



The submerged archaeology of the North Sea: Enhancing the Lower Palaeolithic record of northwest Europe

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ABSTRACT

The Lower Palaeolithic hominin occupation of northwest Europe occurred during a period of significant climatic change. In Britain, hominin populations were present discontinuously, from strongly continental sites to those characterised by a balmy Mediterranean environment. Whilst apparently able to survive a range of conditions, the configuration of the associated landscapes, in particular the presence or absence of a land connection with the continent, would have had a fundamental impact on the density of hominin occupation in Britain at any given time. Similarly, the environments once present in the now-drowned North Sea Basin and Channel regions would presumably have played an important role in attracting and sustaining hominin populations. However, our understanding of the physical and environmental character of these landscapes, as well as the timing of marine transgressive and regressive periods, remains frustratingly murky, hindering the ability to imagine how these landscapes may have been used. A growing body of data from recent research and commercial offshore development is beginning to help researchers understand this issue, but there is still an immense amount of work to do. With the contribution that evidence from these lost landscapes could provide to Lower Palaeolithic archaeology as a focus, this paper begins with a review of the current state of affairs with regard to commercial and research methods and practices. It then discusses the ways that we are moving this forward through specific archaeological projects, providing tentative suggestions for how current methods could be developed and the kinds of information that these could provide.

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1. Introduction

The eroding coastline around the western margin of the North Sea Basin has, over recent years, yielded the earliest archaeological evidence in northwest Europe at Happisburgh 3, Norfolk, UK (0.9ma: Parfitt et al., 2010). Several other key Lower Palaeolithic sites are found along this coastline (e.g. Happisburgh 1, 0.6ma: Ashton et al., 2008a; Pakefield, 0.7ma: Parfitt et al., 2005; Clacton, 0.4ma: Bridgland, 1988, 1999), supporting the broader picture of discontinuous occupation (Dennell, 2003, 2011; Ashton et al., 2011; Ashton and Lewis, 2012). While the earliest of these sites have re-focused our understanding of early hominin movements and capabilities, their coastal locations also serve as a reminder of what we are not seeing: the Pleistocene landscapes now drowned beneath the North Sea.

An increase in intensity and duration of glaciations from c.0.9ma (the Early-Middle Pleistocene Transition [EMPT]) [Zachos et al.,

2001; Maslin and Brierley, 2015]) led to fluctuations in climate and, in turn, dramatic alterations in the configuration of the region's landscape. A variety of processes such as eustatic sea level changes, glacial isostatic adjustment (GIA), sedimentation and tectonics, played an important part in the availability of terrestrial land in the North Sea and Channel/La Manche regions. With sea levels generally significantly lower throughout the Pleistocene (Lisiecki and Raymo, 2005; Rohling et al., 2009), the now-offshore zone contains evidence for these once terrestrial landscapes. If we want to answer questions about hominin use of coastal, or even lowland, environments, this is where the vast majority of these environments will have existed and this is the area that we need to be looking at.

The substantial numbers of faunal remains trawled from the North Sea (van Kolfschoten and Laban, 1995; Mol et al., 2006; Bynoe et al., 2016), as well as sporadic archaeological finds (Area 240: Tizzard et al., 2014, 2015; Zeeland Ridges Neanderthal: Hublin et al., 2009), provide clear indications that at least fragments of these submerged landscapes still exist. Recent years have seen increasing

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interest in this (e.g. Peeters et al., 2009; Benjamin et al., 2011; Bailey and Sakellariou, 2012; Ransley et al., 2013), yet because of its inaccessibility, the cost of working offshore and difficulties in targeting high-potential locations, many questions remain.

Pertinent to this paper is the potential that these landscapes hold for answering questions about the Lower Palaeolithic occupation of Britain, in particular the availability and nature of resources that may have facilitated survival at these latitudes nearly a million years ago. Whilst the specifics of these issues cannot yet be discussed from the currently available data, this paper will highlight current methods, means of improvement—through ever-increasing engagement with industry and the public, the development of new methods for locating and investigating deposits, and improvements in groundtruthing—and, finally, how evidence from these lost landscapes could refine our understanding of Lower Palaeolithic occupation and migrations.

2. Regional setting

The valuable contribution of archaeology from submerged continental shelves has been increasingly acknowledged over the past two decades, through both individual research papers and multinational research frameworks (Coles, 1998; Flemming, 2002, 2004; Hosfield, 2007; Mol et al., 2006; Gaffney et al., 2007, 2009; Bailey and Flemming, 2008; Ward and Larcombe, 2008; Hublin et al., 2009; Peeters et al., 2009; Benjamin et al., 2011; Momber et al., 2011; Bailey and Sakellariou, 2012; Bicket, 2013; Ransley et al., 2013; Roebroeks, 2014; Sturt et al., 2015; Tizzard et al., 2014, 2015; Bynoe et al., 2016; Flemming et al., 2017). This

highlights a potential that submerged landscapes provide in a variety of geological settings the world over. The shallow shelf around the UK and northwestern Europe (the North Sea and Channel/La Manche) is no exception, in fact the vast amount of commercial interest in the North Sea in particular has led to its being one of the most exploited and researched areas. With Lower Palaeolithic occupation of Britain appearing south of approximately 54°N (Fig. 1), the geographical extent of early-Middle Pleistocene landscapes (Cameron et al., 1992; Hijma et al., 2012), and areas escaping the direct effects of glaciation, the southern section of the North Sea is generally considered as having the greatest archaeological potential for the Palaeolithic. This is therefore the region that will form the focus of this paper, with the Lower Palaeolithic (MIS21/25–MIS 9 [c.0.9ma–c.0.3ma]) forming the temporal component.

The geological settings of the North Sea play an important role in its archaeological potential: continued subsidence, active since the Oligocene (Cloetingh et al., 2005), has led to areas of vast sediment build-up. This is not uniform across the region, however, because of a tectonic hinge zone running approximately along the East Anglian coastline (Fig. 2). The land to the west of this hinge zone experiences minor uplift, resulting in a complex series of deposits at virtually the same elevation along the coast of Norfolk and Suffolk, whereas to the east subsidence has led to the build-up and stacking of deposits (For a full discussion see Cohen et al., 2017 and references therein).

This sedimentary record reflects the changing configuration of major European Plio-Pleistocene rivers, whose deposition led to a fluvio-deltaic system in the southern North Sea Basin and continued northwards regression of the North Sea through



Fig. 1. Sites discussed in the text.

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