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Introduction

The relationship between ‘climate’ and ‘literature’ seems a simple one, but only deceptively so. Literature, one might argue, depicts climate in its settings – the atmospheres or climes in which storyworlds are embedded, or the conditions that inspire lyrical effusions. Or weather events might play a part in plot (a storm waylaying a journey, perhaps) and imagery (a storm representing emotional or psychological breakdown). But to go this far is already to consider that literature helps to shape, and not simply reflect, our ideas about climate (how much is one’s response to a tempest ‘real’ and how much ‘imaginary’?). Moreover, climate is itself an elusive term determined by various sets of written records: discrete meteorological occurrences or phenomena, prevailing atmospheres, and statistical averages. So, language and text – literary texts included – are where we parse and apply these different concepts. Increasingly, ‘climate’ refers to a set of physical forces jolted out of kilter, shockingly so, and on a massive, global scale: climate as climate change, as climate crisis. Here, too, literature plays a role, airing anxiety or expressing hope, giving voice to alarm or channelling grief, alerting us to damage, suffering, and injustice.

‘Climate’ is not just a slippery term or innocent scientific word; it has become an emotionally and ethically violent one. It is, then, our contention in this volume that any analysis of climate and literature must not only deal with the many ways in which climate has been conceptualised but also frame those conceptualisations as a pre-history to climate emergency. We chronicle here the vexed genealogy of climate and literature, before turning to consider the literary and literary-critical field in a time of climate crisis. We then introduce the chapters in this volume, which look both back on this terrain and forward into a fraught world.

A Genealogy of Climate and Literature

Climate, as is often observed, is not just weather; it is weather measured, averaged, quantified. At the same time, it refers to meteorological conditions

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or events in a given location; it can be correlated to cultural attitudes and habits; it interacts with human experiences, emotional responses, and memories. To borrow the distinction made by James Fleming and Vladimir Jankovic, although one might think of climate as numerical *index*, it has also long been treated in terms of its *agency*. As Fleming and Jankovic put it, climate in its ‘exclusive association with the atmospheric sciences’ is ‘abstract[ed] from the “lived” experience and construct[ed] as a derived entity, a statistical index of averaged parameters across time and space’; yet, ‘Outside this context one is more likely to encounter climate as an agency rather than an index. Climate has more often been defined as what it *does* rather than what it *is*.’¹ To this study of the chronology of conceptualisations of climate, however, we will add a crucial third term. As we shall show below, in the light of twentieth-century developments in climatological science, climate is no longer just an index, no simple aggregate or data-driven patterning of weather. The conceptualisation of climate as index has led to it being now chiefly regarded as a *system* – in the words of Paul Edwards, ‘a dynamic system, intricately interconnected, articulated, but ultimately fragile and vulnerable’.² As we show, the history of climate and literature is a history of these three distinct but interlocking definitions of index, agency, and system. Looking back on this history, it pays to understand how these ideas have developed, how they are linked, and – now – how they have each played a role in our arrival at the current moment of global climate crisis.

To consider the genealogy of literary engagements with climate is to see how climate has always been textual – as agency and index at least. The written record of human understandings of climate begins with descriptions of massive and extreme weather events, from the deluges of rain that cause the great floods in both the story of Gilgamesh and the Bible’s Old Testament, to the storms that waylay Odysseus. Such dramatic accounts present climate as utterly agential – a non-human force and natural power to be reckoned with.

However, what is also discernible in the earliest ancient written texts is the recording of climate as index. These offer, on the one hand, phenological descriptions that quantify weather events into predictable processes and, on the other, chronicles of distinctive local patterns and thus the first recorded discussions of the world’s differing climates. Examples of the first kind include classical Greek tablet almanacs or *parapegmata* (third century BC) used in fishing and farming, that echo the advice given in Hesiod’s *Works and Days* (ca. 700 BC) on how agricultural practices should pay heed to the different weather patterns that pertain in different regions.³ Similarly, ancient Chinese records provide purviews of the seasonal shifts in diverse

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parts of the nascent Chinese empire. These include the magisterial, multi-authored *Chunqiu* or ‘Spring and Autumn Annals’, consisting of brief records of significant events that cover a period from 722 to 481 BC, and *Lu Shi Chun Qiu* or ‘Master Lu’s Spring and Autumn Annals’ (ca. 239 BC), which offer more detailed phenological observations, such as variations in the timing of crop harvests year on year.⁴ In the second category, one could place the medical treatise *On Airs, Waters, and Places*, attributed to Hippocrates (460–377 BC), which connects seasonal and regional weather variations to people’s physical and psychological conditions. One could include, too, Aristotle’s *Meteorology* (384–322 BC), which not only attempts to investigate all manner of meteorological and geological phenomena, but helps to introduce the concept of climatic zones, or *klimata*, dividing the world latitudinally into five bands, much as Ptolemy would go on to do with seven climatic zones in his *Geography* (ca. 150 CE). Meanwhile, in both Hindu and Tamil poetries from the first few centuries CE (such as Kalidasa’s ‘Garland of the Seasons’ and the *thinai* poetry of early Tamil *Sangram* literature), climatic states are explicitly linked to emotional ones, so much so in *thinai* that climatic settings are assigned their own predetermined poetic tropes, topics, and themes.⁵

Here, then, we see the earliest attempts to quantify weather over space and time as climate, and thus the beginnings of an understanding of climate as index. Even so, these indexical records consistently relate climatic conditions to human activity, in both correlational and causal terms, and thus retain a belief in climate as agency. Such human–climate causation works both ways in these records: not only do meteorological events determine how humans could and should behave but humans were also capable of provoking natural catastrophes, events often believed to be divine punishment for transgressive human behaviour meted out by wrathful gods.

As this history continues into the early modern and modern eras, there is still no clear demarcation between climate as agency and as index, the usurpation of the latter over the former being a gradual shift. Broadly speaking, climate data-keeping begins with the practice of chorography – the regular recording of physical, including meteorological, conditions. There is evidence of distinct traditions of this in both Europe and Asia from the sixteenth century onwards. Keeping weather diaries is a continent-wide habit encompassing Britain, Italy, Iberia, Poland, Germany, and Switzerland,⁶ while the emperors of China’s Qing dynasty (1644–1911) increasingly demanded weather reports from the many corners of their kingdom, contained in what Quansheng Ge *et al.* call the ‘Memos-to-Emperor’.⁷ But, as Jankovic points out, however, although weather diaries attempt a record of weather, they still tend to emphasise

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the subjective encounter between human and climatic agency, since first-hand knowledge and eye-witness accounts were yet considered the most reliable sources of information: ‘personal inspection, scrutiny, and observation played a critical role’.⁸

Nonetheless, chorographical records were the preface to the reification of climate away from ideas of agency and into the objective state of index – or, perhaps more accurately, the transformation of climate’s agential characteristics into an entity knowable primarily through its indexical qualities. This occurs in what one might call the ‘quantifying spirit’ of the Enlightenment – that is, the privileging of ostensibly impartial, calibrated measurement.⁹ With climate, this expresses itself as the systematic comparative study of not just long-term weather patterns but regional similarities and differences, now emblematised by Alexander von Humboldt’s first use of the isotherm in cartography in 1817. As Deborah Coen has shown, in the late nineteenth century, large land-based empires, from the Hapsburg territories to Russia and British India, began to record and compare regional climatic variations.¹⁰ Certainly, climate could still be defined, in Humboldt’s words, in terms of its agential relationship with human and non-human life – ‘with respect to the increased radiation from the Earth, the organic development of plants, and the ripening of fruits, but also with reference to its influence on the feelings and mental condition of men’. But, above all, it described general meteorological conditions – ‘all the changes in the atmosphere which sensibly affect our organs, as temperature, humidity, variations in the barometrical pressure, the calm state of the air or the action of opposite winds, the amount of electric tension, the purity of the atmosphere or its admixture with more or less noxious gaseous exhalations, and, finally, the degree of ordinary transparency and clearness of the sky’ – that could only be known through exhaustive quantification and the subsequent extrapolation of data.¹¹

Such an understanding expresses itself in the nineteenth-century novel as an awareness of how the diverse operations of climate could come together to produce a local condition, much in the same way as character actions and interactions contribute to the plot, mood, and drive of narrative. For this reason, as Jesse Oak Taylor puts it, the Victorian realist novel serves as the kind of ‘climate model’ that contemporary science was in the process of developing and deploying.¹² From Emily Brontë’s *Wuthering Heights* (1847) to Thomas Hardy’s *The Return of the Native* (1878), the novel’s accumulation of descriptions of weather alongside longitudinal climate observations represents the same epistemological operation found in contemporary scientific practice: they both serve to collapse discrete events and features into a coherent, stable state known as a climate.

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It might seem easy to draw a straight line from the Enlightenment and nineteenth-century practice of climate quantification and extrapolation to modern climatology and its understanding of global climate dynamics. Certainly, the kind of massive, multi-scalar climate analysis that Coen describes meant that, by the beginning of the twentieth century, scientists understood that large, regional climates were composed of complex and interdependent ecological, geological, and meteorological processes, an understanding that became ‘crucial to the development of the understanding of the earth as a whole’.¹³ And, certainly, in literature too, particularly in the science fiction of the late nineteenth and early twentieth centuries, ideas of relatively stable regional climates are expanded to depictions of planetary ones, such as the Martian atmosphere of Edgar Rice Burroughs’s ‘Under the Moons of Mars’ (1912), and are discussed as part of a complex and interconnected Earth system in more ambitious works, such as Jules Verne’s *The Purchase of the North Pole* (1889) and Camille Flammarion’s *Omega: The Last Days of the World* (1893).

However, climate’s elevation from index to system required some important further steps. As Spencer Weart shows in his valuable history of the development of what was first known as ‘global warming’, the mid-twentieth century saw an important change of emphasis in climate science. One reason for this lay in the even wider changes in public understandings of the considerable scale of environmental damage inflicted by humans in terms of radioactive fallout or chemical pollution – the outcomes of the dawn of the nuclear age and the birth of modern environmental awareness so eloquently heralded by Rachel Carson’s *Silent Spring* (1962). Other reasons lay in the enormous investment into meteorology made by a (cold-)war-ready United States, eager to gain any advantage in military intelligence, an attitude that benefited scientists, such as those at the University of Chicago, who, from the 1940s onwards, ‘were determined to make the study of climate truly scientific’, who sought to replace ‘traditional climatology [which] merely listed descriptions of the “normal” climate in each geographical region’ with ‘a more complex understanding of climate from basic principles of physics’.¹⁴ Thus, by 1965, the not-quite-coherent field of climate study (a broad church comprising – among others – meteorologists, atmospheric physicists, biochemists, and geologists) came together at Boulder, Colorado, to discuss, for the first time, the ‘Causes of Climate Change’. As they did so, these scientists were becoming aware that global climate ‘could not be treated in the old fashion, like some simple mechanism that kept itself stable’; they were ready to conclude, in other words, that the world’s climate was really ‘a complex system, precariously balanced’.¹⁵ By the 1980s, what Edwards calls the ‘*global knowledge infrastructure*’ of climate science – that ‘collects data,

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models physical processes, tests theories, and ultimately generates a widely shared understanding of climate and climate change – had evolved, effectively maintaining and constantly reproducing climate as system.¹⁶

The significance of the twentieth-century conceptualisation of climate as system (and how it relates back to agency) is best grasped if framed in terms of climate’s designation as divinely ordained. In the dislodging of climate as agency that took place – gradually, but eventually – through the Enlightenment, the ancient idea that climate expressed the ways and will of God or nature writ large remained surprisingly durable. It persisted in the history of understandings of climate as index, as statistical average, for this meant it was really a norm held in place by nature, or what Weart terms ‘a universal principle: the Balance of Nature’.¹⁷ In this case, the shock appeal of extreme weather is merely the flipside to understanding climate as innately a state of balance and normality. Literature responds to this idea by depicting climate catastrophe as an opportunity for dramatic effect, signalling a step outside the ordinary. In early modern and modern literature, this has been the case from Shakespeare’s storms to Daniel Defoe’s sensational reporting in *The Storm* (1703), to the atmospherically induced moodiness and meditations of William Cowper’s *The Task* (1785). Even in twentieth-century tellings, from what Weart calls ‘old folk’s tales’ of the Dust Bowl to John Steinbeck’s literary evocations of the same, catastrophe was ‘something transient; things revert to normal after a few years’.¹⁸ In contrast, the shift from climate as index – ‘stable by *definition*’ – to climate as system punctures the idea that climate offers humans a perpetual, God-given stability: ‘The system showed a dangerous potential for dramatic change, on its own or under human technological intervention, and quicker than anyone had supposed.’¹⁹

Thus, to understand climate as system is to allow the return of climate as agency – this time, with a relentless focus on human agency. The twentieth century’s deepened comprehension of climate, brought on by the discovery of climate change, recognised anew humans as a player – and a major one at that – amidst the diffuse and numerous agential forces of the climate system. Human agency, of course, is what distinguishes climate change (or, to give it its full name, ‘anthropogenic climate change’) from other global climatic phenomena, such as glaciation and the transition into and out of geological epochs. This is also what makes climate change a component of the Anthropocene, along with other devastating, human-caused processes, such as ocean and atmospheric pollution, careless bioengineering, ozone depletion, and nuclear fallout. If the Anthropocene names a possible new geological epoch in which human damage to the environment has become so great as to leave its mark in the stratigraphic record, then climate change at

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least is its ‘most prominent feature’.²⁰ At the same time, and in terms of its effect on human psychology and action, climate change awareness is not simply a subset of Anthropocene anxieties, for we can now recognise it as one of the earliest forms of worldwide attention to a specific fabric of human-generated issues and impacts, from the loss of permafrost to species extinction.

For this reason, the literature of climate change is tightly entangled with literary and critical responses to the Anthropocene. It is perhaps most deeply entangled with that knotty ethical dilemma of the Anthropocene: how to dislodge a vision of human exceptionalism that paints us as benefactors of God-given environmental harmony and yet still retain a sense of human responsibility for reversing the profound disharmony we have visited upon the planet. Or, to put this another way, if the Anthropocene names the recognition that human agency is part of the delicate system of climate, we must now work within that system, not against it. This, in part, underlies Fleming’s and Jankovic’s call to return to the ancient idea of agency – which they invoke under its Greek name, *Klima* – and to disown that of index.²¹ And, yet, Fleming and Jankovic do not quite heed the distinction between *Klima* and what we term here the idea of climate as system: that the one merely returns us to questions of the interconnectedness of human and climatic agencies while the other demands a new form of human agency to preserve the fragile balance that locks them together. It is, then, in the literary sphere that such a balance might be struck. Perhaps it is in the new climate imaginings that we might come to terms with the dilemma of how to decentre ourselves from old ideas of observing, utilising, or exploiting climate, while calling to each other to collectively act in ways that respect it.

Literature in the Age of Climate Change

As climate change has become increasingly researched and reported, and the vulnerability of the climate system has become alarmingly apparent, voices from the humanities, sciences, and the popular press have urged writers and scholars to help create a collective, cultural imagination for grappling with the potential futures of a warming planet. As a recent study points out, ‘the arts and humanities inhabit the (usually fractured) join between “fact-making” and “meaning-making”’.²² Indeed, what the seemingly benign figure of 2°C warming might mean in terms of bodies and places can be profoundly difficult to absorb without imaginative scenarios and careful, hermeneutic study. As earlier climate literature engaged with indexical measures of agricultural statistics and temperature recordings, current literary engagements with the hyperobjects of climate-changed systems respond to

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new indexical measures of alarm, such as the United Nations' IPCC reports. Contemporary stories also contend with the paradox of human agency in the Anthropocene – both as a source of anthropocentric hubris open to critique and as a political body to motivate societies towards a more ethical partnership with nature's agency. Although awareness of anthropogenic climate change accentuates scientific manifestations of human agency, older forms of human agency, including the fear of incurring divine punishment and roles inherited from creation stories, are still at stake as well. As Ursula Heise reminds us, no matter how devoted an individual environmentalist or conservation scientist may be, their work will only 'gain sociocultural traction to the extent they become part of the stories that human communities tell about themselves: stories about their origins, their development, their identity, and their future horizons'.²³ How literature depicts the diverse agencies of cultural climates is now bound up with geophysical and ecological outcomes. From this contemporary vantage point, the historical and conceptual interdependency of agency, index, and system becomes more real and poignant than was popularly understood in earlier eras of climate literature. Given that any literary engagement with climate is, now and unavoidably, also an engagement with climate change, we apply the term 'climate change literature' to literature written within the context of cultural awareness of anthropogenic agency and global warming, rather than the more encompassing 'climate literature', which refers to a myriad of different forms of climate awareness in any period, from ancient texts through the present day.

The study of climate change literature usually centres on fiction, since fictional, narrative treatments of climate change, or climate fiction, have historically been more prevalent than dramatic or poetic ones.²⁴ It has also tended to focus on some genres of fiction over others, for example, on science fiction – indeed, climate fiction is sometimes designated as a subgenre of science fiction.²⁵ Yet, that emphasis risks occluding the sheer explosion of climate change literature now occurring across a wide range of creative outputs and modes. For sure, one can distinguish broadly between climate novels 'set in a recognisable, realist present (or very near future)' and those set 'in a futuristic climate-changed world' (for example, in Sylvia Mayer's distinction of 'anticipatory' and 'catastrophic' forms of climate fiction).²⁶ But to hold too fast to this divide, turning it into a line between the categories of realist novels and science, or speculative, fiction, is to ignore the extent to which climate fiction straddles boundaries. Climate fiction, which can be defined primarily by its 'thematic focus' on anthropogenic climate change, emerges in 'thrillers, science fiction, disaster novels, crime and conspiracy novels, young adult novels of personal development, social satire, and even work in the genres of cyberpunk, horror and fantasy', ranging from 'serious'

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or ‘highbrow’ novels to so-called genre fiction.²⁷ And, although early fictional engagements with global warming from the 1970s and 80s, such as Ursula K. Le Guin’s *The Lathe of Heaven* (1971), Arthur Herzog’s *Heat* (1977), and George Turner’s *The Sea and Summer* (1987), tended to be futuristic in their settings, the second decade of this century onwards has seen a spate of climate fiction in which present-day narratives also abound, for example, Ian McEwan’s *Solar* (2010) and Barbara Kingsolver’s *Flight Behaviour* (2013). This proliferation has seen climate fiction occur increasingly in non-Anglophone literatures as well, such as Finnish and German, in the novels of Antti Tuomainen (*Parantaja*, 2010) and Ilija Trojanow (*EisTau*, 2011), for example.²⁸ Significantly, a rich spectrum of views and voices has emerged: in the work of writers such as Alexis Wright, Nnedi Okorafor, Alexis Pauline Gumbs, and Wu Ming-yi, climate fiction has moved well beyond Anglophone (and predominantly white) perspectives, to incorporate the experiences of people of colour, Indigenous communities, and the Global South; readers are being alerted to the intertwining of environmental (in)justice with issues of climate devastation, for example, the real impact of sea-level rise on pelagic and archipelagic communities, or the new and frightening shapes taken by settler-colonialist attitudes in the Anthropocene.

Yet the field itself is molten and mutable. As many scholars have pointed out, the global scope of climate change challenges the traditional structure of storytelling, whether decentering its conventional focus on a single human protagonist with a personal conflict, distending its scales of space or time, or reinventing wholesale its ideas about nature or wilderness.²⁹ Climate change literature can still be highly localised, drawing attention to particular phenological shifts, migration patterns, or watersheds, recalling earlier indexes, but it may also use cognitive animal science to construct sentient, non-human characters. Alternatively, its plots or characters could sprawl across generations or continents, and in some futuristic fiction, planets and galaxies. Representing how readers experience climate change today involves multiple layers of encounter: from the immediacy of embodied sensation (such as a welcome breeze on sweaty skin) to the abstract symbols of climate science in popular culture (hockey-stick graphs and blue-to-orange temperature stripes). Further, the lived experience of climate change – with its forcings and feedback loops – also increasingly mandates an awareness of something akin to Lorenz’s metaphor for chaos theory, how the wings of a butterfly in Texas can cause a tornado in China, seemingly minor events cascading into larger states of disorder.³⁰ As a result, climate change literature is also a place for working through problems of privilege, suffering, and inequity. ‘Who is the we?’, Dipesh Chakrabarty asks, when ‘we humans never experience

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ourselves as a species'.³¹ Indeed, climate change is imbricated in a lack of understanding and empathy for fellow humans. Kathryn Yusoff traces the 'geomateriality of race', suggesting, for example, how slavery in sugar and coal production 'weaponized the redistribution of energy around the globe through the flesh of black bodies', attesting to the way climate change literature and criticism is grappling with geological, anthropological, historical, and storied antecedents.³² Thus, climate change literature's primary characteristics are less foundational properties than they are reactive elements.

Similarly, in contrast to the *relative stability* of natural fluctuations in pre-change literature, texts written from the late twentieth century to the present reflect the *current instability* of both literal and literary climates – and, further, express awareness of the causes of that instability. This awareness emerges as an anxiety, registered particularly in a heightened call for consciousness-raising, a new set of conflicting emotional paradigms, and even political rancour and passionate cries for environmental and social justice. As a result, there can be an expectation from readers that contemporary climate change literature is or should be a platform for advocacy and protest. Some authors certainly do align themselves with a sense of moral urgency and hope to encourage a public will for the sacrifices required to curb greenhouse emissions. Although writers have long penned pleas for direct action – from William Wordsworth, who bemoaned the cultural devaluation of a once deified nature in a world of 'getting and spending', to Kathy Jetñil-Kijiner, whose lyrics enshrine the beauty of the Marshall Islands as ocean levels rise – the contemporary tone has become more urgent, sometimes more elegiac.³³ Richard Powers, speaking in a recent interview about how *The Overstory* (2018) makes trees sacred beings, defends his overtly political themes while acknowledging that they are often shunned in the literary circles of high art: 'Moral passion hasn't been cool for some time; much better to gird yourself in irony and fatalistic detachment.'³⁴ Of course, that was before *The Overstory* won the 2019 Pulitzer Prize. Others, like Ian McEwan, express concern that 'fiction hates preachiness . . . Nor do readers like to be hectored'.³⁵ In addition to these debates about politically charged content, Robin Wall Kimmerer, a citizen of the Potawatomi nation, reminds readers that cultural assumptions about environmental ethics are already embedded in the power dynamics of the English language: 'Saying *it* makes a living land into "natural resources." If a maple is an *it*, we can take up the chain saw. If a maple is a *her*; we think twice.'³⁶ This anthology makes space for a broad range of political positioning in climate-oriented literatures.

The feelings evoked by climate change literature are also in flux, embroiled in conflicted emotional reactions. For some, the experience of droughts, floods, unparalleled fires, and choking ocean plastics are not just the stuff