Knowing climate as a social-ecological-atmospheric construct

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ABSTRACT

Climate perception, broadly construed, can include interpretations of experienced climate, beliefs about how climate works or changes, attitudes about climate issues such as the human role in climate change, and even climate preferences. The recent literature has stressed three main themes: attitudes and beliefs about anthropogenic climate change, climate literacy, and experienced knowledge of climate change. This study focuses on how people come to “know” climate, not just climate change, in a more fundamental way. To discern the structure of these knowledges we conducted semi-structured interviews of residents of a basin in the U.S. Rocky Mountains whose livelihoods and avocations bring them in routine contact with weather, climate, and landscape. Analysis of their climate knowledge in three categories, features, processes, and benchmarks, and placed in perspective of previous research on climate knowledges, yielded three findings. 1) People often focus on climate-related proxies that might be disregarded as tangential within narrow definitions of climate. 2) People use rubrics to structure climate knowledge, they understand climate as relational and connected. 3) Climate knowledge does not isolate individual climate elements, but accentuates the complex way that many processes together constitute climate. These findings reveal that, for our interviewees, climate is a social-ecological-atmospheric construct. This has both theoretical and methodological implications for future research on climate perception and illuminates the challenge of linking perception to effective mitigation and adaptation.

1. Introduction

The Pew Research Center reported that in 2016 only 48% of Americans believed that global warming was occurring due to human activity (Funk and Kennedy, 2016). This was only one example of a number of surveys meant to assess Americans’ perceptions of climate change (Borick et al., 2010; Pugliese and Ray, 2011; Kohut et al., 2011; Leiserowitz et al., 2017). The notion that roughly half of Americans do not accept the scientific consensus on global warming circulates through communities of scholars, activists, and practitioners and is discussed in research, policy, and the media (Leiserowitz, 2006; Harris, 2011; Kahan et al., 2012).

The reported disparity between scientists and the public has motivated a range of studies. Several large-scale surveys have probed variables that might influence public perception, and specifically climate change skepticism, and have found a number of different correlations ranging from livelihood (Arbuckle et al., 2013), to political affiliation (Dunlap and McCright, 2008), to gender (Sundblad et al., 2007; Israel and Sachs, 2013), to political attitudes about solutions (Leiserowitz, 2006), to distrust of science (Kahan et al., 2012). Others scholars have interpreted global warming skepticism as a lack of knowledge about climate processes and climate change. However, the inference from beliefs about climate change to climate illiteracy over-simplifies the idea of climate knowledges, and may distort our understanding of how people perceive climate differently and why.

Less attention is given to questions that push beyond beliefs about climate change or scientifically-accurate knowledge of climate processes to focus on how people understand their climate in its multifarious nature. Yet, climate knowledge is at the foundation of social dimensions of climate and permeates other studies of attitudes and actions. A person’s understanding of climate—how it works, what elements are important, what counts as climate—will undoubtedly shape how they understand and respond to climate change (Hulme, 2009, 2017). Understanding climate knowledge is important for understanding climate change knowledge and may not be captured in climate change belief or literacy surveys, that can fail to capture how climate and climate change are known.

The purpose of this study is to examine climate knowledges in depth to understand their content and structure. People interact with weather and climate on a daily basis (Hulme, 2017), and researchers using qualitative methods and critical theories can ask how individuals understand and know climate change as a product of their experiences.
with place (Brace and Geoghegan, 2011; Rice et al., 2015). Inasmuch as our inquiry is concerned with climate change, it is about how people understand climate change rather than if they believe in it. We approach this by interviewing people with climate knowledge produced through rich experiences with local weather, climate, and their manifestations through the behavior and quality of natural resources to which their livelihoods and avocations connect.

This research can help expand the way we understand local knowledge and perceptions of climate and may challenge, or at least problematize, previous claims about climate skepticism. Better understanding the character of climate knowledge can improve conclusions about why people hold particular beliefs about climate. This analysis may provide further insight into previous interpretations of public perceptions of climate and highlight how local climate knowledge may fail to meet climate literacy tests, but still reflect a robust and intricate understanding of local climate. In this paper, we first describe the scholarship of different approaches to climate perception. Then we highlight three key findings from our fieldwork in Colorado’s Gunnison Basin on how people know climate through everyday experience. Lastly, we explore how these findings provide alternative interpretations of the claims produced through literacy and belief surveys.

2. Climate perceptions: attitudes, literacy and knowledges

Climate perception, broadly construed, can include interpretations of experienced weather and climate (and, indeed, the distinction between weather and climate), beliefs about how climate works or changes, attitudes about climate issues such as the human role in climate change, and even climate preferences. We divide the study of climate perception is broadly into three approaches. First, large, regional or national-scale surveys provide longitudinal data on changing beliefs and attitudes about climate change, and examine possible influences of those beliefs on mitigation and adaptation policy. Second, in response to what many interpret as a misinformed or scientifically-illiterate public, attention is given to measuring the public’s climate literacy and to devising better science communication. A third approach explores local experience and knowledge of climate at the community and individual scale. The third and third approaches have tended recently to focus on anthropogenic climate change, while the second is more agnostic and explores both climate and climate change, and in some cases the perceived connections between weather and climate. All three areas of research are important to understanding the social dimensions of climate, but each frames the problem in a different way.

2.1. Climate change attitudes and beliefs

The major thread of climate perception scholarship in recent research focuses on beliefs and attitudes about anthropogenic climate change, largely in an attempt to assess whether lay communities are skeptical of global warming and its proposed solutions (Capstick and Pidgeon, 2014). Large-scale surveys correlate climate change belief and skepticism with demographics (Poortinga et al., 2011), political affiliation (Saleh et al., 2012), personal experience of climate (Brody et al., 2008; Whitmarsh, 2008; Spence et al., 2011; Kaufmann et al., 2017), accuracy of educated populations’ knowledge of climate change science and trends (Reynolds et al., 2010), and differences among countries (Lorenzoni et al., 2006). While such studies differ in how they explain skepticism (Whitmarsh, 2008; Capstick and Pidgeon, 2014), complicating comparison of results, they broadly find that a large portion of the general public is skeptical of anthropogenic global warming.

Many of these studies point to political affiliation as among the most important factors in determining attitudes and beliefs about anthropogenic climate change. Thus even long-term (Leiserowitz et al., 2017) studies providing longitudinal data about changes in beliefs and attitudes may reflect the political connotations of the term climate change. These studies report that Republicans (people with conservative ideology) in the United States are more skeptical of climate change than Democrats (people with liberal ideology) or Independents, at least partly because they are skeptical of the solutions posed (e.g., renewable energy systems) and the policies imposed to fix the problem. This would suggest levels of skepticism would be higher in a conservative state like Arizona, yet a study at the University of Arizona that posed a broader set of climate questions (http://www.environment.arizona.edu/climate-survey) found that a majority (74%) of the state’s residents believe that world temperatures are increasing, with 78% of those respondents attributing that trend at least partially to human activity. This case shows how new dimensions emerge that move beyond clear categories of skeptic and believer when different elements of climate are incorporated, and perhaps indicate the limitation of attitude surveys to reveal climate knowledge.

2.2. Climate literacy

This thread of research is in part propelled by the findings of attitude and belief surveys and focuses on how well laypeople understand processes and features of climate as defined by climate science. Climate literacy is a growing theme in earth science and science education; it was the subject of a special issue of Physical Geography (Dupigny-Giroux, 2008). The field is still taking shape and even the definition of climate literacy has not been uniformly established with some papers describing it as knowledge of climate science (Niepold et al., 2007), and others more broadly as “understanding your influence on climate and climate’s influence on you and society” (’Climate Literacy’, 2009, p. 4).

While there are overlaps between climate literacy and attitudes and beliefs, key differences make literacy a distinct research and applications area. First, climate literacy studies are more often conducted by climate scientists themselves. This means that the work is less anchored in behavioral, cognitive, and social framings. Second, climate literacy is focused on processes of climate and climate change, rather than attitudes about climate change. Third, this line of research takes a normative stance. It approaches the issue of climate knowledge with the stated goal of testing and then increasing climate literacy, and argues that climate literacy is a “critical skill” (Dupigny-Giroux, 2010, p. 1203), and “is needed for planetary citizens” (Harrington, 2008, p. 575), with scientists describing the work as a “quest to achieve literacy” (p. 483) motivated by “fervent hope” (p. 485) that a climate-literate citizenry will better respond to the threat of global warming (Dupigny-Giroux, 2008).

Climate literacy also departs from the study of climate knowledges, even though the two bodies of literature occasionally use similar language. The study of climate literacy tests public knowledge against a “correct” scientific answer and thus casts, implicitly or explicitly, knowledge departing from science as “wrong.” For example, Dupigny-Giroux (2008) differentiated somewhat confusingly between “actual knowledge” and “perceived knowledge” (p. 485), the former defined as knowledge that comported with scientific understanding of climate. In many ways, this body of scholarship looks more for an absence of knowledge than a presence of it, and embraces a hierarchical understanding of knowledge rooted in the scientific method; it is less concerned with cognition than understanding science and effective communication. While the “climate knowledge deficit” interpretation has been largely debunked by social scientists (Rudik-Gould, 2012), it has remained current among climate scientists and science educators and continues to spur calls for better climate communication to increase “climate literacy,” or scientifically accurate understanding of climate.

2.3. Climate knowledges

Climate knowledges scholarship seeks to understand not only if people understand climate as a scientific element and/or believe in climate change, but how they understand this subtle and pervasive
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