doi:10.1017/ppr.2024.13

Earliest Movement of Sarsen Into the Stonehenge Landscape: New Insights from Geochemical and Visibility Analysis of the Cuckoo Stone and Tor Stone

By PHIL HARDING[1], DAVID J. NASH[2,3], T. JAKE R. CIBOROWSKI[4], GEORGIOS MANIATIS[2] *and* KIMBERLEY COLMAN[1]

This paper presents the results of new research on two sarsen stones, known as the Cuckoo Stone and Tor Stone, both former standing stones that lie on opposite banks of the River Avon and straddle the eastern border of the Stonehenge and Avebury World Heritage Site. Geochemical analysis indicates that both stones were probably transported to their present site from West Woods on the Marlborough Downs in north Wiltshire, a source that likely also supplied the large sarsen monoliths at Stonehenge. The paper examines the geological conditions necessary for the formation of sarsen across the site of the present-day Salisbury Plain to address the apparent absence of natural sarsen in the area. The results are integrated with those of archaeological fieldwork from nearby contemporaneous sites to suggest that the Cuckoo Stone and Tor Stone were probably introduced into the Stonehenge landscape in the early part of the Late Neolithic period, ie, contemporary with Phase 1 of Stonehenge and some 400–500 years before the construction of the principal sarsen settings at the monument. Visibility analysis indicates that the two stones were probably intervisible and likely to have formed part of a planned landscape and were positioned to create a formal portal to the Stonehenge area on either bank of the River Avon.

Keywords: Sarsen, geochemistry, Stonehenge, Neolithic, visibility analysis, landscape planning

The source of the Stonehenge sarsens and the timing of their arrival at the monument (Fig. 1), have been debated for more than four centuries (eg, Lambarde 1730; Hoare 1812; Atkinson 1956; Bowen & Smith 1977; Howard 1982; Richards 2020). This distinctive stone, which occurs as 'saccharoidal' and 'hard' (or 'quartzitic') variants (Jones 1887), is found today across southern Britain as unevenly distributed scatters of boulders resting mainly on the Cretaceous Chalk and various Paleogene sediments (Summerfield 1979; Summerfield & Goudie 1980; Aldiss 2014; King 2016). The greatest densities of sarsens are found on the Marlborough Downs in north Wiltshire (Bowen & Smith 1977; Summerfield & Goudie 1980), 40 km north of Stonehenge. Sarsen boulders also occur sporadically in parts of Salisbury Plain in central Wiltshire but are largely absent from the immediate vicinity of Stonehenge (see Smith 1885; Bowen & Smith 1977; Green 1997a; 1997b). Whether this is for geological reasons or due to their removal by prehistoric and later stoneworkers remains an area of debate (Green 1997a; 1997b; Parker Pearson 2016; Richards 2020, 359–60).

The Marlborough Downs were confirmed as the likely source for 50 of the 52 extant dressed and

[1]Wessex Archaeology, Old Sarum Park, Salisbury, United Kingdom. Email: p.harding@wessexarch.co.uk
[2]School of Applied Sciences, University of Brighton, Brighton, United Kingdom
[3]School of Geography, Archaeology and Environmental Studies, University of the Witwatersrand, Johannesburg, South Africa
[4]Earth and Life Sciences, School of Natural Sciences, University of Galway, Galway, Republic of Ireland

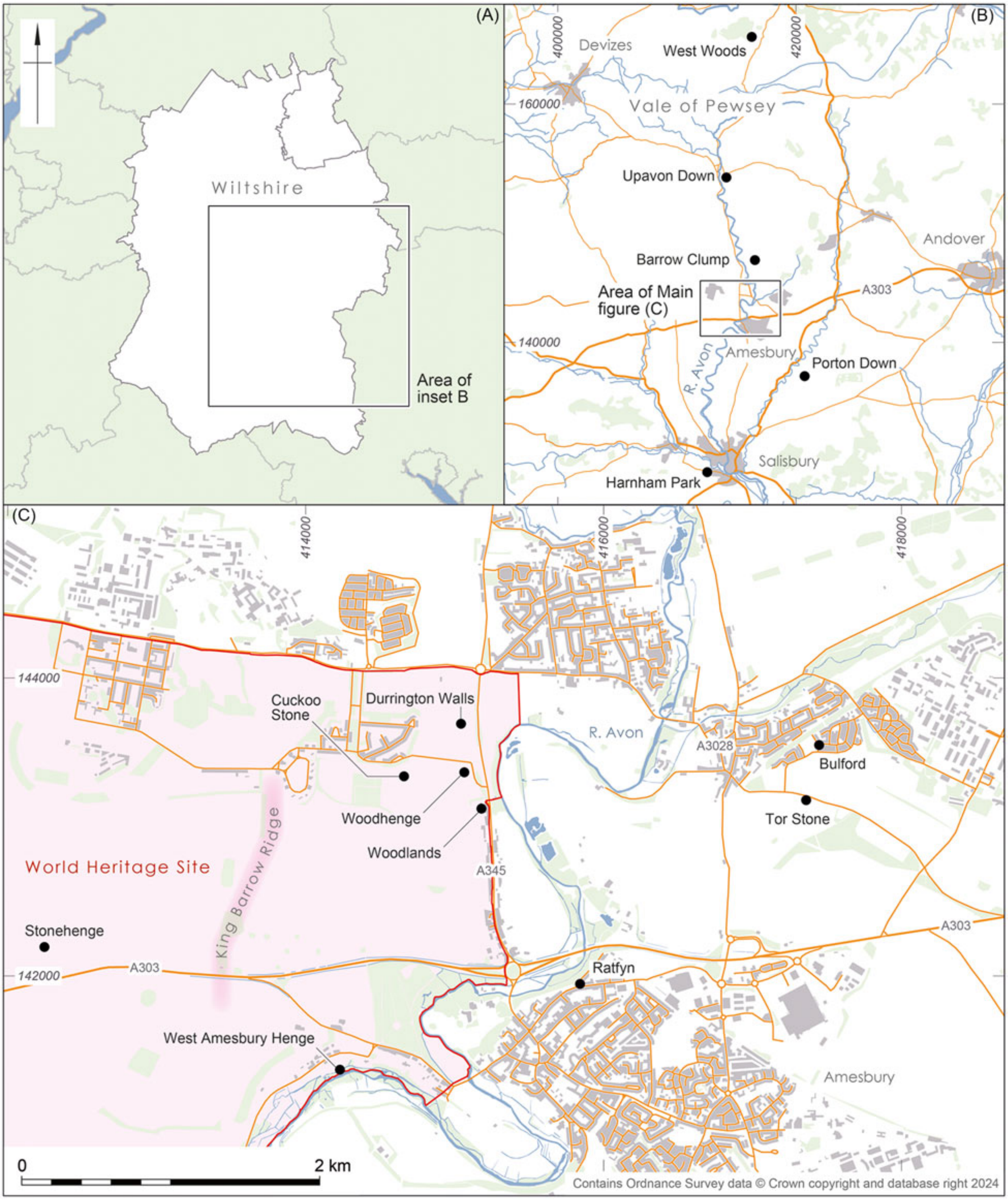

Fig. 1.
Location of key sites in the Stonehenge landscape mentioned in text. Plan 1B expanded from Brook (2024).

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undressed sarsens at Stonehenge by Nash *et al.* (2020), using portable X-ray fluorescence spectrometry (pXRF), inductively coupled plasma mass spectrometry (ICP-MS) and ICP-atomic emission spectrometry (ICP-AES) data. Their results refined the probable main sarsen source to the area now covered by West Woods, to the north of the Vale of Pewsey. Sarsen from West Woods is likely to have contributed to the principal phase of sarsen construction at Stonehenge, including the iconic trilithons, by 2500 cal BCE (Cleal *et al.* 1995; Darvill *et al.* 2012; Parker Pearson *et al.* 2022). Some of the stones may have arrived at an earlier date (Burl 2006), possibly including a large sarsen boulder brought from Monkton Down and dressed to the north of the monument but no longer present on the site (Ciborowski *et al.* 2024).

Some researchers have questioned the idea that specific sarsen outliers in the Stonehenge landscape necessarily came from distant sources (ie, the Marlborough Downs). Richards (2020, 360), for example, has argued that many large sarsen boulders, including two known as the Cuckoo Stone and Tor (or Bulford) Stone (Fig. 2), were already present in this part of Wiltshire. In this study, we present new pXRF data for the Cuckoo Stone and Tor Stone. These data, collected at the same time as the pXRF results reported in Nash *et al.* (2020), allow us to compare the geochemical properties of the two stones with the extant sarsens at Stonehenge. From this, we can explore whether they too might have originated in the Marlborough Downs. Having presented our results, we consider the implications for debates on the origin of sarsen in the Stonehenge environs, deliberate planning of the stones within the monumental landscape (using visibility analysis), and how these findings may relate to the chronology of Stonehenge itself.

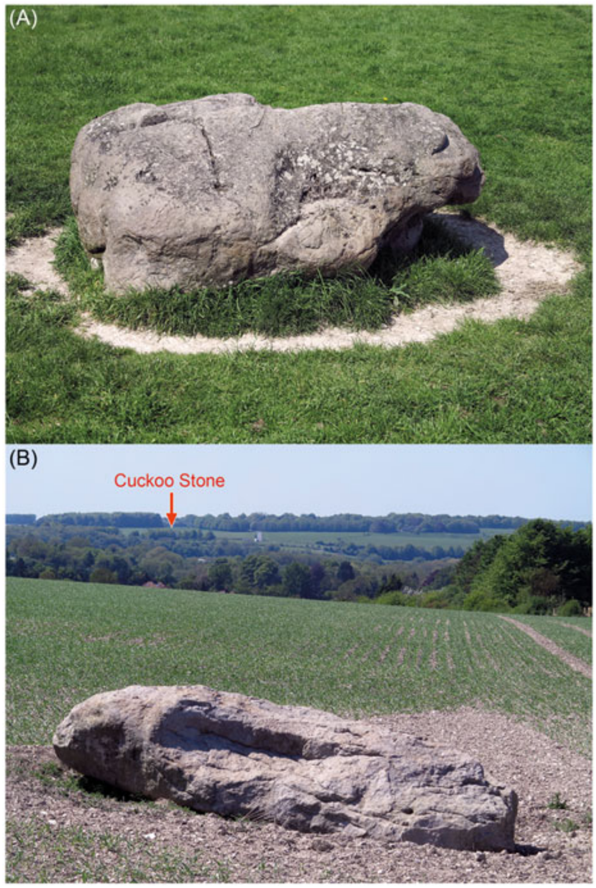

Fig. 2.
Views of (A) the Cuckoo Stone & (B) Tor Stone, looking westwards towards the site of the Cuckoo Stone (arrowed). Dimensions are included in text.

THE CUCKOO STONE AND TOR STONE

The Cuckoo Stone and Tor Stone are isolated large recumbent boulders of undressed saccharoidal sarsen, located at 2.6 km north-east and 5.2 km east-north-east of Stonehenge respectively. The Cuckoo Stone (Fig. 2A) is situated inside the Stonehenge and Avebury World Heritage Site (WHS) on the west side of the River Avon valley at 107 m aOD. It is approximately 2 m long, 1.8 m wide, 0.9 m thick, and weighs an estimated 6.5 tonnes (Richards 2020, 405). The stone lies 0.5 km north-west of the Late Neolithic sites at Woodhenge (Cunnington 1929), Durrington Walls (Wainwright & Longworth 1971; Parker Pearson *et al.* 2022), and an adjacent residential property, *Woodlands* (Stone & Young 1948; Stone 1949), which formed the type assemblage of the Late Neolithic Grooved Ware pottery 'Woodlands' sub-style (Wainwright & Longworth 1971, 238–40). This pottery spread rapidly across Britain from origins in Orkney in the 32nd century BCE (Sheridan 2024). Artefacts from the Woodlands type-site were recovered from four pits, although the full extent and density of the pit group remains unknown.

Excavations at the Cuckoo Stone (Richards 2020, 368) revealed a large, irregular natural hollow, which was interpreted as the location of the recumbent stone before it was moved to one side and then erected in a

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socket dug into the base of the hollow. An adjacent pit contained a chisel arrowhead, flint blades, a red deer antler pick, and a cattle scapula that were probably used as digging tools to erect the stone. The other pit also produced flint blades with micro-denticulates (serrated blades). No datable material was found in the stone socket. However, the faunal remains in the adjacent pit produced radiocarbon age estimates of 2910–2870 cal BCE (95% confidence; OxA-18940; 4253±28 BP; Richards 2020, 369) and 2940–2750 cal BCE (95% confidence; SUERC-46473; 4231±27 BP; Richards 2020, 371) respectively. This indicates a likely date during the very early 3rd millennium BCE (ie, early in the Late Neolithic) for the erection of the Cuckoo Stone.

The Tor Stone (Fig. 2B) measures 2.8 m long, 1.5 m wide, and 1 m thick, and has an estimated weight of 4 tonnes (Richards 2020, 404). It is located to the east of the River Avon, outside the WHS, at a point that is topographically intervisible with, and at the same elevation as, the Cuckoo Stone. The Tor Stone lies 0.4 km south of a site at Bulford where 48 pits, many containing pottery of the Woodlands sub-style (Brook 2024), were found along with two henge monuments that contained Late Neolithic sherds of the slightly later Durrington Walls sub-style of Grooved Ware (Wessex Archaeology 2019). A total of 14 radiocarbon dates from the Woodlands pits returned consistent results indicating that the earliest pit from the sample was probably dug *3020–2920 cal BCE at 68% probability* and the last pit *3000–2905 cal BCE at 68% probability* (Wessex Archaeology 2019, 102).

Richards (2020, 397), using results from an excavation at the Tor Stone, argued that it was also close to its natural position. The excavation revealed a natural hollow in which the recumbent stone was thought to have lain prior to its erection 3 m away in an adjacent socket. Worked flints, most of which were recovered from a cairn of flint nodules that had been constructed in the hollow, comprised core trimming flakes that were supplemented by a number of blades and blade cores (Chan 2020, 403). Determining the erection date of the Tor Stone is more problematic. No datable samples were available from the stone-hole. However, the recovery of blades and blade cores from the neighbouring cairn may be significant. Chan (2020, 380) noted that similar blanks from pits at the Cuckoo Stone indicated that production continued from the Early Neolithic into the early part of the 3rd millennium BCE, to be replaced by flake based industries towards the end of the Late Neolithic. This observation has been confirmed using larger worked flint assemblages from Bulford (Wessex Archaeology 2019). By association, the raising of the Tor Stone therefore probably also dates to the early 3rd millennium BCE.

METHODS

pXRF analysis

Geochemical analysis of the Cuckoo Stone and Tor Stone utilised the same pXRF instrument and analytical protocols employed by Nash *et al.* (2020) in their investigations at Stonehenge. As per that work, five analyses were taken at random points across the natural surface of each boulder using a handheld Olympus Innov-X Delta Professional XRF spectrometer. The instrument operates at 40 kV, is fitted with a Rh anode 4 W X-Ray tube, and uses a silicon drift detector. The 'Geochem' mode was used for all pXRF analyses. This captures data for the following 34 chemical elements: Mg, Al, Si, P, S, K, Ca, Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Zn, As, Se, Rb, Sr, Y, Zr, Nb, Mo, Ag, Cd, Sn, Sb, W, Hg, Pb, Bi, U, and Th, which are recorded as count %. The pXRF instrument was positioned with the analytical window approximately perpendicular to the natural boulder surface on areas that were as flat and as free of lichen as possible. At each of the five random points, the stone was analysed for 120 seconds of total exposure. At the start and end of analysis of each boulder, a calibration check was made against a 316 Stainless Steel Calibration Check Reference Coin to ensure accuracy and consistency of results. Analyses of the Cuckoo Stone and Tor Stone were conducted on a single day directly in between two evening sessions of pXRF investigations at Stonehenge. As such, the data generated are directly comparable with those reported in Nash *et al.* (2020). The full dataset of pXRF analyses from the Cuckoo Stone and Tor Stone is provided in Appendix S1.

Statistical analysis

Initial analysis of pXRF data from the Cuckoo Stone and Tor Stone was conducted using Microsoft Excel. Statistical comparison of pXRF data with equivalent data from the 52 extant sarsen stones at Stonehenge (downloadable from Nash *et al.* 2021a) was conducted using Bayesian Principal Component Analysis (BPCA). Following protocols reported in Nash *et al.* (2020), ten of the 260 pXRF assays of Stonehenge sarsens were excluded from this analysis as they contained anomalously low (<75%) Si once the pXRF data had been normalised to 100% to remove the light element fraction. Further, only the following 26 elements from the pXRF dataset were included in the statistical analysis: Mg, Al, P, S, K, Ti, V, Cr, Mn, Ni, Cu, Zn, As, Rb, Sr, Y, Zr, Nb, Mo, Ag, W, Hg, Pb, Bi, Th, and U. The elements Si, Ca, and Fe were excluded to avoid potential anomalies caused by the introduction of iron and replacement of Si by Ca during late stage diagenesis and sub-aerial weathering (see Nash *et al.* 2021b). Co, Cd, Se, Sb, and Sn were below detection limits in all pXRF readings from Stonehenge; as such, these elements cannot be used as discriminatory variables and were also excluded.

BPCA was applied to the combined pXRF datasets from Stonehenge, the Cuckoo Stone, and Tor Stone using the R statistical suite (R Core Team 2013) and specifically the *pcaMethods* R package (Stacklies *et al.* 2007). Where an element was recorded at below the detection limit of the pXRF instrument, it was treated as an unknown value. BPCA was selected over conventional PCA on the basis that the technique can handle datasets with >10% unknown values, with the *pcaMethods* R package specifically developed for analysing zero-inflated datasets (Stacklies *et al.* 2007).

Visibility analysis

The visibility analyses included in the Discussion section were undertaken using the Visibility geo-processing tool in ArcGIS (Pro). A LiDAR derived Digital Terrain Model (DTM), covering an area of 300 km^2 with a horizontal data resolution of 1 m and time stamp of 2021, was downloaded from the Environment Agency. This DTM was centred on the location of both the Cuckoo Stone and Tor Stone and formed the bare earth elevation surface used in subsequent analyses. For all analyses, results were clipped to a radius of 3440 m. This radius is considered to be the normal limit at which a person with 20/20 vision can see a 1 m wide object (Gillings & Wheatley 2020). Details of the offsets used in each analysis are provided below.

RESULTS

Care is needed when interpreting the pXRF data from the Cuckoo Stone and Tor Stone, and when drawing comparisons with equivalent data for the sarsens at Stonehenge. The Cuckoo and Tor stones are both 'natural', undressed sarsen boulders. Both are likely therefore to exhibit a thin outer weathered patina which may differ chemically to the underlying, unweathered stone. This patina is the combined product of sub-soil weathering while the sarsen was buried and sub-aerial weathering following natural or anthropogenic exposure at the land surface. X-rays from the pXRF instrument will have penetrated through the patina into the outermost few millimetres of unweathered sarsen; the return X-ray signal will therefore be a combination of both the patina and unweathered stone. The impact of a weathered patina on the overall composition reported by pXRF should, in theory, scale with the thickness of the patina. Ullyott and Nash (2006) have shown that patinas on natural sarsen boulders in East Sussex are typically around 1 mm, with Ciborowski *et al.* (2024) identifying a sub-mm patina on sarsen debitage excavated from Salisbury Plain.

Despite these concerns, pXRF analyses of the sarsen megaliths at Stonehenge (Nash *et al.* 2020) suggest that the presence of a patina has a negligible impact on the near-surface chemistry of a sarsen, at least within the resolution of a pXRF instrument. Analyses at the monument were conducted on both dressed and undressed stones, the latter including the Heel Stone and the two remaining Station Stones. The dressed stones will have had their original outer surfaces (and any initial weathered patina) removed, with only a thin secondary patina likely to have formed through subsequent sub-aerial weathering over the 4500 years since their dressing. If the presence of patinas of differing thickness were to have an impact on the pXRF readings, it might be expected that the dressed and undressed stones at Stonehenge would exhibit different chemistries. However, BPCA analyses of the pXRF data by Nash *et al.* (2020) show that none of the undressed sarsens records a statistically different chemistry to the majority of dressed stones at the monument. Rather, two dressed stones (upright 26 and lintel stone 160) were identified as geochemical outliers. This suggests that primary mineralogical differences in the unweathered stone have over-ridden the effects of any weathered patina. Such primary mineralogical differences are detectable because the mean grain size of the Stonehenge sarsens is 0.25–1.00 mm (Nash *et al.* 2021b), equivalent to or greater than any patina that may be present. It is likely that the presence of a surface patina on the undressed Cuckoo and Tor stones would have a similarly limited

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impact on their pXRF analyses as utilised in our statistical model.

With this caveat in mind, the pXRF data show that the geochemistry of both the Cuckoo and Tor stones is dominated by Si ($Mdn_{Cuckoo} = 44.16$ count %, $Mdn_{Tor} = 51.39$ count %) and the Light Element (LE) Fraction ($Mdn_{Cuckoo} = 50.44$ count %, $Mdn_{Tor} = 45.93$ count %). As with other sarsen stones, this reflects the high quartz (SiO_2) content of the host sands and cement, and the mineralogical purity of the stones (Summerfield 1979; Ullyott & Nash 2006). The remainder of the chemistry of the two stones is made up of variable amounts of Al, P, Fe, Ti, and S (Fig. 3). The most obvious difference in chemistry between the Cuckoo and Tor stones is the large amount of Ca present in the latter ($Mdn_{Tor} = 0.54$ count %), relative to the former, where Ca was detected in only two of the five analyses.

Comparisons between the pXRF data for the Cuckoo Stone, Tor Stone, and Stonehenge sarsens suggest some differences in geochemistry. For example, the median composition of the Tor Stone shows a closer chemical similarity to the Stonehenge sarsens than does the Cuckoo Stone (Fig. 4), with the Cuckoo Stone exhibiting higher abundances of S, Ca, K, Mn, P, Fe, and Pb. The differences in these elements, and in Ca and Fe in particular, may be driven by the contrasts in the weathering histories of the Cuckoo Stone and many of the Stonehenge sarsens noted above. Other elements that are recorded in higher abundances in the Cuckoo Stone compared to the Stonehenge sarsens include Zr, Ti, Mn, Nb, Y, and As. Variations in these elements are less likely to be driven by weathering and may instead be evidence of a different (and more varied) mineralogy preserved in the Cuckoo Stone relative to that of the Stonehenge sarsens and the Tor Stone.

The results of BPCA analysis are presented in Figure 5, with the respective element loadings for the first six principal components given in Table 1. The results reveal much greater overall similarity in the geochemical compositions of the Cuckoo Stone, Tor Stone, and the Stonehenge sarsens than inspection of the median pXRF data for individual elements in Figure 4 would suggest (noting that Si, Ca, and Fe are excluded from the BPCA model for reasons explained above). The BPCA model performs very well in terms of explaining the variability of the data, with the first two principal components (PC1 and PC2 on Fig. 5) combined explaining 93.3% of the variance. Most analyses fall into a single well-defined cluster enclosed by an approximately circular loading. Exceptions include the previously identified geochemical outliers, stones 26 and 160 at Stonehenge. This finding confirms the distinct compositions of these two stones, first suggested by Nash *et al.* (2020) and now reinforced through comparison with the larger sarsen pXRF dataset presented here.

The ellipsoid on Figure 5 indicates the 95% normal confidence limit for this cluster. Following Nash *et al.* (2020), a sarsen boulder can only be identified as being statistically different from this cluster where all individual pXRF analyses for the stone fall beyond the 95% confidence limit. For both the Cuckoo Stone and Tor Stone, two of the five analyses fall within the ellipsoid. This means that the geochemical composition of both stones is statistically indistinguishable from the other sarsen boulders in the cluster. This includes Stone 58 at Stonehenge at the centre of the cluster, which was sourced using ICP-MS and ICP-MS data to West Woods. Following the argument made by Nash *et al.* (2020), like the majority of sarsen uprights and lintels at Stonehenge, we can infer that both the Cuckoo Stone and Tor Stone are therefore likely to have originated in the vicinity of West Woods.

DISCUSSION

This study was initiated to understand better the source provenance of two recumbent sarsens – the Cuckoo Stone and Tor Stone – both former standing stones that lie within the Stonehenge landscape. Our results suggest that both stones probably originated in the West Woods area of the Marlborough Downs. Given the absolute and relative age estimates associated with the stones (see above), we can infer that both were probably moved to their present positions during the very early 3rd millennium BCE, prior to being raised – in other words, some 400–500 years before the construction of the sarsen circle and trilithon horseshoe at Stonehenge. Given this finding, a re-evaluation of the role and position of the Cuckoo and Tor stones in the Neolithic landscape is required. However, ahead of this discussion, consideration of the geological implications of the results is needed.

Geological implications

Our inference that the Cuckoo Stone and Tor Stone probably originated in the West Woods area directly challenges the suggestion made by Richards (2020)

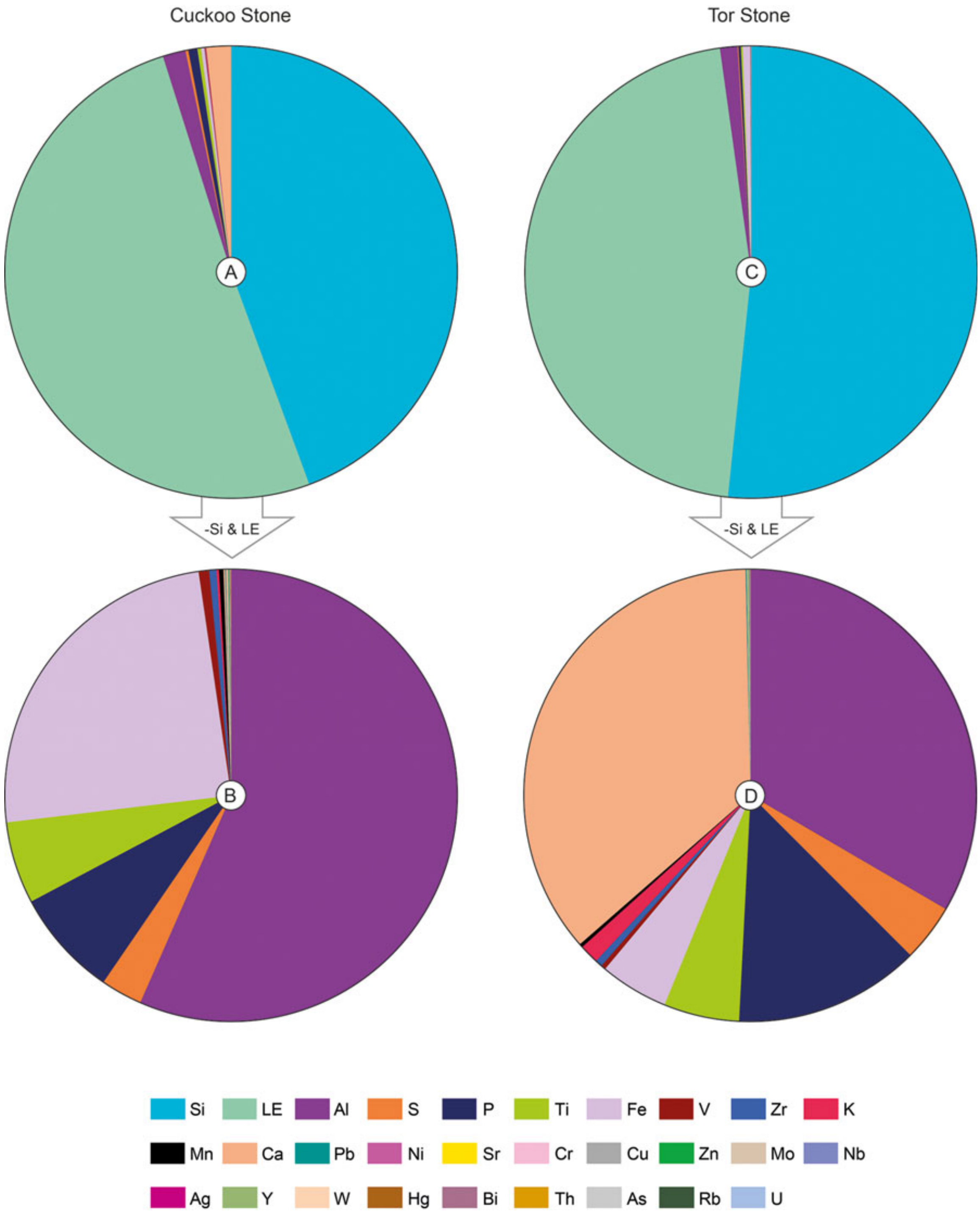

Fig. 3.
Pie charts showing pXRF (median count %) data for (A) the Cuckoo Stone; (B) the Cuckoo Stone, excluding Si & the light element fraction (LE); (C) the Tor Stone; (D) the Tor Stone, excluding Si & LE.

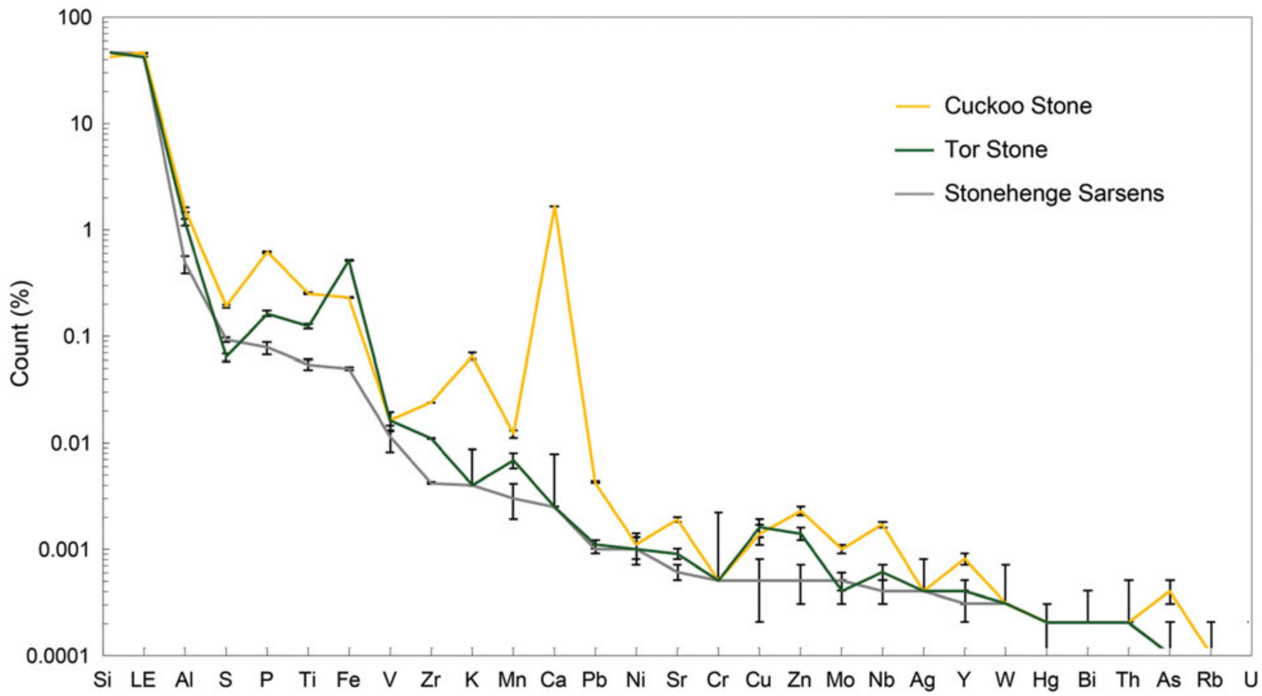

Fig. 4.
pXRF (median count %) data for the Cuckoo Stone (n = 5), Tor Stone (n = 5), & the 52 extant sarsens at Stonehenge (n = 215), the latter data from Nash *et al.* (2021a). Note: where an analysis for an element was below detection limit, the detection limit value was substituted when deriving the median value for that element.

that both stones were either already situated at, or close to, their source locations when they were monumentalised. There is, however, a potential counter argument that would support Richards' view: rather than the two stones being moved from West Woods, could it be that large sarsen boulders with a geochemistry similar to those at West Woods were already present in the Stonehenge landscape near the sites where the two stones were raised? This is a difficult question to answer conclusively without extensive sampling and geochemical analysis. However, were it to be correct, it would require the convergence of five geological factors:

a) Assuming that the silicification of sarsen stones in Wiltshire pre-dates the mid-Eocene (Summerfield & Goudie 1980; Green 1997a; 1997b), Paleogene sediments of mid-Eocene age or earlier would need to have once extended across the site of the east-central Salisbury Plain.
b) These sediments would need to include sandy horizons that were, at least locally, of sufficient thickness to be silicified into 1–2 m thick sarsens (analogous groundwater silcrete lenses in the Paris Basin formed in deposits up to 10 m thick; Thiry *et al.* 1988).
c) The sandy horizons would need to be relatively 'clean', ie, devoid of clay minerals that would otherwise inhibit the development of the quartz overgrowth cements typical of saccharoidal sarsens (Smale 1973; Dewers & Ortoleva, 1991; Ullyott *et al.* 2015).
d) The sands would also need to be situated in a geological structural context (eg, a synform) that would promote the sustained flow of silica-bearing groundwater required to cement 1–2 m thick groundwater silcrete lenses (Thiry *et al.* 1988; Nash & Ullyott 2007).
e) Most importantly, to exhibit the same geochemistry, the sands would need to comprise a similar mix and relative abundance of non-quartz minerals as those that were cemented to form the sarsens at West Woods.

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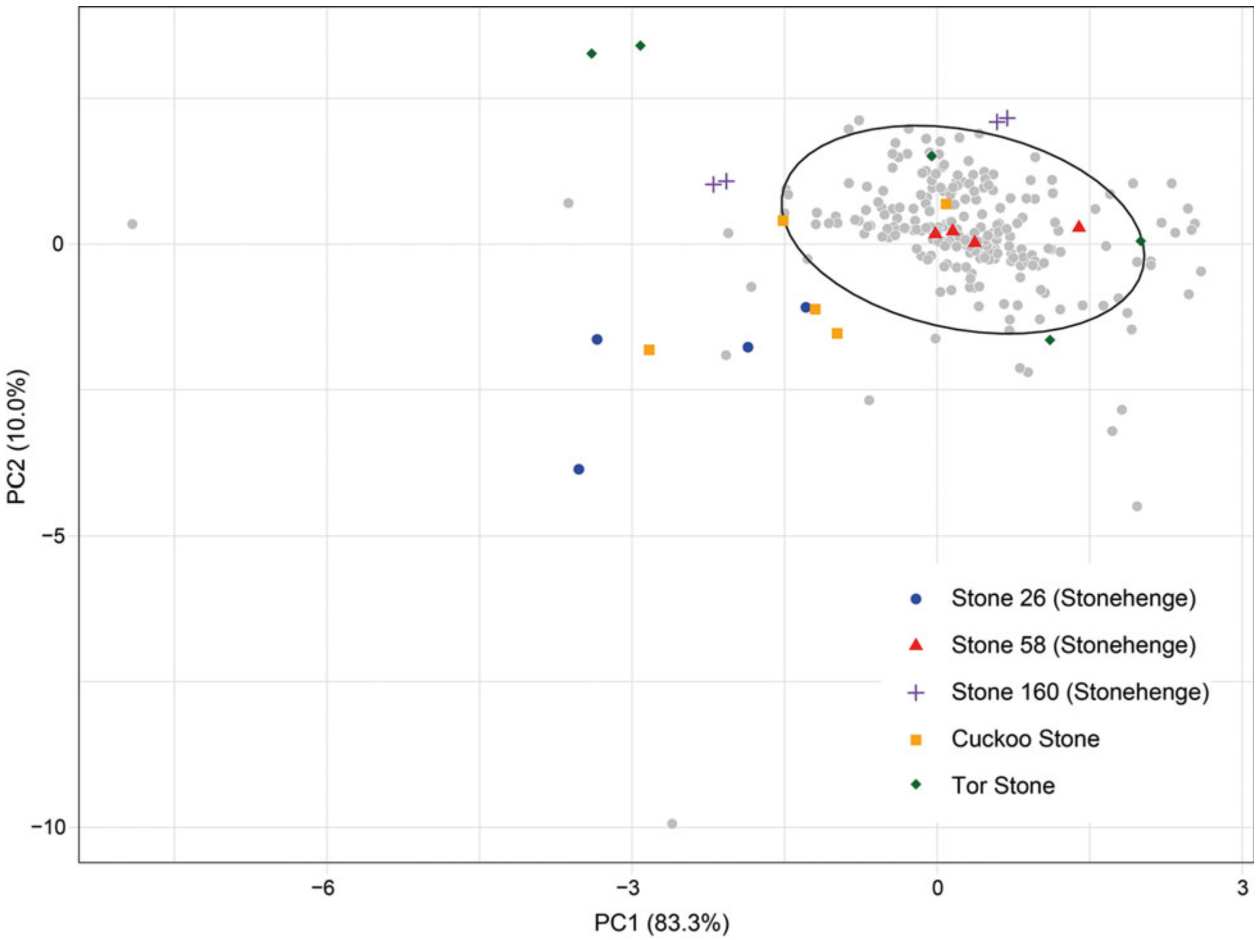

Fig. 5.
Results of Bayesian Principal Component Analysis (BPCA) of pXRF data from the Cuckoo Stone, Tor Stone, Stones 26, 58, & 160 at Stonehenge, & the other 49 extant sarsen stones at the monument (grey symbols). The ellipsoid indicates the 95% normal confidence ellipse. The respective element loadings from the BPCA are shown in Table 1. The pXRF data for the Stonehenge sarsens can be downloaded from Nash *et al.* (2021a).

Factor a) is perfectly feasible. Establishing the former distribution of Paleogene sediments in Wiltshire is not easy; the Paleogene outcrop is sparse (Fig. 6), and the palaeogeography of the time is poorly constrained (King 2006). However, from the available geological evidence, it is highly probable that sediments of latest Palaeocene to Early–Mid-Eocene age once extended across Salisbury Plain (Curry 1965; King 2006; 2016). The Late Palaeocene Upnor Formation (basal Lambeth Group), if present, would have been very thin in the Wiltshire area (Booth *et al.* 2011; Aldiss 2014). However, outliers of the Late Palaeocene–Early Eocene Reading Formation (Lambeth Group) and Early Eocene London Clay Formation (Thames Group) outcrop in the Savernake Forest to the south-east of Marlborough. Reading Formation deposits also occur as an isolated outlier capping Sidbury Hill, north-west of Tidworth. Thicker (up to 20 m) sequences of Reading Formation, London Clay, and Early–Mid-Eocene Wittering Formation (Bracklesham Group) are present to the south-east of Salisbury (Hopson *et al.* 2007).

The distribution of Clay-with-flints, a residual deposit created by the weathering of the Paleogene cover and solution of the underlying Chalk (Hopson *et al.* 2007), suggests that Paleogene sediments – most likely the Reading Formation – may have outcropped even further west (Bateman 1988). Areas

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Table 1. Element loadings & explanation of variance for the first six principal components (pc) resulting from bayesian principal component analysis of pxrf data from the cuckoo stone, tor stone, & the 52 extant sarsen stones at stonehenge

Element	*PC1*	*PC2*	*PC3*	*PC4*	*PC5*	*PC6*
Al	−0.37546	0.01806	−0.00108	0.00077	0.00080	$6.45e^{-7}$
P	−0.02967	−0.07166	0.06808	0.01835	0.00565	$-2.53e^{-5}$
S	−0.02464	−0.07472	−0.05181	0.04119	0.00092	$2.29e^{-8}$
K	−0.03564	−0.07782	−0.01327	−0.05738	−0.00442	$2.24e^{-5}$
Ti	−0.01152	−0.00303	0.01175	0.01364	−0.02752	0.00017
V	−0.00038	0.00023	$5.59e^{-5}$	0.00046	$-3.36e^{-5}$	−0.00284
Cr	0.00068	0.00011	$-5.36e^{-5}$	−0.00122	0.00110	−0.0005
Mn	−0.0008	−0.0005	$-6.93e^{-5}$	0.00017	−0.00152	−0.00205
Ni	$3.98e^{-5}$	0.00013	$3.16e^{-5}$	$-2.49e^{-5}$	$4.25e^{-5}$	−0.00017
Cu	$1.02e^{-5}$	$6.49e^{-5}$	$1.69e^{-5}$	$1.54e^{-5}$	$-8.64e^{-5}$	−0.00015
Zn	−0.00034	−0.00021	$-7.07e^{-5}$	0.00013	−0.00038	−0.00015
As	−0.00034	$-5.95e^{-6}$	−0.00017	$-3.40e^{-5}$	$-3.41e^{-5}$	$-3.85e^{-5}$
Rb	$-1.65e^{-5}$	$1.60e^{-5}$	$7.47e^{-6}$	$-7.78e^{-6}$	$4.20e^{-6}$	$1.09e^{-6}$
Sr	$-5.31e^{-5}$	$-8.94e^{-6}$	$2.58e^{-5}$	0.00010	−0.00011	$-9.15e^{-5}$
Y	$-1.06e^{-5}$	$-4.45e^{-6}$	$2.31e^{-5}$	$2.61e^{-5}$	$-5.12e^{-5}$	$-2.23e^{-5}$
Zr	−0.00028	−0.00054	0.00195	0.00086	−0.00219	−0.00021
Nb	$-3.18e^{-5}$	$8.47e^{-6}$	$7.76e^{-5}$	$4.26e^{-5}$	$-8.84e^{-5}$	$-6.17e^{-5}$
Mo	$-6.91e^{-6}$	$2.99e^{-5}$	$3.61e^{-5}$	$2.46e^{-5}$	$-2.48e^{-5}$	−0.00013
Ag	$1.23e^{-5}$	$-1.13e^{-5}$	$-3.27e^{-5}$	$-2.25e^{-5}$	$4.99e^{-5}$	$-1.09e^{-5}$
W	$-8.90e^{-5}$	$3.98e^{-5}$	$-8.89e^{-6}$	$7.16e^{-5}$	−0.00012	$-2.45e^{-5}$
Hg	$-1.45e^{-5}$	$2.43e^{-5}$	$1.13e^{-7}$	$2.64e^{-5}$	$-9.25e^{-6}$	$3.59e^{-7}$
Pb	−0.00012	−0.00015	$-2.63e^{-5}$	0.00020	−0.00038	$-2.57e^{-5}$
Bi	$5.26e^{-6}$	$-1.32e^{-6}$	$-3.88e^{-6}$	$-2.36e^{-6}$	$-1.74e^{-5}$	$7.14e^{-6}$
Th	$-3.69e^{-5}$	$8.22e^{-5}$	$5.83e^{-5}$	$4.02e^{-5}$	$6.39e^{-6}$	$-7.05e^{-5}$
U	$-1.20e^{-5}$	$2.79e^{-5}$	$1.36e^{-5}$	$4.09e^{-6}$	$1.12e^{-5}$	$-1.98e^{-5}$
Explanation of variance	83.30%	10.04%	3.85%	2.48%	0.32%	$4.62e^{-5}$
Cumulative	83.30%	93.34%	97.19%	99.67%	99.99%	100%

of Clay-with-flints occur around Marlborough and to the east and west of Salisbury (Fig. 6). Clay-with-flints is only mapped by the British Geological Survey on Salisbury Plain to the west of Shrewton, and in isolated patches to the east of the River Avon near Upavon. It has, however, been identified north of Durrington and more widely in solution hollows in the Chalk within the study area (Booth *et al.* 2011).

Factors b) and c) are less likely. Whilst Paleogene sediments were almost certainly present over the east-central Salisbury Plain, it is doubtful that they were sufficiently thick or 'clean' to permit the development of thick saccharoidal sarsen lenses. The Upnor Formation comprises gravel beds and fine to coarse grained glauconitic sands with variable clay and silt content (Booth *et al.* 2011; Aldiss 2014). The Reading Formation, London Clay, and Wittering Formation in the area are dominated by clays, silts, thin sand units, and sandy ironstones deposited in floodplain, deltaic, estuarine, marginal-marine, and inner neritic environments (White 1925; King 2006; 2016; Hopson *et al.* 2007; Aldiss *et al.* 2010; Booth *et al.* 2011; Entwhistle *et al.* 2013; Barnet 2023). Sandy units are present within the Reading Formation around Newbury and in the north Hampshire Basin but are at their thickest further east in the London Basin (Entwhistle *et al.* 2013; King 2016). The only thick, well-sorted, sandy units occur in the Reading Formation south-east of Salisbury, where they are interpreted as representing a fluvial channel within otherwise clay rich floodplain deposits (Hopson *et al.* 2007; Booth *et al.* 2008). Sarsen formation in the Salisbury Plain area would require a similarly large sandy unit within the Reading Formation (Aldiss 2014), but any evidence of this has long been eroded.

Factor d) is doubtful. Even if deposits of thick sandy Paleogene sediments were present over the east-central Salisbury Plain, it is unlikely that they were in a structural context that would promote extensive groundwater silicification. The region between the Marlborough Downs and Salisbury is characterised by belts of broadly east–west trending folds and faults in

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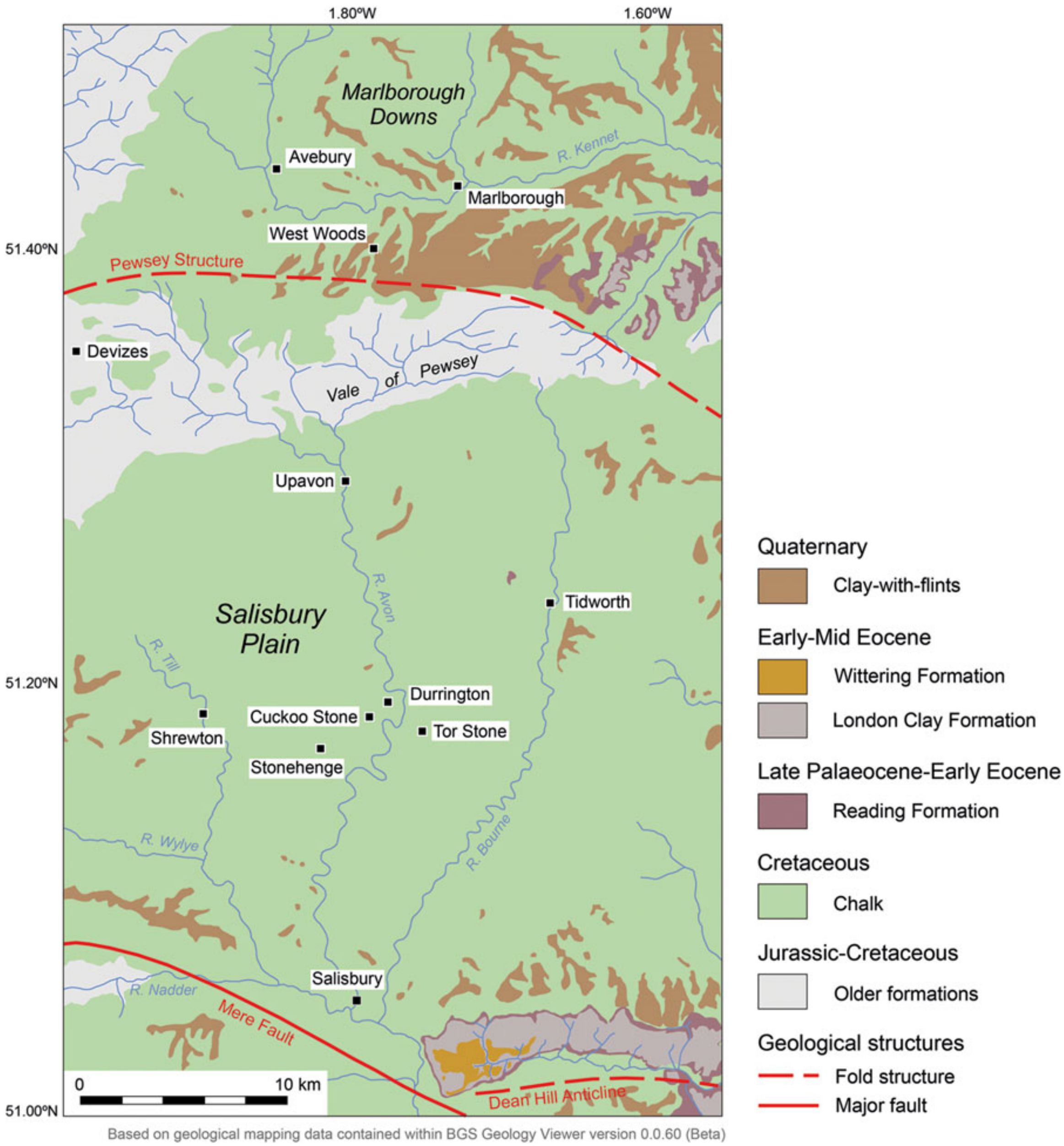

Fig. 6.
Simplified geological map of the area between the Marlborough Downs and Salisbury. Geological structures, after Mortimore *et al.* (2017).

the north and south, with wider less deformed areas in between (Mortimore *et al.* 2017; Allen & Crane 2019). The Paleogene sediments around Marlborough are situated within a synformal structure, part of a belt of folds stretching from Pewsey to Basingstoke (marked as the Pewsey Structure on Fig. 6). This includes the Pewsey anticline, initiated during Early Alpine mountain-building phases in the Late Cretaceous prior to the main phase of Alpine folding during the Neogene (Varney 1921; Booth *et al.* 2011). Equivalent sediments south-east of Salisbury are preserved in the Alderbury–Mottisfont Syncline

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(immediately north of the Dean Hill Anticline on Fig. 6), the easterly end of the east–west trending Mere–Wardour–Portsdown fold and fault zone. The Chalk underlying the intervening area of Salisbury Plain exhibits only a very gentle dip to the south. While fold structures probably exist in this area (speculative folds are identified by Mortimore *et al*. 2017 south of Stonehenge), any synforms are unlikely to be at the scale and amplitude of those mapped to the north and south.

Factor e) is also unlikely. The geochemical composition of the sands that became cemented to form sarsen stone would depend on (i) the mineralogy of the sediments eroded from the landmass that existed to the north-west of the study area during the Paleogene (King 2006) and (ii) the sorting of these sediments during transport in fluvial, estuarine, or shallow-marine regimes. Evolution of the fluvial and near-coastal system is likely to have driven variation of the deposited sand, both laterally and vertically through time. The result of this interplay of processes can be seen in the Marlborough Downs, where Nash *et al.* (2020) have shown that the geochemical signature of sarsens varies over short (sub-km scale) distances. A comparison of the signature of boulders within the sarsen train at Lockeridge Dene with that at West Woods provides a useful illustration. The Lockeridge sarsens, which originated on the plateau surface 1–2 km west of West Woods, consistently record lower Zr-normalised trace element ratios than those at West Woods for all 21 immobile trace elements used by Nash *et al.* (2020) to discriminate between source areas. These differences are likely driven by the sands within the Lockeridge sarsens having a greater abundance of zircon and potentially different abundances of Rare Earth Element-bearing minerals. Boulders sampled at sites north of the River Kennet also show different abundance patterns for many elements compared to West Woods. If sarsens within a 6 km radius of West Woods exhibit such variable trace element profiles, it seems unlikely that sarsens even further away (up to 23 km to the south) would have an identical geochemistry to West Woods, driven by a near-identical set of hydrodynamic conditions at the time of deposition.

In summary, it is hard to find a geological explanation for why the geochemistry of the Cuckoo Stone, Tor Stone, and Stone 58 at Stonehenge should be so similar (Fig. 5) unless they came from a common source area – West Woods. The preceding arguments do not preclude the formation of sarsen boulders in the area now occupied by Salisbury Plain. They do, however, suggest that any natural sarsens would be unlikely to exhibit the same immobile trace element profile as the boulders at West Woods. Sarsens would also be unlikely to occur in the same numbers and reach the same size as those found to the north. This latter conclusion is supported by the distribution and size of sarsens on Salisbury Plain today. Sarsens were mapped to the south of the Vale of Pewsey during the *Sarsen Stones of Wessex* project (Bowen & Smith 1977; Whitaker 2020). However, as Green (1997a, 6–7) notes, lone sarsens were recorded in their supposed natural context at only 28 sites. Of these, the largest was less than 3 m in length and the majority very much smaller. At 11 other sites, groups of two or three sarsens were recorded or more numerous cobbles of sarsen noted in river gravels. Sarsen was present in only 18 prehistoric structures (as small pieces or larger blocks) and 17 historic buildings (almost always as one or two small stones) across the entire mapped area. Green used this evidence to argue that there was no sign of a locality to the south of the Vale of Pewsey that could have yielded the large sarsen blocks used at Stonehenge. Unless almost all the sarsens in the east-central Salisbury Plain were monumentalised, and virtually no smaller boulders left behind, the same is likely true for the smaller Cuckoo and Tor stones.

Archaeological implications

Our inference that the Cuckoo and Tor stones were introduced to the Stonehenge landscape from the Marlborough Downs prompts a re-assessment of the excavated archaeological context from which the stones are thought to have originated. During excavation work, Richards (2020) reported two shallow solution features in the surface of the Chalk, adjacent to the two stones, and considered that the features probably marked the original hollows from which each stone had been extracted. In support of this interpretation, Richards noted that similar features have been recorded beneath sarsen boulders, where the decalcification of the Chalk was apparently accelerated by rainwater run-off around the stone (see Bowen & Smith 1977, 193). However, Bowen and Smith also described an instance where the Chalk surface beneath a sarsen was totally unaltered; this implies that the occurrence of a solution feature may not necessarily be causally related to the presence of a stone. Hollows of this type have been recorded in quantity where large areas of Chalk have been

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exposed in archaeological excavations and where sarsens are absent (eg, Wessex Archaeology 2019, 12). Solution can also result from a diverse range of decalcification mechanisms, including those related to periglacial activity or tree boles or throws (Evans *et al.* 1999). Such solution features may contain undisturbed archaeological material in a relict sorted horizon that is preserved on the surface of the hollow, including refitting artefacts (Richards 1990, 163). This eventuality may account for the preservation of deposits interpreted as a low cairn in the base of the hollow adjacent to the Tor Stone (see above).

Our results also prompt a reconsideration of the timing of sarsen use in the Stonehenge landscape. No datable material has been collected from the excavated stone-holes of either the Cuckoo Stone or Tor Stone. However, radiocarbon determinations derived from closely linked pits at the Cuckoo Stone, in combination with the shared characteristics of flint technology associated with both stones, indicate that they may also have been installed early in the 3rd millennium BCE; this is broadly contemporary with the Phase 1 monument at Stonehenge. That both sarsens existed in their present locations at some point in the Neolithic period may be supported by the fact that they apparently attracted subsequent Bronze Age and Romano-British activity (Richards 2020, 366, 397). Parker Pearson *et al.* (2022) compiled a corpus of contemporaneous monuments (including Late Neolithic pits at Woodlands, Ratfyn, and Bulford) that were linked by pottery of the Woodlands sub-style of Grooved Ware, in a group that also included the West Amesbury henge. The Woodlands type site itself remains undated. However, additional pits containing Woodlands sub-style Grooved Ware pottery have been identified within a radius of approximately 12 km of Stonehenge at Harnham Park (south-west of Salisbury), Porton Down, and Upavon Down. These pits have consistently returned dates from early in the 3rd millennium BCE, confirming the age of the sub-style (Brook 2024) with probable chronological links to the two stones. Parker Pearson *et al.* (2022) included the Cuckoo Stone and Tor Stone in their corpus, which indicated the use of sarsen by this date, on the basis that the stones were thought to be indigenous to the area. The suggestion that the two stones were instead introduced requires a significant amendment to the use of sarsen in the area.

These examples are not alone in the Stonehenge landscape. Stukeley (1740) described five individual blocks, including one 'about 3 miles [*c.* 5 km] off northward, in Durrington Fields' (1740, 56) and probably the Cuckoo Stone that he speculated may have originated from a dismantled temple related to the source of the Stonehenge Avenue. Most were dispersed along the River Avon valley and are currently unlocated with no chronological or archaeological context. Richards (2020, 362) similarly documented an isolated stone, possibly a boundary marker, in a discussion to support an argument for indigenous sarsens in the area. Sarsen fragments have been recovered from other parts of the locality including an extensive scatter found in ploughsoil on the King Barrow Ridge (Richards 1990). This assemblage may have been derived from the breaking of multiple stones or a small number of monoliths; however, the area has produced dated material spanning all phases of the Neolithic period (Harding 1988; Richards 1990; Cleal *et al.* 1995; Roberts *et al.* 2020) making the inclusion of this material in any discussion covering the arrival of sarsen on the Stonehenge landscape inadmissible.

Our inference from analysis of the composition and context of Cuckoo Stone and the Tor Stone, that sarsen was moved into the Stonehenge landscape as early as the early 3rd millennium BCE should not be surprising. Movement of stone across the landscape is known from the Early Neolithic period. For example, blocks of Oolitic Limestone were incorporated into the façade of the West Kennet long barrow (Piggott 1962). Sarsen may also have been moved in smaller quantities, as suggested by a large flake of saccharoidal sarsen (used as a hammer) from an Early Neolithic pit at Barrow Clump, Netheravon, in the River Avon valley, a location where the material is apparently uncommon (Andrews *et al.* 2019). The practice of using sarsen boulders as monoliths may have been initiated alongside the arrival of Grooved Ware pottery from Orkney, where stone was introduced to construct monuments such as the Stones of Stenness, by the early 3rd millennium BCE (Ritchie *et al.* 1978; Garrow & Wilkin 2022). This spread of ideas may have extended beyond the introduction of a pottery style to include other practices, such as the use of exotic stone objects, eg, a macehead of banded gneiss (a rock type that outcrops in north-west Scotland, including the Outer Hebrides) that was found at Stonehenge (Cleal *et al.* 1995, 394).

The apparent introduction of sarsen boulders to the Stonehenge landscape during the early 3rd millennium

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BCE re-opens the possibility that sarsens, which are largely undressed, may have been included in Phase 1 of the development of the monument, some 400–500 years earlier than the principal phase of sarsen construction. The Heelstone and two extant Station Stones, identified by Nash *et al.* (2020) as likely to have originated from West Woods, remain the most obvious candidates (Cleal *et al.* 1995, 289; Parker Pearson *et al.* 2022, 89) but are otherwise undated. The surviving Station Stones are of comparable size and estimated weight to the Cuckoo and Tor stones. However, given the proposed date at which the Cuckoo Stone and Tor Stone were introduced, they are unlikely to represent the two missing Station Stones from Stonehenge. Furthermore, Richards (2020, 404) speculated that sarsen flakes that were recovered from the cairn adjacent to the Tor Stone may have been related to stone dressing at Stonehenge. The origin of these flakes also remains unresolved; however, our revised chronology places the Tor Stone contemporary with Phase 1 at Stonehenge, a phase for which there is no evidence for stone dressing at the monument, thereby suggesting that Stonehenge was not the source. Our results supplement arguments for the early introduction of sarsen stones to Stonehenge but do nothing to confirm or deny the date of arrival of the bluestones at the monument or at the West Amesbury henge, an aspect that has been debated extensively (see Parker Pearson *et al.* 2020; 2022).

Our results may also have spiritual or symbolic implications. West Woods has now been suggested as the likely primary source for the sarsens used in the construction of Stonehenge and – in this study – two other Neolithic monuments in the Stonehenge landscape. This is despite the fact that large sarsen boulders were available in other parts of the Marlborough Downs. Nash *et al.* (2020) noted that the West Woods area contained traces of established early prehistoric occupation from the Mesolithic period onwards, which may have influenced the choice for exploitation. West Woods also lies approximately 5 km to the east of Milk Hill which, at 295 m aOD, forms the highest point in the locality and a potential spiritual link to the heavens for the area. This reverence may have created an embedded memory that was recalled during Phase 2 of the development of Stonehenge, some 400–500 years after initial exploitation of the site.

The introduction of sarsen stones into the Stonehenge landscape required significant motivation and effort. In the context of the Cuckoo and Tor stones – the only recorded monoliths on the east side of the King Barrow Ridge – the process must have incorporated both detailed planning and forethought to determine the role and ultimate position of each stone. Parker Pearson and Ramilisonina (1998a; 1998b) included the sites of the two stones within a symbolic Land of the Living, where the monuments at Woodhenge and Durrington Walls were constructed of wood. They contrasted this landscape with a Land of the Dead, west of the King Barrow Ridge, which was epitomised by the use of stone at Stonehenge.

The insertion of stone monoliths into a world of the living, where human remains were found in the centre of the timber ring, forming an integral part of Woodhenge (Cunnington 1929; Ruggles & Chadburn 2024), may seem somewhat anomalous. However, excavations at Woodhenge have indicated that a stone 'cove' (Parker Pearson *et al.* 2022, 107) may have formed an integral part of that monument when the timber structure was enclosed by a ditch *c.* 2450 BCE (Ruggles & Chadburn 2024). The landscape context can, however, be considered in more detail using visibility analysis (Fig. 7). Separate visibility analyses were undertaken to define areas that are visible from the locations of the Cuckoo Stone and Tor Stone (Figs 8 & 9). A value of 1.65 m, representing the average height of a human (Gillings & Wheatley 2020), was used as the observer offset at each location and added to the ground elevation value. This provided a DTM height for the Cuckoo Stone and Tor Stone of 108.93 m and 109.51 m aOD respectively. Additional visibility analyses (total viewsheds) were undertaken to identify areas in the landscape from which each stone was visible (Figs 10 & 11). A height of 1.65 m was included, but this time as a complete surface offset (ie, 1.65 m was added to the entire DTM). The approximate thickness of the Cuckoo Stone and Tor Stone (1 m) was added to the observer offset, with 1 m being the minimum default offset in the visibility tool. The visibility analyses are presented overlying a Multi-directional Hillshade (illumination angles R = 315°, G = 15°, B = 75°), derived from the 1 m DTM and generated using the Relief Visualisation Toolbox (RTV) version 2.2.1 (Kokali *et al.* 2013).

The results of visibility analysis suggest elements of planning for the two stones, linking them not only spatially with the sites at Woodlands and Bulford, but more clearly with one another on opposite sides of the

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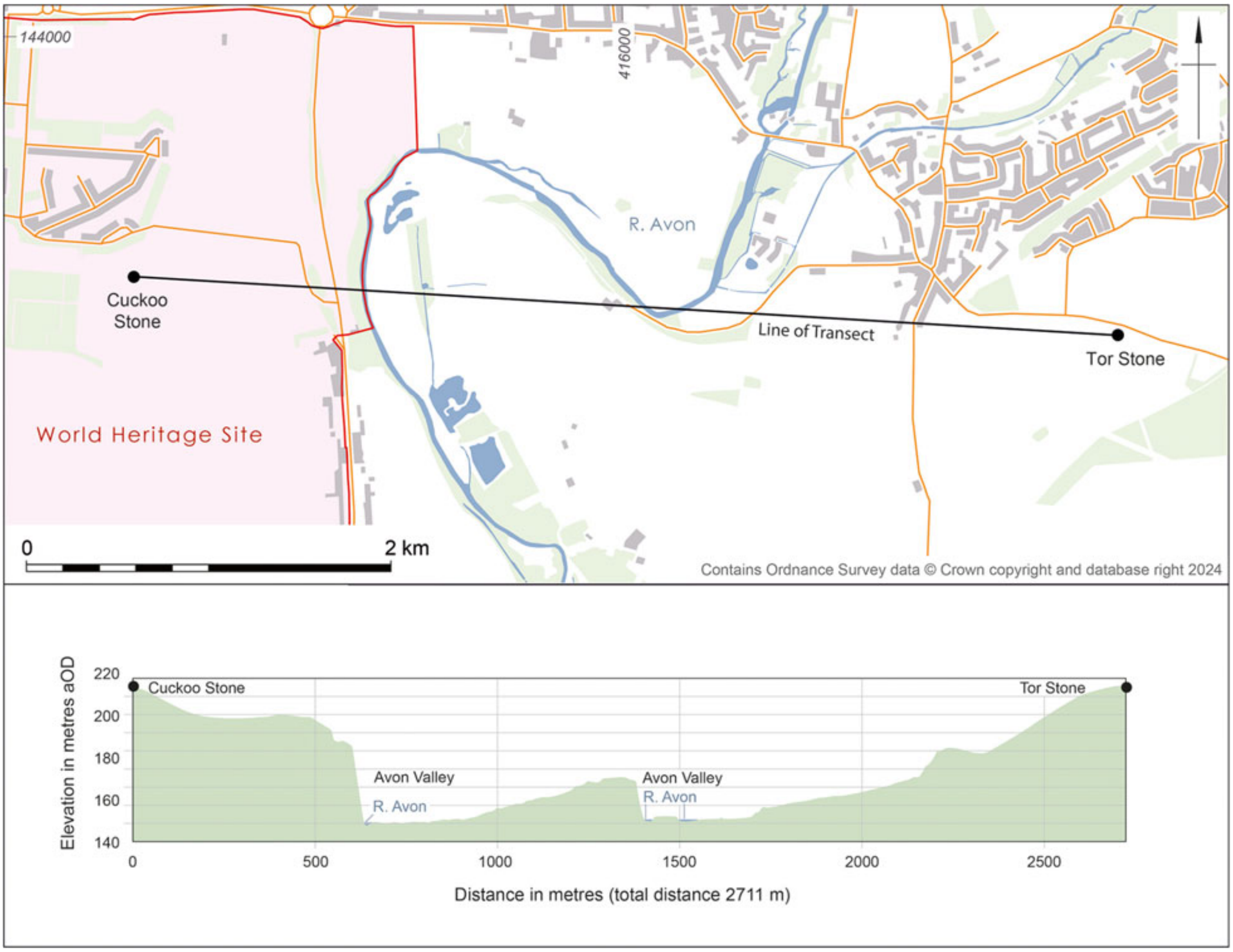

Fig. 7.
Landscape profile showing the respective locations of the two stones related to the River Avon valley. Heights are derived from the 1 m DTM.

River Avon. The intervisibility of the two stones is likely to have been an essential feature of their locations, near the boundaries of their respective overlapping viewsheds, as the DTM indicates. The Cuckoo Stone, located below the crest of the King Barrow Ridge, dominates the viewshed to the south-east while the Tor Stone, which lies below the corresponding eastern skyline, overlooks land to the north-west. Further, the DTM indicates that a transect drawn between the two stones (Fig. 7) passes close to the apex of a meander in the River Avon at a point where it is approximately equidistant from each stone and potentially intervisible, both from and towards both stones. This low spur in the river, together with the surrounding downland, is likely to have been predominantly open with variable patches of deciduous woodland with hazel during the Mesolithic and Early Neolithic periods, which may have obscured visibility (French et al. 2012; 2024). These authors have stressed the attraction of open landscapes to locate monuments for prehistoric communities. This part of the River Avon valley underwent significant environmental transformation at approximately 2900 BCE (French *et al.* 2012, 30), contemporary with the suggested erection of the sarsens. This episode included dramatic tree and shrub clearance across the downlands, with sedges and alder near the river, which collectively may have improved visibility of the river from the surrounding highland – a view that is currently denied (see Fig. 2B, above).

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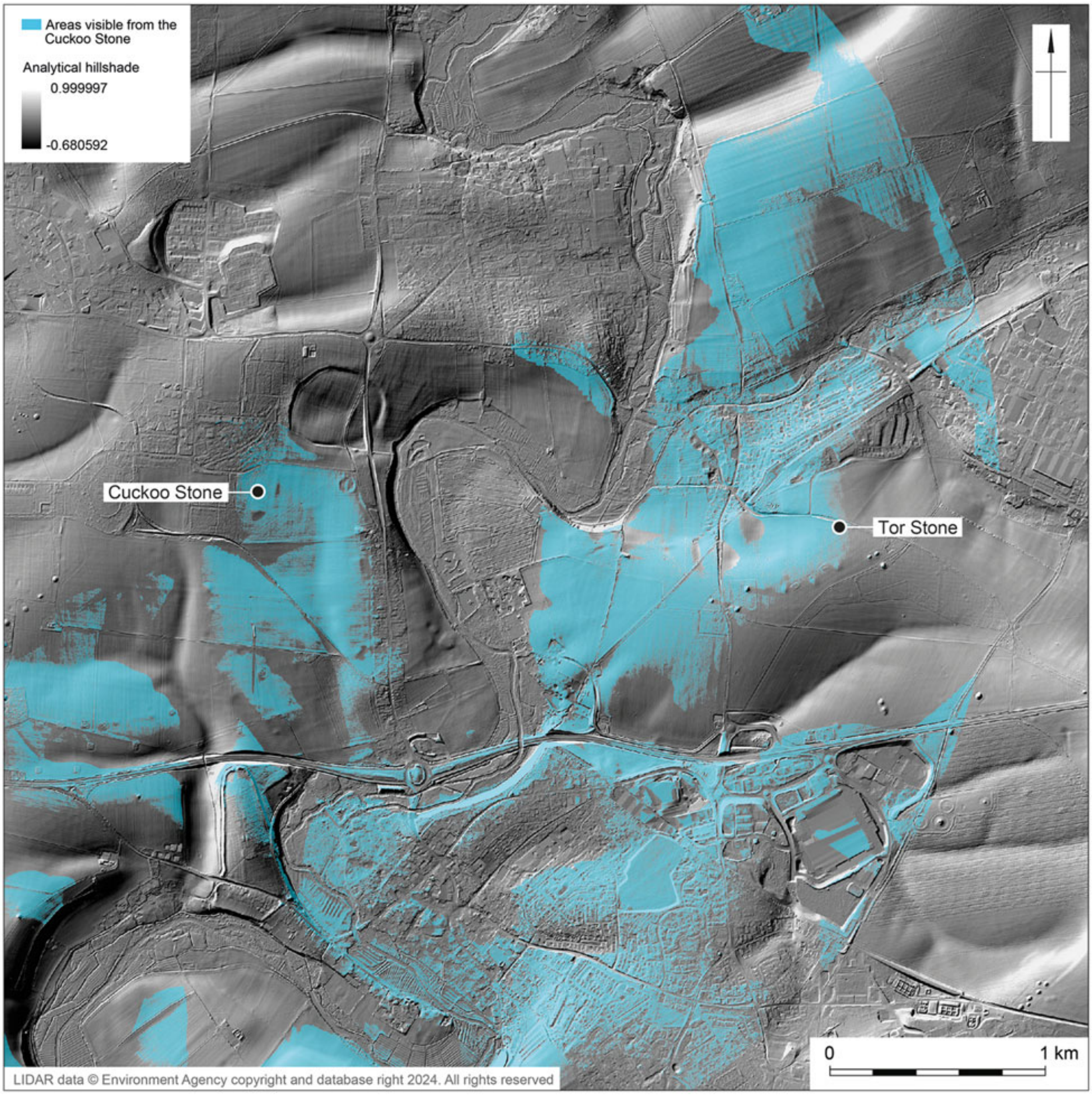

Fig. 8.
Visibility analysis showing areas visible from the Cuckoo Stone, clipped to 3440 m (see text) overlying a Multi-directional hill shade (Illumination angles R = 315°, G = 15°, B = 75°) derived from 1 m DTM.

Richards (2005) remarked on the frequency with which standing stones on Orkney were often paired or grouped. He emphasised how a large standing stone on the banks of the Loch of Stenness, known as the Watchstone, was formerly paired with another stone, known only from a stone hole, and provided a possible 'pathway' (Richards 2005, 216) from the loch to the Stones of Stenness. This role in the landscape could also be repeated in domestic structures, where standing stones created openings at doorways in Orcadian houses. Our model makes it possible to view the Cuckoo Stone and Tor Stone not only as integral

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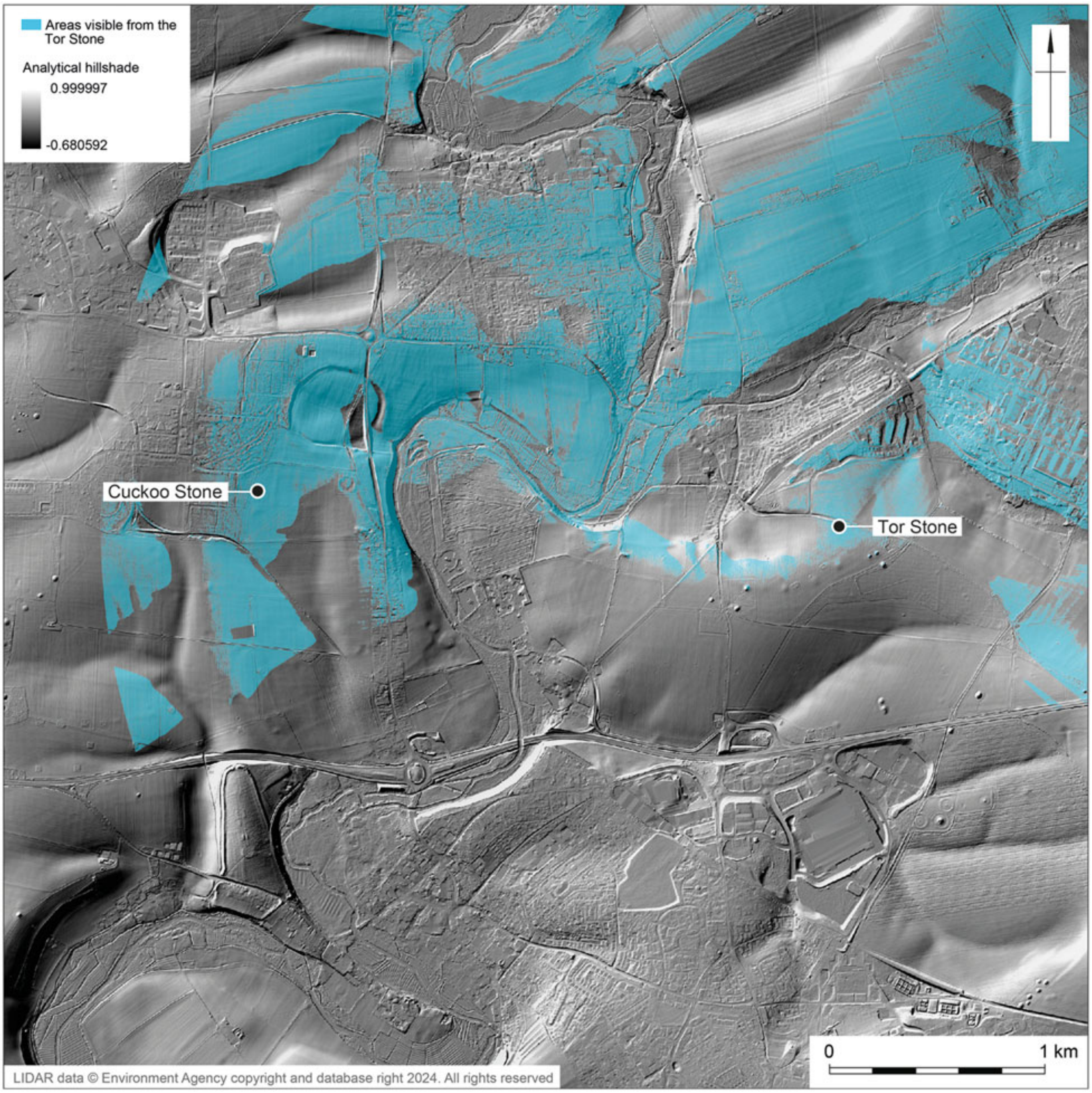

Fig. 9.
Visibility analysis showing areas visible from the Tor Stone, clipped to 3440 m (see text) overlying a Multi-directional hill shade (Illumination angles R = 315°, G = 15°, B = 75°) derived from 1 m DTM.

elements of contemporary sites at Woodlands and Bulford but also, drawing on influences from Orkney, as a portal to the Stonehenge landscape. That the two stones were positioned at almost identical elevations on opposing banks of the River Avon is unlikely to have been purely by chance. These possible origins may have set the scene for the prolonged development of the area towards the end of the Late Neolithic. This would have included the further introduction of sarsen from West Woods and other sites to remodel Stonehenge, together with the development of henges across the local

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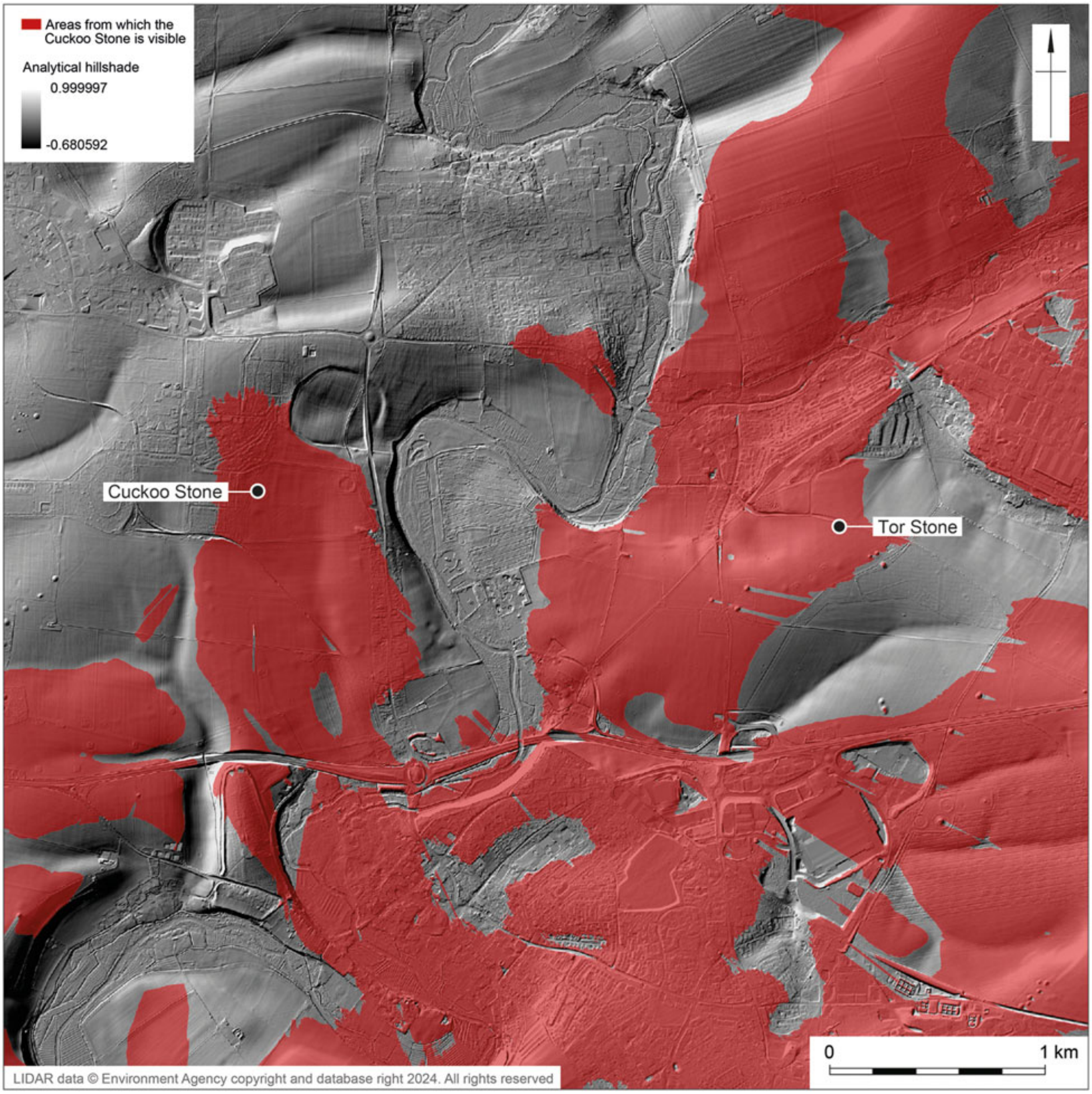

Fig. 10.
Visibility analysis (total viewshed) showing areas from which the Cuckoo Stone is visible, overlying a Multi-directional hill shade (Illumination angles R = 315°, G = 15°, B = 75°) derived from 1 m DTM.

landscape, including the major centres at Durrington Walls and Woodhenge.

CONCLUSIONS

This study set out to establish the likely source provenance of two, now recumbent, sarsen standing stones, known as the Cuckoo Stone and Tor Stone, sited on opposite banks of the River Avon at the eastern edge of the Stonehenge and Avebury WHS. Using geochemical data we have demonstrated that the two stones exhibit a statistically similar chemical composition to the majority of the extant sarsen stones

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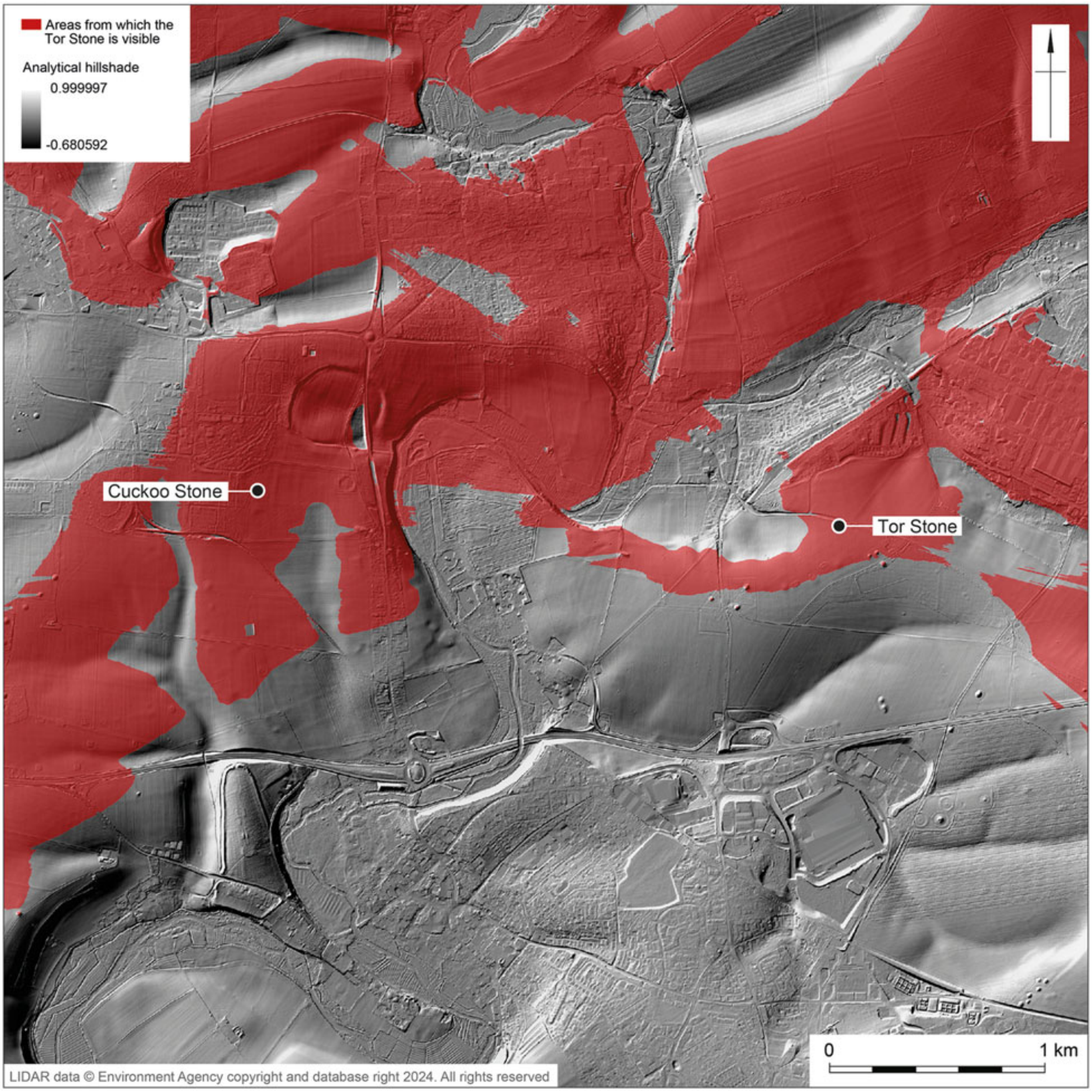

Fig. 11.
Visibility analysis (total viewshed) showing areas from which the Tor Stone is visible, overlying a Multi-directional hill shade (Illumination angles R = 315°, G = 15°, B = 75°) derived from 1 m DTM.

used in the construction of Stonehenge – and, by inference, were transported from the same main source area as the Stonehenge sarsens, proposed by Nash *et al.* (2020) to be West Woods in the Marlborough Downs. We have also presented, for the first time, geological arguments for why sarsen boulders may not have been present in large numbers across the site of the present-day Salisbury Plain. Using absolute and relative age estimates associated with the Cuckoo and Tor stones, and archaeological evidence from nearby contemporaneous sites, we have suggested that the two stones were probably moved to

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their present positions during the early part of the Late Neolithic period (ie, the very early 3rd millennium BCE). This is some 400–500 years prior to the construction of the sarsen circle and trilithon horseshoe at Stonehenge. Through visibility analysis, we have shown that, when viewed together as objects introduced to the area, the Cuckoo and Tor stones contributed to a planned Neolithic landscape contemporary with the earliest phase of activity at Stonehenge and also with other documented sites in the area. These findings encompass both banks of the River Avon confirming that it formed an integral part of this unified Neolithic landscape related to Stonehenge, beyond the boundaries of the present World Heritage Site.

Acknowledgements: Portable XRF analyses at the Cuckoo Stone and Tor Stone were undertaken during the fieldwork for British Academy/Leverhulme Trust Small Research Grant SG170610 – 'Geochemical fingerprinting the sarsen stones at Stonehenge'. All figures were prepared by Rob Goller at Wessex Archaeology, except Figure 6, prepared by David Nash, and Figures 8–10, which were compiled by Kimberley Colman. Constructive comments on the draft text from Amanda Chadburn, Matt Leivers, and Alison Sheridan are also acknowledged. Finally, thanks are extended to two anonymous reviewers for their time and care in reading and commenting on this manuscript.

SUPPLEMENTARY MATERIAL

To view supplementary material for this article, please visit https://doi.org/10.1017/ppr.2024.13

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RÉSUMÉ

Les premiers déplacements de sarsen dans le paysage de Stonehenge : nouvelles perspectives par les analyses géochimiques et de visibilité de la Cuckoo Stone et de la Tor Stone, par Phil Harding, David J. Nash, T. Jake R. Ciborowski, Georgios Maniatis, et Kimberley Colman

Cet article présente les résultats de nouvelles recherches menées sur deux blocs en pierre de sarsen connus sous les noms de Cuckoo Stone et de Tor Stone. Ces deux anciennes pierres dressées se trouvent sur deux rives opposées de la rivière Avon et chevauchent la frontière orientale du site patrimoine mondial de Stonehenge et Avebury. Les analyses géochimiques indiquent que les deux blocs ont été probablement transportés jusqu'à leur emplacement actuel depuis les West Woods et les Marlborough Downs dans le nord du Wiltshire, une région qui a certainement aussi fournit les monolithes en sarsen de Stonehenge. L'article analyse les conditions géologiques nécessaires pour la formation du sarsen dans le site actuel de la Plaine de Salisbury afin d'aborder l'absence apparente de sarsen naturel dans cette zone. Les résultats sont intégrés avec ceux de recherches archéologiques de terrain menées sur des sites contemporains voisins, et indiquent que la Cuckoo Stone et la Tor Stone ont probablement été introduites dans le paysage de Stonehenge durant la première partie du Néolithique final, c'est-à-dire lors de la Phase 1 de Stonehenge, et donc environ 400–500 ans avant la construction de la principale structure en sarsen du monument. Les analyses de visibilité indiquent que les deux blocs étaient probablement en contact visuel et qu'ils participaient sans doute au paysage planifié en étant positionnés de manière à créer un portail formel pour la zone de Stonehenge sur chaque rive de la rivière Avon.

ZUZAMMENFASSUNG

Das früheste Auftreten von Sarsen in der Landschaft von Stonehenge: Neue Erkenntnisse aus geochemischen Analysen und Sichtbarkeitsanalysen des Cuckoo Stone und des Tor Stone, von Phil Harding, David J. Nash, T. Jake R. Ciborowski, Georgios Maniatis, und Kimberley Colman

In diesem Beitrag werden neue Forschungsergebnisse zu zwei Sarsensteinen vorgestellt, die als „Cuckoo Stone" und „Tor Stone" bekannt sind, beides ehemals aufrechtstehende Steine, die an gegenüberliegenden Ufern des Flusses Avon und beiderseits der östliche Grenze der Welterbestätten Stonehenge und Avebury liegen. Geochemische Analysen zeigen, dass beide Steine wahrscheinlich von West Woods in den Marlborough Downs in Nord-Wiltshire zu ihren heutigen Standorten transportiert wurden, also aus einer Quelle, die wahrscheinlich auch die großen Sarsen-Monolithen in Stonehenge lieferte. In dem Beitrag werden die geologischen Bedingungen untersucht, die für die Bildung von Sarsen auf dem Gebiet der heutigen Salisbury-Ebene erforderlich waren, um das offensichtliche Fehlen von natürlichem Sarsen in diesem Gebiet zu erklären. Die Ergebnisse werden mit denen der archäologischen Feldforschung an nahegelegenen, zeitgleichen Fundplätzen zusammengeführt und legen nahe, dass der Cuckoo Stone und der Tor Stone wahrscheinlich im frühen Abschnitt des Spätneolithikums in die Landschaft von Stonehenge eingebracht wurden, d. h. zeitgleich mit Phase 1 von Stonehenge und etwa 400–500 Jahre vor der Errichtung der wichtigsten dortigen Sarsenanlagen. Die Sichtbarkeitsanalyse zeigt, dass zwischen beiden Steine vermutlich eine direkte Sichtverbindung bestand und sie wahrscheinlich Teil einer geplanten Landschaft waren und so positioniert wurden, dass sie zu beiden Ufern des Flusses Avon eine Art Portal zum Gebiet von Stonehenge bildeten.

RESUMEN

Primeros movimientos de Sarsen en el paisaje de Stonehenge: nuevas evidencias geoquímicas y del análisis de visibilidad de Cuckoo y Tor, por Phil Harding, David J. Nash, T. Jake R. Ciborowski, Georgios Maniatis, y Kimberley Colman

Este artículo presenta los resultados de nuevas investigaciones llevadas a cabo en dos nuevas piedras sarsen, Cuckoo y Tor, ambas erigidas originalmente y que se encuentran en la orilla opuesta del río Avon ubicadas en el extremo este del sitio patrimonio mundial de Stonehenge y Avebury. El análisis geoquímico indica que probablemente ambas piedras fueron transportadas a su ubicación actual desde los West Woods en Marlborough Downs en el norte de Wiltshire, una zona de aprovisionamiento que probablemente también proporcionó los grandes monolitos sarsen de Stonehenge. Este artículo examina las condiciones geológicas necesarias para la formación de sarsen en el sitio de la llanura actual de Salisbury, con el objetivo de explorar la aparente ausencia de forma natural de este tipo de roca en el área. Los resultados se integran con aquellos obtenidos del trabajo de campo arqueológico en los yacimientos contemporáneos situados en el entorno para sugerir que tanto las piedras Cuckoo como Tor fueron probablemente introducidas en el paisaje de Stonehenge a inicios del Neolítico final, esto quiere decir que serían contemporáneas a la fase 1 de Stonehenge y unos 400–500 años anteriores a la construcción de las principales estructuras de sarsen en el monumento. Los análisis de visibilidad indican que las dos piedras fueron probablemente intervisibles y que habían formado parte de un paisaje planificado, estando situadas para crear un acceso forma al área de Stonehenge a ambas orillas del río Avon.