.

When Fiction Reflects Fiction: Contrarian Views of Climate Change in Popular Entertainment TV & Films

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Abstract

Climate contrarian discourse permeates a wide range of media outlets, including popular entertainment television shows and films. This study identifies and quantifies the frequency of these views within a large global corpus of entertainment scripts derived from film and television subtitles (N = 223,782). Additionally, drawing on a discourse studies perspective, we evaluate the performance of a Large Language Model (LLM) designed to detect and classify climate contrarian claims. Our findings reveal that climate change is occasionally referenced in entertainment films and TV shows, and contrarian views are a minority; most mentions contain a pro-climate orientation, followed by incidental references that remain ambiguous regarding a clear view, reflecting a growing willingness to engage with the topic. In general, pro-climate views significantly outweigh contrarian views, which are rarely isolated; they mostly appear alongside pro-climate claims, are disqualified, mocked, or sarcastically expressed. This research contributes to understanding the presence and discursive nature of climate change views in mainstream entertainment media and begins to examine how entertainment content reflects possible beliefs and attitudes. We encourage further research into how entertainment media creatives perceive and decide whether to include these representations, as well as their motivations and the potential implications of the visibility of climate-related themes in popular culture.

keywords

Climate Discourse; Entertainment Media, Film & Television; Text Analysis; Large Language Models

Introduction

Climate change ranks among the most pressing global challenges of recent history, demanding sustained and special attention from political, scientific institutions, and civil society worldwide. However, organized actors have simultaneously worked to question, reinterpret, or resist mitigation efforts through climate contrarian discourse [1–3]. Journalists, policymakers, and scholars have documented the presence of such discourse in news media, political communication, and digital misinformation campaigns (e.g., [4, 5]). At the same time, research in environmental communication and media studies has stressed the importance of examining how climate change is represented beyond news media, particularly in fictional and entertainment narratives [6]. Similar voices have emerged from climate activism, politics, media consultancy, and the entertainment industry itself [7]. Yet research on film and television, among the most widely consumed narrative media globally, has largely focused on productions that explicitly foreground climate change consequences (e.g., [8–10]), while paying far less attention to how climate views, including representations of misinformation, may surface implicitly or incidentally across many entertainment productions and formats [11]. Given the vast volume of fictional stories audiences encounter in media, even infrequent or indirect representations of climate views may cumulatively influence the public's perceptions of climate issues. This gap demands a comprehensive assessment of how often and in what ways climate contrarian discourse appears in popular entertainment media.

Entertainment media as propaganda?

Media not only report on societal debates, but they also actively reproduce and structure them. Across formats (e.g., legacy news, films, social media), content creators select, frame, and circulate particular interpretations of public issues, thereby amplifying some points of view while marginalizing others [12]. This dynamic has been deeply examined in relation to legacy news outlets, advertising, and, more recently, social media platforms, where misinformation and coordinated propaganda campaigns have been extensively documented (e.g., [13, 14]), but partially neglecting the role of fiction as a vehicle for propaganda, as perceived as more neutral or a truthful reflection of life [15, 16]. Popular culture, such as entertainment media products, functions as a similarly powerful means of ideological communication. Feature films, television dramas, reality programming, and all forms and formats of entertainment embed political assumptions, normalize specific worldviews, and rehearse social interaction under determined cultural frameworks [17–19]. Historical examples illustrate how specific entertainment productions have served propagandistic purposes, from state-sponsored productions [20], such as nazi-era films such as Triumph des Willens, to Cold War–era cinema, contemporary blockbuster films, to video games [21] that align with military or national interests. Unlike overt news commentary, entertainment media can naturalize political positions indirectly, presenting contested claims as common sense, humor, or background reality.

This perspective draws on Gramsci's concept of *cultural hegemony*, which explains how deeply held social values are learned and transmitted in cohesive societies through the consumption of stories [22]. Here, stories are understood not just as discrete narrative texts, but as meanings that inherently surround human creations and are communicated through their use and consumption. The idea that cultural hegemony is a linear and immutable process is considered to be largely reductive [23], as it treats culture as a one-directional and anachronic mechanism of ideological domination and ignores negotiation, resistance, and divergence. A widely accepted paradigm conceives

the media environment as populated by multiple competing worldviews [24], in which some perspectives gain prominence, others lose visibility, and a few may become dominant over time. Such processes can contribute to broader shifts in social belief systems. Clear examples can be found in the expansion of social rights movements that gained traction in Western societies from the 1960s onward [25]. These transformations have been reflected and promoted by entertainment media and continue to shape how mainstream productions portray social issues and struggles. Notable examples include evolving representations of gender roles and the increasing visibility of LGBT communities in television and film [26]. This media environment, therefore, includes particular perspectives that describe climate change and its nature in distinct directions. We therefore wonder how, in the context of climate discourse, the proportions of these different perspectives look in mainstream entertainment films and television.

Research of climate discourse in entertainment television and films

Research on climate and environmental discourse in entertainment media has largely concentrated on climate fiction (cli-fi), especially in films and literature. Qualitative approaches have provided rich insights into these narratives, but their labor-intensive nature limits analysis to a small set of carefully selected productions, overlooking broader patterns across media formats. Other studies have catalogued cli-fi works and explored audience engagement with the genre (e.g., [8, 27]).

Few studies have addressed how climate change and related discourse appear across entertainment television and films at scale. Notable works include Schneider-Mayerson et al. [28], who applied the Bechdel-Wallace test for climate content to a large collection of TV shows and films, Carter [29], who examined climate frames in American comedy programming, and Schneider-Mayerson et al. [7], who systematically analyses incidental representations of climate change and environmental issues across a corpus of popular films from recent years. These studies indicate that entertainment media portray a wide spectrum of climate issues—including activism, policy, the green economy, and contrarian views—and that such content extends well beyond the cli-fi genre, specific formats, regions, or production periods. Even brief or incidental appearances of climate discourse across diverse media suggest that these representations are increasingly embedded in popular culture–including theater, music, poetry, and more formats, thus warranting closer scholarly attention.

However, studying climate discourse across thousands of films and television episodes requires analytical strategies capable of handling large-scale textual data. Computational text analysis, including natural language processing (NLP), enables the identification of recurring patterns, thematic structures, and discursive markers across corpora that would be impractical to analyze manually [30]. Recent advances in large language models (LLMs), including reasoning-oriented systems, further expand these possibilities by supporting the detection and classification of more nuanced discursive phenomena [31], such as implicit framing, ambiguity, or climate contrarian claims [2]. By integrating quantitative and computer-assisted approaches with discourse perspectives, it becomes possible to assess both the character and the prevalence of climate epistemic in films and TV shows.

Building on these methodological developments, this study provides the first large-scale quantitative estimate of the extent to which climate contrarian discourse appears in popular entertainment film and television. The primary focus is to discover the rate of contrarian views, responding to how much exposure popular films and shows give to climate contrarianism, and second, to understand the nature of their presence

from a discursive perspective. To do so, we test a computer-assisted detection approach [32], and combine it with a discourse studies approach [33] to find, interpret, and classify contrarian views of climate change in TV show episodes and films' scripts (***N*=223,776**). The datasets span 6,766 unique television titles, contributing 116,713 episode scripts and 107,063 film scripts across scripted and non-scripted genres, countries, and decades, with a primary focus on Anglophone productions.

Materials and methods

Data

Comprehensive global data on entertainment television and films remains difficult to compile due to commercial restrictions and proprietary distribution systems. Moreover, the constant expansion of film and TV shows worldwide and the lack of centralized and accessible forms to register them make it nearly impossible to obtain a representative sample of a specific region and time period. With that in mind, the dataset presented here represents the largest open-access collection of popular films and TV show scripts from subtitles.

For this study, we sought to include the broadest possible range of productions worldwide, provided that English subtitles were available from the data sources. Our primary focus in terms of metadata was on genre, country of origin, TV show language, and, where possible, production companies and distribution networks. TV show scripts are mostly sourced from subslikescript.com and films are principally sourced from opensubtitles.org. Both platforms curate subtitles of popular mainstream and classic series and films from diverse regions and decades, primarily guided by IMDb [34] and Nielsen [35] ratings. The TV dataset contains 116,713 single-episode scripts from 6,766 shows (Fig 1) covering popular releases up to early 2023. The film dataset assembles 107,063 individual film scripts (Fig 2) covering popular releases through mid-2024. More detailed data description is provided in the section Supplementary Data.

Figure submitted separately:
episodes_titles_by_decade.pdf

Fig 1. Distribution of episodes and show titles by decade according to the title release year. The vertical axis represents the number of collected episodes and show titles, while the horizontal axis represents the decade in which each title was released.

Figure submitted separately:
movies_per_decade.pdf

Fig 2. Distribution of movie titles by decade according to the title release year. The vertical axis represents the number of collected movies, while the horizontal axis represents the decade in which each title was released.

Methodology

The primary aim of this paper is to identify and estimate the rate of climate contrarian views in entertainment films and television shows and to provide a preliminary qualitative description of how contrarianism manifests in entertainment television and film from a discursive perspective.

In addition to the aims described above, considering that climate discourse in entertainment media continues to increase [7,36], computational methods will become increasingly important for large-scale analysis. We also test an existing computational model trained on a different text type (see [37]), applying it to the subtitles – a linguistic context for which it was not originally designed. We assess the computational model's performance in this new context, informing future refinement and adaptation for entertainment media applications.

Our approach establishes three phases for identifying and analyzing contrarian climate discourse within the scripts (Fig 3).

Figure submitted separately:
pipeline_diagram.pdf

Fig 3. Visual overview of the methodological framework employed in this study.

Data Filtering

The first phase of our analysis filtered single episodes and films that explicitly mention at least one of three terms: "climate change", "global warming", or "climate crisis". This narrow focus aims to capture scripts where the phenomenon is directly addressed, rather than inferred from expressions such as "temperatures in recent years". This approach provides a clear and consistent basis for studying climate discourse in TV and film productions. Although some contrarian views —particularly critiques of climate solutions — may appear without explicit mentions of the phenomenon (e.g., *"...these new emissions rules are going to drive up costs and put people out of work..."*), we prioritize the analysis of single scripts that unambiguously reference climate change within their narrative landscape.

Once these keyword-relevant episodes or films were identified, we also looked for any mention of supplementary keywords (e.g., "greenhouse gas", "sustainability") during the same episode/film. This approach enables the identification of contrarian instances that do not explicitly mention climate change when they appear at a greater distance from the initial reference, given that climate change is being acknowledged in its narrative universe. These supplementary keywords were primarily drawn from established literature (e.g., [38]). Finally, for each script with at least one mention, we extracted a 350-character text segment centred on the keywords, overlapping segments were merged into cohesive fragments without redundancy. If keywords appeared far apart, fragments were combined to ensure each episode produced a single focused excerpt. Then, The excerpts of each script with mentions form the documents where climate contrarian views are subsequently identified. A full list of supplementary keywords is available in the data repository for this paper (see Data & Code Availability).

Climate Contrarianism Identification

Climate contrarian views were identified using an automated computational method applied to the script excerpts in which climate-related keywords were detected. The method is called CARDS 2.0 (Computer-Assisted Recognition of climate change Denial & Skepticism), an LLM designed by Coan et al. [32] to identify and categorize climate-related claims in text according to a structured taxonomy of arguments. In practical terms, the system functions as an automated labelling tool: it reads text and assigns sentences or phrases to predefined categories representing different contrarian positions or claims about climate change. The contrarian claim taxonomy underlying CARDS organizes climate discourse into a large body of studied categories and

subcategories in the literature of climate contrarianism [2]. This taxonomy was originally developed for the first version of CARDS [2], and was revised in Coan et al. [32], which expanded some categories. The complete taxonomy of contrarian claims used by CARDS 2.0 can be found in Supplementary Table 3, or in its source: Coan et al. [32].

CARDS 2.0 was developed using a supervised learning approach based on manually annotated examples. Researchers first curated a dataset of documents from conservative think tank websites, climate skeptic blogs, Congressional floor speeches, and online news media, extracting specific phrases that clearly illustrated each claim category in the taxonomy. These examples were selected to capture the range of ways in which arguments appear in real-world language and were reviewed to ensure that they accurately represented the intended meanings. The model was then trained on this set of labeled examples, enabling it to learn the linguistic patterns associated with each type of claim. Once trained, the system can apply the same coding rules to new texts automatically. According to Coan et al. [32], CARDS 2.0 achieves performance levels comparable to more computationally intensive models while remaining computationally efficient, making it suitable for large-scale analyses of climate discourse.

As previously noted, subtitles from entertainment TV shows and films are not the text type on which the method was originally trained or intended to be applied. Therefore, we do not expect CARDS 2.0 to produce the same level of performance observed in more explicitly argumentative texts. In this study, the use of this model serves as a test of one of the leading automated methods for detecting climate misinformation discourse. Through this application, we aim to evaluate its performance in the context of TV shows and films spoken content.

Validation & Interpretation

This final phase aims to validate the claim classifications produced by CARDS 2.0, and qualitatively interpret the nature of climate contrarian views in entertainment TV and films. We apply Ducrot's [33] polyphonic theory of enunciation, which distinguishes between the locutor (the person who actually speaks) and enunciators (points of view expressed). The locutor may endorse certain points of view while rejecting others. Importantly, specific points of view function as distinct 'enunciators' that the locutor presents rather than originates. Thus, the locutor may invoke various 'voices' (other speakers) to support or undermine particular enunciators (points of view). Let us illustrate this framework with the following example:

> "*Some people say climate change is exaggerated, but scientists keep warning that the risks are real. I trust scientists.*"

Here, any speaker who produces the phrase is the locutor. Within the phrase, two different enunciators appear as opposed points of view and can be outlined as such: 1) climate change is exaggerated; 2) climate change risks are real. Two voices also emerge; the first enunciator is attributed to "some people" (first voice), while the second is attributed to "scientists" (second voice). By adding "I trust scientists", the locutor explicitly aligns with the latter enunciator while distancing themselves from the former.

Under this perspective, we distinguish between two opposing enunciators: climate contrarianism and pro-climate positions. An additional category corresponds to the absence of an enunciator, when no view/position can be inferred from the discourse. Within this framework, contrarian views may take different forms. They may represent a speaker's actual belief expressed directly, or appear as referenced points of view that the same or another speaker subsequently challenges. For this reason, we distinguish between claims and views. Following Nuyts [39], we define a claim as a point of view

asserted with some degree of speaker certainty or epistemic commitment. A view, by contrast, is a broader category that includes explicit claims but also positions that are referenced, suggested, implied, or embedded in various rhetorical forms. Returning to the previous example, the two enunciators represent distinct views that we group into two broader enunciator categories (climate contrarianism and pro-climate positions), whereas the claim can be expressed as: "I believe climate change represents a real threat". If the example were one of the texts from the scripts, it would be classified as containing both enunciators.

We found Ducrot's [33] polyphonic enunciation a particularly useful theoretical approach for the study of climate contrarian discourse in entertainment media, where climate beliefs are often embedded tangential points to the central discussions of the dialogues and narrative situations, rather than elaborated argumentative positions, where much clearer claims are made, as is more typical in other text types and genres such as news reporting or opinion articles.

The validation process randomly sampled one third of the scripts with mentions stratified by key metadata (genre, year, and original language), plus every script where the CARDS model identified contrarian claims, to evaluate whether mentions of climate change within a single script are accompanied by both contrarian and pro-climate views, allowing us to quantify the rate of points of view and assess whether contrarian views are contrasted to some degree. Pro-climate views in this context are defined as statements that recognize or allude to anthropogenic climate change as a social and environmental contemporary problem with global or local consequences, beyond mere acknowledgment of its existence.

To reduce the mention count imbalance caused by productions especially dedicated to climate change, most of which are documentaries, these specific episodes and shows (n=16) and films (n=58) are excluded from the *Results*. Among them, we found productions such as *Cool It* (2010), based on the same book's title by Lomborg [40] and focused on opposing efforts to reduce carbon emissions rather than on climate denial; and documentaries that entirely promote climate contrarianism, such as *Climate Hustle* 1 & 2 (2017, 2020, respectively), and *Climate: The Movie (The Cold Truth)* (2024), which interestingly contains claims from every category within the contrarian taxonomy used by CARDS.

Results

From our dataset, a total of 2,417 scripts, being 1,321 films and 1,096 episodes from 643 distinct shows contained at least one of the three target keywords. They show a pronounced historical concentration, with only sporadic numbers before the 1990s (1 in the 1930s, 2 in the 1950s, 8 in the 1960s, 13 in the 1970s, 11 in the 1980s), growing substantially in the 1990s (85) as climate knowledge expands following global efforts to understand and address climate change [41], and peaking in the 2010s (1,184). The 2020s, though partially recorded, already show 639 scripts. Table 1 presents the total mentions of each keyword by media format. 647 episodes and films feature more than one mention, compared to 1,794 with a single mention. There are 340 scripts with 2 mentions, and 114 with 3 mentions. Scripts containing between 4 and 7 mentions sum to 171. Finally, double-digit mentions appear in 22 scripts.

Computer-Automated Results

CARDS flagged 95 scripts as containing contrarian views; manual evaluation confirmed 88 true positives and 7 false positives. A random subset of 834 scripts (34%) from the full set of 2,417 scripts was then examined. By chance, this subset included 11 of the 95

Keyword	Movies	TV Shows	Total
Climate Change	1120	901	2021
Global Warming	1134	779	1913
Climate Crisis	45	26	71
Total	2299	1706	**4005**

Table 1. Individual count of climate-related keyword mentions across movies and TV shows.

flagged scripts; the model correctly identified all 11. Among the remaining 823 unflagged scripts in the sample, 89 contained contrarian views undetected by the model. This yields a false-negative rate of 89/823 ≈ 10%. Extrapolated to the 2,322 unflagged scripts, this implies an estimated 245 missed contrarian scripts, which, combined with the 88 manually confirmed true positives, yields a total estimate of ≈333 contrarian-script instances in the complete set (stratified method with 95% confidence interval (CI): 284–382 scripts). The classifier shows high precision (≈0.93) and very high specificity (≈0.99) but low recall (≈0.26), providing an F1-score of ≈0.41. In short, when the model flags content as containing contrarian views, it is usually correct, but it misses the majority of contrarian instances.

Interpreting Contrarian Views

The model's overall metrics appear modest, but a closer examination reveals important variation in classifier performance depending on the discursive characteristics of the climate views conveyed in these formats, particularly whether contrarian views are accompanied by opposing perspectives and whether they are asserted rather than discussed. Table 2 displays the most common contrarian views found across the 918 examined scripts (flagged and sampled). *Climate change is not happening* (41 scripts) also appears among the most prevalent forms of climate contrarianism on social media [42]. *Climate is a hoax* or a conspiracy (31) likewise ranks second among contrarian framings in 2022 tweets [43]. The remaining 58 distinct views appear in a single-digit number of scripts (see the full occurrence counts in Supplementary Results' Table 4).

Top 5 Contrarian Views Across Scripts

	View	Count	Proportion
1	Climate change is not happening	41	17.2%
2	Climate change is a hoax/conspiracy	31	13.0%
3	Climate change is beneficial or not bad	25	10.5%
4	We are experiencing cold weather; therefore, climate change is not happening	12	5.0%
5	Climate change proponents are alarmist, biased, wrong, hypocritical, and/or politically motivated.	9	3.7%

Table 2. Top five contrarian views across the scripts. The frequency indicates the number of episode and movie scripts that feature a view. The percentage indicates the portion of that view compared to the rest of views.

Among the 95 scripts flagged by the model, 63 (66.3%) contained contrarian views without any accompanying pro-climate statements, such as the following example, in which a speaker denies the existence of global warming because of the cold weather, without previous or subsequent interventions addressing this claim:

"HOWARD: Global warming, my ass! Must be negative 20 out here."

(*Krampus*, Universal Pictures, 2015)

Whereas 25 scripts (26.3%) included both pro-climate and contrarian views. In this group, manual annotation indicates that the contrarian content was dominant or equated to pro-climate views—either in length or emphasis—suggesting that the model evaluates the weight of each view, as illustrated in the following excerpt:

> "ESSEX: So, where do you stand on climate change?
> GAVIN: Oh, oh, okay. Uh, well, I guess you've kind of got to take all those "studies" with a grain of salt, right?
> ESSEX: Are you kidding? It's absolutely terrifying what's going on out there. They say by the year 2030 most of the planet's wine-producing regions will cease to be."

(*"Into the Dark" A Nasty Piece of Work*, Hulu, 2019)

Among the 89 false-negative scripts identified in the random sample, a clear majority, 61 (69%), included contrarian-nuanced statements or pro-climate claims that directly challenged or undermined the contrarian views. This proportion is significantly higher than the corresponding share among true positives (≈26%), indicating that the classifier systematically under-flags contrarian views when they appear within ambivalent positions (difference in proportions: 41.5 percentage points; 95% CI for difference: roughly 28–54%). A further 21 scripts (23%) contained contrarian content without explicit countervailing pro-climate views but often expressed through comic, mockery, sarcasm, or indirect modes of discourse to disqualify them. This is an example:

> "TY: I was following my heart, and that's what we do around here.
> BEN: You follow your heart.
> TY: Yeah.
> BEN: Well, maybe it's time to look around and ask yourselves how that's working out for you. Maybe you should try following your brain for a change. Because when you follow your heart, the earth is flat, climate change is a hoax, vaccines contain microchips, and Mexican drug dealers killed your sister..."

(*Vengeance*, Blumhouse Productions, 2022)

Finally, only 7 unflagged scripts (9.2%) presented contrarian views with no expressed pro-climate counterbalance and no evident irony, mockery, or disapproval. However, a couple of these cases involved implicit or suggested contrarian views, rather than asserted statements (see [44]), leading the model to dismiss them, as shown in this excerpt, where climate change is presented as positive:

> "LLOYD: They said that they started the festival here in May because in 1939, it apparently had rained A lot during the May months. And what you do in a resort area that rains. So how do you fill up the hotels? So they decided let's have a film festival. Now, 54 years later, the weather patterns have changed with global warming. And it's actually very warm and beautiful. This is the world-famous Croisette of Cannes. This is the most beautiful, beautiful Esplanade which... Which runs along the entire town of Cannes."

(*All the Love You Cannes!*, Troma Entertainment, 2002)

Trends & Aggregates

Given the limited occurrences of contrarian views before the 1990s, we analyze the number of contrarian and pro-climate views by decade in scripts released from 1990 onward. The percentage of scripts with these views indicates opposing temporal trends (Fig 4), with contrarian content declining over time and pro-climate content increasing. The distribution of specific contrarian categories is insufficient to trace a reliable time progression, as would be expected from their natural evolution, shifting from denialism to increasingly challenging climate action [2,3]. In general, the most frequent categories of the taxonomy (1st: *it is not happening*; 2nd: *climate proponents are biased, alarmist, hypocritical, etc.*; 3rd: *climate solutions are harmful or unnecessary*; 4th: *the impacts will not be bad or even beneficial*) are scattered before the 2000s, and all of them begin to develop from that point onward, continuously increasing and peaking in the 2010s and the 2020s.

Figure submitted separately:
climate_views_by_decade_lines.pdf

Fig 4. Pro-climate and contrarian views in scripts with mentions by decade since 1990. Panel A displays the percentage of scripts that include pro-climate views, showing a gradual increase across the last four decades covered in the dataset. Panel B shows the percentage of scripts containing contrarian views, which declines substantially over the same period.

Based on the examined sample, we estimate that 153 scripts (6.6%, 95% CI: 5.3–8.1%) in the 2,417 scripts with climate mentions refer to climate change exclusively as a historical or extraterrestrial phenomenon, not as contemporary anthropogenic climate change (see [45]), a little lower than the same portion (9.4%) found in Schneider-Mayerson et al.'s [7] film dataset. In terms of mentions, it would make 190 estimated mentions (5.0%, 95% CI: 4.0–5.9%) out of a total of 4,005. These scripts also appear scattered before the 2000s and increase thereafter. However, the majority of these productions are documentaries (69%).

The distribution of genres among scripts containing climate-related mentions is dominated by Comedy, Drama, and Documentary, each appearing in more than 600 scripts. These are followed by Sci-Fi & Fantasy (384 scripts) and Action & Adventure (342 scripts); all remaining genres appear in fewer than 200 scripts. Among the top genres, the only notable shift when moving from scripts with climate mentions to those containing contrarian views is observed in documentaries, which drop from 14.6% to 8%, falling to fourth place behind Sci-Fi & Fantasy. This decline is expected, as documentary productions tend to align more closely with the scientific consensus on climate change [46]. On the other hand, scripts with mentions included 46 different original languages, dominated by English at 82% (1,979), followed distantly by French at 4% (95). The remaining top ten were German (43), Spanish (39), Japanese (35), Hindi (27), Portuguese (18), Korean (17), Chinese (13), and Norwegian (13). Scripts with contrarian views appeared in only 11 languages: English (159), Japanese (4), Spanish (3), French (2), and single instances in Russian, Swedish, Finnish, Italian, Norwegian, Portuguese, and German.

Popular films with more than $40 million in worldwide revenue — according to IMDb — containing contrarian views include: *Kingsman: The Secret Service* (2014), *The Simpsons Movie* (2007), *Krampus* (2015), *Love the Coopers* (2015), and *Pokemon: Detective Pikachu* (2019).

To summarise, Fig 5 shows the estimates that describe how climate change is referenced in entertainment films and TV shows. The numbers reveal that pro-climate

discourse is predominant: roughly 1,419 of 2,417 scripts (59%) express support for mainstream climate knowledge. This share is comparable to the portion of scripts that reported 'climate awareness' (75%) in Schneider-Mayerson et al. [7], the discrepancy likely reflects differences in operationalization, as our dataset did not code mere acknowledgment of the phenomenon as a 'pro-climate' view. Scripts with exclusively pro-climate views are estimated at around 1,228 (51%). The inspection process confirmed that those expressed concerns focused primarily on the impacts of climate change (314 of the 521 scripts with pro-climate views). Solutions were discussed in 142 scripts, while 64 discussed both impacts and solutions. Contrarian views appear in an estimated 333 scripts (14%), of which 142 (43% of scripts with contrarian views) are exclusively contrarian, and 180 (54%) intersect both contrarian and pro-climate content. Notably, we estimate 78 of the 142 exclusively contrarian scripts (55%) portray those views in a disqualified manner (e.g., through irony or mockery). Additionally, 856 scripts (35%) remain ambiguous.

Figure submitted separately:
climate_positions_single_plot.pdf

Fig 5. Each bar shows the estimated number of scripts with mentions that feature the grouped position categories. Error bars represent 95% confidence intervals. Percentages indicate the proportion of total scripts (n=2,417). All categories use a stratified estimation method that considers both the flagged scripts and the random sample, except for 'Non-anthropogenic', which is based only on the sample.

We finally estimate that approximately **1 in 9** climate mentions (10.7%, 95% CI: 9.6–11.8%) contains a contrarian view, equivalent to roughly 427 contrarian views among the 4,005 total mentions[1].

Discussion

Determining what constitutes a contrarian view, as well as assessing its narrative function or ideological implications within its context, can be open to a certain degree of interpretation. This subjectivity is especially evident in cases concerning the uncertainty surrounding the impacts of climate change or critiques of climate solutions, where legitimate debate must take place and be acknowledged [47]. Manual annotation introduces another degree of subjectivity, even when guided by clear codebooks, as widely acknowledged in content analysis and qualitative coding literature [48]. Consequently, some classifications in this study should be interpreted with caution, acknowledging the inherent ambiguity present in complex environmental discourse. Moreover, contrary to Schneider-Mayerson et al. [7] and Schneider-Mayerson et al. [28], our inclusion criteria do not limit productions to any specific time period in history, space, or narrative universe, as long as mentions can allude to anthropogenic climate change. In practice, if no clear relationship could be established, they were labeled as 'non-anthropogenic'.

We find that contrarian views are significantly rare in entertainment TV and films, suggesting limited audience exposure to climate contrarian representations, at least on entertainment media. What stands out most is the higher presence of ambiguous positions on climate change, which indicates the growing traction of the topic and, when paired with the upward trend in pro-climate representations, suggests an increasing

[1]Note that the quantitative ratio among mentions reflects the density of contrarian views per mention and does not imply a one-to-one correspondence, particularly regarding climate solutions and support for fossil fuels, where multiple views may be embedded within a single mention or vice versa.

willingness among screenwriters and creatives to engage deeper with and support climate action. Nonetheless, this raises important questions about the nature of the pro-climate views that appear in these productions. As noted earlier, the majority of these views center on the impacts of climate change, in many cases conveyed through hyperbolic or metaphorical depictions of weather, geological, or ecological events that veer into climate doomism. Although classified as pro-climate in this study, reflecting the importance of imagining the worst-case scenarios [49] and their right place in fictional and entertainment formats, some representations of catastrophic consequences render a communicative stance that may operate as two forms of misinformation. First, while some studies suggest direct causality of climate change in increasing frequency and intensity of extreme weather events (e.g., [50]), substantial scientific uncertainty remains in establishing categorical attributions across different types of events [51], alongside ongoing debates about the political implications of such claims [52]. Second, catastrophic or fatalistic representations may reinforce contrarian positions such as *it is too hard to solve* and *it is too late* [53,54], or—as argued by Smith [55]—induce desensitization, all of which risk fostering public inaction or even opposition to climate mitigation efforts. Hence, while popular cli-fi is well known for resorting to catastrophic representations of climate impacts, both in film and in literature [8,9], such representations are not confined to the cli-fi genre. Instead, they appear incidentally across a wider range of mainstream entertainment genres. Contrary to what happens in cli-fi stories, these references emerge not just as fully developed narrative scenarios but as brief discussions, opinions, or beliefs voiced by the speakers, integrating climate discourse into everyday storylines without centering it as the primary plot.

It is essential to emphasize that this study does not imply that the presence of contrarian views in these entertainment formats implies their endorsement or promotion. As several cases in the sample demonstrate, such representations may instead serve a critical or corrective ideological orientation. Moreover, the analysis is limited to spoken language, which captures only one mode of communication. A substantial body of research shows that there are many communicative modes, such as visuals, tension, sound design, character identity, etc., that play a crucial role in shaping portrayals and audience interpretation [56]. By considering only one aspect of the multimodality of discourse, this study necessarily overlooks dimensions of representation that may reinforce or counteract the verbal content. However, regardless of how climate-related views are intended to be portrayed by creators, their actual interpretation by audiences remains uncertain. Media psychology research shows that viewers do not always passively receive messages as intended; often, individuals interpret content through pre-existing beliefs, values, and motivated reasoning processes [57,58]. As a result, even carefully curated portrayals of climate issues may be understood in ways that diverge substantially from the creators' communicative goals. This gap between production intentions and audience interpretation underscores the need for further research on entertainment climate discourse alongside empirical approaches to measure their impact on audiences [6].

Consequently, we consider it crucial to identify views rather than just claims, since views constitute a broader category that encompasses claims. Therefore, a desirable performance of an automated approach to recognize contrarian views in entertainment content (at least in text) would depend on the degree of assertiveness that researchers aim to capture when identifying particular views across these or other communicative formats or contexts. The automated approach applied in this study appears to follow a consistent pattern: the model flags contrarian views that appear in isolation or are distinguishable within a sentence, but dismisses them when the view is less asserted, the context is highly comic or fantastic, such as sci-fi or fantastic stories, or when these views are firmly disqualified. This systematic bias helps clarify the model's underlying

reasoning and decision patterns. In the context of entertainment media and for the reasons previously discussed, we argue that automated approaches should aim to flag contrarian views whenever they appear, regardless of their assertiveness or implicitness, and to assign them a graded score reflecting the speaker's estimated level of epistemic commitment (see [39]). Additionally, models should account for contextual indicators of potential undermining intent, such as sarcasm, dismissive framing, or the presence of countervailing views. So that researchers can then evaluate them rhetorically, along with other communicative modes and their influence on intended and unintended portrayals.

These methodological considerations also point to a broader interpretive issue, which is how such representations can be understood once identified, as explored in the work of Schneider-Mayerson et al. [27]; Tiwathia et al. [59]; Hoppe et al. [60]. If popular entertainment TV and films function as climate propaganda, in the sense of systematically influencing public understanding, these entertainment formats seem to represent a counterweight to organized climate contrarianism. Yet the propagandistic effects are troubling: entertainment representations rely predominantly on negative consequences or worst-case scenarios, potentially cultivating fatalistic and passive views. This catastrophic bias likely stems from fundamental storytelling dynamics, as compelling fictional stories depend on conflict and tension [19, 61]. Climate change offers a readily available source of dramatic material, where more catastrophic depictions tend to generate greater narrative engagement. Climate adaptation strategies or incremental policy changes, by contrast, may offer less dramatic intensity. This intrinsic feature of storytelling may partly explain why discussions of solutions without dramatic representations are often perceived as forced or overly didactic, further constraining narrative possibilities. One proposed solution involves weaving solutions portrayals seamlessly into storylines without explicitly highlighting the underlying problem and, crucially, without challenging prevailing economic assumptions or market logics as illustrated in Craig [62] and Gheihman [63]. However, this approach perpetuates a different problem; by requiring compatibility with growth-oriented economic paradigms, entertainment representations inadvertently reinforce the very systems driving environmental degradation, limiting portrayals to market-based solutions rather than systemic alternatives [64]. In line with Michaels [65], the ultimate propagandistic function of entertainment media is to absorb climate discourse into dominant economic logics.

Data & Code Availability

The datasets are available at
https://github.com/FGonzalez-ac/FilmTV-Contrarian-Data

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Supporting information

Supplementary Data

The data description is divided by source. Subslikescript contributed a total of 115,000 episodes from 6,337 distinct show titles. Opensubtitles provides 107,069 movie titles and an additional 1,713 episodes from 429 show titles.

Subtitles from Subslikescript.com

Genres The dataset adopts TMDB's taxonomy of 20 television genre categories, which includes both scripted and non-scripted genres such as reality, talk, and game shows [66]. Fig 6 shows the distribution of titles across single genres, with Drama being the most frequent at 27.1%, followed by Comedy at 15.8%. Other notable single genres include Sci-Fi & Fantasy, Crime, and Action & Adventure, each representing between 7% and 8% of titles. Fig 7 displays the most frequent genre combinations, highlighting that multi-genre classification is common: 53.1% of shows and 60.7% of episodes are associated with more than one genre.

Figure submitted separately:
show_titles_count_sing_genre.pdf

Fig 6. Distribution of genres among the collected show titles. The vertical axis represents the quantity of titles, while the horizontal axis represents the single TV show genres.

Figure submitted separately:
show_titles_count_combined_genre.pdf

Fig 7. Distribution of combined genres among the collected show titles. The vertical axis represents the quantity of titles, while the horizontal axis represents the top 20 combinations of genres.

Country & Language The dataset includes TV shows from 61 countries, though production is highly concentrated. As shown in Fig 8, the United States contributes 3,050 titles (47% of the total), followed by the United Kingdom with 1,189 titles. This disparity is even greater in episode volume, where the US accounts for 83,790 episodes (70%), nearly seven times more than the UK, the next largest contributor. In total, the US and UK together account for nearly 60% of titles and about 80% of episodes. The production landscape beyond Global North countries includes notable contributions from India, Colombia, Mexico, Thailand, Brazil, and Argentina in terms of episode counts. A subset of 182 titles (2,950 episodes) is international co-productions.

Figure submitted separately:
titles_count_by_country.pdf

Fig 8. Distribution of TV show production titles by country. The vertical axis represents the quantity of titles, while the horizontal axis represents the production countries. The percentages include the US proportion.

Original language distribution (Fig 9) reflects this geographic concentration: approximately 76% of shows are in English. Japanese (4%), Korean (3.6%), Spanish

(2.1%), French (1.4%), and Hindi (1%) are the only other languages representing at least 1% of show titles, though 38 languages are present in total.

Figure submitted separately:
titles_by_language.pdf

Fig 9. Distribution of show titles by original language of the TV show. The vertical axis represents the quantity of titles, while the horizontal axis represents the original language of the TV show.

Networks The dataset includes content from 674 different networks, with an average of 19 episodes per show. This reflects the contemporary television landscape, characterized by the rise of streaming shows with shorter season formats. Netflix is the most represented network with 639 titles, followed by BBC One with 345 titles, as illustrated in the network distribution list (Fig 10). Contemporary streaming services like Netflix lead in title volume, but traditional broadcast networks such as NBC (244 titles) and CBS (230 titles) often have higher episode counts, indicative of their longer-running, multi-season series.

Figure submitted separately:
networks_top50.pdf

Fig 10. Distribution of show titles by a single TV network. The vertical axis represents the quantity of episodes, while the horizontal axis represents the single networks.

Subtitles from Opensubtitles.org

Genres This dataset adopts TMDB's taxonomy of 26 movie genre categories, which also includes both scripted and non-scripted genres. Fig 11 shows the distribution of titles across single genres, with Drama being the most frequent at 23.1%, followed by Comedy at 13.5%. Other notable single genres include Thriller, Romance, Action, Horror, and Crime, each representing between 5% and 8% of the titles. Fig 12 displays the most frequent genre combinations. Multi-genre classification in this case covers 62.6% of titles.

Figure submitted separately:
movie_count_sing_genre.pdf

Fig 11. Distribution of genres among the collected movies. The vertical axis represents the quantity of titles, while the horizontal axis represents the top 20 single movie genres.

Figure submitted separately:
movie_titles_count_combined_genre.pdf

Fig 12. Distribution of combined genres among the collected movies. The vertical axis represents the quantity of titles, while the horizontal axis represents the top 20 combinations of genres.

Country & Language The movie dataset includes titles from 201 countries, though production is highly concentrated as well. The United States contributes nearly 30% of the total, and as shown in Fig 13, it is followed by France and the United Kingdom (7% and 6.6% respectively). Notable contributions from the Global South include countries such as India, China, Brazil, and Mexico. Fifteen percent of the titles (16,377) are international co-productions.

Figure submitted separately:
movie_count_sing_country.pdf

Fig 13. Distribution of movies by production country. The vertical axis represents the quantity of titles, while the horizontal axis represents the top 20 production countries. The percentages include the US proportion.

Original language distribution in the movie dataset (Fig 14) also reflects the geographical concentration: approximately 56% of titles are in English. French (6.4%), Japanese (5.1%), Chinese (3.5%), Spanish (3.4%), Italian (3.3%), German (2.9%), Hindi (2.3%), Korean (1.7%), Russian (1.7%), and Portuguese (1.1%) are the only other languages representing more than 1% of episodes, though 122 languages are present in total.

Figure submitted separately:
movie_count_by_language_no_english.pdf

Fig 14. Distribution of movies by original language. The vertical axis represents the quantity of movies, while the horizontal axis represents the top 20 original languages of the movies.

Production Companies This dataset includes titles produced by a total of 55,082 production companies (Fig 15). Approximately 45% of the titles are produced by at least two production companies. The first 6 production companies in this list correspond to the historically biggest Hollywood studios, except for Disney, which appears a few spots later.

Figure submitted separately:
movie_count_production_company_top50_split.pdf

Fig 15. Distribution of movie titles by a single production company. The vertical axis represents the quantity of titles, while the horizontal axis represents the top 50 production companies.

Supplementary Methods

Taxonomy of Climate Change Misinformation Claims (CARDS)

Label	Claim
1_0_0	Global warming is not happening. Climate change is NOT leading to melting ice (such as glaciers, sea ice, and permafrost), increased extreme weather, or rising sea levels. Cold weather also shows that climate change is not happening.
1_1_0	Climate change is NOT causing melting ice (e.g., glaciers or sea ice), thawing permafrost, or reduced snow cover.
1_1_1	Antarctica is gaining ice.
1_1_2	Greenland is gaining ice.
1_1_3	Arctic sea ice is not vanishing.
1_1_4	Glaciers are not melting and may be gaining mass.
1_2_0	We are heading into a period of global cooling or an ice age.
1_3_0	We are experiencing cold weather, therefore climate change is not happening.
1_4_0	There has been a hiatus or pause in global warming. The climate has not warmed or changed very much over the past few decades.
1_5_0	Oceans are not warming and may even be cooling.
1_6_0	Sea level rise is exaggerated and not accelerating.
1_7_0	Climate change does not cause or worsen extreme weather events such as heatwaves, droughts, wildfires and floods.
1_8_0	Climate advocates and alarmist changed the name from global warming to climate change so that cold weather as well as hot can be taken as evidence.
1_9_0	Oceans are not becoming more acidic and ocean pH is not falling.
2_0_0	Greenhouse gases from humans are not the causing climate change.
2_1_0	Humans are not the causing change. Instead, climate change is due to natural variation.
2_1_1	The sun, cosmic rays, or other astronomical phenomena are causing climate change.
2_1_2	Geological events such as volcanic activity are causing climate change.
2_1_3	Natural ocean variability is causing climate change, not manmade factors. This natural variability includes El Nino and La Nina climate patterns.
2_1_4	Climate has changed naturally and/or it's been warm in the past, so we shouldn't worry too much about recent climate change.
2_2_0	Non-greenhouse gas human climate forcings such as from aerosols, changes land use, or black soot on snow are causing climate change.
2_3_0	There's no evidence for greenhouse effect or carbon dioxide driving climate change
2_3_1	CO2 is just a trace gas and so can't cause climate change.
2_3_2	The greenhouse effect is saturated (or logarithmic) and therefore will have little effect on climate.
2_3_3	Temparature changes drive carbon dioxide, not the other way around.
2_3_4	Naturally occurring water vapor is the most powerful greenhouse gas.
2_3_5	There's no tropospheric hot spot.
2_3_6	CO2 is not rising.
2_3_6_1	CO2 concentrations were higher in the past

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Label	Claim
2_3_6_2	CO2 emissions from humans are tiny and/or not raising atmospheric CO2
3_0_0	The impacts of climate change will not be bad and might even be beneficial.
3_1_0	Climate sensitivity is low and there are negative feedbacks that will reduce warming.
3_2_0	Plants and animals are not showing harmful impacts from climate change and may be benefiting from climate change
3_2_1	Plants and animals will adapt to climate change and therefore the impacts will be minimal.
3_2_2	Polar bears are not in danger from climate change.
3_2_3	The impact of ocean acidification on coral is exaggerated. The oceans are and have been alkaline in the past, yet coral has survived.
3_3_0	CO2 is not a pollutant.
3_3_1	CO2 is plant food – it helps plant growth.
3_4_0	Human-caused climate change will only lead to a few degrees (or less) of warming and so no cause for alarm.
3_5_0	Climate change does not lead to conflict and is not a national security threat.
3_6_0	Climate change does not have negative impacts on human health.
4_0_0	Climate solutions are harmful or unnecessary
4_1_0	Climate solutions are harmful to the economy, society, and/or the environment
4_1_1	Climate solutions will increase costs, harm the economy, and/or kill jobs
4_1_1_1	Climate policies will harm economic competitiveness
4_1_1_2	Climate policies will kill jobs and/or harm vulnerable members of society
4_1_1_3	Climate-friendly technologies and practices are too expensive and/or uneconomical
4_1_2	Climate policies will weaken national security, energy security, national sovereignty, and/or cause conflict
4_1_3	Climate solutions will harm the environment, habitats, and/or species
4_1_3_1	Government climate policies will harm the environment, habitats, and/or species
4_1_3_2	Climate-friendly technologies/practices will harm the environment, habitats, and/or species
4_1_4	Climate policies create economic uncertainty and may have unintended consequences
4_1_5	Climate regulation limits individual liberty, freedom, and undermines capitalism. This includes but not limited to arguments that climate solutions are a justification for government overreach and control. Note that claims of a "war on energy" would fall into this category.
4_2_0	Climate solutions are ineffective and won't work.
4_2_1	The promised benefits of green jobs won't be achieved in practice.
4_2_2	The impact of climate policies on climate change will be negligible and/or only make a difference in the distant future
4_2_3	A single country or region only contributes a small percentage of global emissions
4_2_4	Climate action is pointless because of the emissions of other countries such as China or India
4_2_6	Climate policy can be gamed or manipulated.

Continued on next page

Label	Claim
4_2_7	Climate-friendly technologies and practices are ineffective and won't work.
4_2_7_1	Climate-friendly technologies are not ready
4_2_7_2	Renewable energy cannot provide base-load power and is difficult to scale
4_2_8	Markets and private sector are economically more efficient than government policies at solving climate change
4_2_9	Individuals/consumers are responsible for climate change and should change their behaviour to solve it
4_2_10	Future generations, technologies, and efficiencies will solve it
4_2_10_1	Future generations will be richer and will be better able to solve climate change
4_2_10_2	Future technology will fix climate change, so we shoudn't worry too much.
4_2_11	It's better to adapt to climate change and increase resiliency then to devote resources to mitigation.
4_2_12	Increasing energy efficiency is enough to meet the challenges of climate change.
4_2_13	We should focus on carbon dioxide removal rather than emissions reductions
4_2_14	There are more pressing problems than climate change and we should address those first
4_2_15	It's cheaper to mitigate climate change abroad, so we are better off focusing on helping other countries reduce their emissions
4_3_0	It's too hard to solve climate change and so we shouldn't try
4_3_1	We don't have the right policy to solve climate change and/or need to better understand all the implications before implementing climate policies
4_3_2	It's too late to do anything to mitigate climate change
4_3_3	Support for climate solutions is low and/or decreasing
4_4_0	We have already made a lot of progress on climate change and don't need to do anything else.
4_4_1	We are already taking climate change seriously, so there is no need to worry
4_4_2	We are already doing enough to address climate change, so there is no need for more action
4_4_3	We are already contributing enough to the societal good we don't need to also address climate change issues
5_0_0	Climate science is uncertain, unsound, unreliable, or biased.
5_1_0	There is no scientific consensus on climate change. Scientists continue to disagree on many aspects of climate change and the science is not settled. This includes arguments that the science isn't settled or isn't there.
5_2_0	Proxy climate data from things such as ice cores, tree rings boreholes, etc., are unreliable. This includes "hockey stick" graph.
5_3_0	Temperature data is unreliable and/or biased.
5_4_0	Climate models are flawed, unreliable, or uncertain.
6_0_0	Climate scientists and proponents of climate action are alarmist, biased, wrong, hypocritical, corrupt, and/or politically motivated.
6_1_0	Climate change proponents are alarmist, biased, wrong, hypocritical, and/or politically motivated.
6_1_1	Climate changes is a religion.

Continued on next page

Label	Claim
6_1_2	Media reports on climate change are alarmist, biased, and/or wrong.
6_1_3	Politicians, governments, and organizations such as the UN are alarmist, biased, and/or wrong on climate change.
6_1_4	Environmentalists are alarmist, biased, and/or wrong on climate change.
6_1_5	Scientists and academics are alarmist, biased, and/or wrong on climate change.
6_2_0	Climate change is a hoax or conspiracy. We have been deceived by climate scientists, politicians, bureaucrats, and environmental organizations on climate change.
6_2_0	Climate change is a hoax or conspiracy. We have been deceived by climate scientists, politicians, bureaucrats, and environmental organizations on climate change.
6_2_0	Climate change is a hoax or conspiracy. We have been deceived by climate scientists, politicians, bureaucrats, and environmental organizations on climate change.
7_0_0	We need fossil fuels for economic growth, prosperity, and to maintain our standard of living.
7_1_0	Fossil fuels are plentiful and should be used. This includes arguments that explicitly focus on large domestic fossil fuel reserves or an abundance of potential fossil fuel resources.
7_2_0	Fossil fuels are good for the economy, society, and/or the environment.
7_2_1	Fossil fuels are important for economic growth and development. Only assign when text explicitly links fossil fuels to economic growth/development.
7_2_2	Fossil fuel extraction is important for energy security. Assign when text emphasizes the importance of fossil fuels for domestic security or energy independence.
7_2_3	Our fossil fuels are cleaner than others
7_2_4	Fossil fuels are part of the solution. We need to transition to cleaner fossil fuels.
7_3_0	Fossil fuels are necessary to meet energy demand. This includes, but not limited to, arguments that we need all forms of energy, including fossil fuels.
7_4_0	We have a right to profit from fossil fuels just like others have
0_0_0	No relevant claim detected

Table 3. CARDS 2.0 Complete Taxonomy

Supplementary Results

Claim	Count	Pct (%)
Global warming is not happening	41	0.17
Climate change (science or policy) is a conspiracy (deception)	31	0.13
Climate impacts/global warming is beneficial/not bad	25	0.11
Weather is cold/snowing	12	0.05
Climate movement is alarmist/wrong/political/biased/hypocritical (people or groups)	9	0.04
Politicians/government/UN are alarmist/wrong/political/biased	7	0.03
Other issues are more pressing	7	0.03
It's natural cycles/variation	6	0.03
Climate-related science is uncertain/unsound/unreliable (data, methods & models)	6	0.03
There's no scientific consensus on climate/the science isn't settled	6	0.03
Solutions increases costs	5	0.02
Policy limits freedom	5	0.02
Climate solutions are ineffective	4	0.02
Environmentalists are alarmist/wrong/political/biased	4	0.02
Human greenhouse gases are not causing climate change	3	0.01
Solving climate change is too difficult	3	0.01
It's only a few degrees (or less)	3	0.01
Climate solutions are harmful	3	0.01
Climate scientists and proponents of climate action are alarmist, biased, wrong, hypocritical, corrupt, and/or politically motivated	3	0.01
CO2 is plant food	3	0.01
We have a right to profit from fossil fuels just like others have*	3	0.01
It's the sun/cosmic rays/astronomical	3	0.01

Claim	**Count**	**Pct** (%)
We need fossil fuels	2	0.01
Media (includes bloggers) is alarmist/wrong/political/biased	2	0.01
Future generations, technologies, and efficiencies will solve it	2	0.01
Species can adapt to global warming	2	0.01
Climate-friendly alternatives are ineffective	2	0.01
Climate solutions are harmful or unnecessary	2	0.01
Climate movement is religion	2	0.01
Scientists/academics are alarmist/wrong/political/biased	2	0.01
Climate hasn't warmed/changed over the last (few) decade(s)	2	0.01
Not enough	1	0.00
Climate has changed naturally/been warm in the past	1	0.00
Sea level rise is exaggerated/not accelerating	1	0.00
Climate change does not contribute to human conflict/threaten national security	1	0.00
Adaptation is the solution	1	0.00
We have a right to profit from fossil fuels just like others have	1	0.00
Climate-friendly alternatives are too expensive	1	0.00
Climate sensitivity is low/negative feedbacks reduce warming	1	0.00
Species/plants/reefs aren't showing climate impacts yet/are benefiting from climate change	1	0.00
Human CO2 emissions are miniscule/not raising atmospheric CO2	1	0.00
CO2 is beneficial/not a pollutant	1	0.00
Fossil fuels are plentiful	1	0.00
Polar bears are not in danger from climate change	1	0.00
Arctic sea ice isn't vanishing	1	0.00
Fossil fuels are necessary	1	0.00

Claim	Count	Pct (%)
Climate change doesn't negatively impact health	1	0.00
CO2 was higher in the past	1	0.00
Fossil fuels are good	1	0.00
Proxy data is unreliable (includes hockey stick)	1	0.00
Good for economic growth	1	0.00
We're not ready for policy	1	0.00
It's too late to fix it	1	0.00
Extreme weather isn't increasing/has happened before/isn't linked to climate change	1	0.00
Our fossil fuels are clean	1	0.00
Already taking it seriously	1	0.00
We're heading into an ice age/global cooling	1	0.00
We are already taking climate change seriously, so there is no need to worry*	1	0.00
Technology will fix it	1	0.00

Table 4. Categories and occurrences of contrarian claims within the inspected scripts alongside their proportion (%). Labels marked with an asterisk (*) denote contrarian views that do not exactly correspond to the assigned category but represent the closest match within the taxonomy.

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