

## Climate

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When these prodigies  
Do so conjointly meet, let not men say,  
'These are their reasons, they are natural,'  
For I believe they are portentous things  
Unto the climate that they point upon.<sup>1</sup>

### The Purposes of Climate

The idea of climate has always been useful for explaining things. For classical Greeks climate helped to explain – and hence to justify – Greek cultural superiority: it was they who inhabited the optimal temperate zone between the unwelcoming frigid and torrid frigid climates of the uncivilised north and south. For many a modern mind too, climate has been invoked to explain differences in civic cultures, moral sensibilities and human intelligence: for example in the early twentieth century many scholars were convinced that the humid climates of the tropics caused a lack of vigour in African cultures<sup>2</sup>. And most recently, putative changes in future climate - brought about, we are assured, by human actions - are asserted to be the causes of future wars, famines, plagues and mass migrations<sup>3</sup>.

In late sixteenth century England, climate was also a signifier – but of portentous events, of human moral failure and of judgements of the divine will. So in the epigraph above, from Shakespeare's play *Julius Caesar*, the playwright associates the idea of climate with the ebbing and flowing of personal fates and fortunes, rather than with natural and inanimate meteorological forces. As this essay will suggest, people's physical encounters with weather in Shakespearean England were interpreted through an essentially imaginative construction of the idea of climate. In

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<sup>1</sup> *Julius Caesar* I, iii, 28-32

<sup>2</sup> Ellsworth W Huntington, *Civilization and Climate*, (Honolulu, University Press of the Pacific, 1915/2001). See also: David N Livingstone, "Race, space and moral climatology: notes toward a genealogy", *Journal of Historical Geography* 28(2002): 159-180.

<sup>3</sup> See Hulme, M., "Reducing the future to climate: a story of climate determinism and reductionism", *Osiris* 26(2011): in press

the lives of Shakespeare's contemporaries, climate carried emotional, spiritual and discursive properties more than it revealed the working of natural physical systems.

But this does not entirely satisfy our modern minds. We want to ask the question: "Yes, but what *was* the temperature on the outdoor stage of The Globe theatre on the south bank of the River Thames when Shakespeare first performed *Julius Caesar* in the late summer of 1599?" And when the English chronicler John Stow reported that on Whitsunday 1599 London was inundated with '*great rain, and high waters, the like of long time had not been seen*'<sup>4</sup>, we want to ask: "Yes, but exactly how many millimetres of rain did fall that day?"

In exploring the climate of Shakespeare's England, we repeatedly encounter this disjuncture between the impressionistic and interpretative accounts of early-modern eye-witnesses and our modern fetish with quantified precision. This essay will indeed explore what we can deduce of the enumerated climate of late sixteenth century England, but we do a disservice to the idea of climate – certainly as it would have been understood by William Shakespeare – if we move too quickly to this goal. We may reconstruct the paths and ferocities of the storms of 1588 which frustrated and ransacked the Spanish Armada, but were these violent storms signs of a divine hand protecting a Protestant queen? And we may know, or at least deduce, that the sequence of terrible harvests in the mid-1590s was triggered by poor summer weather, but how did English farmers and town dwellers understand the causes and significance of these adverse conditions?

### The Imaginary of Climate

In Shakespeare's England, climate was an imaginative idea which served many purposes. Climate was essentially an ordering concept: it organised the chaotic and visceral experiences of daily weather into seasonal rhythms and it organised the geography of the world into recognisable zones of difference and regularity. And as with us today, the category of climate offered Elizabethans a benchmark of normality from which deviations of weather could be recognised. Climate offered a sense of the prevailing, or expected, conditions. So when the astrologer and physician Simon Forman observed '*exceptional weather*' in London in late March 1599 he was deploying his idea of climate to reveal to noteworthiness of the weather. Forman recorded that the days between the 22<sup>nd</sup> and 27<sup>th</sup> March were '*bright and clear and very hot ... like summer*'.<sup>5</sup> We do not know the Celsius temperature of these anomalous days, but we know that they struck the chronicler as inverting the usual sequence of a temperature progression from winter to spring to summer.

In contrast to our modern minds that search for naturalistic explanations of such disruptive events, Shakespeare's contemporaries sought out the significance and

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<sup>4</sup> Quoted in: James Shapiro, *1599: a year in the life of William Shakespeare* (London, Faber & Faber, 2009), p.125

<sup>5</sup> *Ibid*, p.97

meaning of excessive meteorological performances. The same month of March 1599 gives a good example of this. In the early afternoon of 27<sup>th</sup> March, the Earl of Essex and his newly-formed army were processing through London on their way to Ireland to crush a rebellion. The historian John Speed noted that out of nowhere there struck '*a strange thunderclap in a clear sunshine day*' and Forman recorded '*It thundered withal and the wind turned to the north*' bringing a hail storm '*that was very great*'<sup>6</sup>. The thunderstorm struck many onlookers as an ominous sign for such a adventure. And this storm, with its association with the start of a dangerous military mission, entered into historical annals as the archetypal definition of the newly coined word, Ecnéphia: a typhoon or sort of hurricane. John Floria, the Italian-English linguist, in his 1611 volume *Queen Anne's New World of Words* defined Ecnéphia as '*a kind of prodigious storm coming in summer, with furious flashings, the firmament seeming to open and burn, as happened when the Earl of Essex parted from London to go to Ireland*'<sup>7</sup>.

In his plays Shakespeare was able to explore this tension between the normality of expected and seemingly weather as ordered by the idea of climate and the abnormality of untimely or extreme weather which disrupted this sense of climatic order. In the tragedy of *King Lear*, he adopts a severe and unprecedented storm – '*I never remember to have heard*' of such - as the setting of dramatic discourse. This is weather at its fiercest and most disorderly and is used by Shakespeare as metaphor for similarly stormy human relationships:

Lear: Blow, winds, and crack your cheeks! rage! blow!  
 You cataracts and hurricanoes, spout  
 Till you have drench'd our steeples, drown'd the cocks!  
 You sulphurous and thought-executing fires,  
 Vaunt-couriers to oak-cleaving thunderbolts,  
 Singe my white head! And thou all-shaking thunder  
 Smite flat the thick rotundity o' the world!

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Rumble thy bellyful! Split, fire! spout, rain.  
 Nor rain, wind, thunder, fire, are my daughters  
 (Enter Kent): Since I was man,  
 Such sheets of fire, such bursts of horrid thunder,  
 Such groans of roaring wind and rain, I never  
 Remember to have heard; man's nature cannot carry  
 The affliction nor the fear --<sup>8</sup>

As well as revealing the portentous and idiosyncratic events of life, the ordering and differencing effects of the idea of climate also found resonance in an age of geographical exploration and exploitation. The idea of climate helped to order, and therefore make sense of, difference between regions and countries. The forays of sixteenth century European adventurers into extra-European longitudes were

<sup>6</sup> Ibid, p.117

<sup>7</sup> Quoted in Shapiro, p.117-8.

<sup>8</sup> King Lear, III, ii

beginning to challenge the Greek idea of klima, that fixed and identical climates exist at different latitudes. And so new climatic schemes were needed to explain the novel climates of the Caribbean and eastern seaboard of the Americas and the exotic monsoonal climates of India. These journeys brought back tales of climates unknown to the island dwellers of northwest Europe and a new geography and vocabulary of climatic differentiation was needed.

Shakespeare would have been fully aware of these new encounters with distant and novel climates and the commercial prospects that they offered. The first English settlement in the Americas at Roanoke had occurred (and failed) between 1585 and 1587, while the more successful Jamestown settlement in Virginia was founded in 1607. And the biggest new commercial venture to emerge from Shakespeare's London was the establishing of the East India Company in 1599, their first trading voyage to the commercially fruitful climates of India leaving in 1601.

Foreign and exotic climates could be both feared and valorised by Elizabethans. The Earl of Essex with his 1599 military expedition feared the Irish climate would *'consume our armies, and if they live, yet famine and nakedness makes them lose both heart and strength'*<sup>9</sup>, while Shakespeare could imagine the enticements of Mediterranean climates he must have heard much of, referring to Sicilia (the island of Sicily) in *The Winter's Tale* where *'The climate's delicate, the air most sweet'*.<sup>10</sup> Yet if Sicily's climate was delicate, Shakespeare could project a very different image of an English climate that was 'raw and dull'. In *Henry V*, Shakespeare adopted the ancient trope of using climate to reveal national character. As the French contemplate facing up the English army, he has the Constable of France speak in bewilderment of the relationship between England's climate – 'foggy, raw and dull' – and her people's character: how can a 'more frosty people ... have this mettle?'

Dieu de batailles! where have they this mettle?  
Is not their climate foggy, raw and dull,  
On whom, as in despite, the sun looks pale,  
Killing their fruit with frowns? Can sodden water,  
A drench for sur-rein'd jades, their barley-broth,  
Decoct their cold blood to such valiant heat?  
And shall our quick blood, spirited with wine,  
Seem frosty? O, for honour of our land,  
Let us not hang like roping icicles  
Upon our houses' thatch, whiles a more frosty people  
Sweat drops of gallant youth in our rich fields!  
Poor we may call them in their native lords.<sup>11</sup>

Climate, then, to Shakespeare and to his contemporaries was not something to be measured instrumentally; as we shall see in the next section the thermoscope – the forerunner of our thermometers - was only invented in Venice around 1610 by

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<sup>9</sup> Quoted in Shapiro, p.90

<sup>10</sup> *The Winter's Tale*, III, i

<sup>11</sup> *Henry V*, III, v

Galileo's circle of friends. There was no sense in Elizabethan culture that climate was or could be circumscribed by mere numbers. The vicissitudes of climate were revealed not by systematic longitudinal measurements of temperature or rainfall as we now like to think today, but they were the vehicle for revealing fate and conveying judgement to individuals and societies alike. For Shakespeare, climates displayed the temper and character of men and of cultures. Climate was an idea which allowed free passage between the physical and imaginative worlds of his Elizabethan audiences.

### The Physicality of Climate

So if we now turn to the physical dimensions of England's climate in the late sixteenth century what can we say? Rather than trying to look *outward* through the eyes, words and imaginations of Elizabethan culture, our vantage point must now become that of the twenty-first century, looking *backwards* using the evidence, tools and theories generated by our scientific era.

Reconstructions of temperature for this early modern period inevitably rely on various forms of proxy evidence – tree rings, documentary sources, glacier movements, phenology such as wine harvest dates. Reliable meteorological instrumentation was not developed until the 1610s and not deployed with systematic record-keeping until much later. Galileo Galilei in Venice created one of the first thermoscopes in the 1590s, in which the expansion and contraction of air in a glass bulb moved water in an attached tube. But the attachment of a measuring *scale* to a thermoscope was the work of Galileo's colleague Santorio Santorio from Padua around 1611. The idea of then using such a scaled thermometer to routinely track the fluctuations of climate did not become widespread until the end of the seventeenth century.

By all conventional accounts of historical climatology we should claim that Shakespeare lived his 52 years from 1564 to 1616 in an English climate colder than today. His life fell within the so-called "Little Ice Age", which indeed according to some European reconstructions was entering its coldest century, the seventeenth<sup>12</sup>. This was a period when average temperatures across northwest Europe may have been up to a degree Celsius colder than the late twentieth century, perhaps colder still in winter. Indeed, the first winter that the infant Shakespeare lived through in Stratford-upon-Avon – that of 1564/5 - was exceptionally severe; the River Thames froze during the height of the cold<sup>13</sup>. This winter, and others like it in this decade, is credited for inspiring Flemish artists such as Pieter Bruegel the Elder to invent a new branch of landscape painting: the winter landscape (Figure 1)<sup>14</sup>.

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<sup>12</sup> Definitions of the period known as the "Little Ice Age" vary enormously. See Jean M Grove, *The Little Ice Age*, (London, Methuen, 1988) for an authoritative survey, but also Ogilvie, A.E.J. and Jónsson, T. (2001) "Little Ice Age" research: a perspective from Iceland *Climatic Change* 48(1), 9-52 for a more challenging view of the validity of the concept.

<sup>13</sup> p.221 in, Hubert H Lamb, *Weather, climate and human affairs*, (London, Routledge, 1988)

<sup>14</sup> p.140 in, Wolfgang Behringer, *A cultural history of climate*, (London, Polity Press, 2010)



Figure 1: The extreme winter climate of the 1560s in the Low Countries led Flemish artists to invent the winter landscape. Pieter Bruegel the Elder, *Return of the Hunter*, c. 1565.

As a young man Shakespeare also lived through the late summer and early autumn storms of 1588 which so famously disrupted the great Spanish Armada -- although exactly where Shakespeare was in this year and what he was doing we do not know. The weather during the period from July to October that year seems to have been particularly stormy. Historical meteorologists have reconstructed the weather conditions around the British Isles between the 31<sup>st</sup> July, when the two fleets first engaged off Plymouth, to the great gale of 21<sup>st</sup> September, which finally dispersed and sank much of the remaining fleet off the coasts of Ireland<sup>15</sup>. The timing of these storms was interpreted by many at the time -- and subsequently -- as a sign of God's providence for a threatened nation, an example of the signifying role described in the previous section that extremes of weather played in the early modern period. Yet from a more naturalistic perspective we would want to make the observation that severe early autumn gales around the shores of Britain -- often the Atlantic-crossing remnants of Caribbean hurricanes -- are hardly uncommon today, nor then.

We also know of other significant events during Shakespeare's life which impacted on English climate, the causal connections of which, if not the events themselves, may well have been veiled from the Elizabethans. The explosive eruption of the volcano Huaynaputina in southern Peru on the 19<sup>th</sup> February 1600 was one such event. This was the largest volcanic explosion in South America in historic times and it continued erupting into March. As is now understood, such explosive eruptions -- especially those in the tropics -- can have significant effects on climates around the world for up to two or three years and Huaynaputina was no exception. The

<sup>15</sup> This painstaking work is described in: Douglas, K.S., Lamb, H.H. and Loader, C. (1978) *A meteorological study of July-October 1588: the Spanish Armada storms* Research Publication No.6 (CRU RP6), Climatic Research Unit, UEA, Norwich, UK, 76pp.

following year, 1601, is estimated to have been the coldest year over the northern hemisphere land mass in the last five hundred years<sup>16</sup>. It led to very severe winters around the Baltic, triggered a famine in Russia from 1601 to 1603 and delayed the French wine harvest in the autumn of 1601. Effects would have been evident to William Shakespeare living in London, effects not just on the weather, but also on the colour and texture of sunsets which would have been made more dramatic by the volcanic aerosols in the atmosphere.

A typical reconstruction of European temperatures for this period which blends proxy evidence and instrumental measurements is shown in Figure 2. This suggests that late sixteenth century annual temperatures in central Europe were noticeably colder – by about 0.5 degree Celsius – than the preceding and succeeding half centuries (the very end of the seventeenth century, the 1690s, may have been somewhat colder). This reconstruction suggests that central European climate was on average perhaps 1 to 1.5 degrees colder during Shakespeare's lifetime than during our own.

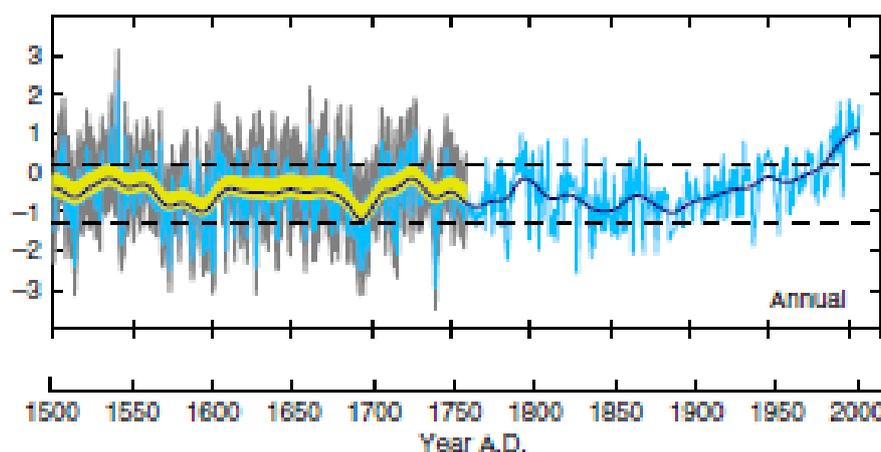


Figure 2: Central European average annual temperature from 1500 to 2007, reconstructed from proxy data 1500–1759 and instrumental data 1760–2007. The scale is expressed as anomalies in degrees Celsius from the 1961–1990 average [Source: Dobrovolný et al., 2010].

But reifying the “Little Ice Age” in ways which connote a radically different experience of weather to today is unwarranted. The term is far from ideal and definitions as to its start and its end are notoriously variable. For example, the period 1500 to 1850 is much too broad a period to speak of a single climatic era. Even if confined just to Europe and the north Atlantic rim where evidence is most abundant, it is clear this period was not ubiquitously colder than the late twentieth century. And caricaturing Shakespeare's climate as a “Little Ice Age” eradicates most of the texture of weather that he and his contemporaries would have experienced. As well as the severe winter of 1564/5 and the cold years of 1601 to 1603,

<sup>16</sup> Alexandra Witze, “The volcano that changed the world” *Nature*, April 2008, doi:10.1038/news.2008.747

Shakespeare would also have known winters dominated by mild Atlantic winds. As well as the poor summers of 1594 to 1597, he would also have experienced the delights of an English high midsummer's day. One of the twentieth century's outstanding climatologists Helmut Landsberg has remarked, "*It would be far better to expurgate the scientifically misleading (even if journalistically appealing) term "Little Ice Age", because of the fact that the interval so designated was not uniformly cold in space or time*"<sup>17</sup>.

We would also do well to recognise a more philosophical aspect of the "Little Ice Age", and indeed of any climatic classification we may now impose on the sixteenth century from the perspective of the twenty-first. It is clear that Shakespeare and his contemporaries would not have had any sense of living through such an episode; indeed the very notion of 'ice ages' in Earth history was to await the nineteenth century. Elizabethan's only access to the idea of secular changes in climate would have been through lived memory and oral tradition. And as we know from such accounts from our own era, changes in climate remembered through embodied lives and narrated traditions can often seemingly be at odds with changes in climate revealed through scientific instrumentation.

This perspective raises some interesting questions about the ontology of climate change<sup>18</sup>. The early moderns of sixteenth century England would have had a strong sense of the seasonal rhythms of climate, the cycles of time and the remembered – directly or vicariously – experiences of past weather. It is not at all obvious, however, that they would have had a sense of a 'changing climate' in our contemporary sense. Indeed, their religious worldview would have likely denied the possibility that the designed orderliness of God's creation could be subject to such precariousness. So if Shakespeare had no access to an ontology which allowed for climate change, nor to any physical evidence for a "Little Ice Age", can we in fact say that such a climatic episode ever existed for him?

### **Weather Endures, Climates Change**

Were we transported back in time four hundred years to the Elizabethan and early Jacobite worlds, we would still recognise the English climate inhabited by Shakespeare's audiences. Galileo's and Santorio's thermoscopes might possibly have told us that the average annual temperature of central England in the 1610s was, say, just over 8 degrees Celsius compared to our late twentieth century average of just over 10 degrees<sup>19</sup>. Yet our physical and imaginative encounters with Shakespeare's weather would offer similar resources and dangers to those we

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<sup>17</sup> p.62 in, Helmut E Landsberg, "Historic weather data and early meteorological observations", p.27-69 in Hecht,A.D. (ed.) *Paleoclimatic analysis and modelling* (New York, Wiley, 1985).

<sup>18</sup> The ontology of climate is something that I explore in Hulme,,M., "'Telling a different tale': literary, historical and meteorological readings of a Norfolk heatwave" *Climatic Change* (in press)

<sup>19</sup> Gordon Manley's Central England Temperature series offers the longest quasi-homogenous numerical climate series in the world and runs from 1659 to the present. It is the most convenient way of indexing English climate. The coldest decade in this series is 1691-1700 at 8.1°C and the warmest decade is 1997-2006 at 10.5°C.

experience today. The seasonal rhythms and regularities of a temperate maritime climate would be so familiar to us: violent autumn storms, hard frosts of winter, bursting early spring warmth into winter's fag end, and exploding thunderstorms of an early summer's day. We in England today well recognise '*the uncertain glory of an April day*'<sup>20</sup> which four hundred years ago Shakespeare describes as resembling the spring of love. And the north-east wind would still blow cold and the west wind mild.

The enduring emotive power of English climate is revealed too by another great English writer. Percy Bysshe Shelley, at the end of the cold decade of the 1810s<sup>21</sup>, could write in his poem *Ode to West Wind* of autumn and spring as the sisters of English climate using imagery still familiar to us today:

O Wild West Wind, thou breath of Autumn's being  
 Thou from whose unseen presence the leaves dead  
 Are driven like ghosts from an enchanter fleeing,

Yellow, and black, and pale, and hectic red,  
 Pestilence-stricken multitudes! O thou  
 Who chariotest to their dark wintry bed

The wingèd seeds, where they lie cold and low,  
 Each like a corpse within its grave, until  
 Thine azure sister of the Spring shall blow

And a more recent writer on English climate, the historical geographer Gordon Manley, speaks too of this continuity between past and present offered by our familiar encounters with climate:

So we can claim that these islands of frequent changes, of the terrible Atlantic gales whose endless roar besets our coasts in winter, of the exquisite long June days celebrated by our poets throughout the centuries, of the harsh biting north-easter in April, the wind-driven rain day after day if there comes a wet autumn, the occasional spell of three weeks of snow and frost, the persistent dryness that quite frequently leads to shortage of water in early summer – all these give us much cause to grumble, but even more cause to enjoy the march of the seasons and the opportunities for such a variety of flowers that the poorest man can still grow them in his garden.<sup>22</sup>

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<sup>20</sup> Two Gentlemen of Verona, I, iii

<sup>21</sup> Manley's Central England Temperature series suggests the 1810s decade was about 8.5°C, compared to a more recent average of over 10°C.

<sup>22</sup> Gordon Manley, "The weather in Britain", *Anglia* 8(1963): 34-43 (in Russian); reproduced in English in Michael J Tooley and Gordon M Sheail, *The climatic scene* (London, George, Allen & Unwin, 1985), pp.8-13

William Shakespeare would have recognised Manley's mid-twentieth century English climate: the tempests that roar, the exquisite days and nights of midsummer, the foggy, raw and dull autumns. Shakespeare wrote in his plays of joys and fears mediated through an English climate. By so-doing he connected not only with his Elizabethan audiences, with whom he directly shared his weather, but he connects with us too, four hundred years later, who dwell amongst these same joys and fears. Whatever our scientific measurements and numbers may suggest about changes in the physical climate of England since the early seventeenth century, in our imaginative encounters with weather we are as one with William Shakespeare.

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