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# Historical geography III: Climate matters

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**Abstract**
My third report covering recent research in historical geography focuses on climate, and particularly scholarship that explores how the meaning of climate and climate change varies in distinct cultural and temporal contexts. Viewing climate science, and more specifically interpretations of climate science, as a discourse amenable to cultural criticism suggests that notions of climate are and have always been a physical and social phenomenon. Reviewed research suggests that ideas of climate and climate change are intertwined with social mores, politics and institutions, philosophies of civilization and progress, and inseparable from the cultural expressions that give them meaning and, thus, are far too important to be left to climate scientists to narrate or interpret.

**Keywords**
climate, climate change, climate discourse, cultures of climate, historical geography

## I Introduction

Climate matters. This was certainly the case for the Mongols and their subjects. Scholars once speculated that prolonged drought inspired the Mongols to conquer their neighbors, but new climate histories suggest the opposite. Tree ring data now indicate that during the 20-year period between 1211 and 1230 C.E. – corresponding with the expansionist heyday of Genghis Khan (Chinggis Khaan) – Mongolia enjoyed warm temperatures and more rainfall than at any point in the previous 900 years (Hvistendahl, 2012). A warmer and wetter Steppe provided a banquet for Mongolian horses, an opportune moment for the son of a concubine to rise up, unite nomadic tribes, and create the world's largest land-based empire. Although Hvistendahl ends her article with a sentence crediting Chinggis and his army with their success, her story essentially overturns one climate-determinist tale with another. But the pendulum swings both ways. Preindustrial peoples also had the power to impact their climate. A study by Nevle et al. (2011) suggests that the demographic collapse associated with the Columbian voyages during the 16th century created a widespread slowdown in biomass burning as well as high rates of reforestation across the Americas, and especially in the Neotropics. The resultant biogeography, they posit, explains the rapid decline in atmospheric $CO_2$ concentration and contributed to the so-called Little Ice Age (see also Dull et al., 2010). These studies are fascinating and illustrate why knowing something about climate and climate change

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matters. Yet none of these sorts of studies tells us how climate or climate change was conceptualized by those who experienced it. Would it not be nice to know what concepts the Mongols used to comprehend seasonal variability in rainfall, or if they understood a relationship between climate and culture, especially among the peoples and lands they conquered? And what about the peoples of the Atlantic World? What did they make of the Little Ice Age? To be fair, scholarship has addressed some of these issues, but these are the sorts of climate matters – scholarship that seeks to reculture climate and contemporaneous meanings ascribed to climate and climate change – that form the principal focus of my third progress report summarizing recent work in historical geography (Offen, 2012, 2013).

Climate also matters to historical geographers. As I write this, two of the top five most downloaded articles from the *Journal of Historical Geography*, according to the Elsevier website www.journals.elsevier.com/journal-of-historical-geography, relate to climate change. One of them, Diana Liverman's 'Conventions of climate change' (2009), has been among the top downloads since its publication as part of the special issue 'Narratives of climate change' (Daniels and Endfield, 2009). Another article from the same collection remains in the top ten (Bravo, 2009). This suggests that historical geographers are truly interested in 'narratives of climate change', or that others consulting the subfield's leading journal do so for its analysis of such narratives, or both. The answer is likely both. Over the last five years a number of journals read by historical geographers have devoted special issues to reframing climate and climate change as a discourse amenable to cultural and geographical analysis. Endfield and Morris (2012a) edited a special issue of *Climatic Change* titled 'Cultural spaces of climate'. Lamenting that scientific discourse is de facto authorized to frame climate and climate change and their respective meanings, the editors set out to present papers that illuminate the culturally specific and the spatially and temporally contingent dimensions of climate and its various meanings (see also Livingstone, 2012). They seek 'to identify ways to re-particularise climate change discourses, to explore the meaning of climate and weather for different groups at different points in time and to question the ontological status of climate' (Endfield and Morris, 2012a: 2). The History of Science Society devoted a lengthy issue of their journal *Orisis* to 'Revisiting *Klima*' (Fleming and Janković, 2011). Contributors to the issue seek to revive the multivocal and inclusive understanding of the ancient Greek term *Klima* and its relationship to medical, geographical, agricultural, economic, racial, and other concerns. More specifically, the editors seek to decouple *Klima* from its current exclusive association with statistical averages and the atmospheric sciences. On the whole, the collection asks what is climate, exactly, and what does the concept seek to explain when it is invoked (Fleming and Janković, 2011)? At least three recent journal special issues explore ideas of climate with respect to indigenous peoples (Aporta et al., 2011; Green and Raygorodetsky, 2010; Salick and Ross, 2009). Meanwhile, the special issue of the *Annals of the Association of American Geographers* titled 'Geographical Perspectives on Climate Change' devoted very little attention to the revival of cultural approaches to the study of climate (Aspinall, 2010). In contrast, the relatively new journal *Wiley Interdisciplinary Reviews: Climate Change* (cited as *WIREs Climate Change*), edited by Mike Hulme, seeks to bring the humanities and social sciences into dialogue with the physical and life sciences so that we can gain a wider perspective on how climate and climate change are understood, analysed, and contested around the world. Two recent review pieces therein do particularly well in historicizing the evolution and use of climate ideas and knowledge (Carey, 2012; Heymann, 2010).

Treating climate change as a discourse amenable to cultural critique does not mean scholars

pursuing this line of reasoning doubt that climate change is 'real' or that many real people will not be adversely affected. Instead, these scholars question how the topic is framed, the implicit assumptions being made, the de-politicization of knowledge production and interpretation, and how new climate futures can be imagined by reconceptualizing the past (see DeSilvey et al., 2011; Hamblyn, 2009; Hulme, 2009; O'Neill et al., 2010). As with all science, climate science does not speak for itself, it is always interpreted and, therefore, simultaneously political and cultural. Recognizing this, and opening spaces for humanistic scholarship on climate and climate change, thus, seeks to complicate climate discourses and inspire new social understandings, criticisms, and practices (see Howe, 2011; Sabin, 2010). Some scholars aim their critique of climate change discourse squarely at a capitalist system that on the one hand demands the unending economic growth that drives climate change, while on the other hand obscures the uneven landscapes of human vulnerability that the system largely created, all the while supporting technical fixes that commodify the atmosphere and address neither the drivers of climate change nor those most vulnerable to its effects (Liverman, 2009; see also Cupples, 2012; Head and Gibson, 2012; Parenti, 2011). In his critique of climate discourse, Wainwright (2010) points out that our understanding of the physical processes producing climate change has outrun our explanations of the social processes driving them. For Wainwright, a capitalist world-view and its control of the terms even used to discuss the parameters of climate change are 'incompatible with an effective global response to climate change' (p. 988). Other scholarly critiques of contemporary climate discourses have emerged around schemes of elite intervention and pie-in-the-sky geo-engineering strategies (Fleming, 2006, 2010; Fleming et al., 2006), statistical manipulation and the benchmark constructions of 'normal' climates (Hulme, 2009; Hulme et al., 2009), and the continued separation of people from nature as evident by our use of concepts such as 'anthropogenic climate change' or the Anthropocene – since humans have long impacted nature and climate at global and geologic scales (Chakrabarty, 2009; Sayre, 2012).

Other critiques center on the neo-environmentalist and determinist arguments that often frame the entire discussion of climate change (Hulme, 2011; Radcliffe et al., 2010). The way in which climate discourse turns over explanatory power to the biophysical sphere as determining human behavior and culture seems to be re-emerging without the benefit of more than a half-century of research to the contrary. For Hulme (2011), the re-emergence of a climate determinism that explains the interaction between societies and their environments is a species of climate reductionism, 'a form of analysis and prediction in which climate is first extracted from the matrix of interdependencies that shape human life within the physical world' (p. 247). Once isolated, climate is 'then elevated to the role of dominant predictor variable' (p. 247). The danger for Hulme is that an overt form of neo-environmental determinism informs our predictive understanding of future climates and societies, and hence, human destiny (see also DeSilvey, 2012; DeSilvey et al., 2011). Climate change will surely not determine the future, but it will constrain and enable the choices that individuals, communities, and societies make, and this creates a lot of space for geographers to explore how climate matters, where, and for whom.

With these thoughts in mind, my paper reviews historical, geographical, and like-minded scholarship that falls into three non-exclusive thematic areas. The first particularizes climate experiences, often among place-specific peoples. A second grouping presents recent scholarship dealing with the ideas of, and cultural meanings associated with, climate and climate change in specific spatial-temporal or social contexts. A third assemblage examines the changing historical geographies attributed to climate change in specific places.

## II Climate and the human experience

The modern, scientific concept of climate might be an abstract statistical index, but it matters to people in unambiguous ways, in specific locales, and in particular instances (Crate, 2011; Endfield and Morris, 2012a; Janković and Barboza, 2009; Ulloa, 2011). Geographers and others have long understood that most peoples adjust and adapt to changing environmental conditions within socially sanctioned parameters and understandings based on cultural values, needs, and abilities – though often not under conditions of their own making (Birkenholtz, 2012; Butzer, 2012; Butzer and Endfield, 2012; Head, 2010). Following Barnett (2010), Geoghegan and Leyson (2012) take a cultural geography approach to understand how lay narratives of climate change are grounded in farming practices in the Lizard Peninsula in Cornwall, England. Their ethnographic work interprets farmer narratives in relation to 'structures of feeling and senses of place' (p. 56). They find that, although externally generated climate change discourses are ever-present, people construct their own understandings through local memories, observations, and conversations, and ground them in place through farming practices (see also Brace and Geoghegan, 2011; Crate, 2011; Head et al., 2011). Endfield seeks to build on findings like these to reculture and particularize climate narratives in order to have them resonate better with the public than the current, sterile metanarratives. She explores the writings of British meteorologist and geographer Gordon Manley whose work targeted popular audiences in the second half of the 20th century (Endfield, 2011). Manley's work studied climate through places, people, and their experiences with British weather. Endfield argues that Manley's approach has a lot to teach us today because he effectively communicated what intangible and statistical information does not. Endfield and Morris (2012b, 2012c) further explore how everyday people engage with and understand weather and climate information, participate in data collection, and form gendered identities through their activities.

Where research on the relationship between culture, climate, and place has excelled is among indigenous peoples, but this research does not always have direct links to the concerns of historical geographers (see Aporta et al., 2011; Green and Raygorodetsky, 2010; Leduc, 2011; Parker and Grossman, 2012; Salick and Ross, 2009). Rather than present indigenous peoples as helpless victims of changes outside of their control, these studies demonstrate the adaptive capacities of peoples already reliant on keen observation, time-tested (i.e. well-adapted) traditional knowledge, and risk-averse strategies. Salick and Ross (2009) specifically remind us that indigenous peoples have always been adapting to change, climatic and otherwise, but that their success has generally relied upon biological diversity, something that climate change is rapidly impacting, especially in high latitudinal and altitudinal locations. Research by Orlove et al. (2010) in southern Uganda reveals the multiple ways in which the farmers make sense of climate and weather, and also the social context in which these understandings come about. Their study finds four major components of a knowledge system: long-term familiarity with the seasonal patterns of precipitation and temperature; local and traditional climate indicators; observation; and information about seasonal change elsewhere in the region. In other studies the effects of climate change on indigenous peoples are difficult to disentangle from the impacts caused by political or economic changes: in short, negative impacts are often mutually reinforcing (Dinero, 2013; Lorimer, 2012; Sánchez-Cortés and Lazos Chavero, 2011).

Because the impacts of climate change are generally felt first at the poles, Arctic peoples and environments have received a lot of scholarly attention. A special issue of *The Canadian*

*Geographer* (Aporta et al., 2011) covers the impacts of climate change on sea ice and the Inuit, and contains several articles that may interest historical geographers. For example, Aporta and MacDonald (2011) analyze the oral accounts of an Inuit elder to show the wealth of knowledge about past climatic conditions contained therein, but also the difficulty in extracting those accounts from their specific social and environmental contexts. Still, the authors highlight the strengths of oral history and hold it up as an innovative example of using indigenous knowledge in pursuit of historical geographies. In a different take on the Arctic, Bravo (2009) finds that indigenous peoples' responses to climate change should be understood in relation to emerging notions of citizenship. Rather than passive recipients of a crisis narrative amenable to outsider intervention, Bravo (2009) finds that indigenous peoples are politically engaged actors confronting their challenges head on (see also Orlove et al., 2011). Sustained humanistic and geographical research among the Iñupiat people of Arctic Alaska by Sakakibara (2008, 2009, 2010, 2011a, 2011b) reveals how climate and associated environmental changes impact both whaling and the cultural practices associated with the annual whaling cycle, the year-round material and cultural activities that prepare for the annual hunts. But above all Sakakibara's work shows how the Iñupiat remember, cope with, narrate, and respond to climatic and environmental changes through culturally specific activities such as storytelling, dancing and drumming, political engagement, and the purposeful revitalization of traditions associated with being 'the people of the whales'. Collectively, her research tells a tale of cultural resiliency, but also of a vibrant humanity coping with an uncertain future. What all these indigenous and ethnographic studies implicitly reveal is that present activities responding to the impacts of climate change are steeped in knowledge of past geographies (see also DeSilvey et al., 2011).

Yet epistemic and ontological quandaries can and do present themselves when seeking to establish a dialogue between indigenous or local experiences on the one hand, and western science and discourses about climate change on the other (Peppler, 2010; Watson and Huntington, 2008). Indigenous peoples often understand weather, climate, and climate change through cosmological and religious beliefs that are not always compatible with linear conceptions of time (Yeh, 2009), for example, or relate environmental understandings in metaphorical terms (Huntington and Watson, 2012). Meanwhile, humanistic research among indigenous peoples can and often does produce understandings of climate and climate change that are incompatible with statistical findings of climate science (Yeh, 2013). It would belittle the significance of human diversity to desire that native ways of knowing and experiencing nature validate or somehow fit into western science, and yet these different ways of knowing, thinking about, and experiencing the world can and should contribute to policy formulations, especially those addressing climate change (see Green and Raygorodetsky, 2010).

## III Ideas and meanings of climate

Geographers and others have long written about the origins of ideas about weather, climate and climate change, and their contemporaneous meanings in different spatial-temporal and social contexts (e.g. Fleming, 1998; Glacken, 1967; Golinski, 2007; Kenny, 1995; Livingstone, 1994, 1999, 2002). Recent research builds upon this base and broadens locales, methods, and social contexts, and often makes a more explicit reference to contemporary narratives about climate change. Two recent works use literature to understand the meanings associated with climatic events. Hulme (2012) explores three different ways in which a single meteorological event – a heatwave in the county of Norfolk, England, in July of 1900 – is

interpreted. He compares L.P. Hartley's novel *The Go Between* (1953) with the world of late Victorian Norfolk and with the scientific world of climate sciences today. By showing the different meanings associated with each epistemic world, Hulme reveals how elusive a common interpretation about a single event can be in practice. His work problematizes the assumption that a single meaning can ever be associated with future climatic events. The relationship between meaning, literature, and past climatic events is also explored in the work of Griffiths and Salisbury (2013). Their paper analyzes the poetry of Guto'r Glyn, a leading Welsh poet of the medieval period, to gauge medieval Welsh society's perceptions of fluvial environments and how these perceptions influenced different cultural uses of river, wetland, and flood environments. The interpretative breadth and methodological scope of their project are truly broad. Guto's poems of compassion showcase innovative uses of fluvial landscapes, while culturally resonant toponyms constitute his writings and influence Welsh poets even today. More interesting still, however, is how Griffiths and Salisbury argue that, by revealing a society-nature relationship in the past in this way, future climatic floodplain impacts and adaptive strategies could be inferred.

Cushman (2011) explores the politics of Humboldtian science by retracing the explorer's intellectual influences in Europe and his practices in South America. Although the idea that human land use, such as forest clearing for agriculture, was capable of causing large-scale climatic change pre-dates Humboldt, Cushman argues that Humboldt and his disciples popularized the idea and gave it political heft. At the heart of Cushman's study is the way 'Humboldtian climatology sometimes wilfully marginalized or ignored other competing explanations for phenomena', including natural climatic cycles (Cushman, 2011: 23). Cushman argues that Humboldt's anti-colonial views led him to fit observations into a declensionist narrative, even along the arid Pacific coast of Peru. Through the adoption and diffusion of Humboldtian science, Cushman argues, the new and dominant idea of climate was cleansed of the qualitative and chorographical properties it once held. This was even true for descriptively inclined disciples of Humboldt whose own observations may have revealed something different, but who wanted to be associated with Humboldtian science. For their part, Janković and Hebbert (2012) examine the origin of the idea of the 'urban heat island', and argue that this pervasive form of anthropogenic climate change has been marginalized in climate change research. Built environments such as cities affect the scale at which climate is both experienced and modified by human activities. Although city planners began to consider urban microclimatologies in the 1950s, the idea has only recently caught the attention of the larger climate change research community.

Following on the work of Harrison (1997) and Kenny (1995), among others, Adamson (2012) seeks to reveal everyday experiences of weather and climate in western India in the 1820s through the examination of two colonial diaries. The colonial discourse about tropical climates at this time suggested that climate presented a barrier to European colonization, but also justified colonial rule. But these discourses were undergoing revision in large part due to James Johnson's influential book *The Influence of Tropical Climates on European Constitutions* (first published in 1813 but reprinted and expanded several times thereafter; Johnson, 1826). Johnson's study argued that, if Europeans took sensible and appropriate precautions, then the tropics posed no barrier to settlement or colonization. What Adamson finds is that:

> For the British to be inherently superior, it held that they must also be inherently 'different'. This precipitated a hardening of attitudes regarding climatic determinism: climate could no longer be derived as a cause of racial variability, as this implied that all races were essentially identical. (Adamson, 2012: 145)

Adamson thus seeks to scrutinize the diaries of a colonial governor and the wife of a Chief Justice to see how their contents either deviate from or reflect these broader colonial discourses. He finds that Hippocratic notions about the effects of climate on health are largely intact, but that the need to project 'racial' superiority in the face of expanding British territorial acquisitions – including the movement toward direct British rule in India – inspired Britons to mitigate the effects of tropical climate through temperance, altitudinal change, and mental exercise in order to maintain their perceived moral and mental superiority (see also Johnson, 1826; Livingstone, 2002). In short, a political context supporting the development of a discourse of racial superiority mutually constituted ideas about climate, as was evident in the writings of two very different individuals. Carey also examines colonial and Hippocratic notions of climate in the Caribbean, as well as the impacts of Johnson's *Influence of Tropical Climates*, but carries the changing ideas forward to the mid-20th century to reveal 'how science, medicine, and tourism changed tropical weather from deadly to healthy' (Carey, 2011: 129). Carey finds that even through the 18th century there was not universal consensus that tropical climates were unhealthy for Europeans – certainly every visitor to Barbados learns that George and Lawrence Washington travelled to the island in 1751 so that the latter could recover from a pulmonary condition by taking in the healthy tropical climes. Instead, Carey finds that interpretations about landscape and social conditions invariably influenced how writers described the healthfulness of an island's climate. By the late 19th century physicians and scientists began to provide major breakthroughs about disease transmission which changed perceptions about the tropics in general and the Caribbean in particular (see also Janković, 2010; McNeill, 2010: Chapter 8; Sutter, 2007). With the rise of tourism between 1850 and 1950, Caribbean climate became a commodity and the association between its climate and healthfulness was sealed.

At a fundamental level, ideas about, and narratives ascribing meanings to, climate and climate change are contested. Knowledge production about climate is rife with conflict, dissent and counter-narratives, and ongoing historical and geographical research consistently demonstrates this. In an interesting study that excavates an anonymous letter published in the *Philosophical Transactions* in 1676, Vogel (2011) shows that contemporaneous notions of anthropogenic climate change were subject to debate and that the concept of climate was linked to theories of landscape change and colonialism. During early English settlement in North America, settlers and their backers created a dominant discourse maintaining that the taming of savage nature through forest clearing and cultivation inevitably moderated climate for the better (see also Golinski, 2008). The narrative of 'amelioration through stewardship' was challenged by a letter writer from Dublin, who pointed out that Ireland's weather had also become more moderate despite a decrease in population and a subsequent decline in agriculture (Vogel, 2011: 112). Ireland's colonial experience is thereby offered as a counter-example to a discourse of 'commodious weather', with its twin meaning of healthy and useful for commodity production – a narrative both justifying and sustaining the colonial enterprise (p. 116). The study also reminds us that anthropogenic climate change was once interpreted as morally correct and inherently good.

Coen (2011) examines the interesting continental-imperial context of mountain climatology in Tyrol and western Turkestan. The comparative connection between the two regions was made by the Austrian meteorologist and mountaineer Heinrich von Flicker (1881–1957). At the heart of Coen's argument is that the globalization of knowledge did not necessarily mean scaling up from the periphery to the metropole (a la Humboldt), but horizontally

across scales, which made causal connections more continuous and intuitive (for the imperial context of Turkestan, see also Withers, 2013). The role of fieldwork in establishing a specific epistemic community forms the backbone of two publications by Sörlin (2009, 2011). Sörlin's studies examine the mid-20th-century work of Swedish glaciologist Hans Ahlmann, and how his diligent fieldwork measuring glacier melting in the Arctic helped to establish the authority of his theory of 'polar warming'. But Ahlmann's theory did not hold up against work by Stockholm meteorology then developing around research by Carl-Gustaf Rossby. Rossby's theory posited that heat-trapping greenhouse gases explained climate change, and this view ascended in scientific circles in direct proportion to the institutional support that it received (see also Bohn, 2011). The narratives investigated by Sörlin show 'the importance of broad science politics as well as local and disciplinary methods, traditions, and institutional trajectories in shaping attitudes among scientists to climate change' (Sörlin, 2009: 237; see also Dörries, 2011). Likewise, Howkins (2011) finds that changing perceptions about climate change since 1958 had an important impact on research agendas in and politics dealing with Antarctica. The result has been a consolidation of political power over the continent by the 'insider' nations of the Antarctic Treaty System signed in 1961. Again, science and politics are linked empirically to the interpretation of climate and climate change (Dörries, 2011; Howkins, 2011).

## IV Climate-society geographies

Although the works discussed above illustrate climate-society geographies, the studies grouped in this section seek to illustrate how past climate changes influenced specific historical and geographical developments in distinct regions. These recent works – which are only a small sample of those published in myriad journals, including those oriented toward scientific audiences – take us away from the realm of climate ideas and discourses to the impacts of both cumulative and cyclical climatic changes on historical geographies.

Scholars of Latin America have long considered the impact of climate on social, biophysical, and historical developments, whether the concern is colonial Mexico (Endfield, 2008), the Andes (Braun and Bezada, 2013; Carey, 2010; Carey et al., 2012; Mark et al., 2010), or extreme, cyclical, or El Niño events in the Caribbean (Carey, 2011; Gamble et al., 2010; McNeill, 2010; Mulcahy; 2006). As with the sweeping study of McNeill (2010; see notice of this work in Offen, 2012), Johnson's (2011) study *Climate and Catastrophe in Cuba and the Atlantic World in the Age of Revolution* demonstrates far-ranging causal relationships between social and climatic processes. Whether it was prolonged droughts associated with El Niño, or floods and high winds linked to La Niña cycles, agricultural and livestock production often declined in the Caribbean. If foodstuffs could not be imported, as was often the case, hunger and political instability generally followed. Relying on a range of archival and scientific sources, Johnson provides an excellent example of how climate cycles in Spanish, French, and English Caribbean colonies impacted political processes and historical geographies there in the second half of the 18th century. Gamble et al. (2010) find that Jamaican farmers are concerned about the increasing drought occurrence in St Elizabeth Parish, especially since 1990, and that this confirms climatic records. In their historical study of climate change and adaptation in the Peru's Cordillera Blanca, Carey et al. (2012) find that successful technological mitigation of tunnels and floodgates in the late 20th century created unintended consequences, as new stakeholders began to struggle over the control of water in ways previously not possible.

In a study linking climate and colonialism in western India (1840–1880), Hazareesingh

(2012) examines the transplantation of American cotton in Dharwar. He finds that the climate of Dharwar was not what British authorities had constructed it to be, and that people preferred their more adapted varieties of cotton in addition to staple food crops. By showing how climate impacted the social and technological processes in Dharwar, Hazareesingh reveals the fragility of colonial power in western India. Gergis et al. (2010) examine how weather and climatic factors influenced European settlement of Australia between 1788 and 1793. They chose these dates because particularly wet and cool weather existed between 1788 and 1790, which coincided with a La Niña cycle, while drought conditions took hold during the El Niño cycle of 1791–1793. In so doing, they compare textual sources with paleoclimatic records to reveal how water scarcity profoundly shaped the development of Australian society. Morgan (2011) likewise explores the impact of climate and aridity in southwestern Australia, but in the second half of the 20th century. Climate change and Zhou tribal relocations in early Chinese history is the subject of a paper by Huang and Su (2009). Nomadic invasions along the middle reaches of the Yellow River between 3500 and 2200 BP forced Zhou people to relocate, impacting successive dynasties. Their study argues that climate instability likely instigated environmental change in the Loess Plateau and spawned the invasions that led to subsequent Zhou migrations. Meanwhile, Xiao et al. (2013) find that climate change is a likely factor in the decline of an important autumn hunting ritual in Mulan, north China. The Mulan *Quixian* flourished during the first hundred years of the Qing dynasty (1683–1820) but declined thereafter. The hunt was an important imperial activity that helped to cement the alliance between the Manchus and the Mongols. Using historical documents, the authors argue that many political decisions made by the Qing court in the late 18th and early 19th centuries reflect an adaptation to climate change.

Sousa et al. (2010) analyze toponyms as evidence of climatic events in a wetland environment of southwestern Spain. Their quantitative study finds a reduction in hydronyms, revealing recent anthropogenic desiccation of the wetlands of the Doñana Natural Park, but also broader landscape changes since the Little Ice Age. They suggest that their method of toponymic reconstruction can be used as environmental indicators of climate change elsewhere in the world. For their part, Tiki et al. (2013) use an 'indigenous time-related framework' to reconstruct the impact of disasters associated with climatic events on the ancient *tula* well systems in southern Ethiopia from 1560 to 1950. Providing water to people and livestock, *tula* well systems have been at the center of land and life in the region for over 500 years. One of the things that make this study interesting is that known climatic events are used as proxy data to corroborate social memories anchored in an oral recording tradition, not the other way around.

## V Conclusion

As I write this paper, news outlets are atwitter with notice that the earth's atmosphere reached an average daily level of carbon dioxide equal to 400 parts per million, the highest amount known over the last three million years. While many commentators are lining up to tell us what this means for global climate change and what steps need to be taken now to avert devastating consequences, studies show that the public is not well informed about nor connected to the issue. Although Boykoff and Boykoff (2007) blame this reality on the bias of mass media trying to be 'balanced' in their coverage, the case could be made that neither scientific narratives nor doom-and-gloom scenarios provide culturally salient handles that people can readily grasp. Some of the research presented here suggests that people and communities are or can be engaged with weather and climate issues if discussions are rooted in place, presented in an

appropriate language, and/or conceptually linked to meanings that resonate culturally with people at local or community levels. Yet what many of the papers discussed herein suggest is that just the opposite is occurring, that the notion of climate is becoming increasingly both a physical and social process, and specifically a discourse mobilized to frame political issues (Hulme, 2009). Perhaps if we temper the notion of climate as statistical index with its older, relational, experiential, chorological, and descriptive meanings, we might reinvigorate public discussions of climate and climate change through humanistic approaches derived from distinct historical and geographical contexts.

Most of the papers here confirm that the meaning of climate or climate change is not, or should not, be the exclusive purview of science and its practitioners. Science is always interpreted and therefore falls into the realm of the social, cultural, and political. The notion that 'better science' leads to better policy would seem to ignore this fact. Just as climate and climate change need to be studied with scientific methods, so too should social sciences and the humanities be tapped. As this review shows, even the research utilizing scientific approaches to understand climate change in the past reveal how people – acting through their cultural beliefs, political institutions, and technical capabilities – respond to climate and changing social and physical phenomena. Historical geographers will surely continue to engage with the ideas and meanings associated with climate and climate change, but it will be interesting to see how their work will adopt and respond to the dominant discursive inclinations, changing institutional proclivities and constraints, and new conditions on the ground. One thing is certain, climate matters and will continue to matter in multiple ways.

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