Towards a Multidimensional GIS Approach for Mapping and Analysing Climate Misinformation: Concepts, Gaps, and Early Directions

Abstract

Climate misinformation continues to obstruct science-informed climate action, skewing public understanding and influencing political agendas. Despite increased recognition of the problem, research has not yet produced tools capable of mapping and analysing misinformation in relation to climate dynamics across space and time. In particular, there is a critical gap in integrating climate data with misinformation content to examine where and how misleading narratives about climate change emerge, circulate, and persist. The research does not introduce a functioning system, but instead focuses on identifying the necessary conditions—technical, conceptual, and social—for such a system to be developed in subsequent stages.

This paper presents the conceptual foundation and early-stage design of a research project that seeks to address this gap. Conducted under the *ClimateSense* initiative, the project aims to explore the feasibility of developing a multidimensional Geographic Information System (GIS) to support the analysis and visualisation of climate misinformation in its spatiotemporal and semantic dimensions. The impetus for this research stems from three interrelated limitations in current scholarship and practice. First, existing Geographic Information System (GIS) infrastructures are not equipped to accommodate or process climate misinformation datasets, particularly those sourced from high-volume, unstructured environments such as social media and news media archives. As a result, there is a lack of spatial tools that can represent and analyse the co-occurrence of climate indicators (e.g. temperature anomalies, precipitation levels, CO_2 concentrations) and misinformation narratives within the same analytical frame. Second, the spatial and temporal diffusion of climate misinformation remains largely unquantified. The absence of geostatistical analysis has limited our understanding of whether, and how, misinformation aligns with specific geographic, socio-political, or climatic contexts. Third, there is no established methodology for the systematic integration of heterogeneous data streams—including sensor-based climate data, geopolitical mapping, and textual misinformation content—into a coherent analytical workflow that could support policy-relevant insights.

The initial phase of the project concentrates on gathering and analysing stakeholder needs. Through participatory research involving participants across the UK, France, Czech Republic, and Lithuania, the study engages with a range of actors including policymakers, civil society representatives, fact-checkers, media analysts, and environmental researchers. A combination of qualitative interviews, co-design workshops, and thematic mapping is being used to capture how these stakeholders understand, monitor, and respond to climate misinformation, and what functionalities they would require from a future GIS-based tool. Particular emphasis is placed on the importance of designing any future system in alignment with existing stakeholder practices, regulatory frameworks (such as the EU AI Act), and ethical considerations concerning misinformation surveillance. This contribution serves as a foundation for future empirical and technical work and aims to stimulate cross-disciplinary dialogue on how spatial thinking and GIS can contribute to more effective monitoring of climate-related misinformation.

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