The Archaeological Heritage of Oman

TAMING THE GREAT DESERT

Adam in the Prehistory of Oman

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Sultanate of Oman
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Cover image: Copper quivers in the "room of the weapons" of Mudhmar East, Building 1 (photograph by G. Gernez).

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Acknowledgments

This book is dedicated to Serge Cleuziou (1945-2009)

This decade of work in Adam would not have been possible without the sponsors, members, workers and Omani friends of the French Archaeological Mission.

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Chapter 1

Archaeology in Adam from the first steps to the latest discoveries and methods. Ten years of research

Guillaume Gernez

The region of Adam, in the region Ad-Dakhiliyah is located on the southern flank of Al-Hajar Mountains and in the northern part of interior Oman, sixty kilometers from Nizwa (Figure 1.1). At the door of the Rub Al-Khali desert, the modern town of Adam is the last oasis on the road to Salalah. Located at the crossroads of the north-south way from Muscat to Salalah and the northwest with a market, it has been for a long time a stage before the crossing of the desert.

Today, Adam is composed of a large oasis including several traditional villages and a part of the modern town that is extending year after year. This urban development can be a danger for archaeological remains, so the preservation of heritage in the area of Adam was an important factor of the research from its beginning.

The landscape of the southern boundary of Oman mountains is characterized by a succession of small whaleback structures, also known as the "Salakh Arch" (Figure 1.2). Standing 1014 m above sea-level (highest point of Jabal Salakh), the arch is made of a chain of anticlinals, each separated by a gap. From East to West: Jabal Mudhmar, Jabal Hinaydil (or Hunayd), Jabal Salakh, Jabal Nahdah (or Rashid) and Jabal Fitri. All share an asymmetrical structure. Indeed, all of Salakh Arch is concave, bent to the north, with steeper slopes on its southern flank. On the other side, the northern flank side is characterized by mild slopes. Each anticlinal is surrounded by a glacis creating a link between the mountains and the plain. Other hills and small mountains are located around Adam: Jabal Qarah (or Khatmah) 20 km to the north, and Sufrat Dishshah, Sufrat Al-Khays 35 km to the west.

The area of Adam is crossed by two major *wadis*: Wadi Umayri (or Uwaifi), close to the western part of Jabal Salakh, and Wadi Halfayn (here called Wadi Izz) in the east side of Jabal Mudhmar. There are also numerous smaller *wadis* all over the region; most of them meet in Adam oasis, between Jabal Hinaydil and Jabal Mudhmar.

History of research in the area of Adam

The discovery of the stone and the new project proposed by Prof. Serge Cleuziou (2006)

Until 2006, Adam and its surroundings had not been visited by archaeologists, but the discovery of a broken carved stone in an offering place near the southwest of Jabal Salakh, in a place called Al-Qutayinah, suggested that this region might have been important during the Early Bronze Age. Indeed, the Ministry of Heritage and Culture asked to the late Professor Serge Cleuziou to identify the style and date of this stone, and he had the surprise of observing some similarities with the famous carved facing stone of the Great Tomb at Hili: two humans next to each other (Figure 1.3). Since Hili was one of the main oasis of Eastern Arabia during the Early Bronze Age (Umm an-Nar Period, 2700-2000 BC), it became possible to suppose that Adam might have been an important protohistoric site.

Figure 1.1. Adam in central Oman (source Google Maps).

For this reason Serge Cleuziou, co-director of the Joint Hadd Project, created an expedition in order to explore the whole area from January 2007, and his Ph.D Student Jessica Giraud was given the responsibility of the 3000 km² survey (Figure 1.4). When this small project started, none of us expected that the work would still go on ten years later.

Surveys and archaeological map: early years of the French Mission led by Jessica Giraud (2007-2011)

Before any excavation, the first aim of the new mission was to explore Adam and its surroundings (Figure 1.5), in order to identify the main sites, their location, size, date, and also to evaluate the quantity and the density of structures and artefacts. During this first ten-days campaign the archaeological map was created implementing a Geographical Information System, GIS. 390 archaeological structures, mainly tombs, were located and described on the western foothill of Jabal Mudhmar (including the Adam North graveyard), and on the top of Jabal Hinaydil and its north and east foothills. Two Late Iron Age graves were excavated, but were completely empty. Inside the oasis, no evidence of protohistoric remains (Umm an-Nar tomb or tower) was observed.

Figure 1.2. Landscape near Adam with Jabal Salakh in background (photograph by J. Giraud).

Figure 1.3. Carved stone discovered at Al-Qutayinah near Adam in 2006. Two humans face each other in a scene of unknown meaning (photograph by the Ministry of Heritage and Culture of Oman).

Figure 1.4. The first day of surveys in Adam (January 2007). Jessica Giraud is explaining the field operations to the late Professor Serge Cleuziou, Olivier Blin and other members of the team (photograph by G. Gernez).

The second season was also short (18 days in April 2008), divided into two parts. 228 new structures were discovered. During one week, the south and west foothills of Jabal Hinaydil were surveyed, and brought to light Adam South graveyard. The other ten days, the team moved to the region called Al-Qutayinah, looking for the original tomb where the carved stone had been taken. Even if this tomb was never found, the modern offering place (or sanctuary) where the carved stone was discovered seemed to present architectural features of a 3rd millennium BC building (Figure 1.6). A sounding in the neighborhood of this sanctuary revealed two pits surrounded by stones, at the bottom of which camel bones were discovered, unfortunately without material evidence that could date the ensemble.

During the third season (one month in December 2008 - January 2009), 547 new structures, mainly tombs, were localized, revealing the wide area of ancient occupation: a large necropolis was found in Jabal Qarah (Figure 1.7), and an Iron Age site was identified on the eastern slope of Jabal Mudhmar.

The fourth season (five weeks in February-March 2010) revealed the first Neolithic sites of Adam. Among the 533 structures and flint concentrations discovered, several stone circles associated with Neolithic tools were identified on the southern side of Jabal Salakh. Hafit and Wadi Suq tombs were found in the western tip of Jabal Salakh, forming a small necropolis, and we localized tombs also in the southern part of Jabal Qarah. A series of archaeological structures, very small and difficult to date were discovered on the terraces to the south of Adam.

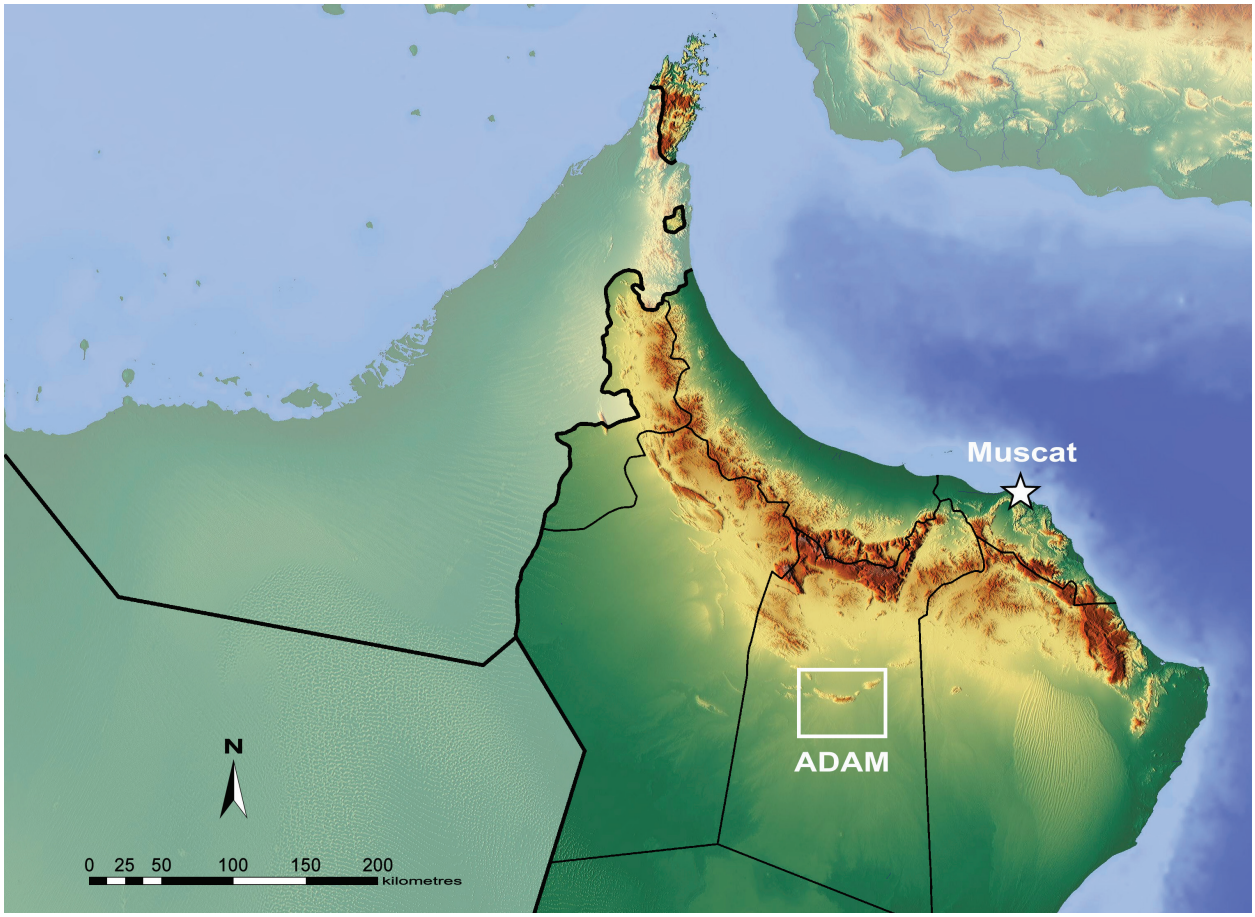

Figure 1.5. Surveyed area around Adam (map by J. Giraud).

Because of the extension of the suburbs, part of the fifth season (seven weeks in January-February 2011) focused on the excavations of three graves in Adam North, where new buildings were beginning to destroy this important site. Wadi Suq Period (2000-1600 BC) material was found in the three graves, confirming the chronology of the site. In the same time, surveys continued inside the oasis and to the west of Jabal Salakh, with the surprising discovery of Early, Middle and maybe Upper Palaeolithic flint tools on the slope of Sufrat Dishshah. From this moment, it was possible to sketch the chronology of Adam from Palaeolithic to the Islamic Period and to propose a regional, diachronic and thematic research program.

The diachronic and regional program, led by Guillaume Gernez and Jessica Giraud (2012-2016)

1800 structures were documented between 2007 and 2011, confirming the high potential of the region. At this stage of the research, they were concentrated in 30 major sites from several periods: Palaeolithic, Neolithic, Copper Age (Hafit Period) necropolises, Early and Middle Bronze Age graveyards (Umm an-Nar and Wadi Suq periods), Iron Age II cultic site, Samad (Late Iron Age) graveyards, other sites (pre-Islamic and Islamic periods). These discoveries made possible the proposition of a five-years program focused on the study of human communities, in order to specify the evolution of human communities and to determine factors of cultural changes in relation with environment.

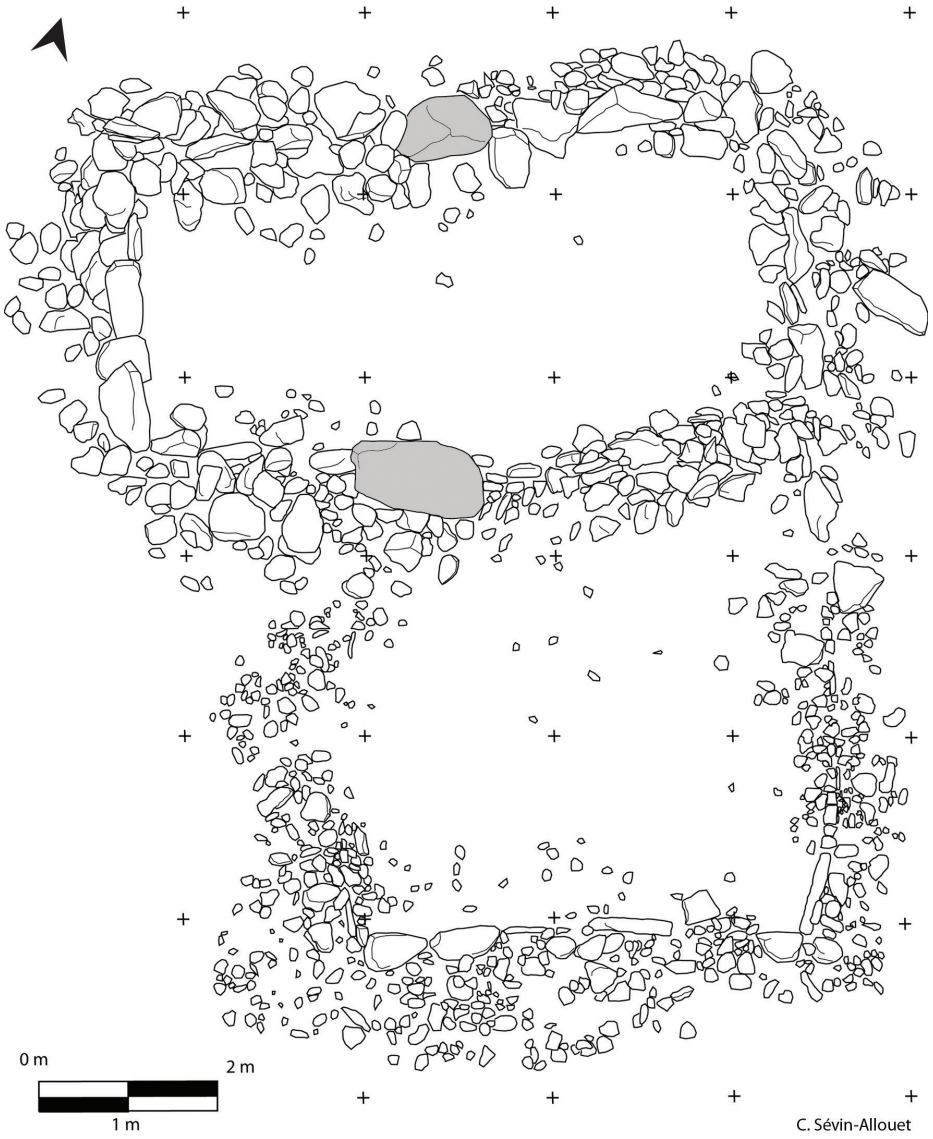

Figure 1.6. The offering place in Al-Qutayinah. The carved stone (Figure 1.3) come from this building that could also reuse other stones of an Early Bronze Age house or tomb (drawing by C. Sévin-Allouet).

Figure 1.7. Map indicating one day of survey track (by car) in Jabal Qarah (map by J. Giraud).

Figure 1.8. Adam North (Qala'a) graveyard during excavations in January 2013 (photograph by G. Gernez).

In order to manage this dense and multidisciplinary project, the support from the Ministry of Heritage and Culture and French Ministry of Foreign Affairs increased, thereby enlarging during the sixth campaign (December 2011-January 2012). Thus began parts of the program: Palaeolithic and Neolithic surveys and first sounding in Jabal Al-Aluya (Salakh South), excavations of Adam North graveyard, environmental study (geomorphology), ethnological study of water management in the oasis, precise cartography and GIS of main sites (including kite views), pottery study, database.

The seventh campaign (Dec. 2012 – Jan. 2013) followed the same system, with three main places of work: surveys, soundings and geomorphology in the Palaeolithic site of Sufrat Dishshah, extension of excavated Neolithic shelters in Jabal Al-Aluya and most of all the excavations of the central part of Adam North graveyard (Figure 1.8), with significant results (Chapter 6). During the eighth season (December 2013-January 2014), most of the work was carried out in the Adam South graveyard, where the noteworthy Umm an-Nar tomb 2000 was excavated (Figure 1.9). New surveys revealed two Hafit necropolises near Wedhha, and one of the most southern 3rd millennium BC tower was identified in the vicinity (Figure 1.10). The ninth season (Dec. 2014 – Jan. 2015) offered the opportunity of experiencing new imagery technology by drones on the different fieldworks (excavated areas and surveys). Even if the Palaeolithic research linked with paleo-environment was continuing in Sufrat Dishshah, and if surveys were completed, the main archaeological operation was the excavation of Building 1 (E 1193) in Mudhmar East (Iron Age). Unique copper weapons were discovered there, including two quivers. Finally, the tenth campaign (Jan. 2016) was planned to be the last. Excavations at Mudhmar East yielded a series of copper weapons, revealing the importance of the site for metallurgy, Iron Age ritual and material culture, and had a large media coverage. Therefore, several weeks will be necessary to excavate around the main buildings of the site.

Methodology

As the research program was becoming multidisciplinary, the variety of methods had to increase. Since the first stages were focused on the exploration of the area leading to the development of the Archaeological Map of Adam, the first methods were used to locate and identify sites (pedestrian surveys and remote sensing) (Figure 1.11). In order to clarify the chronology of populated places and to obtain new data about settlements, funerary practices, society and culture, excavation began, adapted to the kind of remains (unstratified settlements, single burials, collective tombs using physical anthropology methods, collapsed buildings). Methods of physical geography were concurrently used to identify the kind of environment where ancient people lived, and its evolution through time. For all these operations, new techniques and methods (drone high-resolution imagery, orthophotography and 3D models) were developed from 2015 (Figures 1.12 and 1.13). Finally, all of the archaeological material was classified, illustrated, and studied (typology, technology).

Pedestrian surveys, remote sensing and GIS

According to the very large surface (3000 km² = 30 000 hectares) and the presence of mountains, it is not possible to survey the whole region with the same level of precision. Only the combination of several survey techniques can provide the means to obtain a more complete overview.

Figure 1.9. Adam South. Detail of the first layer of bones in the collective tomb 2000 (photograph by G. Gernez).

Figure 1.10. Early Bronze Age tower discovered at Wedhha (photograph by G. Gernez).

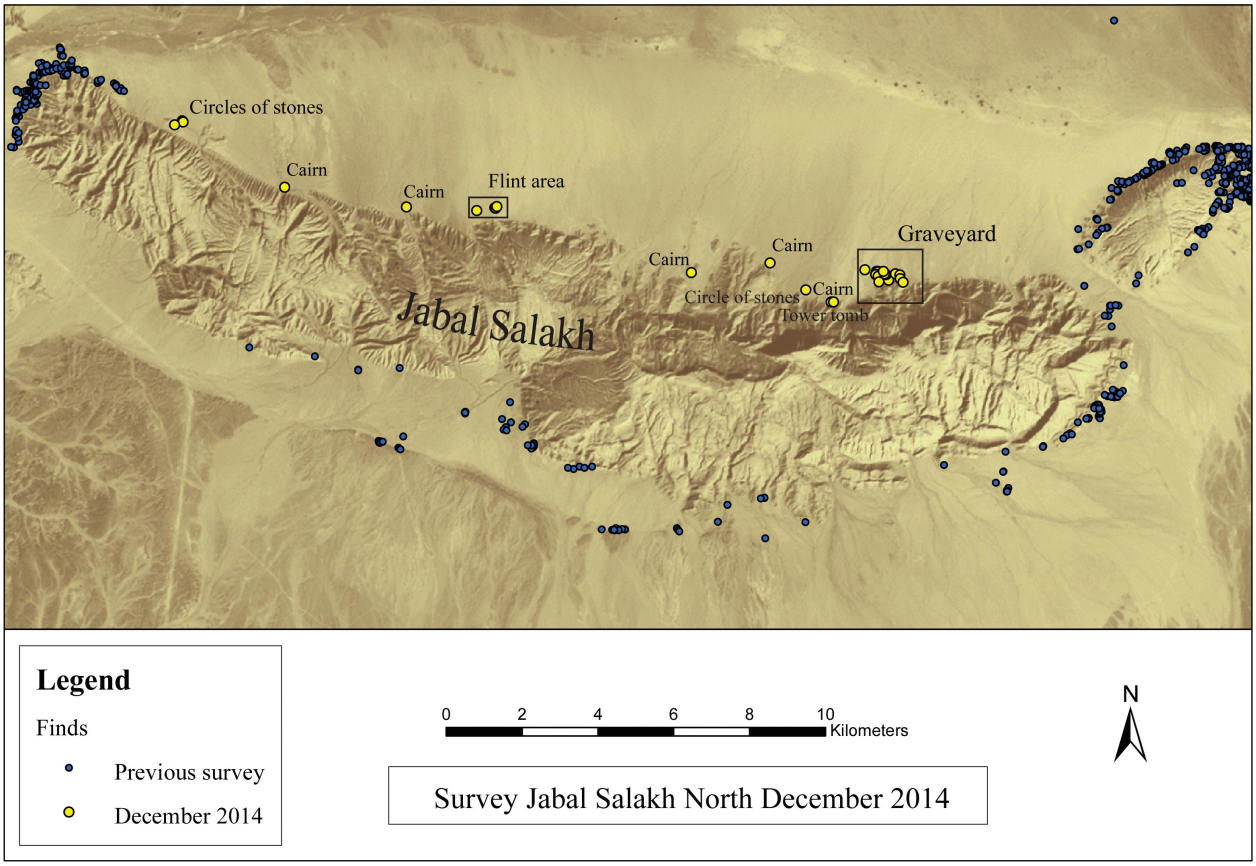

Figure 1.11. Complete map of the archaeological sites around Jabal Salakh (Survey 2014, map by D. Arhan).

Figure 1.12. New technologies used during the surveys in January 2015: CAPTAIR team programming two simultaneous eBee flights and making a video report (photograph by G. Gernez).

Work was divided into four main stages:

1. Identification of archaeological sites, either from satellite pictures or (more often) travelling by car around the area looking for isolated or multiple structures. We also tested every kind of environment, where pedestrian survey was made randomly in order to find material. The combination of these three elements made it possible to locate archaeological concentrations and empty places. This phase was facilitated by the absence of sediment on every relief, due to erosion: thereby making all stones and architectural remains still visible. The situation is quite similar on glacis, so that imperishable material can be found on the surface. Only in *wadis* and alluvial plains the sediments cover potential archaeological sites.
2. Once found, each structure was precisely located (GPS), described, pictured, measured, and registered into the Survey Database, including the material found inside or around it, and geological and topographic features.
3. In many cases, a very intensive and exhaustive pedestrian survey was carried out, especially in sites with lithic concentrations and excavated sites.
4. The database was associated to a GIS, so we obtained thematic maps indicating each archaeological site in Adam.

Mudhmar East. The "Columned building of the Archers" appears as a darker area near the center indicated by the arrow (orthophotograph by CAPTAIR).

Excavations

Soundings were occasionally made during the surveys (Sufrat Dishshah, Al-Qutayinah, Hinaydil North), but main excavations were carried out in four sites:

- Jabal Al-Aluya (Salakh South): Neolithic excavations on a non-stratified settlement. Due to the high difficulty of this kind of field, complete clearing, precise position of each stone and posthole. A complete archaeological and topographical survey was made.
- Adam North: Early and Middle Bronze Age graveyard. A large rectangular area was opened in the central part of the graveyard, including 37 funerary mounds, in order to identify them from an architectural point of view, to understand spatial organization and to date them (according to their characteristic features and/or associated artefacts). Since all of the mounds were partly eroded and crumbled, structures were not always easy to make out without excavation: despite very precise surveys, the forms and dates of the structures were often different from what we expected before cleaning. Each tomb was excavated in the same way: we first dug out the crumbled stones of the structures in order to study the process of collapse and the building method, and to reveal the original structure. In a second stage the funerary chambers were excavated layer by layer. Each step was documented during the course of excavation with drawings, and photos. Anthropological studies were conducted on human bones, the aim being to identify the number of individuals, age, sex, pathologies.
- Adam South: In this Bronze and Iron Age graveyard, the same method was used. However, due to lack of time, only a selection of 8 structures was chosen for excavation. Two tasks were very difficult: the cleaning of a large monumental cairn, and most of all the excavation of a destroyed collective grave where thousands of crushed bones had to be excavated and identified within three weeks. Several hundred potsherds also needed to be collected, located, classified in order to restore some pots.
- Mudhmar East. This Iron Age complex was intensively surveyed, then excavations began inside and outside the main stone/mudbrick building. With 1.7 meters of filling in its western part, the building needed a precise stratigraphic excavation. Orthophotographs of every main stage of excavation (including one layer of copper objects) were made, and a complete 3D Model was obtained.

Geomorphology and environment

The complete geomorphological map of Adam was produced in order to place archaeological sites in their present, and ancient (after reconstruction) environment. Both geological maps, satellite/drone pictures and field surveys were used, sometime on a small scale. Cuts in terraces and core sampling were carried out in Sufrat Dishshah to collect sediments and remains of molluscs for OSL dating (for details, see Chapters 2, 3 and 4).

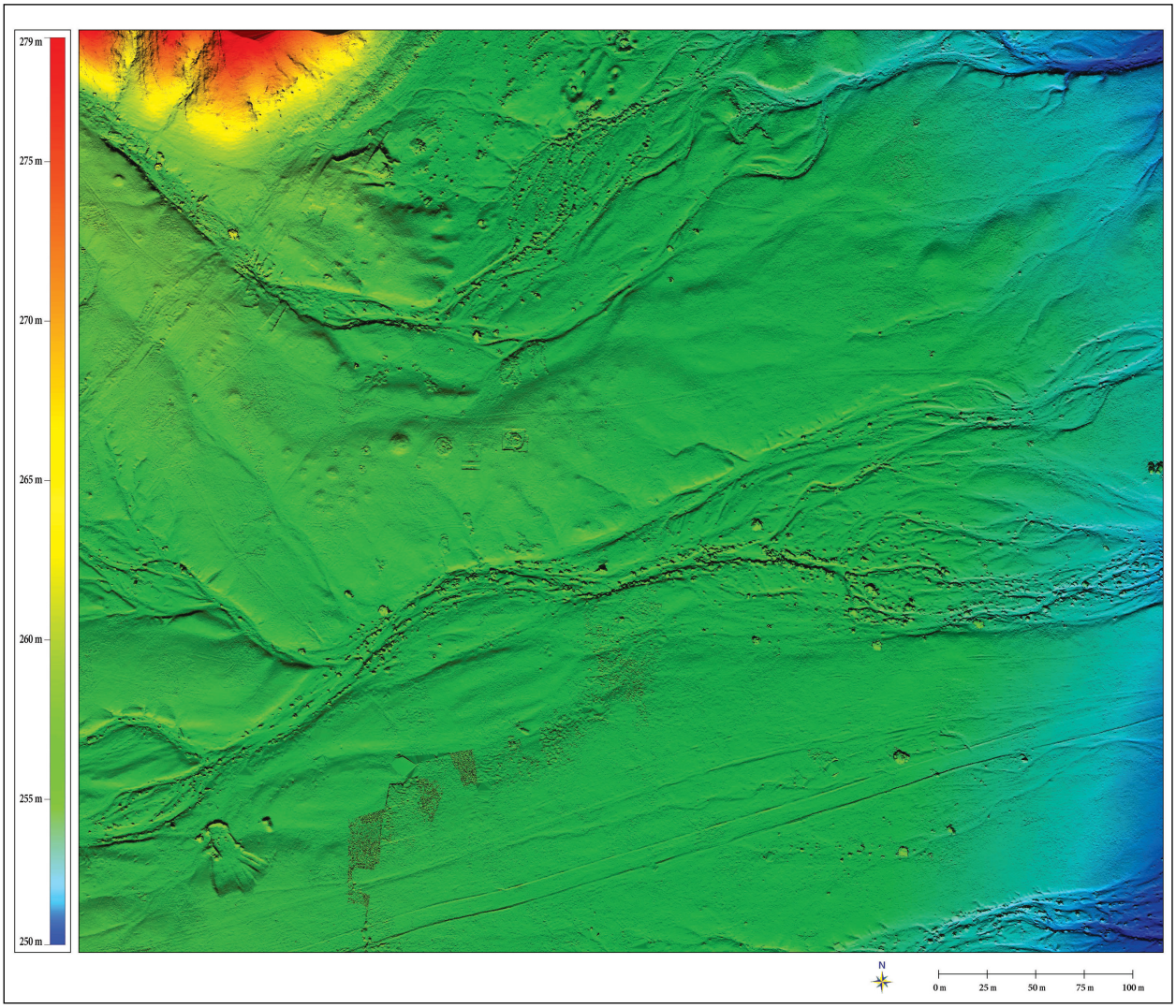

Figure 1.14. Digital Elevation Model of Adam South graveyard. Each small round anomaly indicates the presence of a grave (center left of the DEM) (image by CAPTAIR).

Aerial surveys and photography (kite and drone), 3D modelling

The first experiences of aerial view, photogrammetry and topography were made by the Archéorient team (Olivier Barge and Emmanuelle Regagnon), using a kite and differential GPS in several sites. Since the results were promising, we invited a team of the French company *CAPTAIR Imaging for Archaeology & Heritage* to participate in the 2015 campaign, since they used the most advanced technologies, including hexacopter and eBee drones, high resolution cameras, photogrammetric software and GIS (Figure 1.12), to produce: 1) aerial orthophotography and Digital Elevation Model of excavated sites at Adam South, Adam North, Mudhmar East and Jabal Al-Aluya (Figure 1.14), 2) Large Digital Elevation Model of landscape in Wadi Dishshah and Jabal Qarah, in order to evaluate a new method of aerial survey for geomorphology and archaeology, 3) Topography and architecture of Building 1 in Mudhmar East, and 4) orthophotography and 3D modelling of the Oasis, including the traditional village of Hosn Al-Hawashim and a tower of Falaj Al-Shārʿa.

Material studies

All artefacts and biofacts were inventoried into several databases (Adam excavations, Pottery Adam, Pottery Surveys, Human Bones, Animal Bones, Lithics). Typological studies were undertaken on metal objects (Guillaume Gernez), shell objects (Lyne al-Toki) and pottery (Bronze Age, Iron Age, Islamic Period) (Anne Benoist and Mathilde Jean), while complete studies (typology, technology, lithology) were made on lithic industries from excavations and surveys (Palaeolithic: Stéphanie Bonilauri and Amir Beshkani, and Neolithic: Marion Lemée). One preliminary study about chlorite manufacturing techniques is in preparation (Cécile Guitard), as well as stone beads production (Jonathan Mark Kenoyer and Dennys Frenez). We can also mention the ongoing metallurgical study (XRF and ICP-AES methods, still to be finished (Julie Goy). Human bones were classified (Yannick Prouin, Mathilde Cervel and Élodie Germain). The study of animal bones discovered in the Mudhmar East Building 2 is under process (Delphine Decruyenaere). Charcoal samples were sent to Beta Analytic, Miami. The final reports of these studies will be published – as well as the surveys and excavations – in the final publications of the research carried out by the French Archaeological Mission.