

# Astronomical and Atmospheric Observations in the Anglo-Saxon Chronicle and in Bede

Heinrich Härke

(Honorary Research Fellow, University of Reading)

Textual sources of the early Middle Ages (fifth to tenth centuries AD) contain more astronomical observations than is popularly assumed. The Anglo-Saxon Chronicle lists some 40 observations of astronomical and atmospheric events for the just over 600 years it covers. But the contexts in which these are set show that eclipses, comets, meteor showers and aurorae were seen as portents of evil events, not as objects of early scientific curiosity. The case of Bede in the early eighth century shows that this was true, to an extent, even for the educated ecclesiastical elite. Bede's eclipse records also appear to show that astronomical events could be used to explain unusual phenomena such as the postulated volcanic 'dust-veil' event of AD 536.

## Background

Chronicles and narrative histories of the Early Middle Ages contain a number of entries relating to astronomical events and atmospheric phenomena. Sometimes, their number is surprising given the 'Dark Age' context: the Anglo-Saxon Chronicle, for example, reports astronomical and related observations in no fewer than 38 of its annals. Before one attempts to draw conclusions from this concerning the pursuit of science in this period, it is necessary to consider the historical and social context, and more specifically the nature of the written sources in which such observations are reported. Having done this, we will look at the list of relevant entries in the Anglo-Saxon Chronicle (ASC) and discuss some of the implications.

The Roman rule over large parts of Britain ended early in the fifth century AD with the withdrawal of the army and administration. State organisation and the keeping of written records rapidly disappeared thereafter. The Continental immigrants, later called 'Anglo-Saxons' who began to take over England from the middle of the fifth century onwards were, by the standards of the Roman Empire, uncivilized barbarians from outside the Empire, from the backwoods of northern Germany and southern Scandinavia. Their social organisation was tribal, their religion pagan, their culture illiterate, and their pattern of settlement

entirely rural, without any towns.<sup>1</sup> Conversion to Christianity did not happen until the seventh century, and the formation of the first large, stable kingdoms dates to about the same period, as does the re-emergence of towns.

Written records of the Anglo-Saxon period (c.AD 450–1066) have to be seen against this background. For a start, literacy was absent during the fifth and sixth centuries.<sup>2</sup> That is the original meaning of the, now unfashionable, term 'Dark Ages': a period not illuminated by textual evidence. This means that all records we find in chronicles and annals for these two centuries must necessarily have been taken from written records kept outside England, or they were extracted from oral transmission, such as heroic poems, bards' songs, and so on. Literacy only returned slowly to England with the introduction of Christianity, a religion based, after all, on a holy book which required reading at least by the clergy. This made churches and, initially even more importantly, monasteries the centres of reading, writing and learning in Anglo-Saxon England.

The return of literacy, however, does not mean that science also re-emerged at that time. The medieval concept of scholarship centred on classical texts which were read, re-read, interpreted and copied time and again, without much (if any) effort to check

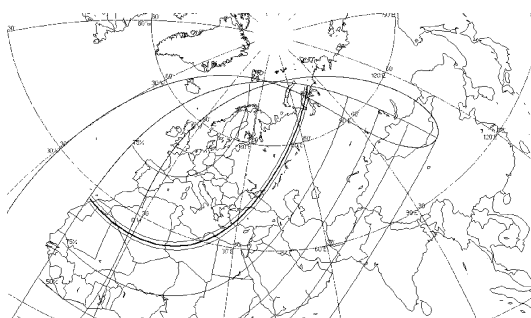
or substantiate them by direct observation. And, of course, the constant copying by hand of old, perhaps partly illegible manuscripts introduced errors, sometimes inadvertently (say, by transposing figures in a number, which might affect the record of an event or observation), sometimes deliberately (as when a gift of land had to be made older in order to establish a right of ownership). Also, the origin of historical annals and chronicles themselves was not the disinterested pursuit of the past as it was, but the explanation and legitimating of the present – requiring to represent the past more as it was imagined.<sup>3</sup> This affects how astronomical observations in such chronicles should be seen by modern readers because their report was unlikely to have been prompted by scientific interest, and even their dates may have been shifted in order to coincide with a significant event on earth.

### Observations in the Anglo-Saxon Chronicle

The ASC, although a wonderfully detailed source of information, is a perfect illustration of all these problems and caveats. It is a list of annals reporting events between 60 BC and AD 1154, but it focuses on the period from AD 449 (the arrival of the mythical first Anglo-Saxons, Hengist and Horsa) and 1066 (the Norman Conquest).<sup>4</sup> But these entries were not all made at the respective time: careful historical research and textual analysis have shown that the ASC was only compiled in the late ninth century, possibly on the orders of King Alfred the Great, using several earlier annals and texts. These include the *Ecclesiastical History of the English People* written by the Anglo-Saxon monk Bede (in Latin: *Beda Venerabilis*) in the early eighth century (see below).<sup>5</sup> Bede's text did not only supply the entry about the arrival and origins of the Anglo-Saxons, but also several astronomical entries (see below). From the late ninth century onwards the ASC was continued as a contemporary record, and numerous copies of it were made by hand over the centuries and kept in various places. Of these copies, seven have survived, the oldest of which appears to go back to the original compilation of the late ninth century.<sup>6</sup>

Between them, the various copies contain the following observations (comments or corrections in italics, in square brackets).<sup>7</sup>

AD 538            In this year there was an eclipse of the sun on 16 February from day-break until nine o'clock in the morning.

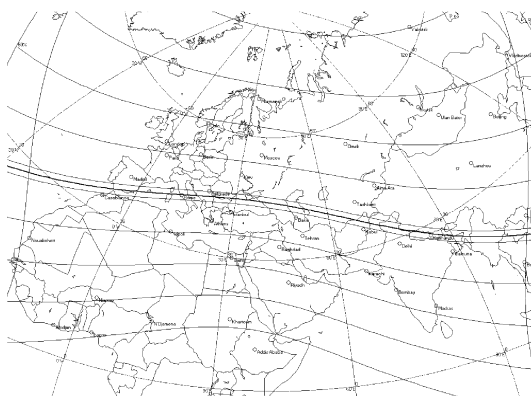


**Fig.1 Path of totality of the eclipse of AD 538.**

Courtesy of Chris Marriott's SkyMap

Pro, see <http://www.skymap.com>

AD 540            In this year there was an eclipse of the sun on 20 June, and the stars were visible for nearly half an hour after nine o'clock in the morning.



**Fig. 2 Path of totality of the eclipse of AD 540.**

Courtesy of Chris Marriott's SkyMap

Pro, see <http://www.skymap.com>

AD 664            In this year there was an eclipse of the sun on 3 May [*correct 1 May*]; and in this year a great pestilence came to the island of Britain.

AD 678            In this year [*correct: AD 676?*] the star called 'comet' appeared in August, and shone every morning for three months, like a sunbeam.

AD 729            In this year the star called 'comet' appeared and St. Egbert [*Bishop of Lindisfarne*] died.

AD 733            In this year Aethelbald [*King of Mercia*] occupied Somerset, and there was an eclipse of the sun and all the circle of the sun became like a black shield.

AD 734	In this year the moon looked as if it were suffused with blood, and Tatwine [ <i>Archbishop of Canterbury</i> ] and Bede died.	AD 809	In this year there was an eclipse of the sun at the beginning of the fifth hour of the day on 16 July, the second day of the week, the twenty-ninth day of the moon.
AD 744	In this year [ <i>bishop</i> ] Daniel resigned in Winchester and Hunfrith succeeded to the bishopric. And shooting stars were frequent.	AD 827	In this year there was an eclipse of the moon on Christmas Eve [ <i>correct 25 December 829, early morning</i> ]. And that year King Egbert conquered the kingdom of the Mercians, and everything south of the Humber.
AD 776	In this year a red cross appeared in the sky after sunset. And that year the Mercians and the people of Kent fought at Otford.	AD 879	And the same year a band of Vikings assembled and encamped at Fulham by the Thames. And the same year there was an eclipse of the sun for one hour of the day [ <i>correct: 29 October 878</i> ].
AD 793	In this year dire portents appeared over Northumbria and sorely frightened the people. They consisted of immense whirlwinds and flashes of lightning, and fiery dragons were seen flying in the air. A great famine immediately followed those signs, and a little after that in the same year, on 8 June, the ravages of heathen men [ <i>Vikings</i> ] miserably destroyed God's church on Lindisfarne, with plunder and slaughter.	AD 892	And the same year after Easter, at the Rogation days or before [ <i>correct: AD 891</i> ], there appeared the star which is called in Latin <u>cometa</u> . Some men say that it is in English the long-haired star, for there shines a long ray from it, sometimes on one side, sometimes on every side.
AD 795	In this year [ <i>correct: AD 796</i> ] there was an eclipse of the moon between cockcrow and dawn on 28 March, and Eardwulf succeeded to the kingdom of the Northumbrians on 14 May.	AD 904	In this year there was an eclipse of the moon.
AD 800	In this year there was an eclipse of the moon in the second hour of the eve of 16 January.	AD 905	In this year a comet appeared on 20 October.
AD 801	In this year there was an eclipse of the moon in the dawn on 20 December [ <i>correct: 21 May 802</i> ].	AD 926	In this year [ <i>correct: AD 927</i> ] appeared fiery lights in the northern quarter of the sky, and Sihtric [ <i>Norse King of York</i> ] died, and King Athelstan succeeded to the kingdom of the Northumbrians.
AD 806	In this year there was an eclipse of the moon on 1 September. And Eardwulf, king of the Northumbrians, was driven from his kingdom. And Eanberht, bishop of Hexham, died. Also in the same year on 31 May the sign of the cross was revealed in the moon, on a Wednesday at dawn. And again in this year on 30 August a wonderful circle was revealed around the sun.	AD 975	And soon in the same year in harvest time there appeared the star 'comet', and in the next year there came a very great famine and very manifold disturbances throughout England.
		AD 979	That same year [ <i>correct AD 978</i> ] a bloody cloud was often seen in the likeness of fire, and especially it was revealed at midnight, and it was

formed in various shafts of light. When day was about to dawn, it disappeared.

them were astonished for they did not remember anything like it before.

AD 995 In this year [*correct AD 994*] the star 'comet' appeared, and Archbishop Sigeric [*of Canterbury*] died.

AD 1106

In the first week of Lent, on the Friday, 16 February, in the evening, there appeared an unusual star, and for a long time after that it was seen shining a while every evening. This star appeared in the south-west; it seemed small and dark. The ray that shone from it, however, was very bright, and seemed to be like an immense beam shining north-east; and one evening it appeared as if this beam were forking into many rays towards the star from an opposite direction. Some said that at this time they saw more strange stars. However, we do not write of it more plainly because we did not see it ourselves. On the eve of Cena Domini [*21 March*], that is the Thursday before Easter, two moons were seen in the sky before day, one to the east and one to the west, both full, and the moon on that day was a fortnight old.

AD 1066 Then over all England there was seen a sign in the skies such as had never been before. Some said it was the star 'comet' which some call the long-haired star; and it first appeared on the eve of the Greater Litany that is 24 April, and so shone all the week. And soon after this Earl Tosti [*Tostig Earl of Northumbria returning from exile*] came from overseas into the Isle of Wight with as large a fleet as he could muster.

AD 1078 This year the moon was eclipsed three nights before Candlemas [*lunar eclipse of 30 January 1078*]. And Aethelwig, the abbot of Evesham, who was skilled in secular affairs, died on St. Juliana's Day.

AD 1110

AD 1095 In this year Easter was on 25 March, and then after Easter on the Eve of St. Ambrose's Day, which is 4 April, there were seen nearly all over this country nearly all night very many stars falling from the sky, not by ones or twos but so thickly that nobody could count them.

On the fifth night in the month of May, the moon appeared in the evening shining bright, and then little by little its light faded until early in the night it was quenched entirely, so much so that neither light nor circle nor anything of it at all was seen; and so it continued until nearly day, and then it appeared full and brightly shining – it was a fortnight old that same day. All that night the sky was very clear, and the stars all over the heaven shining very bright, and fruits were badly damaged by frost that night. After that, in the month of June, a star appeared from the north-east and its beam went out in front of it in the south-west, and it was seen like this for many nights, and later on in the night, after it had risen higher, it was seen going backwards to the north-west.

AD 1098 Before Michaelmas the sky looked as if it was burning all night. This was a very oppressive year because of all sorts of excessive taxes, and great rains that did not cease throughout the year; nearly all the cultivation perished on marshland.

AD 1104 This year Whit-Sunday was on 5 June and on the Tuesday after there appeared at midday four circles all round the sun, of white colour, each intertwined under the other as if they were painted. All who saw

AD 1114

In this year late in May there was

seen a strange star with long rays shining for many nights.

AD 1117 And on the night of 11 December the moon late in the night became as if it were all bloody, and then was eclipsed. Also on the night of 16 December the sky appeared very red as if it were on fire. And on the Octave of St. John the Evangelist there was the great earthquake in Lombardy.

AD 1121 And the moon was eclipsed on the eve of 5 April, and the moon was a fortnight old.

AD 1122 This same year Ralph, the archbishop of Canterbury, died; that was on 20 October. After that there were many sailors, at sea and on inland waters, who said that they saw in the north-east a great and broad fire near the earth, and it increased in length continuously up to the sky, and the sky opened on four sides and fought against it, as if it was going to quench it, and the fire increased no more then up towards the heavens. They saw this fire at daybreak, and it lasted until it was light everywhere. That was 7 December.

AD 1131 This year, after Christmas, on a Sunday night at first sleep, the sky in the north was all as if it was a burning fire, so that all who saw it were afraid as they had never been before – that was on 11 January. In the course of this same year, there was such a great cattle plague all over England as had never been before in the memory of man.

AD 1135 In this year King Henry went overseas at Lammas, and the next day, when he was sleeping on board ship, the day grew dark over all lands, and the sun became as if it were a three-nights'-old moon, with stars about it at midday [*correct: 2 August 1133*]. People were very much astonished and terrified, and

said that something important would be bound to come after this – so it did, for that same year the king died the second day after St. Andrew's Day, in Normandy.

AD 1140 After that, in spring, the sun grew dark, and the day, about midday when people were eating, so that they lit candles to eat by. That was 20 March, and the people were very much astonished. After that Will-iam, archbishop of Canterbury died.

At first sight, this looks like an impressive document of astronomical activities in the 'Dark Ages'. For the 603 years covered, we have the following reports:

Solar Eclipses	: 8
Lunar Eclipses	: 11
Comets	: 10
Meteor Showers	: 2
Aurorae	: 6 or 7
Atmospheric Phenomena	: 4

It is worth pointing out that a number of astronomical events are missing in the Anglo-Saxon Chronicle although they should have been visible from Britain. These include, in particular, the total solar eclipses of AD 758, 968 and 1023, and the supernova of AD 1054 (which produced the Crab Nebula).<sup>8</sup> There are several possible reasons for these omissions, weather being the most obvious one, but it may also be that the irregular recording system of events in batches rather than year by year, and the involvement of many authors were factors which produced gaps in the coverage.

Eclipses in Bede’s Ecclesiastical History

It is surely significant that the first five ASC entries with astronomical contents are also listed by Bede in his *Ecclesiastical History*: the solar eclipses of AD 538, 540 and 664, and the comets of AD 678 and 729.<sup>9</sup> It is highly likely that the compilers of the ASC took these annals straight from Bede.<sup>10</sup> This suggestion is supported by a small detail: for AD 729, two copies of the ASC refer to two comets, as does Bede; and he adds that they could be seen at the same time on opposite sides of the sun. This should mean

that the other (unknown) sources used by the ASC compilers did not mention any astronomical events until the eighth century when literacy was gaining ground again in England. We have to assume, therefore, that the oral traditions of the early Anglo-Saxons did not mention any astronomical observations. This is certainly true of the main heroic poem *Beowulf*, written down in the eighth century or even later, after several centuries of oral transmission.

But this, in turn, raises questions about Bede's sources: Where did he get the information from? Did he himself observe the comets and eclipses listed by him? This requires a short look at his background and location. Bede was a monk at Jarrow, in the kingdom of Northumbria, around AD 700; he died in AD 735 aged 63. He was more than an ordinary monk: he was a teacher, scholar and true polymath who wrote scores of books, commentaries and letters about a variety of subjects. These works had a huge influence on the revival of learning and scholarship in Western Europe in the late eighth and early ninth centuries which centred on Charlemagne's court and is known as the 'Carolingian Renaissance'. His book on the *Ecclesiastical History of the English People* (abbreviated HE) finished in AD 731 has earned him the epithet of 'Father of English History', but he wrote about subjects as diverse (from our modern point of view) as Latin grammar, theology, chronology, and science. And this included astronomy: in his treatise *On the Reckoning of Time*, he explained the motions of sun and moon, an interest which must, at least in part, be derived from the need to compute the Easter date; and in the book *On the Nature of Things*, he wrote about the structure of the world, grappling with concepts of cosmology and creation, mentioning the Milky Way and discussing planets, the zodiac, and eclipses.<sup>11</sup>

So, the inclusion of astronomical observations in the appendix of HE clearly did not happen by chance – he was not only interested in astronomy, but knowledgeable about it. This may or may not mean that he himself observed the heavens, or saw the phenomena he included in HE. It is not very likely that he saw the comet of AD 678 because he was a small boy aged five or six at the time. But the detail he provides about the comet of AD 729 suggests that he may indeed have seen this when he was about 57 years old. There can be no doubt, however, that he did *not* see the three solar eclipses he listed for AD 538, 540 and 664 – they all happened before he was born. He may have included the AD 664 eclipse because that was visible from Britain and was, therefore, part of the history he was writing about; it was visible in Ireland (where it was recorded in the *Annals of Ulster*), northern England and southern Scotland, and

this eclipse is, therefore, considered to be the 'first recorded in England from genuine observation in that country'.<sup>12</sup> By contrast, Bede's two earlier eclipses could not be seen from anywhere in the British Isles or Western Europe. In both cases, the totality zone crossed the Mediterranean and the Black Sea (Figs. 1 and 2). Thus, it stands to reason that Bede derived his information from a Roman or Byzantine source; he could have obtained it from Rome, or he found it among the 200 or so volumes in the library of his monastery, and the compilers of the ASC, in turn, copied it from his book.<sup>13</sup>

This argument explains where the ASC entries of these two eclipses come from, but it does not explain *why* Bede lifted from a Roman or East Mediterranean text the record of two eclipses which were not visible from the British Isles, to include them in his history of England. While this seems to get us away from the main subject here, it is relevant because it illustrates how astronomical and atmospheric observations may have been confused at the time, or used to explain other phenomena. It is worth looking at Bede's entries in full:

In the year 538, an eclipse of the sun occurred on the sixteenth of February, lasting from Prime to Terce [*daybreak to 9 a.m.*].

In the year 540, an eclipse of the sun occurred on the twentieth of June, and the stars appeared for nearly half an hour after the hour of Terce [*9 a.m.*].<sup>14</sup>

These are very specific entries, giving the times of visibility and (in the second case) an impossible length of the total phase, without even a hint that this visibility applied only to some place in the Mediterranean. Any reader at the time would have believed that Bede and, following him, the ASC reported events visible from England. But that may be the point: perhaps he wanted to explain something that was visible from England. Research on tree rings by Mike Baillie at Queen's University Belfast has shown that the entire northern hemisphere was affected in the late 530s by a sudden climatic deterioration caused either by clouds of ash from a major volcanic eruption (which is Baillie's own suggestion), or by dust veils from a cometary impact (as suggested by Victor Clube).<sup>15</sup> These tally with an acidity layer in the Greenland ice-cores dated to around AD 540.<sup>16</sup> Whatever the cause, the climatic effects of this event seem to have been so far-reaching that they were recorded in several textual sources in the Mediterranean, and so profound that they precip-



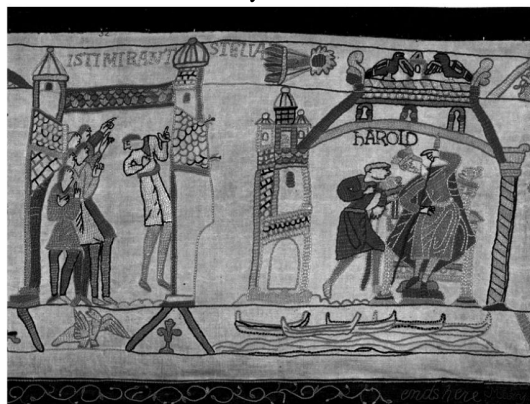
itated a 'sixth-century crisis' in Europe.<sup>17</sup> It is quite possible, therefore, that Bede found garbled reports of 'darkened skies' over England (or something to that effect) in older chronicles or oral traditions, and whilst trying to figure out what this meant, he found a Byzantine text with what looked like a reasonable explanation of 'dark skies': two eclipses. What apparently he did not realize, is that these eclipses would not have darkened the skies of Britain.

## Conclusions

If this sounds like scientific reasoning on Bede's part, this does not mean that he was consistently scientific in his approach to events: he reported many physically impossible or unlikely miracles, like floating stone altars, where it would improve his storyline on the conversion of the Anglo-Saxons. Nor should it lead us to assume such an informed, scientific outlook among other chroniclers of the Early Middle Ages. Reading the ASC excerpts above, shows that the chroniclers paid the greatest attention to eclipses and comets and in many cases juxtaposed them with significant events, such as the death of a saint or a king, or the arrival of a hostile army. This link is made quite explicit, both in phrasing and intention, in the annals for AD 1135: it records what is clearly a solar eclipse, and then adds: 'People were very much astonished and terrified, and said that *something important would be bound to come after this* [author's emphasis. HH] – so it did, for that same year the king died the second day after St. Andrew's Day, in Normandy'.<sup>18</sup> Actually, the eclipse had happened in AD 1133, two years before the king's death, but the scribe moved it to AD 1135, clearly in order to have a celestial omen for the royal death. This was all the more important as King Henry's succession was disputed, and civil war followed his death.<sup>19</sup> In the annals for AD 1140, the situation is vice versa: the eclipse entry for this year is correct (there was a solar eclipse on 20 March that year), but Archbishop William had died four years earlier – not after the eclipse as the ASC would have us believe.<sup>20</sup>

Aurorae, meteor showers, and particularly comets were similarly used in the ASC as evil portents, such as in the cases of the deaths of bishops (comets of AD 729 and 995), famine (comet of AD 975) and invaders (aurorae of AD 793, and comet of AD 1066). The appearance of Halley's Comet in AD 1066 also demonstrates that this belief was not confined to the scribes of the ASC. The comet is shown on the so-called Bayeux Tapestry, a needlework 'strip cartoon' which was made in the 1170s in southern England and tells the story of the Norman Conquest of England.<sup>21</sup> In one scene, we see people gazing and pointing at the

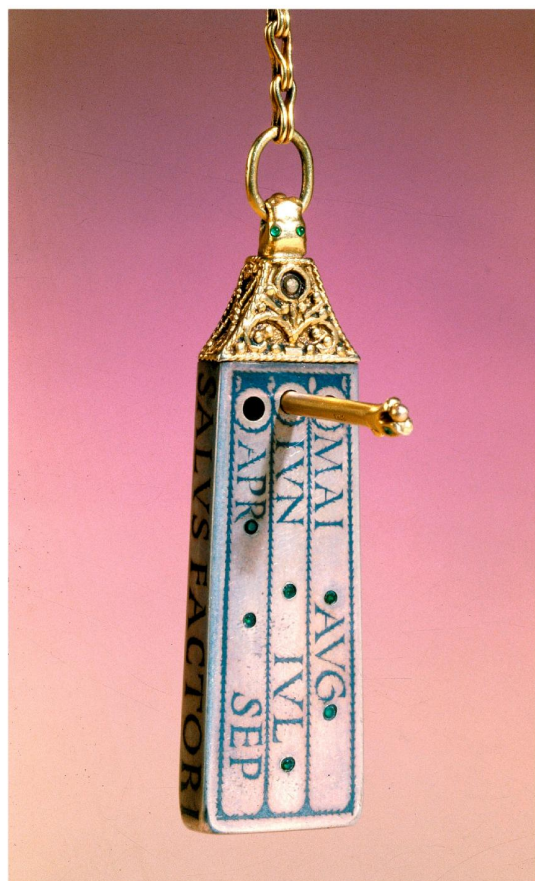
comet with its fiery tail, and the Latin caption informs us 'isti mirant stella' ('these here marvel at the star'). Several contemporary texts confirm that it was easily visible with the naked eye from Britain and Western



**Fig. 3 Halley's Comet in AD 1066 on the Bayeux Tapestry (replica at Reading Museum)**  
See Plate 3 for colour image on page 43

Europe. On the tapestry, King Harold is seen sitting on his throne, listening intently to an adviser who appears to explain to him this remarkable phenomenon. Harold had just succeeded to the crown of England which was also claimed by William, Duke of Normandy. The makers of the tapestry, with the benefit of hindsight, quite obviously wanted to suggest that the comet had been an evil omen for Harold, foretelling his defeat and death. Nor was this interpretation of comets confined to English chroniclers of the Early Middle Ages: the Spanish chronicler Hydatius saw the comet of AD 442, also with hindsight, as a portent of the serious plague in AD 443.<sup>22</sup>

In 1984, Patrick Moore drew attention to the astronomical notes in Bede's *Ecclesiastical History*. He concluded that 'Bede was at least paying some attention to the sky when nobody else in England was likely to be doing so', and he suggested that Bede must have been one of the earliest British amateur astronomers.<sup>23</sup> This paper seeks to show that astronomical and atmospheric observations are more frequent in early medieval documents than one might expect.<sup>24</sup> The sky and the movements of celestial bodies were observed, not least because time reckoning was an important issue. 'But while Bede's scientific interest and knowledge cannot be doubted, the Anglo-Saxon Chronicle is also important because it demonstrates that other, and probably most, observers of the period do not seem to have been inspired by a sense of enquiry or aesthetics, but by superstition and a belief in divine portents. To them, eclipses, comets, aurorae and meteor showers must



**Plate 2. Anglo-Saxon sundial found in grounds of Canterbury Cathedral, tenth century (replica).**

Courtesy of Science Museum, London/SSPL

have appeared as transient phenomena in a cosmic order perceived as static, requiring explanations which linked them to events in the ever-changing world of humans.

### Acknowledgements

John Tate of the Armagh Planetarium kindly plotted for me the solar eclipses of AD 538 and 540 some 20 years ago when my interest in the astronomical observations in early medieval texts was first aroused while I was reading them for very different research purposes. Patrick Moore asked me in 1991 to give him an early version of this paper for publication in a popular astronomy magazine; it may be a good thing that I did not give him that first, and rather undigested, version at the time, but his letter certainly encouraged me to continue looking into and thinking about this subject. I am also grateful to Gerry Bond for advice on, and help with, the eclipse maps for AD 538 and 540, and to Chris Marriott for permission to reproduce them here.

### Notes & References

1. Welch, Martin, *The English Heritage Book of Anglo-Saxon England* (London: Batsford 1992).
2. Yorke, Barbara, 'Fact or fiction? The written evidence for the fifth and sixth centuries AD', *Anglo-Saxon Studies in Archaeology and History* (1993), 6, 45–50.
3. Yorke (note 2)
4. Several versions of the Anglo-Saxon Chronicle are found in Whitlock, Dorothy, *English Historical Documents c.500–1042* (London and New York: Eyre Methuen, 2<sup>nd</sup> edition 1979). There is also a handy paperback edition in Everyman's Library (Vol. 1624, London and New York: Dent and Dutton).
5. Bede, 'Historia Ecclesiastica Gentis Anglorum', edited and translated by Colgrave, B., and Mynors, R.A.B., *Bede's Ecclesiastical History of the English People* (Oxford: Clarendon 1969). More easily accessible is the Penguin Classic edition (Harmondsworth: Penguin).
6. Whitlock (note 4).
7. References to entries in the Anglo-Saxon Chronicle are always by calendar years. The same applies to the chronological appendix in Bede's *Historia Ecclesiastica* (note 5) while references to the rest of his text cite book (in Roman numerals) and chapter (in Arabic numerals).
8. For the eclipses, see Williams, Sheridan, *UK Solar Eclipses from Year 1: An Anthology of 3000 Years of Solar Eclipses* (Leighton Buzzard: Clock Tower Press, 2<sup>nd</sup> edition 1996). I am grateful to Mike Frost (Director, Historical Section, British Astronomical Association) for drawing my attention to these eclipses and to the supernova of AD 1054, and for commenting on the possible reasons for their omission, citing comments by Julia Crick (University of Exeter).
9. Bede (note 5) V, 24.
10. Sims-Williams, P., 'The settlement of England in Bede and the Chronicle', *Anglo-Saxon England* (1983), 12, 1–41, p. 27.
11. Eastwood, B., *Ordering the Heavens: Roman Astronomy and Cosmology in the Carolingian Renaissance* (Leiden: Brill 2007); Lindberg, C., *The Beginnings of Western Science: The European Tradition in Philosophical, Religious, and Institutional Context, 600 B.C. to A.D. 1450* (Chicago and London: University of Chicago Press 1992).
12. Schove, D. Justin, and Fletcher, Alan, *Chronology of Eclipses and Comets AD 1–1000* (Woodbridge: Boydell Press 1987), p. 128.
13. Schove and Fletcher (note 12), page 98. – Bede does not seem to have had direct access to Byzantine sources, but to texts from Rome, and those transmitted through Rome (pers. comm. Patrick Wormald, Glasgow University). He cannot have obtained his eclipse information from Irish sources because these do not contain



- any information about the eclipses of AD 538 and 540 (pers. comm. Richard Warner, Ulster Museum, Belfast).
14. Bede (note 5) V, 24.
  15. Baillie, M.G.L., 'Dendrochronology raises questions about the nature of the AD 536 dust-veil event', *The Holocene* (1994), 4 (2), 212–17; Baillie, M.G.L., 'Patrick, comets and Christianity', *Emania* (1995), 13, 69–78; Baillie, Michael, *A Slice through Time: Dendrochronology and Precision Dating* (London: Batsford 1995), p. 93; Clube, V., *Astronomy Now* (August 1991), p. 49; Clube, S.V.M., and Napier, B., *The Cosmic Winter* (Oxford: Blackwell 1990).
  16. Schove and Fletcher (note 12), p. 98.
  17. Keys, David, *Catastrophe: An Investigation into the Origins of the Modern World* (New York: Ballantine 2000).
  18. Anglo-Saxon Chronicle (note 4) s.a. 1135.
  19. I am grateful to Mike Frost (note 8) for communicating this comment by Julia Crick.
  20. Anglo-Saxon Chronicle (note 4) s.a. 1140.
  21. Probably the best accessible publication is Wilson, David, *The Bayeux Tapestry* (London: Thames & Hudson 1985). There are a number of smaller, less detailed alternatives, including Debby, N., and Filmer-Sankey, J., *The Bayeux Tapestry* (London: Collins 1966).
  22. Todd, M., 'Famosa Pestis and Britain in the fifth century', *Britannia* (1977), 8, 319–25.
  23. Moore, Patrick, *Armchair Astronomy* (Wellingborough: Patrick Stephens Ltd., 1984), 11–12.
  24. See also the study of natural phenomena in the *Annales Cambriae*, a 10<sup>th</sup> century Welsh chronicle, by Grigg, Erik Maurice, 'Mole Rain' and other Natural Phenomena in the *Annales Cambriae*: Can records of *mirabilia* unravel the textual history of an early medieval annal? (Unpubl. M.A. thesis, University of Manchester 2007).

### The Author

Heinrich Härke was born in 1949 at Hameln (Germany). He took up astronomy at the age of 14, but balked at the maths and physics necessary to study it at university. He embarked on archaeology instead, studying at Edinburgh, Oxford and Göttingen (D.Phil. 1988). He held lectureships at Queen's University Belfast 1984–89, and at the University of Reading 1989–2007, with a research specialism in the archaeology of the Early Middle Ages. Now residing in the north German countryside under reasonably dark skies, he finds he is still spending less time on astronomy than he thought he would after early retirement.





Plate 3. The Bayeux Tapestry depicting Halley's Comet in AD 1066 (replica at Reading Museum)  
Copyright Reading Museum (Reading Borough Council). All rights reserved.