MAKING THE CLIMATE A PART OF THE HUMAN WORLD

BY SIMON D. DONNER

Ongoing public uncertainty about climate change may be rooted in a perceived conflict between the scientific evidence for a human role in the climate and a common belief that the weather and climate are controlled by higher powers.

Twenty years after the publication of the first Intergovernmental Panel on Climate Change report, the scientific community continues to struggle to convey the evidence for anthropogenic climate change and the argument for mitigation and adaptation. Uncertainty about climate change persists among the general public, particularly in North America (Pew Research Center 2009), despite repeated consensus statements by leading scientific organizations and groups of the world's leading scientists. In the past few years, public understanding of climate change has itself evolved into an entire subfield of research (e.g., Hulme 2009). Lingering public doubts about the basic science of anthropogenic climate change have been attributed to a wide variety of factors, including organized efforts at promoting "skepticism" (Oreskes and Conway 2010), political affiliations (Dunlap and McCright 2008), and cognitive biases (Weber 2010).

The lingering public uncertainty about anthropogenic climate change may be rooted in an important but largely unrecognized conflict between climate science and some long-held beliefs. In many cultures, the weather and climate have historically been viewed as too vast and too grand to be directly influenced by people. The structure of most agricultural societies is rooted partially in the belief that humans manage the land and the gods manage the weather (Fagan 2003; Burroughs 2005). Divine control of weather and climate is enshrined in many ancient and modern belief systems, including the Semitic religions, Eastern polytheistic religions, and some indigenous animist traditions around the world (e.g., Williams 1998). Examples of higher powers asserting control over the weather and climate are found throughout ancient and modern religious texts, including the Old Testament of the Bible (Fig. 1). In these belief systems, humans may indirectly influence the climate through communication with the divine, but they cannot directly influence the climate.

Skepticism about anthropogenic climate change may therefore be reasonable when viewed through the lens of religion or the lens of history. To create a lasting public understanding of anthropogenic climate change, scientists and educators need to

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The abstract for this article can be found in this issue, following the table of contents.
DOI:10.1175/2011BAMS3219.1

In final form 28 June 2011

Then the Lord answered Job out of the storm. He said:

Do you know the laws of the heavens? Can you set up God's dominion over the earth? Can you raise your voice to the clouds and cover yourself with a flood of water?

Do you send the lightning bolts on their way? Do they report to you, "Here we are?"

Who endowed the heart with wisdom or gave understanding to the mind? Who has the wisdom to count the clouds? Who can tip over the water jars of the heavens when the dust becomes hard and the clods of earth stick together?

Job, 38:1, 33–37 (NIV)

Fig. 1. A passage from the Old Testament describing God's power over the weather and the sky [Book of Job, chapter 38, versus 1 and 33–37 (New International Version)].

appreciate that the very notion that humans can directly change the climate may conflict with beliefs that underpin the culture of the audience.

RELIGION AND CLIMATE. The prevalence of the human belief in divine control of the climate can be traced to the challenges faced by hunter-gatherers and early human societies. Early humans foremost required the skills to respond to immediate, local threats. There may have been an evolutionary advantage to believing that one can only affect the local environment. Regional or global patterns and trends in the environmental variables were not relevant to everyday survival (Hulme 2009).

With the development of agriculture, humans gained control of the land and became more dependent on the climate. Early city-states reliant on agricultural production in the surrounding lands were particularly vulnerable to droughts and floods (Fagan 2003). The weather god, who reigned supreme in early polytheistic belief systems, often emerged as the sole deity in later monotheistic religions; for example, the god "Yahweh" of the Old Testament has been traced to a weather god from a particular region of ancient Palestine (Neihr 1996).

In addition to physical infrastructure such as irrigation and food storage, city-states in Mesopotamia, Egypt, South America, and Mesoamerica developed complex rituals and religious infrastructure to enhance their resilience to climate variability. These activities and structures represented a means for people to indirectly influence the climate, which otherwise lay outside of the human realm (Fleming 2010). Leaders who could predict the coming rains or seasonal flood were perceived to be communicating with the divine (Fagan 2003). Contractual agreements between the people and the gods, with a set of responsibilities for each party, are depicted in religious art (Barber and Barber 2004). Prayers and sacrifices were used to prevent droughts and storms in many agricultural societies across the planet, from city-states in Mesoamerica and Mesopotamia (Fagan 2003) to the indigenous communities in the Pacific Islands (Williamson 1937). In these societies, failure of the annual rains or flood was perceived as punishment for inadequate sacrifices, sins, or a lack of devotion to the divine.

The ancient view of weather and climate is still apparent in modern behavior and language (e.g., the insurance term "act of God"). Scientific claims that human activity could influence the climate were restricted until the twentieth century to regional changes in temperature and rainfall due to the modification of the land surface (Boia 2005). Weather or climate engineering efforts over the past century were often expressed in religious language, as though humans were assuming a divine role (Fleming 2010). Some religious holidays observed in largely secular countries, such as Easter and Passover, draw directly from the ancient practice of praying for rain to nourish the soil or offering thanks for the water that provided a healthy harvest. Examples of communities who continue to interpret droughts, floods, and storms as divine acts can be found in parts of Papua New Guinea (Ellis 2003), the South Pacific (Donner 2007), Bangladesh (Schmuck 2000), and the United States (Paolisso 2003).

Though common, this belief that humans cannot directly influence the climate is not found in all cultures. Some agricultural societies, including several in the highlands of New Guinea, do not distinguish between human culture and nature (Strathern 1998). In such societies, the same word is often used (e.g., *vanua* in Fijian) to describe the land and the people that inhabit the land. These societies may include individuals who are believed to possess the magical powers necessary to command the weather (Fleming 2010). Alternatively, these societies may view the integrated human–nature realm as distinct from the sky, similar to the distinction in the Semitic religions. The practice of praying for the rains during the cultivation

season in the Pacific Islands, such as Fiji, is one factor that unites the "new" religion of Christianity with the local pre-Christian animist belief system.

BELIEVING IN CLIMATE CHANGE. The belief that humans do not directly influence the climate is manifested in the present discourse on climate change in several ways. First, it leads to some of the extremes in public opinion. Polls find that evangelical or religious Americans are more unlikely to believe the planet is warming than the public at large, and even less likely to believe the warming is due to human activity (Pew Research Center 2009). Prominent conservative Christian political leaders in the United States, including Tom Delay, John Shimkus, and James Inhofe, have publicly questioned climate science on the basis that it is "arrogant" to think that humans can change the climate (e.g., McCammack 2007). Many residents of the atoll nations of Kiribati and Tuvalu doubt that human-included climate change could raise sea levels because, in the Book of Genesis, God promised Noah to never flood Earth again (Donner 2007; Mortreux and Barnett 2009). Even in secular communities, a broad sense that forces beyond humans control the climate may partly explain the persistence of the argument that natural forcings, such as solar activity, are the primary cause of observed twentieth-century climate change despite overwhelming scientific evidence to the contrary.

At the other end of the spectrum of the public discourse, climate change is often perceived as a punishment for sins against God or nature (Hulme 2009). In this view, humans have inspired climate change by committing immoral actions that warrant a harsh response either from the divine powers or from the integrated human–nature system. For example, some religious and environmental activist groups present climate change in apocalyptic frames (Swyngedouw 2010). These activists may approach climate change with religious fervor out of a sense that changing the climate is akin to losing Eden or betraying the "last stronghold of Nature" (Hulme 2010, p. 118). Although literature from the more "radical" environmental groups may not refer specifically to religion, the rhetoric reveals a concern that humans have disrupted the natural order and will suffer the consequences (Dunlap 2004).

Finally, the pervasive nature of the belief that humans cannot directly influence the climate may limit the confidence of the segment of the public who provisionally accept that human activity is changing the climate. The lack of conviction in people's acceptance of the science of anthropogenic climate change is typically not captured by opinion polls (Krosnick et al. 2006). Recent swings in public opinion (Pew Research Center 2009; Leiserowitz et al. 2010) suggest that a measurable portion of the population who at one time provided a positive answer to questions like "Is global warming happening" and "Is human activity responsible for global warming?" in fact lacked conviction in those attitudes. For this portion of the public, the belief that human activity is causing climate change is weak enough to be threatened by unseasonably cool weather or other current events. Underlying doubts that human activity can influence the climate may explain some of the malleability of public opinion about the scientific evidence for climate change. It may also have an indirect influence on motivation for action to address climate change, which is a value judgment based on a number of variables, including the scientific evidence for a human role in climate change.

There are important counterexamples in which religious groups have expressed concern about the effects of human activity on the climate. Most notably, a movement within the U.S. Christian evangelical community urges action to reduce greenhouse gas emissions based on the Biblical concept of stewardship, as well as intergenerational equity and social justice (e.g., ECI 2006). The effect of this movement on the public understanding of climate change in the United States is unclear (McCammack 2007). Attitudes about climate change among evangelical Americans may be influenced more by support for conservative politicians and by the evangelical organizations urging the rejection of climate science and climate action based on the Biblical notion of "dominion" over Earth (e.g., Beisner et al. 2006) than by the stewardship movement.

REFORMING CLIMATE CHANGE EDUCATION AND OUTREACH. In light of the recent public scandals about climate science, there have been many calls for scientists to engage the public using different voices and frames (Jasanoff 2010; Nisbet et al. 2010). Scientists often mistakenly assume that public reluctance to take action on issues such as climate change is primarily rooted in a lack of available information (Bubela et al. 2009). Culture affects the way an audience receives information and is critical to engaging the public on controversial scientific issues (Nisbet and Mooney 2007). The emotional or affective response to information about a risk may be valued more in decision making than the cognitive or rational response (Loewenstein et al. 2001). Therefore, an audience can learn more easily or more

rapidly from personal or cultural experience than from numerical or statistical evidence, which require greater interpretative skills and effort (McCaffery and Buhr 2008; Weber 2010). For example, if embracing scientific evidence has implications for behavior and policy choices, some audiences may reasonably choose to reject either the evidence or the authority of the source in favor of past cultural or religious knowledge (Stolberg 2010).

Climate change outreach efforts need to address the perceived conflict between the scientific evidence and deeply ingrained cultural perceptions of climate. First, the development of human beliefs about climate should be added to educational materials and lesson plans. Existing education and outreach efforts rarely acknowledge any thinking about climate or climate change prior to the Arrhenius (1896) study on atmospheric carbon dioxide and temperature. For example, none of the top 50 climate change information Web sites maintained by intergovernmental bodies, governments, and nongovernmental organizations mentions historical or religious perspectives on weather, climate, or climate change (Table 1). The historical and religious context is also missing from the pedagogical philosophy and the materials of the emerging "climate literacy" movement (e.g., NOAA 2009)

Second, educators and scientists should take lessons from approaches used in the teaching of evolution, another subject in which science can appear to conflict with preexisting beliefs. Pedagogical research on evolution finds that providing people with opportunities to evaluate how their culture or beliefs affect their willingness to accept scientific evidence is more effective than attempting to separate scientific views from religious or cultural views (Stolberg 2010). One approach is to hold interactive dialogues or forums, in which the audience, as well as the climate experts, has the opportunity to discuss and voice preexisting doubts about human influence on the climate. Another broader approach is to develop material that directly reconciles perceived areas of conflict between religious beliefs and scientific evidence. For example, literature distributed to religious leaders by the Pacific Council on Churches specifically addresses the perceived conflict between belief in God's covenant with Noah and the evidence for sea level rise (Pacific Council of Churches 2010). Such clear and direct explanations are missing from the "climate literacy" literature (McCaffery and Buhr 2008) and from the educational literature distributed by U.S. evangelical organizations promoting climate action (ECI 2006).

CONCLUSIONS. Reforming public communication about anthropogenic climate change will require humility on the part of scientists and educators. Climate scientists, for whom any inherent doubts about the possible extent of human influence on the climate were overcome by years of training in physics and chemistry of the climate system, need to accept that there are rational cultural, religious, and historical reasons why the public may fail to believe that anthropogenic climate change is real, let alone that it warrants a policy response. It is unreasonable to expect a lay audience, not armed with the same analytical tools as scientists, to develop lasting acceptance during a 1-h public seminar of a scientific conclusion that runs counter to thousands of years of human belief. Without addressing the common long-standing belief that human activity cannot directly influence the climate, public acceptance of climate change and public engagement on climate solutions

Table 1. Top climate-change information Web sites, all of which contain no information on religious or historical perspectives on weather and climate. The sites were found with Google using the search terms "climate change." The first 50 responses belonging to intergovernmental organizations (e.g., United Nations organizations), city, state, or national governments, or nongovernmental organizations that contain educational material about climate change were employed in the analysis.

Category	Examples	No.
Government	U.S. Global Change Research Program; U.S. Environmental Protection Agency (EPA); Met Office	24
Nongovernmental organization	Union of Concerned Scientists; 350.org; Environmental Defense Fund	16
International organizations	United Nations Environment Programme; World Meteorological Organization	6
Educational institutions	University Corporation for Atmospheric Research; Woods Hole Oceanographic Institution	4

will not persist through the next cold winter or the next economic meltdown.

ACKNOWLEDGMENTS. The author thanks M. Oppenheimer and three anonymous reviewers for their helpful comments on earlier drafts of the manuscript. The author also thanks C. Kleinschmidt for research assistance. This research is funded by a Discovery Grant from the Natural Sciences and Engineering Research Council of Canada.

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