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Guillaume Charloux, Samer A Sahlah, Waleed Badaiwi, Mona Abady  
Mahmoud, Saud Almadhi, Paul Bernard, Louise Bigot, Claude Cosandey,  
Rémy Crassard, Othman Al-Shaya, et al.

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# **The Archaeological Project in al-Bad’ (Tabuk Province) - 2018 Season**

Guillaume Charloux, Samer Sahlah and Waleed Badaiwi,

With the contributions of Mona Abady Mahmoud, Saud Almadhi, Paul Bernard, Louise Bigot, Claude Cosandey, Rémy Crassard, Othman al-Shaya, Christian Darles, Stéphane Desruelles, Michèle Dinies, Kevin Guadagnini, Kelly Guetta, Ahmed ElNasseh, Bruno Gavazzi, Juliette Laroye, Abdullellah Al Timani, Romain Mensan, Metaab al-Mutairi and Laurence Naggiar

Following our first seasons of investigations in the al-Bad’ oasis (ancient Madyan) in November 2017,<sup>1</sup> our field operations of the second season (named 2018) started in October-November 2018 and were followed by a brief study in February-March 2019. The research activities were divided into three axes: the first axis concerned architectural, geophysical, prehistoric, hydrological, geomorphological and palaeobotany survey, while the second one consisted of field excavations on the site of al-Malha (Areas 1-3). The third, and more limited, the research focus was the examination and recording of archaeological material.

## **A. Palaeoenvironmental and archaeological surveys**

### **A1. Geomorphological examinations (S. Desruelles & W. Badaiwi)**

Our field mission in February 2019 aimed at producing a geomorphological map, which should indicate the relief forms, fluvial sedimentary formations, and understand

quaternary geomorphological dynamics. We also wanted to locate sedimentary archives likely to provide palaeoenvironmental data.

The geomorphological study focused on the analysis of the quaternary dynamics of the relief, in order to identify the modifications of the landscape, contemporary and after the occupation of the archaeological sites at al-Bad’. Special attention was paid to relief shapes and palaeoforms, as well as sedimentary deposits of fluvial origin (alluvial terraces, in particular), to identify possible changes in the layout of the hydrographic network. The study also aimed to identify sedimentary archives, which are vital for any palaeoenvironmental studies. It was based on the study of satellite images provided by the GoogleEarth and by ArcGisPro, as well as on our field survey. The limits of the geomorphological units and the areas of study likely to provide stratigraphic and palaeoenvironmental data (sections) were geolocated using a GPS in the WGS 1984 UTM zone 36 N. As a result, we created a geomorphological map integrating altimetric data (NASA SRTM Version 3.0 Global 1 arc second). The mapped elements were inserted into a georeferenced database, which is associated with a geographic information

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<sup>1</sup> Charloux G., Sahlah S., Badaiwi W. et al. à paraître, “The Archaeological Project in al-Bad’ (Tabuk Province) \_ 2018 Season”. Atlal.

system. The limits of the relief units mapped need to be verified or specified during the next prospecting campaign.

Based on observations in the field, we suggest the following chronology of the geomorphological evolution of the al-Bad' sector:

1. Formation of an alluvial fan by the Wadi 'Afâl at the outlet of the al-Bad' transverse valley (gorge), probably during the wet phases of the Pleistocene.

2. Concentration of wadi flows in two main channels. The flows were generated by intense precipitation allowing the transport of a coarse load over a long distance. The narrow (vertical) incision could then be favoured by an uprising in the region in connection with the tectonic dynamics. The dating (with, e.g., OSL of the sandy matrix?) of sediments at the base of one of our section (n°2) should help us understand the age of the first flows in this paleo-valley, in the future.

3. The Wadi 'Afâl flows are concentrated in a single active strip, south of the gorge, near the "Afâl West Fault", and leave through a valley cut further to the east. Work in a stratigraphic unit, which had witnessed fluvial flows, would allow us to date the last flows of this type. However, the remains of an old water channel at the bottom of the paleo-valley in the al-Adaf sector, which is less than 2000 years old, provide a chronological milestone.

4. During floods, the Wadi 'Afâl deposited fine alluvium, which seemed to correspond to a large part of the current sediment load (taking into account the composition of the currently active band). The successive deposits created two alluvial sedimentary units, whose chronology should be established. The incision of the wadi, further supported by a decline of the flows and probably by tectonic uplift, causes the formation of terraces. The sediments in the lower part of our section 1, which were slightly altered by cultivation, could make it possible to date the alluvial unit 1.

5. In the paleo-valley, the alluvial unit 1 is regularly flushed away by the flows which concentrate there. These are possibly supplied by the water collected in the north in a basin structured by the remains of the Miocene plateau, where the so-called 'Well of Moses' is located.

## **A2. Hydrological studies in al-Bad' (C. Cosandey, S. Desruelles & Abdul Elah Kalaf Al Timani)**

The hydrological study operates on several time scales, depending on the different sites studied. Two approaches have been adopted in the field in al-Bad' oasis:

1. The first approach concerned the current situation and was implemented using three types of practices:

- a. Acquisition of field data with the

localization of wells, the measurements of their depth and/or other information from farmers;

- b. Conversation with older people in the oasis about the situation they may have known before the introduction of current deep wells and drilling;
- c. Meeting with the authorities in charge of hydraulics on the one hand, and of agriculture on the other.

2. Reflect on the functioning of the old developments identified on the ground (qanats, reservoirs, wells and pipes), in relation to the availability of water (underground or surface).

Considering the data collected during our surveys, it appears that the current situation has nothing to do with natural function. The arrival of motor pumps quickly lowered the water table, so that locals have to go deeper and deeper to reach the water. It seems that concrete wells with a diameter of 3 m were systematically dug to a minimum depth of 20 m at the locations of the older traditional wells. This would explain why these old wells are nowhere to be found. Maybe except for one near a qanat manhole, which is now filled and whose depth is unfortunately unknown. The situation continued to deteriorate, and the need for water increased. It would be interesting to quantify this increase, using data on population growth, possibly on the evolution of consumption per capita and

water use for cultivated areas. For several years, the water supply has come from a deep aquifer, independent of the previous one, into which the boreholes descend between 80 and 120 m, according to the Ministry of Agriculture. There are currently four main boreholes and around 50 smaller ones. The oasis currently has about 12,000 inhabitants, and the average consumption is 100 litres per inhabitant per day. This takes into account agricultural withdrawals, which makes an annual balance of 500,000 m<sup>3</sup>. The level of the water table also continues to fall, while the conductivity increases, which seems to bother the local authorities.

Despite various interpretation difficulties, the results from the study of local wells suggest that several types of aquifers are currently being exploited:

- Phreatic aquifer, whose surface is approximately 10 m deep located in the downstream part of valley crossed by ephemeral streams coming from the plateau of the Ghawwas or Burqan formation. Moreover, during some parts of the year, these wells can be supplied by an underflow. The level of water in these wells would then depend essentially on the underflow from upstream; in other words, the water collected in small basins. This hypothesis could be confirmed by studying the chemical and mineralogical composition of the water and comparing it to the geochemical characteristics of the surrounding sedimentary formations. Besides, it may be relevant to look at the

volume of water collected in the small basins drained by these thalwegs. This volume most likely varies during the year, depending on precipitation. Wells drilled nearby, which are not exactly in the axis of the thalwegs, would not be supplied by this underflow.

- A deep aquifer, with the surface level at approximately 70 m to 100 m depth. This water, used for irrigation, is probably not that of the Lisan Formation aquifer, which is considered to be unusable. The nature of the landscape dotted by these boreholes could give us an idea of the aquifer below. If these holes go through the bedrock, they most likely draw from a deeper aquifer than that of the Lisan formations.

Our knowledge of current management, however, provides little additional information for understanding past management. To progress in this area, it seems necessary in the future:

- to acquire data on climate changes, especially on rainfall since the occupation of archaeological sites;
- to better identify archaeological structures, remains of qanats, the volume of reservoirs, etc.,
- to map the hydrographic paleo-network, in connection with the geomorphological study.

### **A3. (Palaeo) Ecology at al-Bad' : first surveys and samples for testing the potential of different archives (M. Dinies)**

In our approach to the history of the al-Bad' oasis, we include research issues concerning both palaeo- and present-day ecology. Information about the modern natural vegetation helps us to understand past subsistence possibilities. At the same time, natural oases, most favourable sites for human survival in the desert context, have been intensely managed by humans for thousands of years. Plant cultivation is one of these distinct environmental manipulations - the base of today's highly diverse, and well-adapted oasis agricultural system.

In a first field campaign, different strategies were followed to explore the potential of diverse archives for palaeo-ecological reconstructions:

#### **Recording the current ecology of the oasis through surveys.**

The present cultivation of the oasis was documented by recording the cultivated and managed plants, amongst others: notably Fijl – *Raphanus sativus*, Khass – *Lactuca sativa*, Fasuliya – *Phaseolus vulgaris*, Sidr – *Ziziphus spina-christi*, Zaytun – *Olea europaea*, Shair – *Hordeum vulgare*, Tahl – *Acacia tortilis*, Dum – *Hyphaene thebaica*, Citrus limon – Laymun banzahir, etc.

The documentation was complemented by interviews and explanations by several local farmers (information about the management – fertilization, weed management, etc.).

### **Reconstructing past oasis ecology through geomorphology and archaeobotany.**

To test the suitability of different archives for palaeo-ecological investigations, representative structures were sampled for archaeobotanical analyses. Considering this objective, we performed several operations:

- a. Two manual core drills: the first in a sabkha located 30 km south of al-Bad' and the second in a khabra, about 10 km south of al-Bad'. Mechanical core drillings are necessary for the sabkha to get longer sequences.
- b. Archaeobotanical and palynological samples, currently under study (exported to Berlin) were taken at the site from natural cuts (1. Malha East; 2. Wadi 'Afâl; 3. Paleo-valley in al-Adaf)
- c. Archaeobotanical samples were also collected during the survey of the Neolithic site of al-Asifir. The samples are under study.

Figure 3. Manual core drilling in a sabkha 30 km south of al-Bad' (BD2019a0098B, G. Charloux)

### **A4. Prehistoric survey (R. Crassard)**

A preliminary Prehistoric survey was conducted during this field season by Rémy Crassard. It included the area inside the oasis, as well as outside, within a diameter 15 km around al-Bad'. An initial appraisal showed a rather dense prehistoric activity in the region, previously unseen by other teams.<sup>2</sup>

Three Middle Paleolithic sites (BD1033, BD1034 and BD1035) have been uncovered this year thanks to the discovery of lithic assemblages.

Figure 4. Middle Paleolithic site BD1035 (BD2019a0160B, R. Crassard).

Additionally, we also found a previously unidentified site, which came as a surprise. It comprised of a large dam/retention wall, possibly associated with still preserved cairns.

Inside the oasis, we conducted the cleaning of a small area in the previously identified Neolithic site of al-Asifir. This process highlighted the great potential of the site. For

<sup>2</sup> In particular, Ingraham et al. 1981 Ingraham, M.; Johnson, T.; Rihani, B. et al. 1981. Preliminary Report on a Reconnaissance Survey of the Northwestern Province 1981 (with a note on a brief survey of the Northern Province). *Atlal* 5: 59–84 ; see recently Inglis, R. H.; Sinclair, A.; Alsharekh, A. et al. 2019. The Palaeolithic of the northern Red Sea — new investigations in Tabuk and Al-Jawf provinces, Saudi Arabia. *Proceedings of the Seminar for Arabian studies* 49: 167–186.

this reason, we sampled a small quantity of a charcoal layer, which was then floated by M. Dinies. We plan to dig a small test trench in this area next season.

### **A5. Architectural analysis of the modern village al-Malha (C. Darles, S. Sahlah & W. Badaiwi)**

The architectural and urban study of the abandoned village of al-Malha in al-Bad' started in November 2018 thanks to the high-precision aerial photographs, previously taken in 2017. An architectural study allowed a better interpretation/dating of this village, due its relationship with the ancient site underneath. This work was carried out as real archaeological research but applied to the ruins of a recent urban ensemble. However, the studies were only done on the visible remains, and no invasive archaeological trench was carried out.

The village itself is located on the western terraces of the Wadi 'Afâl and positioned east of the Nabataean-Byzantine site of al-Malha North, which it partially covers. Covering approx. 10 ha, it extends for approx. 320 m from north to south, and for 230 m from west to east. The small agricultural establishment is situated to the east, on the edge of the wadi. Some abandoned farmland is located between this village and the river.

The first part of the study consisted of identifying the urban 'islands' and the housing units that compose them. In parallel,

great care has been taken to study the identifiable architectural constructions such as shelters, stores, public hammams or, more generally, the hydraulic works related to the activity of the agglomeration, for example, the cisterns. After this work of description and acquisition of spatial data room by room, and a typological classification linked to the morphology of the agglomeration, the emphasis was put on the treatment of the 600 photos taken and their positioning on background maps. The creation of a database in Excel (for imports into File Maker Pro) made it possible to complete the architectural descriptions and GIS survey, complemented by oral investigations. In a second step, the different units were listed to establish a typology of buildings related to their function: housing, commercial, service, agricultural function.

As a result, thirteen urban 'islands' have been identified, some with only one unit. Others can be composed of five distinct units (I), but most of them are comprised of two or three. The standardization of these units, of their building material and mudbricks, as well as the planning with a main north-south street, testifies to a coherent urban project. The planning was clearly intentional and possibly done by a political authority in the 20th century.

Figure 7. Ruins in al-Malha village (BD2018e0515B).

## **A6. Geophysical prospection (B. Gavazzi, P. Bernard, M. M. al-Mutairi)**

The purpose of this first mission was to map the extent of archaeological remains at the different sites of al-Bad' oasis in order to estimate the needs and plan surveys for future campaigns on a larger scale. Thus far, we have defined three sites:

- Site A (al-Malha): The settlement site under excavation was subdivided into four zones for magnetic measurements: A1 in the south, A2 in the center, A3 in the north and A4 at the west end. The aim was to complete the excavations' picture and provide a high-level observation.
- Site B (al-Qala): The objective was to conduct an initial analysis of supposed human-made masonry structures on this elevated site with obvious signs of anthropogenic remains and lootings.
- Site C (Rudaydah): we here wanted to assess the extent of the necropolis in this badly known site.

In site A, the first results highlight architectural remains and their double alignment: north-west, and north-west/south-west, which seem to overlap. In zone B we can see the presence of large built structures. Zone C consists of a dense necropolis composed of many tombs cut into the gypsum terrace. Post-treatment studies, paired with the interpretation of

archaeological surveys, as well as a future measurement campaign, will make it possible to get an in-depth understanding of the prospected zones and to study the different sites more extensively.

Figure 9. Introduction to geophysical prospecting by M. al-Mutairi (BD2018a0201B).

## **A7. 3D digitization and digital archiving of Nabataean tombs at al-Bad' (L. Bigot, K. Guadagnini, W. Badaiwi)**

It seemed essential to keep a photogrammetric archive of the monumental tombs of al-Bad' in order to complete the heritage inventory of the oasis. This work should allow a detailed study of the decorated façades and will enable comparisons with other Nabatean sites, in particular Petra and Hegra.

The site of al-Bad' includes seven tombs with decorated façades and 33 monumental tombs. In 2018, photogrammetry of 19 tombs with façades was executed in the field. All the plans of the tombs, originally drawn by W. Badaiwi,<sup>3</sup> have been checked and completed to maintain complete documentation. A database dedicated to these monuments has also been created to keep a complete analytical and descriptive reading.

<sup>3</sup> Badaiwi, W. A. 2011, *al-Madāfin al-manḥūtah fī al-ṣakhr bi-Wāḥat al-Bid'* (Maghā'ir Shu'ayb): *dirāsah mi'mārīyah muqāranah. al-Riyād: al-Hay'ah al-'Āmmah lil-Siyāḥah wa-al-Āthār.*



## **B. Excavations at al-Malha**

Excavations at al-Malha in 2018 focused on two distinct areas: the northern part of the site (Areas 1 and 2) revealing large size stone constructions located on small tells and the southern terrace with a typical urban agglomerated network of houses.

### **B1. Area 1 (M. Ali Abady Mahmoud, R. Mensan, A.E. Kalaf al-Timani, O. Dakhel al-Shaya)**

Area 1 (58 x 38 m) is located at the north end of al-Malha not far from the metal fence. In 2017, we located here the remains of a monumental building (almost 60 m long and 40 m wide). It has a tell in the west and what looked like a ‘courtyard’ in the east. The excavations concentrated on the western part of the sector, bordering the tell and the courtyard, in order to connect these two architectural units. It further highlighted the relationship between the southern perimeter wall of the courtyard and the gypsum rampart (sic?). The perimeter wall is made of large granite blocks on a gypsum base, and the rampart lies in a north-south axis, which joins Area 2 to the south. This place was therefore particularly strategic.

Assisted by five workers, the area supervisor Mona Ali Abady Mahmoud started stripping a large area of several hundred square meters, revealing mudbrick walls that delimits small rooms and spaces. At the same time, a test trench was opened at the southern

flank of the tell. Unfortunately, we quickly reached several pits there, some of them containing human skeletons; we stopped our investigations and move our operations further east.

The results of our excavations were nevertheless positive, as we managed to trace the stone and brick walls over long distances, and were able to observe their extension in the center of the ‘courtyard’ to the east. Two alleys appeared north of Area 1, one bypassing the northern limit of the building, the second, perpendicular, appeared only during surface stripping and led north. This second axis is precisely located in the extension of a gate giving access to Area 1. This door leads to a corridor, which joins the southern limit of the building. The corridor is traversed in the center by a low wall with a door, perhaps a later addition. Three small accesses then lead the passer-by to space to the courtyard to the east. These accesses are bordered on each side by a wall, possibly dividing the internal space and creating adjoining rooms in the so-called “courtyard” area.

On the west side of the corridor, two doors give access to quadrangular rooms. However, our current understanding of their layout is still partial. At least two quadrangular spaces have been observed. Access to the outside of the building, that is, to the large space further south, was also discovered further west. The excavation will have to investigate this area in the years to come. The floors are covered with ashy layers, which contain very little

of any material nor ceramic. This stands in sharp contrast to the other areas. Many pits, sometimes spanning large areas, disturbed the upper level. However, the order and monumentality of the walls and rooms seem to confirm a public purpose for this major architectural building.

A test trench opened in the east-west axis, both in a room and in the corridor, denuded an initial phase of the structure. However, we did not reach the substrate of the sector. Five construction phases appeared at this stage of the study. The upper phase, which has just been described, consists of brick walls (a yellowish-brown, often powdery) and gypsum walls of fairly good quality (irregular blocks, but well grouted). Nevertheless, they cannot be compared with the walls of the oldest phase. These were reached at almost 2 m below the surface, and are made of beautiful large blocks cut at an angle reminiscent of Roman cutting techniques (phase 1).

Based on these initial observations, it seemed that this area is key for the interpretation of al-Bad' since it could be linked to the fragmentary Latin inscription found by Parr on the other side of the asphalt road. The C14 dating of the ash layers should quickly fix a first chronological assessment of the sector. At the same time, we should not forget that four fragments of a Nabatean inscription coming from built tombs were discovered on the surface of Area 1 in 2018.

## **B2. Area 2 (A. El Nasseh, K. Guetta, W.A. Badaiwi)**

Area 2 (40 x 50 m) is located on a small tell (2) in the center of the northern part of al-Malha. From what we identified on high-resolution aerial images: several gypsum walls on the surface seemed to draw the plan of a large building here (perhaps for public use).

After a month of excavation, the image obtained was considerably modified. First of all, it seems that we were dealing with at least two connected neighbour buildings (A and B), which extended north and perhaps also further south. This is what also showed the excavation of a small wall and a tannur in a sounding 2c south of the southern limit of building A. This small sounding and two others (2b and 2d), located on either side of the central building A, reached the geological substratum, and have shown that the gypsum walls were constructed to reach considerable heights.

Building A seems approximately square, about 25 m wide, and made up of around twenty rooms of various sizes. Their cleaning almost systematically uncovered the presence of ashy layers, and sometimes even a hearth and tannur on the surface. Against the western limit of building A, as in its eastern part, lie six parallel rooms, which are separated by gypsum walls. These rooms seem approximately aligned along the same axes. However, their extension towards the central part of the building is not equal, which explains why the median corridor is

not really a corridor, but rather a succession of rooms constituting, in fact, a path to the most 'protected' area of the building to the north. At this stage, the circulation within the building seems relatively clear. There is an entrance on the western side, where the wall has a slight offset. The passage was then made continuously from one room to another, which seems to confirm the coherence of the housing unit.

At the highest location, we have logically opened sounding 2a. It quickly became apparent that it was subdivided into two areas separated by a mudbrick brick wall on a stone foundation. This wall collapsed on both sides onto occupational levels, as documented by the thick layer of debris. Domestic features were found in abundance and remained intact in places, in particular, large and finely made ceramic vessels.

The already excavated material enables us to place the building in the Byzantine period (4th-6th century), which confirms the long occupation of the site. However, we did not observe any preceding phase within this building for the moment. Therefore, a more comprehensive review will follow next year to deepen the results of the first trenches.

The other research question concerns the function of the building. However, only extensive clearance of the area would shed more light on this matter. The nature of the features and the type of structures excavated suggest a domestic function,

despite the quality and monumentality of the construction. But it is not clear at this stage.

Construction B, located to the north of Building A, poses several restitution difficulties. Its homogeneity and its very coherence remain difficult to confirm, and, at this stage, we would be tempted to identify two distinct architectural entities.

### **B3. Area 3 (L. Naggiar L. Bigot, S.M. Almadhi, M. M. al-Mutairi)**

The site is located on a large underlying terrace, probably of natural origin, which supports the modern installations, and which is located between two temporary flow zones: a modest one to the west, beyond our excavations, and one to Wadi 'Afal, which borders the excavated area to the east.

Our strategy consisted of digging an area as large as possible (2.400 m<sup>2</sup>) to uncover what appeared to be a residential area. At least according to surveys carried out the previous year. The alignments seen on the surface appeared to be less extensive and organized spaces than those at sites A and B. A test trench was also planned to determine the stratigraphic sequence of this part of the site.

The clearings uncovered a densely populated residential area. It also revealed its density and complexity: 77 walls, 15 structures and 35 layers in Area 3 alone. The existence of several construction phases is obvious but remains to be determined in detail.

The general orientation of the walls is north-south, with a slight declination towards the east - therefrom north/northeast - south/south-west. This organization is more or less in sync with the direction of the flows of the main wadi. The construction method is mostly mixed with gypsum blocks and/or mudbrick walls. The width of walls can vary, which suggests distinct stages of construction. It should be noted that in general, the gypsum block walls seem to be coarser, while the mudbrick walls are better fitted, some even laid out as stretchers and headers. Some structures of disparate shape and construction, the nature of which remains undetermined, are constructed of stone or raw brick. Layers found immediately under the surface indicate a dense domestic occupation. The overview at the end of the campaign therefore highlights a dense settlement of the site.

As we have not studied the finds and features yet, a detailed chronology of the remains still needs to be established. The remarkable objects collected, however, indicate the occupation of Area 3 probably during Classical and Late antiquity.

### **Sorting, recording and drawing of archaeological features (S. Sahlah, G. Charloux, J. Laroye & all members)**

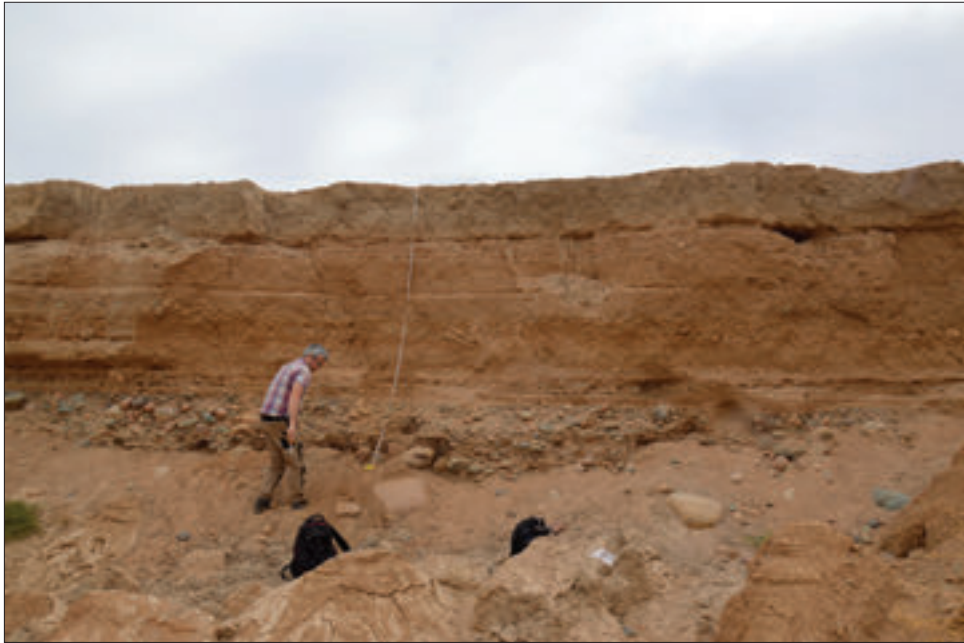
The archaeological features and finds collected at al-Malha have been recorded in full in the mission's relational database,

except for incomplete ceramics, which will be the subject of a study from March 2020. 45 large bags of ceramic sherds were sorted thus far, and part of the surface non-diagnostic material was deposited into a dedicated pit near the Visitor Center, due to a lack of space. Ten complete vessels recovered from Area 2 were drawn by Juliette Laroye (drawer) in February 2019. Some of which were brought by Abdul Elaah Kalaf Al Timani to the regional museum in Tabuk.

Moreover, we have recorded and collected 135 small objects, including 27 coins in 2018. Each of these were geolocated on the site's GIS map.

### **Acknowledgments**

It is a pleasure for us to thank all the institutions and people who have made this 2018 season, and first excavation campaign, in al-Bad' so successful. We would like to address in particular our sincerest thanks to Prince Sultân Bin Sâlmân Bin Abdulaziz al-Saûd, President of the Saudi Commission for Tourism and National Heritage who supports our research activities in Saudi Arabia and authorized our new 2018 field season in al-Bad'. We would also like to extend our many thanks to the directors of the SCTH, Jamal Omar and Dr. Abdullah al-Zahrani for their undefectible help and assistance.



أ. دراسة مقطع في واحة البدع.

a. Studied geomorphological section (n<sup>o</sup>2) in the oasis (BD2019a0190B, M. Dinies).



ب. تسجيل القياسات في واحة البدع عن عمق الآبار وكمية المياه.

b. Work and measurements in a garden in the oasis of al-Bad' : S. Dinies, C. Cosandey accompanied by a local farmer (BD2019a0114B, G. Charloux).



أ. رفع عينة من طبقة السبخة جنوباً من البدع.  
a. Manual core drilling in a sabkha 30 km south of al-Bad' (BD2019a0098B, G. Charloux).



ب. موقع من العصر الحجري القديم الأوسط.  
b. Middle Paleolithic site BD1035 (BD2019a0160B, R. Crassard).



أ. منشأة مما قبل التاريخ شيدت على هيئة صف مستقيم  
a. Megalithic rectilinear and prehistoric structure identified during prospection (BD2019a171B).

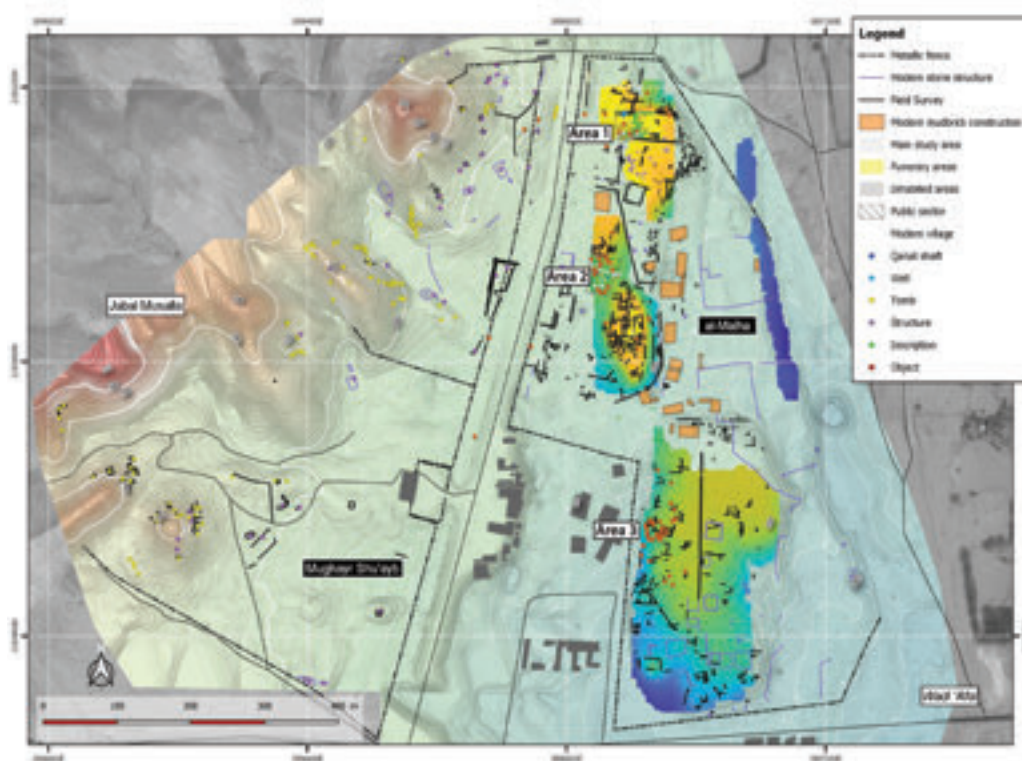


ب. القرية الحديثة في المالحة.  
b. Modern village standing above the site of al-Malha (BD2018e0623B).



أ. أطلال من قرية المالحة.

a. Ruins in al-Malha village (BD2018e0515B).



ب. مسح جيوفيزيائي للقطاع الأوسط لموقع المالحة عام ٢٠١٨م.

b. The extent of the geophysical survey in 2018 (central sector only) (BDAP).





أ. صور لواجهة قبر في البدع.

a. Orthophotography of the T464 façade tomb at al-Bad' (L. Bigot & K. Guadagnini, BD2018a0354).



ب. المسح الجيوفيزيائي

b. Introduction to geophysical prospecting by M. al-Mutairi (BD2018a0201B).



أ. عملية رسم صورة ثلاثية الأبعاد.  
a. 3D image by Kévin Gaudagnini and Louise Bigot (BD2018a0051B).



ب. مبنى كبير في المنطقة ١ في أثناء التنقيب.  
b. Large building at area 1 during excavation (BD2018b0286B).



أ. الكشف عن جدار من حجارة كبيرة في مربع الاختبار بمنطقة ١.  
a. A wall with large blocks in the test trench opened at area 1 (BD2018b0255B).



ب. المنطقة ٢ بعد تنظيفها وتحديد النواحي المستهدفة بالمسح في المبنى.  
b. Area 2, after a general removal and the opening of target surveys within the building (BD2018c0278B).



أ. الكشف عن جرة صحيحة في منطقة ٢.  
a. A complete jar being cleared in area 2 (BD2018c0287B).



ب. المنطقة ٣ وتطهير شامل للقطاع.  
b. Area 3. Extensive clearing of the sector (BD2018d0408B).



أ. جرة سليمة اكتشفت في المنطقة ٢.  
a. Complete jug O.20086-1 discovered in Area 2.