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Review paper

The next frontiers in research on submerged prehistoric sites and landscapes on the continental shelf

F. Sturt^{a,*}, N.C. Flemming^b, D. Carabias^d, H. Jöns^c, J. Adams^a

^a Centre for Maritime Archaeology, University of Southampton, SO171BF, United Kingdom¹

^b National Oceanography Centre, Southampton, United Kingdom²

^c Lower Saxony Institute for Historical Coastal Research, Viktoriastreet 26/28, 26382, Wilhelmshaven, Germany³

^d ARQMAR, Centre for Maritime Archaeology Research of the South Eastern Pacific, Muelle Barón s/n, Valparaíso, Chile

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ABSTRACT

Submerged prehistory has emerged as a key topic within archaeology over the last decade. During this period the broader academic community has become aware of its potential for revolutionising our understanding of the past. With recent technological and scientific developments has come an opportunity to investigate larger areas and learn more than previously thought possible. When charting the future of the subject, however, it is also necessary to consider its historical trajectory. This sense of opportunity and optimism has been experienced before, but not sustained. As such, our greatest challenge lies not in adopting technological developments, but in maintaining momentum.

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Contents

1. Introduction	00
2. Submerged prehistory: a brief review	00
3. Global narratives and deep time potential	00
4. Regional contexts	00
4.1. The Baltic	00
4.1.1. Denmark a history of research	00
4.1.2. North and Eastern Baltic	00
4.1.3. The southern Baltic	00
4.2. The North Sea, English Channel, Irish Sea and Atlantic coast of Europe	00
4.2.1. The UK, Ireland and Norway	00
4.2.2. Denmark, Germany, France, Belgium, The Netherlands, Spain, Portugal	00
4.3. The Mediterranean and Black Sea	00
4.3.1. The Black Sea	00
4.3.2. The Mediterranean	00
4.4. The Americas	00
4.4.1. North America	00
4.4.2. South America	00
4.5. Africa & Arabia	00
4.6. Australia and South East Asia	00
5. Technological developments and increased capacity	00

* Corresponding author.

E-mail address: f.sturt@soton.ac.uk (F. Sturt).

¹ www.soton.ac.uk/archaeology.

² www.noc.ac.uk.

³ <http://nihk.de/index.php?id=404&L=1>.

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6.	Discussion	00
6.1.	Strength through diversity	00
6.2.	The significance of context	00
6.3.	Clear opportunities	00
6.4.	The need for coordinated action	00
7.	Conclusions	00
	Acknowledgements	00
	References	00

1. Introduction

Over the last decade submerged prehistory has emerged as a key topic within archaeology and acted as a unifying point of focus across a range of disciplines. The submerged extent of the continental shelves represent an additional 5% of the land area currently exposed across the globe (Fig. 1), and in regions such as Europe, South East Asia, and northern North America can add 40–100% of the present land area again (Bailey et al., 2017a; p. 1; Harff et al., 2016, p. 1). With sea-level fluctuating by up to 130 m over glacial cycles (Grant et al., 2014, see Fig. 1), this space has been repeatedly exposed and inundated over the six million year temporal window that archaeology is largely concerned with. These changes in land/sea boundaries significantly altered the world that our ancestors lived in, not just in terms of distribution of landmass, but also the behaviour of major ocean currents and the distribution of resources. Although the process of repeated transgression and regression may sound destructive, the variable nature of coastal geomorphology and geology has ensured that in some regions key depositional sequences survive, with artefacts that can be retrieved from both in situ and derived contexts. The corollary of this is that submerged regions of the continental shelves contain an important, and in some areas unique, resource for improving our understanding of human history and environmental change.

The investigation of this resource is a complex and demanding operation, requiring input from oceanographers, geologists, geophysicists, archaeologists and marine engineers (to name but a few). As such, submerged prehistory stands as a truly transdisciplinary subject, one that moves increasingly smoothly between academia and industry. It is this transdisciplinary nature, matched to the varied distribution and extent of continental shelves globally, that has led to a complex and erratic development. This variable history of research and engagement has shaped regional expectations and skewed baseline levels of knowledge. While some regions grapple with complex tectonic histories that have radically altered local geography, others cope with large tidal regimes, greater water depths, erosion and sedimentation. For parts of the world offshore construction and exploration work has seen large scale survey and mapping of the seabed, while in others detailed research has yet to be carried out. Similarly, the questions that we wish this resource to answer vary radically with regard to temporal and spatial scale; from large scale patterns of colonization and movement, through to more local signatures of adaptation, community structure, and change.

Contributing to the growing realisation of the potential of submerged prehistory over the last decade have been dramatic changes in technological and scientific capability. The evolution of improved acoustic survey and mapping systems, mechanical intervention through remotely operated and autonomous vehicles, as well as leaps in computing power, provide a new range of opportunities for effective research. Vast quantities of data acquired for different objectives can now be integrated, incorporated into models, and analysed at a range of scales. Innovative sampling and dating methods are allowing us to ask new and

different questions of sedimentary archives and artefactual material. As such, research into submerged prehistory does not stand as single monolithic entity, but as a shared area of interest amongst academics working on a number of related fronts.

In this paper we chart the development of research into submerged prehistory at a global scale, consider recent developments and reflect on what the future may bring. For reasons that will become clear below, an historical and geographically focused review is critical in order to recognise the strengths and weaknesses that have emerged. It is only once this has been appreciated that a sound platform for future developments can be constructed. In being so ambitious, through offering a global view, it is clear that there are details that will have been omitted. However, we hope to offer a snapshot of the current state of play, and equally importantly explain how we have got to our current position. Rather than see submerged prehistory as an adjunct to traditional modes of investigation we present it as central to future progress. We suggest ways in which we might prioritise and conduct research, emphasising the most significant goals that are usually beyond the reach of single institutions.

Four unifying themes emerge through this paper:

- **Strength through diversity:** The variable history of research and investigation into submerged prehistory around the world provides an important baseline level of understanding. Significantly, due to regional differences in the challenges faced, collectively we have developed a suite of expertise that now allows for a wide range of sites and environments to be investigated.
- **The significance of context:** Archaeological questions are not answered by material culture alone. Transdisciplinary research into sedimentary archives that bridge the contemporary land/sea boundary are transforming our understanding of the changing shape of the world, the coastal zone, and how humans have interacted with it.
- **Clear opportunities:** Some regions (e.g. the tropics, the coastlines of Indonesia, China and Japan) are under-researched and would benefit from targeted survey work, while in others (the North Sea, Australasia, North America) a shift in approach may be needed to move research forward; exploiting available data, consciously selecting new targets and adopting innovative techniques.
- **The need for coordinated action:** The challenges faced in working on this subject are still significant, and the community of scholars relatively small. As such to maintain momentum increased collaboration will be beneficial, and possibly new institutional frameworks.

2. Submerged prehistory: a brief review

When writing (and reading) a paper like this there can be a temptation to think that an historical review is a comforting crutch on which the paper can lean, rather than an analytical device of explicit use. However, as argued below, in the case of research into

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