

IS THERE ANY ORDER TO THIS CHAOS? PATTERNS OF SPACE, STONE, AND PLACE IN LATEGLACIAL SOUTH-EAST ENGLAND AND THE CHANNEL RIVER NETWORK

This paper presents a qualitative archaeological overview of the south-east of England and the Channel River network as well as some initial spatiotemporal renderings that enable a better understanding of the Lateglacial (LG) North-West European lithics and techno-cultures.

Significant quantities of data covering LG human activity in South-East England are currently held across a number of domains with varying degrees of quality and quantity, managed by different institutions in the United Kingdom (UK). As part of my doctoral research, I have explored methods for comparing and integrating these datasets within a Geographic Information System (GIS) during the initial stage of my analysis of British LG assemblages of the Channel River catchment. The methodology presented here enables spatial analyses at specific scales, different chronologies and palaeo-environmental backgrounds for a fully integrated interpretation of archaeological finds, sites, and distributions. This is illustrated with a pilot study of the archaeology associated to the Wey and Mole River catchments.

This work is driven by questions connected to the evolution of research on the LG of Britain over the last 30 years. My methodology combines GIS with an ongoing regional lithic analysis, both tools used to explore the overarching theme of this research. LG site locations and the potential role played by rivers in LG landscapes (Howard et al. 2015) are seen to create dynamic environments for human activities (Barton/Roberts 1996; Barton et al. 2003; Jacobi 2004; Conneller 2007; Barton et al. 2009; Barton 2012). This will assist in the contextualisation of LG distribution patterns from South-East England within the dynamic landscape of the Channel River catchment, one of the most extensive fluvial systems in Northern Europe during the LG (Gibbard/Rose/Bridgland 1988; Coles 1998; Antoine et al. 2003b; 2007; Gupta et al. 2007; Gibbard 2007; Westaway/Bridgland 2010)¹. By characterising the Channel River's changing role as a dividing or linking factor dominating the North-West European landscape during the LG and Early Holocene, a new perspective for analysing LG site distributions is envisaged.

This doctoral project is divided into five phases:

- 1) Collection of background data and initial assessment of the national LG distributions; creation of a topographic template using GIS; modelling of river catchments; selection of case studies based on available datasets,
- 2) Lithic data collection and assessment: characterisation of industries based on an extensive literature review and comparative examinations; a test study assessing the databases in the selected region; ground testing by assessing selected collections; re-recording of principal South-East English assemblages within the study area using a revised recording methodology; assessing the diagnostic values of the criteria used to interpret the assemblages,
- 3) Integration of qualitative assessments of the assemblages (e.g. recovery and taphonomic assessment) and the diagnostic elements (e.g. lithics analysis) into the database,
- 4) Expansion into a larger regional context with the integration of palaeo-environmental and dating datasets within a chronological framework,
- 5) Spatial analysis of the distributions in relation to the course of the Channel River using GIS.

The methodological, landscape modelling, and database assessment aspects of the first two phases of this research were presented at Burgos in October 2014, and are the subject of this paper. These are based on the following questions:

- 1) What is our current understanding of the LG landscape distribution of South-East England, and which datasets exist for its interpretation?
- 2) What are the resolutions for the different datasets, and how is it possible to apply different types of analysis so as to optimise the use of the available data at different scales?

COMPOSITION OF THE LG DATASETS FOR SOUTH-EAST ENGLAND

Current context and distribution of the LG archaeology of South-East England

Cave sites have dominated our perspective of LG archaeological contexts for nearly a century (Garrod 1926; Campbell 1977; Collcutt 1984; Barton/Roberts 1996; Barton et al. 2003; Jacobi 2004). In more recent years the archaeological assemblages recovered from caves have once again been at the forefront of LG research, with a focus on radiocarbon dating and faunal analysis, as caves currently provide the best conditions for preserving organic materials of this age (Jacobi/Higham 2009; 2010). Nevertheless, it has also long been recognised that the limestone regions, where most cave sites are located, represent only a small proportion of the potentially occupied land in Britain during the LG (Reid 1913; Coles 1998). Although not as well-known or immediately as apparent as the cave sites, the distribution and recent discovery of open-air sites continues to suggest a much more extensive occupation of Britain (Barton 1986; 1992; Barton/Roberts 1996; Barton et al. 2003; 2009; Cooper 2006; Conneller/Ellis 2007; Garton/Jacobi 2009; Ballin et al. 2010; Jones 2013; Attfield et al. 2014).

The nature of archaeological research in England has changed dramatically over the last 30 years, notably with the introduction of »Planning Policy Guidance 16« in 1990. This policy transformed the way planning permission was provided, culminating with the introduction of the National Planning Policy Framework (NPPF) in 2012 (Cooper 2012; Department for Communities and Local Government [DCLG] 2012; Flatman/Perring 2013; Historic England 2014). All of the LG excavations undertaken since 1990 in South-East England, except for Avington VI, and two test pits at Brockhill, Surrey, by the Surrey Archaeological Society, have been developer led (Dumont 1997; Barton 1998; Cooper 2012; Mills 2013). The nature of the excavations and research has also resulted in a transformation of how the results of interventions are published, with the vast majority within the realms of »grey literature« (unpublished reports for developers), and only rare sites published as collaborations between university researchers and commercial archaeological »units« in academic journals such as »Proceedings of the Prehistoric Society«, or as monographs (Farr 2009; Cooper 2012; Cooper/Green 2016).

A new challenge concerning the exponential number of interventions associated to developer funded excavations is keeping track of current work, and compiling recognised or »diagnostic« elements (individual finds, scatters, excavations, and palaeo-environmental sequences) within a searchable framework for future cross-referencing and consultation. Currently the Archaeology Data Service (ADS) is hosting an initiative to create a searchable online index to grey literature throughout the UK. Already over 30,000 reports have been indexed (ADS 2015a; Cooper/Green 2016).

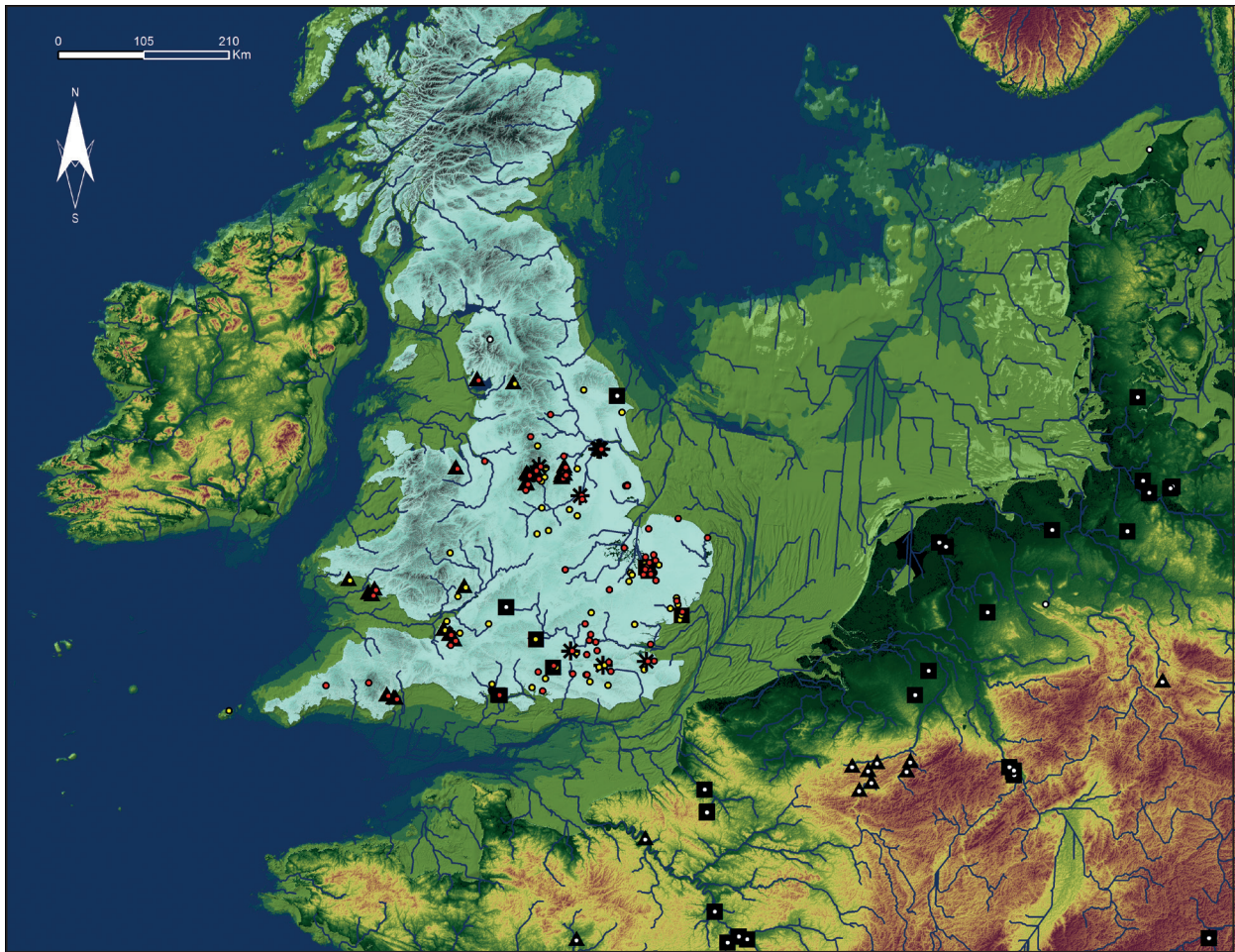


Fig. 1 The distribution of LG events in the CoB dataset ordered by site-type. Background DEM: OS Land-Form Panorama.

LG datasets for England and Wales

Over the past 20 years in Britain several substantial datasets with information regarding LG sites and find-spots have been made digitally accessible for research (Evans 2013; Cooper/Green 2016). Open access to this data provides a unique opportunity to reassess the nature of LG occupation in Britain. However, there is little consistency between the form of the datasets, and a considerable amount of work on data standardisation, scaling, and transformation is necessary before any form of GIS spatial analysis can be attempted. The quality of the data should not be assumed, and my research includes a thorough re-examination of a sample of archaeological material recorded in the datasets for South-East England as a control.

One of the principal datasets used for this research is the Colonisation of Britain (CoB) (fig. 1) (Wessexarch.co.uk 2013). The CoB was constructed from Roger Jacobi's research card index developed for the »Gazetteer of Mesolithic sites in England and Wales« (Wymer/Bonsall 1977), which he continued to compile and update throughout his career (ADS 2015b). It is now curated by the British Museum (Harris 2015), and has been digitised by Wessex Archaeology as the Palaeolithic and Mesolithic Lithic Artefact (PaMELA) database, with its online searchable component being the CoB (ADS 2015b). This database covers all Mesolithic and Upper Palaeolithic sites in Britain known and recorded by Jacobi who researched the LG from the early 1970s until 2009. This database was preferred for this pilot study due to its internal consistency, informed choice of detail, and concise nature. More importantly it can be considered as being the most reliable and

extensive dataset available, as it was compiled by one of the foremost researchers of Mesolithic and LG archaeology in Britain (Ashton/Harris 2015). Roger Jacobi's work was carried out over nearly a 40-year period during which time many elements of his understanding of the lithic industries were refined, redefined, and reinterpreted. However, the LG component was apparently not updated in light of his recent publications on the subject, and excavations post 2000 are absent, therefore the CoB requires cautious application in view of recent research developments (Jacobi 2004; Jacobi/Higham 2009; 2010).

For the purposes of the CoB dataset, Wessex Archaeology attributed chronological interpretations to his find descriptions based on what were considered as »type fossils« and associated a chronological attribution (ADS 2015b; Wessexarch.co.uk 2013). As a result, in the CoB, LG events were divided into four categories: Creswellian, Late Upper Palaeolithic (LUP), Final Upper Palaeolithic (FUP), and Terminal Upper Palaeolithic (TUP). These terms are not fully defined by Wessex Archaeology, but Creswellian is self-explanatory, and following the most frequent usage by Roger Jacobi in his publications (Jacobi 2004; Jacobi/Higham 2009; 2010; Harris 2015) it is assumed that the term FUP refers to Federmesser-Gruppen-type assemblages, and TUP to Long Blade assemblages, with LUP referring to other LG assemblages including those containing shouldered points and »Zinken« typologies (Jacobi/Higham 2010). Although these attributions are arguable, as discussed below, at a larger scale they do enable a preliminary overview of the general LG spatial distribution in Britain and South-East England. A priority for this ongoing research is to refine these chronological attributes and bring the database up to the current LG techno-typological framework for North-West Europe.

The CoB dataset was cross-referenced and supplemented with publications providing detailed specific gazetteers covering the Upper Palaeolithic and Mesolithic (Wymer/Bonsall 1977) and Long Blade industries (Barton 1986). Several other national datasets were consulted including

- 1) National Monuments Record (NMR),
- 2) Regional and district Historic and Environmental Records (HER's),
- 3) English Heritage Excavation Index; provided by Historic England (formerly English Heritage),
- 4) Archaeological Data Service (ADS).

Finally, data from recent excavations have been added from the public domain and »grey literature« sources. The assimilation of these datasets enables a reassessment of past collections within a cohesive research framework, integrating major sites, local museum collections, and individual finds at local, regional, and national scales as well as creating the potential for their integration into future research. This is a pivotal element of my current research as the different databases provide very diverse levels of information. Considering the recent advances in the characterisation strategies used to distinguish LG industries, a reassessment of past recording methods is also undertaken (Pelegrin 2000; Barton et al. 2003; Coudret/Fagnart 2006; Debout et al. 2012). However, due to the size of the collections this is a formidable task beyond the limits of the current research at a national scale. Therefore, as a pilot project I have conducted a thorough reassessment of the LG archaeological assemblages and datasets concerning the catchments of the Rivers Wey and Mole in South-East England. This is currently being extended to a wider area of South-East England including other tributaries of the Channel River such as the Bournemouth Avon, the Test and the Arun Rivers.

METHODOLOGY: SPATIAL ANALYSIS, LITHIC ANALYSIS, SCALES AND POTENTIAL

Archaeological considerations and components

This project re-examines LG flint assemblages and their characterisations. This techno-typological approach combines quantifying datasets so as to make them comparable, within the conceptual framework of the

»chaîne opératoire« *sensu* Inizan et al. (Inizan et al. 1999; see Pelegrin 2000; Soressi/Geneste 2011). This approach is used for the identification, interpretation, and analysis of recurrent methods, technologies, and tool types that may be considered as diagnostic (or not) for the LG.

The objective is to formulate characterisations of individual sites to assist the consideration of groups of sites within a coherent analytical framework. Ultimately the aim is to recognise and associate signatures related to behaviours, movements, and decision-making patterns in relation to the river valleys of the Channel River catchment. These river valleys are the most prominent geomorphological features of the open-landscape, and this landscape is overwhelmingly representative of the living habitat. This approach also assists in bridging the gap between cave and open-air datasets. Furthermore, it is intrinsically relevant to the current archaeological dynamic, following the recent discovery of several open-air LG sites by development funded archaeology along river valleys in southern England (Cooper 2006; Conneller/Ellis 2007; Barton et al. 2009; Lewis/Rackham 2011; Jones 2013; Attfield et al. 2014).

In order to interpret and cross-reference the database for South-East England, the different types of open-air LG signatures are emphasised. Paramount are the stratigraphic context and the different taphonomic processes that open-air sites undergo. These often lead to a very poor preservation of organic material, crucial for direct dating and the functional analysis of sites. Amongst the taphonomic processes the potential for the disturbance or redistribution of materials within alluvial contexts must also be taken into account, as well as the advantages of a relatively fast burial and preservation of artefacts (Needham/Macklin 1992). Although quite often the potential for direct dating is low, this often contrasts with a high spatial and technological resolution that can be gained from the extensive horizontal analysis of refitting lithic assemblages on open-air sites.

Since the 1980s detailed techno-typological analyses have demonstrated that lithic industries in North-West Europe, through extensive refitting programs, can be technologically and methodologically characterised (see Karlin/Newcomer 1982; Cziesla et al. 1990; Barton 1992; Bodu 1994; De Bie/Caspar 2000; Biard et al. 2004; Coudret/Fagnart 2006; Lewis/Rackham 2011). These will constitute the technological reference sites within this analysis. This has been combined with an extensive amount of experimental research so as to characterise the traits and concepts behind the production of LG assemblages (Pelegrin 2000). The aforementioned refitting technological reference sites, in combination with the characterised technological attributes from well dated sites, form the analytical framework used in my research. This allows the incorporation of a much larger distribution of open-air sites, aiming to provide a broader perspective on human activities, associated to this period (Barton 1986; 1992; Cooper 2006; Conneller/Ellis 2007; Barton et al. 2009; Lewis/Rackham 2011; Grant et al. 2014). I emphasise the distinction between elements associated by proxies and directly dated to this period (Blockley et al. 2006) within the site distribution patterns so as to evaluate and clarify the levels of comparison.

Digital Elevation Maps (DEM) and background topographic representation

The elements described above provide a backdrop for specific hypothesis-driven spatial analyses that can be assimilated using a GIS, in this case ESRI ArcGIS 10.2.1. This integration of multiple datasets enables cross-referencing at multiple scales of analysis as well as advanced relational and spatial analysis of site distributions (Connolly/Lake 2006). After defining the criteria for the necessary types of information recorded and assessing diagnostic characterisation and resolutions of lithic assemblages, the resulting dataset will be integrated into a dynamic and comprehensive palaeo-environmental and chronological platform for further spatial analysis. The work of Crombé et al. (2011) in Belgium will be used as an initial template for the analy-

sis of spatial distributions of LG events, leading to the first cross-channel comparison using an equivalent framework.

Base maps

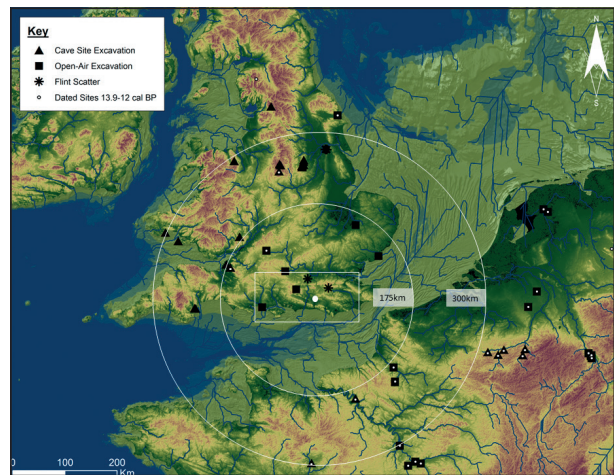
The use of DEMs enables a topographic base-plate for the subsequent datasets. Although many climatic, ground cover and soil changes have arisen since the LG (Catt 1979; Macphail/Scaife 1987; Branch/Green 2004), and eustatic uplift must also be taken into consideration for southern England (Lambeck 1995; Shennan et al. 2006; Westaway/Bridgland/White 2006; Bridgland et al. 2010; Bradley et al. 2011), one can consider the overall topographic features as approximately representative of LG landforms and topography. The most dramatic difference compared to current topographic features, other than sea level, is found along the river courses as a result of the sedimentation of floodplains and river valleys during the Holocene; however, the river valleys persist (Brown 1997; Bridgland et al. 2006; Antoine et al. 2003a; 2007; Westaway/Bridgland 2010; Green/Farr/Branch 2013; Howard et al. 2015). Several DEMs, each with their particular pros and cons, have hence been combined to create a homogeneous land-surface (**fig. 2**)².

The technicalities involved in the construction of the DEM used here will not be discussed in detail, simply the concepts behind its creation and application. To create the palaeo-river flows, the Gebco08 DEM (www.gebco.net) was used as it represents continuous surface covering all of Northern Europe, including the bathymetry of the English Channel and the North Sea. The continuous nature of this DEM enables the modelling of river channels based on topography. This is equivalent to pouring a bucket of water over the modelled landscape and calculating in which direction the water will flow and accumulate to create rivers (Connolly/Lake 2006). The bathymetric data has been supplemented with the Ordnance Survey Land-Form Panorama for the topography of the UK, and SRTM90 DEMs for Ireland and Continental Europe.

Past sea levels are primary factors when considering the LG in relation to the exposure of landforms and their associated topography and fluvial systems. Although both LG sea levels (Shennan et al. 2006; Bradley et al. 2011; Brooks et al. 2011; Sturt/Garrow/Bradley 2013) and palaeo-channels (Antoine et al. 2003b; Gibbard/Lautridou 2003; Gibbard 2007; Lewin/Gibbard 2010; Westaway/Bridgland 2010) have been considered in detailed local and regional studies, they have not been combined with LG archaeological distributions around the English Channel since the seminal work on the now submerged Northern European landscape (Coles 1998). The topography used here is based on contemporary bathymetry, as it is believed that most of the major palaeo-valleys apparent in the bathymetry were created pre-LG and have subsequently guided the river channels during the LG (Gupta et al. 2007; Gibbard 2007; Brooks et al. 2011). The exact location of the individual channel beds remains uncertain without further ground testing, due to the Holocene infilling of the channels (Sturt/Garrow/Bradley 2013; Howard et al. 2015). The resolution is high enough for the consideration of active river valleys and large scale dynamics (Brooks et al. 2011). So as to test the model for currently submerged areas a higher resolution DEM was used (EMODnet), and compared to recent mapping and analysis of submerged palaeo-channels (Gibbard/Lautridou 2003; Gupta et al. 2007; Gibbard 2007). The correlation is very good by eye, coinciding with palaeo-geographic publications (Antoine et al. 2003a; Westaway/Bridgland 2010; Brooks et al. 2011) and will subsequently be quantified using GIS spatial analyses.

When applying this dataset it is possible to approximate the exposed landforms in relation to different sea levels, enabling a more faithful representation of site distributions within the LG landscape. Following this, regional and local analyses are being carried out and integrated based on higher resolution DEMs and LiDAR where available, and/or relevant to the scale of analysis. High-resolution datasets have been obtained from

Fig. 2 Example map showing LUP and FUP sites (from the CoB dataset) at a low scale of analysis which illustrates the relevance of North-West European sites to the study area (white rectangle), with examples of chronologically high-resolution (directly dated) sites (white dots). – (Data for Continental Europe after Miller 2012). – The elevation is based on a combination of GEBCO08 (www.gebco08.net), SRTM90 (<http://srtm.csi.cgiar.org/>), and EMODnet (www.emodnet-hydrography.eu) DEM/DTMs. The shaded region around the estuary of the Channel River represents the estimated rise of sea levels during the Allerød. – (After Brooks et al. 2011; Sturt/Garrow/Bradley 2013).



the Ordnance Survey and the Environmental Agency for the case studies of the Wey and Mole River system as well as the Bournemouth Avon and Test Rivers. These are being used to investigate individual site locations and groups of sites within the same river valley in more detail.

Representing thematic datasets

Following the setup of the topographic basemap, thematic geo-rectified datasets have been added for cross-referencing and contextualisation of the archaeological distributions. The additional information added so far is:

- 1) Geological bedrock (British Geological Society),
- 2) Drift geology (British Geological Society),
- 3) Ground cover (urban, forested, agricultural) (Ordnance Survey),
- 4) Waterways and wetlands (Ordnance Survey and Environmental Agency),
- 5) Current areas susceptible to flooding (Ordnance Survey and Environmental Agency).

SCALING THE DATASETS – RIVER CATCHMENTS AS SCALES OF ANALYSIS

The choice of river systems and their catchments as a scale of analysis allows for a quantitative investigation of the relationship between LG event locations and rivers. This follows patterns perceived in recent research around the Channel network (Coudret/Fagnart 2006; Barton et al. 2009; Bignon 2008; Debout et al. 2012). River courses serve as significant landscape features at local, regional, and supra-regional scales. River catchment areas can also act as a scale for people living in the environment as rivers are often used as regional identifiers in ethnographic and historic research, as well as in LG archaeology (Tyrrell 1911; Reid 1913; Brown 1997; Coles 1998; Grøn 2005; Coudret/Fagnart 2006; Langlais 2008; Bignon 2008; Barton et al. 2009; Schulting 2010). Considering waterways as scales of analysis, one can move from individual river tributaries to larger river networks. The rivers should be represented as dynamic landforms bordering and/or within local and regional environments, which have the potential to divide or link human activity throughout the LG and Early Holocene.

The methodology applied will distinguish sites with different attributes such as sites with faunal remains and well preserved techno-typological contexts in England. When considering true distances and sea levels

of the LG, this methodology provides a scale which encourages comparisons with Northern Europe (**fig. 2**). The inclusion of North-West Europe is an important factor as lithic industries have been compared techno-typologically over the last 30 years (and typologically since 1926 [Garrod 1926]), with similar characteristics being found to those recognised in British assemblages (Barton 1992; Barton/Roberts 1996; Jacobi 2004; Barton et al. 2003; 2009; Jacobi/Higham 2010). This comparative framework is particularly significant considering that South-East England was part of the continental landmass at the time. There is also a need to use appropriate maps for this representation when considering the archaeology of the period, so as to appreciate the potential spatial dynamics (Reid 1913; Coles 1998; Grimm 2011). If ever there was a factor which fragmented the landscape seasonally or during different climatic periods, it would have been the rivers, and although well represented for the Lower and Middle Palaeolithic on maps they are too rarely present on LG maps (Bridgland et al. 2010; Dinnis 2011).

DATING THE LG OF SOUTH-EAST ENGLAND

Direct dating

As stated above, direct dating of human presence in the LG is mainly constrained to the faunal records from cave sites in Britain. There are two notable exceptions in southern Britain: the open-air sites of Flixton and Three Ways Wharf, which have reliable dates on cutmarked horse bones, but these both date to the very end of the LG (Barton/Roberts 1996; Jacobi/Higham 2009; Lewis/Rackham 2011; Conneller/Higham 2015). The preservation of hearths in LG contexts is very rare, and has so far only been found in two caves (e.g. Three Holes Cave and Mother Grundy's Parlour – see Roberts 1996 and Jacobi/Higham 2010), being absent in British open-air sites (Barton et al. 2003). Several extensive radiocarbon programs have been applied to the British LG (Campbell 1977; Collcutt 1984; Housley et al. 1997); however, it is only more recently that a high-resolution AMS dating program has resulted in a reliable chronological framework (Jacobi/Higham 2009; 2010). The quality of this latter dating program is assured by the strict selection of the dated elements: they were all cutmarked bones from known LG contexts from cave sites across the UK. What is important for the interpretation of site distributions is that the AMS dates indicate brackets of known occupation in the western and northern regions that infer the crossing and potential occupation of the southern or eastern landmass, and therefore this pattern of occupation can be extrapolated for open-air sites, albeit not applied directly.

We have to turn once again to Northern Europe for the closest directly dated lithic assemblages (**fig. 2**) that may be used as references, most notably from the Rhine-Meuse Delta, the Somme Valley, and the Paris Basin (Miller 2012). Considering the evidence for long distance travel and/or exchange in the LG there is a need to expand comparative research further afield in the future, most notably taking into consideration the Neuwied Basin (Baales/Street 1997; Stevens et al. 2009; Street/Jöris/Turner 2012) and industries to the east of the Channel River catchment (Grimm/Weber 2008; Riede/Edinburgh 2011; Grimm/Jensen/Weber 2012) where both areas have strong palaeo-environmental and chronological evidence.

Indirect dating

OSL dating has been applied to recently excavated British LG open-air sites; however, there are problems with outlier results and the time range is often too broad (Barton 1992; Barton et al. 1998; Conneller/

Ellis 2007; Barton et al. 2009). Only one site has so far rendered what seem to be truly consistent dates: Guildford Fire Station, excavated in September 2014 by Oxford Archaeology (Gerry Thacker, pers. comm.). Thermoluminescence dating has also been applied at Hengistbury Head (Barton 1992), and although this indicates a LG date, the resolution is too coarse to place the archaeology confidently within a specific part of the LG.

Palaeo-environmental records

The high-resolution palaeo-environmental datasets for the LG are for the most part from deep stratigraphic sequences preserved in wetlands (Walker/Coope/Lowe 1993; Walker et al. 1994; 2003; 2012). These sequences have been studied using multi-proxy analyses resulting in high-resolution reference sequences for the LG. By comparing these different environmental records to well-established Greenland ice core data, a high-resolution trend for the LG and Early Holocene has been developed for England (Lowe et al. 1999). However, all of these records are found in Ireland, Wales, and northern England, and there are so far no published high-resolution examples from local southern sequences. Considering the scales of interpretation, it is possible to apply for the most part the general palaeo-environmental trends recorded in these regions to South-East England (Macphail/Scaife 1987; Sidell et al. 2000; Branch/Green 2004; Parker/Goudie 2007; Preece/Bridgland 1998). Nevertheless, one must bear in mind that the conditions would be a lot more continental (fig. 2) without the current English Channel, the North Sea, and the proximity of the Atlantic Ocean. For LG research this region must be considered as an integral part of the North European Plain, both archaeologically and palaeo-environmentally, and therefore Northern European sequences will also be taken into account.

Faunal remains

The LG zooarchaeological data is again biased towards western and northern Britain where, as mentioned above, LG bone assemblages are almost uniquely from cave sites (Currant/Jacobi 2001; Yalden 2007). In the few cases where bone and organic material (e. g. antler) have been found on LG open-air sites in South-East England it has been in very poor condition, and only evidence of the larger mammals (e. g. horses) has been preserved (Lewis/Rackham 2011; Conneller/Higham 2015). This represents a very limited picture of human interactions with the local biota; however, it remains the only direct evidence of behaviours within the open landscape. Research on the nature of LG horse behavioural patterns will be integrated to enhance the model for human dynamics in the landscape of the early LG (Bignon 2008).

Sedimentary records

Many LG open-air sites are dated contextually, most notably in relation to the fluvial sedimentary record (Conneller/Ellis 2007; Barton et al. 2009; Lewis/Rackham 2011). LG fluvial dynamics have been characterised for South-East England (Gupta et al. 2007; Westaway/Bridgland 2010; Murton/Belshaw 2011), but the best associations of LG fluvial records with LG archaeology are found in northern France, most notably along the Somme and Seine Basins (Antoine et al. 2003b; 2007), and in Belgium along the Meuse catchment (Crombé et al. 2011; Busschers et al. 2007). These sedimentary sequences are one of the stron-

gest contextual markers that we have, which help us to understand when the sites were occupied and in which type of locations these occupations were taking place. The fluvial dynamics are also essential for the interpretation of the taphonomic processes that may have affected the archaeological record (Needham/Macklin 1992; Brown 1997).

METHODS FOR DISTINGUISHING LG SITE DISTRIBUTIONS

When considering the LG archaeological distribution of South-East England, the focus is usually restrained to lithic assemblages due to the aforementioned limited survival of organic materials. This requires taking into account the types of records or »events« – a term used by Heritage England referring to individual records in the database (Evans 2013) – in this case isolated or groups of lithic artefacts/assemblages. Three scales of analysis have been applied to the CoB database: low (sub-continental), medium (regional), and high (local) in combination with three scales of archaeological resolution: low, medium, and high, as described below (fig. 3). The combination of these qualitative attributes will be used to weight individual events for spatial analysis to test against research and taphonomic biases in the first instance, before querying the dataset for geomorphological spatial relationships. Within the CoB database there are four types of events: cave excavation, open-air excavation, scatters, and stray-finds. The application of different scales of analysis to different types of data is considered here.

Low-resolution events (stray-finds and un-contextualised events)

When considering stray-finds, which represent the bulk of the CoB dataset (fig. 3), it is important to question whether it is possible to use this data and at which resolution of analysis and interpretation. Arguably an isolated find is not significant. At the other extreme every event with distinctive attributes associated to LG activity may be considered as an indication of potential activity in the landscape, albeit within a larger chronological bracket. The situation is more complex when the finds are possible projectile points which one would expect to find isolated in the landscape due to hunting activities. Nevertheless, »points« remain arguably the most studied and »diagnostic« lithic components of LG archaeology. It is therefore necessary to compare datasets inclusively and exclusively of these individual finds at different scales, to assess whether they can have a relevant (or statistically significant) signature.

For example, a local analysis of isolated »projectile« points (typological) will provide a very different representation to isolated debitage (technological). The »points« may tentatively be attributed to a specific chronological bracket of the LG, whereas an individual blade based on technological and methodological characteristics might be associated to multiple industries, if at all accepted as diagnostic in isolation (for example the TUP blades of the CoB discussed below). Stray-finds are already included in the CoB database with detailed descriptions of the individual finds; it is therefore a worthwhile sample with which to test this hypothesis. To integrate the data, I am introducing this lower scale into my research. When analysed from a regional scale upwards, localised concentrations of »points« and/or debitage would be of interest. It is important to distinguish concentrations of stray-finds from concentrations of sites. For example, the category of »long blades« (blades over 12 cm length associated to the Long Blade technocomplex), by far the largest proportion of TUP entries in the CoB, bears the potential for many biases. These blades are a lot more visible to fieldwalkers and have a relatively low diagnostic resolution, potentially over-representing the TUP in some regions. These lithic concentrations will be analysed as possible signatures of landscape use meriting fur-

ther investigation. This is therefore a resolution that is best used to indicate potential for future research or so as to explore local research patterns.

Medium-resolution events (isolated scatters and un-dated and /or non-refitting sites)

Examples found in South-East England are open-air scatters, single occupation sites, and multiple occupation sites. Palimpsests are frequent amongst LG open-air sites, along with their inherent complications. The most suitable scale of analysis is very much dependant on the nature of each open-air site (fig. 3). Characterisation of these assemblages can be problematic unless coherence can be demonstrated (Collcutt/Barton/Bergman 1990; Barton 1992). In the past this has been done in the following ways:

- 1) Through substantial refitting which demonstrates chronological contemporaneity of the scatter, assuming re-use of artefacts can be ruled out (medium to high-resolution),
- 2) Using a techno-typological analysis based on our current understanding of stone tool production and clear diagnostic markers in association with the debitage (medium-resolution),
- 3) By the presence of typological elements considered as diagnostic of specific LG industries (low to medium-resolution).

Due to a lack of direct dating, the interpretation of LG assemblages in South-East England is dependent on direct typo-technological comparison to reference sites in the UK, and mostly Northern Europe. There is therefore a need to distinguish appropriate reference sites, relative to the scale and type of analysis carried out.

For multiple occupation sites, the duration of the time lapse between different occupations needs to be taken into consideration (Barton 1992; Coudret/Fagnart 1997; De Bie/Caspar 2000). In some cases there is refitting which isolates individual episodes and stratigraphy to corroborate a chronological bracket. This enables a relatively high resolution of different activities within a site (Zubrow/Audouze/Enloe 2010).

A distinction between taphonomically *in situ* sites and disturbed sites needs to be made. This requires reference to specialist reports (e.g. geoarchaeological, micro-morphological) demonstrating the integrity of the archaeological horizon, and is thus limited to more recent excavations (Conneller/Ellis 2007; Barton 1992; Barton et al. 2009; Lewis/Rackham 2011). When these types of reports are absent, the resolution of the assemblage is difficult to ascertain and must therefore remain low to medium, unless internal coherence has been clearly demonstrated. The resolution for these sites could therefore be relatively high from a techno-typological perspective due to refitting and context, but of a relatively low chronological resolution due to the absence of direct dating. Multiple occupation sites have the additional particularity of demonstrating recurrent uses of a location under changing landscape conditions over both short and long periods of time, which in itself is informative of behavioural patterns. The scales and extent of refitting should also be taken into consideration, from demonstrating integrity of an assemblage to potential technological analysis.

Open-air multiple occupation sites have similar conditions for accumulations as cave sites. Most of the British cave assemblages will therefore be classified as medium-resolution as well. Although they have the

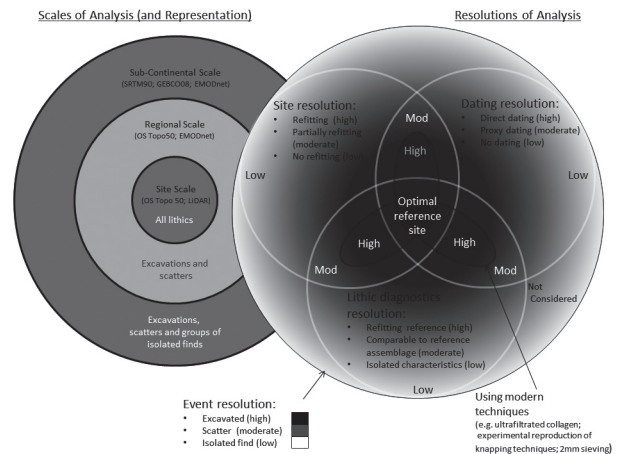


Fig. 3 Scales of analysis and resolutions of analysis used for the categorisation of the archaeological records in the CoB dataset.

best dated material, the contexts are often not secure enough to ensure a direct association with lithic assemblages (Jacobi 2004; Jacobi/Higham 2010). This is because the majority were excavated at an early period in time and without appropriate archaeological methods and controls. The cave assemblages can thus provide a high chronological resolution (as well as direct behavioural and environmental evidence) with directly dated cutmarked fauna, but there is most often a low techno-typological resolution, as refits are limited. The cave assemblages are mostly reliant on the presence/absence of typological attributes and are difficult to relate laterally to other assemblages (Jacobi 2004; Jacobi/Higham 2010).

Some of the site-types mentioned above may have a medium to high chronological or technological resolution, and this is distinguished within this model. If a site does not have both resolutions, it is hard to consider it as a secure reference site.

High-resolution and reference events (single occupations; directly dated sites; reference sites)

Single occupations within multiple occupation sites and single occupation sites are considered at the highest end of the resolution scale used here. When excavated with modern recovery methods these can provide detailed techno-typological information sometimes associated with spatial and behavioural dynamics (Brézillon/Leroi-Gourhan 1966; Karlin/Newcomer 1982; Stapert 1989; Czesla et al. 1990; Barton 1992; Bodu 1994; De Bie/Caspar 2000; Debout et al. 2012; Bodu/Debout/Bignon 2006). When found in stratigraphic context, these high-resolution technological sites, albeit very often lacking in organic material for direct dating, are the foundations for this framework of LG technocomplex characterisations.

It is important to distinguish these high-resolution technological sites as they are constantly referred to when analysing lower resolution sites and individual finds in attempts to find techno-typological parallels. Furthermore when comparing several of these high-resolution sites dating to a similar chronological period, trends in behavioural patterns, »diagnostic« technologies, and tool types may be distinguished in the repetitive and/or isolated occurrences and patterning. Sites which are securely dated and have substantial techno-typological refitting are considered as reference sites in this analysis. Unfortunately, in the UK we only have high-resolution technological or high-resolution chronological sites, and we have to turn to Northern Europe for the directly dated techno-typological reference sites (fig. 2).

PRELIMINARY REMARKS ON THE COB EVENT DISTRIBUTION

Low scale distribution

The CoB dataset highlights some distinct patterns of LG activity in England and Wales (fig. 1), many of which have already been remarked upon by Jacobi, the creator of the card index (Jacobi/Higham 2009; 2010). Immediately concentrations are apparent, and these can initially be explored through the themes of archaeological context (caves/open-air), historic context (intensely researched areas), and geology (ground cover, soil depth). When considering quantities of recovered LG material, cave sites by far and large contain the highest proportion of artefacts within the CoB database; however, in today's archaeological setting, ironically it is the urban sprawl and its spread that is leading to the discovery of the most recent high-resolution sites recovered through development archaeology.

Cave sites

Cave sites are concentrated to the west and north of England and Wales (**fig. 1**) and have a very long history of research, unfortunately linked to very poor stratigraphic control. Making direct parallels to South-East England is limited to cautious typological and very rare technological comparisons. It has been noticed for quite some time that there is a trend for the vast majority of Creswellian activity to be found in cave assemblages as opposed to the more open-air signature of Azilian/Federmesser-Gruppen-type material (Barton et al. 2003; Jacobi 2004; Jacobi/Higham 2009; 2010).

Open-air sites

Open-air excavations are predominantly found to the east and south-east of England in the CoB (**fig. 1**), throughout a relatively large area. These excavations were carried out over a long time period, dating back to the early 20th century. Most of these sites are found in vicinity to major rivers, which is of particular interest for this research. Nevertheless, it cannot immediately be determined whether or not these are linked to preferential preservation or past human preferences. The time period at which sites were excavated can often be linked to the quality of the assemblage recovery. This is important when considering a potential absence of smaller diagnostic elements, particularly before the practices of systematic fine sieving and stratigraphic control. The CoB lacks the most recent excavations that are currently not only the largest LG assemblages nationally (Attfield et al. 2014) but have also been at the forefront of typological and technological research (Conneller/Ellis 2007; Barton et al. 2009; Attfield et al. 2014). These are currently being added to the dataset for this project.

Flint scatters

Flint scatters (surface collected assemblages) are generally considered as homogeneous entities (**fig. 1**). There are four significant concentrations: along the South Downs in the south-east, along the Thames Valley, along the edge of the Wash near Cambridge, and along the Trent Valley close to Creswell Crags, all of which are in areas which have a long tradition of archaeological research. The latter group is of particular interest as these are the only open-air assemblages in proximity to the cave sites, indicating a strong potential for further research, a point emphasised by the recent work at Farndon Fields (Garton/Jacobi 2009). Although scatters cannot be key reference sites, they may have technological and typological parallels, and they do indicate a degree of spatial occupation.

Stray-finds

Stray-finds represent the bulk of the CoB LG events (**fig. 1**), and these have mostly been found by field walkers, as indicated in the CoB notes. The principal concentrations are along river valleys and close to major cities. The highest concentrations are found along the Thames Valley. Considering that the Thames River is the largest river system in the region and would have provided an attractive mosaic of resource rich environments, a high concentration of finds is not surprising and may represent a genuine occupation pattern. One must also bear in mind that the discovery of many finds may be linked to current fluvial dynamics as the

foreshore is undergoing active erosion exposing artefacts in a populated region, which also happens to be a focus of active research (Cohen/Milne/Wagg 2012). Most notable in the database is the high attribution of blades of long dimensions (> 12 cm) with opposed negative removals attributed to the Long Blade techno-complex in the TUP. This is a very weak diagnostic attribute, and in the author's opinion it is most likely Jacobi's short hand indicating a potential rather than a definite cultural attribute. This Long Blade distribution creates a very strong signature within the database, and therefore may be misleading for the interpretation of TUP occupation. Nevertheless, most Long Blade sites are found along the Thames and its tributaries (Barton 1986; Lewis/Rackham 2011). The second highest density is found to the south-east of the Wash, on the edges of Cambridgeshire and Norfolk. The reasons behind this concentration are difficult to ascertain; however, they may once again be linked to the long archaeological tradition in this region, which is further marked by the presence of numerous open-air sites. On the other hand, when considering the Allerød landscape, it is important to consider that this would be a strategic location for movement coming from the continent, circumventing the Channel River if it was a barrier (Barton/Roberts 1996). The region is near large bodies of water rich in resources, and therefore intensive occupation might be expected (**fig. 2**).

A more sparsely spread concentration can be found along the Trent Valley and around Creswell Crags, which is unsurprising as there is a long history of Palaeolithic research (Garton/Jacobi 2009). Interestingly, like many open-air sites and scatters, these events are associated to large active river systems. Further research will attempt to assess these hypotheses with a coherent spatial dataset to examine the spatial distributions.

In summary, there is a concentration of cave sites to the west and north, whereas the open-air sites are distinctly found to the east and south-east, highlighting a geological and taphonomic influence in the distribution of LG records. It is also noticeable that whereas the east and south-east have been impacted to a greater extent by recent development projects and are dominated uniquely by open-air sites, most of the archaeological research in the west of the country has focused on the cave sites. One can also recognise an absence of locations on a south-west to north-east diagonal from Devon to north-western Norfolk. This void is most likely due to a bias in archaeological research, although changes in the bedrock, soil development, and erosion are likely contributing factors. Perhaps one of the most interesting aspects to emerge from this review is that there are very few open-air sites in the vicinity of the cave sites. The reasons for this pattern need further investigation as to whether this is linked to landscape use, taphonomic factors, or collection biases. An ongoing avenue for future research would be to compare site locations to drift and bedrock British Geological Survey (BGS) maps.

COB: ASSESSMENT OF THE TYPOLOGICAL DISTRIBUTIONS (LOW SCALE, MEDIUM- TO LOW-RESOLUTION)

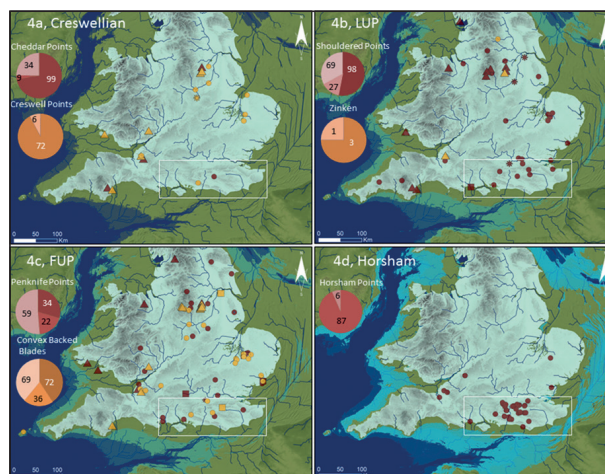
I will here present initial remarks on the typological distribution used in the CoB. These are based on attributions given by Wessex Archaeology using typological characteristics recorded in Jacobi's card index (**tab. 1**). My current research involves reassessing these typological categories from a typological perspective as well as integrating technological associations so as to integrate them into the existing North-Western European LG framework.

The Creswellian distribution (**fig. 4a**) is represented by two point types: Cheddar points and Creswell points. These two point types are largely used as diagnostic elements of the Creswellian (Jacobi 2004; Barton et al. 2009). However, it must be stressed that Creswellian sites can only be confidently identified when associated with the appropriate technological debitage (Barton et al. 2003; Jacobi/Higham 2010). Another aspect

Creswellian	bi-truncated trapezoidal backed blades (Cheddar points), obliquely-truncated backed blades (Creswell points)
Late Upper Palaeolithic	shouldered points, »Zinken«
Final Upper Palaeolithic	»penknife« points, convex-backed blades
Terminal Upper Palaeolithic	long blades, bruised blades, Brancaster cores

Tab. 1 Associated descriptive information for the CoB categories. »Only records where type fossils were present have been assigned a chronological tag. No attempt has been made to apply calendrical dates to the chronological periods within the database«. – (After ADS 2015b).

Fig. 4 Chronological interpretation of LG typological criteria of the CoB dataset based on Jacobi's index cards (Wessexarch.co.uk 2013): **a** Creswellian events based on Cheddar (red) and Creswell (orange) points. – **b** LUP events based on shouldered points (red) and »Zinken« (orange). – **c** FUP sites represented by »penknife« points (red) and convex-backed blades (orange). – **d** Early Mesolithic Horsham points. – The dark hue with white numerals represents the number of events from cave excavations, the medium hue open-air excavations and the lightest hue stray-finds.



of the Creswellian distributions is the clear concentration in the west, most notably amongst the cave sites. The rare open-air events found in South-East England consist mostly of individual finds, and are therefore not very confidently attributed to the Creswellian. There is potentially much more variation than initially perceived for Cheddar points (Jacobi/Roberts 1993; Debout et al. 2012), as well as hints from the recent dating programs to a later phase associated to bi-points (Jacobi/Higham 2010).

The LUP is defined with shouldered points and »Zinken« as type-fossils (fig. 4b). There is a relatively balanced distribution of finds in both cave and open-air locations. These types have never been directly associated to a refitting assemblage in the UK. Although found at Hengistbury Head the shouldered points were not directly associated to the refitting groups, and because they were found at a distance from the refitted excavated area, the question of multiple occupations remains for these elements (Barton 1992). Furthermore, there are no well dated assemblages containing these artefacts, so their association remains typological. These have most often been compared to Hamburgian assemblages based on the presence of shouldered points (Burdukiewicz 1986; Barton 1992; Barton/Roberts 1996), and this question is being re-examined in light of recent publications on this technocomplex, bearing in mind the amount of variation found amongst shouldered points (Burdukiewicz 1986; Burdukiewicz/Schmider 2000; Grimm/Jensen/Weber 2012). Another element here associated to the LUP are »Zinken«; however, there are only four true »Zinken« recorded amongst these assemblages.

The FUP sites and find locations are represented in figure 4c. This distribution map represents penknife points and convex-backed blades associated to Azilian/Federmesser-Gruppen-type industries. There is clearly a much wider distribution of this material and a predominance of open-air locations. This pattern has already been frequently discussed in the literature concerning the LG occupation of Britain (Barton/Roberts 1996; Jacobi/Higham 2009; 2010). Another aspect is the stratigraphic context of the assemblages, as a clear sequence separating Creswellian and FUP material has only been reliably identified within one cave

sequence at Three Holes Cave (Barton/Roberts 1996). Very relevant here is the fact that the greatest proportion of »diagnostic« elements of the Federmesser-Gruppen distribution are »point« stray-finds. These represent the majority of the current dataset with only nine points found in caves and one on an open-air site. When considering that the strongest signature of Azilian/Federmesser-Gruppen-type occupation is based on two types of artefact, both of which are stray-finds, much caution should be taken. Using such an event as a diagnostic element to interpret land-use, especially an isolated projectile point compared to other technocomplexes represented by sites, will be neither at the same scale nor resolution. The geographic extent of the distribution does hint towards a larger use of space (Jacobi 1990). These open-air events lack direct dating, and are here, as for the LUP, interpreted based on typological features alone. It is however interesting that both curve-backed points and »penknife« points are represented in similar proportions. Further contextualisation is therefore needed, with an emphasis on technological reference sites where refitting analyses have been undertaken.

The distribution of Early Mesolithic Horsham points (**fig. 4d**), a very distinct point type, offers a good comparison for spatial distribution in South-East England, and these are here used as a control sample (Clark 1933; Reynier 2005). Although concentrated in the south-east, the outliers are found amongst other areas of long research associated to the Creswellian, LUP, and FUP. This strongly suggests a collection bias, though it does maintain a clear south-eastern distribution (Reynier 2005). However, there are local variations in the site and find locations, recognised at a higher scale of analysis, which will be discussed in case studies.

Overall, there are difficulties with the lumping of some of these typological categories, and a clearer definition based on more distinctly described techno-typological characteristics is now required. Continued comparative work is needed in light of recent research, exploring the relationship of these British assemblages to more clearly dated industries in Northern Europe, most notably sites along the Somme River catchment, the Paris Basin, and the Meuse River (Barton/Roberts 1996).

THE RIVERS WEY AND MOLE PILOT STUDY (HIGH SCALE)

As a pilot study, before expanding this methodology based on the CoB dataset, the catchments of the Rivers Wey and Mole were chosen for their high concentration of open-air sites (**fig. 5**) covering all of the LG categories used in the CoB: Creswellian, LUP, FUP, and TUP, and the full spectrum of open-air site-types. The Rivers Wey and Mole flow in a general south to north direction and are tributaries of the River Thames, which in turn was a tributary of the Channel River in the LG. The Rivers Wey and Mole are also significant because they traverse two major geomorphological regions: the Weald and the Thames Basin (Goudie 1990; BGS 1992). These catchments have seen continuous prehistoric research for over a century (Whimster 1931; Clark 1933; Hooper 1933; Oakley et al. 1939; Clark/Rankine 1939; Pitts/Jacobi 1979; Ellaby 1987; Cotton/Crocker/Graham 2004; Bird/Council/Arch 2006) with several high-resolution LG sites recently excavated (Jones 2013; Attfield et al. 2014). The Wey and Mole also contain all of the categories of sites mentioned above: individual find spots, groups of finds, open-air scatters, multiple occupation sites, and short-term site occupations (**fig. 5**).

The CoB database combined with recent excavations provides 19 LG events along the courses of the Rivers Wey and Mole. The first stage is therefore to identify these sites and findspots and understand how and on what basis they were defined. This will then be evaluated on a scale of resolution consisting of »weighting« the »diagnostic« value of the elements in relation to the sample size, diagnostic features, and contextual evidence. »Ground truthing« has been carried out by returning to museums and recording the material morphometrically in combination with a technological analysis (Barton 1992; Scerri et al. 2015).

As a control sample, the Early Mesolithic record of Horsham points, which are very characteristic (Clark 1933; Reynier 2005), has been used to distinguish potential variations in spatial dynamics and find distributions within the catchments of the Rivers Wey and Mole.

An initial distinction can be made between the concentration of LG occupations on the lower part of the rivers north of the North Downs, in contrast to the Early Mesolithic events located on higher grounds, and in proximity to stream sources. This pattern appears to be quite robust in a region that has been scoured by archaeologists since the 19th century. Most interestingly recent high-resolution LG sites have been discovered in areas with the thickest alluvial cover indicating a strong potential for future sites in the region. These two elements combined indicate a predisposition for FUP hunter-gatherers to locate themselves near developed rivers.

Furthermore, the rare Creswellian and LUP findspots are located on higher ground in vicinity to Early Mesolithic locations. The location of Horsham sites on the higher greensands deposits has already been remarked upon and may be a habitat preference based on climate and soil type, contrasting with the FUP distribution (Clark 1933).

The two most recent excavations, Wey Manor Farm (Jones 2013) and Guildford Fire Station (Attfield et al. 2014), both high-resolution refitting sites, although initially interpreted as Creswellian, also have attributes consistent with early Federmesser-Gruppen/Azilian industries recently characterised in northern France (Bodu/Debout/Bignon 2006; Valentin 2008; Antoine et al. 2012). (N.B.: Guildford Fire Station has not yet undergone refitting; however, during excavation it showed very high potential.) Guildford Fire Station is currently undergoing analysis; however, a preliminary inspection of the Wey Manor Farm material by the author indicates that there may be early Federmesser-Gruppen/Azilian traits. This is of particular interest considering recent hypotheses of the use of river systems during the Allerød along the adjacent Bournemouth Avon River (Barton 2012).

This case study demonstrates the potential of applying high scale analyses for distinguishing not only the qualitative distribution of sites, but also functions as an approach for preparing the dataset for spatial analysis and exploring landscape use. Following this preparation, this dataset is now being used directly for spatial analyses using GIS as well as selecting specific sites for further lithics analysis. The River Wey and River Mole case study stands as a methodological template that is being applied to adjacent river valleys (e.g. Arun, Avon and Test River Valleys), all of which contain significant sites associated to Azilian/Federmesser-Gruppen-type industries. This project can also be expanded to a wider scale to consider the relationship between sites in the rest of Britain and Northern Europe with similar archaeological signatures, most notably around the Channel River catchment area.

CONCLUSIONS

The catchment of the Channel River network and its tributaries present a distinct geographical entity that was dominant in North-West Europe during the LG, with the southern tributaries linking the north and south of Continental Europe (fig. 6). South-east England occupies an interesting location at the heart of

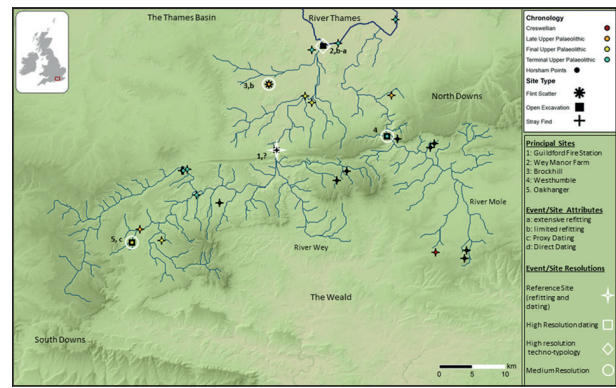


Fig. 5 CoB database: LG distribution within the Wey and Mole catchments. The Horsham points are used as a control sample. The different event resolutions are illustrated and will be used to weight the information individual sites contribute for spatial analysis.



Fig. 6 There are several complex mobility systems, seasonal and/or combined, that in combination with historical and taphonomic biases present a confused »chaotic« appearance underlain by several layers of dynamic systems that need unravelling. Both the Channel River and the Palaeo-Elbe would have created at least seasonal barriers to movement (white dashed lines) during the LG (Gupta et al. 2007; Westaway/Bridgland 2010). The currently submerged Channel River (blue dashed lines) could also have played the role of a network of tributaries connecting regions if the valleys or waterways were used. Britain, Belgium, and the Netherlands are on the watershed line between the Palaeo-Elbe catchment to the east and the Channel River catchment to the west, a region of high ground/dryland always accessible throughout the LG (red dashed line), linking Britain to the North European Plain (Ward/Larcombe/Lillie 2006).

this network, a crossroads of branching tributaries and potential dryland corridors linking Northern Europe. The combination of methods used here, consisting of GIS-based procedures for data integration, and assessment of the lithic signatures has been shown to be a useful tool for reassessing the LG occupations of Britain. One of the greatest challenges is to find ways to integrate variable datasets appropriately, at different scales of analysis.

In summary, the four methodologies being developed throughout this early phase of research are:

- 1) A deep critical assessment of available national datasets and the role they can play in current LG research,
- 2) GIS as an integrative tool, combining multiple datasets into a quantifiable and visual research platform at different scales of analysis,
- 3) Combining lithic technological and typological recording systems,
- 4) Modelling and considering the role of the Channel River, and LG river dynamics, in relation to LG site distributions, considering possible natural links and barriers in the landscape under varying LG conditions.

The preliminary results have proven promising with significant patterning observable in the distributions at a local and regional scale. The first results of the pilot study using the Wey and Mole River catchments as a test case have produced some encouraging results and demonstrate the high potential of applying this approach more widely. The hypothesis of a more intensive use of river valleys during the Allerød contrasting with earlier Creswellian and later Early Mesolithic patterns is beginning to take a more affirmative role. However, there remain many archaeological and taphonomical biases that need to be disproved.

One of my main research objectives is to integrate the broadest spectrum of available data to attempt to qualify the reference sites and integrate lower resolution sites. It also plays a role in reviving historic collections and creating a platform for the integration of »grey literature« while maintaining a focus for both future research and development archaeology.

The novel integration of the Channel River and its tributaries as a framework for analysing the LG of South-East England, and the relationship of this archaeology with what is now Continental Europe, appears to hold a great deal of potential for generating new behavioural questions about hunter-gatherers. One such question I will be exploring in future work is the extent to which rivers divided or linked LG landscapes both in terms of human perception and cultural links, and more practically by, for example, funnelling or blocking animal and human migrations. The notion of »river catchments« as a scale of analysis relating to these highly dynamic LG living environments will be developed around the Channel River network, framing questions of LG dynamics.

I would like to conclude with a few words concerning the Channel River. The combination of attractive riparian environments, strategic vistas overlooking the canyons and mesas of the Channel River system (Gupta et al. 2007) would likely have been accompanied by the sounds of the encounter between one of the largest rivers in Northern Europe with the strong tides of the Atlantic during the LG (Uehara et al. 2006) to possibly even create a tidal »Channel bore« resounding through the canyons, rendering this now submerged dramatic visual and aural landscape significant during the LG.

Acknowledgements

The UISPP A5b board for inviting me to present at Burgos. Alison Roberts for all of her patience, time, advice, and especially encouragement throughout; Nick Barton for always being there to answer endless questions and point me in the direction of suitable sources; John Pouncett for guiding me through the realms of GIS; and Natalie Hill for tremendous amounts of support and patient proof-reading. Peter Fiske and Charles Arthur for their insightful remarks and editing. I would also like to thank Gundula Lidke for her invaluable meticulous and helpful editing of drafts.

Notes

- 1) Based on the models created by the author the estimate for the flooded Irish Channel/Sea catchment at the onset of the Allerød (GI 1c-a) is c. 110,000km², the one for the Palaeo-Elbe is c. 320,000km², and the Channel River c. 517,000km². At some point during the Allerød the rising sea levels flooded Hurd Deep (Antoine et al. 2003b; Westaway/Bridgland 2010; Brooks et al. 2011), separating the Seine from the Channel River (reducing the area by c. 100,000km²), although they continued to share the same estuary (fig. 1).
- 2) The basemap for the construction of fluvial channels is currently being updated to Gebco2014, OS Panorama to Terrain 50 and SRTM90 to SRTM1. Additionally new DEMs, made available by the European Environmental Agency, are being tested.

References

- Archaeological Data Service (ADS) 2015a: ADS. Library of Unpublished Fieldwork Reports. <http://archaeologydataservice.ac.uk/archives/view/greylit/> (29.7.2015).
- 2015b: ADS. Palaeolithic and Mesolithic Lithic Artefact (PaMELA) database: Introduction. http://archaeologydataservice.ac.uk/archives/view/pamela_2014/ (24.8.2015).
- Antoine et al. 2003a: P. Antoine / J. Catt / J.-P. Lautridou / J. Sommé, The loess and coversands of northern France and southern England. *Journal of Quaternary Science* 18, 2003, 309-318.
- 2003b: P. Antoine / J.-P. Coutard / P. Gibbard / B. Hallegouet / J.-P. Lautridou / J.-C. Ozouf, The Pleistocene rivers of the English Channel region. *Journal of Quaternary Science* 18, 2003, 227-243.
- 2007: P. Antoine / N. L. Lozouet / C. Chaussé / J.-P. Lautridou / J.-F. Pastre / P. Auguste / B. Galehb, Pleistocene fluvial terraces from northern France (Seine, Yonne, Somme): synthesis, and new results from interglacial deposits. *Quaternary Science Reviews* 26, 2007, 2701-2723.
- 2012: P. Antoine / J. Fagnart / P. Auguste / P. Coudret / N. Limondin-Lozouet / P. Ponel / C. Fritz, Conty, vallée de la Selle (Somme, France): séquence tardiglaciaire de référence et occupations préhistoriques. *Quaternaire, Hors série* 5 (Bordeaux 2012).
- Ashton/Harris 2015: N. Ashton / C. R. Harris (eds), No stone unturned: papers in honour of Roger Jacobi. LSS Occasional Paper 9 (London 2015).
- Attfield et al. 2014: B. Attfield / N. Barton / M. Donnelly / A. Roberts, A new Later Upper Palaeolithic site at Guildford Fire Station, Surrey, UK. Poster presented at the XVII World Congress of the International Union of Prehistoric and Protohistoric Sciences, Burgos, 2014.
- Baales/Street 1997: M. Baales / M. Street, Les groupes à Federmesser de l'Allerød en Rhénanie centrale (Allemagne). *Bulletin de la Société préhistorique française* 94, 1997, 373-386.
- Ballin et al. 2010: T. B. Ballin / A. Saville / R. Tipping / T. Ward, An Upper Palaeolithic Flint and Chert Assemblage from Howburn Farm, South Lanarkshire, Scotland: First Results. *Oxford Journal of Archaeology* 29, 2010, 323-360.
- Barton 1986: R. N. E. Barton, A study of selected British and European flint assemblages of Late Devensian and Early Flandrian Age [unpubl. PhD thesis Univ. Oxford 1986].

- 1992: R. N. E. Barton, Hengistbury Head, Dorset. 2: The Late Upper Palaeolithic and Early Mesolithic Sites. Oxford University Committee for Archaeology: Monograph 34 (Oxford 1992).
- 1998: R. N. E. Barton, Long Blade technology and the question of British Late Pleistocene/Early Holocene lithic assemblages. In: N. M. Ashton / F. Healy / P. Pettitt (eds), *Stone Age Archaeology: Essays in Honour of John Wymer*. Oxbow Monograph 102 (Oxford 1998) 158-164.
- 2012: R. N. E. Barton, Revisiting »intentional breakage« in the British Late Upper Palaeolithic. In: Niekus et al. 2012, 183-192.
- Barton/Roberts 1996: R. N. E. Barton / A. J. Roberts, Reviewing the British Late Upper Palaeolithic: New Evidence for Chronological Patterning in the Lateglacial Record. *Oxford Journal of Archaeology* 15, 1996, 245-265.
- Barton et al. 1998: R. N. E. Barton / P. Antoine / S. Dumont / S. Hall / A. V. Munaut, New optically stimulated luminescence (OSL) dates from a Late-glacial site in the Kennet Valley at Avington VI, Berkshire, UK. *Quaternary Newsletter* 85, 1998, 21-31.
- 2003: R. N. E. Barton / R. M. Jacobi / D. Stapert / M. Street, The Late-glacial reoccupation of the British Isles and the Creswellian. *Journal of Quaternary Science* 18, 2003, 631-643.
- 2009: R. N. E. Barton / S. Ford / S. Collcutt / J. Crowther / R. Macphail / E. Rhodes / A. van Gijn, A Final Upper Palaeolithic site at Nea Farm, Somerley, Hampshire (England) and some reflections on the occupation of Britain in the Late Glacial Interstadial. *Quartär* 56, 2009, 1-29.
- BGS 1992: British Geological Survey, The Wealden District. *British Regional Geological Guides* (London 1992).
- Biard et al. 2004: M. Biard / S. Hinguant / C. Beurion / V. Deloze / P. Forre / F. Sellami, Le bivouac préhistorique du Buhot à Calleville (Eure): caractérisation techno-typologique d'un assemblage lithique lamino-lamellaire de la fin du Paléolithique supérieur. INRAP Grand-Ouest, Service Régional de l'Archéologie de Haute-Normandie, Rouen (Rouen 2014).
- Bignon 2008: O. Bignon, Chasser les chevaux à la fin du Paléolithique dans le Bassin parisien: stratégie cynégétique et mode de vie au Magdalénien et à l'Azilien ancien. *British Archaeological Reports: International Series 1747* (Oxford 2008).
- Bird/Bird 1987: J. Bird / J. G. Bird (eds), *The Archaeology of Surrey to 1540* (Guildford 1987).
- Bird/Council/Arch 2006: D. Bird / S. Council / C. Arch, *Surrey Archaeological Research Framework 2006*. www.surreyarchaeology.org.uk (6.2.2015).
- Blockley et al. 2006: S. P. E. Blockley / S. M. Blockley / R. E. Donahue / C. S. Lane / J. J. Lowe / A. M. Pollard, The chronology of abrupt climate change and Late Upper Palaeolithic human adaptation in Europe. *Journal of Quaternary Science* 21, 2006, 575-584.
- Bodu 1994: P. Bodu, Analyse typo-technologique du matériel lithique de quelques unités du site magdalénien de Pincevent (Seine-et-Marne). Applications spatiales, économiques et sociales [unpubl. PhD thesis Univ. Panthéon-Sorbonne Paris 1994].
- Bodu/Debout/Bignon 2006: P. Bodu / G. Debout / O. Bignon, Variabilité des habitudes tardiglaciaires dans le Bassin parisien: l'organisation spatiale et sociale de l'Azilien ancien du Closeau. *Bulletin de la Société préhistorique française* 103, 2006, 711-728.
- Bradley et al. 2011: S. L. Bradley / G. A. Milne / I. Shennan / R. Edwards, An improved glacial isostatic adjustment model for the British Isles. *Journal of Quaternary Science* 26, 2011, 541-552.
- Branch/Green 2004: N. P. Branch / C. P. Green, The environmental history of Surrey. In: Cotton/Crocker/Graham 2004, 1-18.
- Brézillon/Leroi-Gourhan 1966: M. Brézillon / A. Leroi-Gourhan, L'habitation magdalénienne n° 1 de Pincevent près Montereau (Seine-et-Marne). *Gallia Préhistoire* 9, 1966, 263-385.
- Bridgland et al. 2006: D. R. Bridgland / P. Antoine / N. Limondin-Lozouet / J. I. Santisteban / R. Westaway / M. J. White, The Palaeolithic occupation of Europe as revealed by evidence from the rivers: data from IGCP 449. *Journal of Quaternary Science* 21, 2006, 437-455.
- 2010: D. R. Bridgland / R. Westaway / A. J. Howard / J. B. Innes / A. J. Long / W. A. Mitchell / T. S. White, The role of glacio-isostasy in the formation of post-glacial river terraces in relation to the MIS 2 ice limit: evidence from northern England. *Proceedings of the Geologists' Association* 121, 2010, 113-127.
- Brooks et al. 2011: A. Brooks / S. Bradley / R. Edwards / N. Goodwyn, The palaeogeography of Northwest Europe during the last 20,000 years. *Journal of Maps* 2011, 573-587.
- Brown 1997: A. G. Brown, *Alluvial Geoarchaeology: Floodplain Archaeology and Environmental Change* (Cambridge 1997).
- Burdukiewicz 1986: J. M. Burdukiewicz, *The Late Pleistocene Shouldered Point Assemblages in Western Europe* (Leiden 1986).
- Burdukiewicz/Schmider 2000: J. M. Burdukiewicz / B. Schmider, Analyse comparative des pointes à cran hambourgiennes du Bassin de l'Oder et des pointes à cran magdaléniennes du Bassin parisien. In: B. Valentin / P. Bodu / M. Christensen (eds), *L'Europe centrale et septentrionale au Tardiglaciaire. Actes de la table ronde internationale de Nemours (14-15-16 mai 1997)*. Mémoires du Musée de Préhistoire d'Île-de-France 7 (Nemours 2000) 97-108.
- Busschers et al. 2007: F. S. Busschers / C. Kasse / R. T. van Balen / J. Vandenberghe / K. M. Cohen / H. J. T. Weerts / F. P. M. Bunnik, Late Pleistocene evolution of the Rhine-Meuse system in the southern North Sea basin: imprints of climate change, sea-level oscillation and glacio-isostasy. *Quaternary Science Reviews* 26, 2007, 3216-3248.
- Campbell 1977: J. B. Campbell, *The Upper Palaeolithic of Britain: a study of man and nature in the Late Ice Age 1* (Oxford 1977).
- Catt 1979: J. A. Catt, Soils and Quaternary geology in Britain. *Journal of Soil Science* 30, 1979, 607-642.
- Clark 1933: J. G. D. Clark, The Classification of a Microlithic Culture: The Tardenoisian of Horsham. *Archaeological Journal* 90, 1933, 52-77.
- Clark/Rankine 1939: J. G. D. Clark / W. F. Rankine, Excavations at Farnham, Surrey (1937-38): The Horsham Culture and the Question of Mesolithic Dwellings. *Proceedings of the Prehistoric Society* 5, 1939, 61-118.
- Cohen/Milne/Wagg 2012: N. Cohen / G. Milne / E. Wagg, The Thames Discovery Programme: Public Engagement and Research on London's Foreshore. *Archaeology International* 15, 2012, 99-106.
- Coles 1998: B. Coles, Doggerland: a speculative survey. *Proceedings of the Prehistoric Society* 64, 1998, 45-81.

- Collcutt 1984: S. N. Collcutt, The analysis of quaternary cave sediments and its bearing upon Palaeolithic archaeology, with special reference to selected sites from Western Britain [unpubl. PhD thesis Univ. Oxford 1984].
- Collcutt/Barton/Bergman 1990: S. N. Collcutt / N. R. E. Barton / C. A. Bergman, Refitting in context: a taphonomic case study from a Late Upper Palaeolithic site in sands on Hengistbury Head, Dorset, Great Britain. In: Czesla et al. 1990, 219-235.
- Conneller 2007: C. Conneller, Inhabiting new landscapes: settlement and mobility in Britain after the last glacial maximum. *Oxford Journal of Archaeology* 26, 2007, 215-237.
- Conneller/Ellis 2007: C. Conneller / C. Ellis, A Final Upper Palaeolithic Site at La Sagesse Convent, Romsey, Hampshire. *Proceedings of the Prehistoric Society* 73, 2007, 191-227.
- Conneller/Higham 2015: C. Conneller / T. F. G. Higham, The early Mesolithic colonisation of Britain: preliminary results. In: Ashton/Harris 2015, 157-166
- Connolly/Lake 2006: J. Connolly / M. Lake, Geographical information systems in archaeology (Cambridge 2006).
- Cooper 2012: A. Cooper, Pursuing »the Pressure of the Past«: British Prehistoric Research, 1980-2010. *Proceedings of the Prehistoric Society* 78, 2012, 315-339.
- Cooper/Green 2016: A. Cooper / C. Green, Embracing the complexities of archaeological »big data«: the case of the English Landscape and Identities project. *Journal of Archaeological Method and Theory* 23(1), 2016, 271-304.
- Cooper 2006: L. P. Cooper, Launde, a terminal Palaeolithic campsite in the English midlands and its North European context. *Proceedings of the Prehistoric Society* 72, 2006, 53-93.
- Cotton/Crocker/Graham 2004: J. Cotton / G. Crocker / A. Graham, Aspects of archaeology and history in Surrey: towards a research framework for the county (Guildford 2004).
- Coudret/Fagnart 1997: P. Coudret / J. Fagnart, Les industries à Federmesser dans le Bassin de la Somme: chronologie et identité des groupes culturels. *Bulletin de la Société préhistorique française* 94, 1997, 349-359.
- 2006: P. Coudret / J. Fagnart, Données préliminaires sur les habitats des groupes de la tradition à Federmesser du bassin de la Somme. *Bulletin de la Société préhistorique française* 103, 2006, 729-740.
- Crombé et al. 2011: Ph. Crombé / J. Sergant / E. Robinson / J. De Reu, Hunter-gatherer responses to environmental change during the Pleistocene-Holocene transition in the southern North Sea basin: Final Palaeolithic-Final Mesolithic land use in northwest Belgium. *Journal of Anthropological Archaeology* 30, 2011, 454-471.
- Currant / Jacobi 2001: A. Currant / R. Jacobi, A formal mammalian biostratigraphy for the Late Pleistocene of Britain. *Quaternary Science Reviews* 20, 2001, 1707-1716.
- Czesla et al. 1990: E. Czesla / S. Eickhoff / N. Arts / D. Winter (eds), The Big Puzzle: International Symposium on Refitting Stone Artefacts. *Studies in Modern Archaeology* 1 (Bonn 1990).
- DCLG (Department for Communities and Local Government) 2012: National Planning Policy Framework – Publications – GOV.UK. www.gov.uk/government/publications/national-planning-policy-framework (29.7.2015).
- Debout et al. 2012: G. Debout / M. Olive / O. Bignon / P. Bodu / L. Chehmana / B. Valentin, The Magdalenian in the Paris Basin: New results. *Quaternary International* 272/273, 2012, 176-190.
- De Bie/Caspar 2000: M. De Bie / J.-P. Caspar, Rekem. A Federmesser Camp on the Meuse River Bank. *Archeologie in Vlaanderen: Monografie 3 = Acta Archaeologica Lovaniensia: Monographiae* 10 (Leuven 2000).
- Dinnis 2011: R. Dinnis, The Paviland burin, the burin busqué and Aurignacian occupation of Britain. *Anthropologica et Præhistorica* 122, 2011, 5-17.
- Dumont 1997: S. Dumont, Nouvelles recherches sur la transition Tardiglaciaire-Préboréal dans le Sud et l'Est de l'Angleterre. In: J.-P. Fagnart / A. Thévenin (eds), Le tardiglaciaire en Europe du Nord-Ouest [actes du Colloque Chronostratigraphie et Environnement des Occupations Humaines du Tardiglaciaire et du Début de l'Holocène en Europe du Nord-Ouest; Actes du 119^{ème} Congrès National des Sociétés Historiques et Scientifiques, Amiens 26-30 octobre 1994] (Paris 1997) 517-528.
- Ellaby 1987: R. Ellaby, The Upper Palaeolithic and Mesolithic in Surrey. In: Bird/Bird 1987, 53-69.
- Evans 2013: T. N. L. Evans, Holes in the Archaeological Record? A Comparison of National Event Databases for the Historic Environment in England. *The Historic Environment: Policy and Practice* 4, 2013, 19-34.
- Farr 2009: L. R. Farr, Enhancing our understanding of Mesolithic environments and resource exploitation in South England [unpubl. PhD thesis Univ. London 2009].
- Flatman/Perring 2013: J. Flatman / D. Perring, The National Planning Policy Framework and Archaeology: A Discussion. *Papers from the Institute of Archaeology* 22, 2013, 4-10.
- Gamble et al. 2004: C. Gamble / W. Davies / P. Pettitt / M. Richards, Climate change and evolving human diversity in Europe during the last glacial. *Philosophical Transactions of the Royal Society of London, Series B: Biological Sciences* 359, 2004, 243-254.
- Garrod 1926: D. A. Garrod, The Upper Palaeolithic Age in Britain (Oxford 1926).
- Garton/Jacobi 2009: D. Garton / R. M. Jacobi, An Extensive Late Upper Palaeolithic Flint Scatter at Farndon Fields, Near Newark, Nottinghamshire. *Archaeological Journal* 166, 2009, 1-38.
- Gibbard 2007: P. L. Gibbard, Palaeogeography: Europe cut adrift. *Nature* 448, 2007, 259-260.
- Gibbard/Lautridou 2003: P. L. Gibbard / J. P. Lautridou, The Quaternary history of the English Channel: an introduction. *Journal of Quaternary Science* 18, 2003, 195-199.
- Gibbard/Rose/Bridgland 1988: P. L. Gibbard / J. Rose / D. R. Bridgland, The History of the Great Northwest European Rivers During the Past Three Million Years (and Discussion). *Philosophical Transactions of the Royal Society, Series B: Biological Sciences* 318, 1988, 559-602.
- Goudie 1990: A. Goudie, The landforms of England and Wales (Oxford 1990).
- Grant et al. 2014: M. J. Grant / C. J. Stevens / N. J. Whitehouse / D. Norcott / R. I. Macphail / C. Langdon / N. Cameron / C. Barnett / P. Langdon / J. Crowder, A palaeoenvironmental context for Terminal Upper Palaeolithic and Mesolithic activity in the Colne Valley: Offsite records contemporary with occupation at

- Three Ways Wharf, Uxbridge. *Environmental Archaeology* 19, 2014, 131-152.
- Green/Farr/Branch 2013: C. Green / L. Farr / N. Branch, Geomorphology, Site Formation and Landscape Context. In: Jones 2013, 14-16.
- Grimm 2011: S. B. Grimm, Maps of late glacial NW-Europe. NW-EU 10W-20E 45-60N. Available from 2007-09-19 to 2013-11-04.
- Grimm/Weber 2008: S. B. Grimm / M.-J. Weber, The chronological framework of the Hamburgian in the light of old and new ¹⁴C dates. *Quartär* 55, 2008, 17-40.
- Grimm/Jensen/Weber 2012: S. B. Grimm / D. S. Jensen / M.-J. Weber, A lot of good points: Havelte points in the context of Late Glacial tanged points in northwestern Europe. In: Niekus et al. 2012, 251-266.
- Grøn 2005: O. Grøn, A Siberian perspective on the north European Hamburgian Culture: a study in applied hunter-gatherer ethnoarchaeology. *Before Farming* 2005, 1-30.
- Gupta et al. 2007: S. Gupta / J. S. Collier / A. Palmer-Felgate / G. Potter, Catastrophic flooding origin of shelf valley systems in the English Channel. *Nature* 448, 2007, 342-345.
- Harris 2015: C. R. Harris, The academic legacy of Roger Jacobi. In: Ashton/Harris 2015, 259-269.
- Higham 2010: T. F. G. Higham, Obituary: Roger M. Jacobi. *February 16, 1947 Ealing – December 9, 2009 Watford Hospital*. *Mitteilungen der Gesellschaft für Urgeschichte* 19, 2010, 217-220.
- Historic England 2014: Research News Issue 21 / Historic England. <http://historicengland.org.uk/images-books/publications/research-news-21/> (29.7.2015).
- Hooper 1933: W. Hooper, The pigmy flint industries of Surrey. *Surrey Archaeological Collections* 41, 1933, 50-78.
- Housley et al. 1997: R. A. Housley / C. S. Gamble / M. Street / P. Pettitt, Radiocarbon evidence for the Lateglacial Human Recolonisation of Northern Europe. *Proceedings of the Prehistoric Society* 63, 1997, 25-54.
- Howard et al. 2015: A. J. Howard / S. J. Kluiving / M. Engel / V. M. Heyvaert, Geoarchaeological records in temperate European river valleys: Quantifying the resource, assessing its potential and managing its future. *Quaternary International* 367, 2015, 42-50.
- Inizan et al. 1999: M.-L. Inizan / M. Reduron-Ballinger / H. Roche / J. Tixier, Technology and Terminology of Knapped Stone: Followed by a Multilingual Vocabulary: Arabic, English, French, German, Greek, Italian, Portuguese, Spanish. *Préhistoire de la Pierre Taillée* 5 (Nanterre 1999).
- Jacobi 2004: R. Jacobi, The Late Upper Palaeolithic lithic collection from Gough's Cave, Cheddar, Somerset and human use of the cave. *Proceedings of the Prehistoric Society* 70, 2004, 1-92.
- Jacobi/Higham 2009: R. M. Jacobi / T. F. G. Higham, The early Late-glacial re-colonization of Britain: new radiocarbon evidence from Gough's Cave, southwest England. *Quaternary Science Reviews* 28, 2009, 1895-1913.
- 2010: R. M. Jacobi / T. F. G. Higham, The Later Upper Palaeolithic recolonisation of Britain: new results from AMS radiocarbon dating. *The Ancient Human Occupation of Britain* 14, 2010, 223.
- Jacobi/Roberts 1993: R. M. Jacobi / A. J. Roberts, A new variant on the Creswellian angle-backed blade. *Lithics* 13, 1993, 33-39.
- Jones 2013: P. Jones, Upper Palaeolithic Sites in the Lower Courses of the Rivers Colne and Wey: Excavations at Church Lammas and Way Manor Farm (Woking 2013).
- Karlin/Newcomer 1982: C. Karlin / M. Newcomer, Interpreting Flake Scatters: An Example from Pincevent. *Studia Praehistorica Belgica* 2, 1982, 159-165.
- Lambeck 1995: K. Lambeck, Late Devensian and Holocene shorelines of the British Isles and North Sea from models of glacio-hydro-isostatic rebound. *Journal of the Geological Society-London* 152, 1995, 437-448.
- Langlais 2008: M. Langlais, Chronologie et territoires au Magdalénien entre le Rhône et l'Ebre: L'exemple des armatures lithiques. *Paléthnologie* 1, 2008, 220-249.
- Lewin/Gibbard 2010: J. Lewin / P. L. Gibbard, Quaternary river terraces in England: forms, sediments and processes. *Geomorphology* 120, 2010, 293-311.
- Lewis/Rackham 2011: J. S. Lewis / J. Rackham, Three Ways Wharf, Uxbridge: a Lateglacial and Early Holocene hunter-gatherer site in the Colne Valley. *MoLAS Monograph* 51 (London 2011).
- Lowe et al. 1999: J. J. Lowe / H. H. Birks / S. J. Brooks / G. R. Coope / D. D. Harkness / F. E. Mayle / M. J. C. Walker, The chronology of palaeoenvironmental changes during the Last Glacial-Holocene transition: towards an event stratigraphy for the British Isles. *Journal of the Geological Society* 156, 1999, 397-410.
- Macphail/Scaife 1987: R. I. Macphail / R. G. Scaife, The geographical and environmental background. In: *Bird/Bird* 1987, 31-51.
- Miller 2012: R. Miller, Mapping the expansion of the Northwest Magdalenian. *Quaternary International* 272/273, 2012, 209-230.
- Mills 2013: W. Mills, Current research on the Late Glacial of Southern Britain. The Lawson collection and its technological representation of the Final Upper Palaeolithic [unpubl. MPhil thesis Univ. Oxford 2013].
- Murton/Belshaw 2011: J. B. Murton / R. K. Belshaw, A conceptual model of valley incision, planation and terrace formation during cold and arid permafrost conditions of Pleistocene southern England. *Quaternary Research* 75, 2011, 385-394.
- Needham/Macklin 1992: S. Needham / M. Macklin, Alluvial Archaeology in Britain. *Oxbow Monographs in Archaeology* 27 (Oxford 1992).
- Niekus et al. 2012: M. J. L. T. Niekus / R. N. E. Barton / M. Street / Th. Terberger (eds), A mind set on flint. *Studies in honour of Dick Stapert*. *Groningen Archaeological Studies* 16 (Groningen 2012).
- Oakley et al. 1939: K. P. Oakley / W. F. Rankine / A. W. G. Lowther / A. Keiller / S. Piggott (eds), A Survey of the Prehistory of the Farnham District (Surrey) (Guildford 1939).
- Parker/Goudie 2007: A. Parker / A. S. Goudie, Late Quaternary environmental change in the limestone regions of Britain. In: A. S. Goudie / J. Kalvoda (eds), *Geomorphological Variations* (Prague 2007) 157-182.
- Pelegrin 2000: J. Pelegrin, Les techniques de débitage laminaire au Tardiglaciaire: critères de diagnose et quelques réflexions. In: B. Valentin / P. Bodu / M. Christensen (eds), *L'Europe centrale et septentrionale au Tardiglaciaire*. *Actes de la table ronde internationale de Nemours* (14-15-16 mai 1997). *Mémoires du Musée de Préhistoire d'Île-de-France* 7 (Nemours 2000) 73-86.
- Pitts/Jacobi 1979: M. W. Pitts / R. M. Jacobi, Some aspects of change in flaked stone industries of the Mesolithic and Neolithic

- in Southern Britain. *Journal of Archaeological Science* 6, 1979, 163-177.
- Preece/Bridgland 1998: R. Preece / D. R. Bridgland (eds), *Late Quaternary Environmental Change in North-west Europe: Excavations at Holywell Coombe, South-east England* (London 2012).
- Reid 1913: C. Reid, *Submerged Forests* (Cambridge 1913).
- Reynier 2005: M. Reynier, *Early Mesolithic Britain: origins, development and directions*. *British Archaeological Reports: British Series* 393 (Oxford 2005).
- Riede/Edinburgh 2011: F. Riede / K. Edinborough, *Bayesian radiocarbon models for the cultural transition during the Allerød in southern Scandinavia*. *Journal of Archaeological Science* 39, 2011, 744-756.
- Roberts 1996: A. J. Roberts, *Evidence for late Pleistocene and early Holocene human activity and environmental change from Torbryan Valley, south Devon*. In: D. J. Charman / R. M. Newnham / D. G. Croot (eds), *Devon and East Cornwall Field Guide* (London 1996) 168-204.
- Scerri et al. 2016: E. M. L. Scerri / B. Gravina / J. Blinkhorn / A. Delagnes, *Can Lithic Attribute Analyses Identify Discrete Reduction Trajectories? A Quantitative Study Using Refitted Lithic Sets*. *Journal of Archaeological Method and Theory* 23, 2016, 669-691.
- Schulting 2010: R. J. Schulting, *Staying home for dinner: an isotopic approach to regionality in Mesolithic Atlantic Europe*. In: R. Barndon / A. Engevik / I. Øye (eds), *The Archaeology of Regional Technologies: Case Studies from the Palaeolithic to the Age of the Vikings* (Lewiston NY 2010) 69-88.
- Shennan et al. 2006: I. Shennan / S. Bradley / G. Milne / A. Brooks / S. Bassett / S. Hamilton, *Relative sea-level changes, glacial isostatic modelling and ice-sheet reconstructions from the British Isles since the Last Glacial Maximum*. *Journal of Quaternary Science* 21, 2006, 585-599.
- Sidell et al. 2000: J. Sidell / K. Wilkinson / R. Scaife / N. Cameron, *The Holocene Evolution of the London Thames: Archaeological Excavations (1991-1998) for the London Underground Limited Jubilee Line Extension Project*. *MoLAS Monograph* 5 (London 2000).
- Soressi/Geneste 2011: M. Soressi / J.-M. Geneste, *The History and Efficacy of the *Chaîne Opératoire* Approach to Lithic Analysis: Studying Techniques to Reveal Past Societies in an Evolutionary Perspective*. *PalaeoAnthropology, Special Issue* 2011, 334-350.
- Stapert 1989: D. Stapert, *The ring and sector method: intrasite spatial analysis of Stone Age sites, with special reference to Pincevent*. *Palaeohistoria* 31, 1989, 1-57.
- Stevens et al. 2009: R. E. Stevens / T. C. O'Connell / R. E. Hedges / M. Street, *Radiocarbon and stable isotope investigations at the Central Rhineland sites of Gönnersdorf and Andernach-Martinsberg, Germany*. *Journal of Human Evolution* 57, 2009, 131-148.
- Street/Jöris/Turner 2012: M. Street / O. Jöris / E. Turner, *Magdalenian settlement in the German Rhineland – An update*. *Quaternary International* 272/273, 2012, 231-250.
- Sturt/Garrow/Bradley 2013: F. Sturt / D. Garrow / S. Bradley, *New models of North West European Holocene palaeogeography and inundation*. *Journal of Archaeological Science* 40, 2013, 3963-3976.
- Tyrrell 1911: J. B. Tyrrell, *A Journey from Prince Of Wales' Fort in Hudson's Bay to the Northern Ocean in the Years 1769, 1770, 1771 and 1772, by Samuel Hearne* (Toronto 1911).
- Uehara et al. 2006: K. Uehara / J. D. Scourse / K. J. Horsburgh / K. Lambeck / A. P. Purcell, *Tidal evolution of the northwest European shelf seas from the Last Glacial Maximum to the present*. *Journal of Geophysical Research* 111, 2006. <https://doi.org/10.1029/2006JC003531>.
- Valentin 2008: B. Valentin, *Jalons pour une paléohistoire des derniers chasseurs: (XIV^e-VI^e millénaire avant J.-C.)*. *Cahiers archéologiques de Paris* 1 (Paris 2008).
- Walker/Coope/Lowe 1993: M. J. C. Walker / G. R. Coope / J. J. Lowe, *The Devensian (Weichselian) Lateglacial palaeoenvironmental record from Gransmoor, East Yorkshire, England: A contribution to the »North Atlantic seaboard programme« of IGCP-253, »Termination of the Pleistocene«*. *Quaternary Science Reviews* 12, 1993, 659-680.
- Walker et al. 1994: M. J. C. Walker / S. J. P. Bohncke / G. R. Coope / M. O'Connell / H. Usinger / C. Verbruggen, *The Devensian/Weichselian Late-glacial in northwest Europe (Ireland, Britain, north Belgium, The Netherlands, northwest Germany)*. *Journal of Quaternary Science* 9, 1994, 109-118.
- 2003: M. J. C. Walker / G. R. Coope / C. Sheldrick / C. S. M. Turney / J. J. Lowe / S. P. E. Blockley / D. D. Harkness, *Devensian Lateglacial environmental changes in Britain: a multi-proxy environmental record from Llanilid, South Wales, UK*. *Quaternary Science Reviews* 22, 2003, 475-520.
- 2012: M. Walker / J. Lowe / S. P. E. Blockley / C. Bryant / P. Coombes / S. Davies / J. Watson, *Lateglacial and early Holocene palaeoenvironmental »events« in Sluggan Bog, Northern Ireland: comparisons with the Greenland NGRIP GICC05 event stratigraphy*. *Quaternary Science Reviews* 36, 2012, 124-138.
- Ward/Larcombe/Lillie 2006: I. Ward / P. Larcombe / M. Lillie, *The dating of Doggerland – post-glacial geochronology of the southern North Sea*. *Environmental Archaeology* 11, 2006, 207-218.
- Wessexarch.co.uk 2013: *The digitisation and resource enhancement of the lithic records made by Dr. Roger Jacobi/Wessex Archaeology*. www.wessexarch.co.uk/48666/colonisation-britain-project (14.9.2013).
- Westaway/Bridgland 2010: R. Westaway / D. R. Bridgland, *Causes, consequences and chronology of large-magnitude palaeoflows in Middle and Late Pleistocene river systems of northwest Europe*. *Earth Surface Processes and Landforms* 35, 2010, 1071-1094.
- Westaway/Bridgland/White 2006: R. Westaway / D. Bridgland / M. White, *The Quaternary uplift history of central southern England: evidence from the terraces of the Solent River system and nearby raised beaches*. *Quaternary Science Reviews* 25, 2006, 2212-2250.
- Whimster 1931: D. C. Whimster, *The archaeology of Surrey* (London 1931).
- Wymer/Bonsall 1977: J. Wymer / C. J. Bonsall (eds), *Gazetteer of Mesolithic sites in England and Wales; Gazetteer of Upper Palaeolithic sites in England and Wales*. *Council for British Archaeology Research Report* 20 (London 1977).
- Yalden 2007: D. W. Yalden, *Zoological perspectives on the Late Glacial*. In: P. Pettitt / P. Bahn / S. Ripoll (eds), *Palaeolithic Cave Art at Creswell Crags in European Context* (Oxford 2007) 53-60.
- Zubrow/Audouze/Enloe 2010: E. B. W. Zubrow / F. Audouze / J. G. Enloe, *The Magdalenian Household: Unraveling Domesticity* (Albany 2010).

Summary

A novel perspective on Late Glacial archaeological distributions of South-East England framed within the dynamics of the Channel River network is presented. The Colonisation of Britain dataset of Late Glacial archaeological events is assessed within the dynamic framework of the Channel River system. The main focus is on the region of South-East England, considering its position towards the centre of the Channel River network and the interconnectivity of this region with North-West Europe. Multiple datasets are integrated at different scales of analysis, with an emphasis on the characterisation of open-air lithic assemblages. The methodology for this doctoral research is presented here with some preliminary results, concluding with directions for future research.

Keywords

Lateglacial, Channel River, River Wey, GIS, lithics