

Vision Statement

Why Your Climate Change Map Can Never be Right

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ABSTRACT: Climate maps are some of the most contentious of maps. They seem to spark a visceral response in their readers, either in favor of or in opposition to their message. There are many reasons for these maps, in particular, to find universal acceptance so difficult. In this paper, I explore the reasons why it is so difficult to gain consensus on climate maps, and I suggest that there are maps of other subjects that have equal difficulties. Knowing what the hurdles to climate mapping are, and what some of the ways to jump over them are, may help climate mappers, and others, to overcome the oppositions, in advance, of their cartographic endeavors.

KEYWORDS: *climate change, map, scientific communication, cartography, GIS*

Introduction

Any cartographer will tell you – there are just some things that are hard to map. It might be because it is an abstract concept – like happiness or freedom. Abstract or subjective concepts do not have clear spatial boundaries. How do you put emotions, cultural identity, social dynamics, political ideologies, and belief systems on a map? Complex human experiences, perceptions, and interactions are difficult to represent through geographic coordinates or spatial data.

It might be because you need to map something, but you can't show its location – like archeological sites or, when I was in college, spotted owl nesting sites. These kinds of things have known locations which are often stored in reputable GIS databases but disclosing their locations may make them targets for damage or destruction. Some nefarious folks may want to raid archeological sites for artifacts for collection or sale. Spotted owl nesting sites might be destroyed so that the area no longer needs to be protected and logging operations can proceed.

It might be because there isn't any definitive data – like human trafficking or organized crime. The data for things of a covert or clandestine nature are often not from well-known, authoritative sources, like the Census Bureau or the USGS. And like archaeological sites, you don't want to map individual features (people) because that may at the least invade their privacy or at the worst put them in harm's way. The traffickers often operate under the radar, and the victims are often hidden. Victims may not want to report their situation for fear of being re-discovered by the traffickers, they may not identify as victims and instead blame themselves for their situation, or they may not want to come forward because they feel ashamed. And the data recorders may not be able to verify claims or don't classify something as a crime.

It might be because it is something that people have a predetermined, sometimes visceral, reaction to – like abortion or a reaction to a politician. Even the terminology can be problematic – is the issue about pro-life/pro-choice or anti-abortion/abortion or pro-fetal

rights? Will the map readers be more inclined to look at the map if you use one set of terms versus another? If the map paints a favorable picture for one side of the issue, people who agree with the other side are sure to oppose it or at the least disregard it.

It might be because the science behind the map is difficult to understand and even more difficult to communicate. Climate change maps fall into this category, and maybe some of the previous ones as well, as we will see. Smith et al., 1992). To quote Smith, “cartography is great fun” (Smith, 1997, p. 187). Use the “et al.” form for more than two authors.

Challenges in Mapping Climate Change

Mapping climate change is challenging for several reasons.

Scientific Understanding

Climate change is a complex scientific phenomenon that involves the study of various factors such as greenhouse gas emissions, temperature changes, sea level rise, and extreme weather events. Different individuals may have varying levels of scientific understanding, which can influence their interpretation of climate change data and maps. A number of factors contribute to the intricacies of understanding climate change, much less trying to communicate about it:

- **Scale and complexity:** Climate change operates at various scales, from global to regional and local. It involves complex interactions between the atmosphere, oceans, land, and human activities. Mapping this complexity requires data and models that are difficult to explain.
- **Data availability and quality:** Climate change data, such as temperature, precipitation, and greenhouse gas emissions, may not be uniformly available or of consistent quality across different regions. Gaps in data can make it challenging to create accurate and reliable maps.
- **Uncertainties and projections:** Climate change involves future projections and uncertainties. Predicting future climate patterns and their impacts on different regions
- **requires sophisticated models and assumptions, which can introduce uncertainties into the mapping process.**
- **Interdisciplinary nature:** Mapping climate change requires expertise from various disciplines, including meteorology, climatology, geospatial analysis, and data science. Coordinating and integrating knowledge from these diverse fields can be challenging.
- **Dynamic and evolving nature:** Climate change is an ongoing process, and its impacts can change over time. Continuous monitoring, updating, and refining of maps are necessary to capture the evolving nature of climate change.

But scientific understanding is not the only thing that hinders climate change mapping.

Political Beliefs

Climate change has become a politically charged topic, with differing opinions and beliefs across the political spectrum. People's political affiliations and ideologies can shape their views on climate change and their acceptance of climate change maps. Some may be more inclined to accept the scientific consensus, while others may be skeptical or deny the existence of climate change altogether.

Economic Interests

Climate change mitigation measures often require significant changes in industries and economies. Some individuals or groups may resist accepting climate change maps if they perceive that the maps could negatively impact their economic interests. This can lead to skepticism or denial of climate change and a reluctance to agree with the information presented in climate change maps.

Media Influence

The media plays a crucial role in shaping public opinion on climate change. The way climate change is portrayed in the media can influence people's perceptions and acceptance of climate change maps. Media bias, misinformation, or the amplification of dissenting voices can contribute to confusion and disagreement among the public.

Cultural and Social Factors

Cultural and social factors can also influence people's acceptance of climate change maps. Beliefs, values, and norms within a particular community or society can shape individuals' attitudes towards climate change. Cultural differences, social mores, and the influence of social networks can all impact the level of agreement or disagreement with climate change maps.

Impacts on Climate Maps and Mapping

As a result, it would be difficult or impossible to get everyone to agree on your climate change map. While you might think it's right, someone will think it's wrong.

What can you do?

It's important to address the challenges and engage in open and respectful dialogue to foster understanding and consensus on climate change. Providing clear and accessible information, promoting scientific literacy, and encouraging public participation can help bridge the gaps and increase agreement on climate change maps. For example, climate-analog mapping repackages the data about climate change into something more personal and understandable as it compares the climate of one place to another.. "The idea is to translate global forecasts into something that's less remote, less abstract, that's more psychologically local and relevant," says University of Maryland Center for Environmental Science ecologist Matt Fitzpatrick, lead author on a new paper in Nature Communications describing the system.

Additionally, advancements in satellite technology, remote sensing, and geospatial analysis techniques have significantly improved our ability to map and monitor climate change. These tools help us track changes in temperature, sea-level rise, ice cover, and other indicators, contributing to a better understanding of the Earth's changing climate. Maps of these indicators can offer evidence that is difficult to refute even in the face of personal, economic, political, or social opposition.

But in the end, you may end up doing what other cartographers would. Carefully consider the ethical and moral reasons for your decisions, do the best you can, and be able to live with yourself afterwards. Sometimes this means admitting it is not the best but that it's good enough. Sometimes it means skipping steps, for example in the data checking process. Sometimes it means bending or breaking the rules, with justification. Sometimes it means saying no outright and dealing with the consequences.

References

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