

Mike Hulme 1978 to 2012: a research narrative

© Mike Hulme, 22 December 2011

Preamble

This account of my research career is aimed at providing a narrative which shows not only the range of work on climate change which I have undertaken throughout my career, but also to show the evolution of my thinking about climate and climate change during this 30-yr period. The narrative is structured around different phases of my higher education and of my subsequent employment within higher education. It has been constructed with the primary intention to show how all of my peer-reviewed publications, and my other more significant work, emerge from the personal and intellectual journey I have followed.

The major sub-fields to which my work has contributed are highlighted in bold text and those publications which have attracted more than 100 citations (as measured by Scopus) are highlighted thus. (This is but one, rather limited, measure of the impact of my work). Significant numbers of my publications have clearly been collaborative (as shown by the authorships), but I only explicitly isolate such collaborations (underlined thus) if they clearly emerged from the research theses of Masters and PhD students whom I directly supervised.

The ambition of this account is therefore quite limited. It is not a comprehensive account of climate change knowledge of the last 30 years, nor of the problems associated with that knowledge and its uses and abuses in public life. Nor does this account reflect on the full range of influences – and people – which have shaped my own intellectual journey. Still less does it lay out my future research agenda. But what I do offer here is a story – a narrative structure – that may help others see the journey I am on and explain why my published work at different stages of my career may have been different, distinct and even at times contradictory.

The world that we study – the climates that we seek to understand – is not simply out there in pure form waiting to be discovered by the impartial mind. These climates that we bring to life are partly created through our processes of enquiry. That the knowledge about climate and climate change that I have offered my peers and my readers throughout my career does not always stitch together into a seamless whole, is therefore at least partly a function of the limitations and biases of my own mind and of its subjection to external (and internal) influences. This is one sense therefore in which my own ‘science’ of climate change has been ‘post-normal’ (cf. Hulme, 2007a,b). A full disclosure of these biases and inadequacies can of course never be delivered, neither by me nor by my interlocutors.

University Education : 1978-1984

I studied for a BSc degree in geography at the University of Durham (1978-1981). My first research report was my undergraduate dissertation – “*A severe winter weather index for the UK*” (Hulme, 1981) – which was completed in January 1981 as part of my honours degree.

An article was subsequently published from this work in the rather modest *Journal of Meteorology* (Hulme, 1982). This early use of **UK climate and synoptic data** demonstrated one of the recurring instincts which shaped my interest in climate: how its performance can be revealed through statistics. (My interest in numbers was cultivated through many childhood years of following cricket and being obsessed with cricket statistics). The “Hulme winter severity index” was subsequently promoted by John Thornes at the University of Birmingham and used by a number of local authorities in the development and application of salting regimes for motorway winter maintenance.

My PhD studies at University College Swansea (1981-1984) developed a second strand to my research interests, namely African climate and desertification and in particular **Sudanese rainfall and hydrology**. This was the focus of my PhD thesis – “*Secular variations in Sudan rainfall and water resources*” (Hulme, 1985a) – which was awarded by the University of Wales in June 1985. One of the side-achievements of my PhD was a compilation of the first digitised database of Sudan’s historical daily and monthly rainfall data, data which eventually ended up being assimilated into my later global precipitation archive. My interest in Sudan rainfall trends and variability and their social and environmental impacts led to several publications on this topic during the 1980s (Hulme, 1983; 1984; 1985b; 1987a,b,c; 1990a; Hulme and Tosdevin, 1989; Trilsbach and Hulme, 1984; Hulme and Trilsbach, 1989) which contributed to a growing international scientific analysis of the Sahel drought of the 1970s and 1980s. My index of annual rainfall trends in central Sudan was published in *New Scientist* in 1985 (Hulme and Walsh, 1985).

My work on Sudan rainfall variability was occurring at a time of heightened international attention on drought and famine in northeast Africa, especially Ethiopia. The severe famine in this region in 1984/5 gained worldwide attention and led to Bob Geldof’s Band Aid phenomenon of the summer of 1985. My work therefore had potential humanitarian (and some mildly political) significance and led to my **first paid consultancy**. This was for the development NGO Oxfam, who paid me £50 (cf. £150 today in terms of earning’s growth) to analyse my historical rainfall data from Sudan to ascertain whether a simple statistical monthly forecasting potential was feasible (Hulme, 1986a). For Oxfam, this was in the context of food security and the emergence in the 1980s of primitive famine early warning systems. Again, this work was to signal my later involvement in aspects of seasonal rainfall forecasting for Africa.

Employment at the University of Salford : 1984-1988

My first paid employment was as lecturer in physical geography at the University of Salford (1984-1988). This was in a rather small geography department, where I was the only climatologist. I taught across all undergraduate years, but my primary course was a third year option which I called ‘Contemporary climatic change’. I covered issues such as acid rain, stratospheric ozone depletion, tropical drought and desertification, nuclear winter and the enhanced greenhouse effect.

My publications during this period all built on my PhD research from Sudan. The implications of Sudanese rainfall characteristics for rural hydrology and water supply were

the subject of several papers (Hulme, 1986b, 1987d; Walsh et al., 1988). My 1986 paper on the adaptability of a rural water resource system in central Sudan was a precursor for **later work on climate adaptation**. This was well before the sub-field of climate adaptation had become established, yet it was nearly always geographers who were the leading thinkers in this area. I converted the literature review for my thesis into a small monograph in 1987 (Hulme, 1987e): *Annotated Bibliography of the Climate of Sudan*. During the summer of 1986, I was a British Council visiting lecturer at the University of Zimbabwe, Harare, for three months. This extended my interest in African climates into the southern hemisphere and laid the ground for a later southern African climate impacts research study which I led in the 1990s.

My work in the 1980s on African climate was firmly located in a geographer's worldview rather than in a meteorological perspective, or in the Earth system science paradigm which was emerging around this time. This is crucial for understanding later developments in my work on climate change: my early introduction to climate change and variability, and to its significance for ecology and society, was strongly rooted in place and culture. And, furthermore, this cultural setting – Islamic – was strongly differentiated from my own, allowing me to reflect on the role of culture in understanding climate and human responses to it.

My first major engagement with the media occurred in the spring of 1988 when I secured an arrangement with *The Guardian* newspaper to write a **regular monthly newspaper column** summarising the UK climate of the previous month, in statistical, graphical and narrative form. This opening resulted from my approach to the newspaper in February 1988 with an idea to give greater public prominence to UK climate variations. My reasoning was that readers were increasingly interested in the variability of climate and its impacts and my contribution would complement the newspaper's daily weather reports and forecasts. I was to continue writing these monthly and annual summaries for *The Guardian* without interruption until December 2001, a sequence of 165 monthly reports. (The series was then taken over by Weatherquest Ltd. at the University of East Anglia, to whom I franchised the concept).

For the first year (1988/9) of this association, these monthly climate summaries were supplemented by a parallel series of short articles, in which I introduced a variety of climate-society related topics into the newspaper. The full set 16 articles included ones on climate and winter weather payments, severe flooding in Khartoum, the behaviour of El Niño, the summer climate of English cricket Test Match venues. These articles gave me some media visibility and led directly to my first TV appearances in the summer of 1988: twice on BBC2 *Newsnight* commenting in July on the severe floods in Khartoum and in September on hurricane Gilbert's devastating arrival in Jamaica and Mexico.

This relationship with *The Guardian* newspaper early in my career now appears significant to me for a number of reasons. It was a good example of what would now in higher education be termed public engagement and impact: using my academic expertise to reach and engage public audiences. (These columns generated an interesting range of correspondence with *Guardian* readers). My thinking behind these articles also demonstrates a recurring pattern in my career engagement with climate: that the

relationship between climate and society matters and has wide public interest. And, third, this experience introduced me to the print media, gave me a media 'presence' and opened up later broadcast media opportunities.

The Climatic Research Unit (CRU) : 1988-2000

By the time I moved to the University of East Anglia in the 'greenhouse year' of 1988, my understanding of climate and its relationship with society had already formed around a number of perspectives: the innate variability of climate; the importance of such variability for societies, whether developed or developing; the notion of societal adaptability; the importance of culture in shaping understanding and attitudes to climate; the power of statistics in revealing climate variability. These perspectives had emerged from my academic training as a geographer, my place-based research in Sudan and my interest in numbers. And through my involvement with *The Guardian* newspaper I had also grasped – or had I even helped promote it in some small way? - the public interest in climate and its interactions with society.

In the autumn of 1988 I started a 2-yr employment contract in the School of Environmental Sciences at the University of East Anglia, based in the Climatic Research Unit (CRU). This contract work for the UK Department of Environment (DOE) established two new lines of research for me which came to dominate the next 10 years of my career: (i) global precipitation analysis - which later broadened out into work more generally on observational climate datasets - and (ii) the evaluation of global climate models - which later developed into work on climate scenarios. CRU provided a very different environment in which to study climate change compared to my habitation of academic geography departments. CRU rapidly inducted me into still forming international multi-disciplinary climate change network.

My work on **global precipitation** picked up on earlier work in the late 1980s by Ray Bradley and Henry Diaz and eventually led to me compiling one of the most comprehensive gridded global precipitation datasets in the world ([Hulme, 1992a](#)), later extended to the tropical oceans (Doherty et al., 1999). For the next 12 years, until I left CRU in 2000 to found the Tyndall Centre, I expanded and maintained this global station monthly precipitation data archive and gridded dataset. Analysis of this dataset led to a number of analytical publications: about global changes in humidity and aridity (Hulme et al., 1992a; Hulme, 1996a), trends in African ([Hulme, 1992b](#)), east Asian (Hulme et al., 1994a) and global land precipitation (Hulme, 1995; [New et al., 2001](#)) and spatial and temporal patterns of European summer drought (Briffa et al., 1994). This body of work on precipitation was recognised by the award in 1995, jointly with Phil Jones, of the Hugh Robert Mill Prize from the Royal Meteorological Society.

In parallel with this work on precipitation observations, I also started analysing output from first generation General Circulation Models (GCMs), especially the UK Met Office model(s). Building on Ben Santer's 1988 PhD thesis on model validation, I published a series of papers **evaluating different aspects of GCM performance** including:

- spatial patterns of land precipitation (Hulme, 1991a; Airey and Hulme, 1995; Airey et al., 1996 – based on Martin Airey's 1996 PhD thesis; Srinivasan et al., 1995);
- airflow indices over the British Isles (Hulme, et al., 1993a; Jones et al., 1993; Turnpenny et al., 2002);
- European summer drought (Jones et al., 1996);
- global precipitation sensitivity to global warming (Hulme et al., 1998a);
- daily precipitation variability (Osborn and Hulme, 1998; Osborn et al., 1999);
- the Southern Oscillation (Doherty and Hulme, 2002).

Some of my work relating both to precipitation analysis and to model evaluation was **methodological or statistical**: how best to compile regional indices of climate from erratically located station data (Barring and Hulme, 1991; Jones and Hulme, 1996; Jones et al., 1999; Horton et al., 2001) and how best to manipulate station climate data in order to conduct fair tests of climate model performance against observations (Hulme and New, 1997; Osborn and Hulme, 1997).

During the early 1990s I was also responsible for managing another UK DOE contract: what became known as the Climate Impacts LINK Project. This was concerned with facilitating the uptake of results from UKMO GCM climate change simulations by networks of researchers assessing the potential impacts of future climate change on a wide range of UK (and extra-UK) ecological and physical systems and activities. Through interactions with these networks, one of my early realisations was that such studies needed high quality and well-resolved observational climate data, as much as – if not more than – climate model results of possible future climates.

With my experience of working with African and global precipitation observational data I initiated and ran a number of funded projects which had the objective of generating comprehensive **gridded observational climate datasets**. These datasets adopted the World Meteorological Organisation normal period 1961-1990 as the baseline, but which also captured historical and spatial variability in observed climates for the most commonly used meteorological variables in climate impacts studies. This work started at the European scale (Hulme, 1994a; Hulme et al., 1995a), before extending to Africa (Hulme et al., 1996a) and then to the world's terrestrial land surface (New et al., 1999; 2000; 2002). These latter datasets became the most widely used in the world for climate impacts studies and these papers have become my most widely cited work; New et al. (2000) has been cited over 950 times¹ and is the 3rd most cited article in the *Journal of Climate*. With Tim Mitchell I later converted these gridded datasets into equivalents for national land territories (Mitchell et al., 2002), a data product which has also found a large number of applications.

I had first been introduced to the art of **climate scenario construction** shortly after arriving at CRU, when I worked with colleagues to generate a set of temporal analogue climate scenarios for Europe (Hulme et al., 1990). This quite rapidly took me into the use of GCM model simulations for scenario construction, often combined with results from reduced-form climate models such as Tom Wigley and Sarah Raper's simple climate model MAGICC (Model for the Assessment of Greenhouse Gas Induced Climate Change). This led to a series

¹ Scopus; 19 December 2011

of papers where I applied these methods for constructing regional climate scenarios for Africa (Hulme, 1994b), for the tropics (Hulme and Viner, 1998), for Scotland using regional climate models (Lu et al., 2002), incorporating changes in daily climate variability - based on Elaine Barrow's 1999 PhD thesis (Barrow and Hulme, 1996; Barrow et al., 1996) and for global impact studies (Viner et al., 1995; Hulme et al., 1999c).

Alongside these papers which reported the climate scenarios themselves, I also developed with colleagues a variety of methods for incorporating and **representing uncertainties in scenario products** – both emissions and modelling uncertainties (Hulme and Brown, 1998; New and Hulme, 2000; Dessai and Hulme, 2001). The particular issues surrounding uncertainties in regional scenarios were investigated in Mitchell and Hulme (1999) – based on Tim Mitchell's 2001 PhD thesis – and in Giorgi et al. (2001) and Dessai et al. (2005), while the significance of these uncertainties for impacts and adaptation assessments and policy development were evaluated in Hulme and Carter (1999), Dessai and Hulme (2004; 2007) and Dessai et al. (2007). This latter work was part of Suraje Dessai's 2005 PhD thesis. Finally, a series of papers based on Irene Lorenzoni's 2003 PhD thesis explored the co-development of climate and non-climate scenarios and their perceptions by different stakeholders and publics (Lorenzoni et al., 2000a,b; Lorenzoni and Hulme, 2009).

My work on climate scenario development also resulted in me being contracted to lead teams for the construction of successive national climate scenarios for the UK Government: in 1996 for the Climate Change Impacts Review Group (CCIRG, 1996), followed by the UKCIP98 (Hulme and Jenkins, 1998) and UKCIP02 (Hulme et al., 2002a,b) scenarios. Other scenario work which I led or contributed to around this time was for UNEP (Smith and Hulme, 1998), the European Commission (Hulme and Carter, 2000), WWF (e.g. Hulme and Sheard, 2000) and for the Intergovernmental Panel on Climate Change (IPCC) (Carter et al., 2000; Mearns et al., 2001). As a member of the IPCC's Task Group on Scenarios for Climate Impacts Assessment, I was responsible for managing the IPCC Data Distribution Centre between 1997 and 2001.

During my time in CRU during the 1990s I also made contributions to a number of **Integrated Assessment Models** (IAMs), most notably the ESCAPE (Evaluation of Strategies for Controlling and Preventing Emissions) model for the European Commission (Rotmans et al., 1994) and the MAGICC/SCENGEN climate scenario generator (Hulme et al., 1994a, 1995b), which was later taken up as an assessment tool by UNDP and for which I wrote the Handbook (Hulme et al., 2000). I also contributed to a later review of how climate extremes could be represented in IAMs (Goodess et al., 2004).

The expertise I had by now gained in the ways in which observational climate data and results from simple and global climate models could be combined to create climate scenarios, together with representations of different sources of uncertainty, allowed me to apply this knowledge to a number of **climate change impacts studies and assessments**. These studies covered different scales, regions and sectors and adopted a variety of methods. I conducted or contributed to assessments of the impacts of future climate change on China's water, agriculture and forests (Hulme et al., 1992d), UK land use (Hulme et al., 1993b), UK water resources (Wardlaw et al., 1996), the Nile Basin (Conway and Hulme, 1993, 1996; Hulme, 1994f; Conway et al., 1996), Indian evaporation (Chattopadhyay

and Hulme, 1997), global impacts (Parry et al., 1999; Arnell et al., 2002) and polar bear populations (O'Neill et al., 2008). The latter was part of Saffron O'Neill's PhD 2008 thesis and used expert elicitation methods. One seminal paper in this collection of studies explored the relative contributions of natural climate variability and anthropogenic climate change to future European water resources and crop yields (Hulme et al., 1999a,b), the first time these relative effects on regional resources had been systematically quantified.

Throughout these years I continued my interest and work on **Africa climate change, variability and socio-ecological impact**, building on my earlier PhD work in Sudan and in the semi-arid margins of the northern and southern tropics. I wrote a number of review articles about the troubled and contentious question of climate change and desertification in Africa (Hulme, 1989; Hulme and Kelly, 1993; Hulme, 1996a; Hulme, 2001a; Dai et al., 2004) and led one of the very first assessments of the value for African societies and economies of the emergent seasonal tropical rainfall forecasting capability being developed in the UK Met Office (Hulme, 1990b; Hulme et al., 1992b,c). I also applied scenario construction methodologies to Africa climates (Hulme, 1994b; Hulme et al., 2001), surveyed continent-wide trends in climate during the instrumental period (Hulme, 1996b) and contributed to studies of climate change impacts on the Nile Basin based on Declan Conway's 1993 PhD thesis (Conway and Hulme, 1993, 1996; Conway et al., 1996) and on African highland malaria (Patz et al., 2002). And in 1996 I reported the results of one of the first climate impacts and adaptation assessments for southern Africa (Hulme et al., 1996b), a study I had led with a contract from the World-Wide Fund for Nature.

I also made contributions to a number of studies into **observed climate trends and impacts in the UK**, revealing continuity with my very first climate study as a geography undergraduate student back in 1981 into UK winter weather. Alongside my regular monthly UK climate summaries for *The Guardian*, the very mild years of 1989 and 1990 were analysed in greater detail (Jones and Hulme, 1990; Hulme and Jones, 1991), as was the anomalously warm year of 1994/5 (Hulme, 1997a) and its economic impacts on the UK (Subak et al, 2000). Historical trends in heavy precipitation events were analysed (Osborn et al., 2000; Osborn and Hulme, 2002) and changes in the UK growing season (Mitchell and Hulme, 2002). A significant spin-off from my work on British climate was the publication in 1997 by Routledge of the edited book *Climates of the British Isles: present, past and future* (Hulme and Barrow, 1997), which I co-edited and to which I contributed to a number of chapters (e.g. Barrow and Hulme, 1997). This volume was timed to coincide with the 25th anniversary of the founding of the Climatic Research Unit by Hubert H Lamb in 1971/2

These diverse perspectives gained on global climate change enabled me to write a number of **review and synthesis articles** during these years. These included assessments of the significance of anthropogenic climate change for Less Developed Countries (Hulme, 1990c), east Asia (Hulme, 1994c) and the UK (Hulme, 1999a), while other papers or book chapters reported on the record global warmth of 1990 (Hulme, 1991b), mapping climate seasonality on global scales (Hulme, 1994d) and a summary of historic records and climate change in the instrumental period (Hulme, 1993a; Hulme and Jones, 1994). In similar vein, during the 1990s I wrote a series of eight literature reviews for the journal *Progress in Physical Geography* on various aspects of global warming (Hulme, 1991c; 1993b; 1994e; 1996c; 1997b; 1998; 1999b; 2000a).

During these 12 years in the Climatic Research Unit I came to see myself no longer as a geographer, but as a climate scientist. (For example, on my passport I now stated my occupation as 'climate scientist and I cancelled my membership of the Royal Geographical Society-Institute of British Geographers in 1992, only to join again in 2008). The two core pillars of my work during these years were the compilation and analysis of large-scale observational climate datasets, especially precipitation, and my work involving the evaluation and manipulation of climate model simulations. These two pillars of work converged around the idea of climate scenarios: their design, communication and application both to impact and integrated assessments.

'Uncertainties' were very evident in my work – regularly dealing with both data uncertainties and model uncertainties. But although I published significant papers on these issues, I did not have available to me the analytical tools from critical or philosophical disciplines to reflect more deeply about what such uncertainty signified, nor how this related to public policy-making. In CRU I was immersed in a contract research environment where my employment continuity and that of my group was dependent upon gaining the next research contract or consultancy. It would take me several more years to be able to adopt a more reflexive stance to my own work. But now, in 1999, the prospect of a major new research initiative was on the horizon.

The Tyndall Centre for Climate Change Research : 2000-2007

On behalf of UEA I successfully led the multi-university bid to three of the UK's national research councils to win the initial £10m research contract over five years to established a new inter-disciplinary climate change research centre. The bidding process took place during 1999/2000 and the Centre opened in October 2000. I left CRU and took on the role of Executive Director. For the next seven years, until July 2007, my duties become more oriented around research management and administration than around scientific or scholarly research. Operating now in a completely different setting to CRU, interacting with a more diverse set of academic and disciplinary traditions and with different external accountabilities, my thinking about climate change - how we can and should understand it, and how we should best respond to it – continued to evolve.

As part of my PhD work in Sudan in the early 1980s I had considered the ways in which **societies adapt to climate variability and change**, in that instance in relation to water resources in semi-arid agrarian societies (Hulme, 1986b). In the late 1990s the discourse of adaptation to anthropogenic climate change was becoming increasingly important, as some of my papers with colleagues showed (Hulme and Parry, 1997; Hulme et al., 1997; Downing et al., 1997; Parry et al., 1998a). As part of the adaptation research group with the Tyndall Centre I made a number of contributions to the significant work produced by the Centre during these years (Adger et al., 2003; Dessai and Hulme, 2004; Dessai and Hulme, 2007; Adger et al., 2009). I also explored the question of societal adaptation in the context of abrupt climate change, notably adaptation to the possibility of the collapse of the thermohaline circulation (Hulme, 2003). This latter work emerged out of my involvement on the scientific assessment panel of the NERC RAPID research programme.

My role at the head of the Tyndall Centre meant that I had to learn and think more carefully about **climate policy**. I had already published with colleagues some thoughts on the idea of dangerous climate change (Parry et al., 1996), an idea that was a powerful anchoring device in climate policy discourse. I later contributed to a more thoughtful argument about the problems of defining ‘dangerous climate change’ which emerged from an intense series of deliberations I helped convene within the Centre (Dessai et al., 2004). Some of my work also contributed to a reflection on the scope and ambition of the Kyoto Protocol which had been signed in 1997 (Parry et al., 1998b; Dessai and Hulme, 2001). In the autumn of 1997 I had been proactive with colleagues in compiling a list of nearly 800 signatories amongst European climate change-related scientists to an open letter to the European delegations convening in Kyoto urging them to lend their weight behind the idea of legally-binding emissions reductions targets. It was to be another 10 years before I revoked on this conviction, becoming convinced that this approach was misguided and ineffective (Hulme, 2010a; Prins et al., 2010).

My research publication output during these years running the Tyndall Centre reduced significantly. Yet I continued to write a number of more general articles or book chapters, offering a variety of perspectives on climate change science and policy. I reflected on some of the recent institutional and intellectual developments in the UK which had been provoked by climate change (Hulme and Turnpenny, 2004), an article in which for the first time I mentioned the idea of post-normal science. I also wrote a number of articles or book chapters offering overviews or perspectives on the current status of climate change as a scientific, social and policy issue (Hulme, 2002; Hulme, 2004; Watkinson et al., 2004; Hulme, 2005; Hulme et al., 2005). And as a new co-editor of the journal *Global Environmental Change*, I co-authored an introductory essay at the beginning of our period of tenure (Adger et al., 2005) in which we argued for the journal to re-orientate around the social, political and cultural dynamics of environment-society interactions. That this reflected a paradigm more familiar to me as ‘geography’ than as ‘Earth system science’ was significant.

During these years as Tyndall Centre Executive Director (and as Director after 2005), I began to write a growing number of shorter **opinion essays and commentaries** on many different aspects of climate change. These were for a wide variety of conventional printed media and the now rapidly rising number of on-line comment and discussion sites. For example, in 2000 I wrote an essay for *The Guardian* about the significance of severe flooding in Mozambique (Hulme, 2000b) and a commentary for *New Scientist* emphasising the difficult choices facing society when dealing with climate change (Hulme, 2000c). In the former, I made the observation that all weather is now ‘non-natural’, i.e., since the climate system is inescapably influenced to some extent by human actions all manifestations of that system at specific times and places (‘weather’) was also at the very least co-produced between the human and non-human world.

As my time as Tyndall Director was drawing to a close – I had already signalled in October 2005 my intention to retire from the position in 2007 - I wrote three short articles in 2006/7 which offered stronger challenges to some of the popular and professional understandings of climate change. In January 2006 I wrote in the *Times Higher Education* about the need to move beyond scientific analysis of climate change to embrace a much more radical inter-

disciplined analysis (Hulme, 2006a). In November 2006 I wrote an opinion piece for the BBC on-line Green Room in which I challenged the language and rhetoric of 'climate catastrophe' which I felt had become too pervasive around the edges of climate science and amongst some public commentators and advocates (Hulme, 2006b). And thirdly, in March 2007, I wrote a book review in *The Guardian* in which I claimed that climate change had become a post-normal science, in the sense that facts and values could no longer be cleanly separated (Hulme, 2007a,b).

These latter two essays in particular gained a huge amount of critical attention both inside the academy and outside, attention that was both positive and negative. I received more personal correspondence in response to my BBC Green Room essay than from any of my previously published work. These three essays signalled my growing unease about some of the ways in which (climate) science was being presented and deployed in public debates. My exposure to a wider range of academic disciplines allowed me to adopt a more critical stance in how I perceived the relations between climate change science, public knowledge and discourse and policy development. And my changing personal (see below) and professional circumstances gave me new independence to express these views in public.

School of Environmental Sciences : 2007 –

This intellectual move coincided with my imminent departure from the Tyndall Centre and the greater freedom I was to possess as an independent academic. I was no longer constrained by the need to secure recurrent contract funding for my salary (as in my years in CRU), nor by the management responsibilities of the Tyndall Centre and the need to satisfy major government and research council sponsors. (During this period – 2006 to 2009 - I did continue to manage one large EU consortium project: ADAM – 'Adaptation and Mitigation Strategies'. Drawing upon the results of this project I co-ordinated a book series and co-edited a major book - Hulme and Neufeldt, 2010). This departure from the Tyndall Centre also coincided with a personal mini-crisis I experienced in 2005 – in my 46th year of life – the result of which was that I signed up for two educational courses: first in autumn 2005 an evening course in memoir writing in UEA's School of Creative Writing and, second, in 2006/7, a postgraduate diploma in UEA's School of History. Both of these two courses were to have significant influences on my subsequent thinking and writing about climate change.

My research and professional writings on the subject of climate change in recent years have seen me draw much more heavily on some of the intellectual traditions and insights to which my earlier disciplinary training as a geographer had first introduced me. For example, I now returned to some of my work on climate scenarios, but was interested in subjecting this work to more rigorous critiques (Dessai and Hulme, 2008; Hulme and Dessai, 2008a,b; Girod et al., 2009). I became interested in the role of perception, memory and worldview in the ways in which people came to form their beliefs and impressions of climate change (Lorenzoni and Hulme, 2009; Hulme et al., 2009a; Bellamy and Hulme, 2011 – based on Rob Bellamy's 2009 MSc thesis). I wanted to investigate and offer more historically informed and situated accounts of the evolving idea of climate change (Hulme, 2001b; 2008a; 2009a;

2011a; 2012a) and how scientific knowledge is always coloured by broader cultural and intellectual movements.

Using newly discovered – for me! - theories and insights from **science and technology studies and the geography of science**, I became more critical of the ways in which climate change knowledge was made and exercised. The object of my critiques were not only my own earlier production of UKCIP climate scenarios (Hulme and Dessai, 2008a), but also the knowledge claims of the IPCC (Hulme, 2008b; 2010b; Hulme et al., 2010; Hulme and Mahony, 2010) and of the different ways in which climate knowledge gets validated (Hulme, 2010c). I also examined the deficiencies of global kinds of climate knowledge more generally (Hulme, 2010d; O’Neill et al., 2010) and the limitations of their use in policy (Hulme, 2008b,c; Hulme et al., 2011). And with regard to climate adaptation I co-authored a series of articles which challenged the presumption that climate model predictions are sufficient, or even necessary, for undertaking serious adaptation interventions (Dessai et al., 2009a,b; Hulme et al., 2009b). To elaborate the argument I scrutinised the role of one specific regional climate modelling system – PRECIS – in particular (Mahony and Hulme, 2012 – based on Martin Mahony’s 2010 MSc thesis).

Alongside these critiques of knowledge, I also began exploring the range of cultural forms through which climate change is represented and meaning constructed: in the media (Jennings and Hulme, 2010 – based upon Neil Jennings’ 2008 PhD thesis; Hulme, 2009b); in the use of icons (O’Neill and Hulme, 2009 – based upon Saffron O’Neill’s 2008 PhD thesis); in the form of myth (Hulme, 2010i); and in the ways in which representations of climate change are always imaginative and in flux, as much as climate change becomes reified through science (Hulme, 2010e,f,g; 2012b).

My thinking which underlay this change (to some people a rather surprising change) in my analysis of climate change – at least a change in the unquestioning support I might earlier have given to certain unreflexive policy discourses and advocacy campaigns – was laid out most comprehensively in my 2009 book ***Why We Disagree About Climate Change*** (Hulme, 2009c). This book was the culmination of the previous 10 years of my career and the different networks, people, situations, challenges, texts to which I had been exposed. It could only have been written following my experience of setting up and running the Tyndall Centre; it certainly could not have been written had I still been in the Climatic Research Unit. The book was (is) an academic best-seller with over 13,000 copies sold worldwide and having gone through five different printings.

Why We Disagree About Climate Change proved to be a provocative intervention into the discourse and politics of climate change. It received criticism from both environmental advocates and from climate change critics, but overall the reviews were more positive than negative. The book opened up for me creative interactions with more varied academic disciplines and networks (from environmental history and sociology, through to anthropology and literary criticism). It has also engaged me with public audiences in Europe, India, USA, Canada and Australia, with different institutions of civil society such as museums and literary festivals, and provided a bridge between my work and the new policy discourse of climate pragmatism (Hulme, 2010a; Prins et al., 2009, 2010).

Six months after *Why We Disagree About Climate Change* was published the 'Climategate' affair erupted. Owing to my previous involvement with CRU, I was familiar with some aspects of the allegations subsequently made by critics about the corruption of science. Some of my own email correspondence was amongst that published and I was also accused of certain dubious practices, or at least of being a proximate observer of such practices. From my new perspective as an analyst of science-society interactions around climate change, I was interested in 'Climategate' for a number of reasons, several of which I had explored just a few months earlier in my book. What did 'Climategate' teach us about the changing relationships between scientists and publics, about expectations of transparency and accountability in science and about the relationship between climate science and climate policy? I wrote a number of opinion essays and commentaries on these themes, some within a few days of the affair breaking (e.g. Hulme and Ravetz, 2009; Hulme, 2009d) and some later in 2010 after controversies about the IPCC had also emerged (e.g. Hulme, 2010b,j).

In January 2010 a new multi-disciplinary review journal - *WIREs Climate Change* - for which I was appointed Editor-in-Chief in 2007 was launched. Through this journal I have been able to commission and publish peer-reviewed review articles from the full suite of academic disciplines engaged with climate change, drawing upon the diverse networks of scholars and researchers around the world with which I have interacted throughout my career. I am keen to promote, in particular, reviews about climate change from scholars working in the **humanities and interpretative social sciences** for reasons outlined in my founding editorial (Hulme, 2010h; see also Hulme, 2011b). This appreciation for how the humanities can open up new ways of thinking about and acting upon climate change is leading me into new ventures, such as a cross-Faculty MA/MSc in Environmental Sciences and Humanities launching in 2012 and the framing for my next planned book project.

Full Reference List – (100+ cited publications are underlined)

- Adger, W.N., Huq, S., Brown, K., Conway, D. and Hulme, M. (2003) Adaptation to climate change in the developing world ***Progress in Development Studies* 3**, 179-195
- Adger, W.N., Brown, K. and Hulme, M. (2005) Re-defining global environmental change ***Global Environmental Change* 15**, 1-4
- Adger, W.N., Dessai, S., Goulden, M., Hulme, M., Lorenzoni, I., Nelson, D., Otto-Naess, L., Wolf, J. and Wreford, A. (2009) Are there social limits to adaptation to climate change? ***Climatic Change* 93**, 335-354
- Airey, M. and Hulme, M. (1995) Validating precipitation simulations by climate models: problems, methods and applications ***Progress in Physical Geography* 19**, 427-448
- Airey, M.J., Hulme, M. and Johns, T. (1996) Evaluation of simulations of precipitation by the UK Met. Office/Hadley Centre model ***Geophysical Research Letters* 23**, 1657-1660
- Arnell, N.W., Cannell, M.G.R., Hulme, M., Kovats, R.S., Mitchell, J.F.B., Nicholls, R.J., Parry, M.L., Livermore, M.T.J. and White, A. (2002) The consequences of CO₂ stabilisation for the impacts of climate change ***Climatic Change* 53**, 413-446
- Barring, L. and Hulme, M. (1991) Filters and approximate confidence intervals for interpreting rainfall

- anomaly indices **Journal of Climate** 4, 837-847
- Barrow,E.M. and Hulme,M. (1996) The changing probabilities of daily temperature extremes in the UK related to future global warming and changes in climate variability **Climate Research** 6, 21-31
- Barrow,E.M. and Hulme,M. (1997) Describing the surface climate of the British Isles pp.33-62 in, **Climates of the British Isles: present, past and future** (eds.) Hulme,M. and Barrow,E.M., Routledge, London, UK, 454pp.
- Barrow,E.M., Hulme,M. and Semenov,M. (1996) Effect of using different methods in the construction of climate change scenarios: examples from Europe **Climate Research** 7, 195-211
- Bellamy,R. and Hulme,M. (2011) Beyond the tipping point: understanding perceptions of abrupt climate change and their implications **Weather, Climate and Society** 3(1), 48-60
- Briffa,K.R., Jones,P.D. and Hulme,M. (1994) Summer moisture supply across Europe: an analysis based on the Palmer Drought Severity Index, 1892-1991 **Int. J. Climatol.** 14, 475-506
- Carter,T.R., Hulme,M., Crossley,J.F., Malyshev,S., New,M.G., Schlesinger,M.E. and Tuomenvirta,H. (2000) Climate change in the 21st century: interim characterizations based on the new IPCC emissions scenarios **Finnish Environment Institute Report No.433**, Helsinki, Finland, 148pp.
- CCIRG (co-author) (1996) **Review of the potential effects of climate change in the UK**, HMSO, London, 247pp.
- Chattopadhyay,N. and Hulme,M. (1997) Evaporation and potential evapotranspiration in India under conditions of recent and future climate change **Agric. and Forest Meteor.** 87, 55-72
- Conway,D. and Hulme,M. (1993) Recent fluctuations in precipitation and runoff over the Nile sub-Basins and impacts on Main Nile discharge **Climatic Change** 25, 127-152
- Conway,D. and Hulme,M. (1996) The impacts of climate variability and climate change in the Nile Basin on future water resources in Egypt **Int. J. Water Resources Development** 12, 277-296
- Conway,D., Krol,M., Alcamo,J. and Hulme,M. (1996) Future water availability in Egypt: the interaction of global, regional and basin-scale driving forces in the Nile Basin **Ambio** 25, 336-342
- Dai,A., Lamb,P.J., Trenberth,K.E., Hulme,M., Jones,P.D. and Xie,P. (2004) The recent Sahel drought is real **Int. J. Climatol.** 24 1323-1331
- Dessai,S. and Hulme,M. (2001) Climatic implications of revised IPCC emissions scenarios, the Kyoto Protocol and quantification of uncertainties **Integrated Assessment** 2, 159-170
- Dessai,S. and Hulme,M. (2004) Does climate adaptation policy need probabilities? **Climate Policy** 4, 107-128
- Dessai,S. and Hulme,M. (2007) Assessing the robustness of adaptation decisions to climate change uncertainties: a case-study on water resources management in the East of England **Global Environmental Change** 17(1), 59-72
- Dessai,S. and Hulme,M. (2008) How do UK climate scenarios compare with recent observations? **Atmospheric Science Letters** doi:10.1002/asl.197
- Dessai,S., Adger,N.W., Hulme,M., Köhler,J., Turnpenny,J. and Warren,R. (2004) Defining and experiencing dangerous climate change **Climatic Change** 64, 11-25

- Dessai,S., Lu,X. and Hulme,M. (2005) Limited sensitivity analysis of regional climate change probabilities for the 21st century **J. Geophys. Res.** 110, D19108, doi:10.1029/2005JD005919
- Dessai,S., O'Brien,K. and Hulme,M. (2007) On uncertainty and climate change **Global Environmental Change** 17(1), 1-3
- Dessai,S., Hulme,M., Lempert,R. and Pielke,R. jr. (2009a) Climate prediction: a limit to adaptation? pp.64-78 in, **Adapting to climate change: thresholds, values, governance** (eds.) Adger,W.N., Lorenzoni,I. and O'Brien,K. Cambridge University Press, Cambridge, 514pp.
- Dessai,S., Hulme,M., Lempert,R. and Pielke,R. jr. (2009b) Do we need better predictions to adapt to a changing climate? **EOS** 90(13), 111-112
- Doherty,R.M. and Hulme,M. (2002) The relationship between the SOI and extended tropical precipitation in simulations of future climate change **Geophys. Res. Letts.** 29(10), 113-116
- Doherty,R.M., Hulme,M. and Jones,C.G. (1999) A gridded reconstruction of land and ocean precipitation for the extended Tropics from 1974-1994 **Int. J. Climatol.** 19, 119-142
- Downing,T.E., Ringius,L., Hulme,M. and Waughray,D. (1997) Adapting to climate change in Africa **Mitigation and Adaptation Strategies for Global Change** 2, 19-44
- Giorgi,F., Hewitson,B., Christensen,H.J., Hulme,M., Von Storch,H., Whetton,P., Jones,R., Mearns,L.O. and Fu,C. (2001) Regional climate information – evaluation and projections pp. 583-638 in, **Climate change 2001: the scientific basis** (eds.) Houghton,J.T., Ding,Y., Griggs,D.J., Noguer,M., van der Linden,P.J., Dai,X., Maskell,K. and Johnson,C.A. (eds.) (2001) Contribution of WG1 to the IPCC Third Assessment, Cambridge University Press, Cambridge, UK, 944pp.
- Girod,B., Wiek,A., Mieg,H. and Hulme,M. (2009) The evolution of the IPCC's emission scenarios – changes, causes and critical aspects **Environmental Science and Policy** 12(2), 103-118
- Goodess,C.G., Hanson,C., Hulme,M. and Osborn,T.J. (2004) Representing climate and extreme weather events in integrated assessment models: a review of existing methods and options for development **Integrated Assessment** 3, 145-171
- Horton,E.B., Parker,D.E., Folland,C.K., Jones,P.D. and Hulme,M. (2001) The effect of increasing the mean on the percentage of extreme values in Gaussian and skew distributions. Response to X. Zhang *et al.* **Climatic Change** 50, 509-510
- Hulme,M. (1981) **A synoptic study of recent winters in the British Isles** Unpublished B.Sc. Dissertation, Department of Geography, University of Durham, 62pp.
- Hulme,M. (1982) A new winter index and geographical variations in winter weather **Journal of Meteorology (UK)** 7, 294-300
- Hulme,M. (1983) Unusual rains in the 1982-83 'dry' season at Khartoum **Weather** 38, 275-276
- Hulme,M. (1984) 1983: an exceptionally dry year in central Sudan **Weather** 39, 270-274
- Hulme,M. (1985a) **Secular climatic and hydrological change in central Sudan** Unpublished Ph.D. Thesis, University of Wales, 292pp.
- Hulme,M. (1985b) Dust production in the Sahel **Nature** 318, 488
- Hulme,M. (1986a) A monthly rainfall assessment model for central Sudan **Discussion Paper No.31**, Department of Geography, University of Salford, 25pp.
- Hulme,M. (1986b) The adaptability of a rural water supply system to extreme rainfall anomalies in central Sudan **Applied Geography** 6, 87-103

- Hulme,M. (1987a) Rainfall in Sudan: An asset or liability **Geoforum** 18, 321-331
- Hulme,M. (1987b) The 1986 wet season in central Sudan **Weather** 42, 193-195
- Hulme,M. (1987c) Secular changes in wet season structure in central Sudan **J. of Arid Environments** 13, 31-46
- Hulme,M. (1987d) Some hydrological consequences of secular climatic change in White Nile Province, central Sudan pp.35-46 in, **African resources: monitoring and appraisal, Vol.1** (eds.) Millington,A.C., Binns,J.A. and Mutiso,S.K. Reading Geographical Paper No.96, University of Reading, 57pp.
- Hulme,M. (1987e) **Annotated bibliography of the climate of Sudan** Cambridge Occasional Papers No.5, African Studies Centre, Cambridge, 54pp.
- Hulme,M. (1989) Is environmental degradation causing drought in the Sahel? **Geography** 74, 38-46
- Hulme,M. (1990a) The changing rainfall resources of Sudan **Trans. Inst. Brit. Geogr.** 15, 21-34
- Hulme,M. (1990b) The application of seasonal rainfall forecasts for Africa **Disasters** 14, 171-172
- Hulme,M. (1990c) Global warming in the twenty-first century: an issue for Less Developed Countries **Science, Technology and Development** 8, 3-21
- Hulme,M. (1991a) An intercomparison of model and observed global precipitation climatologies **Geophysical Research Letters** 18, 1715-1718
- Hulme,M. (1991b) Record warmth in 1990 and global warming **Geography** 76, 365-369
- Hulme,M. (1991c) Global warming **Prog. in Phys. Geography**, 15, 310-318
- Hulme,M. (1992a) A 1951-80 global land precipitation climatology for the evaluation of General Circulation Models **Climate Dynamics** 7, 57-72
- Hulme,M. (1992b) Rainfall changes in Africa: 1931-60 to 1961-90 **Int. J. Climatol.** 12, 685-699
- Hulme,M. (1993a) Historic records and recent climatic change pp.69-98 in, **The changing global environment** (ed.) Roberts,N., Blackwell, Oxford, 531pp.
- Hulme,M. (1993b) Global warming **Prog. in Phys. Geogr.** 17, 81-91
- Hulme,M. (1994a) The cost of climate data - a European experience **Weather** 49, 168-175
- Hulme,M. (1994b) Regional climate change scenarios based on IPCC emissions projections with some illustrations for Africa **Area** 26, 33-44
- Hulme,M. (1994c) Global warming and the implications for Asia and the Pacific pp.39-46 in, **The Far East and Australasia, 1995** (26th edn.) Europa Publications, London, 1142pp.
- Hulme,M. (1994d) Global climate seasonality, variability and change pp.50-63 in, **Atlas of world development** (ed.) Unwin,P.T.H., J.Wiley & Sons, Chichester, 346pp.
- Hulme,M. (1994e) Global warming **Prog. in Phys. Geography** 8, 401-410
- Hulme,M. (1994f) Global climate change and the Nile Basin pp.139-162 in, **The Nile: sharing a scarce resource** (eds.) Howell,P.P. and Allan,J.A., Cambridge University Press, Cambridge, 408pp.
- Hulme,M. (1995) Estimating changes in global precipitation **Weather** 50, 34-42
- Hulme,M. (1996a) Recent climatic change in the world's drylands **Geophys. Res. Letts.** 23, 61-64
- Hulme,M. (1996b) Climatic change within the period of meteorological records pp.88-102 in, **The physical geography of Africa** (eds.) Adams,W.M., Goudie,A.S. and Orme,A.R., Oxford

University Press, Oxford, UK, 348pp.

- Hulme, M. (1996c) Global warming **Prog. in Phys. Geogr.** 20, 222-229
- Hulme, M. (1997a) The climate in the UK from November 1994 to October 1995 **Weather** 52, 242-257
- Hulme, M. (1997b) Global warming **Prog. in Phys. Geogr.** 21, 446-453
- Hulme, M. (1998) Global warming **Prog. in Phys. Geogr.** 22, 398-406
- Hulme, M. (1999a) Climate change pp.406-436 in, **The Changing Geography of the UK** (eds.) Gardiner, V. and Matthews, H., Routledge, London, 528pp.
- Hulme, M. (1999b) Global warming **Prog. in Phys. Geogr.** 23, 283-291
- Hulme, M. (2000a) Global warming **Prog. Phys. Geography** 24, 591-599
- Hulme, M. (2000b) There is no longer such a thing as a purely natural weather event **The Guardian**, 15 March, Environment Section
- Hulme, M. (2000c) Choice is all **New Scientist** 2263, 4 November, 56-57
- Hulme, M. (2001a) Climatic perspectives on Sahelian desiccation: 1973-1998 **Global Environmental Change** 11, 19-29
- Hulme, M. (2001b) Manabe, S. and Wetherald, R.T. 1975: The effects of doubling the CO₂ concentration on the climate of a general circulation model *Journal of the Atmospheric Sciences* 32, 3-15. Classics in physical geography revisited **Prog. in Phys. Geogr.** 25, 385-387
- Hulme, M. (2002) Climate change: a sober assessment pp.1-17 in, **Nature's revenge?: hurricanes, floods and climate change** (ed.) Tony Gilland, Institute of Ideas, Hodder & Stoughton, London, UK, 88pp.
- Hulme, M. (2003) Abrupt climate change: can society cope? **Phil. Trans. Royal Society London (A)** 361, 2001-2021
- Hulme, M. (2004) A change in the weather? Coming to terms with climate change pp.21-44 in, **Global environmental issues** (ed.) Harris, F., Wiley & Sons, Chichester, UK, 324pp.
- Hulme, M. (2005) Recent trends in climate pp.31-40 in, **Climate change and biodiversity** (eds.) Lovejoy, T.E. and Hannah, L., Yale University Press, Yale, USA, 418pp.
- Hulme, M. (2006a) We need a change of climate to survive **Times Higher Educational Supplement** 6 January, p.14
- Hulme, M. (2006b) Chaotic world of climate truth **BBC News On-line, Viewpoint**, posted 4 November 2006, 3pp. news.bbc.co.uk/1/hi/sci/tech/6115644.stm
- Hulme, M. (2007a) The appliance of science in **The Guardian** 14 March, G2, p.9
- Hulme, M. (2007b) Understanding climate change: the power and the limit of science **Weather** 62(9), 243-244
- Hulme, M. (2008a) The conquering of climate: discourses of fear and their dissolution **The Geographical Journal** 174(1), 5-16
- Hulme, M. (2008b) Geographical work at the boundaries of climate change **Transactions of the Institute of British Geographers** 33(1), 5-11
- Hulme, M. (2008c) Governing and adapting to climate. A response to Ian Bailey's commentary on "Geographical work at the boundaries of climate change" **Transactions of the Institute of British Geographers** 33(3), 424-427

- Hulme, M. (2009a) On the origin of the greenhouse effect: John Tyndall's 1859 interrogation of Nature **Weather** 64(5), 121-123
- Hulme, M. (2009b) Mediating the messages about climate change: reporting the IPCC Fourth Assessment in the UK print media pp.117-128 in, **Media and climate change** (eds.) Boyce, T. and Lewis, J., Peter Lang, New York, 261pp.
- Hulme, M. (2009c) **Why we disagree about climate change: understanding controversy, inaction and opportunity** Cambridge University Press, Cambridge, 393pp.
- Hulme, M. (2009d) The science and politics of climate change **The Wall Street Journal** 2 December <http://online.wsj.com/article/SB10001424052748704107104574571613215771336.html>
- Hulme, M. (2010a) Moving beyond climate change **Environment** 52(3), May/June, 15-19
- Hulme, M. (2010b) The IPCC on trial: experimentation continues **Environmental Research Web Talking Point** <http://environmentalresearchweb.org/cws/article/opinion/43250>
- Hulme, M. (2010c) Claiming and adjudicating on Kilimanjaro's shrinking glaciers: Guy Callendar, Al Gore and extended peer communities **Science as Culture** 19(3), 303-326
- Hulme, M. (2010d) Problems with making and governing global kinds of knowledge **Global Environmental Change** 20(4), 558-564
- Hulme, M. (2010e) Cosmopolitan climates: hybridity, foresight and meaning **Theory, Culture and Society** 27(2/3), 267-276
- Hulme, M. (2010f) Learning to live with re-created climates **Nature and Culture** 5(2), 117-122
- Hulme, M. (2010g) The idea of climate change: exploring complexity, plurality and opportunity **Gaia** 19(3), 171-174
- Hulme, M. (2010h) Mapping climate change knowledge - an editorial for *Wiley Interdisciplinary Reviews (WIREs) Climate Change* **WIREs Climate Change** 1(1), 1-7
- Hulme, M. (2010i) Four meanings of climate change Chapter 2 (pp.37-58) in: **Future ethics: climate change and apocalyptic imagination** (ed.) Skrimshire, S., Continuum Press, London
- Hulme, M. (2010j) The year climate science was redefined **The Guardian** 16 November <http://www.guardian.co.uk/environment/2010/nov/15/year-climate-science-was-redefined>
- Hulme, M. (2011) Reducing the future to climate: a story of climate determinism and reductionism **Osiris** 26 (1), 245-266
- Hulme, M. (2011) Meet the humanities **Nature Climate Change** 1(4), 177-179
- Hulme, M. (2012, press) Climate In: **Mapping Shakespeare's World**, Section 1.1 in: **Cambridge World Shakespeare Encyclopaedia, Volume 1: Shakespeare's World** (eds.) B.F. Smith, Cambridge University Press
- Hulme, M. (2012, press) 'Telling a different tale': literary, historical and meteorological reading of a Norfolk heatwave **Climatic Change**
- Hulme, M. and Barrow, E.M. (eds.) (1997) **Climates of The British Isles: present, past and future** Routledge, London, 454pp.
- Hulme, M. and Brown, O. (1998) Portraying climate scenario uncertainties in relation to tolerable regional climate change **Climate Research** 10, 1-14
- Hulme, M. and Carter, T.R. (1999) Representing uncertainty in climate change scenarios and impact studies pp.11-37 in, **Representing uncertainty in climate change scenarios and impact studies, proceedings of the ECLAT-2 Helsinki Workshop, 14-16 April, 1999** (eds.) Carter, T., Hulme, M. and Viner, D., Climatic Research Unit, Norwich, UK, 128pp.

- Hulme, M. and Carter, T.R. (2000) The changing climate of Europe pp.47-84 in, **Assessment of potential effects and adaptations for climate change in Europe: the Europe ACACIA project** (ed.) Parry, M.L., The Jackson Environment Institute, UEA, Norwich, UK, 320pp.
- Hulme, M. and Dessai, S. (2008a) Negotiating future climates: a critical review of the development of climate scenarios for the UK **Environmental Science and Policy** 11(1), 54-70
- Hulme, M. and Dessai, S. (2008b) Predicting, deciding, learning: can we evaluate the 'success' of national climate scenarios? **Environmental Research Letters** 3(4), 045013, 7pp.
doi:10.1088/1748-9326/3/4/045013
- Hulme, M. and Jenkins, G.J. (1998) **Climate Change Scenarios for the United Kingdom** UKCIP Technical Report No.1, Climatic Research Unit, Norwich, UK, 80pp.
- Hulme, M. and Jones, P.D. (1991) Temperatures and windiness over the UK during the winters of 1988/89 and 1989/90 compared to previous years **Weather** 46, 126-135
- Hulme, M. and Jones, P.D. (1994) Global climate change in the instrumental period **Environmental Pollution** 83, 23-36
- Hulme, M. and Kelly, P.M. (1993) Exploring the links between desertification and climate change **Environment** 35, 4-11 and 39-45
- Hulme, M. and Mahony, M. (2010) Climate change: what do we know about the IPCC? **Progress in Physical Geography** 34(5), 705-718
- Hulme, M. and Neufeldt, H. (eds.) (2010) **Making climate change work for us: European perspectives on adaptation and mitigation strategies** Cambridge University Press, Cambridge, 413pp.
- Hulme, M. and New, M. (1997) Dependence of large-scale precipitation climatologies on temporal and spatial gauge sampling **Journal of Climate** 10, 1099-1113
- Hulme, M. and Parry, M.L. (1997) Whistling in the dark **New Scientist** 6 December, p.51
- Hulme, M. and Ravetz, J. (2009) 'Show your working': what ClimateGate means **BBC On-line Green Room** 1 December <http://news.bbc.co.uk/1/hi/sci/tech/8388485.stm>
- Hulme, M. and Sheard, N. (2000) Escenarios de cambio climatico para la Argentina pp.314-319 in, **Situacion ambiental Argentina 2000** (eds.) Bertonatti, C. and Corcuera, J., Fundacion vida Silvestre Argentina, Buenos Aires, Argentina, 440pp.
- Hulme, M. and Tosdevin, N. (1989) The Tropical Easterly Jet and Sudan rainfall: a review **Theor. and Appl. Climatol.** 39, 179-187
- Hulme, M. and Trilsbach, A. (1989) The August 1988 storm over Khartoum: its climatology and impact **Weather** 44, 82-90
- Hulme, M. and Turnpenny, J. (2004) Understanding and managing climate change: the UK experience **The Geographical Journal** 170, 115-125
- Hulme, M. and Viner, D. (1998) A climate change scenario for the Tropics **Climatic Change** 39, 145-176
- Hulme, M. and Walsh, R.P.D. (1985) A generation of drought that triggered disaster **New Scientist** 1451, p.11
- Hulme, M., Wigley, T.M.L. and Jones, P.D. (1990) Limitations of regional climate scenarios for impact analysis pp.111-129 in, **Landscape-ecological impact of climatic change** (eds.) Boer, M.M. and de Groot, R.S., IOS, Amsterdam, 429pp.
- Hulme, M., T.M.L.Wigley, T.Jiang, Z-C.Zhao, F.Wang, Y.Ding, R.Leemans and A.Markham, (1992a)

Climate change due to the greenhouse effect and its implications for China WWF International, Gland, Switzerland, 57pp. (English and Chinese versions).

- Hulme, M., Biot, Y., Borton, J., Buchanan-Smith, M., Davies, S., Folland, C.K., Nicholds, N., Seddon, D. and Ward, M.N. (1992b) Seasonal rainfall forecasting for Africa. Part I: current status and future development **Int. J. Env. Studies (A)** 39, 245-256
- Hulme, M., Biot, Y., Borton, J., Buchanan-Smith, M., Davies, S., Folland, C.K., Nicholds, N., Seddon, D. and Ward, M.N. (1992c) Seasonal rainfall forecasting for Africa. Part II: application and impact assessment **Int. J. Env. Studies (A)** 40, 103-121
- Hulme, M., Marsh, R. and Jones, P.D. (1992a) Global changes in a humidity index between 1931-60 and 1961-90 **Climate Research** 2, 1-22
- Hulme, M., Briffa, K.R., Jones, P.D. and Senior, C.A. (1993a) Validation of GCM control simulations using daily airflows indices over the British Isles **Climate Dynamics** 9, 95-105
- Hulme, M., Hossell, J.E. and Parry, M.L. (1993b) Future climate change and land use in the United Kingdom **Geogr. J.** 159, 131-147
- Hulme, M., Zhao, Z.-C. and Jiang, T. (1994a) Recent and future climate change in East Asia **Int. J. Climatol.** 14, 637-658
- Hulme, M., Raper, S.C.B. and Wigley, T.M.L. (1994b) An integrated framework to address climate change (ESCAPE) and further developments of the global and regional climate modules (MAGICC) pp.289-308 in, **Integrative assessment of mitigation, impacts and adaptation to climate change** (ed.) Nakicenovic, N., Nordhaus, W.D., Richels, R. and Toth, F., IASA Collaborative Paper Series CP-94-9, Laxenburg, Austria, 669pp.
- Hulme, M., Conway, D., Jones, P.D., Barrow, E.M., Jiang, T. and Turney, C. (1995a) A 1961-90 climatology for Europe for climate change modelling and impacts applications **Int. J. Climatol.** 15, 1333-1363
- Hulme, M., Raper, S.C.B. and Wigley, T.M.L. (1995b) An integrated framework to address climate change (ESCAPE) and further developments of the global and regional climate modules (MAGICC) **Energy Policy** 23, 347-355
- Hulme, M., Conway, D., Joyce, A. and Mulenga, H. (1996a) A 1961-90 climatology for Africa south of the equator and a comparison of PE estimates for the region **S.African J. Science** 92, 334-343
- Hulme, M. (ed.) (1996b) **Climate change and southern Africa: an exploration of some potential impacts and implications** CRU/WWF, Norwich, UK, 103pp.
- Hulme, M., Parry, M.L., Arnell, N. and Nicholls, R.J. (1997) Trouble is on its way **The Guardian** 2 December, p.17
- Hulme, M., Osborn, T.J. and T.C.Johns (1998) Precipitation sensitivity to global warming: Comparison of observations with HadCM2 simulations **Geophys. Res. Letts.** 25, 3379-3382
- Hulme, M., Barrow, E.M., Arnell, N., Harrison, P.A., T.E.Downing and T.C.Johns (1999a) Relative impacts of human-induced climate change and natural climate variability **Nature** 397, 688-691
- Hulme, M., Harrison, P.A. and Arnell, N.W. (1999b) Climate variability and crop yields in Europe: reply to Porter, J.R. and Semenov, M.A., **Nature** 400, 724
- Hulme, M., Mitchell, J.F.B., Ingram, W., Johns, T.C., Lowe, J.A., New, M.G. and Viner, D. (1999c) Climate change scenarios for global impacts studies **Global Environmental Change** 9, S3-S19

- Hulme, M., Wigley, T.M.L., Barrow, E.M., Raper, S.C.B., Centella, A., Smith, S. and Chipanshi, A. (2000) **Using a Climate Scenario Generator in Vulnerability and Adaptation Assessments: MAGICC and SCENGEN Workbook**, Climatic Research Unit, UEA, Norwich, 60pp.
- Hulme, M., Doherty, R.M., Ngara, T., New, M.G. and Lister, D. (2001) African climate change: 1900-2100 **Climate Research** 17, 145-168
- Hulme, M., Jenkins, G.J., Lu, X., Turnpenny, J.R., Mitchell, T.D., Jones, R.G., Lowe, J., Murphy, J.M., Hassell, D., Boorman, P., McDonald, R. and Hill, S. (2002a) **Climate change scenarios for the UK: the UKCIP02 Scientific report** Tyndall Centre, UEA, Norwich, UK, 112pp.
- Hulme, M., Turnpenny, J.R. and Jenkins, G.J. (2002b) **Climate change scenarios for the UK: the UKCIP02 briefing report** Tyndall Centre, UEA, Norwich, UK, 14pp.
- Hulme, M., Doherty, R.M., Ngara, T. and New, M.G. (2005) Global warming and African climate change: a re-assessment pp.29-40 in, **Climate change and Africa** (ed.) P.S.Low, Cambridge University Press, Cambridge, UK, 369pp.
- Hulme, M., Dessai, S., Lorenzoni, I. and Nelson, D. (2009a) Unstable climates: exploring the statistical and social constructions of 'normal' climate **Geoforum** 40(2), 197-206
- Hulme, M., Pielke, R.A. Jr. and Dessai, S. (2009b) Keeping prediction in perspective **Nature Reports Climate Change** Issue 11, 29 October, doi:10.1038/climate.2009.110
- Hulme, M. et al. (2010) IPCC: cherish it, tweak it or scrap it? **Nature** 463, 730-731
- Hulme, M., O'Neill, S.J. and Dessai, S. (2011) Is weather event attribution necessary for adaptation funding? **Science** 334, 764-765
- Jennings, N. and Hulme, M. (2010) UK newspaper (mis-)representations of the potential for a collapse of the thermohaline circulation **Area** 42(4), 444-456
- Jones, P.D. and Hulme, M. (1990) Temperatures and sunshine duration over the UK during the period May to October 1989 compared to previous years **Weather** 45, 430-437
- Jones, P.D. and Hulme, M. (1996) Calculating regional climatic time series for temperature and precipitation: methods and illustrations **Int J. Climatol.** 16, 361-377
- Jones, P.D., Hulme, M. and Briffa, K.R. (1993) A comparison of Lamb circulation types with an objective classification derived from grid-point mean-sea-level pressure data **Int. J. Climatol.** 13, 655-664
- Jones, P.D., Hulme, M., Briffa, K.R., Jones, C.G., Mitchell, J.F.B. and Murphy, J.G. (1996) Summer moisture variability over Europe in the Hadley Centre GCM using the Palmer Drought Severity Index **Int. J. Climatol.** 16, 155-172
- Jones, P.D., Horton, E.B., Folland, C.K., Hulme, M., Parker, D.E. and Basnett, T.A. (1999) The use of indices to identify changes in climatic extremes **Climatic Change** 42, 131-149
- Lorenzoni, I. and Hulme, M. (2009) Believing is seeing: laypeople's views of future socio-economic and climate change through scenarios in England and Italy **Public Understanding of Science** 18, 383-400
- Lorenzoni, I., Jordan, A., Hulme, M., Turner, R.K. and O'Riordan, T. (2000a) A co-evolutionary approach to climate change impact assessment: part I - integrating socio-economic and climate change scenarios **Global Environmental Change** 10, 57-68
- Lorenzoni, I., Jordan, A., Hulme, M., Turner, R.K. and O'Riordan, T. (2000b) A co-evolutionary approach to climate change impact assessment (II): a scenario-based case study in the UK **Global Environmental Change** 10, 145-155

- Lu,X., Crossley,J. and Hulme,M. (2002) An exploration of regional climate change scenarios for Scotland **Scottish Geographical Journal** 117, 251-270
- Mahony,M. and Hulme,M. (2012) Model migrations: mobility and boundary crossings in regional climate prediction **Transactions of the Institute of British Geographers** doi: 10.1111/j.1475-5661.2011.00473.x
- Mearns,L.O., Hulme,M., Carter,T.R., Lal,M., Leemans,R. and Whetton,P.H. (2001) Climate scenario development pp.739-768 in, *Climate change 2001: the scientific basis* (eds.) Houghton,J.T., Ding,Y., Griggs,D.J., Noguer,M., van der Linden,P.J., Dai,X., Maskell,K. and Johnson,C.A. (eds.) (2001) *Contribution of WG1 to the IPCC Third Assessment*, Cambridge University Press, Cambridge, UK, 944pp.
- Mitchell,T.D. and Hulme,M. (1999) Predicting regional climate change: living with uncertainty **Prog. in Phys. Geogr** 23, 57-78
- Mitchell,T.D. and Hulme,M. (2002) Length of the growing season **Weather** 57, 196-198
- Mitchell,T.D., Hulme,M. and New,M. (2002) Climate data for political areas **Area** 34, 109-112
- New,M., Hulme,M. and Jones,P.D. (1999) Representing twentieth century space-time climate variability. Part 1: development of a 1961-90 mean monthly terrestrial climatology **Journal of Climate** 12, 829-856
- New,M., Hulme,M. and Jones,P.D. (2000) Representing twentieth century space-time climate variability. Part 2: development of 1901-96 monthly grids of terrestrial surface climate **Journal of Climate** 13, 2217-2238
- New,M., Lister,D., Hulme,M. and Makin,I. (2002) A high-resolution data set of surface climate over global land areas **Climate Research** 21, 1-25
- New,M., Todd,M., Hulme,M. and Jones,P.D. (2001) Precipitation measurements and trends in the twentieth century **Int. J. Climatol.** 21, 1899-1922
- New,M. and Hulme,M. (2000) Representing uncertainties in climate change scenarios: a Monte Carlo approach **Integrated Assessment** 1, 203-213
- O'Neill,S., Osborn,T.J., Hulme,M., Lorenzoni,I. and Watkinson,A.R. (2008) Using expert knowledge to assess uncertainties in future polar bear populations under climate change **The Journal of Applied Ecology** 45(6), 1649-1659
- O'Neill,S.J. and Hulme,M. (2009) An iconic approach for representing climate change **Global Environmental Change** 19(4), 402-410
- O'Neill,S.J., Hulme,M., Turnpenny,J. and Screen,J.A. (2010) Disciplines, geography and gender in the framing of climate change **Bulletin of the American Meteorological Society** 91(8), 997-1002
- Osborn,T.J. and Hulme,M. (1997) Development of a relationship between station and gridbox rainyday frequencies for climate model validation **Journal of Climate** 10, 1885-1908
- Osborn,T.J. and Hulme,M. (1998) Evaluation of the daily precipitation characteristics of AMIP atmospheric model simulations over Europe **Int. J. Climatol.** 18, 505-522
- Osborn,T.J. and Hulme,M. (2002) Evidence for trends in heavy rainfall events over the UK **Phil. Transactions of the Royal Society (A)** 360, 1313-1325
- Osborn,T.J., Conway,D., Hulme,M., Gregory,J.M. and Jones,P.D. (1999) Air flow influences on local climate: observed and simulated mean relationships for the UK **Climate Research** 13, 171-191

- Osborn,T.J., Hulme,M., Jones,P.D. and Basnett,T. (2000) Observed trends in the daily intensity of United Kingdom precipitation **Int. J.Climatol.** 20, 347-364
- Parry,M.L., Arnell,N., Hulme,M., Nicholls,R.J. and Livermore,M. (1998a) Adapting to the inevitable **Nature** 395, 741
- Parry,M.L., Arnell,N.W., Hulme,M., Nicholls,R.J. and Livermore,M. (1998b) Buenos Aires and Kyoto targets do little to reduce climate impacts **Global Env. Change** 8, 285-289
- Parry,M.L., Arnell,N.W., Hulme,M., Martens,P., Nicholls,R.J. and White,A. (1999) The global impact of climate change: a new assessment **Global Environmental Change** 9, S1-S2
- Parry,M.L., Carter,T.R. and Hulme,M. (1996) What is a dangerous climate change? **Global Environmental Change** 6, 1-6
- Patz,J.A., Hulme,M., Rosenzweig,C., Mitchell,T.D., Goldberg,R.A., Githeko,A.K., Lele,S., McMichael,A.J. and Le Sueur,D. (2002) Regional warming and malaria resurgence **Nature** 420, 627-628
- Prins,G., Cook,M., Green,C., Hulme,M., Korhola,A., Korhola,E-R., Pielke,R.jr., Rayner,S., Sawa,A., Sarewitz,D., Stehr,N. and von Storch,H. (2009) **How to get climate policy back on course** LSE Mackinder Programme London and ISIS Oxford, 15pp.
- Prins,G., Galiana,I., Green,C., Grundmann,R., Hulme,M., Korhola,A., Laird,F., Nordhaus,T., Pielke jr.,R., Rayner,S., Sarewitz,D., Shellenberger,M., Stehr,N. and Tezuka,H. (2010) **The Hartwell Paper: a new direction for climate policy after the crash of 2009** London School of Economics, London, 42pp.
- Rotmans,J., Hulme,M. and Downing,T.E. (1994) Climate change implications for Europe: an application of the ESCAPE model **Global Environmental Change** 4, 97-124
- Smith,J.B. and Hulme,M. (1998) Climate change scenarios Chapter 3 in, **Handbook on methods of climate change impacts assessment and adaptation strategies** (ed.) Feenstra,J., Burton,I., Smith,J.B. and Tol,R.S.J., UNEP/IES, Version 2.0, October, Amsterdam
- Srinivasan,G., Hulme,M. and Jones,C.G. (1995) An evaluation of the spatial and interannual variability of tropical precipitation as simulated by GCMs **Geophys. Res. Letts.** 22, 1697-1700
- Subak,S., Palutikof,J.P., Agnew,M.D., Watson,S.J., Bentham,C.G., Cannell,M.G.R., Hulme,M., McNally,S., Thornes,J.E., Waughray,D. and Woods,J.C. (2000) The impact of the anomalous weather of 1995 on the UK economy **Climatic Change** 44, 1-26
- Trilsbach,A. and Hulme,M. (1984) Recent rainfall changes in central Sudan and their physical and human implications **Trans. Inst. Brit. Geogs.** 9, 280-298
- Turnpenny,J.R., Crossley,J.F., Hulme,M. and Osborn,T.J. (2002) Air flow influences on local climate: comparison of a regional climate model with observations over the United Kingdom. **Climate Research** 20, 189-202
- Viner,D., Hulme,M. and Raper,S.C.B. (1995) Climate change scenarios for the assessment of climate change on regional ecosystems **Journal of Thermal Biology** 20, 175-190
- Walsh,R.P.D., Hulme,M. and Campbell,M. (1988) Recent rainfall changes and their impact on hydrology and water supply in the semi-arid zone of Sudan **Geographical Journal** 154, 181-198
- Wardlaw,R.B., Hulme,M. and Stuck,A.Y. (1996) Modelling the impacts of climatic change on water resources **J.Chartered Inst. Water & Env. Management** 10, 355-364

Watkinson,A.R., Gill,J.A. and Hulme,M. (2004) Flying in the face of climate change: a review of climate change, past, present and future *Ibis* 146 (Suppl. 1), 4-10

Books (40) I have formally reviewed

- Allan,R., Lindesay,J. and Parker,D.E. '**El Niño, Southern Oscillation and climatic variability**' *Progress in Physical Geography* (1998) 23, 294-296
- Beaumont,P. and McLachlan,K. (eds.) '**Agricultural development in the Middle East**' *Applied Geography* (1987) 7, 84-85
- Behringer,W. '**A cultural history of climate**' *Reviews in History* (2010)
<http://www.history.ac.uk/reviews/review/925>
- Brown,V. et al., (eds.) '**Tackling wicked problems through transdisciplinary imagination**' *ECOS* (2010) December
- Burroughs,W. (ed.) '**Climate into the 21st century**' *Times Higher Educational Supplement* (2004) 16 April, p.29
- Burroughs,W. '**Watching the world's weather**' *New Scientist* (1991) 25 May, p.48
- Daniels,S., DeLyser,D., Entrikin,J.N. and Richardson,D. (eds.) '**Envisioning landscapes, making worlds: geography and the humanities**' *Progress in Human Geography* (2012, press)
- Dear,M., Ketchum,J., Luria,S. and Richardson,D. (eds.) '**GeoHumanities: art, history, text at the edge of place**' *Progress in Human Geography* (2012, press)
- Foster,J. '**The sustainability mirage**' *Nature Reports Climate Change* (2009), 3 (October), p.121 and in *The Geographical Journal* (2009) 175(4), 315-323
- Giddens,A. '**The politics of climate change**' *International Affairs* (2009) 85(5), 1022-1023
- Goodall,C. '**Ten technologies to save the planet**' *Third Way* (2009) 32(3), p.38
- Hamilton,C. '**Requiem for a species**' *Resurgence* (2010) 263 (November/December), pp.58-59
- Hayes,P. and Smith,K. (eds.) '**The global greenhouse regime: who pays?**' *Futures* (1994) 26, 878-879
- Hetherington,C.R. (ed.) '**The year without a summer? World climate in 1816**' *Bulletin American Meteorological Society* (1993), 74, 456-458
- Houghton,J.T. '**Global warming: the complete briefing (2nd edition)**' *Progress in Physical Geography* (1998) 23, 149-150
- Ibrahim,F.N. '**Ecological imbalance in the Republic of Sudan: with reference to desertification in Darfur**' *Sudan Studies (UK)* (1987) 1, 14
- Idso,S.B. '**CO2 and global change: the Earth in transition**' *Progress in Physical Geography* (1991) 15, 122-124
- Jackson,I.J. '**Climate, water and agriculture in the tropics (2nd edn.)**' *Applied Geography* (1990) 10, 78-79
- Jepma,C.J. and Munasinghe,M. '**Climate change policy: facts, issues and analyses**' *Meteorological Applications* (1998) 5, 405-406

- Lomborg,B. (ed.) '**Global crises, global solutions**' *Times Higher Educational Supplement* (2005) 22 April, pp.28-29
- Lomborg,B. (ed.) '**How to spend \$50 billion to make the world a better place**' *Times Higher Educational Supplement* (2006) 1 September, pp.24-25
- Lynas,M. '**High tide: news from a warming world**' *Times Higher Educational Supplement* (2004) 22 October, pp.24-25
- Mainguet,M. '**Desertification: natural background and human mismanagement**' *The Holocene* (1993) 3, 191-192
- Mannion,A. '**Carbon and its domestication**' *Times Higher Educational Supplement - textbook guide* (2006) 26 May, pp.XII-XIII
- Meyer,S.M. '**The end of the wild**' *Times Higher Educational Supplement* (2007) 2 February, p.22
- Mintzer,I.M. (ed.) '**Confronting climate change: risks, implications and responses**' *Endeavour* (1993)
- Nakicenovic,N. and Swart,R. (eds.) '**Emissions scenarios: Special Report of the IPCC**' *Times Higher Educational Supplement* (2001) 2 February, p.30
- Northcott,M. '**A moral climate: the ethics of global warming**' *Third Way* (2007) December, p.27
- O'Lear,S. '**Environmental politics: scale and power**' *Dialogues in Human Geography* (2012, press)
- Paepe,R. et al. (eds.) '**Greenhouse effect, sea level and drought**' *The Holocene* (1991) 1, 281-282
- Pretty,J. '**The Earth only endures**' *Times Higher Educational Supplement* (2007) 22 June, p.22
- Schellnhuber,H.J. et al. '**Avoiding dangerous climate change**' *Times Higher Educational Supplement* (2006) 18 August, p.23
- Speth,J.G. '**Red sky at morning: America and the crisis of the global environment – a citizen's agenda for action**' *Times Higher Educational Supplement* (2004) 22 October, pp.24-25
- Tyson,P.D. '**Climatic change and variability in southern Africa**' *Weather* (1990) 45, 154
- Urry,J. '**Climate change and society**' *Sociology* (2012, press)
- US National Assessment Synthesis Team '**Climate change impacts on the United States: the potential consequences of climate variability and change**' *Times Higher Educational Supplement* (2001) 22 June, p.25
- Victor,D. '**The collapse of the Kyoto Protocol and the struggle to slow global warming**' *Times Higher Educational Supplement* (2001) 22 June, p.25
- Walker,G. and King,D. '**The hot topic: how to tackle global warming and still keep the lights on**' *The Independent* (2008) 18 January, Review Supplement p.25 and in *Times Higher Education* (2008) 21 February, p.50
- Whyte,I. '**World without end? Environmental disaster and the collapse of empires**' *Progress in Human Geography* (2010) 34(5), 706-707
- Zhang,J. and Lin,Z. '**Climate of China**' *International Journal of Climatology* (1994) 14, 116