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Meteors and perceptions of environmental change in the *annus mirabilis* AD1783-4

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Abstract

The years 1783 and 1784 experienced a remarkable concentration of natural disasters with volcanic eruptions in Iceland, Italy and Japan, large earthquakes in Italy, floods in central Europe and greatly elevated human mortality in northwest Europe. This 'year of awe' has attracted considerable interest from environmental scientists and historians for both the natural disasters themselves and their societal perception. This paper argues that one key piece of this jigsaw has been largely over-looked: 1783 also saw reports of a remarkable number of large, bright meteors in Britain and throughout northern Europe, including one of the most dramatic in recorded history. Records of these meteors in British newspapers and the contemporary scientific record are explored and it is proposed that meteors played an important role in perceptions of environmental change. The meteors contributed to a widespread sense of impending cataclysm, often interpreted in explicitly religious terms. The scientific response was to catalogue and describe the sightings and hypothesise links with the other environmental 'events' of the period. To fully understand environmental change in the *annus mirabilis* the meteors cannot be ignored.

Keywords

Meteoroids; Climate; Fireballs; Laki; Aerosols

The *annus mirabilis* 1783-4

The period 1783-1784 contained a remarkable number of natural disasters perhaps unmatched in European history leading to its naming as an *annus mirabilis* ('year of awe': Steinthorsson 1992; Courtillot 2005). The most severe of these natural disasters was the massive Laki (also referred to as Lakagígar or Skaftáreldar) eruption in Iceland. The Laki eruption was the largest flood basalt eruption in the last millennium; over an 8-month period approximately 15 km^3 of lava was erupted and 122Mt of sulphur emitted to the atmosphere (Thordarson and Self 1993; 2003). The eruption had devastating impacts in Iceland where pasture land was degraded, the majority of the sheep and horses died and over 20% of the human population perished (Thorarinsson 1979; Thordarson and Self 2003). Impacts extended far beyond Iceland. A volcanogenic 'dry fog' was widely recorded across Europe with accounts from as far away as eastern North America, the Altai Mountains and even Brazil (Thorarinsson 1979, 1981; Stothers 1996; Demaree *et al*. 1998; Thordarson and Self 2003; Trigo *et al*. 2010). Models suggest Laki aerosols were distributed through most of the northern Hemsisphere (Stevenson *et al*. 2003; Chenet *et al*. 2005; Oman *et al*. 2006). The volcanic haze was associated with impacts on vegetation across northwest Europe (Grattan and Charman 1994; Grattan and Gilbertson 1994; Grattan and Pyatt 1994, 1999) and substantially elevated rates of human morbidity and mortality (Grattan *et al*. 2005; Witham and Oppenheimer 2005; Durand and Grattan 1999). The summer of 1783 was extremely hot in much of northern Europe while the winter of 1783-4 was one of the coldest on record with the Central England Temperature Series (Manley 1974) showing January temperatures of –0.6 °C, over 3 °C below the month's 30-year average (Witham and Oppenheimer 2005). The probable cause of this cold winter (and conceivably the hot summer: Grattan & Sadler 1999) was the Laki eruption with stratospheric injection of sulphur in a number of explosive phases leading to sulphuric acid aerosol formation and increased albedo (Devine *et al*. 1984; McCormick *et al*. 1995; Zielinski 2000; Thordarson & Self 2003). Analyses of the limited thermometer records for this period generally suggest European temperature suppression in the range 1-2°C (Lamb 1970, Sigurdsson 1982, Angell and Korshover 1985, Thordarson and Self 2003; Pisek & Brazdil 2006) and qualitative temperature records (Brazdil *et al*.

2003), models (Bertrand *et al*. 1999; Highwood and Stevenson 2003) and proxy-climate data (D'Arrigo and Jacoby 1999, Jacoby *et al*. 1999, Briffa 1998) support widespread cooling across the northern hemisphere, although some controversy remains over the link between the Laki eruption and the climatic anomaly (D'Arrigo *et al*. 2011)

The Laki eruption was the most dramatic and best known environmental 'event' of 1783-4 however it was far from the only one. Over-lapping with the Laki eruption there were also volcanic eruptions in Italy which contributed to the dry fog conditions in southern Europe (Camuffo and Enzi 1995). In Japan an eruption of Asama in May-August 1783 caused severe local impacts (Aramaki 1956; Zielinski *et al*. 1994; Yasui & Koyaguchi 2004). Off the Reykjanes Peninsula of SW Iceland a volcano erupted in February 1783 forming the new island of Nyey and attracting considerable interest from across Europe. There are even reports of a volcanic eruption in Germany (Grattan *et al*. 2000). In Italy there was a sequence of large earthquakes in Sicily and Calabria between February and March 1783 reaching M~7 and leading to perhaps 40,000 deaths (Hamilton 1783; Jacques *et al*. 2001; Pizzino *et al*. 2004). Other reports are of earthquakes in eastern France on 6th July; in the Netherlands on 7th or 8th August, in Lebanon on 30th July and in SW England in August 1783 (Demaree & Ogilvie 2001). Over the winter of 1783-4 there were severe floods in Central Europe (Brazdil *et al*. 2010). The combined effect of these events was a widespread sense of public disquiet, a cause of scientific investigation and even an expectation of the end of the world (Montredon 1784; Grattan & Brayshay 1995; Demaree and Ogilvie 2001).

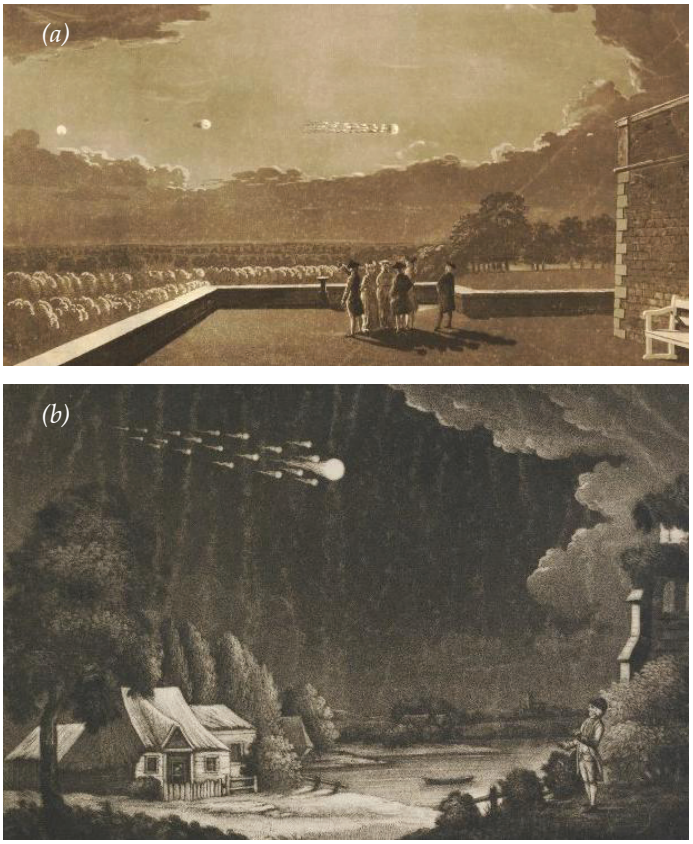

Fig. 1: Two contemporary engravings of the 'Great Meteor' of 18th August 1783. (a) 'The meteor of Aug 18th, 1783, as it appeared from the NE Terrace, at Windsor Castle' by Thomas Sandby. (b) 'An accurate representation of the meteor' seen at Winthorpe on 18th August 1783.' by Henry Robinson.
Note the fine details of, for instance, buildings and clothing visible by the light of the meteor, and strong shadows cast. Also of interest are the large number of distinct fragments in the train, the number and apparent size of which exceed most documented meteors and give some idea of the scale of the main body.
Both images © Trustees of the British Museum.

Environmental change in 1783-4 has been the subject of an intensive research effort by earth scientists and environmental historians over more than 20 years forming one of the best examples of the use of the historical record to inform scientific understanding of palaeoenvironmental change. This work has shaped our understanding of not only the environmental impacts of a sequence of extreme events, but how these were perceived by a relatively modern society. What has barely been commented on (the only reference I am aware of is Demaree & Ogilvie 2001) in any of the several hundred publications on this topic is that during this period there are reports of a remarkable number of large, bright meteors visible from northern Europe including one of the most spectacular ever recorded (Beech 1989). This paper explores these records and argues that meteor sightings played an important role in perceptions of rapid environmental change in this period. Two principal lines of evidence are used: the contemporary scientific literature and newspaper accounts, principally derived from the British Library's Burney Collection (Goff 2007).

The 'Great Meteor' of August 18th 1783

On the evening of 18th August 1783 an exceptionally bright meteor was seen across Britain and much of northwest Europe. A report from York records that '*the whole of the atmosphere, as far as I could discern, was perfectly illuminated with the most beautifully vivid light I ever remember to have seen.*' (Cooper 1784) A letter from Whitby (London Chronicle 26/8/1783) speaks of '*an extraordinary meteor... whose lustre almost equalled the sun.*' Piggott (1784a) writes of '*so vivid a brightness, that the whole horizon was illuminated, so that the smallest object might have been seen on the ground*'.' Cavallo (1784) notes that '*every object appeared very distinct; the whole face of the country... being instantly illuminated*'.' Artistic

depictions of the event show even fine details discernable by the light of the meteor (Beech 1989; Pasachoff and Olson 1995; Fig. 1). The meteor was one of the brightest and most dramatic ever recorded (Beech 1989).

The meteor was first seen from Shetland (Blagden 1784) and travelled in a SSE direction passing over Scotland, northern and eastern England and on over northern France (Fig. 2). Sightings are reported in northern continental Europe from Dunkirk, Calais, Ostend, Brussels and Leiden (Blagden 1784; London Chronicle 26/8/1783, 4/9/1783, 15/1/1784; Morning Post and Daily Advertiser 17/9/1783). In Ireland the meteor was recorded from Armagh, Mullingar, and Newtonards near Belfast (Edgworth 1784; Blagden 1784; EML 1967). The compendium of Greg (1861, 1867) lists a fireball sighting from southwest Germany at around the same time (listed as 7th August 1783 but this date is probably on the Julian calendar, 18th August on the Gregorian calendar). The most southerly acknowledged sighting is from Burgundy; a reported sighting from Rome is uncertain (Blagden 1784). These records show an amazing distance travelled by the meteor, apparently over 1600 km relative to the earth's surface, among the greatest ever observed.

Accompanying the meteor sightings are reports of

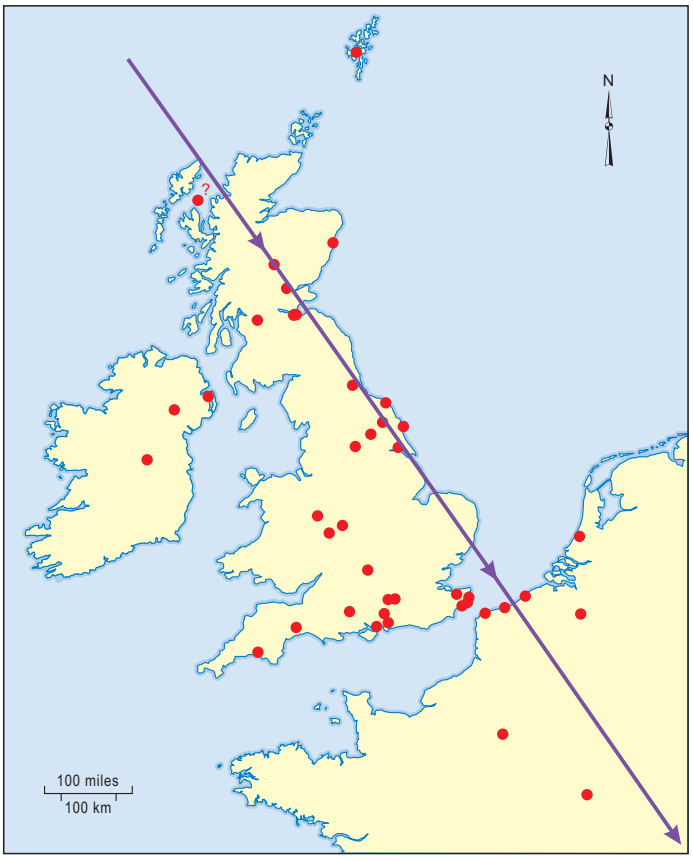

Fig. 2: Sighting locations of the 'Great Meteor' of 18th August 1783 based on contemporary scientific and newspaper accounts. The approximate path is based on extrapolation of vector shown by Beech (1989).

'hissing', 'whizzing' or 'crackling' noises (Blagden 1784), effects probably attributable to direct transduction of ELF or VLF electro-magnetic radiation (Keay 1980, 1992, 1995). Blagden (1784) calculates the altitude of the meteor to between 54 and 60 miles (86-97 km) by triangulation using eight sets of paired observations from across Britain and Ireland. As it passed over eastern England the meteor started to break-up, reports record many distinct smaller bodies within the train; more than 15 individual fragments are visible in the illustrations (Fig. 1). Accompanying this break-up are reports of explosions likened to a distant cannon-shot. It is probable that the meteor entirely disintegrated in the atmosphere (Beech 1989) or left the earth's atmosphere as there are no accounts of material reaching the ground.

Following the Great Meteor there are accounts of unseasonable aurorae borealis in Britain and Ireland. Six days after the meteor a letter from Dublin explicitly linked meteors and aurora: *'Last Sunday night, there was an aurora borealis in the north west quarter of the horizon near this city, and at the same time an amazing and unusual number of meteors, vulgarly called the falling stars, were seen incessantly in the eastern firmament.'* (Morning Herald and Daily Advertiser September 3rd 1783) In southern England two weeks after the Great Meteor there are several reports of aurora sightings, described in the London Chronicle (7th September 1783) as *'one of the strongest Aurora Borealis ever seen in this country.'* These accounts are of interest in the light of reports of 'bright nights' due to the formation of noctilucent clouds following other large meteors, notably the 1908 Tunguska event (Turco *et al*. 1982; Kelley *et al*. 2009). It seems possible that noctilucent clouds could be mistaken for aurorae, implying some meteoric aerosol component at this time (*cf*. Cziczo *et al*. 2001; Gerding *et al*. 2003; Klekociuk *et al*. 2005; Renard *et al*. 2008).

An elevated meteor flux in 1783?

Although, the 'Great Meteor' of 18th August 1783 was the most dramatic meteor in this period, it was far from the only one. A widely-disseminated letter from the British Astronomer Royal, Rev. Dr. Nevil Maskelyne, dated 6th November 1783 (e.g. Whitehall Evening Post 27/12/1783) highlights this: *'Five meteors, of the kind which, from there appearance, are generally called fire-balls, have been seen of late, in the space of a few weeks, viz. on August 18, Sept. 26, Oct. 4, 19 and 29, which seems to indicate that they appear more frequently than is commonly imagined.'* Maskelyne's later correspondence notes a further three meteors (EML 1967) and the corpus of material examined here adds up to four further meteors seen from the British Isles in late 1783 (Appendix 1). While

the reliability of some of the records is uncertain due to a lack of corroboration or possible confusion with other phenomena (Appendix 1) seven of the sightings are reported by fellows of the Royal Society giving reasonable confidence that the events are genuine meteor sightings. In addition to these events recorded in the British historical record the compendium of Greg (1861, 1867) lists further fireball sighting from Zelierfeld (Zellerfeld) in central Germany on September 5th, and Richmond, Virginia on 31st May. Applying strictly consistent search criteria it appears clear that the number of reported meteors in 1783 was well above background levels; that all of these sightings occur within a period of just three months is even more remarkable (Fig. 2). For such a large number of bright meteors to be observed in a restricted geographic area and very limited period of time in late 1783 might suggest a common origin. It is interesting to note that this period also marked the first sighting of a new comet (now designated 226P/Pigott-LINEAR-Kowalski), first seen from Yorkshire and subsequently reported from France and the USA, where it was noted to be visible with the naked eye (Pigott 1784; Gazeteer and New Daily Advertiser 26/2/1784; London Chronicle 11/5/1784). Although concurrence in timing is no proof of causality (new comets were discovered comparatively frequently through the late 18th century: Kidger 1994) the coincidence is noteworthy nonetheless.

Perceptions of the meteors

Grattan & Brayshay (1995) identify three distinct public responses to the 'dry fog' of 1783: 'God's divine judgement', 'Panic and alarm' and 'Rational and scientific', responses which are also apparent with respect to the meteors. Newspaper records from this period give a somewhat skewed view of public perception being written largely by and for more affluent members of society. A letter in the Whitehall Evening Post (21/8/1783) notes that: '*The globe of fire that appeared on Monday night ... could not, I think, have astonished or terrified any other than the ignorant part of the beholders. It was the most pleasant and beautiful phenomenon ever seen, and consequently could not be terrific.*' Such an attitude, that only the un-educated would be anything other than impressed by the meteors, is commonplace in these newspapers in which the most frequent descriptive adjective for the meteor is 'extraordinary'. However some accounts do provide a picture of a more emotional response. A report from Glasgow (London Chronicle 26th August) tells that '*Most boys were frightened with it, believing it to be a fiery dragon. Many men were so, at least astonished; and a few were delighted, like myself. Some ran into their houses; others bent themselves down, believing it was* [about to] *break upon them.*' Demaree & Ogilvie (2001) highlight a poem by William Cowper (1855) '*Fires from beneath, and meteors from above, portentous, unexampled, unexplain'd, have kindled beacons in the skies; and th'old and crazy earth has had her shaking fits more frequent and foregone her usual rest.*' Such phrases clearly suggest widespread public disquiet associated with the meteors. A correspondent from Honiton, Devon writes in the Morning Herald and Daily Advertiser (21st December 1783) that: '*About three hours ago we were all struck with a panics too dreadful to be described: an universal terror seized the whole town, and most people believed the world was at an end, for that the moon was falling from heaven.*'

Such references to an imminent end of the world were a recurrent theme in the response to the environmental disasters of this period (Grattan & Brayshay 1995) with many accounts expressed in explicitly religious terms. A report in the Morning Post and Daily Advertiser (21st August) relates that '*A Methodist preacher, who saw the aerial phenomenon on Monday night last, described it the following evening in his sermon thus: I saw heaven open, and lo! a prodigy! a revelation! in flames, a huge beast with seven heads and ten horns: seven crowns and ten comets issued; and like a wounded whale, gasped in the vacuum for the period of one hour, till at last the great mystery suddenly fell! Michael prevailed, and hurled the dragon down head-long.*' (the linking of meteors and comets with the archangel Michael may have a long history: Baillie 1999). The General Evening Post (26/8/1783) similarly reports that '*A Methodist preacher*

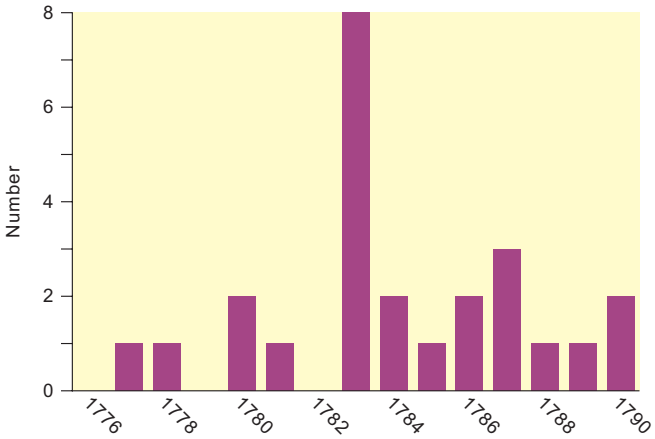

Fig. 3: References to British meteor sightings between 1776 and 1790 reported in newspapers of the British Library's Burney collection. For consistency only dated reports citing the word 'meteor' are included. In the late 18th century the term 'meteor' was sometimes used for other atmospheric and astronomic phenomena, only sightings attributable to meteors as we would now understand the term are included here. Note the large peak in 1783, suggesting enhanced meteor flux or greater reporting of meteors.

in his sermon on Sunday, informed his audience, that the meteor seen a few evenings ago, and which went over their heads, was a warning gun, but they might rest assured that the next which came would not fly so high, but blow their brains out.'

A frequent confusion is apparent between meteors and hot air balloons. The Montgolfier brothers flew the first hot-air balloon in June1783 and news of this exceptional event rapidly spread throughout Europe leading to a brief phase of 'aeromania' (Alexander 1996). Evidently many people were aware of this new invention but had a hazy idea of what a balloon might look like. The 4th October meteor was discussed in Parker's General Advertiser and Morning Intelligencer (9th October 1783) thus: *'The fiery meteor, which made its appearance on Saturday evening, is at present the subject of the day. ..The cause of this phenomenon has been differently accounted for, some saying, that it was a ball of fire sent by Mr Herschell from Greenwich. Others (and the most generally believed) say it was a ball of that inflammable matter invented by Mons. Montgolfier… Thus various have been the opinions upon this matter, but our correspondent thinks it was a meteor.'*

Enlightenment rationalism encouraged a more considered approach to the meteors typified by efforts to catalogue and record the sightings, to find precedent and to seek a causative mechanism with a particular emphasis on making links to the coincident environmental changes. Sir Charles Blagden (1784) compiled the various reports of the meteors on behalf of the Royal Society while Nevil Maskelyne corresponded widely and disseminated a detailed guide to recording future events. The meteor sightings of 1783 re-ignited a debate about the causes of meteors with three principle hypotheses presented, that meteors are an electrical phenomenon, that they are extra-terrestrial bodies and that they are balls of burning vapours in the upper atmosphere (Beech 1989). Suggested precedents included meteors in Ecuador in 1735, in the South Pacific in 1745 (*Morning Herald and Daily Advertiser* 25/8/1783), in Italy in 1676 (London Chronicle 26/8/1783) and in central England in 1766 (Blagden 1784).

Perhaps the most widespread scientific response to the environmental changes in 1783-4 was an attempt to draw links between the disparate environmental disasters. The link between the dry fog and the eruptions in Iceland (both the Laki eruption and the vastly smaller Nyey eruption) was independently suggested by several contemporary scientists including Christian Gottlieb Kratzenstein in Denmark (Thorarinsson 1981) and Mourgue de Montredon (Montredon 1784; Courtillot 2005) and Benjamin Franklin (Franklin in 1785; Payne 2010) in France. While such a link has been substantiated by a wealth of research other proposed links are not supported by current scientific knowledge. A widespread theory was that the dry fog was related to the Italian earthquakes (e.g. Montredon 1784). For instance a report in the Norwich Mercury (19/7/1783; Thordarson & Self 2003) suggests vegetation damage was due to '*air* [that] *received such a concussion by the late earthquakes at Messina and elsewhere, that it became impregnated with sulphurous particles and had all the qualities of lightning without being inflammable.'* A correspondent to the General Evening Post (13/9/1784) wrote that '*When we combine the time and circumstances of this phenomena* [in Iceland] *with the late earthquakes in Calabria, in Germany, in Sweden, in Siberia, we readily have recourse to the same common cause, namely that subterraneous fire which has lately spread terror over so great a part of the globe.'* The Gazette de Leyde in Leiden notes coincidence in timing between the emergence of Nyey and the Italian earthquakes (18/7/1783, Demaree and Ogilvie 2001).

The meteor sightings formed part of this discussion. A correspondent to the *London Chronicle* (26/8/1783) for instance suggests the 18th August meteor may have '*been occasioned by some of the vapours issuing from the volcanoes upon the New Island lately sprung up in the ocean, about nine leagues to the S.W. of Iceland or perhaps only from that profuse exhalation of vapours, occasioned by the excessive warm and dry weather we have experienced this summer.'* Similarly a correspondent to Parker's General Advertiser and Morning Advertiser (16/9/1783) notes that '*Others have conjectured that it* [the meteor] *was a flame issuing from a new volcano of the earth.*' The Gazetteer and New Daily Advertiser (22/8/1783) suggests the hot summer as a cause of the meteor: '*The meteor which has occasioned such a variety of conjectures since its appearance on Monday, a philosophical correspondent assures us, has nothing portentous. Such exhalations are very common in the southern hemisphere, when excessive heats succeed a wet season. The uncommon degree of rain that fell last year, the want of frost in the winter months, and so hot and dry a summer now so closely succeeding, has been the natural cause of those phenomena this country has exhibited*'.' Benjamin Franklin's (1785) essay 'Meteorological Imaginations and Conjectures' is well known for the speculation that the dry fog and cold winter might be related to the eruption in Iceland (e.g. Lamb 1970, Bertrand *et al*. 1999) however it is often over-looked that Franklin also suggests a second hypothesis that the fog was due to: '*the consumption by fire of some of those great burning balls or globes which we happen to meet with in our rapid course round the sun, and which are sometimes seen to kindle and be destroyed in passing our atmosphere.'* Clearly Franklin was aware of the meteors and considered them a possible agent of climatic change (Payne 2010).

Conclusions

Environmental change in 1783-4 has become a major research focus in environmental history however to-date one component has been missing from the discussion: as well as the Laki eruption and Italian earthquakes this period also encompassed a remarkable number of meteor sightings from northern Europe including one of the most dramatic in recorded history. The significance of these meteors lies as much in their role in the perception of rapid environmental change as with any physical impacts. People in 1783-4 were well aware that they were living through a period with a large number of natural disasters. The meteors, unlike the distant volcanoes and earthquakes and intangible dry fog, were directly witnessed by many people in northwest Europe and therefore a much more immediate experience. Responses ranged from the rational to the emotional. It is apparent that the meteors contributed to an atmosphere of portent and cataclysm among many people. The scientific response by contrast was to document and make linkages to other events. To fully understand environmental change and their perception in the *annus mirabilis* these meteors should not be ignored.

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Appendix 1: Possible meteor sightings based on historical accounts from the British Isles in AD1783-4. A number of accounts of 'fire-balls' associated with summer thunder-storms are not included here as they are clearly attributable to (ball?) lightning.

Event date	Description(s)	Source
26/9/1783[1]	*'Five meteors, of the kind which, from there appearance, are generally called fire-balls, have been seen of late, in the space of a few weeks, viz. on August 18, Sept. 26, Oct. 4, 19 and 29, which seems to indicate that they appear more frequently than is commonly imagined.'*	Maskelyne, in Whitehall Evening Post (27th December 1783)
27/9/1783	*'A correspondent assures us that at 40 minutes past six on Saturday evening a strong light came suddenly from behind him, much brighter than the moon when at full; he instantly turned and discovered a body of fire moving in a direction W.N.W. ... it seemed to burst and shot a train of fire about 12 degrees in length, the whole track of which remained visible the full space of a minute, and then gradually vanished.'*	London Chronicle (October 4th 1783)
	'On Saturday evening about 7 o'clock, a large meteor, similar to that which late occasioned much observation, appeared in the southeast part of the hemisphere, from whence it made a rapid progress towards the North West, leaving behind it a very light stream of vapour.'	Whitehall Evening Post (October 4th 1783)
3/10/1783[2]	*'Bright meteor.'*	The Gentleman's Magazine Vol. 54, p.72
4/10/1783 (morning)	*'rising from the northward to a small altitude ... an illumination like day-light; it vanished in a few moments leaving a train behind.'*	Blagden (1784)
	'I have heard of two more meteors... viz. Oct. 4 between 2 and 3 in the morning, seen by the coachman of the Worcester Coach.'	Letter from Nevil Maskelyne to Dr Hamilton, in EML (1967)
4/10/1783 (evening)	*'It was first perceived to the northward as a stream of fire, like the common shooting stars but large; and having proceeded some way under this form, it suddenly burst out into that intensely bright bluish light which is peculiar to such meteors ... Some observers thought this meteor also near as big as the moon, but to me it did not appear above one quarter of her diameter.'*	Blagden (1784)
	'I saw, towards the N.N.E. a train of fire, resembling in its motion a common meteor, vulgarly called a falling star, but the colour of it was red ... almost as large as the moon ; it illuminated the street and houses much more than any lightening I have seen.'	Aubert (1784)
	'an appearance in the atmosphere of a sphere with a diameter of 9 to 10 inches. It seemed to rise high from the stars, and it described at high speed an oblique line from above to below, and [then] it disappeared from the view westwards around the Lower Scheldt in the space of 2 minutes.'	Gazette von Antwerpen (7th October 1783) in Demarée and Ogilvie (2001)
	'The fiery meteor, which made its appearance on Saturday evening, is at present the subject of the day. Various have been the conjectures as to its progression and cause, there is not a point of the compass, but which it has been seen in by the different persons who saw it, some affirming its direction to be north, others south, and so on. The cause of this phenomenon has been differently accounted for, some saying, that it was a ball of fire sent by Mr Herschell from Greenwich. Others (and the most generally believed) say it was a ball of that inflammable matter invented by Mons. Montgolfier ... Thus various have been the opinions upon this matter, but our correspondent thinks it was a meteor.'	Parker's General Advertiser and Morning Intelligencer (9th October 1783)
18/10/1783	*'I have heard of two more meteors ... one Oct. 18th seen by Dr Sharp near Bamburgh Castle, Northumberland.'*	Letter from Nevil Maskelyne to Dr Hamilton, in EML (1967)
19/10/1783	*'By letters from Exeter we learn that a ball of fire passed over Exeter last Sunday evening, it appeared about the size of a man's head. The evening was remarkably serene.'*	Morning Chronicle and London Advertiser (27th October 1783)
	'Five meteors, of the kind which, from there appearance, are generally called fire-balls, have been seen of late, in the space of a few weeks, viz. on August 18, Sept. 26, Oct. 4, 19 and 29, which seems to indicate that they appear more frequently than is commonly imagined.'	Maskelyne, in: Whitehall Evening Post (27th December 1783)
29/10/1783	*'Five meteors, of the kind which, from there appearance, are generally called fire-balls, have been seen of late, in the space of a few weeks, viz. on August 18, Sept. 26, Oct. 4, 19 and 29, which seems to indicate that they appear more frequently than is commonly imagined.'*	Maskelyne, in: Whitehall Evening Post (27th December 1783)
13/11/1783	*'I thank you for the account of a meteor seen near you on Nov. 13th of which I had not heard before.'*	Letter from Nevil Maskelyne to Dr Hamilton, in EML (1967)

18/11/1783	*'A gentleman returning from Barnsley on Tuesday last about half past six o'clock in the evening ... a meteor, to appearance half the diameter of the moon, when in the meridian, seemed to fall a little more than a mile from him, of a very bright colour ... so light that he believes it was possible to distinguish the hour by a watch ... The same phenomenon was also observed by several people in this town and neighbourhood.'* *'The meteor which on the 18th November passed over part of England and was also seen in Burgundy: The Baron de Bernstoff, who calculated its velocity, proved in a lecture he delivered on the 4th of last month, that it came from London to Nuits in less than three minutes, that it was a distance of two leagues above the highest clouds, and was at least 216 feet in diameter.'*	Whitehall Evening Post (25th November 1783) London Chronicle (17th January 1784)
27/11/1783[3]	*'About three hours ago we were all struck with a panics too dreadful to be described: an universal terror seized the whole town, and most people believed the world was at an end, for that the moon was falling from heaven ... I ... to my unspeakable surprise beheld the alarming meteor; it still continued to approach nearer and nearer, and made its way over the upper part of the town, and apparently about a quarter of a mile high ... At last we were relieved from our fright by several of the gentlemen returning, and informing us, it was the air-ball which was let go from London.'*	Morning Herald and Daily Advertiser (21st December 1783)
6/8/1784[4]	*'This night about half an hour past ten, an extraordinary meteor appeared in a direction from West to East. It was observed at five distinct periods, and illuminated every part of the hemisphere with effulgence equal to the light of the sun, but with a blue cast. A violent rumbling was produced in the air for several seconds after the light disappeared.'*	Felix Farley's Bristol Journal (7th August 1784)
18/8/1784	*'M. Gommet has informed the societies and the public, that, on the 18th ult. [August] he saw at Turly, near Bourges, in Berry, a globe of fire, the most brilliant, and about half the size of the moon. It followed the sun, and had a luminous tail of about 20 degrees. It constantly shot forth sparks of light as large and brilliant as the planets, and which instantly disappeared. It was about 40 degrees above the horizon, and near the star Arcturus.'*	General Evening Post (4th September 1784)
28/9/1784[5]	*'For some evenings past this city, and indeed the whole estate, have been most awfully entertained by a most extraordinary meteor; it appeared like a luminous globe, in the shape of a comet with its tail, and was so brilliant at times, that sparks seemed to drop from it; it seemed to come from the Levant.'*	London Chronicle (14th October 1784)

1. Possible confusion in dates; the 26th September event is only referred to in Maskelyne's letter.
2. Possible confusion with the meteor in the early hours of 4th October.
3. The account of 27th November, which does otherwise sound very much like another meteor could, as suggested by the author, refer to a hot air balloon released from London on the 25th November (Lynn 2008), although the direction of travel would be surprising.
4. Presumed date.
5. The reference to 'some evenings past' suggests this is probably not a genuine meteor sighting.