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*Edited by Stefania M. Maci, Massimiliano Demata,
Mark McGlashan and Philip Seargeant*

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THE DISCOURSES OF CLIMATE CHANGE DENIALISM ACROSS CONSPIRACY AND PSEUDOSCIENCE WEBSITES

Isabelle Clarke

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Introduction

Despite the growing body of scientific evidence supporting the notion of anthropogenic global warming (AGW) and climate change, there remains a persistent sceptic and denialist movement – comprised of and influenced by the fossil fuel industry, conservative think-tanks, politicians, contrarian scientists, some news media, and self-interested corporations and individuals, among others. The movement’s endurance is largely a consequence of their employment of discourses (McCright and Dunlap, 2010). Some of the discourses that have been consistently reported on across studies (e.g. Dunlap and McCright, 2010, 2015; Washington and Cook, 2011) investigating the denialist movement include (1) stating that climate scientists are in a global conspiracy that they profit from, (2) referring to fake experts that deny AGW, (3) stating calls for action on climate change are unsubstantiated because of uncertainties in climate models and disagreements between climate scientists, and (4) outright denial.

Much attention has been paid to the roots of climate change denial, which has demonstrated the role of the fossil fuel industry (e.g. Lahsen, 2005), conservative think-tanks (e.g. Lahsen, 2005), politicians (e.g. McCright and Dunlap, 2003), contrarian scientists (e.g. McCright and Dunlap, 2003), and the press (e.g. Boykoff and Boykoff, 2004). More recently, research has focused on the role of climate denier blogs, which are blogs by self-described climate sceptics and contrarian scientists dedicated to disputing climate science and questioning the reality and significance of climate change (Dunlap and McCright, 2010, 2015). Denier blogs have passionate audiences with new posts often inciting hundreds of comments expressing contempt for climate scientists, activists, and policy proponents (Dunlap and McCright, 2015). Whilst the community of deniers is smaller than that of science-based bloggers, denier-based bloggers and their community are more closely linked and supportive of one another (Bloomfield and Tillery, 2018). For example, Dunlap and McCright note that

virtually any claim uttered by a contrarian scientist – whether it be a “finding” that challenges anthropogenic climate change or the discovery of a weakness in a mainstream scientist’s work or an allegation of suppression – immediately zooms around the internet via the climate change blogosphere.

(2010: 253)

In addition to the mechanisms behind the circulation of denial content, research has investigated the content of denier blogs. Harvey *et al.* (2018), for example, compared the representation of polar bears and Arctic Sea ice by science-based and denier-based bloggers. They found that the two groups represent the facts differently. Science-based blogs were found to use the frame of established scientific certainties, drawing on published literature concerning the reduction of Arctic Sea ice extent, which is threatening polar bears, whereas denier blogs were found to emphasise the uncertainties around AGW to cast doubt on the population trends of polar bears.

In another study, Brüggemann *et al.* (2020) analysed science-based and denier-based blog posts for evidence of the hoax discourse, which they define as calling into question the truthfulness of someone else. In a sample of the posts referring to hoax-related terms, they found science-based posts refer to “denial” and “denier”, whilst sceptic blog posts referred to “alarmist” and “fraud”. Both groups use “fake”, “hoax”, “propaganda”, and “conspiracy” to refer to the other. Overall, they found that the hoax discourse impeded deliberation and open exchange of arguments. Instead, they argue that it served identity purposes as one was able to situate themselves as supporting a particular group.

The Internet has changed the ways in which science is communicated, enabling “voices to appear equally credible” and “reach many people” (Tillery and Bloomfield, 2022: 1). Climate change denial views are both visible and proliferate on the Internet, meaning that they can have considerable influence. Because the Internet is a hub for science and environmental communication, Dunlap (2013) called for more research into sceptic and denier blogs. While previous research has explored the communication strategies of blogs, existing research is limited to either (1) providing a detailed account of the strategies employed by a single or small number of sites (e.g. Bloomfield and Tillery, 2018; Tillery and Bloomfield, 2022), (2) providing an account of how a larger number of denier blogs frame a small number of entities (e.g. polar bears and sea ice in Harvey *et al.*, 2018), or (3) exploring the use of a single strategy across the denier blogs (e.g. Brüggemann *et al.*, 2020). As a result, there lacks a large-scale exploratory linguistic analysis of the common discourses used across many climate denier websites and blogs. This chapter seeks to fill that gap by analysing the major representations of climate change and global warming across 186 websites and blogs known to promote pseudoscience and conspiracy.

Methodology

Data: the pseudoscience and conspiracy sources (PaCS) corpus

This research reported on in this chapter forms part of a larger project investigating numerous branches of antiscience, including climate change denialism. In this project, a corpus has been built comprising texts (all content on a single webpage – i.e. article and comments) from 235 websites labelled as “conspiracy-pseudoscience” by mediabiasfactcheck.com, which is a comprehensive and continuously updated resource of online media sites which have been rated for various levels of bias. The corpus was then filtered by retaining texts according to “seed” words and phrases associated with the branches of antiscience relevant to the larger project. The present chapter drew on the climate change sub-corpus of the pseudoscience and conspiracy sources (PaCS) corpus, which was filtered according to the seed phrases “climate change” and/or “global warming”.

Duplicated texts were removed from the corpus using a Python script to avoid skewing the data. Table 20.1 presents the composition of the climate change sub-corpus before and after the removal of duplicates. This table shows that nearly 27% of texts were reproduced from other sites. Table 20.1 shows that the climate change sub-corpus analysed comprises 19,961 texts, totalling over 38-million-word tokens. These texts come from 186 different sites.

Table 20.1 The climate change denial sub-corpus

	<i>Number of Texts</i>	<i>Number of Word Tokens</i>
Before removal of duplicates	27,302	46,739,379
After removal of duplicates	19,961	38,510,518

It should be noted that not all the sites included in this analysis are denying climate change. Some websites are dedicated to antiscience strands, which mention the impact of climate change (e.g. anti-genetically modified organisms). Unfortunately, no further filtering of the data was completed to ensure that the texts analysed are only those which deny climate change. This was in part due to (1) the large number of texts in the corpus and the lengths of some of these, which would take a considerable amount of time to read to assess the presence of denial; (2) the complexity, sophistication, and persuasiveness of denial, which, for a general novice in climatology (such as myself), can make it hard to assess if denial is present in the texts, and; (3) for reasons of replicability. Because of this, it is important to note that while I label the discourses identified as climate change denial (for matters of convenience), they are more specifically characterised as the representations of climate change on pseudoscience and conspiracy websites.

Keyword co-occurrence analysis

To identify the discourses of climate change denialism, this corpus is analysed using keyword co-occurrence analysis (KCA; Clarke, McEnery and Brookes, 2021). KCA is an approach aimed at identifying patterns of co-occurring keywords across a corpus of texts. In corpus linguistic research, keywords are words which occur with a statistically marked frequency in one corpus (focus corpus) when compared with another (reference corpus). Keywords can allow access to discourses associated with some object of study (Baker, Gabrielatos and McEnery, 2013). KCA draws on the notion that keywords point to discourses (Baker, Gabrielatos and McEnery, 2013), as well as the notion of linguistic co-occurrence (Biber, 1988) – that is, that frequent patterns of co-occurring linguistic features tend to reveal an underlying communicative function – to hypothesise that patterns of co-occurring keywords may point to discourses (Clarke, McEnery and Brookes, 2021).

The keyword analysis was completed in Sketch Engine, which uses the simple maths method for the computation of keywords (see Kilgariff, 2009). Specifically, the climate change sub-corpus was uploaded to Sketch Engine and defined as the focus corpus. This focus corpus was then compared to the English Web 2020 corpus (enTenTen2020), which served as the reference corpus. The enTenTen20 corpus is a 38-billion-word corpus comprising online texts collected between 2019 and 2021. This reference corpus was selected as it represents a general sample of web content throughout these years and because the bulk of the focus corpus' texts are from this period (nearly 30% spread across these 3 years, with the remaining 70% spread across 20 years; see Figure 20.1). However, this reference corpus is limited in that the climate change sub-corpus spans a wider timeframe (from 1999 to 2021) and comparisons against it may thus lead to some time-sensitive words being defined as key.

The keyword analysis produced a list of 1,000 keywords. KCA uses multiple correspondence analysis (MCA) to group keywords based on how they co-occur in the texts of the corpus. Very infrequent features are given unfair weight in MCA, and so Le Roux and Rouanet (2010) advise that features occurring in less than 5% of the data are removed. Consequently, the list of 1,000

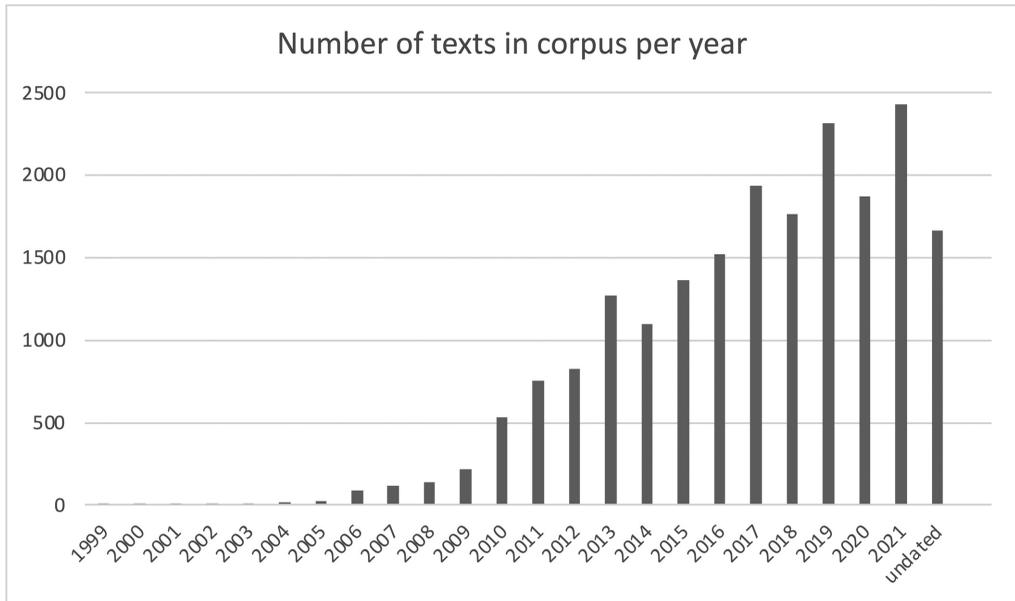


Figure 20.1 The number of texts in the climate change sub-corpus per year

keywords was reduced, retaining only those that occurred in more than 5% of the texts (135 keywords). These keywords can be found in Appendix 1.

To complete KCA, each text in the corpus was analysed for the presence/absence of each of the 135 keywords using a script, written in R, which records this information in a data matrix. This matrix was then subjected to MCA.

MCA is a geometric data analytic method which identifies relationships between three or more categorical variables. In KCA, MCA is used to identify keywords that co-occur often in the texts of the corpus. It also reveals which texts exhibit these patterns of co-occurring keywords. Specifically, MCA produces a series of dimensions where each category of a keyword (e.g. presence of *climate*, absence of *climate*), and each text in the corpus is assigned a coordinate and a contribution for each dimension. Coordinates reflect the nature of the association between the categories of the keywords in terms of proximity, where keywords distributed in similar ways in the texts have coordinates closer to each other on the same side of the origin, and keywords not distributed in similar ways are positioned on opposite sides of the origin (i.e. one will have a positive coordinate and the other a negative one). Hence, coordinates signal co-occurrence patterns. Contributions show which categories of keywords are the most important contributors to the dimensions. Contributions do not have polarity, and so the coordinates of the keywords need to be interpreted in conjunction with their contributions. Specifically, keywords with strong contributions and positive coordinates need to be interpreted in opposition to keywords with strong contributions and negative coordinates. In line with Le Roux and Rouanet (2010), only the categories of keywords whose contribution exceeds the average were analysed, as these represent the most distinguishing patterns of variation. Each dimension represents a distinct pattern of co-variation. Dimension 1 represents the best fit of the data with each subsequent dimension representing the next most common pattern of variation (i.e. set co-occurring keywords).

Each dimension was interpreted until the dimensions were no longer readily interpretable (i.e. it was not possible to make sense of the patterns of co-occurring keywords), beginning with the first dimension. Overall, eight dimensions were interpreted. Like other studies employing KCA (e.g. Clarke, McEnery and Brookes, 2021), the first dimension opposed the *presence* of keywords with the *absence* of keywords and had a strong correlation to the length of the text ($r = .70$). This is a result of investigating the presence/absence of keywords, as opposed to the texts' relative frequency, as text length is not controlled for. The relative frequencies of features are often analysed so that texts of different lengths can be compared reliably. The relative frequencies of keywords in each text are not analysed in this study because most texts (63%) analysed contain under 1,000 words. The relative frequencies of features in texts with less than 1,000 words tend to be unreliable estimates. Moreover, the relative frequencies of keywords are also not analysed in KCA because keywords are typically infrequent in comparison to high-frequency grammatical features, meaning there will be lots of zeros. When datasets comprised of many zeros are analysed by multivariate statistical techniques for continuous data (i.e. not MCA, but techniques such as factor analysis or principal component analysis), then the correlation coefficients can be misleading. As a result, the presence/absence of keywords are analysed using MCA (a multivariate statistical technique for categorical data). However, because text length is not controlled for, and because the length of the text in words is the greatest influence on the presence of keywords (i.e. the more words a text has, the more likely the keywords will be present), the first dimension reflects text length. No other dimensions are associated with text length. For this reason, Dimension 1 is not interpreted further. In the next section, I present the patterns of co-occurring keywords and sample texts that are most associated with Dimensions 2 to 8 and provide my interpretations of the discourses to which the patterns point.

Results

Dimension 2: political versus science discourses

The keywords associated with positive Dimension 2 point to political discourses. Politicians (*clinton, obama, trump*), political ideologies (*socialist, capitalism, activist*), and organisations (*UN, EPA*) are referenced to discuss policies (calls for), political action, and programmes related to AGW, such as calls to control energy production, storage and consumption (*energy, grid, electricity, fuel, nuclear, gas*), limiting the burning of fossil fuels (*fossil, coal, fuel*) due to their effects (*pollution, emission, carbon, dioxide*), and switching to renewable energy sources (*wind, renewable*). These keywords co-occur with keywords signalling hoax discourses (*scam, corrupt, agenda, propaganda, fraud, fake*), ignorance (*ignorant, stupid, ignorance, nonsense*), and cost (*trillion*), frequently to evaluate such political calls for action against the threat of AGW as a scam and stupid, as the actions (e.g. renewable energy) cost a huge amount, profit particular individuals, especially those calling for climate action, and are unreliable. There are also arguments suggesting that limiting the burning of fossil fuels impacts economic growth and is pointless as other countries do not make reductions. For example, Text 1, taken from the corpus, is strongly associated with positive Dimension 2. This text covers various American presidents' actions and policies on AGW. The text describes Clinton's climate change policies as a "weapon" for scaremongering. Additionally, it presents the view that other countries are producing more CO₂, rendering any reductions by America pointless.

Text 1: Green New Deal – Boldest Tactic Yet to Advance U.N. Agenda 21 (<https://wattsupwiththat.com/2019/03/29/green-new-deal-boldest-tactic-yet-to-advance-u-n-agenda-21/>, 29 March 2019)

[. . .]

The main weapon used by *Clinton* for his call for action was the threat of Environmental Armageddon, particularly manifested through the charge of manmade global warming, later to becoming “climate change”. It didn’t matter if true science refused to cooperate in the scheme, as actual global temperatures are not rising and there continues to be no evidence of any appreciable manmade effects on the climate.

[. . .]

And even if Americans did stop producing CO₂, Earth’s CO₂ levels would continue to rise because China, India, and other countries are building *coal*-fired plants by the dozen, which will like more than offset any reductions Americans make.

[. . .]

Alternatively, the keywords associated with negative Dimension 2 draw on scientific discourses. There are keywords associated with places and areas (*antarctica, antarctic, greenland, hemisphere, arctic, atlantic, polar, sea, ocean, surface*), changes in state (*warm, warmer, melt, melting, cooling, freezing, snow, ice, temperature*), natural processes (*variability, volcanic, el Niño, winter, weather, tropical, precipitation*), and scientific data analysis (*forecast, trend, graph, satellite, NOAA*). These keywords co-occur in articles to discuss the poor predictions of scientific models on the impact of future climate change, to suggest that they should not be trusted, especially the model’s conclusions that man-made CO₂ levels are to blame. These keywords also co-occur in articles suggesting that any changes in temperature, weather, sea level, and ice thickness are not due to man-made carbon emissions, but rather due to natural processes, such as volcanic eruptions, el niño, and natural variability, which occur in periodic cycles. Records of growing ice in Antarctica and Greenland are also referred to as a form of “whataboutery” to disprove global warming, as in Text 2. This text draws on evidence showing ice gain in Greenland to suggest that climatologists are lying about ice loss and fabricating data to align with their theory of climate change.

Text 2: If The Data Doesn’t Match Theory, Change The Data (<https://realclimatescience.com/2017/04/if-the-data-doesnt-match-theory-change-the-data/>, 25 April 2017)

Professional climate fraudsters claim that *Greenland* is losing *ice* 600% faster than predicted. As of yesterday, the Danish Meteorological Institute (DMI) showed *Greenland surface* mass gain for the *winter* at a record high. This is a direct contradiction to the lies being spread by climate alarmists.

The DMI data was being widely cited by skeptics as evidence against global warming fraud, so today DMI changed the *graph*. They changed their baseline dates, and no longer show 2017 as being a record high.

We have seen this identical story hundreds of times. Climate data being altered to avoid criticism from global warming alarmists. [. . .]

This dimension indicates that the second most common pattern of keyword variation distinguishes between texts drawing on political discourses with those drawing on scientific discourses. This demonstrates that climate change and climate change denial are both political and scientific issues.

**Dimension 3: the discreditation of public institutions versus
the discreditation of renewable energy**

The keywords associated with positive Dimension 3 are used in the texts for the purpose of discrediting public institutions. The mainstream media (*msm, mainstream*), politicians (*Clinton, Gore, Trump, Obama, UN*), political ideologies (*socialist, activist*), and scientists (*mann, scientist, met*) are often critiqued in the texts for promoting bias, fake news, and alarmism about AGW (*bias, corrupt, cagw, fraud, fake, alarmism, alarmist, warmist, propaganda, hoax, ignorance, ignorant, scam, scare, stupid, nonsense, agenda*). Such texts emphasise that global warming is a *conspiracy*, that there is no *consensus* on *AGW*, and that they are sceptical (*skeptical, skeptic*) of claims that humans are to *blame* and of graphs and data. For example, Text 3 reports on “Climategate” – a case where hackers broke into email exchanges between researchers within the Climate Research Unit at East Anglia University, which supposedly involved researchers colluding on manipulating data to conceal evidence against global warming – to suggest that man-made global warming is a conspiracy. Some texts reject the common accusation of climate change sceptics/denialists as having capitalist interests (*capitalism*).

Text 3: Climategate: CATO’s Pat Michaels and Center for American Progress Dan Weiss on Fox News (<https://wattsupwiththat.com/2009/11/25/catos-pat-michaels-and-center-for-american-progress-dan-weiss-on-fox-news/>, 25 November 2009)

Hackers broke into thousands of emails and documents from the Climate Research Unit at East Anglia University last week and uncovered the global warming conspiracy.

[. . .]

Calls for an independent inquiry into what is being dubbed “Climategate” are growing as the foundation for man-made global warming implodes following the release of emails which prove researchers colluded to manipulate data in order to “hide the decline” in global temperatures.

[. . .]

The keywords associated with negative Dimension 3 are used to discredit renewable energy. Notably, renewable energy sources (*renewable, solar, wind, sun, gas*) are described as expensive, unpredictable, unreliable, and unable to cope with demand, as in Text 4. Such texts describe fossil fuels (*fossil, fuel, gas*) as being more reliable than renewable energy sources, as the electric grid is described as requiring a constant and stable flow of electrons and is damaged by the unpredictability of renewable energy (*energy, electricity, grid*). There are also keywords associated with atmospheric CO₂ levels (*atmospheric, atmosphere, CO₂, carbon, dioxide, heat, pollution, greenhouse, heating, emission*), and these often co-occur to emphasise that natural gas (which has been a solution to burning less coal and can be viewed as a bridge to a clean energy future) still produces a large amount of carbon dioxide and pollution. Additionally, atmospheric CO₂ levels are often mentioned to emphasise that CO₂ is a trace gas and therefore cannot be the cause of climate change.

Text 4: Endless Subsidies For Unreliable Wind & Solar are an Economic Suicide Pact (<https://stopthesethings.com/2021/08/01/endless-subsidies-for-unreliable-wind-solar-are-an-economic-suicide-pact/>, 1 August 2021)

Australia's *renewable* energy target has subsidised *wind* and *solar* to the tune of more than \$60 billion, wrecked its *grid* and driven power prices through the roof.

[. . .]

And, in a country heavily reliant upon *wind* and *solar*, power becomes scarce when the sun sets and/or calm weather sets in.

Couple that with a period of peak demand (breathless 42°C days, for example) and *energy* intensive industries are simply chopped from the grid under the euphemism of “demand management”.

Suicidal doesn't cover it.

[. . .]

Overall, this dimension indicates that the next most common pattern of variation across the texts in the climate change denial corpus distinguishes texts that are discrediting believers of climate change or discrediting initiatives for combating the effects of climate change. Oreskes and Conway (2010) similarly found that climate denial strategies are designed to question the credibility of mainstream scientists and simultaneously boost the appearance of scientific credibility for the denial countermovement. This dimension marks the overt questioning, undermining, and damaging of the reputation of climate scientists, other public institutions, and renewable energy, suggesting that climate change denial is a kind of smear campaign.

Dimension 4: the discourse of extremism versus the “consensus”

The keywords associated with positive Dimension 4 often co-occur in texts to point to a discourse of extremism. Specifically, there are keywords associated with extreme cold weather (*freezing, snow, winter, storm, cold, forecast, flooding, polar, weather, ice, extreme, atlantic, melt, melting*). These keywords often occur in texts reporting on cold weather to suggest that global warming is a hoax and that an ice age is imminent, as in Text 5. Many texts emphasise that the mainstream media (*msm*) reports are sensationalistic, *extreme* and *stupid* for blaming (*blame*) the cold weather on AGW, as a *warm winter* would indicate AGW, rather than a *cold winter*. The impact of the cold weather on renewable energy sources (*renewable, wind*) is also discussed in some of the texts, where heaters drawing on fossil fuel energy (*grid, electricity, nuclear, coal*) are required during cold weather to pump *warm* air onto the blades, thereby suggesting that renewable energy is unreliable. Plans to curb rising temperatures and extreme weather – for example, as the “Green New Deal”, which proposes a reduction of CO₂ emissions by switching to renewables – are deemed *socialist, extreme*, and unrealistic. Additionally, the use of renewable energy in *Germany* is also mentioned and critiqued as extreme and extremely expensive. Political actors (*clinton, trump, obama*) are also referenced, often to report on actions deemed as extreme. For example, Obama shutting down power plants as the country goes into winter.

Text 5: Polar Vortex of Stupidity (<https://climatechangedispatch.com/polar-vortex-of-stupidity/>, 30 January 2019)

A few years ago, the Washington Post said global warming would cause cherry trees to start blooming in January.

That didn't work out for them, so now they are *blaming* the record *cold* on global warming.

If the *Polar* Vortex is caused by global warming, why does it mimic the pattern of the last *ice* age?

By contrast, the keywords associated with negative Dimension 4 are used to discuss the consensus of the role of CO₂ in global warming. Notably, many of the texts mention scepticism (*skeptical, skeptic*) of the *consensus* promoted by the Intergovernmental Panel on Climate Change (*IPCC*) – that climate change (*anthropogenic, man-made*) is a result of increasing levels of atmospheric carbon dioxide (*CO₂, carbon, dioxide, concentration, greenhouse, emission, atmosphere, atmospheric*) produced by humans through the burning of fossil fuels. For example, some texts note that there is no *correlation* between *emissions* and *atmospheric concentrations* of CO₂ to suggest that something else is influencing global warming. Additionally, many texts cite scientific articles (*science, NASA, scientist, scientific, radiation, planetary, physics, magnitude, earth, surface, cloud, atmosphere, atmospheric*), observations (*observed*), findings, and principles to demonstrate particular aspects of the climate where there is uncertainty and debate. These conclusions are used to suggest that there is no consensus and that man-made climate change is a *hypothesis*, as in Text 6. Instead, many of the texts emphasise the role of natural influences on the climate (*volcanic, variability, magnitude, surface, radiation, cloud*).

Text 6: On Consensus (<https://notrickszone.com/2013/12/18/climate-sciences-constant-appeals-to-authority-only-confirm-its-total-fallacy/>, 18 December 2013)

We are constantly told that there is a *consensus* in climate *science* that CO₂ is warming the planet, or the deep ocean, (or something) and that if we do not limit CO₂ something bad will happen. As one can easily see, there is no *consensus* on the two “somethings” in that first sentence. We are told that CO₂ is responsible for warming, cooling, less rainfall, more rainfall, less snow, more snow, less ice, more ice, more hurricanes, fewer hurricanes, more tornados, fewer tornados, and so on. Each of those things can also be good or bad, (but mostly bad) depending on where and when they happen. The “*consensus*” seems to morph to whatever bad thing the writer wants to prove. This isn’t climatology, it’s calamitology.

[. . .]

This dimension indicates that the next most common pattern of variation in the corpus distinguishes texts that are drawing on the discourse of extremism with texts that are emphasising that there is no consensus. This dimension shows that refutation is an important strategy in climate change denials, as global warming is refuted due to extreme cold weather, and the consensus is refuted by showing areas of climate science which are debated to persuade others to disbelieve human’s influence on climate change. Additionally, the seriousness of global warming is downplayed by suggesting green policies are extreme.

Dimension 5: the role of CO₂ versus natural variation

The keywords associated with positive Dimension 5 co-occur in texts to describe the role of carbon dioxide in global warming. Specifically, there are keywords associated with global warming (*global, warming, earth, planet*), its causes (*carbon, dioxide, pollution*), and its effects, such as melting ice in the Arctic, Greenland, and Antarctica (*melting, antarctica, antarctic, melt, greenland, arctic, ice*), leading to sea levels rising (*sea, rise, ocean*) and the extinction of species (*extinction, polar*). Interestingly, some texts with these keywords present research findings which indicate the impact of global warming, but they then go on to criticise the cited report for perceived flaws. This is arguably for the purpose of instilling doubt in parts or all the conclusions (see Dunlap and McCright, 2010). Some texts acknowledge global warming, describing the different explanations for why the globe is warming

(including anthropogenic, natural causes, and aliens), and its different effects, often to downplay the role of humans. Some other texts, especially those containing the keywords used to mark deception (*propaganda, agenda, hoax*) emphasise that global warming is a hoax. Some of these texts state that global warming is only partially caused by human production of CO₂, but that the *mainstream* media, politicians, and organisations (*clinton, UN, obama, trump, mainstream, activist*) make it out to be more. Keywords associated with hysteria (*catastrophe, catastrophic, unprecedented*) are used both to ridicule believers of AGW and to emphasise the seriousness of it. Notably, some texts associated with this side of the dimension refer to growing ice cover, as opposed to melting ice and poor model predictions on sea level rise which overstate the actual measurements. Additionally, many texts claim that carbon dioxide plays no role in global warming, as the planet was warmer before industrialised levels of CO₂, or because the global temperatures are not rising, as in Text 7.

Text 7: Highest CO₂ levels recorded in 3 million years still don't budge global temperatures . . . official climate change narrative collapses in the face of real science (www.newstarget.com/2019-05-03-highest-co2-levels-recorded-in-3-million-years-still-dont-budge-global-temperatures.html, 3 May 2019)

Is *carbon dioxide* the driving force behind climate change? That's what many climate change alarmists would have you believe, but when you look at real-world data, that narrative collapses.

[. . .]

Put quite simply, *carbon dioxide* is not a poison that we should fear. Instead, what we should fear is a dramatic reduction in it because it's what gives our planet life. Without *carbon dioxide*, we wouldn't have plants, which means there wouldn't be oxygen and humans would eventually die out.

In the past, *carbon dioxide* levels have been significantly higher than they are now, yet life still managed to exist and plants, not surprisingly, thrived. Indeed, experts say that if *carbon dioxide* levels drop too much, many plants and other vegetal species would become extinct.

[. . .]

The keywords associated with negative Dimension 5 are used to refer to natural processes (*variability, cloud, precipitation, sun, wind, el* (Niño), *physics, heating, cycle, solar, sun, winter, magnitude*) as a cause of climate change, as in Text 8. Additionally, there are keywords associated with AGW (*AGW, CAGW*) and denigrating terms for people who believe in it (*warmist*), which co-occur in texts often stating that there is *zero* evidence for the *hypothesis* of *AGW*. There are also keywords associated with energy (*electricity, grid*). These co-occur in texts that are critiquing renewable energy policies and the shutting down of power plants. According to the authors, these actions are pointless given that climate change is due to natural causes.

Text 8: New Met Office study suggests natural factors, including the sun, are the biggest reason behind "the pause" (<https://wattsupwiththat.com/2018/06/07/new-met-office-study-suggests-natural-factors-including-the-sun-are-the-biggest-reason-behind-the-pause/>, 7 June 2018)

[. . .]

A team of researchers from the U.K. Met Office, Sweden and Australia has found that three periods of global warming slowdown since 1891 were likely due to natural causes rather than disruptions to the factors causing global warming.

[. . .]

The team asserts that the third slowdown, aka “the pause” which is also the one on which many global warming skeptics like us here at WUWT follow, was likely caused by a combination of La Niña events and volcanism.

They also claim that the third slowdown period wasn’t a stopping point, and they say temperatures continued to rise, they just did so at a slower pace.

[. . .]

Overall, Dimension 5 shows that the next strongest pattern of variation distinguishes texts mentioning the role of CO₂ in global warming with texts mentioning natural variation as the reason for climate change. This dimension indicates that climate change deniers often appeal to the fallacy of lack of proportion, where the role of CO₂ in climate change is downplayed, and the role of natural processes in climate change are exaggerated. Both sides of the dimension align with Cohen’s (2001) interpretative denial and may be positioned as climate sceptics, given that both repertoires tend to acknowledge climate change as happening but assign an alternative cause to climate change.

Dimension 6: counterevidence versus no evidence

The keywords associated with positive Dimension 6 co-occur in texts to provide counterevidence against the arguments of AGW. In particular, there are keywords associated with Antarctica and Greenland (*antarctica, antarctic, greenland, hemisphere*), which occur in texts to state that the ice sheet is *not melting* but in fact it is growing, despite CO₂ *emissions* and *concentration* levels rising. These texts provide counterevidence, including *satellite* images of growing ice to suggest that there is no relation between CO₂ and global warming. There are keywords associated with scientific analysis (*graph, observed, physics*), which co-occur in texts discussing scientific models predicting the impacts of climate change over time (*decade*), such as predictions of sea levels (*sea, ocean, surface, melt, melting, atlantic*), the extinction of species (*extinction*), and extreme weather events (*tropical*). These texts often provide counterevidence contrasting the scientific models’ predictions with observed reality to suggest that the models are wrong. There are also keywords associated with natural variability (*el Niño, cloud, radiation, volcanic, magnitude*), which occur in texts to provide counterevidence against AGW to suggest that climate change is due to natural causes, as opposed to human’s production of CO₂. Some texts refer to *Trump’s* actions in pulling out of green policies and the “evidence” that supports these policy changes. Such evidence is positioned as counterevidence against the impact of CO₂ on climate change. The argument that *capitalism* is to blame for AGW is introduced, so as to counter it. Such texts instead emphasise the good of capitalism and reinforce the “actual” causes of climate change. Finally, the keyword *unprecedented* is associated with positive Dimension 6, and this occurs in the texts to critique the “unprecedented” label applied to evidence of AGW. Such texts describe the uses of the word “unprecedented” as hysteria, providing counterevidence, including warmer temperatures in the past (before industrialised levels of CO₂) and natural processes, as in Text 9, which emphasises that the warming in the Arctic is natural and not a result of CO₂.

Text 9: The Real Arctic Story (<https://alarmistclaimresearch.files.wordpress.com/2019/02/amo-pdo-solar-and-arctic-v2.pdf>, 8 March 2019)

Arctic warming and the *melting* of the arctic ice are not at all *unprecedented* (they happen predictably on multidecadal scales with a period of around 60 years) and are in fact entirely natural.
[. . .]

The keywords associated with negative Dimension 6 co-occur in texts to indicate that there is no evidence of AGW. Specifically, texts associated with this side of the dimension note that *global warming* is a theory and that claims of the role of *carbon dioxide* in global warming are not substantiated, as in Text 10. Some of the texts use the derogatory labels *warmist* and *alarmist* when referring to those that advocate global warming is *man-made* (AGW), to position such views as different to theirs. Such texts suggest that the theory of AGW is a *hoax*, exaggerated and intended to *scare*, as there is no evidence to support the theory. Many of the texts draw on examples of cold weather and temperature (*weather, snow, forecast, temperature, winter, cooling, cold*) to suggest that there is no evidence of global warming. Some of the keywords are used to refer to the individuals emphasising AGW (e.g. *IPCC, gore, science, scientific, scientist*) in order to discredit them. For example, Al Gore is referenced to suggest that he is profiteering from climate policies. *Scientists* and the *IPCC* are accused of going against *science* and the traditional *scientific* method by (1) not challenging climate change theory, (2) not publishing dissenting views or counterevidence against AGW, and (3) accepting and promoting that there is a consensus on human's role in global warming. Additionally, some texts mention particular scientists as holding views against the consensus, as in Text 10, which depicts professors, researchers, and scientists who are in support of Senator Roberts report finding that the CSIRO could neither confirm nor prove that carbon dioxide is dangerous or the cause of climate change.

Text 10: Australian Sen Malcolm Roberts Exposes The Climate Change Scam (www.australiannationalreview.com/state-of-affairs/australian-sen-malcolm-roberts-exposes-the-climate-change-scam/, 19 January 2020)

[. . .]

The key findings of Senator Roberts' report shows that CSIRO: 1. Refuses to state that *carbon dioxide* from human activity is a danger 2. Does not have empirical evidence proving that *carbon dioxide* from human activity effects climate 3. Have used evidence in their presentation that contradicts the empirical climate evidence. 4. Uses climate computer models that are neither appropriate nor recommended to be used to inform government policy. . . . Those supporting the senator at his press conference were Internationally eminent Canadian climatologist, geographer and environmentalist Professor Tim Ball, expert on the United Nations' unfounded and politically motivated climate claims cited by CSIRO.

[. . .]

Overall, this dimension indicates that the texts in the corpus can be distinguished according to those providing counterevidence to climate change believers with those stating that there is no evidence for climate change. This dimension reveals common argumentation strategies employed by climate change deniers: rebutting and denying.

Dimension 7: the discourse of weather manipulation versus anti-alarmism

The keywords on the positive side of Dimension 7 co-occur in texts signalling the discourse of weather manipulation. There are keywords associated with weather and weather forecasts (*flooding, drought, storm, weather, forecast, cloud, tropical, cool, extreme, precipitation, sun*), which co-occur in texts often to describe the disparity between the current weather and that which was forecasted. The texts accuse those higher up (*obama, fake, socialist, trump, mainstream, clinton*) of being part of a conspiracy (*conspiracy, corrupt, blame, agenda*), which is aimed at manipulating the earth's (*earth, planet*) climate cycle. Notably, they suggest planes are spraying chemicals into the atmosphere (*atmosphere, atmospheric*) to manipulate weather events – often referred to in the texts as geo-engineering. Weather manipulation is described as being, among others, for the purpose of profiting from various climate policies and taxes, which have been enforced at an unprecedented scale, as in Text 11. Weather manipulation is often described in these texts as a threat to life on earth (*extinction, civilization*).

Text 11: Meteorologists And Climate Engineering Denial, Perpetuating The Lie For A Paycheck And A Pension (www.geoengineeringwatch.org/meteorologists-and-climate-engineering-denial-perpetuating-the-lie-for-a-paycheck-and-a-pension/, 22 February 2016)

[. . .] How many so called “experts” have long since sold any shred of honor and honesty they may have once possessed in exchange for a paycheck and a pension? The blatant criminal denial of the climate engineering atrocities so visible in skies around the globe is the greatest deception ever perpetrated on populations of the planet. The majority of the masses have unfortunately so far been all too willing to accept a constant parade of lies from the power structure and their paid minions on an endless list of issues.

[. . .]

The keywords associated with negative Dimension 7 co-occur in articles expressing the discourse of anti-alarmism. Specifically, the texts most associated with this dimension are often critiquing and mocking believers of AGW (e.g. *mann, IPCC*) as *alarmists* (*alarmism, alarmist, CAGW*). The texts associated with this dimension critique sensationalist reports and headlines emphasising that West Antarctica is melting and sea levels are rising (*antarctic, antarctica, greenland, melt, melting, sea, ice, arctic, polar*), as can be seen in Text 12. The texts instead state that it is not melting, despite rising levels of carbon dioxide (*co2*) from the burning of fossil fuels (*fossil, coal*), or they state that it is melting, but due to natural processes. Keywords associated with renewable energy (*renewable, electricity, grid*) and places where there has been a big push for renewable energy (*Germany*) are mentioned. These co-occur in texts to denounce alarmists' impulsion for renewable energy. Such texts describe the unsustainability of renewable energy, due to the cost and shelf life of wind turbines and their impact on birds, as well as the unreliability of renewable energy on the grid.

Text 12: BIAS BY OMISSION: No Mention Of Mother Nature's Undersea Volcanoes In The Latest Antarctic “Global Warming” Scare Story (<https://climatism.wordpress.com/2018/05/10/bias-by-omission-no-mention-of-mother-natures-undersea-volcanoes-in-the-latest-antarctic-global-warming-scare-story/>, 10 May 2018)

ANTARCTICA has always been a thorn in the side of the Climate Crisis Industry. It simply has not behaved as global warming *alarmists* would have liked or as climate models predicted.

HISTORICALLY, Antarctica has been cooling and growing ice mass, despite rising carbon dioxide emissions. Emissions that, according to “global warming theory”, are meant to effect the poles greater than mid latitude regions due to the lack of humidity enhancing the theorised CO_2 feedback.

[. . .]

Overall, this dimension indicates that the next major pattern of variation distinguishes texts that promote the conspiracy of weather manipulation with texts that mock climate change believers as “alarmists”. It can be argued that promoting the conspiracy of weather manipulation serves as a deflection strategy. Proponents of the conspiracy do not deny AGW but instead divert the attention away from human’s CO_2 production and instead focus the attention on the dangers of the manipulation of the weather to block solar radiation. Consequently, the impact of human’s CO_2 production is arguably presented as less severe than the dangers and effects associated with climate manipulation. The negative side of this dimension marks that name-calling and responding to the tone are common strategies in climate change denials, as climate change believers are accused of exaggerating and being hysterical. This dimension may therefore be seen as opposing texts that are engaged in emphasising an alternative concern, often in a hysterical manner, with those that are de-emphasising a mainstream concern, often by critiquing the manner of climate activists as hysterical.

***Dimension 8: extreme weather as climate scaremongering
versus global warming is fraud/scam***

The keywords associated with positive Dimension 8 are used in texts to criticise reports of extreme weather as climate scaremongering. Specifically, there are keywords associated with extreme weather (*flooding, drought, tropical, storm, precipitation, extreme, weather, forecast, predict*) in specific areas (*atlantic*). There are also keywords that co-occur to critique AGW believers as climate scaremongering (*climate, climatic, alarmism, catastrophe, catastrophic, alarmist*), such as Text 13. Such texts mock scientists’ (*EPA, mann*) use of the word *unprecedented* and blame the scientists for overstating and exaggerating the impact of *carbon dioxide* (*greenhouse, fossil, fuels, pollution*) and causing alarm and scare. Natural *variability* is also often mentioned in the texts to indicate that the extreme weather is nothing new and just a part of the earth’s climate cycle.

Text 13: “The Science” Proves Extreme Weather Events Are NOT Increasing (www.climatepot.com/2020/02/20/the-science-that-proves-extreme-weather-events-are-not-increasing/, 20 February 2020)

COGNITIVE BIAS: *Climate Change Alarmists Refuse To Accept “The Science” That Proves Extreme Weather Events Are NOT Increasing*

[. . .]

COGNITIVE BIAS fuelled by an era of mass hysteria, delusion, groupthink and panic has helped foster dark and far-fetched clichés of a current “*climate crisis*”, that is an “*existential threat*” which will “*end civilisation by 2030*”.

[. . .]

By contrast, the keywords associated with negative Dimension 8 co-occur in texts emphasising that climate change, that data supporting it, and policies and incentives associated with combating

it are fraudulent. There are keywords used to mark that climate change is a hoax (*conspiracy, hoax, fake, scam, fraud, propaganda*), that there is *zero* evidence behind CO₂ and global warming, and that people who believe in it are ignorant (*ignorance, ignorant, stupid*) to the other reasons for the planet's (*earth, planet*) *cooling* and *heating* (*cloud, sun, volcanic, solar, cycle, surface, cool, cold, radiation*). *NASA* is often mentioned to accuse them of adjusting graphs to support AGW, such as Text 14, or to describe the views of a *NASA* employee as going against the consensus.

Text 14: 1975 Documentary “The Weather Machine”: Climate “Keeps Changing Gear” . . .
“Ice Age Now Due Any Time”! (<https://notrickszone.com/2018/03/18/1975-documentary-the-weather-machine-climate-keeps-changing-gear-ice-age-now-due-any-time/>, 18 March 2018)

A documentary dubbed “The Weather Machine” produced in 1975 – long before *NASA* fiddled with the data – warned of an impending ice age (10:35), and maintained that the globe is *cooling*. Hat-tip: reader The Indomitable Snowman.

The documentary attempted and succeeded at presenting the latest on climate change at the time. Changing climate accepted as normal

It is true that back in 1975 climatologists already knew that the climate behaved *cyclically*, as evidenced by the ice cores and tree ring sets extracted from the American Southwest.

[. . .]

Overall, Dimension 8 shows that the final major pattern of variation in the corpus distinguishes texts that depict global warming as a scam with texts that critique people who accuse extreme weather events to be a consequence of AGW. This dimension demonstrates that many texts in the corpus are involved in accusing. For example, the texts associated with the positive side accuse people linking extreme weather events to climate change as scaremongering and the texts associated with the negative side accuse people of making up AGW, adjusting graphs to suit the theory, and for being ignorant to the real causes of global warming.

Conclusion

Responding to calls for more research into sceptic and denier blogs (Dunlap, 2013), the present study aimed to conduct a large-scale analysis of 19,961 texts mentioning global warming or climate change, taken from 186 websites/blogs known to promote conspiracy and pseudoscience. Using corpus linguistic tools, a list of keywords that occur with a significantly higher frequency in this corpus in comparison to a 38-billion-word corpus of web texts (EnTenTen20) was computed. Using this list of keywords, the corpus was analysed for the most common patterns of co-occurring keywords across the texts using KCA (Clarke, McEnery and Brookes, 2021; Clarke, Brookes and McEnery, 2021). Previous research has noted that climate science receives “multifaceted, complex, and nuanced opposition” (Bloomfield and Tillery, 2018: 32). Thus, given that KCA is a multidimensional approach, KCA was deemed appropriate for uncovering such patterns.

KCA revealed the most common patterns of keyword variation in the dataset, which were interpreted as pointing to common representations and discourses associated with climate change across these conspiracy and pseudoscience sites. The analysis has not only revealed the common discourses of climate change scepticism, but it has also shown the order of prominence in terms of frequency – which discourses are most common across the blogs, with each dimension representing the next strongest pattern of keyword variation across the texts in the corpus. As a result, it is

possible to say that the texts in the corpus most commonly are either critiquing political calls for action against climate change as a scam or they are critiquing scientific research, such as by pointing out faults and flaws with climate models and scientific measurements. In this way, the analysis has provided a richer account of the most common mechanisms and repertoires of climate scepticism by structuring these co-occurrence patterns in order of frequency.

The results indicate that all the tactics and arguments known to have been developed and promulgated by conservative think tanks (funded by the fossil fuel industry) have permeated online blogs and websites promoting pseudoscience and conspiracy. This lends support to Dunlap and Jacques' (2013) observation that, unlike scientific knowledge, which accumulates through testing, rejecting, and modifying hypotheses and theories, the denial literature accumulates – claims are “retained and reused whenever convenient” (2013: 713). Online blogs and websites provide another home for these claims to be repeated. The major goals of social movement activists are to make their causes publicly visible, resonant, and legitimate (Koopmans, 2004). Because the Internet has enabled “voices to appear equally credible” and “reach many people” (Tillery and Bloomfield, 2022: 1), these recycled arguments arguably have a considerable amount of influence, as the Internet affords public visibility, resonance, and to some degree, legitimacy.

Overall, the analysis has revealed the most common discourses and argumentation strategies used for disputing AGW across websites known to promote pseudoscience and conspiracy. These discourses can be compelling. For example, whilst there is evidence of outright denial in texts associated with negative Dimension 6 (“No evidence”) and negative Dimension 9 (“Global warming is a scam”), other dimensions show that texts do not necessarily deny climate change. Instead, texts are focused on downplaying the seriousness of climate change. For example, the seriousness of climate change is lessened in texts associated with positive Dimension 4 (the discourse of extremism) when the authors critique climate policies as extreme. Additionally, the seriousness of climate change is downplayed in texts associated with negative Dimension 7 and positive Dimension 8, when the authors label climate activists as “alarmists” and “scaremongers” respectively. These strategies present climate change as being not as bad as climate activists present it, which consequently creates doubt about the reality of climate change. In comparison to outright denial, which is harder to believe in the face of growing scientific evidence of AGW, downplaying the seriousness of climate change is arguably a subtler and more believable strategy. As in law, rather than prove innocence, the defence attorney need only create reasonable doubt in the narrative being promulgated by the prosecutor. In the context of the climate change debate, the climate denial movement has created an exceptional amount of doubt. This doubt has the potential to delay effective climate action, which will likely have disastrous consequences for life on earth. Studies aimed at uncovering and understanding the discourses of disinformation, such as the one presented here in and throughout this collection, are well-positioned to pave the way for the creation of effective counterstrategies to prevent such negative consequences from happening.

Appendix

Keywords occurring in more than 5% of the texts in the focus corpus:

activist, agenda, agw, alarmism, alarmist, antarctic, antarctica, anthony, anthropogenic, arctic, atlantic, atmosphere, atmospheric, average, bias, blame, btw, cagw, capitalism, carbon, catastrophe, catastrophic, civilization, climate, climatic, clinton, cloud, co2, coal, cold, concentration, consensus, conspiracy, cool, cooling, correlation, corrupt, cycle, decade, dioxide, drought, earth, el, electricity, emission, energy, epa, extinction, extreme, fake, flooding, forecast, fossil, fraud, freezing, fuel, gas, germany, global, gore, graph, greenhouse, greenland, grid, heat, heating, hemisphere,

hoax, hypothesis, ice, ignorance, ignorant, ipcc, magnitude, mainstream, man-made, mankind, mann, melt, melting, met, msm, nasa, nonsense, nuclear, obama, observed, ocean, physics, planet, planetary, polar, pollution, precipitation, predict, prediction, propaganda, radiation, renewable, rise, satellite, scam, scare, science, scientific, scientist, sea, skeptic, skeptical, snow, socialist, solar, storm, stupid, sun, surface, temperature, trend, trillion, tropical, trump, un, unprecedented, variability, volcanic, warm, warmer, warming, warmist, weather, wind, winter, wuwt, zero

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