the community memberships of the nodes (such as the retweet cluster around the central figure of Greta Thunberg, see Figure 2.2). This data was further augmented with other attribute data available from Twitter (such as number of followers, number of tweets, language, etc.).

Mapping clusters: How to read the visualization

It is critical to first underscore that the network visualization (Figure 2.2) presented here is, by nature, an *exploratory* rendering of social network dynamics on Twitter. The retweet network map that informs our discussion here *does not* provide a simple, rationalistic *explanation* of what happened on Twitter during COP26. Rather, what the map offers are points of departure for developing closer, exploratory readings of the distinct community structures and networked communication flows that emerged on Twitter during this event.

Below, we explicate what retweets are, how the network map was created, how we read it, and offer clarifications on some of the conceptual language that informs how we describe the social network activity that took place on Twitter during COP26.

What is a retweet?

On Twitter, a "retweet" (RT) refers to any instance where a user chooses to publicly recognize a specific tweet by sharing it among their own followers, thus using the potential attention of their social networks (i.e. followers) as a resource of recognition (attention power). Introduced to the platform in 2009, the retweet button affords users the option to either reproduce an original tweet verbatim, or to select "quote tweet" and reproduce it with their own modifications (For more on these functions see, How to Retweet).

Retweets are thereby moments (or acts) of *symbolic recognition* where individual users can direct an audience's *attention* toward certain kinds of content through a process of selection, modification and (re)circulation. This act of symbolic recognition holds true regardless of how a user identifies with the retweeted content. The user's values need not necessarily align socially or politically with the retweeted content for this to constitute an act of public recognition and further distribution on Twitter. In a significant sense, then, it is the daily retweeting activity of millions of users that shapes the communication flows and the exposure or particular individuals and groups to events, topics, issues or trends on Twitter.

[10] For a discussion of how the ForceAtlas2 layout algorithm works, see Jacomy et al., 2014.

3. KEY FINDINGS

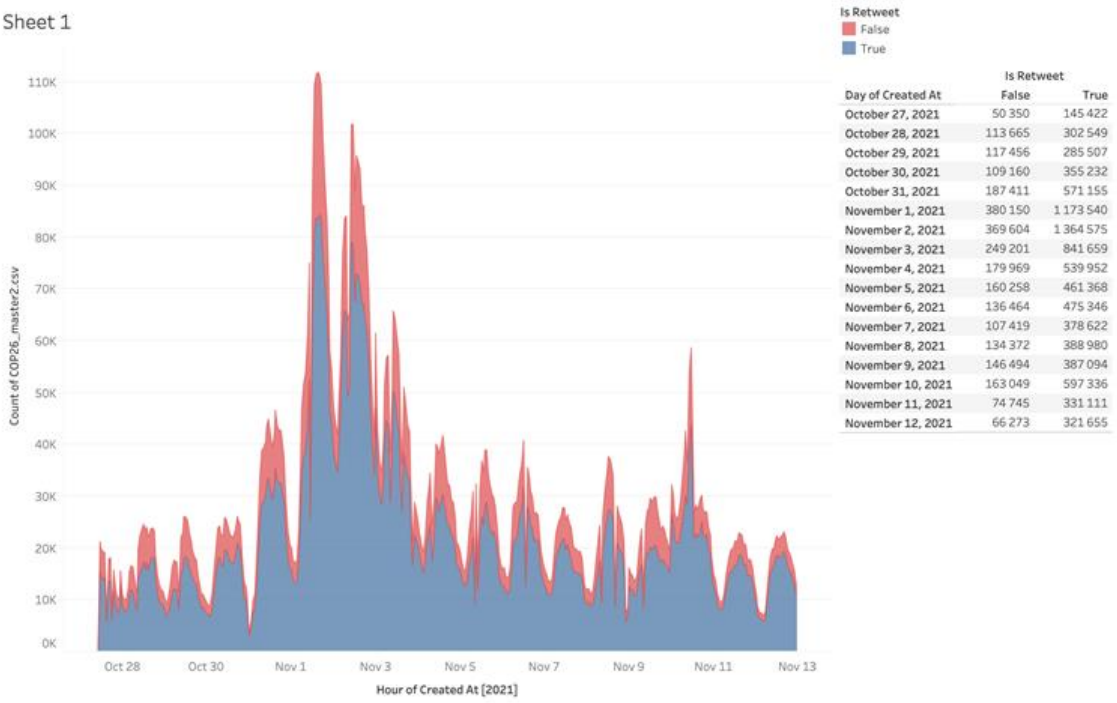
Temporal distribution and unfolding of the event

Figure 2.1 provides a summary of the daily Twitter activity during COP26. The red shading represents the total number of original tweets produced daily that included any of the four research keywords. The grey shading shows the volume of retweeting activity that took place each day. Retweeting activity peaked during the first three days of the climate summit (November 1 to 3), when world leaders arrived in Glasgow and attracted considerable media attention. Another spike in the retweeting activity occurred on November 10, the same day that a draft text of the final agreement was released to the public. These broad temporal dynamics of the COP26 retweet network give rise to two preliminary remarks that underlie the analysis.

Firstly, as the graph reveals, more than 75% of tweets produced during the summit were retweets. The significantly higher volume of daily retweets to original content suggests that, on Twitter, social networks – the structure in which the content of communication is circulated – are built through a process of retweeting recognition and sharing of content generated by millions of users. That is, *the social networks we analyze are built by retweeting.* These are, of course, also substantial acts of selection and valorization of particular content, in this case, information and opinions about climate change. However, the number of tweets that are shared through daily retweeting activity represents a much more limited amount of content than suggested by the mental image of a sample of over 11 million tweets.

Secondly, this sharing activity is what creates the communities that are later subjected to interpretive analysis. So, while the networks of influence are built by retweeting, there is also a distinction between "content production" and "network construction." The power/ability to produce content should be distinguished from the power to share (or to be shared). This is a crucially important distinction when we think about the way social media platforms (like Twitter) contribute to public debates and "spheres". Our analysis of dominant retweeting clusters will develop this line of thinking further.

Figure 2.1 – Volume of daily COP26 Twitter activity (red=original tweets, blue=retweets)



Day of Created At	Is Retweet: False	Is Retweet: True
October 27, 2021	50 350	145 422
October 28, 2021	113 665	302 549
October 29, 2021	117 456	285 507
October 30, 2021	109 160	355 232
October 31, 2021	187 411	571 155
November 1, 2021	380 150	1 173 540
November 2, 2021	369 604	1 364 575
November 3, 2021	249 201	841 659
November 4, 2021	179 969	539 952
November 5, 2021	160 258	461 368
November 6, 2021	136 464	475 346
November 7, 2021	107 419	378 622
November 8, 2021	134 372	388 980
November 9, 2021	146 494	387 094
November 10, 2021	163 049	597 336
November 11, 2021	74 745	331 111
November 12, 2021	66 273	321 655

Figure 2.1 also offers a snapshot of the daily temporal synchronization between the "event on the ground" and in the social media sphere. It is not difficult to see how peaks in Twitter attention are driven by the UNFCCC and host nation's staging and planning of the conference itself. This routine, anticipated "choreography" of the event is an essential part of understanding how the UN summits work both as events that try to raise general global consciousness about climate change, manage the balance between urgency (crisis) and hope – and at the same time – stage a meeting for hard-boiled, interest-driven bargaining between nations and key political and economic actors.

More specifically, the period between November 1 and November 3 included arrivals and official speeches by the top world leaders that came to Glasgow. Similarly, we see a second spike around November 10 as the summit heads into overtime and delegates work toward a final agreement. These examples show how attention peaks on Twitter are driven (and supported) by the communication and public relations efforts of "traditional" actors in the arena of climate (summit) politics. The fact that the peak of attention correlates with the moment when world leaders (with recognized political power) appeared in Glasgow to make their official remarks is suggestive of how political power translates into social media attention.

It is also worth pointing out that a considerable amount of the retweeting activity captured in our data occurred during the more open, spectacle driven early moments of the Glasgow summit. That is, during the moments *before* the final stretch of negotiations where power bargaining inevitably moved behind closed doors, away from immediate public scrutiny. This quantitative "bias" is important to bear in mind as we turn to a discussion of how to study and read the retweet network map that is introduced below. It suggests two remarks: The first is that perhaps the social media event dynamic emphasizes or gravitates toward performance and political "declarations" – and to the liking, sharing, etc., of this type of content – more than to the process of hard-bargaining around policy choices. The second is that we

should pay closer attention to what *different* dynamics emerge in social media networks towards the end of an event like the COP; a question we shall return to later.

Mapping the Glasgow galaxy

Figure 2.2 offers a map of the most important retweet clusters of our data. Several steps were taken to create this visualization.

First, the initial Twitter API requests generated a large sample of text-based data for **11,667,143 tweets**. While there is no social network data in this material, the text-based data includes a column representing 'user_name' (i.e. who posts on Twitter) and 'retweet_name' (i.e. which tweets are retweets, who is retweeted). With this data, edge weights were established by calculating the number of times individual nodes were retweeted by other nodes within the network.

Figure 2.2 can thus be read as both an algorithmically derived network of *clusters* representing the mathematical frequency of connections between nodes, and as a qualitatively produced representation of human perceived connections in the network that take the form of *community structures*. It is important to bear in mind that the *exact spatial location* of the largest nodes, such as Narendra Modi and Greta Thunberg, do not accurately depict "*real"* (statistical) distance between these actors or the clusters they represent within this social network. In our figure, based on the network visualisation algorithm, distances and connections between these nodes and edges are slightly exaggerated to offer a valuable heuristic device for further exploration of COP26 social network dynamics on Twitter.[11] Thus, by referring to *clusters,* we are speaking of the *relative proximity of groups of nodes within the network*. This proximity is statistically objective, even if the visual representation in Figure 2.2 is manipulated to make the clusters more visible.

Mono-nodal and multi-nodal clusters

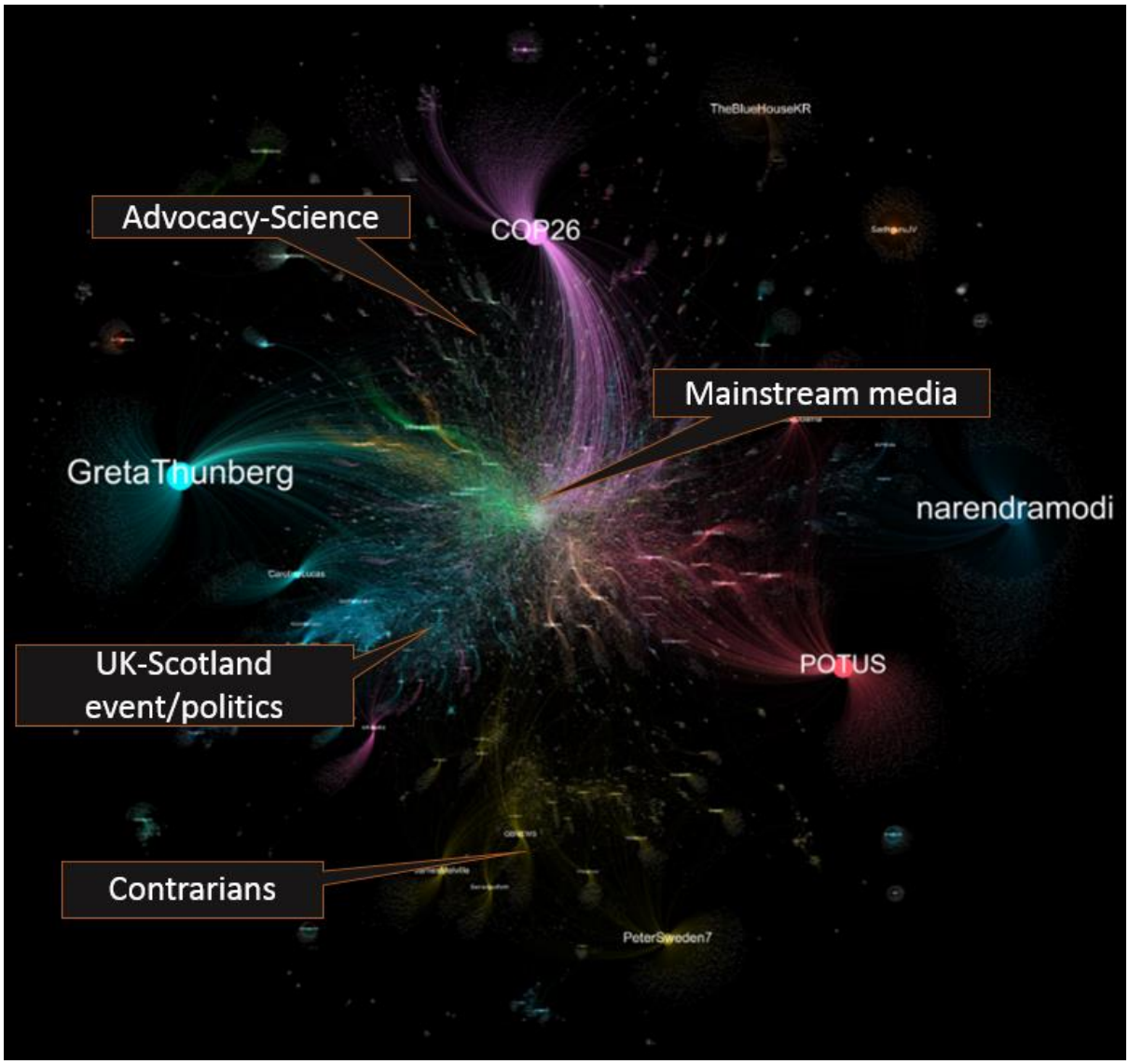
On the map, then, we differentiate between coloured clusters with two distinct types of structure. The first type, which are classified as *mono-nodal clusters,* are structured around one large, centralized node. What makes the central nodes in these clusters so large is the fact that the tweets these users produced were massively retweeted by other users in the network. The second group of clusters is classified as *multi-nodal* because retweet activity in these social networks is spread out across multiple nodes rather than just one.

Identifying influencers and cluster structures

Actor (node) sizes in Figure 2.2 are determined by the amount a user was retweeted by others in the network. In our analysis, we identify two distinct ways that key actors shape the structure of the eight largest retweet communities on our network map.

[11] For more detail on how the Forceatlast2 algorithm visualized these clusters, see: https://gephi.org/tutorials/gephi-tutorial-layouts.pdf

Figure 2.2 – COP26 retweet network



The first are a small group of actors visible as the largest nodes within their respective communities. We refer to these as *mono-nodal* clusters where the Twitter account of one user, such as Greta Thunberg (@GretaThunberg), the UK COP26 Presidency (@COP26), US President Joe Biden (@POTUS), and Indian President Narendra Modi (@narendramodi), stands out as the largest node in the cluster. These actors appear as large nodes because of their high degree centrality relative to other users in the same cluster. For example, in the Greta Thunberg community, @GretaThunberg was retweeted 120,596 times in 588,608 re-tweets**.** This represents 20% of the total retweets for this community. Thunberg's very high *degree centrality* makes her a massive node in Figure 2.2. No other users in this community come close to rivalling the same communicative power wielded by Thunberg. Hence, on our map, the cluster takes on a mono-nodal structure when there is one actor with a very high level of degree centrality.

The second variant are the *multi-nodal* clusters. Here, by contrast, we see actor influence distributed across multiple user accounts. Take, for example, the climate contrarian cluster that can be seen coloured in yellow in the lower portion of our map (Figure 2.2). Here, the

high degree centrality of several actors produces a cluster structure that is much more diffuse than the mono-nodal clusters. In this cluster, retweets of @PeterSweden7 made up 6% of the sample (35,183 RTs) while @Prisonplanet accounted for 5% and @GBNews and @disclosetv each made up for 4% of the total retweets. We refer to this as a multi-nodal cluster structure because the network/communicative power is located among a core *group of user accounts* as opposed to a single, dominant actor.

Modes of power and influence

Power to influence the flow of information manifests in two distinct ways on the COP26 retweet network map.

First, we can see the conventional power wielded by national political actors in a socially mediated climate sphere. This is demonstrated by the large, centralized presence of US President Joe Biden (@POTUS) and Indian Prime Minister Narendra Modi (@narendramodi). These elite actors attract attention and large, devoted followings on Twitter because of their tremendous *political power*. Another group of actors derive influence from what we call natural *event power*. This is evidenced by the centrality of the official COP26 Twitter account (@COP26), one of the four largest nodes on the map. By setting daily agendas and highlighting core issues, the spatial positioning of the UNFCCC at the centre of the COP event translates into event power in the social network.[12] A third source of influence is represented by actors with *media power*. These actors are visible in a multi-nodal cluster of user accounts representing mainstream news media, such as @Reuters, @SkyNews and @BBCWorld. Predictably, in the COP26 retweet network this cluster is located close to actors with political and event power. This suggests that long-standing ties between mainstream media and traditional sources of political and institutional power can extend to social media platforms.

Second, the clusters demonstrate how personality can generate attention power inside the retweet network. This is best demonstrated in the obvious yet remarkable case of Greta Thunberg. After joining Twitter in June 2018, in less than five years she has come to yield more influence in our social media event network than the US president. This power arises from both the retweeting volume of grassroots followers and the sharing activity of influential users.

4. HIGHLIGHTING MAJOR CLUSTERS

Table 3.1 identifies the eight largest communities on our COP26 retweet network map by name, nodal structure, colour and total retweet totals. In this section, we develop detailed descriptions of quantitative and qualitative elements of the social network dynamics in each of these communities. The community descriptions are guided by four main research questions:

- RQ1: Who are the most influential actors (nodes) in the main clusters? (content producers)
- RQ2: What types of content spread the widest within these clusters? (content)
- RQ3: Who retweeted and helped to spread these messages? (network constructors)

Table 3.1 – Eight largest COP26 retweet communities

[12] Similarly, albeit to a lesser degree, the strong presence of a multi-nodal cluster of key actors in the UK-Scottish event/politics cluster arguably stems from the proximity of these actors to real-time events unfolding in Glasgow during the climate talks.

Name	Structure	Colour	Retweet total
Greta Thunberg	Mono-nodal	turquoise	588,608
Science-advocacy	Multi-nodal	green	586,197
Contrarian	Multi-nodal	yellow	526,863
COP26	Mono-nodal	neon pink	436,189
Mainstream media	Multi-nodal	tan	310,261
UK/Scotland event/politics	Multi-nodal	neon blue	229,884
POTUS	Mono-nodal	orange	206,535
Narendra Modi	Mono-nodal	navy blue	109,427

We provide retweet data for each of the eight largest communities that is packaged in three tables. First, each cluster is identified on the map by a close-up view of the internal actor dynamics and network structure. We then offer three descriptive tables:

1. Table representing the top *retweeted users* (RQ1, content producers) for each cluster. This table identifies these users, tallies total retweets, total followers, and offers a very brief profile of each of the user accounts.
2. Table highlighting the top *retweeted content* (RQ2, content) in each of the eight largest clusters. This table displays user names, provides the content of an original tweet, and tallies the total retweets.
3. Table listing the top *retweeting users* (RQ3, network constructors) in the retweet network data. This table shows user names, tallies total retweets and total tweets, and offers a very brief profile of each of the user accounts.

4.1 Greta Thunberg cluster (588,608 RTs)

Figure 4.1 – Close-up view of Greta Thunberg cluster

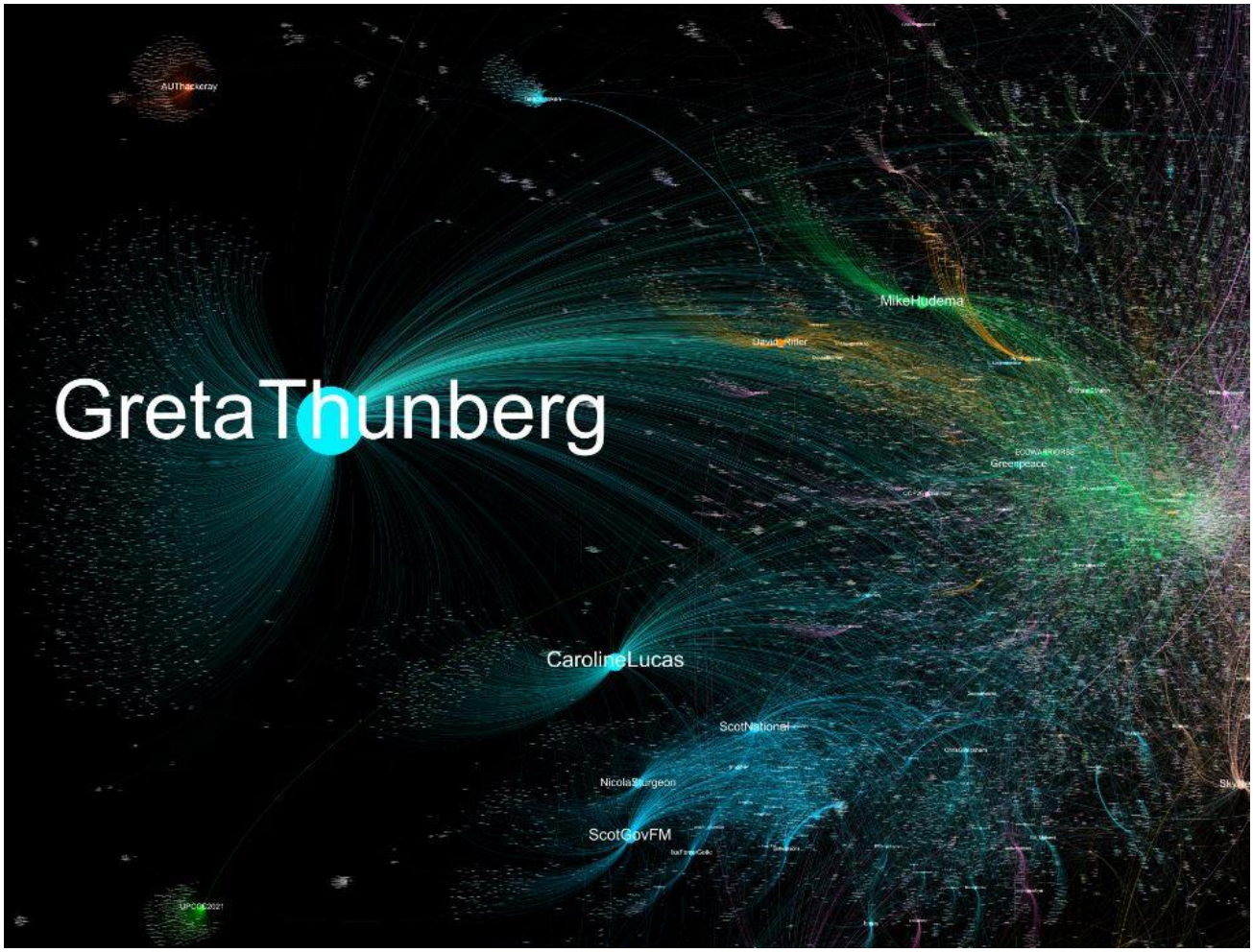


Table 4.1.1 – Top retweeted users in Greta Thunberg cluster

User	Total RTs	Followers	Total tweets	Joined	Bio
GretaThunberg	120,596	5 million	11,400	2018	Founder Fridays for Future, climate campaigner
CarolineLucas	19,708	574,000	30,300	2009	Scottish Green MP
ChrisGPackham	16,144	555,300	37,000	2009	Wildlife TV celebrity
NadiaWhittomeMP	13,248	104,100	7,482	2012	UK Labour MP
davidschneider	13,069	554,400	39,700	2009	Actor
bmay	12,367	55,800	51,200	2008	Sustainability advisor
GeorgeMonbiot	11,745	493,600	47,200	2010	Guardian journalist
stephenfry	11,726	12.4 million	25,600	2008	Celebrity
vanessa_vash	11,349	235,800	22,400	2019	Youth climate activist
Account suspended	9214	N/A	N/A	N/A	Account suspended
Ed_Miliband	8277	782,600	8033	2009	Labour MP, shadow climate secretary
Haggis_UK	8112	59,300	24,000	2011	Political satire, news
ExtinctionR	7167	401,300	47,900	2018	Climate activism
AaronBastani	6670	101,000	152,400	2009	Socialist theorist
Luisamneubauer	6658	383,700	6257	2013	Climate activist
beltrandelrio	6471	856,300	202,300	2009	Journalist, radio host, Mexico
Bill_Esterson	6391	39,500	49,400	2010	Labour MP
RichardJMurphy	6210	137,300	87,200	2008	Economic justice, green new deal
ThatTimWalker	5341	146,300	87,800	2009	Freelance journalist
Avaaz	5008	727,800	10,300	2007	Global civil society

Table 4.1.2 – Top retweeted content in Greta Thunberg cluster

User	Content of original tweet	Total RTs
@GretaThunberg	"Many are asking what will it take for the people in power to wake up? But let's be clear. They are already awake. They know exactly what they are doing...This is an active choice by leaders to let exploitation of people and destruction of nature take place." My speech from today's march in Glasgow. (link)	13093
@GretaThunberg	Wow. This is truly what people power looks like. #FridaysForFuture #UprootTheSystem (link)	12461
@stephenfry	David Attenborough has shared his hope for COP26. Let's spread this powerful message and show world leaders we're all watching #EyesonCOP26 (link)	11392
@GretaThunberg	#COP26 has been named the most excluding COP ever. This is no longer a climate conference. This is a Global North greenwash festival. A two-week celebration of business as usual and blah blah blah. (link)	11056
@GretaThunberg	I am pleased to announce that I've decided to go net-zero on swear words and bad language. In the event that I should say something inappropriate I pledge to compensate that by saying something nice. #COP26 (link)	9566
@GretaThunberg	Finally in Glasgow for the #COP26! And thank you for the very warm welcome… (link)	8976
@GretaThunberg	We are filing a legal petition to the UN secretary-general urging him to declare the climate crisis a global level 3 emergency – the UN's highest category. #FaceTheClimateEmergency (link)	7323
@GretaThunberg	Time is running out. Change won't come from these conferences like #COP26 unless there is big public pressure from the outside. Join the climate strike this Friday (Kelvingrove Park 11am), and the climate march Saturday (11.30am) to make your voice heard. Together we are strong. (link)	6963
@GretaThunberg	Unless we achieve immediate, drastic, unprecedented, annual emission cuts at the source then that means we're failing when it comes to this climate crisis. "Small steps in the right direction", "making some progress" or "winning slowly" equals losing. #COP26 #UprootTheSystem (link)	6874
@GretaThunberg	"As citizens across the planet, we urge you to face up to the climate emergency. Not next year. Not next month. Now" Join me and activists all over the world and demand leaders to face the climate crisis at #COP26 So far more than 650k people have signed! (link)	6775

@GretaThunberg	Today hundreds of thousands all over the world marched for the climate, sending a clear signal to people in power at #CO26 to protect people and the planet. Our so-called "leaders" aren't leading – THIS is what leadership looks like! #UprootTheSystem (link)	6250
@NadiaWhit-tomeMP	A private jet produces 10 times the emissions per person as an economy class flight. World leaders used 400 private jets for #COP26, emitting as much CO2 as 1,600 Scottish people do a year. Lifestyle changes should start with the rich and powerful. link	5440
@Haggis_UK	Boris Johnson tries to explain why he wasn't wearing a mask while sitting next to Sir David Attenborough. #COP26 link	5431
@GeorgeMonbiot	I'm on my way home from #COP26, full of frustration and fury after reading the draft declaration. The world's powerful governments propose to do more to defend the fossil fuel industry than to defend life on Earth. link	5193
@Bill_Esterson	On the eve of #COP26, what is the UK government doing to lead the way? New coal mine in Cumbria. New coal mine in Cumbria. New oil field in the North Sea. Tax cuts for air travel. Sewage dumped into rivers and the sea. Embarrassing isn't it? link	4775
@NadiaWhit-tomeMP	A Tory MP is paid £150,000 by an oil firm, then calls on the government to delay policies to tackle climate change. As MPs, we were elected to serve our constituents, not the polluting transnational corporations destroying our planet. Lucrative second jobs should be banned. link	4629
@GretaThunberg	A must watch, especially now during #COP26 link	4559
@ChrisGPackham	I believe this is humanity's last chance. We need a real & binding result at #COP26 . In truth I'm very scared because I don't think they're anywhere near up to the job . . . so this is how I currently feel about the next two weeks. Please RT. link	4318
@GretaThunberg	"There are more delegates at COP26 associated with the fossil fuel industry than from any single country" I don't know about you, but I sure am not comfortable with having some of the world's biggest villains influencing & dictating the fate of the world. link	4283
@davidschneider	He has nothing to say. No justification. He is just the very worst person at the very worst time. link	3769

Table 4.2.3 – Top retweeting users in Greta Thunberg cluster

User	Total RTs	Followers	Total tweets	Joined	Bio
jewel_thin	567	9,569	92,000	2020	RTs of UK politics
DiannaKopansky	501	1,772	5,164	2013	UN Biodiversity
DingaBelle	442	4,574	706,300	2012	RTs of UK politics
Account closed	335	18,700	289,700	2018	Account closed
Middletonlord	324	746	138,600	2011	RTs of climate justice
jambojambo49	313	991	133,700	2012	RTs of UK politics
PTClimate_UK	312	1,097	16,700	2018	RTs of UK & climate politics
Olwyn_55	307	2,004	153,900	2011	RTs of UK politics
terryelaineh1	269	4,078	445,000	2015	RTs of UK politics
HalseyJane	259	2,753	251,300	2014	RTs of UK politics
KingsmeadMrT	259	2,347	400,800	2015	RTs of UK politics
TheWholeShebang	244	1,270	38,500	2016	RTs of climate and ecojustice topics
AlfieTurner2	229	301	284,200	2011	RTs of UK politics
ChristineJameis	226	11,400	762,700	2018	RTs of climate justice, UK politics
cristinacalgary	225	1,953	251,900	2015	RTs of UK politics
martinandrea86	223	894	320,800	2014	RTs of UK politics
KrisGibson13	221	3,366	75,300	2013	RTs of UK politics
SomethingVintag	221	4,478	210,300	2011	RTs of UK politics
parents4future	215	51,200	187,300	2019	Parents 4 future
Gio73568992	209	192	24,400	2021	Unknown

4.1 Science-advocacy cluster (586,197 RTs)

Figure 4.2 – Close-up view of Science-advocacy cluster

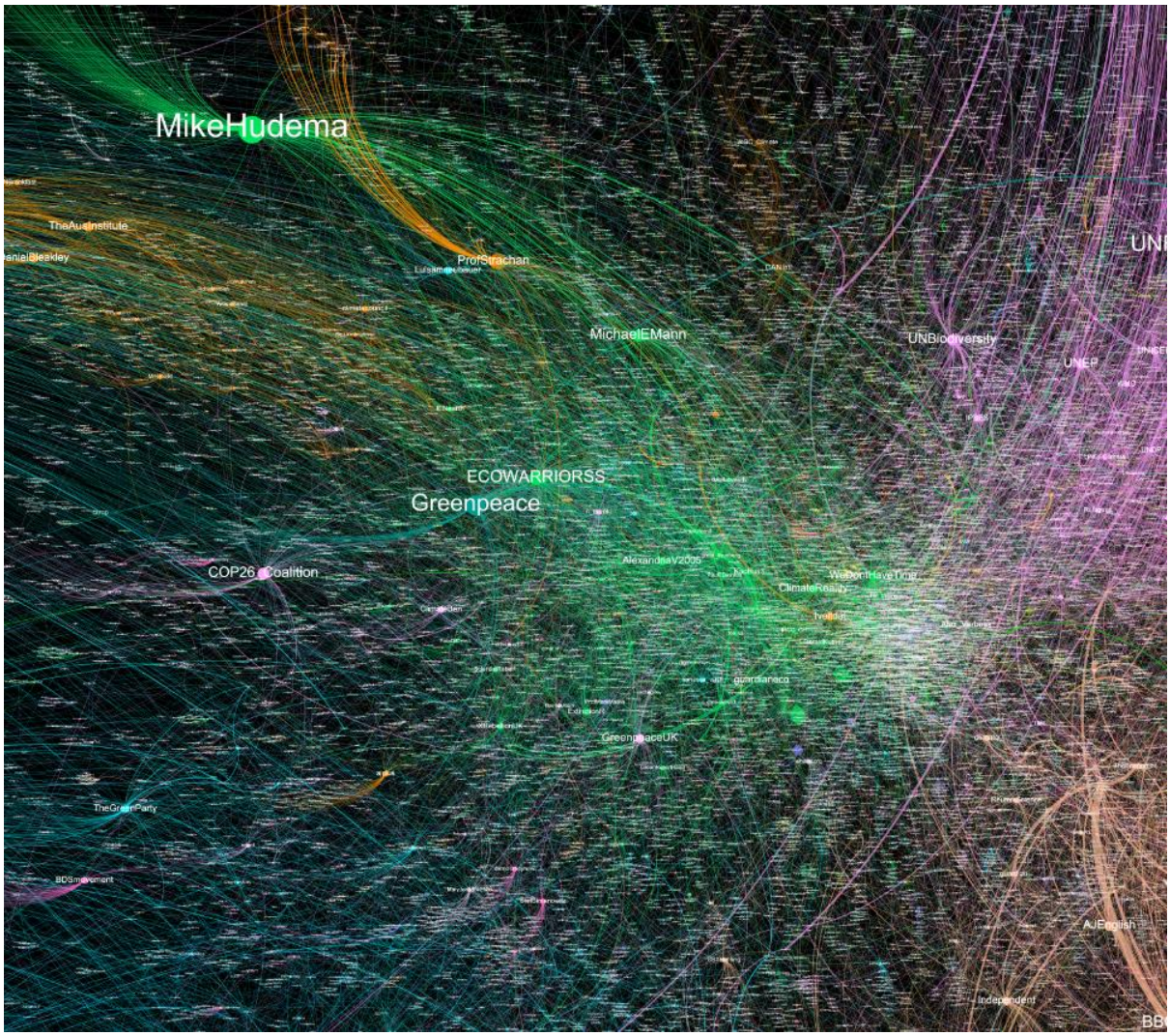


Table 4.2.1 – Top retweeted users in Science-advocacy cluster

User	Total RTs	Followers	Total tweets	Joined	Bio
benphillips76	25,079	31,000	74,600	2010	Author, justice advocate
ajplus	18,718	1.2 million	102,100	2010	Digital storytelling
LeoDiCaprio	14,752	19.6 million	2,628	2010	Hollywood celebrity
MikeHudema	14,422	165,400	33,700	2008	Climate activist
AlexandriaV2005	13,420	77,700	6,516	2018	Youth climate activist
Greenpeace	9920	1.9 million	77,100	2007	Global ENGO
ClemSenechal	9458	23,300	17,700	2011	Greenpeace France
MichaelEMann	7607	210,600	153,400	2011	Climate scientist
GreenpeaceUK	6901	226,800	46,800	2007	UK Greenpeace
AOC	6613	13 million	13,800	2010	US Representative, Democrats
GreenRupertRead	6567	34,000	59,000	2009	Professor East Anglia, popular author
COP26_Coalition	5944	17,300	1,486	2020	COP26 civil society
ProfMarkMaslin	5636	17,400	16,500	2014	Professor, UK, author "How to save our planet"
walela15	5632	39,000	4,676	2019	Indigenous climate activist, Brazil
ProfStrachan	5586	18,900	50,600	2014	Professor, UK, energy policy, sustainability
ECOWARRIORSS	5582	65,900	184,000	2013	Climate justice activist
KetanJ0	5079	60,600	197,100	2010	Climate justice activist
afpfr	4437	3.9 million	448,400	2011	Global news agency
KaoHua3	4272	13,400	24,500	2019	Youth climate activist
ClimateBen	4197	98,600	43,500	2018	Climate justice

Table 4.2.2 – Top retweeted content in Science-advocacy cluster

User	Content of original tweet	Total RTs
@benphillips76	Once again Barbados PM Mia Mottley has been the one who has delivered the speech the world needed. May she be heard, may we rise. Take 8 minutes to listen to the whole thing. Share the lines that grabbed you most. #COP26 (link)	16,207
@ajplus	Prince Charles called for action on the climate crisis and says he has spent 50 years "trying to raise awareness." Charles and his wife have a carbon footprint 96x higher than the average person — releasing 430+ tonnes of CO2 per year, mostly with private jets and helicopters. (link)	8880
@benphillips76	This photo of Tuvalu's virtual address to the Climate Conference says everything that should need to be said. #COP26 (link)	8694
@LeoDiCaprio	Congratulations to Ecuadorian President @LassoGuillermo on the creation of a new 23,166-square-mile Marine Protected Area near the Galápagos and the new debt swap to help manage it, announced today at #COP26. (Photo by @shawnheinrichs) (link)	6090
@ClemSenechal	Si vous l'avez manquée, je la remets ici, parce que cette image dit tout : le ministre des Affaires étrangères de Tuvalu, une île menacée du Pacifique sud, s'adresse à distance à la #COP26. (link)	5632
@AlexandriaV2005	By now, you've probably heard about the lines, access and representation issues at #COP26. But it's been a really awkward, strange day, so I want to lay everything out here, because if you've wondered if #COP26 is okay, I'm gonna show you that no, #COP26 is really not okay/1 (link)	3428
@susie_dent	Word of the day is one we all need: 'respair' (16th century): fresh hope; a recovery from despair. #COP26 (link)	3198
@walela15	Colonialism caused climate change https://t.co/bqjn9LtaGp	3039
@ajplus	Indonesia reversed a #COP26 pledge to end deforestation by 2030, calling the plan "inappropriate and unfair." Indonesia is one of the world's worst deforesters, mostly due to the palm oil industry, and has lost 10% of its virgin forest — the size of Portugal — since 2001. (link)	2647
@KetanJ0	Folks, here's your daily reminder The harm of climate change is caused by **cumulative** greenhouse gases. So: a very slow path to zero by 2050 does much more absolute harm than a very fast one. This isn't widely understood: the fossil industry knows and exploits this. (link)	2526
@GreenRupertRead	Sunak's #budget halves air-passenger duty: a tax on flying. Remember: most flying is by the rich; 15% of the population take 70% of flights. A taxbreak for the rich, on the most	2447

	climate-destructive action there is, flying. Days before #Cop26. They're spitting in our kids' faces. | link	
@Debbie_banks30	DID YOU KNOW: If every person on earth just recycled, stopped using plastic straws, and drove an electric car, 100 corporations would still produce 70% of total global emissions. #Tiredearth #COP26 | link	2126
@AOC	Yes. BIF+BBB are not written as 2 distinct bills, but interlocking policy. BIF's climate benefits only unlock if BBB passes. If BBB gutted/dies, we may have just locked in US emissions &thrown away our biggest chance to combat climate change. Stakes are now higher on BBB passing. link	2054
@LeoDiCaprio	Sir David Attenborough's powerful message to leaders at #COP26 reminds them why they are there. The world is watching. #EyesOnCOP26 ¦ link	1997
@ajplus	Barbados PM Mia Mottley called out world leaders for their failure to rise to the urgency of the global climate crisis during #COP26. "Simply put, when will leaders lead? Our people are watching and our people are taking note." link	1922
@AOC	I finally got a hold of some Irn-Bru at #COP26! link	1824
@StopCambo	BREAKING: Youth Delegates disrupt #Cop26 president Alok Sharma's speech! #StopCambo Today at the closing ceremony of #COY16, youth delegates called out the hypocrisy of @AlokSharma_RDG, who is still supporting development of new oil fields in the North Sea. @FoEScot @YFoES | link	1740
@walela15	Nos, os povos indígenas, estamos na linha de frente da emergência climática lutando com nossas vidas e devemos estar no centro dessa discussão. Sem povos indígenas não existe equilíbrio climático. #cop26 | link	1734
@WritesBright	Well this is awkward... President of COP26 Alok Sharma has received donations from the man behind a billion-dollar oil drilling and shipping company. |link	1606
@AOC	Happy to announce creation of a US Civilian Climate Corps is now in the Build Back Better Act. Estimated to create 300k+ public jobs w/ Dept of Labor + Americorps to combat the climate crisis & enviro injustices. We 1st outlined the vision for it here: link	1495

Table 4.2.3 – Top retweeting users in Science-advocacy cluster

User	Total RTs	Follow-ers	Total tweets	Joined	Bio
Account closed	1913	N/A	N/A	N/A	Account closed. Also in Greta retweeting users
allan_crawshaw	1142	5,239	619,400	2016	RTs of climate activism
NoahsArkCrew	815	2168	204,400	2010	RTs of climate solutions
Nicolasnne	799	215	43,500	2013	RTs of climate activism
Gio73568992	715	193	24,400	2021	Unknown, also in Greta re-tweeting users
RWare7	708	1638	75,300	2021	RTs of climate, Greta fan
endsarsbot_	703	6533	614,800	2019	RT bot for EndSARS
ProfStrachan	683	18,900	50,600	2014	RTs of climate science/activ-ism
DawnRo-seTurner	669	6622	554,900	2009	RTs of Indigenous activism
GlobalUnion3	635	1496	130,600	2018	RTs of climate, energy
madlove_love	508	1521	93,300	2017	RTs of climate justice
SaleemulHuq	480	51,100	336,300	2006	Climate scientist, RTs of cli-mate news, justice, loss and damage
bgkmsc	477	1015	62,500	2012	RTs of nature, animal rights, environment
TheWholeSheb ang	467	1276	38,600	2016	Climate emergency, forestry background
GreenAssam	438	1021	74,200	2009	RTs of climate, environment
benoit_gregory	426	2791	358,900	2014	French politics
lisanoel1968	420	2080	120,500	2014	RTs of climate, social justice news and events
jane__eden	404	3734	345,800	2020	Bot that RTs on conservation and climate
MolinaElorza	383	1199	37,700	2019	RTs on climate, environment
wavetop	383	4127	473,400	2011	RTs of climate, environment

4.3 Contrarian cluster (526,863 RTs)

Figure 4.3 – Close-up view of Contrarian cluster

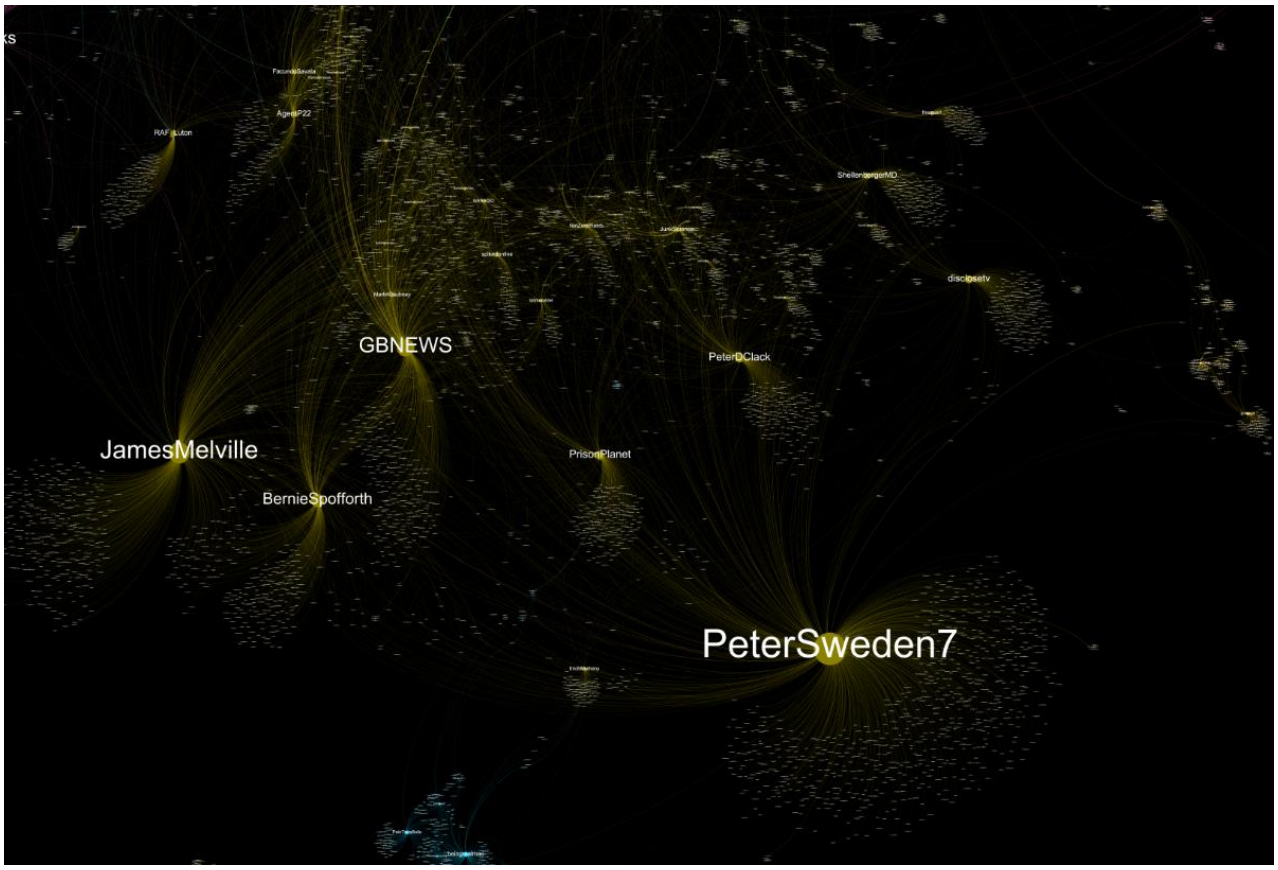


Table 4.3.1 – Top retweeted users in Contrarian cluster

User	Total RTs	Followers	Total tweets	Joined	Bio
PeterSweden7	35,183	308,400	22,600	2016	Far-right extremist
JamesMelville	30,082	281,000	49,400	2009	Twitter personality, Fife Scotland
PrisonPlanet	29,439	1.2 million	82,400	2009	UK right-wing, extremist
disclosetv	27,674	958,300	763	2008	Junk news outlet
BernieSpofforth	22,034	124,900	80,200	2016	RTs of right-wing
GBNEWS	21,542	402,500	53,900	2020	UK right-wing news
JuliaHB1	12,705	382,900	146,300	2012	UK Breakfast TV host
MartinDaubney	12,579	114,600	79,400	2012	Deputy leader of Reclaim party, UK right wing populism
EricMMatheny	11,926	228,900	213,500	2014	US right-wing pundit/podcaster
ShellenbergerMD	10,634	253,100	18,700	2014	Climate sceptic,
Nigel_Farage	9670	1.6 million	17,900	2009	Brexit
DrEliDavid	8297	193,300	2,525	2016	AI specialist/expert
PeterDClack	7576	23,400	9,962	2010	Climate denial
JulianMellentin	6529	3,445	5,771	2009	Food business expert
EcoSenseNow	6231	110,100	48,000	2013	Patrick Moore, climate denial superspreader
spikedonline	5727	135,000	53,800	2009	Internet magazine of UK libertarianism, pro-Brexit
Account closed	5549	N/A	N/A	N/A	Account closed
MaajidNawaz	5483	500,600	3,074	2009	RTs of right-wing news
darrengrimes	5482	205,200	2,855	2016	UK right wing pundit

Table 4.3.2 – Top retweeted content in Contrarian cluster

User	Content of original tweet	Total RTs
@PrisonPlanet	Wealthy technocrats arriving on private jets staying at luxury 5-star hotels and being chauffeured around in large entourages are about to spend the next 2 weeks lecturing us about how we need to reduce our living standards. I won't be listening and neither should you. #COP26 link	11,515
@disclosetv	Biden falls asleep at #COP26 "climate change" conference. (Tweet removed)	8957
@GBNEWS	'Until further notice, and until persuaded otherwise, I shall continue to believe it's not about what they say it's about, and never has been.' Neil Oliver calls the world leaders at COP26 'hypocrites.' link	8170
@Peter-Sweden7	I'm not worried about climate change or global warming. I'm worried about the global tyranny taking over the world. link	8101
@JulianMellentin	Day 3, Cop26. A fleet of Mercedes (petrol & diesel, not electric, we checked) ferries delegates from city centre hotels. At just one hotel we counted 60 cars waiting. The journey can be accomplished in 15 mins by electric bus or train or 20 mins on foot. But cows are the problem. link	6022
@JamesMelville	Prince Charles will take a private jet to Rome to take part in the G20 conference before returning via private jet to the #COP26 summit in Glasgow to express his concern over climate change. Seriously. link	5583
@disclosetv	JUST IN - Fully vaccinated LA Mayor has tested positive for #COVID19 at #COP26 in Glasgow and is now isolating in his hotel room. (Tweet removed)	5156
@BernieSpofforth	COP26 - Covid Carbon super spreader event: 2 private air fields; over 100 private jets; 50% of all plane emissions are from private jets; no red countries so no quarantine; No vaccine requirements and no passports. Some animals are more equal than others. #COP26Glasgow link	4592
@disclosetv	Jeff Bezos's $65m Gulf Stream leads parade of 400 private jets into #COP26 , including scores of royals and "green" CEOs" (Tweet removed)	4497
@JamesMelville	When our leaders talk about the environment at #COP26 - they have conveniently forgotten that masks are an environmental catastrophe of Covid. 129 billion masks that cannot be biodegraded are used and thrown away every month. Over 3 billion masks now pollute the oceans. link	3923

@MartinDaubney	Why do world leaders need to fly to Rome in private jets, then fly to Glasgow in private jets, then fly home in private jets, to make the point that the rest of us need to switch off our central heating, pay 30%more for gas & scrap our cars? Utter hypocrites! #COP26 #g20 link	3860
@ArchRose90	Just over 400 private jets carrying world leaders & business executives to COP26. Blasting 13,000 tonnes of CO2 into the atmosphere. But of course, me eating an extra cheeseburger is killing the planet… link	3585
@EricMMatheny	If climate change was a doomsday-level threat you wouldn't have 400 private jets being flown to a climate change conference. If COVID was a life-or-death health emergency, the US Border would be closed and you wouldn't be incentivizing people to come here to the tune of $450K. link	3286
@DrEliDavid	By "we" he means "you". He just took a private jet to attend G20 in Rome, before flying back with private jet to attend #COP26 link	3269
@PeterSweden7	The elites attending the climate change conference are not required to show a covid passport. Meanwhile to attend the part that is open for the public, you must show a covid passport. One rule for the elite, another rule for you. link	3232
@Nigel_Farage	Every world leader or dignitary that arrives to @COP26 by private jet is an eco-hypocrite. Fact. link	3143
@PeterSweden7	Sweden closed down nuclear reactors. The result? They had to fire up an oil power plant burning 140 000 litres of oil EVERY hour. Britain had to fire up coal power plants because low winds not producing enough wind turbine electricity. Fantastic job climate change fanatics. link	2920
@JamesMelville	The Royal Family have collectively flown over 545,000 air miles over the last five years - enough miles to get them to the moon and back. Prince Charles has flown the most - with 25 trips covering 120,213 air miles at a cost of more than £2.4m. #Cop26 link	2902
@PeterSweden7	The elites used 400 private jets to fly to the climate change conference. Emitting tons and tons of CO2. I can tell you one thing. They sure don't seem to be worried about climate change...	2890
@EricMMatheny	If you fly a private jet to an elite climate change conference, you don't care about the climate. You care about flying on private jets and being invited to elite events and appearing to be concerned about the climate. link	2799

Table 4.3.3 – Top retweeting users in Contrarian cluster

User	Total RTs	Followers	Total Tweets	Joined	Bio
GrnConservatism	494	980	171,900	2010	"Conservative green"
PeteDenes	423	1,569	62,100	2013	RTs Pro-Trump
RogerXMathew	364	1,007	263,800	2013	RTs Pro-Trump, fossil fuel
JohnNicklay2	362	1,252	201,500	2017	RTs pro-Trump, libertarian
Account suspended	359	N/A	N/A	N/A	Account suspended
GreatestPresidt	303	1,462	131,000	2019	RTs Pro-Trump
YvetteHenson	301	11,600	309,900	2011	RTs of UK right-wing
FJEB88	282	1,430	312,200	2012	RTs of UK right-wing
LyndaE222	274	2,313	973,500	2012	RTs Pro-Trump
sterlingbaht	274	704	77,000	2017	RTs of climate denial
RussJensen5	270	3,472	390,800	2016	RTs pro-freedom
z_chrissie	263	7,114	698,100	2015	"unashamedly conservative", free speech
pmevans5	255	492	172,700	2011	RTs of UK conservatives
Ilovehairy1	249	2,020	40,200	2019	RTs pro-fossil fuel
Account closed	238	N/A	N/A	N/A	Account closed
MiniMooJack	233	4,433	330,200	2015	RTs anti-vax
EileenBuck13	227	1,015	250,700	2019	RTs free speech
jer0319	227	320	110,900	2020	RTs Canadian politics, anti-Trudeau
tan123	225	34,300	274,100	2008	Climate sceptic
Veritatem2021	225	4,713	138,100	2019	RTs of climate denial

4.4 COP26 cluster (436,189 RTs)

Figure 4.4 – Close-up view of COP26 cluster

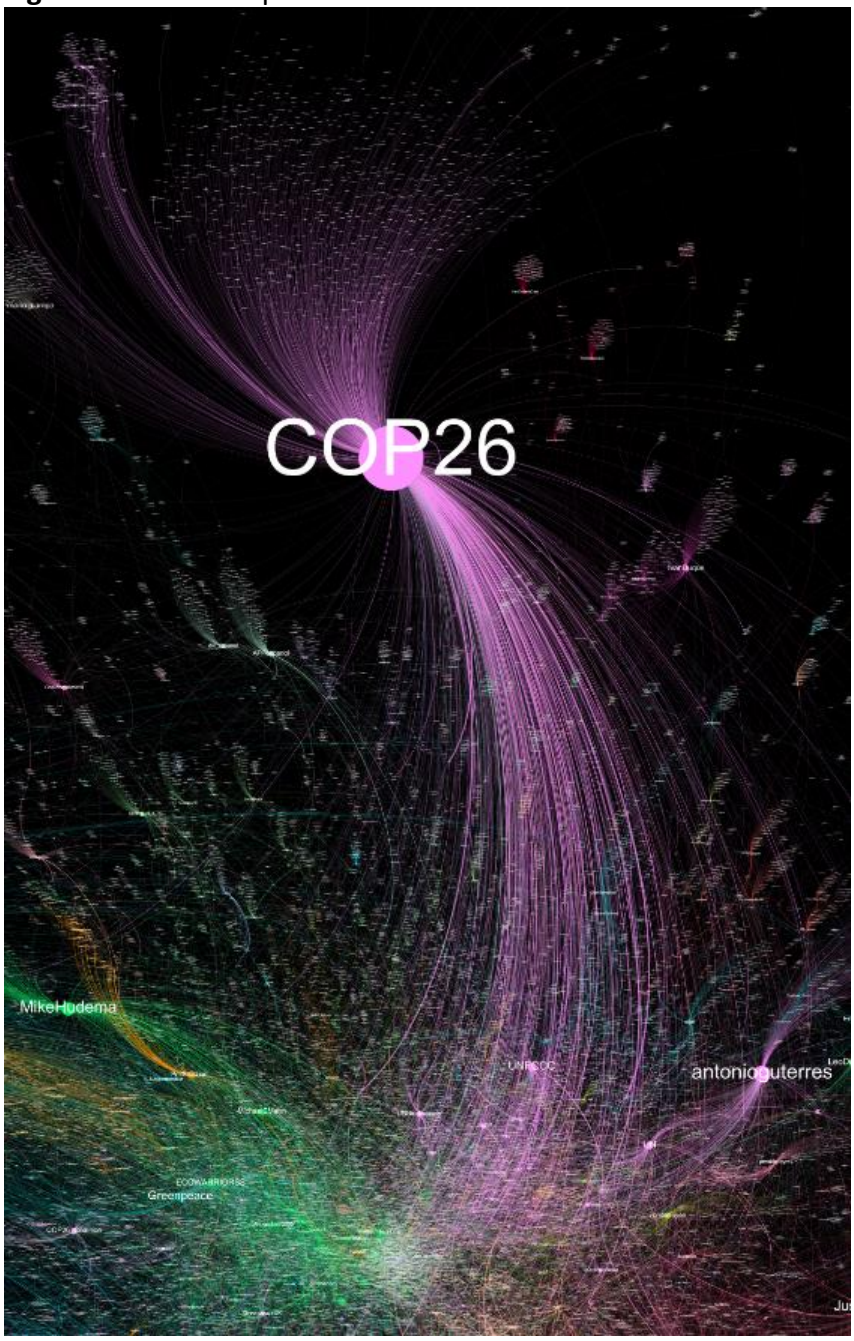


Table 4.4.1 – Top retweeted users in COP26 cluster

User	Total RTs	Followers	Total tweets	Joined	Bio
COP26	72,433	237,900	6454	2019	Official COP26
ygofficialblink	28,071	8.1 million	2081	2017	Black Pink, K-pop musicians, formal advocates for COP26
SumakHelena	21,621	10,300	195	2014	Indigenous youth climate activist, Amazon
antonioguterres	18,090	1.7 million	3,756	2016	UN Secretary General
Feargal_Sharkey	13,667	76.500	18,300	2015	Singer, eco-activist
UN	12,522	15.5 million	85,500	2008	UN on Twitter
UNFCCC	12,196	912,700	28,400	2008	UNFCCC on Twitter
UKinKorea	11,202	12,500	9,504	2010	British embassy in Korea
BorisJohnson	9261	4.4 million	5844	2015	PM, COP26 host
notsoaidil	6965	20,700	16,100	2020	Advocacy director for climate action & biodiversity protection in Malaysia
UNBiodiversity	6753	132,500	63,200	2009	Secretariat of the Convention on Biological Diversity
UNDP	5497	1.7 million	73,500	2009	UN Development Agency
TIME	4493	19.1 million	395,000	2008	US News Magazine
UNICEF	4337	9.2 million	54,600	2009	UN Children's Fund
UNEP	4184	1.2 million	34,400	2009	UN Environment Programme
IPBES	3351	103,700	35,000	2010	Intergovernmental Platform on Biodiversity & Ecosystem Services
UN_Women	3333	2.1 million	67,200	2008	Gender equality and women's empowerment
10DowningStreet	3315	5.9 million	18,000	2008	PMO, UK
shekharkapur	3102	2.7 million	31,600	2008	Indian filmmaker, actor, celebrity
WMO	2868	156,000	16,500	2010	World Meteorology

Table 4.4.2 – Top retweeted content in COP26 cluster

Retweeted User	Content of original tweet	Total RTs
@ygofficialblink	We can still realise what was promised in Paris 2015. We can still save our planet. We can still save our future. WATCH our message to world leaders at today's UN Climate Change Conference – COP26 in #Glasgow #ClimateActionInYourArea #TogetherForOurPlanet #BLINKS @COP26 (link)	24394
@SumakHelena	Honestly, so disappointed at media. The Amazonian youth from Brazil and Ecuador lead the entire march today in Glasgow and were up on the main stage for almost 30 minutes. Frontline people at the FRONT LINE. Yet no coverage. This is what invisiblization looks like. #COP26 (link)	12154
@UKinKorea	It's been a real pleasure to work with @BLACKPINK on #ClimateActionInYourArea Next stop… Glasgow @COP26 #COP26 #TogetherForOurPlanet (link)	11143
@SumakHelena	Indigenous peoples, from all over the Americas took over Glasgows streets today! This should be amplified. #COP26 (link)	8466
@COP26	#BLACKPINK x #COP26 "This is the most important issue of our time" Hear the message from @BLACKPINK to world leaders @ygofficialblink|#TogetherForOurPlanet (link)	7122
@COP26	"That desperate hope, is why the world is looking to you and why you are here." -- Sir David Attenborough, #COP26 People's Advocate, speaking at the Opening Ceremony. #TogetherForOurPlanet (link)	5470
@UN	We can no longer ignore the climate crisis. It's time to stop making excuses and start making changes! Let's take #ClimateAction before it's too late: http://dontchooseextinction.com via @UNDP #DontChooseExtinction (link)	4606
@Feargal_Sharkey	As of this morning this Tweet has 9,960,312 impressions. Wouldn't it be great for that to become 10 million. (link)	4098
@COP26	#TogetherForOurPlanet Over the last year, it has been great to hear from #COP26 advocates @BLACKPINK about the importance of global climate action #BLACKPINK | @ygofficialblink (link)	3908
@notsoaidil	He does not represent my generation for climate justice. my generation did not cause deforestation & encroachment of indigenous lands. my generation is not a shareholder of a waste disposal project. my	3862

	generation's carbon footprint is significantly less than the rich. (link)	
@ygofficialblink	CALLING ALL #BLINKS! Only a few days to go until #COP26 in Glasgow. Time to step up and come #TogetherForOurPlanet Watch this space for more #ClimateActionInYourArea @COP26 link	3505
@UNDP	We can't ignore #ClimateChange any longer. Unless we end the excuses, we'll be another species facing extinction. Join us and @FrankieTheDino, and let's take #ClimateAction before it's too late: http://dontchooseextinction.com #DontChooseExtinction #COP26 link	2908
@Feargal_Sharkey	104 days after been fined £90m for dumping sewage into the environment and less than 12 hours after Gov voted to protect water companies and not our rivers, @SouthernWater were dumping sewage at 60, yes 60, different locations along the south coast of England. #COP26 hypocrisy link	2753
@COP26	On climate, the world will succeed, or fail, as one. Now is the time for real action. #COP26 begins today. We must make it count. #TogetherForOurPlanet link	2681
@Feargal_Sharkey	I thought you might all like to know that this Tweet has now had 8,845,224 impressions on Twitter. Bloody hell. Fantastic job y'all, hugely well done and thank you. link	2549
@COP26	"Is this how our story ends?" Powerful moment from #COP26 People's Advocate, Sir David Attenborough from yesterday's Opening Ceremony. #ClimateAction #TogetherForOurPlanet link	2264
@shekharkapur	'India is 17% of the world's population, yet contributes less than 5% to Global Warming' Well said PM @NarendraModi at #COP26 link	2259
@COP26	NEWS: At COP26, over 100 leaders have committed to halt and reverse forest loss and land degradation by 2030. To have any chance of keeping below 1.5°C of global warming, we must halt deforestation" -- Sir David Attenborough" #COP26 link	2021
@COP26	"Staying below 1.5 degrees is the only chance we have of avoiding these tipping points and stabilising our world again" Hear from #COP26 People's Advocate, Sir David Attenborough, on why every fraction of a degree matters. link	1969
@BLACKPINKGLOBAL	#BLACKPINK for COP26 #ClimateActionInYourArea #TogetherForOurPlanet @BLACKPINK link	1919

Table 4.4.3 – Top retweeting users in COP26 cluster

User	Total RTs	Follow-ers	Total tweets	Joined	Bio
DrML350PhD	1260	243	23,700	2014	Research scientist
madhavanpallan	706	661	123,200	2009	Research scientist, physics and computing
ABriphin	619	1,071	53,100	2020	International relations scholar, Uganda
GENESYS_x34	549	214	63,800	2021	“social media influencer”, Algeria
shaqibshahril	526	4,327	180,000	2009	RTs of climate and energy
mubarakbashir83	494	314	61,500	2014	Greece, international migration agency
Account suspended	487	N/A	N/A	N/A	Account suspended
Mohitrajindian	471	203	25,900	2021	RTs on climate, human rights
sdgcounting	457	1520	8,734	2015	UN SDG tracker
marianatrobosky	451	3,332	159,700	2015	Freelance journalist
Gecko	400	1939	283700	2009	Singer, storyteller
Eco1stArt	388	6787	393,200	2010	Eco-artist
andytoronto	387	6182	430,500	2009	RTs social justice
Cristin97894443	377	38	11,800	2021	RTs global politics
UNBiodiversity	371	132,200	63,200	2009	UN Convention on Biodiversity
IPBES	370	103,600	35,000	2010	Intergovernmental Platform on Biodiversity & Ecosystem Services
VitrinaNorte	369	81,400	3791	2009	Chile, climate/green tech art and innovation hub
JFSebastian146	363	18,100	1.1 million	2013	Climate action
sixsign	360	1824	77,400	2011	Retweet bot
jvasconcelosh	333	1365	56,000	2014	Brazil
Account closed	326	N/A	N/A	N/A	Account closed. Also appears in Greta Thunberg cluster

4.5. Mainstream media cluster (310,261 RTs)

Figure 4.5 – Close-up view of Mainstream media cluster

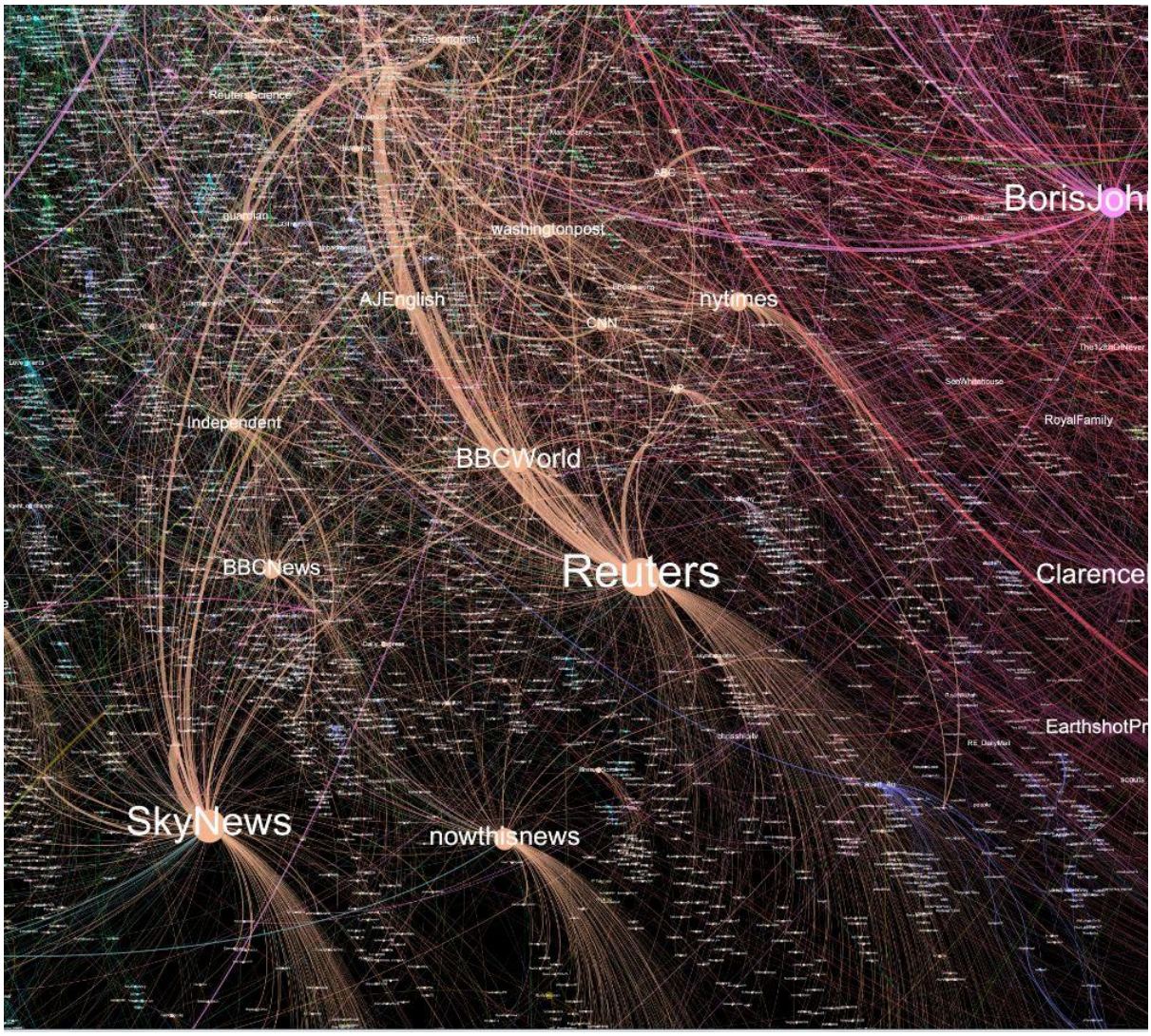


Table 4.5.1 – Top retweeted users in Mainstream media cluster

User	Total RTs	Followers	Total tweets	Joined	Bio
Reuters	22,524	25.3 million	872,900	2007	News agency
SkyNews	15,643	7.8 million	530,400	2007	UK TV-channel
nowthisnews	12,570	2.7 million	243,700	2012	Online news aggregator
nytimes	11,958	53.2 million	475,700	2007	Global newspaper
BBCWorld	9779	37 million	347,800	2007	UK/Global public service
BBCNews	9756	14 million	495,400	2007	UK/Global public service
rappler-dotcom	8410	3.6 million	913,300	2011	Online news, Philippines
CNN	7261	58.5 million	376,900	2007	US-Global news
washing-tonpost	6123	19.2 million	430,500	2007	US-Global news
AJEnglish	5590	7.8 million	307,900	2007	Middle East-Global news
Independent	4960	3.6 million	1.2 million	2008	UK-global news
AP	4935	15.8 million	321,900	2009	News agency
Account sus-pended	4908	N/A	N/A	N/A	Account suspended
lopezdoriga	4507	8 million	419,400	2011	Spanish-Mexican journal-ist
MollyJongFast	4451	1 million	17,500	2008	Journalist, The Atlantic
newsmax	4392	1.4 million	149,400	2009	Right-wing, US news pun-dits
guardian	4268	10.5 million	755,300	2009	UK-global news
SenSanders	4232	12.5 million	23,200	2009	U.S Senator
ABC	3903	17.5 million	389,200	2009	US news
TheEconomist	3866	16.7 million	309,700	2007	Global news magazine

Table 4.5.2 – Top retweeted content in Mainstream media cluster

User	Content of original tweet	Total RTs
@Reuters	Climate activist @GretaThunberg addresses crowd at #FridaysForFuture protest during #COP26 https://t.co/2wpM9GN4ZM	5193
@rapplerdotcom	WATCH: At the 26th United Nations Climate Change Conference on Tuesday, November 2, Korean girl group and COP26 ambassador @BLACKPINK urges fans and the younger generation to work for the planet and take climate action. Visit our live updates page: https://rappler.com/world/global-a (link)	4979
@PoliticsForAll	NEW: More than 400 private jets carrying world leaders and business executives to Cop26 will blast 13,000 tonnes of CO2 into the atmosphere	3066
@SenSanders	The people want to lower drug costs. Big Pharma wants to stop us. The people want to expand Medicare. The health care industry wants to stop us. The people want to combat climate change. The fossil fuel industry wants to stop us. It's time Congress listen to the people. (link)	2555
@tv6tnt	FULL SPEECH: "1.5°C is what we need to survive, 2°C, is a death sentence... We do not want that dreaded death sentence, and we've come here today to say, try harder, try harder." Prime Minister of Barbados Mia Mottley Q.C. addresses #COP26 Climate Conference (link)	2133
@MailOnline	Awkward moment India's PM Modi gets a little TOO close as he gives UN Secretary General a big hug at COP26 (link)	1913
@maxinejoselow	At least they're being honest? #COP26 #climatepledgetheatre (link)	1907
@MollyJongFast	I'm in France, watching British news channels and boy do they spend a lot of time covering climate change. (tweet removed)	1875
@newsmax	President Joe Biden, at a reception hosted by Britain's royal family to mark the global climate change summit's opening night, reportedly farted so loudly it made the Duchess of Cornwall blush. https://bit.ly/3mSHpHL (link)	1870
@BBCBreaking	First major deal at COP26 climate summit sees 100 nations promise to end deforestation by 2030 and protect "lungs of our planet" #COP26BBC https://bbc.in/3EvP9FE (link)	1755
@lopezdoriga	Con razón no fue @lopezobrador Prefirió irse a su finca en Chiapas de cuyo nombre no quiero acordarme, aunque muchos, si. (link)	1573
@BBCPolitics	What does halving air passenger duty on domestic flights say about the UK's climate commitments? It	1547

	shows a “pattern” of "avoiding taking real action” and not viewing the climate crisis as a "main priority," says climate activist Greta Thunberg. http://bbc.in/3mtWC1K #Marr link	
@FinancialTimes	COP26, the climate summit in Glasgow, is rapidly approaching. We looked at the top 5 countries, emitting the most emissions and the pledges they’re bringing to the world stage: https://on.ft.com/3Bpsf0T link	1530
@rapplerdotcom	‘TAKE CLIMATE ACTION IN YOUR AREA’ BLACKPINK urges world leaders to take necessary actions to limit global warming to 1.5°C above pre-industrial levels. There’s still hope to realize what was once promised in Paris last 2015, the group says. #COP26 http://rplr.co/cop26 link	1487
@Jairam_Ramesh	Need climate change in syllabi to educate children, says PM in Glasgow. Wow! This from a man who said on TV to school children that climate has not changed, humans have!! link	1353
@krishgm	This is why both persistence and a little interruption is sometimes needed - if you keep on at it as Justin does here the interviewee has, eventually, to answer the question. Not that it actually stops the coal mine…. link	1329
@nytimes	Txai Suruí, a 24-year-old Indigenous activist from Brazil, told heads of state at COP26 that their timetables for reducing carbon emissions and scaling back the use of fossil fuels were not adequate. "It’s not 2030 or 2050," she said. "It’s now." https://nyti.ms/3EAdhqS link	1229
@MollyJongFast	Too stupid to understand climate change, the Louie Gohmert story (tweet removed)	1134
@jamesmatthew-sky	Police block demonstrator dressed as a tree. Someone shouts “Are you Special Branch?” #patter #COP26 link	1117

Table 4.5.3 – Top retweeting users in Mainstream media cluster

User	Total RTs	Followers	Total tweets	Joined	Bio
world_news_eng	1772	25	19,400	2011	RTs of news, sports
vmrwanda	532	1280	518,500	2011	RTs of African news
rashidaldosari	415	2341	2.3 million	2011	RTs of global news
jmhamiltonblog	393	5045	853,400	2011	Political blogger
sdgcounting	361	1519	8,355	2015	UN SDG success tracker, also in COP26 data
wj3Kdz8TXpfykRC	351	766	276,700	2020	Middle East politics, RTs global news
WillyGaleon2	294	6	30,800	2021	RTs of Rappler news, Philippines
Account suspended	289	N/A	N/A	N/A	Account suspended
BekMarkeyTowler	286	60	6370	2019	Climate researcher, RTs climate news
Account suspended	280	N/A	N/A	N/A	Account suspended
deduped_economi	270	269	170,800	2015	Only RTs of The Economist maga-zine
SerendipitySays	267	2238	1.3 million	2010	RTs everything, self-proclaimed lib-eral
falconhamada_90	265	2387	1.7 million	2014	RTs of global news
bites_sound	222	57	168,400	2020	RTs of global news
rednano3	221	174	70,200	2021	RTs of global news
viriyabot	218	1209	788,000	2016	RTs of global news
rjgms	209	612	123,600	2012	RTs of global news
Account removed	201	N/A	N/A	N/A	Account removed
SouzaEluam	192	455	490,100	2017	RTs of global news
Calmways1	191	463	73,900	2020	RTs of pet media

4.6. UK-Scotland politics/event cluster (229,884 RTs)

Figure 4.6 – Close-up view of UK-Scotland event cluster

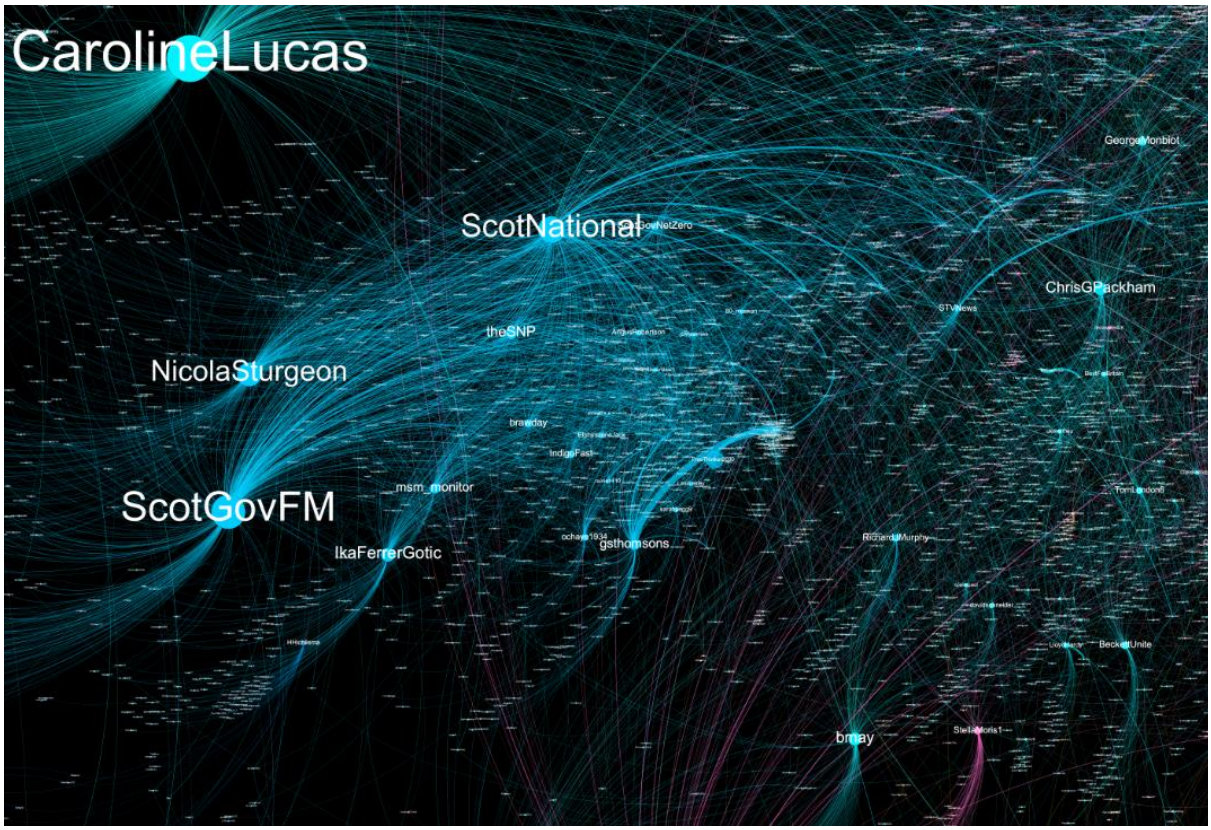


Table 4.6.1 – Top retweeted users in UK-Scotland event cluster

User	Total RTs	Followers	Total tweets	Joined	Bio
NicolaSturgeon	17730	1.4 million	27,600	2010	First Minister of Scotland
ScotGovFM	9661	232,600	4,542	2011	Office of FM of Scotland
ScotNational	7734	124,300	150,800	2014	Pro-Independence news
DavidLammy	5618	781,300	24,400	2008	Labour MP, Tottenham
AdamBienkov	4552	105,300	67,600	2008	Journalist, Byline Times
IkaFerrerGotic	4252	15,300	20,300	2011	CNN news anchor, foreign policy, Bosnia
gsthomsons	4013	6,629	74,400	2009	RTs Scottish independence
msm_monitor	3845	29,900	32,500	2015	Media fact checking of Scottish news
BjCruickshank	3620	27,600	159,800	2012	Pro Scottish independence
theSNP	3504	329,700	94,200	2009	Scottish National Party, currently holds power
STVNews	2897	554,100	246,300	2009	TV news broadcast
ScotGovNetZero	2717	19,600	11,100	2009	Campaigner, net zero 2045
marcuscarslaw1	2655	8477	17,000	2018	SNP staffer
IndigoFast	2633	11,500	93,500	2014	Pro-independence campaigner
ElphinstoneJack	2460	7803	15,400	2017	Pro-independence campaigner
80_mcswan	2441	54,000	47,700	2017	Pro-Independence news, comment, RTs
Brawday	2337	13,800	159,000	2013	Tweets and RTs pro-Independence
AngusRobertson	2172	82,600	14,500	2009	SNP MSP, Edinburgh
BuntinRobert	2116	7806	247,000	2014	SNP member
GMBScotOrg	2001	5685	5617	2012	Scottish trade union

Table 4.6.2 – Top retweeted content in UK-Scotland event cluster

User	Content of original tweet	Total RTs
@NicolaSturgeon	The one and only Sir David Attenborough telling world leaders that it's time to act - and that there is no longer any excuse for inaction - was a powerful moment of the #COP26 opening ceremony link	2962
@AdamBienkov	Boris Johnson says he "acknowledged there was a problem" with climate change 11 years ago in Copenhagen. Here's what he wrote as recently as 2015. #COP26 link	2867
@NicolaSturgeon	Amidst all the serious business at #COP26 today, I'm pleased to also report that @AOC now has a supply of Irn Bru link	2690
@DavidLammy	Time to wake up @borisjohnson the world is burning. Sir David Attenborough is paying attention to the climate crisis, it's time your Government did too #cop26 link	2618
@DavidLammy	Don't blame a clown for acting like a clown. Ask yourself why you keep going to the circus. #COP26 link	2597
@NicolaSturgeon	The voices of young people like @GretaThunberg and @vanessa_vash must be heard loudly and clearly at #COP26 - the next few days should not be comfortable for leaders, the responsibility to act must be felt. link	2317
@ScotGovFM	First Minister @NicolaSturgeon is delighted to have received, on behalf of the people of Scotland, a gift from President Biden. She was also pleased to welcome @POTUS to Glasgow, and looks forward to him returning to Scotland in future. #COP26 link	1770
@danbloom1	Outside a restaurant at COP26, more than a dozen cars of police / bodyguards / etc are sitting with engines ticking over, waiting for the VIPs inside to finish their dinners. Got to love the climate summit... link	1661
@BuntinRobert	I abhor the fact that Charles Windsor gets to speak at Cop26 and the First Minister of the hosting nation does not. #IndyRef2 link	1533
@JenniferB41	I abhor the fact that Charles Windsor gets to speak at Cop26 and the First Minister of the hosting nation does not. #IndyRef2 link	1458
@jim45cotland	The 'union dividend': Boris Johnson caught red handed saying that he doesn't want Scotland's First Minister Nicola Sturgeon "anywhere near" the #COP26 climate summit that's being hosted in Scotland. #ScottishIndependence14 link	1294
@NicolaSturgeon	To everyone attending #COP26 - welcome to Scotland. Please stay safe and enjoy your time in Glasgow. link	1092
@AdamBienkov	Liz Truss calls on world leaders to "step up" on tackling climate change, before refusing to say whether the UK	1054

	will allow drilling of the Cambo oilfield and the construction of a new coal mine in Cumbria. #r4today	
@IkaFerrerGotic	I might lose my Bosnian citizenship over this, but this one is for you, #Sco Scotland, you have single-handedly taken over the title of #TheCoolestNationOnEarth. Thanks again for treating me as one of your own. #Scotland #Glasgow #BecomingScottish #NewScot #scotfest #COP26 https://t.co/xfzd1rF4d9 link	981
@MartinJDocherty	The director for the international centre on climate change has some interesting things to say regarding COP26. https://t.co/wGAMDdMFSF link	889
@GMBScotOrg	BREAKING: Glasgow #COP26 refuse and cleansing strike to go ahead. Glasgow City Council has acted in bad faith and failed to give our members proper time and space to discuss the 11th hour offer from COSLA. Strike action will commence from midnight. link	845
@IndigoFast	#ScottishIndependence	835
@NicolaSturgeon	Early morning at #COP26. Big few days ahead here in Glasgow for the future of the planet. Let's hope the leaders gathering here today step up and do what is needed. (link)	775
@jandersonnews	Police have split off a socialist contingent of the march - protestors on the main Glasgow march are chanting 'let them… link	744
@scotfoodjames	Hey, @BorisJohnson & world leaders, Holly has something to say. #COP26Glasgow #COP26 link	710

Table 4.6.3 – Top retweeting users in UK-Scotland event cluster

User	Total RTs	Follow-ers	Total tweets	Joined	Bio
isthisab0t	2719	2396	926,300	2020	RT bot, pro-indy
lesmurphy6	1093	1525	197,200	2013	RTs pro-indy, Scottish nationalism
tartancobweb	1037	2538	845,300	2014	RTs pro-indy, Scottish nationalism
HarleyEbe	929	1698	85,600	2009	RTs for independence, Scottish nationalism
FCBoswellona	879	1029	134,300	2011	RTs of Scottish politics
Free-Thinker2030	783	2300	169,300	2016	RTs for independence
MaureenPick-eri5	713	4183	316,500	2019	RTs for independence, environmental topics
roblwilson	709	3878	1.3 million	2011	RTs for independence
ferguson2811	703	4201	677,200	2014	RTs for independence
iAntsaoir	671	2728	230,200	2016	RTs for independence
fiona_fionnagal	572	3041	570,900	2013	RTs for independence, Scottish nationalism
Staples1955	540	752	128,400	2021	RTs of Scottish politics
blondiesa	503	8777	454,100	2009	RTs for independence, Scottish nationalism
Jules23744754	498	1996	86,500	2019	RTs for independence, Scottish nationalism
EU_Re-main_2017	480	4041	301,900	2017	RTs for independence
GeronimoG14	470	1619	50,100	2021	SNP member, pro-indy
g_hibby	449	2833	127,200	2021	RTs, anti-UK
Mar-yjaneAusti13	446	497	13,900	2020	RTs for independence
Account closed	442	N/A	N/A	N/A	Account closed
CatherineMcKer	442	3179	127,000	2012	RTs for independence

4.7 POTUS cluster (206,535 RTs)

Figure 4.7 – Close-up view of POTUS cluster

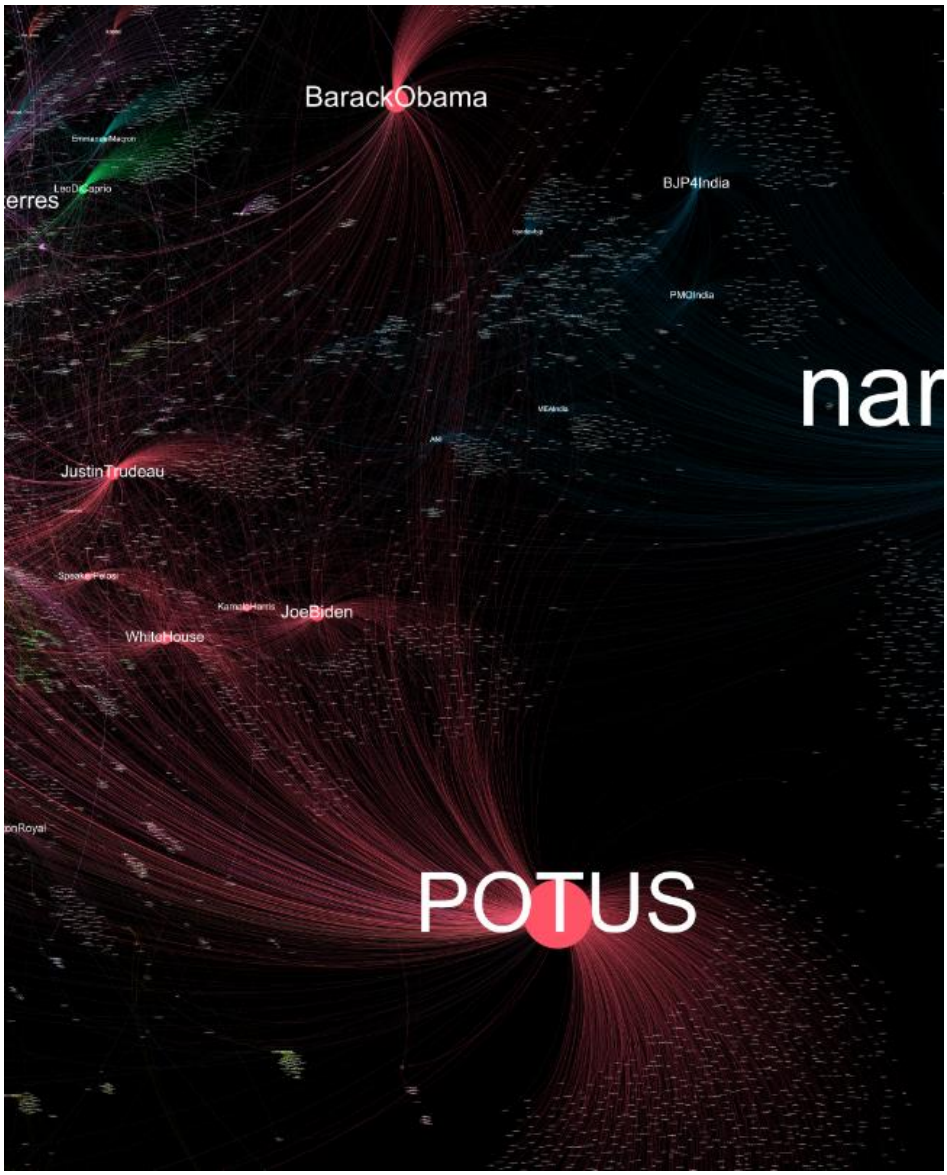


Table 4.7.1 – Top retweeted users in POTUS cluster

User	Total RTs	Followers	Total tweets	Bio
POTUS	51,293	23 million	3350	President of US
BarackObama	23,502	132 million	16,500	Former POTUS
JoeBiden	12,485	34.4 million	8272	Joe Biden
WhiteHouse	9404	7.1 million	3654	White House
naftalibennett	9315	499,800	11,000	Prime Minister of Israel
KamalaHarris	7691	19.7 million	16,500	U.S. Vice President
SpeakerPelosi	6329	7.4 million	13,200	U.S. Speaker of the House
OccupyDemocrats	4458	374,100	92,300	News website, political org.
SenWhitehouse	3958	555,600	19,200	U.S Senator, Rhode Island
VP	3702	12.9 million	7,508	V.P. US, official account
ewarren	3375	5.9 million	12,500	Senator, dems
joncoopertweets	3334	1 million	341,900	Obama campaign chair
TheDemocrats	2683	2.2 million	37,700	Democratic Party on Twit-ter
SecDebHaaland	2281	153,500	921	Secretary of Interior
akasayiigaremus	2109	47,900	43,800	Japanese user
IsraeliPM	2104	969,500	16,000	Israel PMO
StateDept	2099	6.3 million	75,300	US Department of State
NPR	2057	8.9 million	67,600	National Public Radio
MikeBloomberg	2036	2.7 million	13,700	Entrepreneur, media mogul
CBSNews	1780	8.6 million	240,200	US news media

Table 4.7.2 – Top retweeted content in POTUS cluster

User	Content of original tweet	Total RTs
@naftalibennett	It was truly great to finally meet you, @NarendraModi. #COP26 link	8795
@POTUS	Last night, the House of Representatives passed my Bipartisan Infrastructure Deal – a once-in-a-generation investment that will create millions of jobs modernizing our infrastructure, turn the climate crisis into an opportunity, and put us on a path to win the 21st century. link	7133
@POTUS	It was an honor to meet with Pope Francis again at the Vatican today. I thanked His Holiness for his advocacy for the world's poor and those suffering from hunger, conflict, and persecution, and lauded his leadership in fighting the climate crisis and ending the pandemic. link	5731
@POTUS	My two bills – the Build Back Better Framework and the Bipartisan Infrastructure Deal – add up to the largest effort to combat climate change in the history of the United States of America. link	4916
@BarackObama	Today is Election Day, and so much of what we care about is on the ballot—from access to health care to bringing our economy back from COVID-19 to combating climate change. We need everybody going out to vote. So make a plan to vote, and make your voice heard. link	4814
@POTUS	Climate change is already ravaging our world. It's not a hypothetical threat — it's destroying people's lives and livelihood every day. We have to act. link	4774
@POTUS	Today, I'm in Glasgow to kick off COP26. Climate change is the challenge of our collective lifetimes — the existential threat to human existence as we know it. And every day we delay, the cost of inaction increases. Let this be the moment that we answer history's call. link	3448
@joncooper-tweets	BREAKING: Biden just announced a 100-country pledge to END and reverse deforestation by 2030. This covers 85% of Earth forests – our main carbon sink to prevent climate change! How do you feel? link	3256
@POTUS	My Bipartisan Infrastructure Deal will build a national network of charging stations for electric vehicles and thousands of miles of new, resilient transmission lines for a clean energy grid. Together with the Build Back Better Framework, it will help tackle the climate crisis. link	3040
@POTUS	It isn't just our moral obligation to combat climate change — it's an economic imperative. The future will belong to those who act now to harness the power of a clean energy economy. link	2598

@POTUS	Action on climate change is a moral imperative. But it is also an economic imperative. We must build an equitable clean energy future that creates millions of good-paying jobs. link	2587
@BarackObama	We've done some important work since the Paris Agreement was signed six year ago, but we're still nowhere near where we need to be on climate. Watch live from #COP26 in Glasgow as I talk about the steps we can take to combat climate change. link	2523
@BarackObama	Signing the Paris Agreement to fight climate change was one of my proudest moments in office. But it was always a foundation to build on. As world leaders gather for COP26, I shared some reflections on the road to Paris and the young activists who are pushing us further. link	2517
@POTUS	The framework will: - Create millions of jobs - Grow the economy - Invest in our nation and our people - Turn the climate crisis into an opportunity - Put us on a path to win the economic competition for the 21st century against China and the rest of the world. link	2460
@POTUS	I left COP26 today feeling as optimistic as I ever have about our path forward on climate. We're leading the way, and we're going to get this done. link	2399
@POTUS	There's no more time to waste when it comes to combating climate change. Let this be the moment we answer history's call. Let COP26 be the start of a decade of transformative action that preserves our planet and raises the quality of life for people everywhere. We can do this. link	2289
@POTUS	Day one of the G20, working with world leaders on our shared interests — from the global pandemic and our global recovery, to confronting the climate crisis, and a host of other issues that matter to the American people. link	2283
@BarackObama	I spoke at COP26 in Glasgow about what's happened in the six years since the Paris Agreement, and how much further we still need to go to control climate change. link	2081
@JoeBiden	Climate change is an existential threat to our planet. That's why the Build Back Better Framework will be an unprecedented effort to combat climate change and puts the United States on track to meet our target of reducing greenhouse gas emissions in half by the year 2030. link	2070
@BarackObama	Young people have more at stake in the fight against climate change than anyone else. I had a chance to talk with some young people who are helping lead the fight, and could not be more impressed by their courage, creativity, and persistence. They give me hope. https://t.co/muFbKl5WcF	1974

Table 4.7.3 – Top retweeting users in POTUS cluster

User	Total RTs	Followers	Total tweets	Joined	Bio
Turgut_Guliyev	563	462	183,400	2012	Youtuber, Turkey
ASPaton	265	8774	225,900	2012	RTs of conservation news
InsdataInter	240	2142	1.3 million	2013	RT bot, Greek language
All435Reps	238	6667	910,200	2019	RTs of US Gov
TyberZannxxxx	223	1206	685,900	2014	RTs of Dems
ManojKu70630177	212	224	36,800	2021	RTs of POTUS, Modi, BJP
SaashaSingh1	202	996	172,400	2020	RTs of POTUS, Modi
NikolasVision	174	212	360,000	2015	RTs of Biden, US Gov
KelebogileMoad2	162	232	28,800	2021	RTs of US Gov. tweets
YuriRiv02558750	161	2,733	281,600	2020	RTs of POTUS and Dems
Kat4Obama	152	8,554	1.3 million	2012	RTs of POTUS and Dems
jdh_harms	148	341	100,600	2015	RTs pro-Biden, Dems
WolfgangRUL	138	7,323	138,400	2018	RTs of Dems
evenspl	134	1,857	83,300	2011	RTs of POTUS and Dems
barba_ribera	133	306	43,200	2018	RTs of POTUS and Dems
Account closed	130	3,087	376,400	2018	Account closed
VickiMo08056436	125	1,126	308,300	2020	RTs of POTUS and Dems
KatrinaWTE	124	5,522	174,800	2017	RTs of Dems
dreamcatchermja	113	2,151	636,400	2015	RTs of Dems
PeterYaoUS	111	122	11,900	2020	RTs of Biden, Dems

4.8. Narendra Modi cluster (109,427 RTs)

Figure 4.8 – Close-up view of Narendra Modi cluster

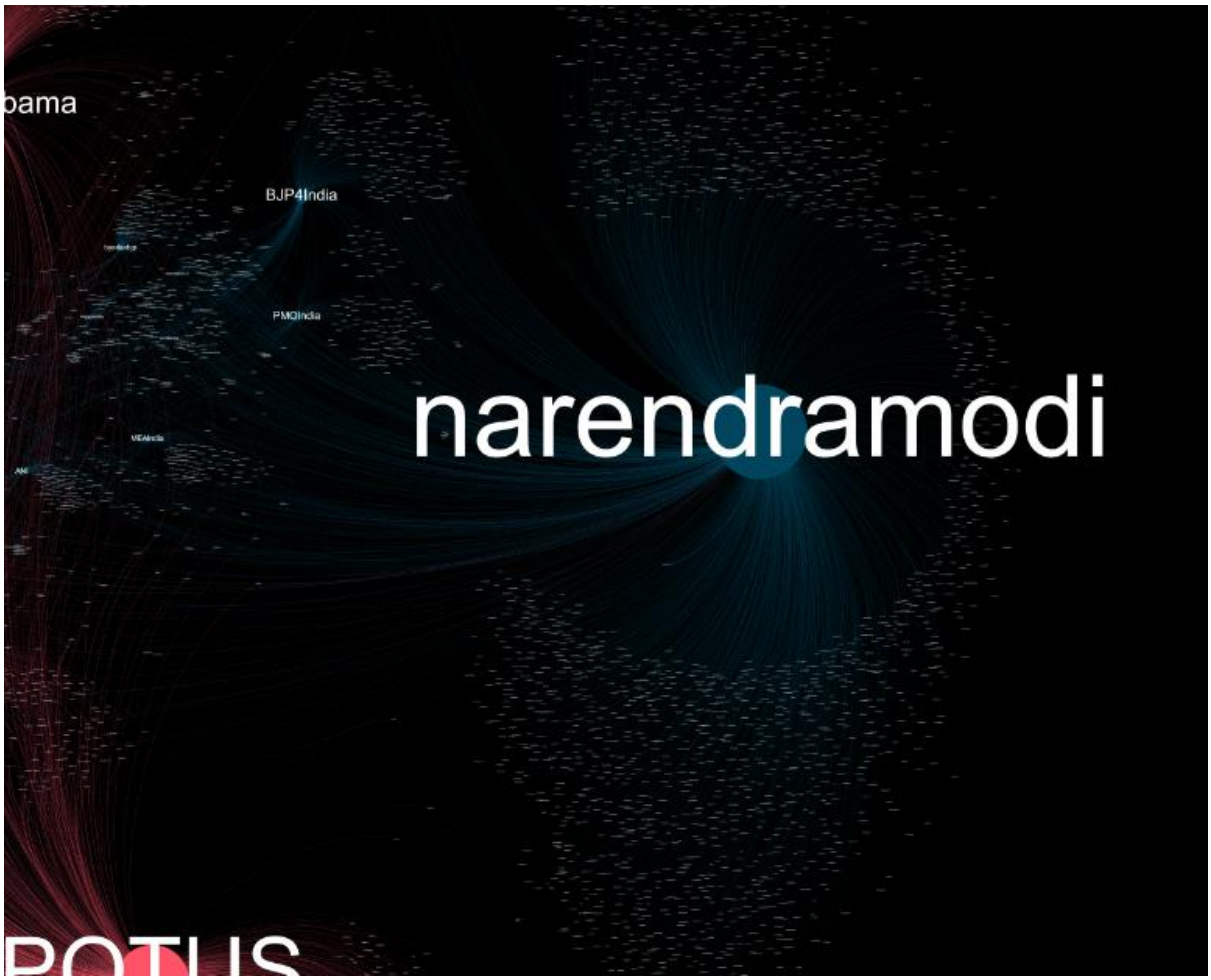


Table 4.8.1 – Top retweeted users in Narendra Modi cluster

User	Total RTs	Followers	Total tweets	Bio
narendramodi	49,203	79.7 million	33,100	Prime Minister of India
ANI	6108	6.9 million	567,400	Asian News International
PMOIndia	5612	48.8 million	32,100	PM office
BJP4India	5218	18.5 million	231,000	Bharatiya Janata Party (BJP)
MEAIndia	3815	2.2 million	28,600	Minister of External Affairs
byadavbjp	2979	505,900	17,200	Minister of Environment, Forests & Climate Change
mygovindia	2394	2.9 million	46,100	Citizen engagement platform, Gov. of India
WIONews	2241	451,400	244,600	News outlet
airnewsalerts	1538	3 million	371,400	All India Radio
PIB_India	1344	2.6 million	267,400	Press Information Bureau, Gov. of India
MrsGandhi	1149	502,900	103,300	Priti Gandhi, BJP official
sambitswaraj	1109	6.3 million	62,000	Sambit Patra, BJP
DDNewslive	1001	3.5 million	224,200	India's public broadcaster
PTI_News	962	3.8 million	125,000	Press Trust of India, news agency
DrSJaishankar	889	1.6 million	6,130	Minister of External Affairs
republic	874	2.7 million	491,600	News media, Mumbai
PiyushGoyal	869	11.1 million	41,000	Minister of Commerce
bjpdrmahendra	869	397,200	19,300	BJP, former Minister
narendramodi_in	849	2.7 million	42,200	PM Modi, personal account
sidhant	786	156,100	73,600	Journalist
KanchanGupta	786	313,400	145,900	Minister of Information & Broadcasting

Table 4.8.2 – Top retweeted content in Narendra Modi cluster

User	Content of original tweet	Total RTs
@narendramodi	Delivering the National Statement at the @COP26 Summit in Glasgow. (link)	6887
@narendramodi	Indeed! We shall continue working together for stronger bilateral ties and for a better planet. The people of India deeply value the friendship with Israel. (link)	4954
@narendramodi	Met PM @BorisJohnson on the sidelines of the @COP26 Summit in Glasgow. We got the opportunity to talk about different subjects including mitigating climate change. (link)	4406
@narendramodi	Addressing the @COP26 Summit in Glasgow. https://t.co/Gca9quYv9b (link)	4392
@narendramodi	Had an excellent meeting with @BillGates at the @COP26 Summit. We discussed a wide range of subjects including ways to strengthen global efforts towards overcoming climate change. (link)	4186
@narendramodi	Over the next few days, I would be in Rome, the Vatican City and Glasgow to attend important multilateral gatherings like the @g20org and @COP26. There would also be various bilateral and community related programmes during this visit. https://pib.gov.in/PressReleasePa (link)	3875
@narendramodi	India's Panchamrut that will power our fight against climate change. https://t.co/H6kV7IlCd4 (link)	3708
@narendramodi	The @COP26 Summit offers a wonderful opportunity to interact with various world leaders. In a short while, I will be delivering the National Statement at the Summit. link	3665
@narendramodi	A brief tête-à-tête with @MinPres at the @COP26 Summit yesterday. https://t.co/gNbAFAWSv0	2759
@narendramodi	Will be addressing the @COP26 Summit shortly, where I shall elaborate on India's vision and efforts to overcome climate change. (link)	2663
@narendramodi	Met PM @SherBDeuba in Glasgow. It is important we keep working together for sustainable development. He rightly highlighted the threat of climate change to the Himalayan region. link	2595
@narendramodi	Landed in Glasgow. Will be joining the @COP26 Summit, where I look forward to working with other world leaders on mitigating climate change and articulating India's efforts in this regard. link	2582
@narendramodi	Happy to have met you in Glasgow after the very fruitful interaction in Rome. As I highlighted during my speech yesterday, India will always strengthen any effort for sustainable development. link	2399

@PMOIndia	Prime Minister @narendramodi met @BillGates on the sidelines of the @COP26 Summit in Glasgow. Both discussed ways to further sustainable development and steps to mitigate climate change. link	1199
@PMOIndia	PM @narendramodi landed in Glasgow to take part in the @COP26 Summit. https://t.co/tDQbTSaU0U	1155
@ANI	India constitutes 17% of global population and India's contribution to the emission has only been 5%. But today, the entire world admits that India is the only major economy which has delivered on Paris agreements in letter & spirit: PM Modi at #COP26 World Leaders' Summit. link	1099
@PMOIndia	Watch LIVE	1041
@PMOIndia	PM @narendramodi met Nepal PM @SherBDeuba in Glasgow. Theirs was a fruitful meeting, in which different issues including a collective effort against COVID-19 and working together to overcome climate change were discussed. link	912
@MrsGandhi	Do note the positive body language of Israel Prime Minister @naftalibennett and Indian Prime Minister @narendramodi during their first public interaction at #COP26 link	898
@mygovindia	Coming together for our planet! PM @narendramodi received by UK PM @BorisJohnson and UN Secretary-General @antonioguterres at the Scottish Exhibition Centre to attend the World Leaders Summit of #COP26. link	875

Table 4.8.3 Top retweeting users in Narendra Modi cluster

User	Total RTs	Followers	Total tweets	Joined	Bio
wingcdrsharma	467	636	302,200	2021	Retired military
Mukherjee-Writam	183	170	103,200	2019	RTs pro-Modi, BJP
IndiaTodayFLASH	172	1,100,000	634,800	2013	News magazine, widest national circulation
Saiakt1	126	145	96,500	2019	RTs pro-Modi, BJP
Account closed	118	N/A	N/A	N/A	Account closed
SudarshanTheva3	116	607	171,900	2019	BJP supporter
Ranjeet_mishraa	115	915	188,400	2021	BJP staff
Account closed	113	N/A	N/A	N/A	Account closed
KENILPA69458345	111	722	44,000	2020	Politician
DhuvaNirmal	109	1,190	196,000	2017	BJP staff
viralvm69	105	882	547,300	2014	RTs pro-Modi, BJP
Shashan20797894	102	134	67,700	2018	RTs pro-Modi, BJP
rajksharma093	101	1,222	305,400	2014	RTs pro-Modi, BJP
anilsc65	99	432	118,900	2015	RTs pro-Modi, BJP
abhiatal	98	1,179	61,500	2010	RTs pro-Modi, BJP
honey9834	98	618	189,100	2016	RTs pro-Modi, BJP
Account sus-pended	97	N/A	N/A	N/A	Account sus-pended
akash_rauth	95	236	93,300	2015	RTs pro-Modi, BJP
Account closed	93	N/A	N/A	N/A	Account closed
Mandeep_vyas13	92	2,621	110,900	2020	RTs pro-Modi, BJP

5. DISCUSSION AND CONCLUSIONS

This report has presented a preliminary overview of the Twitter data collected during the Glasgow climate summit (COP26) in November 2021. The report offers a *meta-scale* overview of a sample that consisted of 11,667,143 tweets and 8,921,103 retweets that were produced during COP26. These retweets are then broken down further into eight samples of retweets that shaped the diverse community structures that appear on our COP26 network map (Figure 2.2).

It is important to bear in mind that the "object" of such an analysis is to produce an artefact that represents climate politics, communication, opinions, interpretations and interactions in a complex way. To begin with, social media platforms offer particular and limited repertoires for such interaction. They exclude some actors, and tone down some ways of representing the world, among other limitations. Gathering the massive amounts of information these platforms produce necessarily demands the use of computational tools. Tools that, in turn, shape the "objects" of research inquiry in particular ways. Identifying retweet clusters with a particular "community detection algorithm" is but one example of this. We could have chosen a different algorithm or chosen to visualize its findings differently. Similarly, we could have chosen to build networks with other Twitter data-points (@mention networks, hashtags, replies, etc.). In sum, our choice to study retweet networks represents just one of the myriad ways in which researchers can begin to develop interpretive analyses of the deep surface of a Twitter data set.

Social networking tools create potential for a bridging of quantitative (math, statistical analysis) and qualitative (hermeneutics, textual and discursive analysis, virtual ethnography) methods to drill deeper into the material. In further work, we will explore these clusters in more detail by connecting this broad descriptive summary of the COP26 retweet network data to critical analysis that focuses on specific questions of media research and climate communication. To diversity the scope of our investigation, we will work together with a network of international colleagues to make more effective use of the dataset. While this work continues, we close this preliminary report with some final remarks and interpretations. They serve here as examples of the productive potential of this dataset and the questions that seem worthy of further attention.

Content production vs. network construction

While it is not surprising to learn that most tweets are retweets (Cf. Wojcik & Hughes, 2019), this distinction deserves further analysis. In a sense, it can point to different kinds "power" mobilized by different actors. There are actors who feed primary content to the networks (either by making arguments in original tweets or by linking to various digital contents). In contrast, there are actors (user accounts) that "only" share and circulate contents that other users have fed into the network (these can, of course, also be automated accounts). This distinction between content production and network construction, and the different ways in which they play out in the specific clusters on our map can help to characterise the broader communication dynamics that transpired during COP26. What are the resources on which different clusters draw from in terms of their "contents"? Who are the active (or hyper-active) users that build and keep up the attention network for these contents? Understanding climate communication through this division of labour seems a crucial task.

Hierarchy of interaction and influence

It is obvious that the communication flows (or interaction networks) that we have mapped here are highly concentrated and hierarchical. Each of the clusters we have described here have some semblance of this structure, although some with more of it than others. Thus, closer analysis of the multi-nodal clusters – and the contents that seem to link them together – is definitely needed. Understanding how "influence" works at the different scales of content producers, celebrities, and their followers is a crucial task. These preliminary findings also urge us to take stock of the relevance of an earlier research traditions on "opinion leaders" and multi-step flows of communication (Katz & Lazarsfeld, 2006). Following these chains from the central nodes of our communities to the fringes of the map is important if we wish to understand what happens when *social media* networks extend to *social* networks. On this note, it is critical to remind the reader that we have ourselves bracketed the "long tail" (users who were less active) from our analysis thus far. This has been a practical and temporary move: we will be returning to the "long tail" of these cluster in due course.

Cross-platform traffic and connections

Another interface that the dataset points to is the interaction between platforms. While we have focused on one particular platform (Twitter), the nature of social media is to establish linkages between digital platforms in many ways by sharing content across them. Looking more closely at how network construction takes place in Twitter serves as an interface through which users can land on other platforms and context for socially mediated communication. Taking a closer look at such cross-platform connection can help us to better understand how specific communication ecologies are built and sustained. As an example of this, we can point to our contrarian cluster: following its network leads quite quickly to other platforms and contexts where climate change positions intermesh with other contentious political topics and questions, such as immigration, gender and race.

Clusters or communities?

In our analysis, we have intentionally sought to refer to "clusters" rather than "communities". There is both a technical and intellectual reason for this. First, we believe it is important to bear in mind that the clusters identified are primarily products of our analysis. Calling them "communities" would, we believe, demand a more substantial elaboration on what kinds of reality constructions, values, communicative styles, etc. seem to hold these groups of actors (user accounts) together. This is not to argue that the clusters on our map are not representative of spheres of climate change communication with distinctive political and cultural ties that link them together. However, making such a distinction is important for elaborating on the different "logics" that tie some of our clusters together. It also serves to remind us of the difference between behaviour and meaning: the clusters emerging from the dataset reflect behaviour, that is what the actors do with their accounts. By contrast, to consider how this behaviour intersects with what other users think, and how these users interpret their own positions in the climate change communication landscape means posing different kinds of questions. So, for instance, while we identify a Science-advocacy cluster, this should not be taken as conclusive evidence that the differentiation between science and activism disappeared during COP26. Rather, the relatively intense interaction between these actors can lead to such an interpretation – and certainly, in the case of climate communication, there is room for arguing that this represents a sign of "post-normal" science emerging. Yet to argue that there is indeed a Science-advocacy community in the data would demand more evidence.

Networks as site of legacy institutional power

Our mapping at this point raises the question of what types of actors ultimately hold power *over* the attention landscape of social media. Looking at both the temporal dynamics of the data (see Section 3 above) and the main actors suggests that social media (Twitter) offers a space and communication structure where established social power is transmitted, yielded and practiced. In other words, It is tempting to conclude that many arguments about "old" structural dependencies in the media landscape – for better and worse – remain applicable to our material.

The dominant position of individuals such as POTUS and Modi is easily understood against this background. The attention they receive speaks of how politicians, controlling the decisions and resources of nation-states, can translate their political power into attention in the social media sphere. The power of COP26 and UK-Scotland event clusters is more closely related to their geographic centrality at the COP gathering. These groups – particularly COP26 – are tightly linked to the actual unfolding of this event, shaping its daily themes, sessions and spotlights. In this sense, they carry – in addition to political and bureaucratical power – a "choreographical" event power. For the UNFCCC, attracting this attention is strategically essential. As the UN body governing the COP process, its influence has been largely based on gathering decision-makers under the lens of global attention – and hoping to create public pressure for climate action. It seems, as far as attention goes, this influence pays off on Twitter. It is tempting to look at the overall map from this perspective and suggest that something like the "primary definers" (Hall et al., 1978) operates in this social climate sphere. Of course, at the same time, we should bear in mind that this is not a simple "sphere" but rather a complex, clustered network of attention.

Network power

If existing resources of power help to explain the broad attention economy of our sample, there are also signs of power that might be emerging more from the networks themselves. Fundamentally, this reflects the potential of the new communication infrastructure and the ways it can empower individual media users, allowing them vastly expanded access and choice to communication contents (and modalities). It also introduces – or highlights, materializes, amplifies – many *social* practices of media usage: directing one's attention (and recommending others to do so), sharing communication contents, transmitting influence and interpretation, and sustaining and building interpretative communities. One could argue that these practices as such have been part of pre-social media communication cultures as well. However, their importance and cumulative power has grown exponentially in the era of digitally networked media. We know that the cumulative everyday choices of social media users can potentially serve as a base for connective action (Bennett & Segerberg, 2013) that can accumulate to network power, where clusters of users identify issues and problems, recognize and reinforce shared values, and articulate challenges to existing, inherited institutions and actors.

In our material this is evident in the case of Greta Thunberg. Having joined Twitter in June 2018, in less than five years she has come to yield more influence in our social media event network than the US president. This power arises from both the retweeting volume of her grassroots followers and the sharing activity of other influential users – or, their recognition of her status and meaning. Through Thunberg's public personality, the youth climate movement has achieved considerable communicative power (Eide & Kunelius, 2021). In social media, she speaks with a collective voice that other individuals and groups in climate

communication must recognise and take into consideration. Her account draws attention and shares from politicians, influential journalists and celebrities. For example, the most widely shared tweet by Reuters during COP26 links to a story about Thunberg's speech at a Glasgow demonstration.

Another cluster, the "contrarians" (or sceptics) exemplifies network power with which diametrically opposite in its values and politics. Despite a marginal location on the map, the sceptic cluster is recognisable for its independence from established power holders, accounting for 6% of total retweets (526,863) in our sample. Similarly, recent analysis of climate disinformation online, suggests the influence of small networks of climate disinformation superspreaders to be far-reaching (King, et al., 2022). In addition to its isolation, it is noteworthy that accounts in the contrarian cluster are not strictly focused on climate. The most viral retweets among sceptics often spread attempted irony, sarcasm and ridicule of political elites – a stylistic feature visible in some of Thunberg's most popular tweets as well. Yet, drilling deeper into this network quickly exposes links to individuals, websites and platforms that traffic in extremist content.

Analytically it is important to pay attention to the fact these two articulations of network power are directing their critical, confrontational attention to established political power holders and elites of climate politics. They both exemplify the amplifying power of social media networks in bringing together like-minded actors and helping them to recognize themselves as communities (something more than clusters) with values, aims, goals and demands. However, our further analysis can also highlight and tease out their differences. Diving deeper into in the contrarian cluster, we discovered a broad suite of such extremist and conspiratorial messaging, linking critiques of urgent climate action to prevalent social, cultural and political issues – including anti-vaccination and opposition to Covid-19 public health measures, condemnation of the so-called tyranny of "global elites", and anti-immigration rhetoric. It is noteworthy that this cluster was quite isolated from other clusters in the sample.

The cluster around Thunberg, in contrast, looked different, both in terms of the more intense relationship to the powers that it was challenging, and in terms of the content of its messaging. Both are driven by a sense of existential crisis. This comparison allows us to suggest that these communities represent different and distinctive ways of articulating the climate crises. One engages with other actors, draws its authority from science, emphasizes the urgency of action, and the need to include more voices in the climate debate. The other draws its energy from exclusion in relation to political, established power and expertise as well as from divisions between nations and social groups. This difference is an example of how the assessment of social media network power must extend from the descriptive detection of clusters to the normative valorisation of the communities themselves. In the light of such assessment, the label of genuinely communicative power would only apply to one of them.

In conclusion, we believe that this last interpretation offers an important lesson for further analyses of social media (and other communication research) in the crisis rich era we are living through. It makes little sense to analyse social media activity in general: we must urgently study its actual intersections with the critical, substantial – and often systemic – challenges we currently face.

REFERENCES

Benkler, Y. (2006). *The Wealth of Networks: How Social Production Transforms Markets and Freedom*. New Haven, US: Yale University Press.

Bennett, L. & Segerberg, A. (2013). *The Logic of Connective Action: Digital Media and the Personalization of Contentious Politics*. Cambridge, UK: Cambridge UP.

Chadwick, A. (2013). *The Hybrid Media System: Politics and Power*. Oxford, UK: Oxford UP.

Couldry, N. (2012). *Media, Society, World: Social Theory and Digital Media Practice.* Cambridge, UK: Polity Press.

Couldry, N. & Mejias, U.A. (2019). Data Colonialism: Rethinking Big Data's Relation to the Contemporary Subject. *Television & New Media*, *20*(4), 336–349.

De Meo, P., Ferrara, E., Fiumara, G., & Provetti, A. (2011). Generalized Louvain Method for Community Detection in Large Networks. *11th International Conference on Intelligent Systems Design and Applications*, 2011, 88–93.

Eide, E., & Kunelius, R. (2021). Voices of a Generation the Communicative Power of Youth Activism. *Climatic Change, 169*(6).

Esser, F., & Strömbäck, J. (2014). Paradigm in the Making: Lessons for the Future of Mediatization Research. In F. Esser & J. Strömbäck (Eds.), *Mediatization of Politics. Understanding the Transformation of Western Democracies* (pp. 223–242). Basingstoke, UK: Palgrave.

Hall S., Critcher, C., Jefferson, T., Clarke, J, & Roberts, B. (1978). *Policing the Crisis: Mugging, The State, and Law and Order*. London: Macmillan.

Jacomy M., Venturini T., Heymann S., & Bastian M. (2014). ForceAtlas2, a Continuous Graph Layout Algorithm for Handy Network Visualization Designed for the Gephi Software. *PLOS ONE 9*(6).

Katz, E., Lazarsfeld, P. and Roper, E. (2006). *Personal Influence: The Part Played by People in the Flow of Mass Communications*. London: Routledge.

King, J. Janulewicz, L., Arcostanzo, F. (2022). Deny, Decieve, Delay: Documenting and Responding to Climate Disinformation at COP26 and Beyond. London: Institute for Strategic Dialogue.

Kunelius, R., & Eide, E., (Eds). (2012a). *Media Meets Climate: The Global Challenge for Journalism*. Göteborg, SE: Nordicom.

Kunelius, R., & Eide, E., & (2012b). Moment of Hope, Mode of Realism: On the Dynamics of A Transnational Journalistic Field During UN Climate Change Summits. *International Journal of Communication*, *6*, 266–285.

Mahl, D., Zeng, J., & Schäfer, M. S. (2021). From “Nasa Lies” to “Reptilian Eyes”: Mapping Communication About 10 Conspiracy Theories, Their Communities, and Main Propagators on Twitter. *Social Media + Society*, *7*(2).

Malm, A. (2016). *Fossil Capital: The Rise of Steam Power and the Roots of Global Warming*. London, UK: Verso.

Pearman, O., Boykoff, M., Nacu-Schmidt, A., & Katzung, J. *Media and Climate Change Observatory Special Issue 2021: A Review of Media Coverage of Climate Change and Global Warming in 2021.* Boulder, US: University of Colorado.

Roosvall, A., & Tegelberg, M. (2015). Media and the Geographies of Climate Justice: Indigenous Peoples, Nature and the Geopolitics of Climate Change. *TripleC: Communication, Capitalism & Critique, 13*(1), 39–54*.*

Roosvall, A., & Tegelberg, M. (2018). *Media and Transnational Climate Justice: Indigenous Activism and Climate Politics.* New York, US: Peter Lang.

van Dijck, J., & Poell, T. (2013). Understanding Social Media Logic. *Media and Communication*, 1, 2–14.

Vicari, R., Tchiguirinskaia, I., Tisserand, B., & Schertzer, D. (2019). Climate Risks, Digital Media, and Big Data: Following Communication Trails to Investigate Urban Communities’ Resilience. *Natural Hazards and Earth Systems Science*, 19, 1485–1498.

Vu, H., Do, H., Seo, H., & Liu, Y. (2020). Who Leads the Conversation on Climate Change? A Study of a Global Network of NGOs on Twitter. *Environmental Communication*, 14(4), 450-464.

Wozniak, A., Wessler, H., Chan, C.H., & Lück, J. (2021). The Event-Centered Nature of Global Public Spheres: UN Climate Change Conferences, Fridays for Future, and the (Limited) Transnationalization of Media Debates. *International Journal of Communication,* 15, 688-714.

Williams, H., McMurray, J., Kurz, T., & Lambert, H. (2015). Network Analysis Reveals Open Forums and Echo Chambers in Social Media Discussions of Climate Change. *Global Environmental Change, 32,* 126–138*.*

Wojcik, S., & Hughes, A. (2019). *Sizing Up Twitter Users*. Washington, DC: Pew Research Centre.

Wu, T. (2016). *The Attention Merchants: The Epic Scramble to Get Inside Our Heads*. New York, US: Penguin Random House.

Zuboff, S. (2019). *The Age of Surveillance Capitalism: The Fight for a Human Future at the New Frontier of Power*. London, UK: Profile Books.