Show Me the Curve: A Cross-Platform Thematic Analysis of Flat Earth Social Media Posts

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Abstract. Conspiracy theories thrive on social media, and many are intertwined with complex scientific, political, and cultural issues. The flat earth conspiracy theory, though, stands mostly on its own as an aggressive rejection of science with minimal complicating issues. In this paper, we conduct the first thematic analysis of pro-flat earth posts on Twitter, Instagram, and Facebook. We find themes occur in similar proportions across platforms but differ from what has been found previously on YouTube. We discuss implications these results have for studying anti-science conspiracy theories more broadly.

Keywords: Conspiracy Theories, Social Media, Flat Earth

1 Introduction

Social media has always been a place for people to share, discuss, and spread conspiracy theories. Political and policy-related conspiracy theories, like the anti-vaccine movement, Pizzagate and QAnon, and climate deniers, have all been a focus because of the immediate implications of their beliefs. However, there are many more conspiracy theories with large followings online, and understanding behavior within those communities can also yield important insights.

In this paper, we investigate the flat earth community on Twitter, Facebook, and Instagram. Believers are committed to the idea that the earth is flat, not a globe.

While this belief has limited implications on politics or policy, it is one of the most fundamental science-denying conspiracy theories. Thus, understanding the major themes behind it can be useful for understanding anti-science beliefs more broadly.

While flat earthers have been studied on YouTube, there has been no analysis of the kinds of content shared by the community on other platforms (e.g. Fig 1). To address this gap, we conducted a thematic analysis of flat Earth posts across Twitter, Facebook, and Instagram. Our research aims to answer the following questions:

1. What are the prevalent themes in flat Earth content shared on Twitter, Facebook, and Instagram?
2. How do these themes compare across the three platforms?
3. How do the themes on these platforms differ from those found in previous research on YouTube?

By answering these questions, we seek to contribute to a broader understanding of how conspiracy theories, particularly those that reject scientific evidence, manifest and spread on different social media platforms.

2 Related Works

The spread of conspiracy theories on social media has been a growing concern in recent years. Echo chambers and increased polarization have created an environment conducive to the proliferation of conspiracist thinking [1], with flat earth conspiracy theories emerging as a prominent example [2, 3].

flat earth discourse has been particularly prevalent on YouTube, where flat earth videos have been shown to outnumber debunking videos [4] and increase susceptibility to flat earth arguments [5]. This has led to calls for censorship [6] and research on the third-person effects of flat earth video exposure [7]. However, flat earth discourse is not limited to YouTube, with studies examining the use of anti-science rhetoric and personal experience to assert flat earth views on Twitter [8, 9] and the role of controversy in flat earth discussions [10]. While these studies provide valuable insights into flat earth discourse on Twitter, they focus on specific aspects such as the use of anti-science rhetoric or the role of controversy. In contrast, our work takes a more comprehensive approach by conducting a thematic analysis of flat earth content across multiple platforms, allowing for a broader understanding of the prevalent themes and their relative importance within the flat earth community.

Research has also explored the characteristics and motivations of flat Earth believers, finding associations with religiosity [2, 4, 11], political conservatism [11-13], and belief in other conspiracy theories [2, 4, 11]. Flat Earthers often value personal experience over scientific evidence [12, 13] and self-identify as researchers despite lower levels of education [8]. The roles of social identity, contrarian thinking, and charismatic leadership in flat Earth belief have also been examined [14].

While flat earth communities may appear homogeneous, research suggests they are diverse, with internal divisions and opposing factions [15, 16]. The social motives and group dynamics observed in other conspiracy theory communities [17, 18] likely influence flat earth groups as well, with social factors playing a significant role in

conspiracy engagement [19]. The culture of the flat earth movement and its consequences have also been explored [20].

More broadly, the resurgence of flat earth beliefs has been framed as a symptom of declining trust in scientific and institutional authority [21], with conspiracy beliefs linked to reduced prosocial behavior and organizational commitment [22-24]. However, research on flat earth discourse beyond YouTube and the social impacts of flat earth belief remains limited.

3 Data

We collected posts from Twitter (N=1,310), Facebook (N=570), and Instagram (N=291) for analysis.

On Twitter, we searched for posts related to flat Earth ideas using the platform's native search functionality. We searched for the keywords "flat earth" and the hashtag "#flatearth". Researchers examined the resulting accounts to confirm that a substantial proportion of their tweets were dedicated to flat Earth content. In total, we included 131 Twitter accounts and selected 10 flat Earth-related posts from each account, yielding a total of 1,310 tweets for analysis.

On Facebook, we analyzed posts from two public groups dedicated to flat Earth topics: Flat Earth Friends, with over 50,000 members, and Flat Earth, with 13,700 members. We collected a sample of 570 posts from these groups for analysis.

On Instagram, we analyzed posts that included the hashtag "#flatearth". Posts that used the hashtag but were not directly related to flat Earth topics were excluded from the analysis. This process yielded a total of 291 Instagram posts for our study.

4 Codebook

We conducted a thematic analysis [22] and identified four major themes: Bad Science, Conspiracy Theories, Religion, and Other. These themes were developed independently, without reference to previous work, and align with the major themes identified in flat Earth YouTube videos by Mohammed [3].

4.1 "Bad Science"

This category generally contains posts that express the belief that the Earth's flatness can be scientifically proven (see Fig. 2). It encompasses the following:

- Posts that reflect a poor understanding of science, such as claims that the Earth doesn't move, gravity hasn't been proven, sunbeams should behave in a certain way based on the sun's position, the Earth's curvature is not visible, and misinterpretations of scientifically explainable phenomena as evidence of a flat Earth.
- Rejection of science, such as posts that quote scientific authorities like NASA and accuse them of lying or call people who believe in science dumb or indoctrinated.

• Incorrect attempts at using calculations, formulas, or models to allegedly prove a flat Earth.

Note that while many "bad science" posts may resemble conspiracy theory-related content, they are only classified as conspiracy theories if they explicitly claim that forces are working to suppress the knowledge that the Earth is flat.

4.2 Globe-Related Conspiracy Theories

These posts posit that some powerful entities, such as the government, NASA, the Illuminati, or even aliens, know the Earth is flat but are conspiring to make people believe it is a globe. The motivations behind this alleged conspiracy are often vague and described as a means of control or exploitation. Conspiracy theory posts include claims of evidence that NASA is lying, quotes from military or space personnel allegedly stating the Earth is flat or space travel is a hoax (see Fig. 3).

4.3 Religion

Religious flat Earth proponents post about biblical evidence of a flat Earth, claim that God created humans as central to the universe, and highlight the flat Earth as a common belief across many religions. While most of these posts appear to be Christian, this category also includes supernatural, new age, and sci-fi philosophy (see Fig. 4). The latter groups touch on topics like energy-based control, living in a simulation, and multiverse crossovers.

4.4 Other

This category serves as a catchall for posts that don't fit into the other three major categories. These posts tend to have less meaningful content and are often simple assertions that the Earth is flat or memes mocking people who believe the Earth is round (see Fig. 5).

Our initial codebook included codes for politically oriented posts that touched on military policy, climate change denial, and critiques of specific politicians, as well as a code for posts about space aliens and UFOs. However, after analysis, we found that these themes constituted a very small percentage of all posts. Therefore, we grouped them into this "other" category.

5 Results

After developing the themes, we applied them to the posts collected from Twitter, Facebook, and Instagram. Posts could be assigned multiple themes. We then calculated the proportion of posts labeled with each theme (see Table 1).

Despite the distinct cultures and data collection methods across the three platforms—through groups on Facebook, user search on Twitter, and hashtag searches on

Instagram—we observed a remarkable consistency in the frequency of themes. "Bad Science" accounted for half or more of all flat Earth posts on each platform.

Conspiracy theories were also quite common, appearing in around a quarter of posts on Twitter and Facebook and over a third of posts on Instagram. While NASA was a frequent target, we also observed posts accusing the government, Jews, and space aliens of perpetuating the alleged conspiracy. However, the majority of conspiracy theory posts targeted a vague "they" who "don't want you to know" or who are running a "psyop". Posts also interpret azimuthal projection maps as evidence that "they" know the truth about the Earth being flat.

6 Discussion and Conclusions

In this study, we conducted a thematic analysis of pro-flat Earth posts on Twitter, Facebook, and Instagram. Across all three platforms, we found a relatively consistent distribution of themes. "Bad science" content, which included pseudoscience and misapplications of scientific ideas, was present in approximately half of all posts. Conspiracy theory content appeared in around a quarter of posts on Twitter and Facebook and over a third of posts on Instagram. Religious themes were present in just under 10% of posts across all platforms.

This is the first study to analyze flat Earth content across multiple social media platforms. While our results were consistent regarding the prevalence of themes on Twitter, Facebook, and Instagram, they differed from the findings of Mohammed [3] on YouTube. Mohammed found that conspiracy theory content was present in 79.7% of flat Earth videos on YouTube, while content falling under our "bad science" theme was present in 75.1% of videos. This discrepancy is likely due to the differences in the nature of the platforms and the format of the content. A single social media post is limited in the amount of information it can convey through a meme or a few hundred characters, whereas a video can provide more extensive commentary. The average length of pro-flat Earth videos in Mohammed's sample was 29.79 minutes, allowing for the coverage of a wider range of topics. These differences underscore the importance of conducting cross-platform content analyses, particularly when considering the unique characteristics of video-sharing platforms like YouTube.

Our findings provide further evidence of the "do your own research" philosophy common among conspiracy theorists. The prevalence of the "bad science" theme, characterized by non-expert attempts at scientific inquiry, aligns with this notion. As Levy [26] notes, while non-expert research can be valuable for exploration, it is a common refrain among conspiracy theorists and often undermines the truth. Given the relative lack of political or external ideological factors influencing flat Earth beliefs, this community may offer unique insights into the psychological and social factors contributing to the rejection of scientific authority.

While our study provides valuable insights into the prevalence and nature of flat Earth content across social media platforms, it is important to acknowledge its limitations. The sample sizes for Facebook (N=570) and Instagram (N=291) are

relatively small compared to Twitter (N=1,310). Future research could expand the sample sizes for these platforms to improve the generalizability of the findings.

Additionally, our study presents a snapshot of flat Earth content at one point in time and does not capture the evolution of themes and dynamics within these communities over time. Longitudinal research could provide a more comprehensive understanding of how flat Earth discourse develops and changes on social media platforms.

Future research could also delve deeper into the psychological and social factors motivating individuals to engage with flat Earth content online. Understanding these underlying drivers could inform the development of interventions to counter the spread of misinformation and promote critical thinking.

The co-occurrence of bad science, conspiracy theory, and religious themes in flat Earth posts mirrors patterns observed in other conspiracy theories. As flat Earth beliefs are relatively unencumbered by political considerations, this community may serve as a useful case study for understanding the interplay between conspiracy theories, pseudoscience, and religion in the digital age.

Disclosure of Interests. The authors have no competing interests to declare that are relevant to the content of this article.

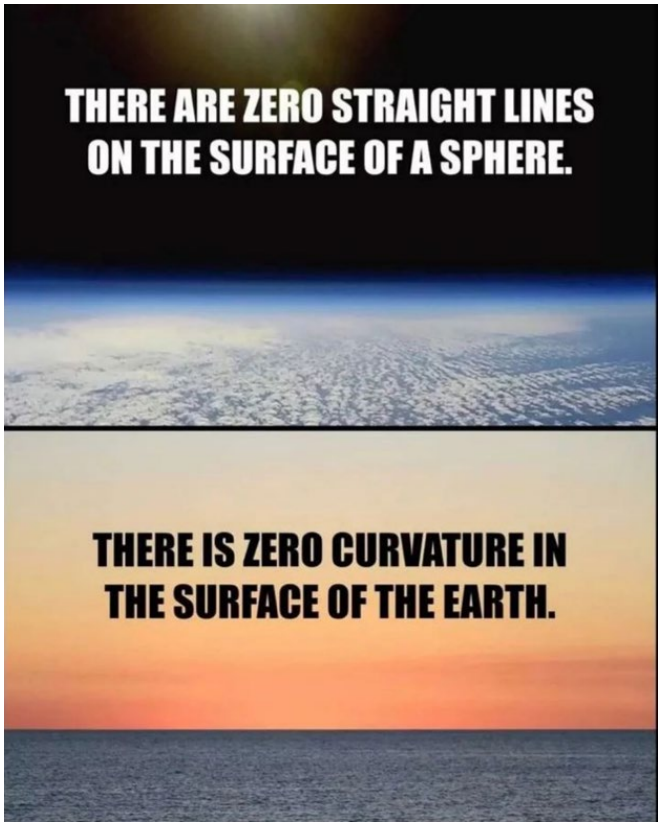

Fig. 1. Figure 1. Flat earth conspiracy theory post

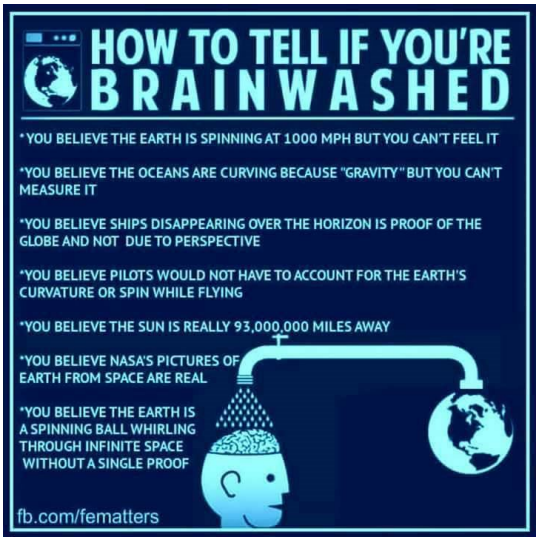

Fig. 2. Figure 2. Example of “Bad Science”

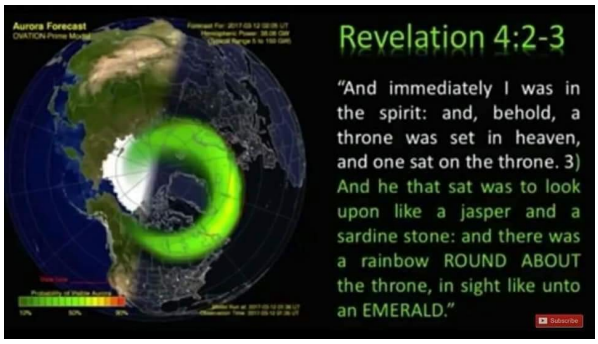

Fig. 3. Figure 3. Example of “Religion”

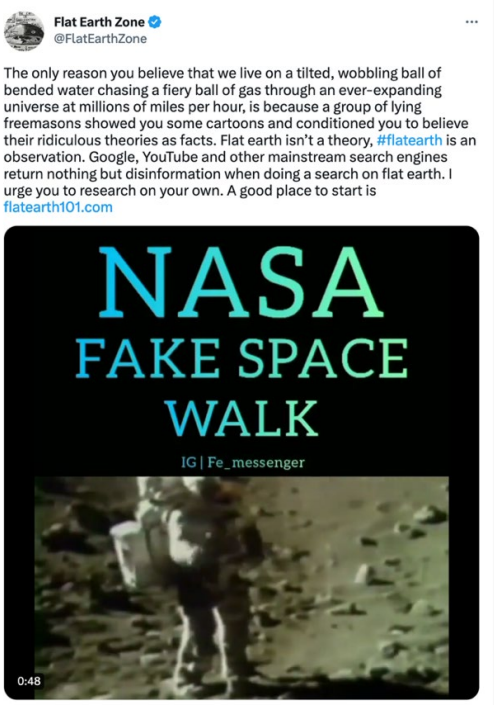

Fig. 4. Figure 4. Example of "Globe-Related Conspiracy Theories"

Fig. 5. Figure 5. Example of "Other"

Theme	Twitter	Facebook	Instagram
Bad Science	0.54	0.63	0.50
Conspiracy	0.24	0.24	0.38
Religion	0.08	0.08	0.09
Other	0.22	0.10	0.27

TABLE 1. PROPORTION OF TWEETS LABELED WITH EACH THEME ACROSS PLATFORMS

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