Exploring the Omani Rub' Al-Khali (2023-2024): Archaeological and Geomorphological Investigations in Maitan and Wadi Stum

Maiorano M.P.,[1] V. Charpentier[2] T. Beuzen-Waller[3] & A. Al-Mahri[4]

The 2024 season of the "Exploring the Omani Rub' Al-Khali" project continued the archaeological and geomorphological work in the Maitan region (Shaqat and Urq Jadailah) and began investigations at Wadi Stum. Through a combination of archaeological surveys, excavations, and palaeoenvironmental analyses, the research identified significant Neolithic occupations and past hydrological activity. Newly collected radiocarbon and OSL samples will refine the environmental and cultural chronology of this scarcely explored area of southern Oman, emphasizing its importance as a corridor and hub for mobile prehistoric communities.

تواصلت خلال الموسم الميداني لعام 2024 الأعمال الأثرية والجيوموفولوجية لمشروع "استكشاف الربع الخالي العُماني" في منطقة ميتان (شقط وعرق جديلة)، وبدأت الاستكشافات في وادي ستوم من خلال الجمع بين المسوحات الأثرية، والتنقيبات، والتحليلات البيئية القديمة حيث كشفت الدراسة عن دلائل مهمة على استيطان إنساني خلال العصر الحجري الحديث إلى جانب نشاط هيدرولوجي سابق. ستُسهم دراسة أحدث العينات التي تم جمعها بواسطة التأريخ بالكربون المشع وتقنية التأريخ بالرنين الضوئي المحفز OSL في تحسين فهمنا للتسلسل البيئي والثقافي لهذه المنطقة البعيدة في جنوب عُمان، والتأكيد على أهميتها كممر حيوي للمجتمعات المتنقلة في عصور ما قبل التاريخ

Part of the broader Arabian Seashores program (Charpentier *et al.* 2023), this project focuses on the desert margins of southern Oman, particularly Urq Jadailah (UQJ), Shaqat Jadailah (SQJ), and Wadi Stum (WST) (Fig. 1). The first two areas, embedded within interdunal valleys and extensive playas, offered a unique opportunity to link archaeological evidence of Neolithic life with the palaeoenvironmental record of fluctuating hydrological conditions (Maiorano *et al.* 2020, 2024). The campaign employed a combination of geomorphological and topographic mapping, systematic surface collection, stratigraphic excavation, and palaeoclimatic sampling to explore long-term occupation and mobility strategies in the southern Rub' Al-Khali.

Palaeoenvironment and Geomorphology

In UQJ and SQJ the geomorphological study focused on understanding landscape evolution in link with the rainfall variability. At Urq Jadailah, OSL samples from palaeosebkha levels revealed two key humid phases: one during MIS 5 and another in the early Holocene. Shaqat Jadailah displayed concentric playa deposits suggesting a receding water body. These findings reinforce the interpretation of these interdunal basins as hydrologically reactive systems, fed by groundwater and episodic rainfall, likely connected to regional aquifers and influenced by both monsoonal and cyclonic events.

While the study of Maitan area is more advanced, Wadi Stum's fluvial deposits are currently under investigation with the aim of correlating riverine dynamics with the settlement history of the adjacent terrace.

Archaeological Investigations

The fieldwork focused on documenting extensive lithic scatters and associated features across UQJ, SQJ and make a preliminary assessment at WST. At UQJ, over three hectares were surveyed and subdivided into zones UQJ-1 through UQJ-5. Systematic collection and density transect revealed spatial clustering of activities, with high concentrations of debitage and diagnostic tools including projectile points, bifaces, ornaments and groundstone tools. Excavations in UQJ-2 uncovered three combustion structures, from which charcoal samples were retrieved for radiocarbon dating. Complementary mapping with high-resolution GNSS produced a digital elevation model (DEM) crucial for landforms and spatial analyses. The site's dense material culture—mortar and pestles, marine shell ornaments, flint hammers, and tethering stones—underscores the diversity of prehistoric activities and suggests repeated seasonal occupation (Fig. 2).

Shaqat Jadailah SQJ-1 to 5 appears partly different from UQJ and features one of the richest assemblages of ground stone tools in the region, with 168 grinding implements recorded, documented and sampled for use-wear and starch grains analysis. Two previous test soundings set over two fireplaces

Director: Vincent Charpentier ✉ vincent.charpentier29@gmail.com

[1] *Czech Academy of Sciences, Czechia;* [2] *National Institute for Preventive Archaeological Research, France;* [3] *Université de Perpignan, France;* [4] *Ministry of Heritage and Tourism, Sultanate of Oman*

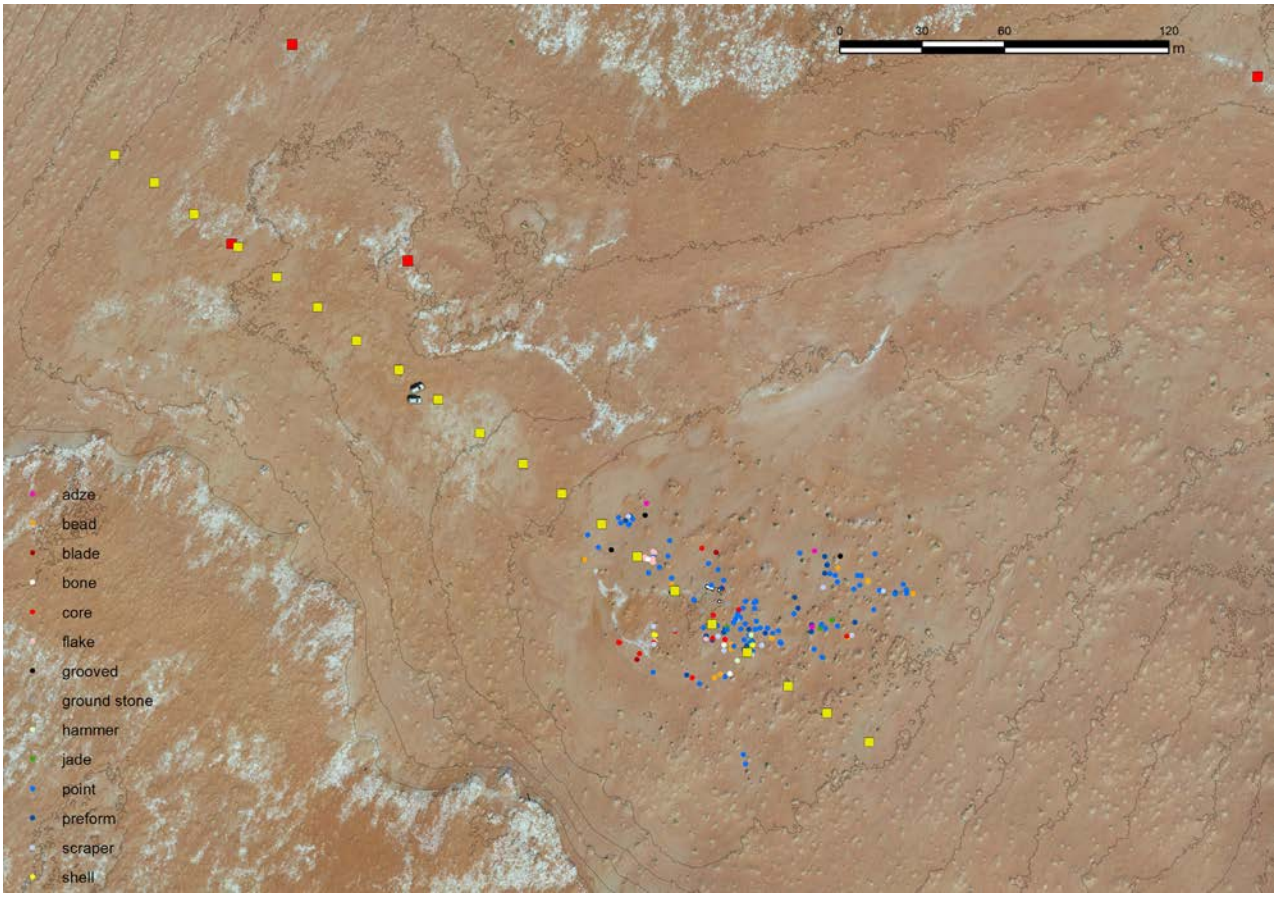

Figure 1. Map of UQJ survey area indicating the position of the collected artefacts, OSL sampling, density transect and test-trenches. Inset: general map of south and central Oman indicating the position of the mentioned sites (Source: NSA, Sultanate of Oman).

returned calibrated radiocarbon ages dating to the half of the 6th millennium BCE. This period aligns with the Holocene Humid Phase, reinforcing the hypothesis of increased mobility and attendance of these playa-lakes.

The fieldwork proceeded at Wadi Stum, where a previously undocumented site (WST-1) revealed fluted trihedral projectile point production workshops, comparable to the assemblages found at Ad-Dahariz (DHZ-2, Salalah) (Fig. 3). The presence of both preforms and finished points suggests on-site manufacture. Surface scatters of bifacial tools and stone structures indicate multiple occupation phases, potentially extending into later prehistoric or early historic periods.

Material Culture and Technological Insights

The lithic industries of Maitan are characterized by sophisticated bifacial techniques and the production of projectile points using high-quality chert. Diagnostic types include trihedral tanged and shouldered projectile points, bifacial adzes, scrapers, and various retouched pieces (Fig. 4; Maiorano *et al.* 2020, 2024; Al Kindi *et al.* 2021). A key focus was the collection of diagnostic pieces using D-GPS, alongside the systematic recovery of artefacts in three sample areas. This approach aims to reconstruct the operational chain of artefact production and to identify the primary objectives of flintknapping activities at the site. Grinding tools are largely made from Eocene bioclastic limestone and silicified sandstone. When grouped by typology and spatial distribution, these artefacts reveal standardized manufacturing practices and suggest coordinated processing activities—possibly involving wild cereals and grasses. The targeted sampling of the better-preserved grinding stones (and the surrounding sediment) supports ongoing use-wear and phytolith analyses (Fig. 5). Additionally, shell ornaments—beads and pendants crafted from marine mollusks—attest to symbolic expression and long-distance exchange.

Figure 2. General view of Urq Jadailah from the dune south of the basin (left). Inset: detail of a projectile point discovered on surface in UQJ-2.

Figure 3. General view of Wadi Stum from the top of the terrace with the Neolithic occupation (left). Section of the wadi with S. Al-Huraizi marking the position of freshwater shells (right).

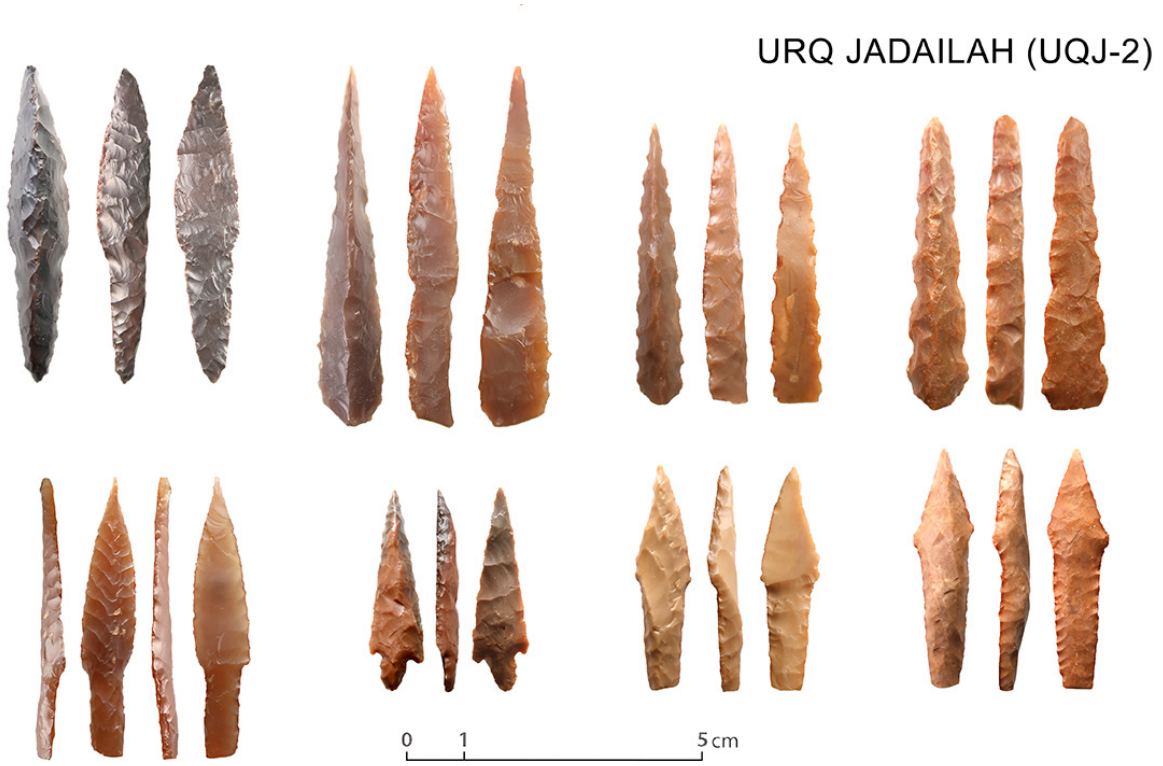

Figure 4. Selection of projectile points from Urq Jadailah.

Figure 5. Mapping and photographic documentation of the groundstone tools in Shaqat Jadailah SQJ-2, 3, 4, 5.

Lastly, in Wadi Stum WST-1, the presence of all-stages preforms and finished points suggests on-site manufacture for fluted trihedral points. Surface scatters of bifacial tools and stone structures indicate multiple occupation phases, potentially extending into later prehistoric or early historic periods.

Conclusion

The 2024 campaign fully integrates archaeology and geomorphology to approach the study of settlement dynamics of southern Oman's Neolithic populations. Initial radiocarbon and OSL dates align with known humid periods, supporting the hypothesis that this part of the Rub' Al-Khali might have represented a hub for nomadic and semi-nomadic communities. The density and richness of lithic material, combined with the systematic organization of grinding areas and ornaments, suggest a highly mobile yet structured society. Future field seasons will expand survey coverage, focus on dating early Holocene deposits at Shaq Shuayt, and complete the technological study of the collected assemblages.

Acknowledgements

This project was supported by the Society of Antiquaries of London (Beatrice de Cardi Award) and the Fokus A|B Grant from GRADE – Goethe University Frankfurt. We thank the Ministry of Heritage and Tourism of Oman for their continuous support, particularly the Directorate General of Antiquities and the Earth Science Consultancy Centre. Field assistance by Said Al-Huraizi, Ali Al-Mahri, and Adam Al-Ghafri was crucial to the mission's success.

Bibliography

Al-Kindi, M., V. Charpentier, M. P. Maiorano, M. Musa, A. Pavan, A. Heward, J. Vosges, G. Marchand, and M. Pickford (2021). Evidence of Neolithic long-distance exchange in Southern Arabia: The road of the Jade axes. *Journal of Archaeological Science: Reports* 39: 103116. https://doi.org/10.1016/j.jasrep.2021.103116

Charpentier V., M.P. Maiorano, G. Marchand, J. Vosges, and F. Borgi (2023). Twelve years of the "Arabian Seashores" project: How the extensive investigation of coastal Oman changed the paradigm of the Arabian Neolithic. *Arabian Archaeology and Epigraphy* 34(S1). https://doi.org/10.1111/aae.12236

Maiorano, M.P., M. Al-Kindi, V. Charpentier, J. Vosges, D. Gommery, G. Marchand, A. Qatan, F. Borgi, and M. Pickford (2020). Living and moving in Urq al-Hadd: Neolithic settlements and regional exchanges in Southern Rub' al-Khali (Sultanate of Oman). *Stone Tools of Prehistoric Arabia* (Supplement to Volume 50 of the *Proceedings of the Seminar for Arabian Studies*). Oxford, UK: Archaeopress, pp. 83–99.

Maiorano M.P., M. Al-Kindi, V. Charpentier, J. Vosges, G. Marchand, F. Borgi, M. Pickford, D. Gommery, T. Beuzen-Waller, S. Al-Huraizi, and A. Al-Mahri (2024). Alle porte del deserto: gli insediamenti di Maitan nel quadro del Neolitico dell'Oman meridionale (Rub al-Khali, Sultanato dell'Oman). In M. Ramazzotti (ed.), *Costeggiando l'Eurasia: Archeologia del paesaggio e geografia storica tra l'Oceano Indiano e il Mar Mediterraneo* (Atlante del Vicino Oriente Antico, Opere Collettanee 3). Rome: Sapienza University Press, pp. 99–111.