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Resumen

Este breve artículo se centra en los monumentos del paisaje de Stonehenge, a fin de ofrecer una idea "moderna" de estos monumentos y su astronomía que concuerde con las pruebas arqueológicas más recientes. Aunque la conexión de Stonehenge y otros monumentos cercanos con la astronomía está reconocida por la UNESCO como parte del Valor Universal Excepcional del Sitio del Patrimonio Mundial de Stonehenge, la única manifestación específica de ello que ha logrado un amplio consenso entre los arqueólogos son las líneas de visión solsticiales, indicadas por los ejes principales de las configuraciones de piedra de Stonehenge y los círculos múltiples de postes de madera de Woodhenge y el Círculo del Sur de Durrington Walls. Estas líneas de visión—suficientemente precisas para señalar el solsticio en el paisaje aunque no en el tiempo—parecen representar un desarrollo específico en esta zona hacia mediados del III milenio a.C.

Luego pasamos a criticar algunos artículos recientes de arqueólogos muy respetados que proponen (i) que Stonehenge encapsulaba elementos clave de un calendario solar de 365¼ días en la numerología de sus características principales; (ii) que se construyó un "megacírculo" de enormes fosos, de más de 2 km de diámetro, en la misma época que el círculo de piedras de Stonehenge, centrado en Durrington Walls Henge; y (iii) que se colocaron dos grandes fosas en el "Stonehenge Cursus", situadas en las alineaciones de la salida y la puesta del sol del solsticio de verano, vistas desde la "Heel Stone". Presentamos nuevas pruebas para contrarrestar estas ideas (ii) y razonamos que todas ellas son extrapolaciones que van mucho más allá de las evidencias disponibles y se enfrentan a las consideraciones metodológicas básicas (por ejemplo, con respecto a la selección de datos) que han sido bien conocidas por los astrónomos culturales desde los años 80.

Concluimos hablando de algunas cuestiones abiertas. La primera, si Stonehenge y algunos monumentos contemporáneos cercanos hubieran podido ser colocados en lugares ya percibidos como significativos debido a la alineación aproximadamente solsticial de las características naturales. Otra cuestión es durante cuánto tiempo siguieron funcionando las líneas de visión solsticiales, y como debe interpretarse, particularmente con respecto a las ideas de rituales solsticiales que implicaban procesiones entre los distintos monumentos. Tercero, ¿es posible que las orientaciones solsticiales evidentes en Stonehenge y sus alrededores a mediados del III milenio a.C. derivaran de prácticas desarrolladas siglos antes en el suroeste de Gales, de donde procedían las "bluestones" ("piedras azules") de Stonehenge? Una última pregunta, que sigue en gran medida sin resolverse, es si la alineación lunar del rectángulo formado por las "Station Stones" es realmente intencional y, en caso afirmativo, cuál fue su propósito y significado. Investigaciones recientes han logrado arrojar nueva luz sobre el tema.

Palabras clave: Prehistoria británica, Stonehenge, Líneas de visión solsticiales, Selección de datos, Metodología.

Abstract

This short paper focuses on monuments in the Stonehenge landscape, including Stonehenge itself, with the aim of presenting a "modern" picture of these monuments and their astronomy that is consistent with the latest archaeological evidence. While the connection of Stonehenge and other nearby monuments to astronomy is recognized by UNESCO as part of the Outstanding Universal Value of the Stonehenge World Heritage site, the only specific manifestation of this that has achieved broad consensus among archaeologists is the solstitial sightlines, indicated by the main axes of the stone settings at Stonehenge and the multiple timber circles at Woodhenge and Durrington Walls Southern Circle. These sightlines —precise enough to pinpoint the solstice in space although not in time— seem to represent a specific development in this area around the mid-3rd millennium BC.

We proceed to critique some recent papers by well-respected archaeologists proposing (i) that Stonehenge encapsulated key elements of a 365¼-day solar calendar in the numerology of its key features; (ii) that a "mega-circle" of huge pits, over 2km in diameter, was built around the same time as the stone circle at Stonehenge, centred on Durrington Walls Henge; and (iii) that two large pits were placed in the Stonehenge Cursus positioned on the summer solstice sunrise and sunset alignments as viewed from the Heel Stone. We present new evidence to counter (ii) and argue that all these ideas extrapolate well beyond the available evidence and fall foul of basic methodological considerations (e.g., regarding data selection) that have been well known to cultural astronomers since the 1980s.

We finish with a discussion of some open questions. The first is whether Stonehenge and some nearby contemporary monuments might have been placed at locations already perceived as significant because of the approximately solstitial alignment of natural features. Another is how long the solstitial sightlines remained "operational" in the sense of being usable for actual observations, and what this implies for their interpretation —particularly for ideas of solstitial observances involving processions between the different monuments. Third is the possibility that the solstitial orientations evident at and around Stonehenge in the mid-3rd millennium BC might have derived from practices developed centuries earlier in southwest Wales, from which the Stonehenge bluestones were brought. A final question that remains largely unresolved is whether the lunar alignment of the Station Stone rectangle at Stonehenge was indeed intentional and, if so, what was its purpose and meaning. Recent investigations have succeeded in casting some new light on the subject.

Keywords: Prehistoric Britain, Stonehenge, Solstitial sightlines, Data selection, Methodology

Sighting the sun in the Stonehenge landscape

Stonehenge remains firmly associated with astronomy in the global public perception, even though most do not fully understand how and why. Ideas depicting it as an "astronomical observatory" incorporating numerous alignments upon horizon rising and setting points of the sun and moon (Hawkins 1965) or as a "backsight" for highly precise lunar observations (Thom, Thom, and Thom 1975) have long been consigned to history (Ruggles 1999a), but unfortunately these still remain as credible explanations for many people. North's (1996: xxxix) audacious claim that "Stonehenge was indeed built to an astronomical design, or rather succession of designs, but all of them were much more ingenious that has previously been recognized" proved equally controversial (Ruggles 1999b), as did Sims' (2006) proposal that its design facilitated observations of the "dark moon" necessitated by deeply embedded ancestor rituals connecting lunar cycles to ancient hunting practices. Various other astronomical speculations relating to Stonehenge over the years have failed to achieve consensus among either archaeologists or archaeoastronomers.

On the other hand, the connection to astronomy at the Stonehenge World Heritage Site has been recognised by site managers and formally by UNESCO (decision 32 COM 8B.93) since 2008 as part of its "Outstanding Universal Value" (Young, Chadburn and Bedu 2009: 25–27; Chadburn and Ruggles 2017) and this is therefore critical to preserving its World Heritage status. This link to the skies is manifested most clearly and credibly by various solstitial sightlines found at Stonehenge and other nearby monuments (Fig. 1).

It is generally accepted that the solstitial axis of the stone settings at Stonehenge was deliberate, with the direction towards winter solstice sunset —"ahead" when following the direction of formal approach to the monument along the Avenue— likely to be the more significant (Ruggles 2014). The sightlines in each direction are more closely aligned upon the first or last gleam, rather than the centre or lower limb of the sun, and are precise to within ~0.5° (Ruggles 2006). This means that they are precise enough to fix the solstices in space —i.e., their position in relation to the landscape— but do not pinpoint them in time because there was no discernible difference in the sunrise or sunset position for several days either side of the actual solstice[1]. Consequently Stonehenge would have functioned well to identify a range of days around one or other solstice when, say, ceremonies should be carried out (presumably whenever a non-cloudy day permitted observation of the sun rising or setting along the alignment); but it could not be used as an accurate calendrical "instrument" for determining the exact dates of the solstices.

[1] It is helpful to distinguish between (i) constructions that are broadly solstitially aligned, such as Maes Howe tomb in Orkney (precision say ~5°); (ii) those that pinpoint the solstice in space, as at Stonehenge (~0.5°); and (iii) those that pinpoint the solstice in time, as Thom (1971: 37–38) suggested might have been done at Kintraw (~0.01°) (Ruggles and Chadburn 2024: 107).

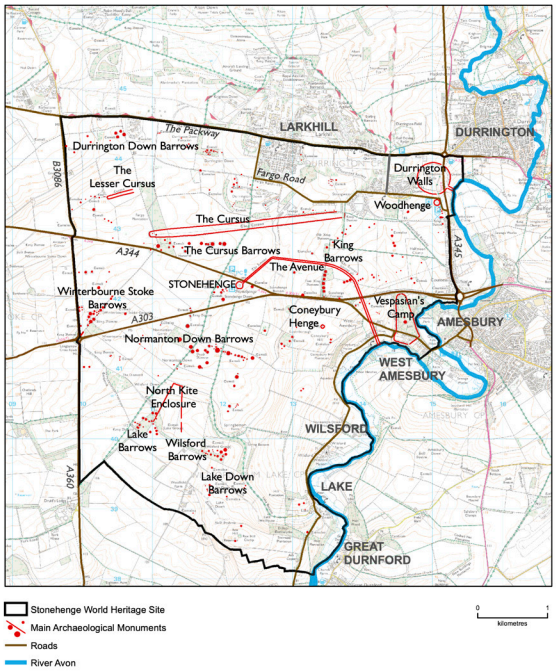

Fig. 1. The main archaeological monuments in the Stonehenge World Heritage Site. Based on scheduled monument data from Historic England. Other features drawn from Ordnance Survey mapping data. After Chadburn and Ruggles 2017, fig. 4.1.

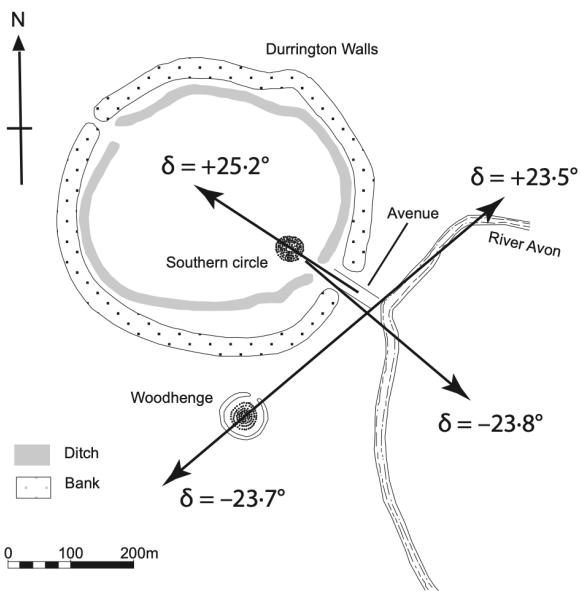

Fig. 2. Plan of Woodhenge and Durrington Walls showing the principal alignments and their declinations. For more information see Ruggles (2014) and Ruggles and Chadburn (2024: ch. 6).

A practice of precise solstitial orientation around the mid-3rd millennium BC is not only evident at Stonehenge itself but at two nearby monuments, Woodhenge and Durrington Walls Southern Circle, both multiple concentric rings of timber posts (Fig. 2). At Woodhenge the axis is defined by the long axis of the concentric oval rings (see Ruggles 2006 for a discussion of the slightly different azimuth determinations by Cunnington, the excavator, and Thom). At Durrington Walls a short Avenue, discovered in 2005 during excavations by the Stonehenge Riverside Project, led down from the Southern Circle towards the River Avon (Parker Pearson 2007). Both monuments were later enclosed in henges (earthen ditch and bank). Through computer reconstructions based on DTM data and excavated evidence, we can now visualise the solstitial alignments at Durrington Walls (Ruggles and Chadburn 2024: 97–98), despite the fact that the site of the circle itself is buried beneath a road embankment. A contemporary posthole alignment recently discovered at Lark Hill to the north, built through the entrance of a causewayed enclosure constructed several centuries earlier, was aligned with similar precision upon the rising summer solstice sun (Ruggles et al. 2021).

The solstitial alignment of the main axes of several monuments in the Stonehenge landscape seems to represent a specific

development in this area around the mid-3rd millennium BC. While long barrows in the area constructed around a millennium earlier manifest patterns of orientation more broadly correlated with the sun (specifically, within sunrise/sun-climbing sectors of the horizon) (Burl 1987; Ruggles 1997)[2], they were clearly influenced by a number of other factors (Tilley, Bennett, and Field 2020). Elsewhere, well-known solstitial alignments of specific monuments (such as the Newgrange passage tomb in Ireland) appear to be "one-offs" within patterns of orientation influenced by a range of factors (Prendergast 2016).

Moreover, there is no evidence that they persisted or developed further. Rather, the alignments at both Durrington Walls and Woodhenge appear to have been short-lived, with the posts decaying or the sightlines becoming compromised by later constructions such as henge banks (Ruggles and Chadburn 2024: 109–111).

Some recent ideas

Darvill (2022) has recently proposed that Stonehenge encapsulated key elements of a 365¼-day solar calendar in its architectural design. The basic argument is that there are 30 uprights in the sarsen circle, 5 trilithons and 4 Station Stones, and 30 x 12 + 5 = 365, with 4 representing the quarter. This is simply playing with numbers—"numerology"—recognized for many decades by cultural astronomers as an unhelpful approach. Its dangers are most evident from the complete absence of any physical structures at Stonehenge manifesting the number 12. Added to this, the solstitial alignment does not accurately mark the solstice in time (see above) and there is no independent cultural evidence whatsoever for the existence of a 365¼-day calendar at Stonehenge. See Magli and Belmonte (2023) for a thorough critique. The numerological subjectivity is underlined by Meaden's (2023) alternative interpretation in which one of the circle stones, Stone 11, is counted as "½" so that the circle stones are supposed to represent the 29½ days of the lunar phase cycle. (Shadow alignments are also added into the mix.)

In another recent paper, Gaffney et al. (2020) have argued that Durrington Walls Henge was surrounded by a huge ring, over 2km in diameter, of massive pits up to 20m wide. The supposed ring is evidenced from two main arcs of features identified from geophysical surveys. The northern arc is formed by what is in fact a curved line of natural sinkholes running down a dry valley in the chalkland landscape, albeit some of them elaborated by human intervention in prehistoric times (Leivers 2021), together with some other identified features. The second arc, on the south-western side, comprises a mixture of Bronze Age and unverified features, with many comparable features being omitted (see Fig. 3). The dangers of data selection, as well as of biased interpretation, are again clear, not least because many of the areas in and around the "circle" have not been investigated.

[2] These reflect local orientation patterns found widely among groups of later prehistoric ceremonial and funerary monuments in Western Mediterranean Europe (Hoskin 2001).

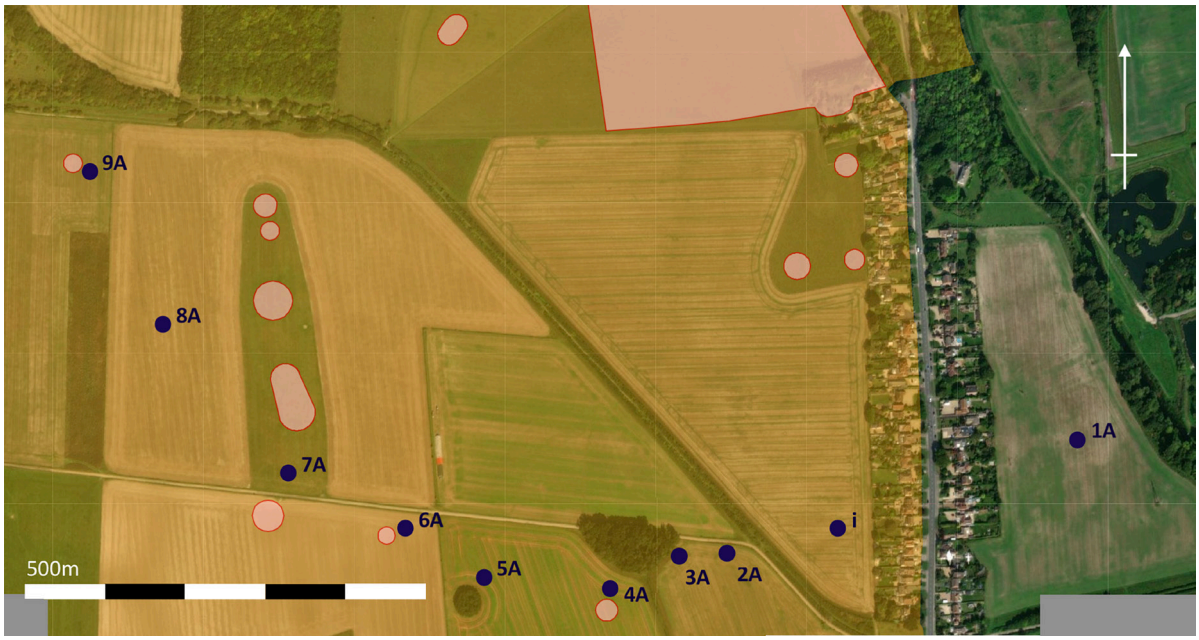

Fig. 3. Part of the alleged large pit circle, as enumerated by Gaffney et al. (2020), compared with the locations of prehistoric scheduled monuments (pink areas), taken from historicengland.org.uk/listing/the-list (satellite layer), © Historic England. 9A, 6A and 4A (which actually coincide with the scheduled areas, despite discrepancies between the marked positions of the latter and features evident on the OS base map) are scheduled as levelled Bronze Age bowl barrows (SM 1009145, SM 1009137, and SM 1009138 respectively). Gaffney et al. undertook core investigations at unscheduled features 8A, 7A and 5A, finding no signs of human activity at 8A and 7A but some charcoal and bone at 5A. Moreover, organic matter within cores 5A, 7A and 8A varies in date by around four thousand years (Gaffney et al. 2020, Table 1).

A third idea, which received significant press coverage back in 2011, is that two large (undated) pits within the Stonehenge Cursus, which dates to the mid-4th millennium BC, marked sunrise and sunset at the summer solstice as viewed from the Heel Stone. There are issues concerning the visibility of the pits from the Heel Stone, but most important is that the selected pits are merely two among several other large pits in the vicinity[3]. The Heel Stone itself is undated, although the fact that it is now known to have come from the same sarsen source as nearly all the other sarsen uprights at Stonehenge means that it may have been positioned at a similar time, around 2500 BC. All this undermines Gaffney et al. (2012)'s suggestion that this positioning of

[3] The pits in question (F1 and F2) were part of "a series of large pits", but none of the rest are highlighted on the plans (Gaffney et al. 2012: 154 and figs 3 and 5). However, some of these other nearby pits/features are shown in a later paper (Gaffney et al. 2020: fig. 9).

the two large pits was significant and "unlikely to be a coincidence".

The authors of all these papers, well respected archaeologists, seem to be falling into traps all too familiar to cultural astronomers from the early critical development of their discipline. It took many years for early archaeoastronomers, especially those from the "green" school, to recognize the importance of the broader archaeological/cultural context in framing credible interpretations (Aveni 1989; 2016), which was happening around the same time that "post-processual" archaeologists were striving to develop frameworks of interpretation appropriately grounded in anthropological theory (e.g., Johnson 1999). Archaeoastronomers have long acknowledged that statistical objectivity is a goal neither achievable (because of arbitrary choices of hypothesis) nor appropriate in an anthropological context (at its simplest, because people in the past did not act like laws of the universe) (Ruggles 2011). But we have gone badly astray if the pursuit of more contextual, theory-aware approaches then results in trying to mould the archaeological evidence to fit a favoured theory rather than letting it speak for itself.

It seems ironic that archaeoastronomers are now having to critique mainstream archaeologists in this regard, although less surprising perhaps in view of a similar debate some two decades ago between phenomenological and more conventional approaches in landscape archaeology (Tilley 1994; Fleming 2006).

The simple rules espoused by statistician Peter Freeman at the original Oxford conference in 1981 —"Observe everything" and "Report all you observe" (Freeman 1982)— seem as relevant now as they ever have been.

Open questions

The process of interpretation always involves extrapolating beyond the evidence in one sense, but has to mean suggesting credible ideas, not only well grounded theoretically but consistent with the archaeological and archaeoastronomical evidence as it stands —and ideally that are open to further investigation in the future.

It has been suggested, for example, that Stonehenge is where it is because of the approximately solstitial alignment of natural features, in this case striations in the chalk subsoil surface caused by water running downhill away from the site in that direction (Parker Pearson 2012: ch. 16). What is to us a coincidence of nature may have provided a tangible connection between the landscape and skyscape to ancient peoples. This might well have been perceived as demonstrating the sacred power and significance of the place, a power that was then appropriated and enhanced by the construction of a succession of monuments at Stonehenge itself, and the Avenue. While there is doubt about the visibility of those striations in the early Neolithic landscape, similar arguments might apply at Durrington Walls Southern Circle and the Lark Hill posthole alignment, both of which face down dry valleys that lead off in broadly solstitial directions (Leivers 2021; Ruggles et al. 2021). These are ideas that need to be, and are being, investigated further.

Another open question relates to the chronological development of the solstitial sightlines and how long they remained "operational" in the sense of being usable for actual observations. Recent dating evidence suggests that, within a century of so of their construction, the solstitial alignments at both Woodhenge (where the timbers rotted away) and Durrington Walls Southern Circle (which was enclosed within a 300m-wide henge monument), ceased to be of practical use (Ruggles and Chadburn 2024: 109–111; Chadburn and Marshall n.d.).

At the other end of the timeline, the broadly solstitial alignment of Waun Mawn stone circle in the Preseli mountains in southwest Wales (the area from which the Stonehenge "bluestones" were sourced), a site put forward as a possible precursor to Stonehenge (Parker Pearson et al. 2021), might suggest that a tradition of solstitial orientation could originally have developed in that region before being transported (along with the stones) to Stonehenge and subsequently refined. This is a viable theory but it needs stronger supporting evidence. In particular, there remains considerable uncertainty about exactly when the bluestones were first brought to the Stonehenge area: whether this was only shortly before, or at around the same time as, the large sarsens, or many centuries earlier.

One of the biggest open questions relates to potential connections between Stonehenge and the moon. The only putative lunar sightlines indicated in the overall architectural design are towards the most southerly moonrise and most northerly moonset along the longer sides of the Station Stone rectangle. Recent geochemical analyses (Nash et al. 2020) have confirmed that the Station Stones were provenanced from the same area (the West Woods area of the Marlborough Downs, about 25km north of Stonehenge) as the large sarsens. This, and their careful positioning in relation to the sarsen circle, with the longer sides almost tangential to it, suggest that they were put in place around the same time as the larger stones. The problem is that, being perpendicular to the main solstitial axis, the lunar alignments could have arisen fortuitously given that the shorter sides of the rectangle were solstitially aligned along the main axis of the monument.

If it was indeed designed for sighting the moon, the alignment to the northwest is surprisingly accurate (dec. +28.4°), but the practicalities of scattered observations (due both to the complex lunar motions and the uncertain weather) in and around major standstill years make intentional high precision unlikely (Ruggles 2014). On the other hand, a concentration of cremations and offerings deposited around the site during the centuries before the sarsen monument was constructed can be seen around the direction of most southerly moonrise, suggesting a pre-existing interest in the moon's appearances unusually far north or south (Pollard and Ruggles 2001). The orientation of the long sides of the rectangle perpendicular to, rather than along, the solstitial axis also give credibility to the lunar sightlines. To date, though, no credible lunar alignments have been identified at any of the nearby contemporary monuments.

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