



# Obstruction, delay, and transnationalism: Examining the online climate change counter-movement

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## ABSTRACT

In this article, we provide a preliminary exploration of the Climate Change Counter Movement Hyperlink Network. Recognising the international growth of the Climate Change Counter Movement, we use a hyperlink analysis to 1) identify if the counter movement uses this platform, 2) identify the structural dynamics of the hyperlink network, and 3) if and how do movement organisations connect across countries. Our findings reveal that a combination of USA and non-USA actors are operational in the hyperlink network, where climate delaying and obstruction discourse can diffuse across countries. In addition, we found cohesive subgroups illuminating an alignment of interests between think tanks across countries on climate change, a distinct role played by blogs, and a small group of connected coal-related organisations promoting information on clean coal technologies. Lastly, we observe an alignment between climate change counter movement organisations and representative organisations of the traditional Wise Use Movement. These findings provide an intriguing account of the operations of a counter movement hyperlink network, expanding our knowledge on the transmission of counter movement across countries and what this means for further developments in this area of scholarship.

## 1. Introduction

The Climate Change Counter Movement (CCCM) is an eco-system of organisations and individuals that operate using monetary resources and discourses of power to shape the public and policy [non]response to climate change [1]. This network of actors includes but is not limited to the corporate world, including the fossil fuel sector and other multinational corporations, 'public relations firms,' foundations, conservative, libertarian and partisan think tanks, advocacy groups, contrarian scientists, and the media [1]. The roots of this organised opposition are in the United States of America (USA) [2,3], but it now operates across countries [4–7]. This article contributes to this research area by presenting the results of an exploratory analysis of the CCCM operations online. Importantly, by examining this online platform, we can observe how the counter-movement reach an international audience by forging potential connections between organisations across countries. It answers three questions; 1) *Is there a CCCM hyperlink network?* In other words, does the CCCM have a structured presence online? 2) *How is this hyperlink community constructed?* 3) *Is there any transnational transmission or diffusion of information, or how do these interact across countries?*

The article is structured as follows. We first examine the existing

literature on the CCCM, its use of online platforms, and how this can inform our exploration of the CCCM hyperlink community. Following this, we document our methodological approach before presenting the results. Our results section draws together both our hyperlink network analysis and qualitative observations to better illuminate the findings. Finally, we summarise our findings and offer prospects for how this method can inform our understanding of the CCCM.

## 2. Literature review

While there has been considerable attention in the literature devoted to the USA CCCM [8–11], the movement has expanded into parts of Europe [4], Latin America [6] and South-East Asia [7]. Interest groups have formed alliances operating in the public and policy sphere to stall global action on climate change. These groups include think tanks, industry associations, political associations, and research institutes, engaging in activities to protect trade relations, global commodity chains, and fossil fuel-related industries [11]. Moreover, these interested groups align with monetary resources and power to influence domestic climate change and related policy decisions with the aim of preventing necessary climate action.

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McKie [12] suggests that the spread of CCCM messaging across continents reflects the transnational diffusion of knowledge to delay global climate action. However, examining this possible transnational element of the movement is not without its challenges. These include the complexity of each country's political and economic contexts, a robust methodological framework, and limited knowledge of how CCCM organisations organise and operate outside the USA, Europe, and Australia. Nevertheless, we can examine this transnational element using CCCM organisation websites as a unit of analysis.

CCCM organisations use websites to enhance visibility and reach international audiences, depositing information and promoting op-eds, research, and policy reports. They may also connect to one another via hyperlink ties. The ties between CCCM organisations online illustrate communication and behaviour patterns forming a hyperlink community. In this case, a hyperlink community refers to organisations that share a series of values or interests that communicate and share information in a virtual space [13]. In this virtual space, organisations can share or diffuse information to build and strengthen a particular narrative on climate change science and policy. Put simply, actors in the CCCM have multiple interests yet have chosen to coalesce around the issue of climate change. Hyperlink ties between different organisations in this virtual space enact a social relation [14], indicating an implicit agreement that they hold similar views or attitudes on climate change. If these links then form an extensive network, it reflects the potential for information exchange with the goal of developing a cohesive narrative on climate delay and obstruction. One way to map these relational ties between CCCM is to crawl the web.

### 3. Methodology

#### 3.1. Sample

We took a sample of CCCM organisations originally derived by McKie [15]. This original data collection took place between October 2015 and December 2016. The author identified each organisation employing a unique coding framework to create a preliminary international census of CCCM actors. First, the dataset was created by triangulating data from existing sources, including Plehwe [4], Brulle [7], Greenpeace [16], Corporate Europe Observatory [17], and Union of Concerned Scientists [18]. Second, affiliated or partnership organisations were identified using snowball sampling, where each subsequent organisation had to meet a series of criteria to be included in the dataset. Finally, for this research, we filtered organisations from this original dataset to include those with an active weblink, finding that some no longer had an operational web presence.

We used only organisations coded as primary or secondary in the crawling process. Primary organisations focused only on climate change or related subjects identified by the organisation's mission statement. We used each primary organisation's landing page URL in our analysis, noting that the organisation's purpose is to focus on climate change/global warming. Secondary organisations had to have previously been identified in the academic literature and/or have a clear policy area focused on environment/energy. We curated a list of API addresses based on the criterion that they had a clear policy area focusing on energy and the environment for our analysis. In total, we used 132 active hyperlinks to start the web crawling process. Ninety-four were in the USA and thirty-eight outside of the USA. These active hyperlinks represented eight Foundations, 109 Think tanks or advocacy groups, and fifteen trade associations. Details of these organisations are available on request.

#### 3.2. IssueCrawler process and settings

IssueCrawler is an open-source network mapping software that allows users to identify and visualise web networks [19], providing automated functions to crawl through web pages, extract links and

record these in a large dataset [19]. On 7th October 2020, we entered the URLs of our CCCM organisations into the harvesting tool. Each CCCM organisation URL represents a node, and the hyperlink between two CCCM organisation URLs denotes a tie. Thus, each CCCM URL entered in the harvesting tool became a starting point or 'seed.'

We undertook a co-link analysis because this was an exploratory study of an unknown network [20]. A co-link analysis establishes nodes at each level of a network that share at least two links coming from the previous level. It is only when two nodes share a common starting point that they are mapped into the network. Thus, ensuring two links in common provides a more robust indication that nodes in the network are not random [20].

Furthermore, these two links in common expand the network by identifying Out-links. Out-links are a new URL or node mapped into the network by ties to two original linked web pages. In other words, two URL's are both linked to each other and connected to a third web page. Thus, each Out-link represents the two original nodes that retrieve information from the third, which may shape the content they adopt or point browsers to other relevant resources in the CCCM network. The reciprocal of Out-links are In-links. In-links are links a node in a hyperlink network receives from others [21]. Here, CCCM websites that receive many ties from others mean they are in a relative position [13] to influence the potential flow of information and content of delaying discourses in the CCCM hyperlink network.

A co-link analysis performs this process through one, two, or three iterations. Each iteration creates a new set of seeds based on the previous iterations [19]. Two tied web pages (nodes) must connect to a third web page to be included in the network. That third web page then becomes a node in the network, used as a seed in the second iteration of the co-link analysis [19]. In this research, we used two iterations, a standard setting used across studies when dealing with an unknown network [21]. After the second iteration, the final hyperlink network did not have all the original hyperlinks because they did not form two starting points in common.

#### 3.3. Analytical technique

We converted our IssueCrawler data into a UCINET file to visualise and conduct our further analysis. To analyse this data, we use methods applied in traditional social network analysis [13]. First, we calculated network density to observe the overall level of integration in the hyperlink network [21], identifying the proportion of potential connections between nodes in a network versus those that exist. Put simply, the measure illustrated how inter-connected our CCCM hyperlink community is, determining how efficiently climate delaying discourse could diffuse through the hyperlink network.

Second, we calculated average and individual nodes in-degree and out-degree centralities [22]. In-degree centrality refers to those nodes in our network with many ties, and other nodes form ties to extract information [23]. In our hyperlink network, nodes with higher in-degree values represent a temporary position of centrality and importance in the CCCM hyperlink network. Out-degree centrality refers to nodes in a network that initiate more ties seeking to extract information from others. In turn, nodes with the highest out-degree may copy information or emulate positions from nodes with higher in-degrees.

Third, we took a measure of betweenness [24]. Nodes in a network with higher betweenness values are more likely to bridge two disconnected nodes or act as gatekeepers. In other words, it is dependent on these gatekeeper nodes to spread information through the network [25]. Therefore, nodes with larger betweenness values can potentially control the information that flows through the wider CCCM hyperlink network.

Finally, we identified eigenvector values to examine which nodes share more ties in the network. This measure provided a provisional understanding of the structural dynamics of the CCCM web community by counting the number of ties to a node and accounts for how connected these nodes are to the overall network. This measure is a robust

indicator of which CCCM actors may be in a stronger position to frame information on climate change throughout the CCCM hyperlink network.

To tell us more about our unknown CCCM hyperlink network, we used Girvan and Newman's algorithm [26] to identify subgroups. This algorithm identifies cohesive communities that join into small groups by partitioning networks into mutually exclusive groups. This is a valuable tool used by researchers conducting an exploratory study with little to no understanding of the hyperlink network [27]. To build a more comprehensive and detailed understanding of the network, we combined this data with qualitative observations from these web pages to better theorise these subgroups with the existing literature on the CCCM. Providing these qualitative observations elevates the conclusions we can draw from the findings by moving beyond hyperlink connections, focusing on the content behind these linking patterns.

Because we wanted to explore elements of transnationalism, we divided the sample of organisations into two groups where Group One represented USA organisations ( $N = 72$ ; 85.68%), and Group Two non-USA organisations ( $N = 46$ ; 14.32%). We also wanted to examine if different types of organisations such as think tanks or trade associations would link to one another based on these organisational characteristics. Therefore, we separated each of these into groups.

To do this, we first used Krackhardt and Stern's E-I Index [28] to determine two things. First, if the USA (Group One) and Non-USA organisations (Group Two) form ties only with those nodes within the same group; and second, if nodes divided into organisational types (i.e. think tanks) form ties only with others in the same group. To calculate the E-I index, we subtract the number of links connecting actors of the same group (i.e. type of organisation) from the number of external links connecting to another group(s), then divide the difference by the total number of links. This result is a standardised figure between  $-1$  and  $+1$ . Values closer to  $-1$  indicate that organisations only linked to others within their groups, and values closer to  $+1$  indicate a linking pattern that solely connects actors of different groups. Thus, when all ties are internal, we have complete homophily. When all ties are external, we have complete heterophily. Blau's Index of Heterogeneity [29] allowed us to predict the actions of certain groups, measuring diversity within a network, offering a more robust measure of how groups operate compared to that of the E-I Index. Rather than a dichotomous value, it takes the probability that two nodes in the same group link. Where organisations foster links only within their group(s), Blau's index value is zero. In contrast, higher values indicated more dispersion where organisations interact with other groups [30]. Both measures helped determine some of the structural dynamics of the CCCM hyperlink network [31].

### 3.4. Limitations

There are several limitations of this method. First, research indicates that the CCCM has changed its messaging over time [32,33], and the static nature of this hyperlink analysis did not capture potential variation over time. Nonetheless, future research could repeat the data collection process at multiple intervals and compare findings over time.

Second, while we recognise that web pages may grant a link to receive a link representing a cognisance between actors [33], we cannot determine the decisions for creating these connections by website owners and whether this replicates or forms bonds offline [13]. Nonetheless, we consider some of these offline connections by drawing on the existing CCCM literature that may illuminate how these patterns are similar, different, or extend our understanding of the CCCM use of web platforms.

Third, although we only used operational hyperlinks in our analysis, this does not mean that the websites are well maintained. For example, web page producers may not actively update pages, making it unclear how strong these online relationships are [34]. In turn, this restricts our analysis to one which is exploratory, and future research must elaborate

with accompanying data such as interviews or surveys with website creators to determine if and how these hyperlink ties do or do not represent the strengths of relationships between organisations formed offline [14,35,36].

Finally, we used a large sample of actors in the web crawling process, which increased the chance of noise in the network [36]. To address this, two individuals coded this data, and our inter-coder reliability check provided a Krippendorff's Alpha value of 0.81 [37]. Thus, we could confidently say that the coding of these new nodes to determine their relevance was reliable and have faith in the results.

Despite these limitations, this method explains how the CCCM operates and builds relationships online to support disseminating delaying discourse that can reach an international audience. That is, the hyperlink analysis can reveal some efforts of the CCCM to reach an international audience, providing an important contribution to mapping the international communications patterns of CCCM organisations.

## 4. Analysis

### 4.1. Network structure

Fig. 1 is a visual representation of the complete network, and Table 1 presents basic network properties. In Fig. 1, node size corresponds to 'eigenvector centrality.' The larger the node, the more influence it has on the rest of the network. We label nodes with an eigenvector value above one for clarity. Hyperlink-hyperlink ties represent the relative position of individual nodes (i.e., average distance), and arrowheads indicate the direction of ties. Black lines represent ties within each group, and grey lines represent ties between the USA and non-USA nodes.

There were 119 nodes in the hyperlink network representing 119 web pages and 296 ties. The network included sixty-eight think tanks or advocacy organisations, eleven trade associations and three foundations. The web crawling process also revealed new links in the hyperlink network. Ten climate sceptic blogs emerged in the network and non-CCCM actors, including one Scientific and nine Government Organisations and twenty organisations in an Other/Miscellaneous category.

Network density equalled 0.021, suggesting that the hyperlink network provides limited opportunities for an influential exchange of information [38]. Our measure of cohesion, Arc Reciprocity, provided a numerical value of how connected organisations are in this hyperlink network [39]. Higher values indicate a stronger sense of connectedness or meaningful community [40]. However, there is only a 6.1% chance that ties in the network are reciprocated (Arc Reciprocity = 0.061), suggesting that delaying discourse may not quickly diffuse through the hyperlink community, unable to build a cohesive message throughout the network.

Looking closer at individual nodes in the network, the International Climate Science Coalition (ICSC) has the highest in-degree (0.059), betweenness (0.935), and eigenvector centrality (1.400). The ICSC's position in the network means it can exert more influence over the information spread through the network than others. Moreover, the ICSC acts as a bridge between two disconnected nodes within the network to spread information that would otherwise not enter the positions of others in the network. The organisation with the highest out-degree value is the Alabama Forest Owners Association (AFOA) (0.229), a trade association representing forest owners and those that manage forestlands in the state of Alabama [41]. In this context, the AFOA obtains information from others that indicate it is more likely to adopt and present information learnt on the issue of climate change by other organisations.

Table 2 presents the top ten nodes with the largest eigenvector centrality and documents if the nodes were in the original sample of links harvested by IssueCrawler. Four (40%) of these were in the original harvested sample, and six (60%) emerged during the web crawling process. Several think tanks, the ICSC, Lavoisier Group [42], Science and

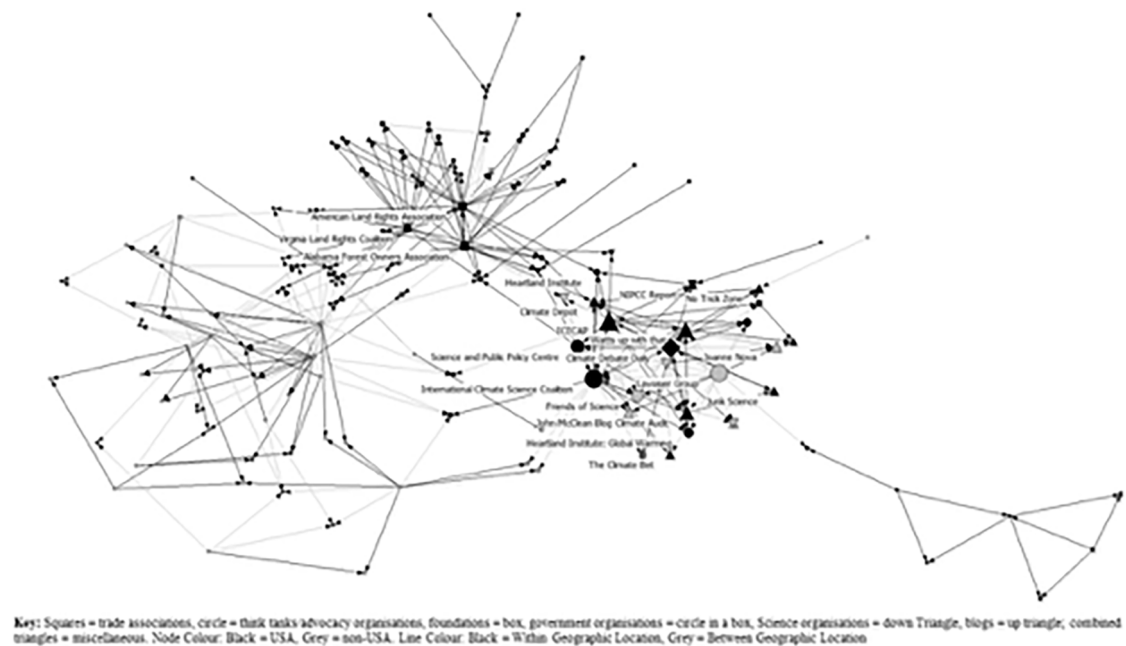


Fig. 1. Complete Hyperlink Network.

**Table 1**  
Global Network Properties.

Global Network Properties	Value
Type of Network	Directed
Nodes	119
Ties	296
Density	0.021
Average Degree	2.487
Components	111
Component Ratio	0.932
Average Distance	1.612
Connectedness	0.039
Fragmentation	0.961
Closure	0.490
Arc Reciprocity	0.061
Indeg H-Index	6
Cluster Coefficient	0.456
Diameter	4
Deg Centralisation	0.191
Out-Centralisation	0.0209
In-Centralization	0.039

**Table 2**  
Top 10 Central Nodes in the Network.

Name	Eigenvector	In original sample
International Climate Science Coalition	1.4	Y
Lavoisier Group	1.03	Y
Climate Debate Daily	1.23	N
Watts up with that	1.14	N
Science and Public Policy Centre	1.22	Y
ICECAP	1.36	N
Climate Depot	1.20	N
NIPCC Report	1.05	N
Climate Audit	1.05	N
Friends of Science	1.03	Y

Public Policy Centre [43] and Friends of Science [44], and several blogs, Climate Debate Daily [45], Watts Up With That [46], ICECAP [47], Climate Depot [48], Climate Audit [49] and the Non-Governmental Panel on Climate Change (NIPCC) Report Website [50],<sup>2</sup> all of which promote climate denial or challenge the scientific evidence and had the highest eigenvector values. This indicates that the web pages of these CCCM think tanks and climate sceptic blogs are well-positioned in the network for their discourses of explicit climate scepticism and denial to travel easily through the CCCM hyperlink network.

**Table 3**  
Descriptive Statistics on Types of Organisation and Geographic Variation.

	Nodes in Network	Heterogeneity <sup>a</sup>	E-I Index <sup>b</sup>	Density
Think Tanks/Advocacy	68	0.571	1.000	
Trade Associations	11	0.118	-0.431	
Foundations	3	0.034	0.389	
Blogs	10	0.092	0.718	
Scientific Organisation	1	0.034	1.000	
Government Organisation	9	0.067	1.000	
Other/Miscellaneous	20	0.017	1.000	
Total				0.169
USA Organisations	72	0.610	-0.404	
Non-USA Organisations	46	0.390	-0.005	
Total	119			-0.036*

<sup>a</sup>Blau's Index of Heterogeneity.

<sup>b</sup>Krackenhardt and Stern's E-I Index.

\*E-I Index Significant at the  $p < 0.05$  level.

<sup>2</sup> The NIPCC Report is a climate sceptic response to the International Governmental Panel on Climate Change (IPCC) report. It is a panel made up of scientists and scholars that have no attachment to governmental agencies. They propose that this removes any elements of political motivation and bias in their reports and findings.

Table 3 provides descriptive data on the nodes in the hyperlink network by category (e.g. think tank) and the number of nodes in the USA and other countries. On initial observation, both USA and non-USA organisations prioritise hyperlink ties within their geographical groups. As documented across the CCCM literature, the USA component of the CCCM is distinct from that of other countries [1], suggesting the concentration of USA hyperlinks in the network is unsurprising. Similarly, organisations in other countries have formed relation ties with one another, which could be an effort to produce a more effective form of climate change discourse for their far less politically polarised systems.

Based on grouping divided into different types of organisations, there was far more diversity (mean E-I Index = 0.613). This diversity or lack of homogeneity indicates potential opportunities for the diffusion of CCCM delaying discourse between different types of organisations quite easily. Moreover, the coalition of these interest groups in this hyperlink network is consistent with the CCCM literature showing major actors aligning with the aim of protecting fossil fuel-based economic capitalism [1].

#### 4.2. Subgroups

We applied Girvan and Newman's [27] algorithm to identify cohesive communities in our hyperlink network. We partitioned the network into seven largely homogenous subgroups. Table 4 provides details on these subgroups labelled with the name of the most central node, and Fig. 2 provides a visual representation of these subgroups, which we label with the name of the central actor.

**Group One** contains twenty-six organisations, including think tanks (N = 25, 96.2%) and one miscellaneous organisation. Twelve nodes (46.2%) are in the USA, and fifteen (53.8%) are elsewhere. The direction of ties shows non-USA think tanks connecting to USA neoliberal think tank websites in this hyperlink network to source information. More specifically, they are looking to source information from the USA think tanks that are ideologically aligned, which may help them influence policy in their region on climate change. For example, The Institute for Economic Analysis is a Russian neoliberal non-profit organisation [51]. The organisation participated in the Civil Society Coalition on Climate Change (CSCCC), a sceptic coalition of counter-movement organisations set up in 2007 with ties to Koch Industries and Exxon Mobil [52]. Additionally, the institute was founded by climate sceptic Andrey Illarionov, Russian libertarian economist, former economic policy advisor to Vladimir Putin and former senior fellow at the Cato Institute [53].

This subgroup indicates the potential flow of information between the USA and non-USA counter-movement organisations. USA organisations can influence climate change, delaying discourse that non-USA organisations can then adopt. This finding adds to the existing evidence that CCCM organisations adopt variations of neoliberal

ideological thought [10], and here, these ideological interests may operate as cues to 'younger' and less organised CCCM actors outside of the USA to copy what appears to be influential climate delaying positions.

Furthermore, it presents evidence that these USA organisations are hegemonic in this subgroup. While organised opposition to climate action emerged in the USA, the interests of those most responsible for climate change operate across countries. Conservative and neoliberal think tanks, research institutes, front groups, and 'public relations firms' [1] have supported disinformation campaigns by ExxonMobil [54], Marathon Oil Corporation, and other large polluting industries to delay climate action. However, these industries exploit resources from multiple countries and must impact domestic and subsequent international legislation on climate change. Thus, they have enlisted organisations across jurisdictions to defend fossil interests.

**Group Two** contains eight climate sceptic blogs, including Climate Audit, Watts Up With That, Junkscience; seven climate sceptic think tanks including the Lavoisier Group (Australia), International Climate Science Coalition (USA), Friends of Science (Canada), European Institute for Climate and Energy (Germany); six neoliberal think tanks including the Institute for Public Affairs (Australia), Instituto de Libre Empresa (Peru) and the Liberty Institute (India); and two scientific bodies (IPCC and NOAA). There is a 50/50 split between the USA and non-USA organisations and a constellation of different organisational types.

At the centre of the subgroup is the ICSC, a think tank led by climate sceptic Tom Harris which promotes denial of the scientific evidence on climate change under the label of credible science produced by a 'global warming expert' [55]. In this subgroup, the ICSC can obtain information from others easily and then distribute information through the subgroup. For example, the ICSC draws links to the Australian Institute for Public Affairs (IPA), pointing users to a resource from the IPA website, a text available via the IPA written by climate sceptics [56] (see Fig. 3). Discourses of delay promoted here include criticising the discourse on climate change promoted by legitimate scientific organisations arguing that human-caused emissions are overestimated and climate modelling cannot comprehensively predict climate changes. These delaying discourses used by the CCCM are well documented [57].

The direction of ties indicates that the ICSC also sources information from climate sceptic blogs (e.g. Climate Audit, ICECAP and Watts Up With That). One example is the link between the ICSC and the climate sceptic blog Climate Audit created and maintained by climate sceptic Steve McIntyre [58] (see Fig. 4). This example illustrates connections between a CCCM organisation and the CCCM echo chamber [59], and the direction of ties between the echo chamber and traditional CCCM organisations shows how these traditional CCCM organisations can retrieve information from blogs. This finding suggests that blogs may be playing a more vital role in shaping narratives of delay than just an echo for think tanks and interest groups on this online platform.

**Group Three** includes an ideologically aligned constellation of neoliberal think tanks; the Mises Institute (USA), Liberal Institute (Switzerland), Free Market Foundation (South Africa), Alternate Solutions Institute (Pakistan), International Property Rights Index (USA), Institute for Public Policy Analysis (Nigeria), Liberal Institute (Czech Republic) and Association for Liberal Thinking (Turkey).

The Association of Liberal Thinking is a neo-liberal think tank in Turkey and a previous co-sponsor of the Heartland Institutes 2008 International Conference on Climate Change. Fig. 5 provides a screenshot of the linked page that focuses on climate-related policies [60]. A closer look reveals several subgroup members extract information on climate change from the Association of Liberal Thinking. The climate delaying discourse here includes undermining the science on climate change and suggest that climate science itself is somehow an 'extremist scare tactic' used to increase overburdening state/government-based interventions that will reduce the ability of the free market economy to function properly. The in-linking to this web page presents the opportunity for

**Table 4**  
Descriptive Statistics for Subgroups in the Hyperlink Network.

Group	N in subgroup	Mean Degree	Heterogeneity <sup>a</sup>	E-I Index <sup>b</sup>
Libre Afrique	26	0.0738	0.218	-0.548
International Climate Science Coalition	30	0.1126	0.252	-0.864
Alternate Solutions Institute	9	0.1528	0.076	-0.222
American Land Rights Coalition	36	0.0579	0.303	-0.708
Physicians for Civil Defence	7	0.2143	0.059	-0.895
Andes Libre	8	0.1697	0.067	-0.286
National Mining Association	3	0.3333	0.025	-0.600
Total	119			-0.689

<sup>a</sup>Blau's Index of Heterogeneity.

<sup>b</sup>Krackenhardt and Stern's E-I Index.

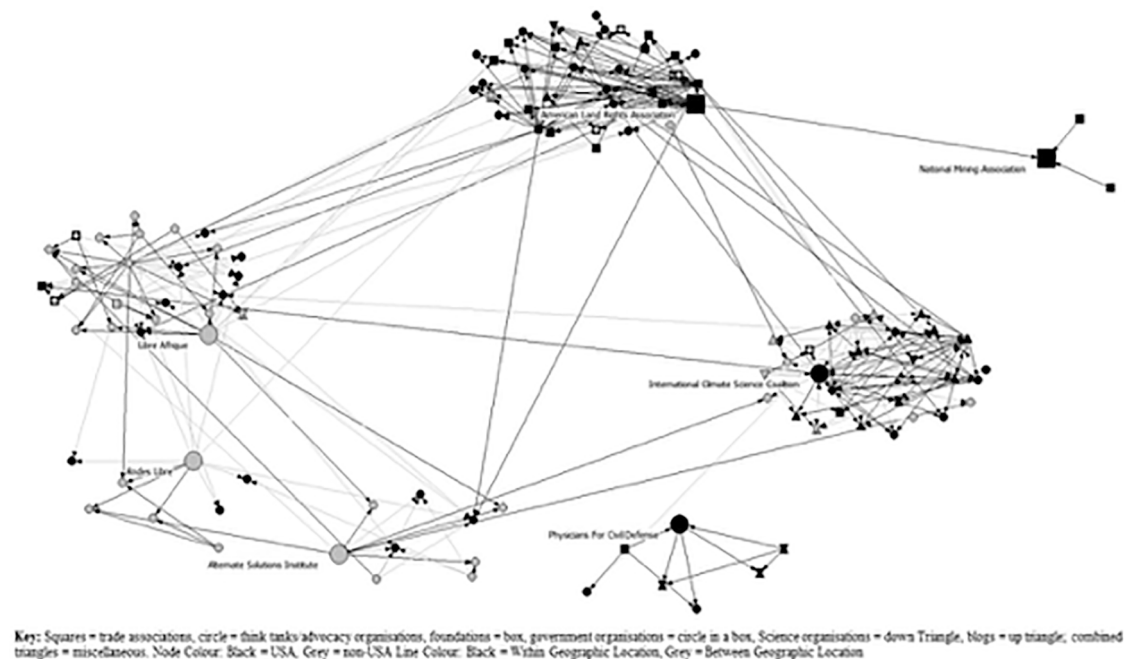


Fig. 2. Girvan and Newman Partitioned Subgroups.



Fig. 3. Screenshot from the ICSC to the IPA [56].

information to diffuse and be emulated [61] by other subgroup members, and the delaying discourse is consistent with Lamb et al.'s [57] current typology on non-transformative solutions, focusing on market-based solutions and prioritising individual consumer behaviour in reducing carbon emissions.

**Group Four** predominantly contains USA organisations, except for the European Enterprise Institute (Belgium) connected to the main network by ties to counter-movement organisations, the Heritage Foundation and the American Enterprise Institute (AEI). There are fourteen conservative think tanks and six agricultural-related associations in this subgroup, and at its centre is the American Land Rights

Association (ALRA) [62]. The emergence of the ALRA and other agricultural and land rights related actors shows the overlapping relationship between CCCM organisations and the historic Wise Use Movement in the American West in this hyperlink network.

Following the convening of a conference by the Centre for the Defence of Free Enterprise 1988 [63], the Wise Use Movement campaigned for the significant weakening of the Endangered Species Act (1973) to allow the commercialisation of public lands for deforestation, mineral and energy production [64–66]. This movement's 'playbook' was optimised by the climate contrarian movement, which "attempted to appeal to the ideologies of hardworking, rural America" [66],

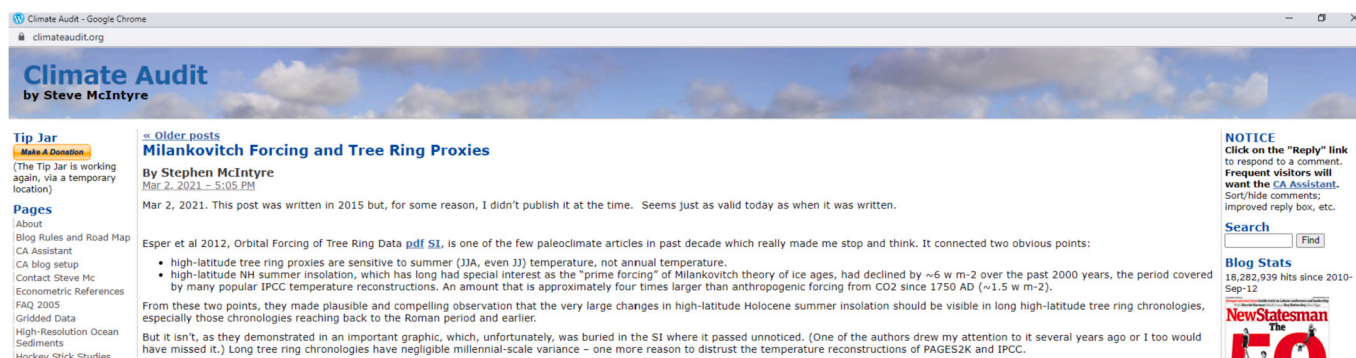


Fig. 4. Screenshot from the Home page of Climate Audit Blog [58].



Fig. 5. Screenshot from the Association of Liberal Thinking [60].

connecting conservative anti-environmental campaigns in the American West with legislative campaigns against climate action that moved to the forefront of political debates on environmental regulations [67]. For instance, the ALRA links with CCCM think tank web pages, including a document produced by the CCCM Property and Environment Research Centre on land ownership and the costs of regulation [68] and the Heartland Institute home page [69]. This finding sheds light on the ongoing connections between this historic anti-environmentalism campaign that cemented the anti-regulatory, neoliberal resistance to climate and related environmental policies observed in the USA.

Moreover, the direction of ties indicates that the ALRA retrieves information from governmental and scientific bodies concerned with trade, agriculture and the environment (i.e., the USA Wildlife and Fisheries Services and the EPA). Such agencies can influence policies that will ultimately affect the interests of those these organisations represent. Notably, users can view these web pages potentially mobilising support to reject climate science and climate action, building potential action offline.

Our co-link analysis revealed a previously unidentified agricultural-related actor in the CCCM literature. According to its website, the National Endangered Species Act Reform Coalition (NESARC) is a coalition of organisations that have “been instrumental in shaping both comprehensive and targeted Endangered Species Act proposals considered by Congress and federal agencies. The coalition has supported and worked with Members of Congress from both sides of the aisle as they have developed legislation and built support for legislative improvements to the Act” [70]. This organisation shows similarities to Wise Use

Movement organisations. After further inspection of the NESARC website, we found several of the coalition’s members to be associated with the CCCM, including the American Petroleum Institute (API), American Farm Bureau Federation, and American Fuel and Petrochemical Manufacturers [71] (see Fig. 6). However, in our co-link analysis, these organisations did not appear in the hyperlink network themselves. That the API, AFBF and AFPM are missing from the network and other oil, gas, and coal sector actors may suggest that they do not feel it necessary to use their online platforms in a CCCM hyperlink network strategically. This mirrors Brulle’s [72] suggestion that the API and much larger oil and gas sector actors are shifting to a peripheral position in the CCCM, relying on obstructing climate policies via political contributions to protect their public image.

**Group Five** comprises anti-science-related landing web pages but is positioned on the network’s periphery. We see a familiar face from the CCCM, the Oregon Institute for Science and Medicine (OISM), which developed the Petition Project disputing the evidence on global warming science [73]. Others include the Physicians for Civil Defence, Doctors for Disaster Preparedness (DDP), the related Homeland for Civil Defence Library and two miscellaneous actors referring to the sale of nuclear detector devices: nukalert.com and nukalertnow.com. This subgroup represents a specific anti-science component of the CCCM that maintains an active presence online at the time of analysis. However, that the subgroup is isolated and receives few ties indicates its relatively weak and limited ability to influence the type of information diffused through the rest of the network.

These anti-science positions on climate change are no longer viable

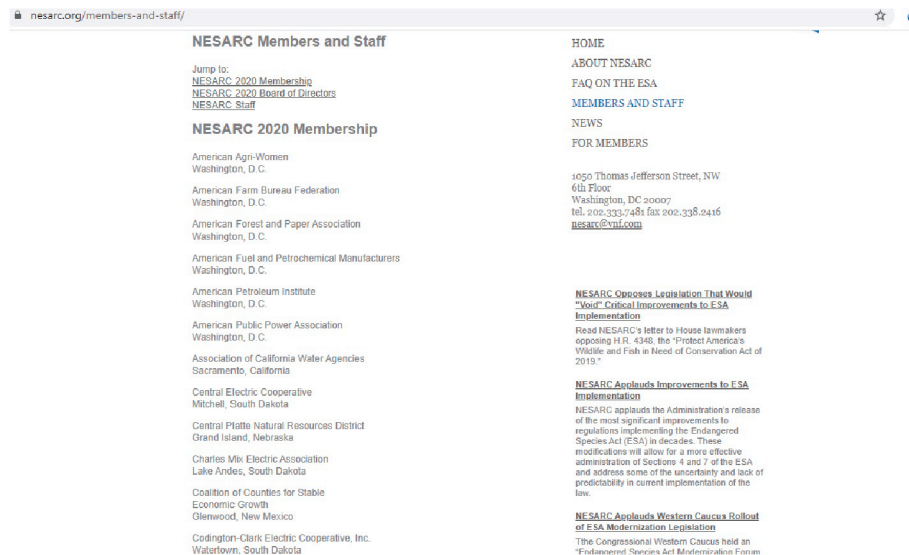


Fig. 6. Screenshot from NESARC Webpage of Member Organisations [71].

discourses of delay yet remain pervasive on social media [74]. Nevertheless, this subgroup maintains a presence in the network and promotes anti-science rhetoric, including nuclear conspiracies. Moreover, the technique of employing discredited scientific positions mirror anti-science and conspiratorial debates on the COVID19 pandemic. This includes the anti-lockdown and misinformation campaigns by the Koch funded libertarian American Institute for Economic Research (AIER) [75]. The Koch funded institute created the Great Barrington Declaration, similar to the OSIM's Petition Project, and includes climate sceptic authors Dr Jay Bhattacharya and Sunetra Gupta promoted by the counter-movement organisation the Heartland Institute. Overlaps between AIER and other think tanks in a network funded by Koch Industries show the ongoing relationship between fossil interests and the dissemination of scientific misinformation to protect a business as usual scenario even during the time of an international public health crisis [76] on this international web platform.

**Group Six** includes three USA neoliberal think tanks and one from Latin American countries: Peru, Mexico, Venezuela, Ecuador, and Chile. Again, like Groups One and Three, all organisations in this group are broadly concerned with protecting profit through unfettered economic growth and a solid commitment to neoliberal free-market economics. The linking between Latin American to USA organisations speaks to the role of think tanks in shaping climate change and related environmental policies in the interests of industries and governments in the USA and across Latin America.

Think tanks are networks of individuals and constituencies, partners, contractors and allies that produce and promote information and perspectives on a particular issue [4]. The enlistment of think tanks in Latin American is the product of a strategic effort to build a global network of neoliberal, libertarian and free-market organisations under the Atlas Economic Research Foundation (Atlas). More generally, Atlas has undoubtedly played a role in advancing neoliberal and libertarian thinking

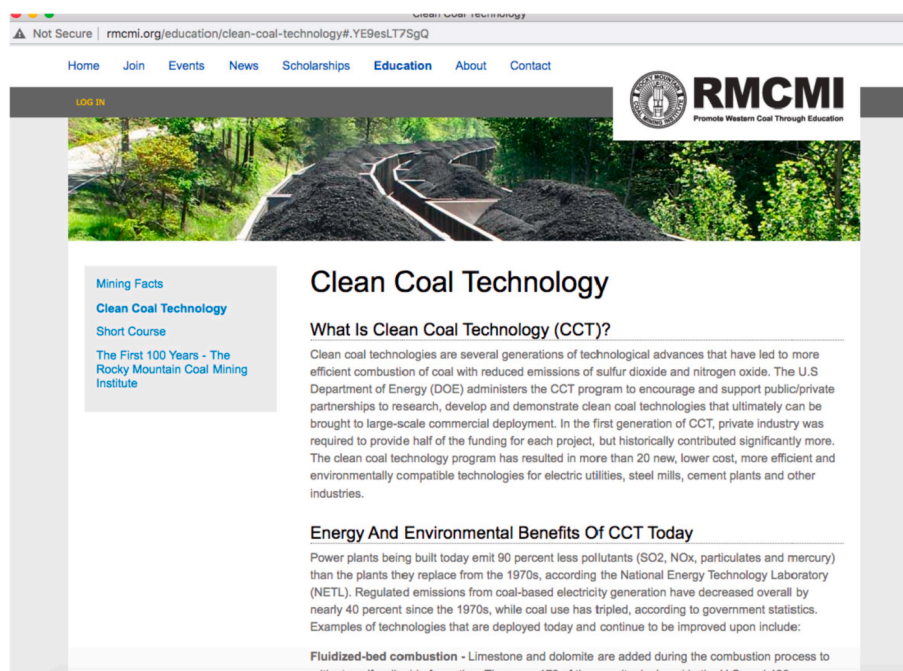


Fig. 7. Screenshot from the RMCMI Webpage on Clean Coal Technology [78].

across ninety-six countries, along with the dissemination of delaying discourses between organisations on the issue of climate change [77]. Therefore, it is reasonable to assume that diffusion of climate delaying discourse between think tank web pages aligns these specific interest groups spreading climate delaying discourse to other countries offline.

**Group Seven** is the smallest subgroup containing the National Mining Association (NMA), the National Coal Council (NCC), and the Rocky Mountain Coal Mining Institute (RMCMI). The direction of ties indicates that the NCC and the RMCMI are accessing information from the NMA, potentially utilising its information to develop their positions on climate change. For example, Fig. 7 is a web page from the RMCMI. They have sourced this information from the NMA on clean coal technology, directing users to equivalent discussion on the NMA website [78]. Disseminating information on clean coal is an increasingly popular tactic by the fossil industry promoting carbon capture facilities in coal-fired power plants, arguing that they can offset the harmful emissions from coal-burning [79]. However, the efficiency of clean coal technologies has been widely challenged and conceived as the coal industry's effort to divert attention from its carbon-intensive production practices to maintain unsustainable and environmentally harmful fossil fuel use [79].

## 5. Discussion and conclusion

Our findings provide an important contribution to our understanding of how the CCCM use the internet to connect organisations across countries, providing opportunities for the diffusion of discourses of delay. First, our results indicate that there is some structure to a CCCM hyperlink network. While the overall network lacks cohesion, strategic activity appears to spread delaying discourse outside the USA in this virtual space. More specifically, there is some diffusion of climate delaying discourse across countries in Subgroups One, Two, Three, and Six. For example, Subgroup One indicates a somewhat hegemonic climate obstruction transported from the USA to other parts of the world, predominantly facilitated through think tank networks. Think tanks have been integral in fostering neoliberal, libertarian and free-market lobbying activities to influence policy across countries [4], with discourses of delay promoted by these organisations by a range of climate contrarians such as Andrey Illarionov. These findings online mirror offline patterns of behaviour by CCCM think tanks, including using climate contrarians, engaging in campaigns against climate action, lobbying activities, which have succeeded in part due to funding by fossil interests [80]. This finding then provides further evidence of the transnational diffusion of climate delay through think tank networks.

Second, a more vital role of blogs written by the same climate sceptics appears on this online platform. These sceptics are fellows or former senior fellows of counter-movement think tanks in disseminating climate delay on this international public platform. While the historical misinformation efforts have undermined climate science, this discourse is no longer viable in mainstream policy discussions. Nevertheless, online this is not necessarily the case. More specifically, blog authors connected to think tanks that have been funded by fossil interests continue to disseminate delaying messages that undermine climate science. Third, Subgroup Five reveals how the anti-science strategies developed by the CCCM, such as the Petition Project organised by the OSIM, is the same as the COVID19 misinformation and anti-lockdown campaigns. Moreover, the same climate sceptics support and promote potentially harmful information to undermine public health protection measures taken by governments that might *undermine the free market to function* in the same way as increased government intervention to address the climate crisis.

Fourth, our findings for Subgroup Four illustrated the overlaps between the conservative anti-environmental movement in the American West and the neoliberal think tank regime that has been a keystone of neoliberal anti-regulatory policies [67]. Moreover, in the case of the NESARC, they are associated with fossil fuel heavyweights such as the

API. Public support for the subsidisation and legislation in favour of oil, gas, and coal industries in the USA is under fire, but observing these connections online suggests conservative anti-environmentalism connected to trade associations and workers whom they represent may mean climate-related legislation will continue to encounter resistance by these voters who go onto to shape the possibilities for USA state-based and national policies on climate change [81].

In sum, our hyperlink analysis has shown how this web platform hosts a repository of information related to climate change with the opportunity for CCCM organisations or interested actors to obtain information from each other. They have formed a hyperlink community to do this, making it easier for users of these web pages to access often like-minded positions on climate change. In turn, CCCM organisations have formed relational ties online to spread discourses of delay like offline communication patterns, including linking across countries, providing the opportunity for the transnational diffusion of delaying discourse. Thus, not without limitations, the method employed here can be a valuable way to understand better the transnational diffusion of climate delaying discourse online and its potential international reach.

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The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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