

Dynamic Coastlines and Human Prehistory: The DISPERSE Project Investigations in the Southern Red Sea

Robyn Inglis^{1*}, Abdullah Alsharekh², Bill Bosworth³, Maud Devès⁴, Saud Al Ghamdi², Niklas Hausmann¹, Matthew Meredith-Williams¹, Garry Momber⁵, Najeeb Rasul⁶, Giorgos Rousakis⁷, Dimitris Sakellariou⁷, Andrew Shuttleworth⁸, Anthony Sinclair⁹, Geoff Bailey¹ and DISPERSE Project Partners

¹Department of Archaeology, University of York, UK; ²Department of Archaeology, King Saud University, Kingdom of Saudi Arabia; ³Apache Egypt, Cairo, Egypt; ⁴Laboratoire Tectonique, Institut du Physique du Globe, Paris, France; ⁵Maritime Archaeology Trust, UK; ⁶Saudi Geological Survey, Jeddah, Kingdom of Saudi Arabia; ⁷Institute of Oceanography, Hellenic Centre for Marine Research, Greece; ⁸Department of Anthropology, University of Durham, UK; ⁹School of Archaeology, Classics and Egyptology, University of Liverpool, UK

*Corresponding author: robyn.inglis@york.ac.uk

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1. INTRODUCTION

The exploitation of coastal landscapes and resources in human prehistory has long been a subject of debate, particularly in assessing the conditions and timing of global dispersals of modern humans from Africa, but also in the diversity of Holocene hunter-gatherer lifeways.

Coastal landscapes may provide highly attractive concentrations of different marine and terrestrial resources, yet current discussions into Pleistocene and early Holocene coastal exploitation are hampered due to submergence of previous coastlines by mid-Holocene sea level rise.

Interdisciplinary approaches that integrate prospection work both on land and underwater, and that integrate the dynamic nature of coastlines driven by sea level change, are desperately needed.

The ERC-funded DISPERSE project is undertaking interdisciplinary investigations into the prehistoric occupation of the Southern Red Sea, on land and underwater.



2. BROAD-SCALE MAPPING

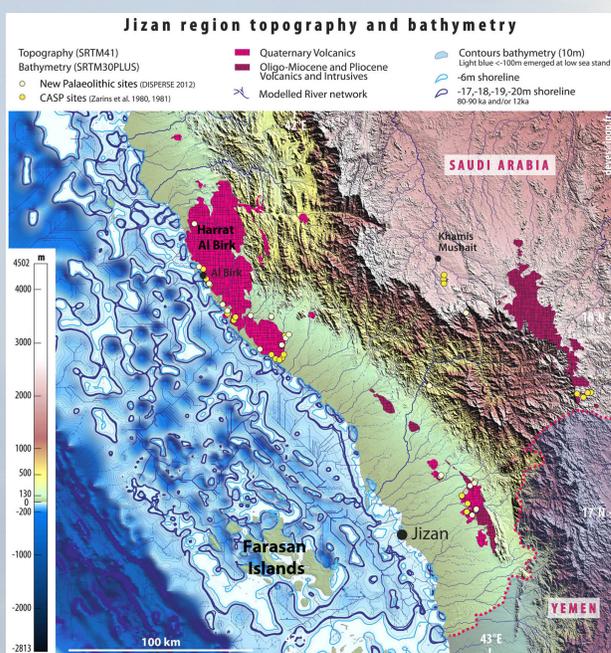
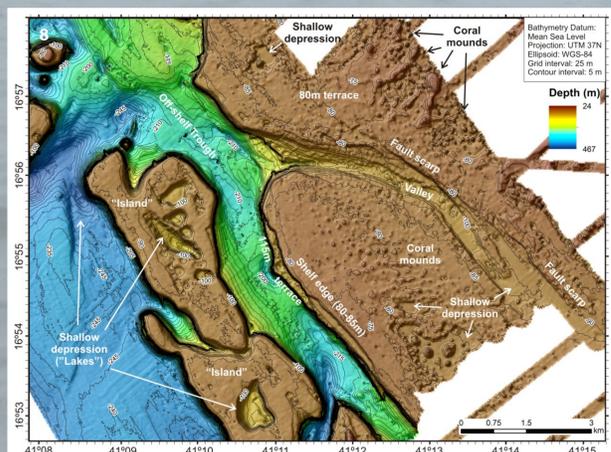


Figure 2: Combined topographic and bathymetric map showing study area and known Palaeolithic sites prior to survey following DISPERSE reconnaissance in 2012 and survey programmes in 1980s. Map: M. Devès.

Broad-scale mapping of the terrestrial and submerged landscapes using satellite and remote sensing data (SRTM41, GECO30, LandSat) distinguished major topographic features and landscape types, both on and offshore (Figure 2). The relationships of previously known archaeological sites to landscape features and geomorphological settings, groundtruthed through reconnaissance fieldwork (Devès *et al.* 2013), were used to target survey on land and underwater.

5. SUBMERGED LANDSCAPES

Multi beam bathymetry, coupled with side scan sonar survey, was carried out by the R/V Aegaeo in targeted locations across the continental shelf offshore of the Farasan Islands. This provided high-resolution characterisations of the submerged landscape and its potential attractiveness to hominin populations, e.g. areas with access to rivers and lakes (Figure 8).



3. HOLOCENE SHELL MIDDENS

Over 3000 shell mounds, dating from 6,500 to 4,500 cal. BP (Figure 3a; Meredith-Williams *et al.* 2014) have been surveyed on the Farasan Islands, illustrating intense past marine resource exploitation. DISPERSE's programme of excavation, coupled with bioarchaeological analysis of the shells, has given new insights into the subsistence strategies that drew on these environments.



Figure 3: a) Shell mound under excavation above wave-cut notch, Janaba Bay, Farasan Islands. Photo: G. Bailey. b) Shell mounds along palaeoshoreline, Janaba Bay, Farasan Islands. Image: Digital Globe via Google Earth.

Shell mounds are closely associated with palaeoshorelines (Figure 3b) and earlier mounds may have been submerged by subsequent sea level rise. DISPERSE has carried out a programme of shallow-water diving in areas where submerged shell mounds may have been preserved (Figure 4a, b).

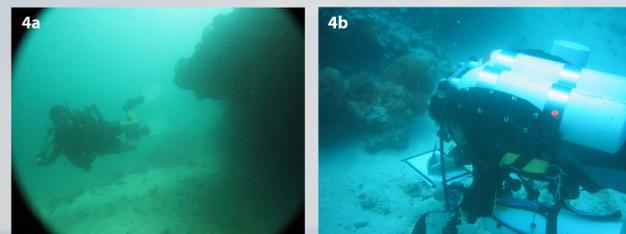


Figure 4: Diver surveying (a) and recording (b) base of wave-cut notch off of Farasan Islands. Photos: G. Momber.

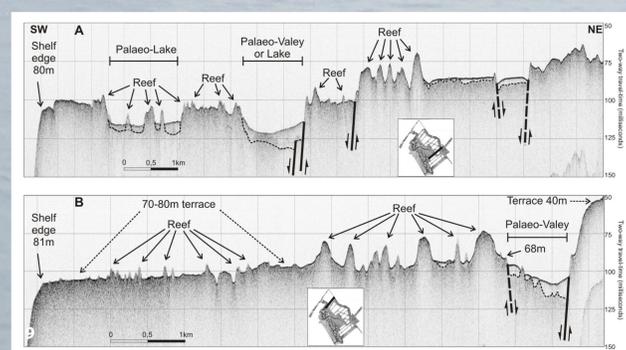


Figure 8 (left): Swath bathymetry map of detail of FARASAN 1 survey area, showing deeply-incised river valleys and potential lakes at the edge of the continental shelf. Figure: D. Sakellariou and G. Rousakis.

Figure 9 (above): Air gun seismic profile from FARASAN 1 survey area showing features such as coral reefs, valleys and faults (potentially related to salt tectonics). Figure: D. Sakellariou and G. Rousakis.

High-resolution sub-bottom profiling and seismic profiling was undertaken along selected transects within the surveyed areas (Figure 9). Combined with gravity coring of key locations (e.g. potential lake basins) this has allowed a further understanding of landscape evolution and palaeoenvironments of the submerged landscape. OSL dating of these cores will help to temporally constrain this evolution, and the timing of sea level change.

4. PALAEOOLITHIC COASTLINES

Southwestern Saudi Arabia possesses a record of Palaeolithic occupation of up to 1.8 million years. The DISPERSE project has located and recorded the characteristics and geomorphological settings of over 3000 lithic artefacts (Figure 5a, b; Inglis *et al.* 2014), as well as collecting samples for dating landscape evolution.

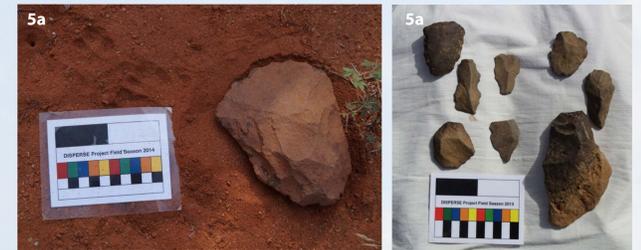


Figure 5: a) Early Stone Age basalt cleaver from Southern Jizan. Photo: G. Bailey. Middle Stone Age basalt flakes from Southern Jizan. Photo: A. Sinclair.

The coastline of the Harrat Al Birk lava fields, Asir Province, contain fossil coral and marine terraces above present-day sea level (Figure 6a, b). In conjunction with the Saudi Geological Survey, these terraces have been surveyed and sampled for dating, and will provide much-needed regional palaeo sea level benchmarks, advancing understanding of the Red Sea Rift.



Figure 6: a) Fossil coral terraces overlying basalt lava flows in the Harrat Al Birk. b) Detail of coral terrace. Photos: R. Inglis.

These terraces, consistent in height with an MIS5 high sea stand (Lambeck *et al.* 2011), are, in places associated with Palaeolithic material (e.g. Dhahaban Quarry, Figure 7a, b), providing the opportunity to examine Palaeolithic coastal exploitation during high sea stands.



Figure 7: a) Fossil beach deposits at Dhahaban Quarry overlying wadi cobble unit containing coral cobbles and b) worked MSA artefacts. Photos: R. Inglis and A. Sinclair.

5. CONCLUSIONS

The research carried out by the DISPERSE project has produced a unique dataset of information on archaeology spanning up to two millions of years associated with the coastal regions and islands of Southwestern Saudi Arabia.

Offshore survey and terrestrial geomorphological mapping has allowed this long-term record to be placed in the context of a dynamic landscape, both onshore and now-submerged, and has highlighted numerous routes for further research to explore the potential of this region.

It is only through interdisciplinary research programmes that the major, unique challenges associated with tracing the prehistory of coastal regions around the world can begin to be overcome.

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REFERENCES: Devès *et al.* (2013). Palaeolithic survey in southwest Saudi Arabia: methodology and preliminary results. *Adumatu* 27: 7-39. Inglis *et al.* (2014) Investigating the Palaeolithic Landscapes and Archaeology of the Jizan and Qunfudah Regions, Southwestern Saudi Arabia. *Proc. Sem. Arab. Stud.* 2013. Lambeck *et al.* (2011) Sea level and shoreline reconstructions for the Red Sea: isostatic and tectonic considerations and implications for hominin migration out of Africa. *Quat. Sci. Rev.* 30 (25-26): 3542-74. Meredith-Williams *et al.* (2014) 4200 New Shell Midden Sites in the Southern Red Sea. *Int. Arch.* <http://dx.doi.org/10.1111/ia.37.2>. Zarins *et al.* (1981) The second preliminary report on the Southwestern Province. *Atlat.* 5, 9-42; Zarins *et al.* (1980) Comprehensive Archaeological Survey Program: preliminary report on the Central Southwestern Provinces Survey. *Atlat.* 4, 9-117.



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