

Reviewer Comments

This manuscript is engaging, timely, and potentially valuable. The topic: ‘*Framing the Orbital Commons: Public Discourse and LEO Sustainability After the Starlink Gen2 Approval*’ addresses an important and emerging area at the intersection of environmental communication, governance, and space sustainability. The paper is generally well written, logically structured, and demonstrates a strong engagement with both the orbital sustainability and framing literature. In particular, the effort to bridge geoscience, governance, and communication research is a notable strength.

In general, the manuscript holds value and could provide a beneficial contribution with adjustments. **My recommendation is Major Revision.** This recommendation is not based on concerns about the relevance of the topic or the overall quality of the work, but rather on issues relating to *methodological transparency, clarity of the coding process, sample consistency, and the strength of some interpretive claims*. Addressing these points would significantly strengthen the manuscript.

Before providing detailed comments, I acknowledge a possible limitation of my review. My expertise is strongest in environmental policy, science-policy communication, governance, and science communication than in social media analytics and qualitative framing methodologies. Consequently, some of my observations, particularly those relating to coding procedures, coding reliability, and social media sampling may reflect my own perspective rather than established methodological conventions within this specific research fields. The author may therefore wish to consider these comments alongside discipline-specific standards for qualitative framing research.

1. Comments on the Coding Process

One area where I found myself needing more clarity was on how the coding was implemented in practice.

My understanding of the coding process is that:

1. Each post was examined for the presence or absence of Entman's four framing functions: problem definition, causal interpretation, moral evaluation, and treatment recommendation.
2. A dominant framing orientation was then assigned to each post (Neutral, Technological Optimism, Environmental Risk, or Hybrid).
3. One or more sustainability dimensions were subsequently coded (Environmental-Orbital, Operational, Governance/Responsibility, and Socio-technical). (Lines 168–240; 310–324; 855–875).

The coding framework presented in Appendix A is helpful and demonstrates considerable thought. However, it was still somewhat unclear about how coding decisions were made when multiple framing orientations appeared in a single post.

For example, what criteria distinguished a post coded as **Hybrid** from one coded as primarily **Technological Optimism** that briefly acknowledged environmental risks? Additional examples of borderline cases would help readers better understand the decision-making process and improve transparency (lines 209–214; 866–869).

Similarly, Governance and Responsibility was coded in 196 out of 207 posts (lines 389–397; 425–430). While this may be entirely reasonable given that the dataset centres on a regulatory decision, the proportion is strikingly high. Readers would benefit from a clearer explanation of the threshold used for assigning this category, along with a few illustrative examples.

Since coding was done by a single researcher, the study inevitably relies heavily on individual interpretation. The manuscript appropriately discusses the use of an audit trail and iterative coding procedures (lines 320–329). However, the limitations section could more explicitly acknowledge the subjective nature of qualitative coding and explain how consistency was maintained throughout the process.

2. Methodological Transparency

I would encourage the author to provide additional detail regarding the data collection process.

The manuscript reports using keywords such as "Starlink", "FCC", "approval", "Gen2", and "expansion" (lines 280–283), but the exact search strings, combinations of terms, query settings, and collection dates are not reported. Including these details would greatly improve reproducibility.

I also wondered whether the keyword selection itself may have influenced the results. Because the search strategy focused on approval, regulation, and expansion, the resulting dataset may naturally favour news-oriented and institutional discourse. This could partially explain the dominance of neutral framing reported in the findings (lines 280–289; 354–375). It would be helpful if the manuscript acknowledged this possibility as a potential source of sampling bias.

3. Results and Interpretation

The findings are interesting and generally presented in a clear and coherent manner.

One issue concerns the temporal analysis. The manuscript reports only five pre-approval posts compared with over two hundred post-approval posts (lines 533–537). Given such a limited pre-event sample, it seems difficult to draw meaningful conclusions about changes in discourse over time. I would therefore suggest either reducing emphasis on temporal comparisons or explicitly stating that the data do not support substantive before-and-after analysis.

There also appears to be a numerical inconsistency. The manuscript reports a final analytical corpus of 207 posts following screening (lines 303–305). However, the temporal breakdown later reports 204 post-approval posts and 5 pre-approval posts (lines 533–537), which totals 209 posts. This should be checked and corrected if necessary.

In some places, the discussion may go slightly beyond what the data can directly support. For example, the manuscript suggests that limited visibility of sustainability concerns in public discourse may influence governance processes, policy prioritisation, and regulatory outcomes (lines 747–769; 829–834). While these arguments are theoretically plausible and may well be correct, the present study analyses discourse

rather than governance outcomes. It would therefore be better to present these claims more cautiously as implications or hypotheses rather than demonstrated effects.

Similarly, the statement that technological optimism was "significantly more prevalent" than environmental risk framing (lines 466–479) may imply statistical testing. Unless such testing was conducted, terms such as "substantially," "considerably," or "markedly" more prevalent would be more appropriate.

4. Strengths of the manuscript

- The discussion section is one of the strongest parts of the manuscript.
- The argument that so-called neutral reporting constitutes a form of framing rather than an absence of framing is persuasive and theoretically well grounded (lines 570–614).
- Likewise, the discussion of the "communicative gap" between scientific understandings of orbital sustainability and its representation in public discourse is insightful and, in my view, represents one of the paper's most valuable contributions (lines 617–639).
- More broadly, the manuscript does an excellent job of reconnecting the empirical findings with wider debates on risk communication, governance, and socio-technical systems (lines 734–784). This helps position the contribution beyond the immediate case study.

5. Minor Issues

Section numbering

The numbering appears to jump from Section 4.5 to Section 4.7. Section 4.6 appears to be missing (line 531).

Numerical consistency

Please verify the discrepancy between the reported final sample size of 207 posts (lines 303–305) and the reported temporal distribution of 204 post-approval and 5 pre-approval posts (lines 533–537).

Typographical issue

"Progressoriented framing" should be corrected to "progress-oriented framing" (lines 473–474).

Grammar

In the Abstract, the sentence:

"...environmental risk framing, particularly relating to orbital debris and ecological impacts appears comparatively limited..."

would read more smoothly as:

"...environmental risk framing, particularly relating to orbital debris and ecological impacts, appears comparatively limited..." (lines 41–43).

Data Availability Statement

The manuscript currently states that the dataset "will be deposited" in a repository prior to publication (lines 886–889). If possible, providing repository details or a DOI when available would improve transparency.

Appendix formatting

Several tables in Appendix A contain formatting irregularities (for example "Var i abl e" and alignment issues) that would benefit from correction before publication (lines 850–875).

Summary

This paper is a relevant and potentially valuable contribution that addresses an underexplored aspect of orbital sustainability research. The manuscript is well motivated, theoretically informed, and generally well written. The primary recommendations relate to improving methodological transparency, clarifying coding procedures, resolving minor inconsistencies, and ensuring that broader governance implications remain closely aligned with what can be directly supported by the data. With these revisions, the manuscript would be substantially strengthened.