HOMININ ACTIVITY ON THE CHALK UPLANDS OF SOUTHEAST BRITAIN: A GEOMORPHOLOGICAL PERSPECTIVE ON THE ARCHAEOLOGICAL RECORD

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ABSTRACT

The northwest European chalklands provide an internationally important dataset for the Lower and Middle Palaeolithic. Archaeologists have, however, concentrated primarily on the Chalk lowland fluvial contexts, with recent interpretations emphasising their importance as preferentially targeted hominin environments. There has been relatively little systematic investigation of the plateaux and interfluves, or consideration of how their record properly relates to established occupation chronologies.

The Unified Palaeolithic Landscape Approach (UPLA) seeks to address this imbalance by integrating geomorphology and landscape processes into considerations of past human behaviour. It argues that, as preservation and release are the primary controls on archaeological survival, geomorphology will provide a more robust first-order explanation for artefact distribution patterns than habitat preference alone. I attempted to test this UPLA perspective by examining the relationship between palaeoliths and the geological context in which they were found.

Using data drawn from three Chalk upland areas — the Chilterns and the North and South Downs of southern Britain — and treating the Quaternary Clay-with-flints as a proxy for the degree of erosion suffered by the chalklands, I proposed that poor Clay-with-flints survival would produce only rare archaeological traces of human activity. Dense unbroken Clay-with-flints survival, offering little scope for release, would similarly result in low recorded artefact distribution. Between these extremes, however, each landscape would have optimal cover/erosion levels for artefact release and discovery. In short, if geomorphology, not human behaviour, is the prime control over recorded artefact density, the relative abundance of upland find-spots should increase and decrease proportionally to Clay-with-flints survival. This paper presents the preliminary results of my study, demonstrating a clear, non-linear correlation between surviving Clay-with-flints cover and find-spot density within each study area.


Keywords: Clay-with-flints, geomorphology, plateau, Pleistocene, Palaeolithic

INTRODUCTION

The loess-mantled plateaux of northern France are officially recognised as a context within which there is high potential for Acheulean archaeology (Locht 2010), yet in southern Britain equivalent plateau locations are viewed as marginal Palaeolithic landscapes with little archaeological potential. Despite its historic significance and extensive nature, British upland archaeology is widely regarded as contextless, undated and mostly un-dateable. In contrast, fluvial contexts are seen as extensive, datable and offering localised preservational conditions for fine-grained archaeology (Pope et al. 2015, 40).

Our ‘Unified Palaeolithic Landscape Approach’ (UPLA) (Pope et al. 2015 & 2016) seeks to bring the role played by plateau, interfluve and escarpment-edge locations under closer scrutiny and to understand regional archaeological distribution patterns in relation to research history, artefact preservation and release processes and past human behaviour. We argue that such behaviour can only be brought properly into focus when careful consideration is given to how the archaeological record was formed.

As early as 1968, Wymer (1968, 4) argued that the two chief characteristics used to describe a Lower–Middle Palaeolithic site should be its geomorphology, i.e. the shape of the land in the immediate vicinity and the geological context in which the palaeoliths are found. However, although site formation processes are regularly addressed at the individual site or palaeolandscape level, little attention is paid to the effects of landscape formation processes on
site distribution patterns when working at the regional or national level.

The UPLA identifies geomorphology as the core control over artefact preservation and release and argues that developing an analytical framework which considers archaeological finds within their wider geomorphological context is key to understanding the processes responsible for the formation of the Lower and Middle Palaeolithic archaeological record.

This paper describes the preliminary results of my application of the UPLA approach to the archaeological record of Lower–Middle Palaeolithic artefacts from the Chilterns, North and South Downs of southeast Britain. Focusing particularly on deposits mapped as Clay-with-flints by the British Geological Survey, I examine the relationship between artefacts in the archaeological record and the geological deposits in which they have been found, with the objective of assessing the effects of geomorphological processes of preservation and release on artefact distribution patterns and thus, ultimately, on interpretations of past human behaviour.

BACKGROUND

During the 19th century the Chalk landscapes were crucial to the development of the European Palaeolithic archaeological record. French and English rivers such as the Somme and Thames, which acted as major hominin routeways through the landscape (Ashton et al. 2015) were rich in the river gravels which were exploited so extensively providing the opportunity for artefacts to be recovered in large numbers. On a smaller scale, brickearth extraction provided similar opportunities, most notably in the Chilterns. Further analysis of the data is in hand to establish the extent to which these and other resource extraction activities have impacted on the archaeological record and, consequently, on site distribution patterns.

In the 1840s Boucher de Perthes, the ‘Father of Prehistory’ (Gowlett 2009, 13), discovered some of the first-known early stone tools in association with the bones of extinct animals in the gravels of the Somme river near Abbeville and Amiens. It was, however, only with their validation in 1859 by the English geologist Joseph Prestwich and antiquarian John Evans, that the antiquity of man was established and Palaeolithic archaeology was born. For most English Victorian scientists there had been only one glacial period and hominin occupation of Britain must, therefore, be entirely post-glacial (McNabb 2009, 98).

During the closing decades of the 19th century attention turned to the Chalk uplands, which became important as part of the ‘Second Antiquity of Man’ debate (McNabb ibid.). This challenged the prevailing view and, in 1899, worn hand-axes found by the collector Benjamin Harrison on the North Downs of Kent provided the first properly contextualised evidence of both glacial and pre-glacial occupation to be accepted in Britain (McNabb 2009, 114). On the Chiltern plateau, Worthington George Smith, ‘… an outstanding example of the best of the early amateurs’ (Roe 1981, 24), used his local knowledge of the brickearth pits around his home in Dunstable to locate, observe and record some of the best preserved Lower Palaeolithic sites yet found in Britain. Other antiquarian collectors, working on the Chilterns, North and South Downs included A.M. Bell (1898 & 1894; Field et al. 1999), de Barri Crawshay (1924), A.E. Todd (1934 & 1936) and Llewellyn Treacher (Treacher et al. 1948).

More recently, numerous high-level find-spots on the North Downs have been identified through the fieldwalking activities of the Kent Archaeology Group (Gaunt et al. 1976; Halliwell & Parfitt 1993 & 1996; Parfitt & Halliwell 2002) and Surrey Archaeological Society’s Plateau Archaeology Group, the latter building on earlier work by Carpenter and Walls (Walls & Cotton 1980; Harp 2005). Scott-Jackson (2000) re-emphasised the archaeological potential of Clay-with-flints, reviewing those sites where stone tools had been found ‘embedded’ in Clay-with-flints at Lower Kingswood, Surrey, and Hackpen Hill, Wiltshire, as well as Worthington Smith’s Chilterns sites around Luton and Dunstable. Working with the Kent Archaeology Group, Scott-Jackson also carried out a small-scale excavation at Wood Hill, Kingsdown, from which it proved possible to TL date two pieces of burnt flint from different depths, although both the anthropogenicity of the burning and the identification of two separate occupation
CURRENT THINKING ON HOMININ LANDSCAPE USE

More than 90% of the Lower and Middle Palaeolithic finds in Britain have come from river gravel deposits (Brown et al. 2013, 1). Nevertheless, isolated artefacts, surface scatters and occasional in situ doline finds are made outside the river valleys, primarily on the Chalk uplands of southeast Britain and northwest Europe. In southern Limburg (Netherlands) there are more than 100 known Middle Palaeolithic sites, mostly surface scatters, on the plateau surrounding the Maas valley (Kolen et al. 1999, 179). In northern France, numerous upland sites have been found buried under significant loess deposits, primarily as a result of pre-emptive archaeological activity during large infrastructure projects. In 2010, for example, the Middle Palaeolithic site of Etricourt-Manancourt was discovered on the plateau between the Somme and Pas-de-Calais départements (Hérisson et al. 2016) during diagnostic archaeology preceding construction of a retention basin for the Canal Seine Nord-Europe. It is worth noting that, given the preservational qualities of deep loess deposits, these French sites would not have entered the archaeological record through natural processes of artefact release but only as a result of French government policy on archaeology.

Despite the resultant increased awareness of the archaeological potential of the Chalk uplands and a shift from a site-oriented to a more regional perspective (Glauberman 2006), most studies have continued to focus on lowland fluvial contexts. Current thinking asserts that early humans targeted river valleys preferentially because of their greater resource diversity, ability to act as major routes through the landscape and access to raw materials owing to the erosive forces of the river (Hosfield 1999; Ashton et al. 2006; Ashton & Lewis 2012). River floodplains, in particular, provided an optimal hominin niche (Brown et al. 2013). A different and wider range of activities has been argued for the valleys compared to the upland plateaux (Kolen et al. 1999; Drinkall 2014) with the interfluves being used, if at all, during cooler periods and in addition to the river valleys (Ashton et al. 2006).

However, given the lack of evidence and problems with the interpretation of upland archaeology, it could be argued that this thinking is based on a biased dataset, drawn from a restricted environmental context. The fact that artefacts found in fluvial contexts dominate the Lower–Middle Palaeolithic archaeological record is hardly surprising, given the intense commercial exploitation of the gravel terraces associated with fluvial systems during the past 200 years (Wilkinson 2001). Answering the questions posed by the upland record is pivotal to establishing meaningful patterns of past human behaviour; ignoring the controls over its formation negates any possibility of forming a full picture of the ways in which early humans made use of their landscape.

THE IMPLICATIONS OF CHALK UPLAND GEOMORPHOLOGY FOR THE SURVIVAL OF PLEISTOCENE DEPOSITS AND ARCHAEOLOGY

Chalk is a unique type of limestone formed only during the Cretaceous period (146–65 Ma). A widespread, sedimentary rock that extends from Northern Ireland, across Britain to Denmark and south into France and central Europe (Toghill 2000, 145 & 153), Chalk’s archaeological importance lies in the fact that the Upper Chalk contains flint, a durable siliceous rock that has been used to make stone tools for a million years.

Chalk downland is surprisingly resistant to weathering and erosion, due mainly to its exceptional permeability (Williams & Robinson 1983, 40). In southern Britain it has suffered removal rates equated to a lowering of only 12–40 m since the start of the Middle Pleistocene, with limited surface alteration despite long periods of subsurface erosion (Williams 1968 & 1980; Douglas 1976, 269). Pre-existing Tertiary drainage lines in southeast England have been largely maintained (Catt et al. 2006), albeit with later periglacial deepening and modification. Present dry-valley patterns have existed since at least the Middle Pleistocene, with periglacial erosion, primarily during the Wolstonian and
Devensian, responsible for their current depth and asymmetric profile (Morgan 1971; Catt & Hodgson 1976; Catt 2010). It can, therefore, be argued that the general topography of the Chalk downland differs in degree, rather than in kind, from that of the late Middle to Upper Pleistocene.

Nonetheless, the Wallingford Fan Gravels (NGR SU 6130 8240–SU 6840 9470) offer a classic example of the dramatic and misleading effect that geomorphological processes can have on the archaeological record. Accumulated mainly during MIS 12 by solifluction under sub-arctic conditions (Horton et al. 1981), and appearing now as discrete patches along the lower slopes of the Chilterns, the Gravels have produced at least 122 bifaces from eight sites, all derived off the slopes or crest of the Chiltern escarpment to their east (Wymer 1999, 175). Given that the archaeology within them must be at least as old as the Gravels themselves, these are a clear indication of early human occupation on the Chiltern plateau, rather than on the lower ground where the artefacts have been found.

One Quaternary deposit which occurs widely across the Chalk uplands of northwest Europe and which can be shown to have a high potential to preserve Palaeolithic archaeology is Clay-with-flints. Of the 262 Kent sites identified as part of this study for which a geological context was recorded, 67 (25.6%) were associated with Clay-with-flints. Containing up to 50% flint, Clay-with-flints formed in interglacial periods, probably repeatedly (Catt & Hodgson 1976, 184) from the dissolution, decalcification and cryoturbation of the underlying Chalk and Palaeogene deposits. It has the ability to set hard in dry conditions and, as a result, upland areas protected by Clay-with-flints have undergone only minor erosion or deposition since MIS 13 (Catt 1986, 157). On higher plateaux and interfluves away from the edge the deposits remain, in geological terms, in situ (Scott-Jackson 2000, 11).

The UPLA perspective suggests that, under these conditions, artefact preservation and release and hence the archaeological record, will be strongly controlled by the geomorphology. If this perspective is correct then, treating Clay-with-flints survival as a proxy for the degree of erosion suffered by the Chalk uplands, we can make some assumptions about the archaeological record:

- where little Clay-with-flints survives, the archaeology will mostly have eroded away;
- where dense Clay-with-flints survives, the archaeology will be obscured by the geology;
- between these two extremes there will be optimal conditions for artefact release and recovery; and
- if geomorphology, not early human behaviour, is the prime control over recorded artefact density then the relative abundance of upland find-spots should increase and decrease proportionally to Clay-with-flints survival.

This study seeks to test these assumptions.

METHODS

The research model was tested using data drawn from three core areas of the Chalk uplands of southern Britain – the Chilterns, North and South Downs (Figure 1). The Somme valley uplands will, in due course, be used as a control area. All these areas were south of, or circumvented by, the MIS 12 and subsequent glaciations, meaning that, although periglaciated, there has been no removal of their archaeology by surface scouring.

An Excel spreadsheet was created for each area, with Lower and Middle Palaeolithic find-spots drawn from the electronic database of Wessex Archaeology’s 1993 Southern Rivers (SRPP) and 1996 English Rivers (TERPS) Palaeolithic Projects. These lists were then cross-checked against the SRPP/TERPS hard copy and any additional find-spots added. A significant number of find-spots in each region were found to have been omitted from the electronic database, including some key sites, such as West Yoke, Ash-cum-Ridley Kent (TQ 597 655) and Hawkshill Down, Deal (TR 375 491).
Historic England’s Heritage Gateway database and/or the Historic Environment Records (HERs) for each local authority in the study areas were then cross-checked against the lists. These included the modern counties of Berkshire, Oxfordshire, Buckinghamshire, Hertfordshire and Bedfordshire (for the Chilterns), Surrey and Kent (for the North Downs) and East and West Sussex and Hampshire as far west as the river Test (for the South Downs). A number of London boroughs and other unitary authorities fringing both sides of the Middle and Lower Thames Valley were also included. The Portable Antiquities Scheme (PAS) database was searched for all relevant local authorities, as PAS finds are not always included in the HERs. A total of 1798 find-spots were identified in this way.

While the SRPP/TERPS, HER and PAS databases proved invaluable sources of information, experience showed that great care and rigorous cross-checking were required to produce an accurate dataset with minimal duplication or omission.

The next stage was to produce find-spot distribution maps. Find-spots were plotted against their geological context using ArcGIS software and British Geological Survey (BGS) data downloaded from Edina Digimap (Figure 2). As multiple find-spots with the same NGR receive only a single marker on ArcGIS-generated maps, fewer than 1798 find-spots appear on the maps.

The Chalk escarpments of the North and South Downs and the Chilterns are breached by a number of river valleys and wind gaps. Each of the interfluves between these breaches in the cuesta was treated as a separate unit for analytical purposes (Figure 2).

The approximate area of Chalk on each interfluve was measured using the ArcGIS measuring tools. In each case the measurement was taken down the middle of the river valley or wind-gap and the results entered into an Excel spreadsheet. The area mapped as Clay-with-flints was likewise measured for each interfluve and calculated as a percentage of the Chalk bedrock (Figure 3).

The geological context of each find-spot was analysed and the number of find-spots on each interfluve counted. Scatter diagrams were generated to identify any relationship between find-spot density and Clay-with-flints survival (Figure 4).
Figure 2. Distribution map showing the North Downs interfluve between the Medway and Darent valleys. The horizontal arrow indicates the extent of the interfluve. The Clay-with-flints is the brown deposit running across the centre of the map. The underlying layers of Chalk are depicted in green. The blue triangles represent the antiquarian collector Benjamin Harrison’s finds, primarily on the Clay-with-flints on the plateau. There is also a concentration of sites in the Swanscombe area of the Thames Valley, again due to antiquarian collector bias. (Created using BGS data downloaded from EDINA Digimap.)

Figure 3. Comparison of the total amount of surviving Clay-with-flints for the whole of each study area, as a percentage of the Chalk for that area.
RESULTS

Figure 3 illustrates the differences in surviving percentages of Clay-with-flints between the three study areas. These have resulted in very different opportunities for artefact preservation and release and in wide variations in the numbers of find-spots.

On the North Downs, total find-spots per 100 km$^2$ of Chalk range between 0 (on the interfluve between the Blackwater-Lodden and the Wey, where Clay-with-flints survival is only 0.17%) and 24 on the Medway-Darent interfluve, with 19.49% Clay-with-flints survival. On the Chiltern interfluves the range of find-spots per 100 km$^2$ of Chalk is between 0 (at 21.95% Clay-with-flints survival) and 14 (at 25.29%). On the South Downs the range is between 1 find-spot per 100 km$^2$ of Chalk at 0.53% Clay-with-flints survival and 23 at 10.61% (Eastbourne to Cuckmere interfluve).

Figure 4 shows the results of analysing the number of find-spots in relation to 100 km$^2$ Chalk on each interfluve against the surviving percentage of Clay-with-flints.

The effect of collector bias can be clearly discerned on the North Downs. On the interfluve between the rivers Darent and Medway, known as ‘Harrison’s plateau’ (Crawshay 1924, 155), Benjamin Harrison alone accounts for 40 individual site entries in the SRPP, often with multiple artefacts. (Research into Harrison’s notes and maps as part of the SRPP project ensured that none of his ‘eoliths’ is included in that total). This, together with collector activity in the Swanscombe area, probably accounts for the outlier of 24 findspots at 19.49% Clay-with-flints on that interfluve (Figure 2).

The anomalous zero result at 21.95% survival on the Chilterns can probably be attributed to the land-use history of this interfluve, between Tring and Dagnall. This area has, since the 13th century, been private estate land (now National Trust). As a result, the aggregate extraction that allowed antiquarians to make finds on the other interfluves did not occur and little of the estate, which still has large areas of woodland and commons, has ever been ploughed.

The anomaly of 23 findspots at 10.61% Clay-with-flints survival on the South Downs is, however, more difficult to explain.

There is an identifiable correlation between Clay-with-flints survival and find-spot numbers in each of the three areas, albeit more
evident on the North and South Downs than for the Chilterns. This may be because the northern and southern Chiltern hills are very different both in Clay-with-flints survival and drainage patterns (Catt 2010, 94–97) and would perhaps be better treated separately. Within each area, the number of find-spots increases and decreases broadly proportionally to Clay-with-flints survival, despite the fact that the areas have such different amounts of surviving Clay-with-flints. My proposal that each landscape should have optimal cover/erosion levels for artefact release and discovery is, therefore, valid in each discrete area, regardless of the range of Clay-with-flints in that area and the potential effects of geomorphology on the creation of the archaeological record are visible.

**DISCUSSION**

The validity of interpretive models of human behaviour must be assessed against the controls over the creation of that record (Pope *et al.* 2016, 2) and using archaeological distribution patterns to interpret early human behaviour without taking into account the controls over the formation of those patterns is fraught with the potential for misinterpretation. This paper takes the UPLA perspective that artefact preservation and release and, consequently, the archaeological record will be strongly controlled by geomorphological processes. Using the Quaternary Clay-with-flints deposits as a proxy for the amount of erosion suffered by the Chalk uplands, it tests the assumption that if geomorphology, not early human behaviour, is the prime control over recorded artefact density, then the relative abundance of upland find-spots should increase and decrease proportionally to Clay-with-flints survival.

The results presented here demonstrate that, at least within each of the three Chalk upland areas included in the study, this assumption is correct. Find-spot numbers do increase and decrease proportionally to Clay-with-flints survival, resulting in a non-linear correlation curve for each of the discrete areas. There is a direct relationship between Clay-with-flints survival and the frequency of recorded Lower-Middle Palaeolithic find-spots, but because the three areas do not fully overlap in respect of their Clay-with-flints survival, there can be no unified correlation curve and no single identifiable Clay-with-flints density point at which find-spot numbers always peak. Nevertheless, the effect of geomorphological processes on artefact preservation and release can be seen. Clay-with-flints is the starting product for transformation into colluvium. When it is soliflucted or geliflucted and comes to rest on an inclined surface or hillside then it is classed as ‘Head’ and mapped as such by the British Geological Survey (British Geological Survey 2017). It ends up eventually as valley infill below the plateau from which it derived and many sites including, for example those at Cuxton shown in Figure 2, lie on such deposits, potentially representing upland rather than river valley occupation.

The distorting effects of antiquarian collection and modern fieldwalking on the archaeological record have likewise been demonstrated. The dip-slope of the Darent Medway interfluve descends into the Lower Thames Valley, where the river flows on Chalk or Thanet sand. The ca 3 km stretch between Greenhithe and Swanscombe, including the numerous large chalk quarries east of Dartford have, since the end of the nineteenth century, been favourite places for collectors such as Stopes, Spurrell and Dewey (Dewey 1915; Wymer 1968, 332). Ashton *et al.* (2015, 25) have drawn attention to the potential for individual sites to skew the archaeological record and, while the post-Anglian Thames was undoubtedly a major Middle Pleistocene routeway into Britain (Ashton *et al.* 2015), a simple correlation cannot safely be drawn between the number of sites in the archaeological record of the Thames Valley and hominin landscape preference.

Collector bias cannot, however, explain the exceptionally high number of chance finds on the Eastbourne to Cuckmere interfluve of the South Downs, where there has been no significant individual collector (Woodcock 1981), fieldwalking programme or mineral extraction. This could, therefore, reasonably be considered to be a real archaeological distribution.

This paper has also drawn attention back to the significance of the Chalk uplands in the
archaeological record, emphasising the importance of the whole landscape when interpreting hominin behaviour. Accepting that most north European Lower Palaeolithic sites were associated with freshwater (Ashton & Lewis 2002, 58) and while it is true that there is little if any freshwater on the Chalk uplands today, this was not necessarily always the case. At Round Green, Luton (161.5 metres OD), Worthington Smith detected a former pond 4.5–6 m deep, filled with brick-earth, with human activity restricted to a thin horizon surrounding its margins (Smith 1916). Early humans may have centred their activity around such dolines when they were ‘fully ponded’ (White 1997, 926). Acheulean occupation at the Caddington sites (161.5–181 m OD) also occurred by a marsh or shallow lake (Catt et al. 1978, 143). The Chalk escarpments would have provided a superb vantage point for observing both game and predators and hominins dependent on natural resources for their survival would have made use of all, not just part of the accessible landscape. Evidence for hominin behaviour is to be found in the archaeological record of the Chalk plateaux and only by including it in our interpretations can a full picture of early human landscape use be drawn.

Finally, focussing on the geomorphological qualities of artefact preservation and release of different geological contexts could suggest where Palaeolithic archaeology is most likely to be found. On dense surviving deposits with high preservation potential, such as Clay-with-flints, the empty areas on the archaeological distribution maps could be those with the most potential for surviving archaeology, while the fraying edges of those deposits should be where artefacts will be eroding out.

CONCLUSION

This paper illustrates the dangers of interpreting hominin landscape preference based on site distribution patterns without taking full account of all the controls on the creation of the archaeological record. If patterns in that record are to be used to interpret past human behaviour, then archaeologists must understand and take into account all the controls over their creation. In this paper, I have attempted to measure one of those controls, the effect of geological context on artefact preservation and release. However, collector history and modern and historic landscape use, including infrastructure building and quarrying, must be taken equally into account when using archaeological distribution maps to understand the past. Otherwise, using patterns in the archaeology to interpret hominin landscape use will result in a partial and potentially distorted picture.

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