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**Preliminary report of the First season of the  
Saudi-French mission in al-Yamāma. Al-Kharj area (20  
September-21 October 2011)**

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**PRELIMINARY REPORT**  
**FIRST CAMPAIGN OF THE SAUDI-FRENCH**  
**MISSION IN AL-YAMĀMA**

**- AL-KHARJ AREA -**

**20 SEPTEMBER-21 OCTOBER 2011**







“I trust that I have said enough to show that there is much in Southern Najd to encourage further investigation, and to show that in Kharj and the Aflaj, in distant Jafura, in Wubar, and possibly other buried cities of the southern sands, there lies open a fruitful field for the archaeologist of the future.”

Philby, 1920, *Geographical Journal*, p. 185.





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## Preamble

The first campaign of the Saudi-French mission in al-Yamāma was carried out from September 20 to October 21, 2011, under the supervision of Prof. ‘Abd al-‘Azīz al-Ghazzī (King Saud University, Riyadh) and Dr Jérémie Schiettecatte (CNRS, Ivry sur Seine).

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## Team

### *Saudi Part*

- Prof. ‘Abd al-‘AZĪZ AL-GHAZZĪ (King Saud University, Riyadh) – Archaeologist, Director of the Saudi Part
- ‘Abd al-‘AZĪZ AL-HAMAD (Supreme Commission for Tourism and Antiquities, Riyadh) – archaeologist
- Fahad AL-HAMDĀN (Supreme Commission for Tourism and Antiquities, Kharj) – head of the SCTA office at Kharj
- Jīza AL-HARBĪ (Supreme Commission for Tourism and Antiquities, Riyadh) – surveyor
- Prof. Salem TAYRĀN (King Saud University, Riyadh) – epigrapher

### *French Part*

- Dr Jérémie SCHIETTECATTE (CNRS, Ivry sur Seine) – Archaeologist, Director of the French Part
- Dr Mounir ARBACH (CNRS, Ivry sur Seine) – Epigrapher
- Dr Guillaume CHARLOUX (CNRS, Ivry sur Seine) – Archaeologist
- Dr Rémy CRASSARD (CNRS, Lyons) – Prehistorian archaeologist
- Guillaume FORTIN (Université Paris IV Paris-Sorbonne, Master Student) – Geomorphologist
- Yamandu H. HILBERT (University of Birmingham, PhD student) – Prehistorian archaeologist
- Rozan AL-KHATIB (Université de Strasbourg, doctorate student) – Geophysicist
- Dr Hervé MONCHOT (Université Paris-Sorbonne, postdoctoral fellow Labex ResMed) – Archaeozoologist
- Dr Michel MOUTON (CNRS, Nanterre) – Archaeologist
- Laetitia MUNDUTEGUY (Université Paris I Panthéon-Sorbonne, Master Student) – Archaeologist & drawer
- Prof. Marc MUNSCHY (Université de Strasbourg) – Geophysicist
- Mathieu NIVELEAU – Surveyor
- Prof. Christian ROBIN (CNRS, Ivry sur Seine – Académie des Inscriptions et Belles-Lettres) – Epigrapher and historian
- Dr Pierre SIMEON (CNRS, Ivry sur Seine, postdoctoral fellow)

## Support

The Saudi-French Mission benefited from the financial and technical support from:

- Supreme Commission for Tourism and Antiquities, Riyadh
- King Saud University, Riyadh
- French Ministry of Foreign Affairs, Paris
- French Embassy, Riyadh
- Centre National de la Recherche Scientifique, Paris
- UMR 8167 « Orient et Méditerranée », Ivry sur Seine
- Agence Nationale pour la Recherche, Paris
- Université Paris IV Paris-Sorbonne
- Labex ResMed (Religion et Société en Méditerranée)
- École et Observatoire des Sciences de la Terre, Institut de Physique du Globe de Strasbourg.

## Acknowledgment

We would like to thank these institutions most warmly for their support. We are also most grateful to people who put their trust in our work and did their best to make fieldwork possible and easier in Riyadh and Paris: HRH Prince Sultan bin Salman bin Abdul Aziz (President of Supreme Commission for Tourism and Antiquities [SCTA] and Chairman of the Board of Directors of SCTA), Prof. Ali al-Ghabban (Vice-President of SCTA for Antiquities and Museums, Riyadh), Jamal Omar (Head of the Research and Excavation Centre, SCTA, Riyadh), Pierre Vincent (attaché de coopération, French Embassy in Riyadh), Prof. Jean-Claude Cheynet (Univ. Paris IV), Prof. Olivier Delouis (Univ. Paris IV), Marie-Véronique Diamant (CNRS, Ivry), Magali Picone (Univ. Paris IV).



## Geographic and Historical Setting

Al-Kharj area is one of the major oases of the Najd, in the very heart of the Kingdom of Saudi Arabia (Fig. 1). This oasis owes its fertility to its specific geographic context: it is settled at the confluence of several wādīs and benefits from one of the largest drainage basin of Arabia. Moreover, artesian wells provided water down to a recent time. They are now empty, due to active pumping of groundwater.

These environmental conditions made this area one of the most attractive region of central Arabia for settled communities.

As it is one of the rare fertile area in Central Arabia, the region of al-Kharj appears as an obvious stopping place and as a main crossroad on the commercial roads that linked Yemen and Ḥijāz to the Gulf and Mesopotamia.



Figure 1 : Location of al-Kharj area in Saudi Arabia

### Geographic and physiographic settings<sup>1</sup> (Fig. 2)

Al-Kharj area is bounded by latitude 24° and 24,4° N. and by longitude 46,6° and 48° E. and lies in the Eastern part of the Najd province in East-Central Saudi Arabia. Al-Kharj is one of the main city in the neighbourhood of al-Riyadh, 70 km to the SW of the capital city.

A dense urbanisation, an important road network and agricultural areas intensively cultivated thanks to the pumping characterize a large part of the Riyadh-Kharj region.

Al-Kharj region is characterized by a succession of parallel northwest striking cuervas with south-west facing scarps. The main ones are:

- Jabal Tuwayq, bordering al-Kharj area to the west. It is an escarpment crossing Central Arabia from North to South in a crescent shape.
- Jabal al-Jubayl, that bounds the city of Riyadh to the East, and further South, beyond the graben of al-Kharj, Jabal al-Qusaya.

These cuervas are interrupted by the wide central Arabian graben system (the al-Kharj cluse). The drainage network reflects the cuesta system and the grabens:

- Between Jabal Tuwayq and Jabal al-Jubayl, in the Maragha depression, the wādī Ḥanīfa flows southward, from the

<sup>1</sup> Most of the data are taken from D. Vaslet *et al.*, 1991, *Explanatory Notes to the Geologic Map of the ar-Riyad Quadrangle, Sheet 241, Kingdom of Saudi Arabia*, Jidda.



modern city of ar-Riyadh, down to al-Kharj;

- Between Jabal Tuwayq and Jabal al-Qusaya, in the Dilam depression, the wādīs ar-Raghīb and Abā adh-Dharr flows northward, down to al-Kharj;

- Crossing the Jabal Tuwayq from West to East, through the Nisāḥ graben and al-Kharj cluse, the wādī Nisāḥ flows eastward.

These three wādīs converge in the al-Kharj cluse and then into the Mughāra graben, further east, to form all together the wādī as-Sahbā'.

Karst morphologies abound in this area, exemplified by the large swallow holes of 'Ayn al-Ḍila' and al-Khafs.

Both the drainage basin and these swallow holes providing local population with fresh water have been decisive in the sedentary occupation of this area.

### STRUCTURAL SKETCH MAP

Scale 1:1,000,000

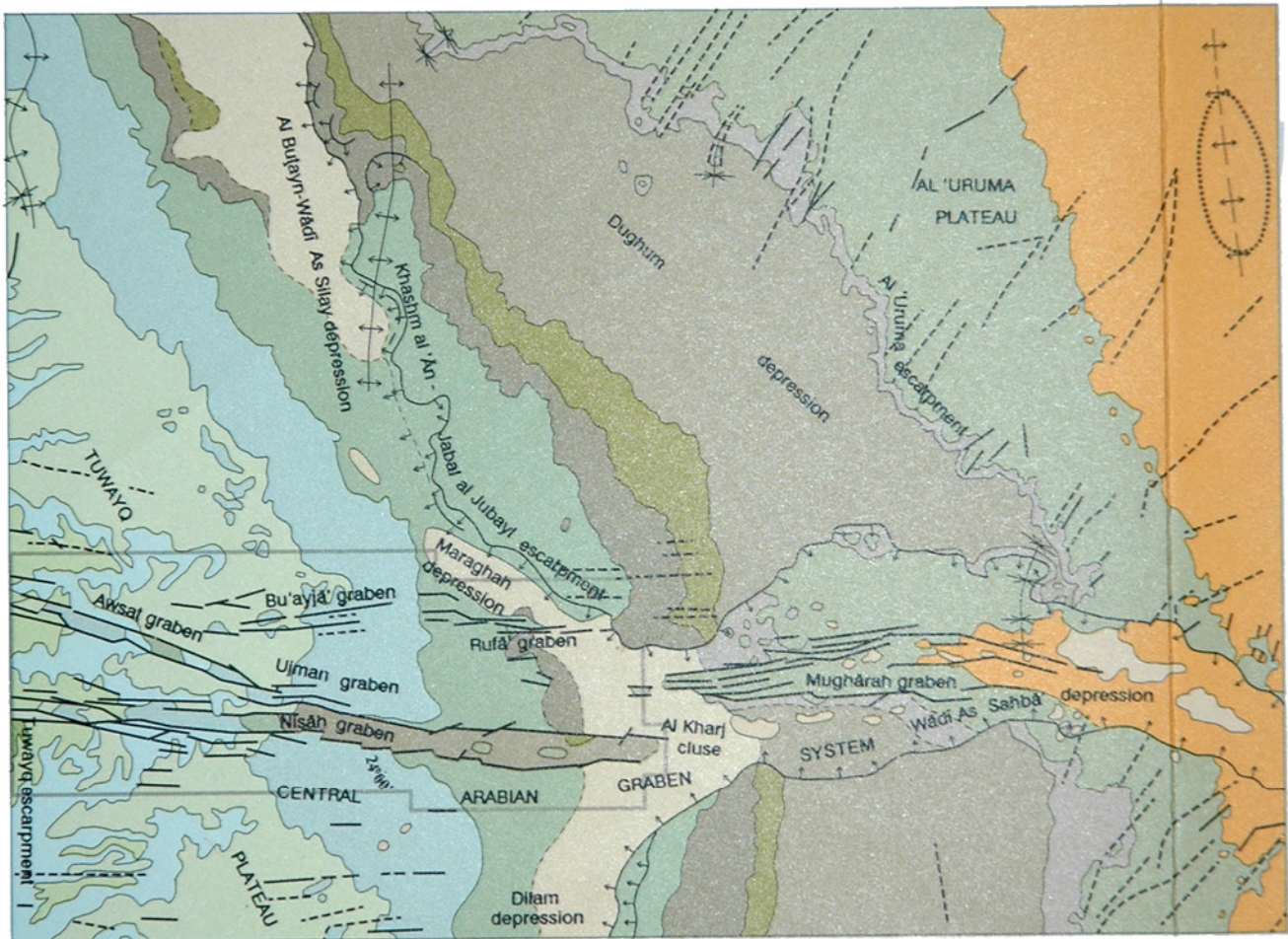


Figure 2: Structural Sketch map of al-Kharj area

### Historical setting<sup>2</sup>

The favourable environment make this oasis one of the main actor of the history of Arabian Peninsula. Many preislamic and Islamic sources mention the region and its main populated places (cf. toponymy study below): Yamāma, Jaww, Kharj.

According to the Arabic tradition, al-Yamāma was the centre of the kingdom of Tasim and Jadis. This tradition also mentions that this kingdom disappeared in the early 5th century, when the ḥimyarite king Hasan Tubba (Hassān Yuha'min, son of Abīkarib As'ad) took control of the area and entrusted it to the tribe of Kinda. This event could be echoed by the South-Arabic inscription Ry 509 found in wādī Ma'sal (Najd).

It was probably at that time that the Banū Hanifa settled in this region. This tribe went down in history with the emergence within it of the so-called False-Prophet Musaylima. Contemporary with the Prophet Muḥammad, Musaylima federated the tribes from the Najd. Standing in the way of the first Muslim community, they were finally defeated in the battle of 'Aqraba (633). The area fell into the hands of al-Madina administration.

<sup>2</sup> Most of the data are taken from A. al-Askar, 2002.

During the reign of the first Umayyad caliph, Mu'awiya (661-680), thousands of families were brought from Syria to al-Yamāma so as to maintain farming areas.

The area progressively became depopulated at the beginning of the Abbasid period (750-869) so that when the fleeing army of the Banū al-Ukhaydir entered al-Yamāma, they found a region deprived of governor. This tribe controlled the region during two centuries. From the 12th to the 15th century AD, the area is seldom mentioned and it is likely that it was depopulated.



## Present issues for a study of al-Kharj area

By its geographic, historical and archaeological context, this oasis offers many opportunities for the study of the peopling and of the settlement process in central Arabia, from Prehistory down to the mediaeval period.

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### Prehistory

A debate exists now about trying to understand from where comes the Arabian Neolithic: Levantine influence or local developments from autochthonous populations? Recent palaeoenvironmental and palaeoclimatic studies revealed a possible influence of the wet phases in the development of a production economy. These studies, combined with the lithics analysis, help to defining better and better the Neolithic of Arabia.

Beyond this period, understanding the dispersals of the first Anatomically Modern Humans (AMH) in Arabia during Paleolithic is one of the main concern for the current Prehistoric researches in the Peninsula.

### Bronze Age

Several necropolises showing hundreds of dry-stone turet graves or tumuli have been identified in this area. The main issues are the date of their building, and the span of time of their use. In Yemen, these tombs delivered artefacts from the 3rd and 1st millennium BC. Is this indicative of long lasting funerary practices, or of the reuse of these tombs far later on?

Furthermore, in western and southern Arabia, these tombs were collective and are generally seen as nomad tombs; on the opposite, on the shore of the Persian Gulf (Bahrayn, Dharan area), they contained only a single body and were burials for settled people. Al-Kharj area is the buffer area between these two cultural spheres; the study of the burial practices in this area could be indicative of the very nature of people (origin, way of living).

### Iron Age and turn of the Christian era

One of our main concern is to ascribe a period of time to the sedentarization process in al-Kharj area. Has this process begun right from the 3rd millennium BC, as it can be observed in Oman peninsula (Hafit / Umm an-Nar periods) or in Bahrayn area (Dilmun period)? Has it begun later on, at the end of the 2nd millennium BC, on the Yemeni lowlands model? Or are we to observe in al-Kharj area an alternate and specific model? Is the sedentarization process linked to the domestication of palm-tree, as in Oman Peninsula? Is this model varying according to other criteria such as caravan trade?

A second issue is the very nature of the goods exchanged in Arabian Peninsula. At the crossroads of the caravan tracks between frankincense-bearing kingdoms (in Yemen), Oman Peninsula, the Gulf region and Mesopotamia, this area should throw a new light on these commercial activities.

A third issue concerns the 3rd-2nd centuries BC, a transitional period in Arabian Peninsula. New populations appeared in historical sources and settled in Oman peninsula (e.g. Mleiha), in South Arabia (penetration of Arab groups in the Jawf valley), in North-West Arabia (Nabateans). They all shared common features, particularly in the funerary practices. And yet, the origin of these groups is still unknown. The study of a site in central Arabia could bring new evidence to the file.

### Late preislamic period and the advent of Islam

Issues regarding the Late Antiquity and the Islamic period are also numerous. A sharp decline of the settlement pattern can be observed in South Arabia, West Arabia and North Arabia from the 4th cent. onwards and accelerated during the 6th century. Is this process, partly linked to the evolution of the environmental context, to be seen in Central Arabia? Did the Islam spread thanks to settlement vacuum? Was the Yamāma region able to compete with the new power of Medina? Finally, the soundings already done on the site of al-Yamāma (Ghazzi, 2010) indicate the abandonment of most of the site at the end of the 12th century. This makes one wonder about the reasons leading to such a situation.



## Historiography of the exploration of al-Kharj area

1917-18 – Travel of Philby in the Najd in 1917-18 ; two detailed accounts have been published:

Philby H. St J. B., 1919. *Southern Nejd. Journey to Kharj, Aflaj, Sulaiyyil and Wādī Dawasir in 1918*, Le Caire, The Arab Bureau.

Philby H. St J. B., 1920. “Southern Najd”, *The Geographical Journal*, vol. 55 no. 3 (Mar. 1920), p. 161-185.

1940's – Stay of Gerald de Gaury in al-Kharj area and description of a necropolis

De Gaury, G., 1945. “A Burial Ground in Al-Kharj”, *The Geographical Journal*, vol. 106 no. 3/4 (Sep. - Oct. 1945), p. 152-153.

1948 – Travel of Philby in February 1948 in the Aflaj and wādī Dawasir areas:

Philby H. St J. B., 1949. “Two notes from Central Arabia”, *The Geographical Journal*, vol. 113 (Jan.-Jun. 1949), p. 86-93.

1978 – Comprehensive Survey carried out by a Saudi-American team for the Department of Archaeology of the kingdom of Saudi Arabia. 16 sites were identified and few soundings realized on a preislamic site near ‘Ayn al-Ḍila‘ (today destroyed) and in the necropolis nearby:

Zarins J., Ibrahim M., Potts D.T., Edens Ch., 1979. « Saudi Arabian archaeological Reconnaissance 1978. The preliminary Report on the third phase of the Comprehensive Archaeological Survey Program - The Central Province », *Atlat* 3, p. 9-42.

1988 – Sounding on the site of Ḥazm ‘Aqīla (today destroyed):

Al-Ghazzi A., 1996. “A preliminary report of an excavation at Hazem Agila in al-Kharj oasis / central region of Saudi Arabia”, *Atlat* 14, p. 43-51, pl. 18-23.

Al-Ghazzi, A., 2009. *Awān fuḥārīyya min mawqa‘ Ḥazm ‘Aqīla (muḥāfaḍat al-Ḥarġ / Manṭaqat al-Riyād)* [Céramiques du site de Ḥazm ‘Aqīla (gouvernorat de Kharj / Province de Riyadh)], Riyadh, Dārat al-malik ‘Abd al-‘Azīz.

2004-2005 – Excavation of several tombs in the necropolis of ‘Ayn Farzān supervised by ‘Abd al-Aziz al-Ghazzi (King Saud University):

A. al-Ghazzi, 2011. *Mašrū‘ masaḥ w-tawfīq al-Manšāt al-ḥajariyya fī maḥīṭ ‘Aynī Farzān. Al-mujāllad al-awal. Dirāsāt maydāniyya muqārna li-l-muqābarā al-rakāmiyyat al-ḥajariyya*, Riyadh, Dārat al-malik ‘Abd al-‘Azīz (A.H. 1432-2011 AD) [Project of study and research on stone structures in ‘Aynī Farzān area. Vol. 1. Comparative study of dry-stone funerary structures].

2004-2005 – Study of the qanat at ‘Ayn Farzān supervised by ‘Abd al-Aziz al-Ghazzi (King Saud University):

A. al-Ghazzi, 2011. *Mašrū‘ masaḥ w-tawfīq al-Manšāt al-ḥajariyya fī maḥīṭ ‘Aynī Farzān. Al-mujāllad al-tānī. Qanāt al-rī fī Farzān “‘Aynī Farzān” wa-fuḥār-ha (Dirāsāt maydāniyya tawfīqiyya aṭāriyya muqārna)*, Riyadh, Dārat al-malik ‘Abd al-‘Azīz (A.H. 1432-2011 AD) [Project of study and research on stone structures in ‘Aynī Farzān area. Vol. 2. Irrigation qanāt at Farzān “‘Aynī Farzān” and its pottery (Documentary, archaeological and comparative studies)].

## Program, Schedule

The first campaign of archaeological research in the oasis of al-Kharj took place from 20th September to 21st October. The aim of this preliminary campaign was at first to focus on surface studies so as to start an archaeological map of the oasis. It was completed by archaeological soundings in the site of al-Yamāma to precise the time span of occupation of the area. In the frame of this archaeological mission, specialists of several domains collaborated.

### *Prehistorical survey of the oasis and its neighborhood*

From 1st October to 20th October, two prehistorians [R. Crassard; Y. Hilbert] and an archaeologist (A. al-Hamad) conducted a survey of the Kharj oasis and the surrounding area to identify Paleolithic and Neolithic sites.

### *Historical and geomorphological survey of the oasis*

From 24th September to 20th October, archaeologists [G. Charloux, A. al-Ghazzī, M. Mouton, J. Schiettecatte, p. Simeon], an epigrapher [Ch. Robin] and a geomorphologist [G. Fortin] registered already known, or newly discovered archaeological sites in Kharj area. The aim was to identify in an exhaustive way pre-Islamic and Islamic traces of occupation. The work of the geomorphologist will be the realization of the geomorphological map of the area (geological, hydrographical, pedological), so as to better understand how environment evolved through the time and how it provided the water needed for agriculture.

### *Toponymic and historical study of the oasis*

From 1st to 16th October, two epigraphers and historians [M. Arbach, Ch. Robin] initiated a study of the present place names attested in the area in order to compare them and identify them with those mentioned in ancient sources (pre-Islamic inscriptions and early Islamic sources). It shall lead to the understanding of the toponymic and tribal history of this area on the eve of Islam and during the early centuries of the Islamic era.

### *Archaeological exploration of the site of al-Yamāma*

#### **Topographic and geomagnetic survey**

The main site of the oasis, al-Yamāma, received most of our attention. The first aim of this first campaign was to realize a map of the site and of its remains, be that those visible on surface through the use of traditional topographic methods [J. al-Harbī & M. Niveleau] or by practicing a geophysical survey of the site to identify underground remains concentration [R. al-Khatib & M. Munschy]. This has been conducted from 25th September to 16th October.

#### **Archaeological soundings**

To identify the very time-span of occupation of the site and the different phases of this occupation, two soundings have been opened in the site of al-Yamāma [G. Charloux, A. al-Ghazzī, A. al-Hamad, H. Monchot, L. Munduteguy & J. Schiettecatte], from 25th September to 20th October. The aim was also to draw up a typology of ceramics for each period of occupation [M. Mouton & p. Simeon], and to identify the presence of imports in the archaeological artifacts, enlightening exchanges throughout Arabian Peninsula during pre-Islamic and Islamic periods.

The archaeological approach has been completed by an archaeozoological study [H. Monchot], from 1st to 20th October. Moreover, a drawer specialized in archaeology [L. Munduteguy] drew the lithic material coming from the prehistoric survey as well as ceramic and artifacts coming from the soundings in al-Yamāma.

All these steps aimed at providing a first overview of the evolution of the occupation of the region from the Palaeolithic to the Islamic era, to map the remains in the oasis, to make a plan of al-Yamāma site, to identify the different phases of occupation of al-Yamāma and to begin the study of the ceramic and artefacts that have been produced or exchanged in the area through the time.

## Registration system

A homogeneous registering system has been set up to meet the requirements of both the survey of al-Kharj area and the excavation of the site known as al-Yamāma. It has been done by Dr J. Schiettecatte and Dr G. Charloux.

It is constituted of several related databases designed with the software *File Maker Pro 10*:

- Database of the archaeological sites of al-Kharj area (Fig. 3);
- Database of the photographs taken during survey and excavation (Fig. 4);
- Database of stratigraphic units (Fig. 5);
- Database of archaeological structure (Fig. 6);



- Database of archaeological artefacts (Fig. 7);
- Database of pottery (Fig. 8);
- Database of samples (bones, charcoal, slags, etc.) (Fig. 9).

Figure 3: Database of the archaeological sites

Figure 4: Database of photographs



YAMAMA - UF			
Number	004	Area	N6
		year	2011
under UF	001 - 002	interpretation	AEOLIAN DEPOSIT DESTRUCTION LAYER COLLAPSED WALLS
equal UF	005		
above UF	006 - 009		
Contact with structure	W 002 - W 003 - W 006 - P 007 - Po 008 - Po 009 - P 010 - P 012 - R 013	upper altitude	429,25
		lower altitude	427,83
Nature of the sediment	Above W 002, north to it and south to it : fallen mudbricks covered to the north by aeolian deposit		
Inclusions	Mudbricks (complete or fragmentary); pebbles; few bones; few sherds		
description	<p>In the SE quarter of sounding 1, removal of aeolian sand accumulated on W 002. Under this deposit, unearthing to the South of W 002, of the fallen parts of this wall to the north and to the west.</p> <p>The fallen mudbricks are in slope, toward north. At the foot of this slope, aeolian sand deposit have been hardened by running water and then cracked after having dried.</p> <p>W 002 and W 003 unearthed. Holes have been dug into W 002 (either postholes or pit) : P 007, Po 008, Po 009, P 010 and P 012.</p>		

Figure 5: Database of stratigraphic units

YAMAMA - STRUCTURES			
Number	001	Area	N6
		Year	2011
		Date	1/10
Type	<input checked="" type="checkbox"/> Wall (W) <input type="checkbox"/> Floor (F) <input type="checkbox"/> Pit (P) <input type="checkbox"/> Built hearth (H) <input type="checkbox"/> Room (R) <input type="checkbox"/> Access (A) <input type="checkbox"/> Posthole (Po) <input type="checkbox"/> Column (Co)		
Identical to	-	Constituent UF	-
under UF	001	UF against the structure	002 - 003 - 005 - 008 - 010 -
above UF	012	Contact with structure	-
Length	Approx. 70 m	Height	1,50 m
Width/diameter	up: 0,60; down: 0,90		
upper altitude	428,97	Building material	Mudbrick
lower altitude	427,47	Appareillage	Courses of mudbricks
		Courses number	Undetermined
		Mean size of the stones/bricks	-
description	<p>Long wall turned E-W, visible on the surface of the site over 70 m. It crosses the northern part of the site. Both the face are battered. Possibly a wall encircling a plot of land.</p> <p>Its base is enlarged by the width of one brick. The three layers at the basis constitute a batter/glacis.</p> <p>The wall does not seem to be made of mudbrick but rather of horizontal layers of melted mud.</p>		

Figure 6: Database of archaeological structures

CNRS  
Paris 10  
EPHE  
Collège de France  
UMR 5067

YAMAMA - ARTEFACTS

Number  Type

Area  UF  Year

Material  Dimensions

**Complete**

**State of conservation**

Discooidal stone, flat on both sides and with rounded edge. Coarse limestone with visible seashells. The upper face partly turned red, probably due to exposure to fire. Black deposit on some parts. In the middle of the stone, a hollow may have been created by percussion on this stone.

This could have been used as a worktop for cooking activities.

**Description**

Drawing

Picture

Figure 7: Database of archaeological artefacts

CNRS  
Paris 10  
EPHE  
Collège de France  
UMR 5067

YAMAMA - CERAMIC

Number	Area	UF
<input type="text" value="Y.001.9"/>	<input type="text" value="N6"/>	<input type="text" value="001"/>

**Fabric**

**Inclusion/temper**

**Colour of the fabric**

**Surface**   Surface (complement)

**Decor**

**Category**   Diameter

**Preserved Part**   Part (complement)

**Profile**

**Shaping method**

**Remark**

**Pottery\_Full\_text**

Drawing

Update drawing

Update pictures

Photo 1


NomFichierImage

Photo 2

NomFichierImageb

Figure 8: Database of pottery

CNRS  
 Paris Lodron  
 Université  
 Collège de France  
 UMR 8507



YAMAMA - SAMPLES

Number

Area

Locus

date

Type

Material

Dimensions/Weight

Conservation Observation

Analysed  OUI  NON

By

Dating

**Results**

Figure 9: Database of samples

The database of the archaeological sites has been designed so as to be exported and used on a GIS (Geographic Information System), the software being used is *ArcGis Desktop 10* (Fig. 10).

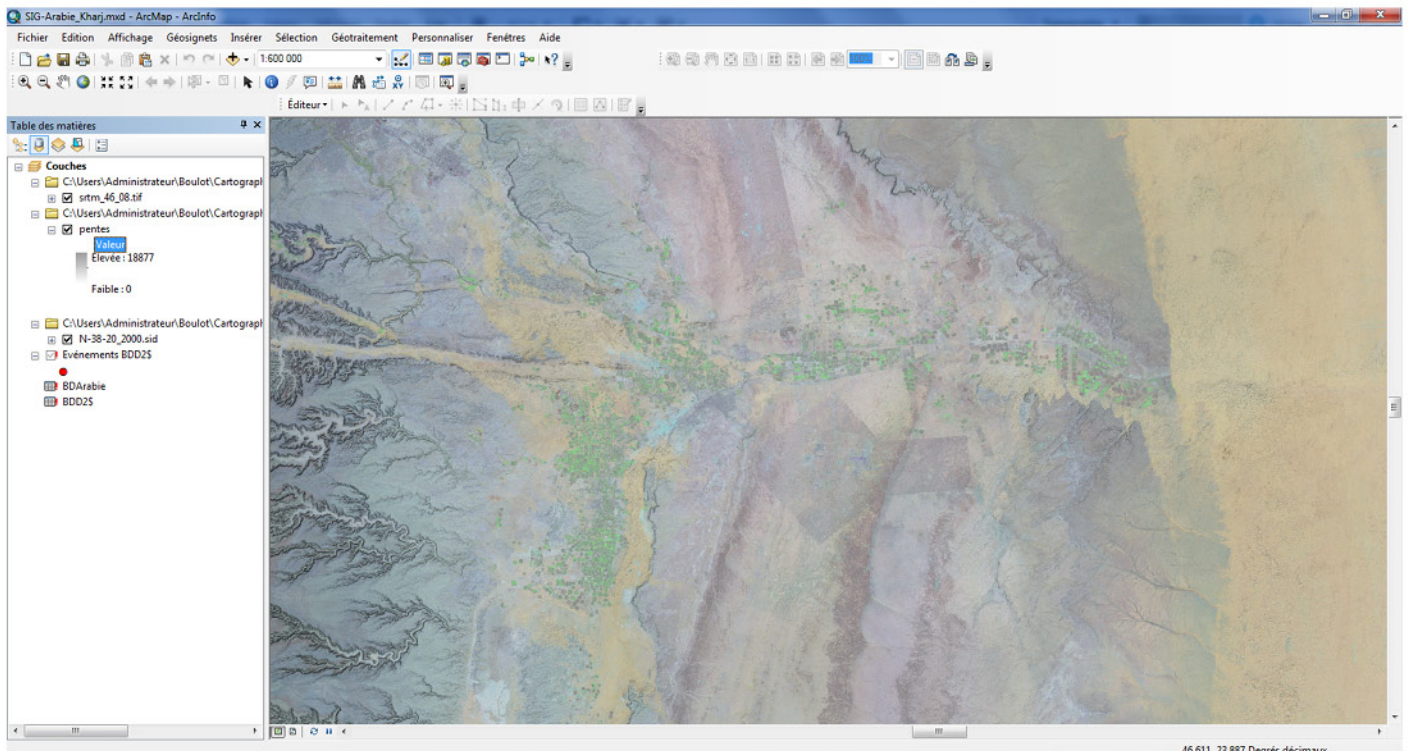


Figure 10: GIS and map of al-Kharj area designed with *ArcGis Desktop 10*

## Prehistoric survey of the oasis and its neighbourhood

*By Rémy Crassard (CNRS, France) & Yamandu Hilbert (University of Birmingham, UK)*

The team comprised Dr R. Crassard (CNRS, Lyons), Yamandu Hilbert (MA, University of Birmingham), and ‘Abd al-‘Azīz al-Hamad (archaeologist, SCTA, Riyadh).

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## Historical survey of the oasis

*“There is a strong local tradition that in the halcyon days of the ancient kingdom of Yamama, the valley was dotted with prosperous villages and oases so closely set together that on a certain occasion the news of the birth of a son to a certain notable of Ayaina, the most northerly settlement of the Wādī, was known at Yamama, the capital, some 80 miles distant, the same evening, having been proclaimed by word of mouth from housetop to housetop down the valley. In those days, the story goes, God visited His wrath upon His people in the shape of a double scourge of locusts and plague, from whose effects the stricken land has never recovered”*

Philby, 1920, p. 164.

On September 26 and 27, the time was devoted to the visit of already known archaeological sites in al-Kharj area. The team comprised Dr J. Schiettecatte (head of the French team), Dr G. Charloux (archaeologist), Dr p. Simeon (ceramologist), M. Niveleau (surveyor), F. al-Hamdan (SCTA, al-Kharj) and A. al-Hamad (archaeologist, SCTA, Riyadh). On September 29, A.S. al-Ghazzi and J. Schiettecatte visited newly discovered archaeological sites by Dharih al-Dawsri in the Wādī Nisāh.

During the following weeks, outside of working hours in al-Yamāma, afternoons and week-ends have been occasion for pursuing the visit of already known archaeological sites in al-Kharj area or surveying new ones. It has been carried out by Prof. A.S. al-Ghazzi and Dr J. Schiettecatte, sometimes accompanied by Dr R. Crassard, G. Fortin, Y. Hilbert and Dr M. Mouton.

All these sites have been registered; pottery have been sampled and is currently studied. Here below is the list of the sites informed into the Database of the archaeological sites of al-Kharj area.

21 sites have been identified so far, they include (Fig. 18):

- 10 settlements (5 isolated farms; 4 settlement of undetermined size due to recent destruction; 1 town);
- 7 necropolis/isolated tomb (2 large necropolises; 2 necropolis with scattered tombs; 3 isolated graves);
- 4 artesian springs
- 3 hydraulic structures (qanats)

### 1 - Yamama

Coordinates: 24,192°N - 47,35188889°E

Altitude: 439 m

#### Bibliography

al-Ghazzi A.S., 2010, *A Comparative Study of Pottery from a site in the Al-Kharj Valley*.

Philby 1920, *Geogr. Journ.*, p. 168

Zarins *et al.* 1979, *Atlal* 3, p. 9-42.

#### Description

This place is alternatively named:

Jaww in connection with the Kingdom of Tasim and Jadis

Al-Yamama. According to A. al-Ghazzi (2010, p. 38), the origin of the name would be linked to a legend related to a Yamanite King called Hasan Tubba'. If the King was Hasan Tubba', the origin of the term could not date earlier than the fifth century A.D. Nevertheless, the term seemed to be used in a regional sense ; Ibn Hawqal made use of the term to speak of a valley whose major town was Al-Khadramah.

Al-Khadramah: this name appears in the early Muslim writings to designate a settlement.

Al-Banna : this recent name designates the source of mud that could be reused for recent building for inhabitants of the surrounding area.

Al-Mahraqah: it means a fire place and this would be of a modern origin.

It has been registered with the number 207-30 by the Comprehensive Survey of Saudi Arabia in 1978

The area is located close to the confluence of the Wādī Hanifa and Wādī Nisāh, which merged together onto Wādī Sahba. It benefits from one of the largest drainage area of Arabian Peninsula, on the eastern slopes of the Tuwayq mountain.

It is also located at the crossroads of the trade routes from the Gulf to the Hijaz and South-Arabia.

The fenced archaeological area is 40 ha wide (800 x 500 m). But many archaeological structures are to be seen outside the fenced area, principally to the north-west of the site. The western part is regarded as a cemetery; it is surrounded by





Figure 18 : Archaeological Map of al-Kharj area



a concrete wall. In the fenced area, walls come up to ground level all over the area. They are more densely visible in the north of the site and west to it.

Soundings have been realized in the late 1980's by Abd al-Aziz al-Ghazzi, north and west of the site, showing remains of mudbrick dwellings preserved on more than 2 m high and covering older buildings.

Above ground pottery is characteristic from the late pre-Islamic period / beginning of the Islamic era.

Zarins *et al.* (1979, p. 34-35) mentions the presence of Layla plain black/green ware, of coarse yellow buff ware (compared to Thaj type 3), coarse green chaff-tempered ware, plain sandy red ware with yellow lime grit inclusions and painted ware comparable to the one from Ayn Jawan, Qalat al-Bahrayn (Cité V) and Thaj (type 5).

## 2 - 'Ayn al-Ḍila' 1 (Fig. 19)

Coordinates: 24,10180556°N -47,25491667°E

Altitude: 481 m

### *Bibliography*

Philby 1920, *Geogr. Journ.*, p. 169.

De Gaury, 1945, *Geogr. Journ.*, vol. 106.3/4, p. 152.

Zarins *et al.* 1979, *Atlal* 3, p. 9-42.

### *Description*

Necropolis of so-called "Bronze Age tumuli" or cairns. The major part of this necropolis has been fenced by the SCTA. Some tombs are still visible south of the fence, along the crests. It is approximately more than 4 km long, 500 m wide at the largest, and hundreds of tumuli are visible.

Philby (1920 p. 169) described it as «a rocky ridge called Qusaia, whose summit is surmounted by a vast concourse of cairn-like mounds of stones and mortar, less striking than though reminding one of the Firzan ruins».

De Gaury visited the site in the early 1940's and described 3 different kind of tombs:

- 1st type: the most numerous type made of ordinary round mounds of stones;
- 2nd type: Round tumuli considerably higher with larger stones and a flat earth-covered top;
- 3rd type: a 12 yards long structure running roughly north and south, and with an erect stone at the southern end in one case and at the northern end in the others. These long mounds or walls were only about 3 feet 6 inches high.



Figure 19: 'Ayn al-Ḍila' 1

He mentions that the number of mounds of the first type is perhaps 1500, and of the second type only a very few, perhaps under fifteen. There were even fewer of the third type (only three are mentioned), close to the others.

In 1978, archaeologists taking part to the Comprehensive Survey of the kingdom of Saudi Arabia registered this site as 207-20 (Zarins *et al.* 1979, p. 9-42). It is described as the largest of the 3 necropolises known in Kharj area.

They mentioned circular tumuli without any appendix, made up with dry-stones (type A). The funerary chambers are said to be delimited by large orthostats [Zarins *et al.* 1979, p. 23, pl. 8b, 12]. To the South-East of the necropolis, they mention the same kind of tombs together with tumuli encircled by a wall of well-laid stones (type B) [Zarins *et al.* 1979, p. 23, pl. 12].

One of these tumuli has been excavated during this survey (Zarins *et al.* 1979, p. 24). The funerary chamber was already plundered. It was encircled by limestone slabs.

They finally mention the presence of tapered structures [Zarins *et al.* 1979, p. 25]. One of these proved to be a tomb after being excavated: a funerary chamber was laid out at the head of the structure.

The material collected on surface has been attributed to the Pre-Islamic period [Zarins *et al.* 1979, p. 27, 34].

During our visit, we sampled sherds on the surface. Comparisons will be of some help in refining this chronology.

An excavation of one of these tombs will be a priority during our next field campaign (2012).

### 3 - 'Ayn al-Ḍila' 2 (Fig. 20)

Coordinates: 24,11278°N-47,25825°E

Altitude: 447 m

#### Description

The site of 'Ayn al-Ḍila' 2 is an empty cavity of an artesian well, 76 m long and 50 m wide. The recent drop of groundwater does not allow this well to refill permanently as it used to do some decades ago.

### 4 - 'Ayn al-Ḍila' 3 (Fig. 21)

Coordinates: 24,11602°N - 47,25865°E

Altitude: 446 m

#### Description

The site of 'Ayn al-Ḍila' 3 is located 350 m N of the artesian well of 'Ayn al-Ḍila' 2. It is also an empty cavity of an artesian well, 66 m long and 43 m wide. The recent drop of groundwater does not allow this well to refill permanently as it used to do some decades ago.

Rusted mechanic pump are set up on its north-western end and closely linked to underground channel leaving the area toward the north-west.

### 5 - al-'Afja (Fig. 22)

Coordinates: 24,20641667°N - 47,23791667°E

Altitude: 478 m

#### Bibliography

Philby, *Heart of Arabia* (vol. 2), p. 26 sq.

Philby, 1920, *Geogr. Journ.*, vol. 55.3, p. 161.

Zarins *et al.* 1979, *Atlal* 3, p. 23.

al-Ghazzi, 2011. *Al-Manšāt al-ḥajarī fī mahīṭ 'Ayn Farzān*

#### Description

Located to the west of 'Ayn Farzān (207-31), the site is known for its large tumuli field and has been mentioned by Philby in 1920 and Zarins *et al.* in 1978 (1979, p. 23).

Most of the tombs are circular in shape, and have been erected in a dry-stone masonry. A rectangular funerary chamber is set in the middle.

Few tombs have a tail, up to 20 m long. Some of the most monumental graves are stepped: two or three stone cylinder are built one above the other. Most of these tombs have been plundered but a few turned out to be untouched according to the excavations of A.S. al-Ghazzi. They contained a single body with a few artefacts and ceramics.

These graves can be paralleled with those of Yabrin oasis and with the Gulf coast region (Dhahran Airport, Bahrayn). They can be dated to the Early Bronze Age.





Figure 20: 'Ayn al-Dīla' 2



Figure 21: 'Ayn al-Dīla' 3



Figure 22: al-'Afja



**6 - 'Ayn Farzān (Fig. 23)**

Coordinates: 24,21138889°N - 47,23552778°E

Altitude: 448 m

36

*Bibliographie*Philby 1920, *Geogr. Journ.*, p. 167Zarins *et al.* 1979, *Atlal* 3, p. 9-42.Ghazzi, 2011. *Qanat al-ri fi Farzān**Description*

At the foot of Jabal Abraḡ Farzān, a qanat watered by a spring can be seen over 4 km. The water catchment is an open-sky canal leading into an underground qanat visible from the ground by more than 3-m-wide wells. Wells are dug every 11 m. The upper part of the well is faced with stones and a mudbrick rim, approximately 50 cm high, encircled the well. Philby described the structure in 1920 (p. 167-168): «Firzan, at the base of which rises a spring, from which a subterranean channel, with well shafts at intervals, runs eastward for 3 miles to the village and oasis of Sulaimiyya. (...) The aqueduct, to which I have referred, is of the type called by the Arabs Kharaz or Saqi and known to the Persians as the Kariz, namely, a subterranean channel, in this case some 4 fathoms [1 brasse = 1,83 m] deep at the top end, pierced at frequent intervals by well-shafts designed to admit workmen for the inspection, cleaning or repair of the aqueduct. I have seen specimens of such channels in the Sirr and Qasim, and shall soon have occasion to describe those of the Aflaj, but the best-known specimen in the Wahhabi territory is that of Qatif, where we are on strong and even indisputable ground in ascribing the workmanship to the Persians themselves or to Persian influence. Is it possible then that at some period in the remote past Persian influence, perhaps a Persian colony, penetrated to and settled in Kharj (...)? I believe that it was so, and that the very name of the Firzan ridge preserves and betrays the identity of the builders of the aqueduct and settlement I have attempted to describe-Firzan, Fursan, the Persians.»

**7 - Ḥazm 'Aqila**

Coordinates: 24,19378°N - 47,40507°E

Altitude: 463 m

*Bibliographie*Zarins *et al.* 1979, *Atlal* 3, p. 9-42.Al-Ghazzi, 1996, *Atlal* 14, p. 43-51, pl. 18-23.Al-Ghazzi, 2009. *Awān fuhāriyya min mawḡa' Ḥazm 'Aqīla.**Description*

The site is located c. 4 km SE of al-Yamāma, on the southern bank of the wādī Ḥanīfa. According to al-Ghazzi (1996), Ḥazm means a hillock and 'Aqila could have been the name of a tribe.

This site used to be a densely settled area whose remains were visible on the ground. Recent farming activity and industrial construction have badly damaged the site. It is now use as rubbish dump so that most of the archaeological site has been destroyed.

Before being damaged, the site has been discovered during the Comprehensive Survey of the Central Region of Saudi Arabia in 1978. It has been registered with the number 207-26 (Zarins *et al.*, 1979).

They mentioned the presence of coarse yellow buff ware and plain sandy red ware with yellow lime grit inclusions.

A sounding has been done on the site in 1988 (al-Ghazzi 1996 and 2009). At that time, the site was already cut in two parts by the asphalt road.

The room excavated (3 x 2,8 m) was delineated by walls were courses of mudbrick alternated with courses of stones. Walls were coated with plaster. It was preserved on 2 meters and only one phase of occupation has been highlighted?

The main pottery category were Arabian Red Ware already known at Failaka (Late pre-Islamic); greenish coarse ware with yellow and black pebbles.

The material could have been as well pre-Islamic as early Islamic.

**8- Wādī Nisāḡ 1 (Fig. 24)**

Coordinates: 24,20399°N - 47,15969°E

Altitude: 503 m





Figure 23: 'Ayn Farzān: wells of the qanat on the ground (top) - inner part of a well (bottom)



*Description*

In the river bed of the wādī Nisāḥ, several sites with 2 or 3 mounds covered with stones, pebbles and pottery have been recently discovered by Dhari al-Dawsri who informed the SCTA.

The French-Saudi Mission in al-Yamāma visited these sites on Friday, September 29.

They are approximately 30 to 50 m in diameter and the mounds encircle a lower area.

They can be seen as isolated farms benefiting from the flood of the wādī.

Five of these sites have been seen, named Wādī Nisāḥ 1 to 5.

**9 - Wādī Nisāḥ 2**

Coordinates: 24,20145°N - 47,1587°E

Altitude: 501 m

*Description*

Cf. Wādī Nisāḥ 1.

**10 - Wādī Nisāḥ 3**

Coordinates: 24,20552°N - 47,15772°E

Altitude: 502 m

*Description*

Cf. Wādī Nisāḥ 1.

**11 - Wādī Nisāḥ 4**

Coordinates: 24,21188°N - 47,13335°E

Altitude: 506 m

*Description*

Cf. Wādī Nisāḥ 1.

Pottery on the ground included green ware with triangular rim and red ridged ware.

**12 - Wādī Nisāḥ 5**

Coordinates: 24,19916°N - 47,15635°E

Altitude: 501 m

*Description*

Cf. Wādī Nisāḥ 1.

**13 - 'Ayn al-Ḍila' 4 (Fig. 25)**

Coordinates: 24,106739°N - 47,245838°E

Altitude: 437m

*Bibliographie:*

Philby, 1920, *Geogr. Journ.*, p. 169

Zarins *et al.* 1979, *Atlal* 3, p. 9-42.

*Description*

The site of 'Ayn al-Ḍila' 4 is located 1,5k m SW of the artesian well of 'Ayn al-Ḍila' 2. it is also an empty cavity of an artesian well, 144 m long and 123 m wide. The recent drop of groundwater does not allow this well to refill permanently as it used to do some decades ago.



Figure 24: Wādī Nisāḥ 1: remains of an isolated mediaeval farm

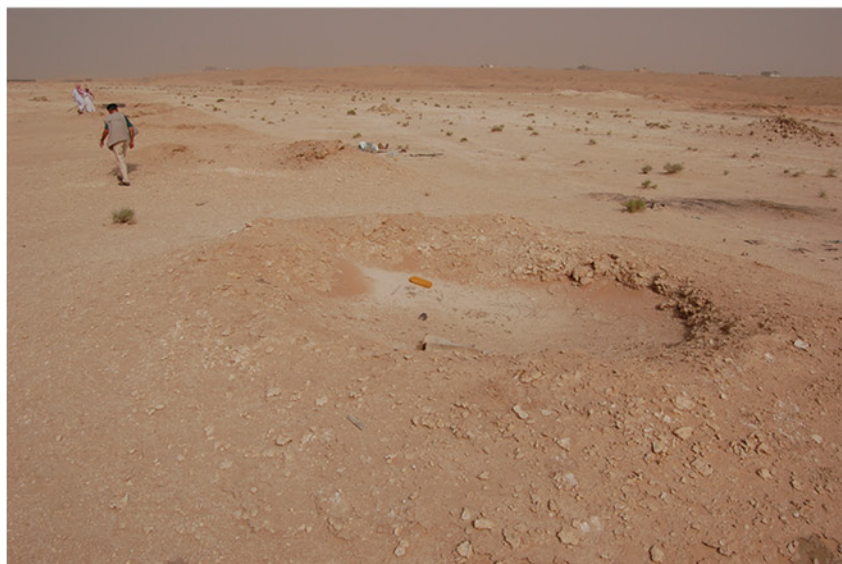


Figure 25: 'Ayn al-Ḍila' 4: remains of an ancient qanat



This is probably the one mentioned in the description Philby gave of al-Kharj area (1920, p. 169), “the lucerne fields of Qurain are irrigated by a narrow open channel fed by a triple kariz [qanat], whose three heads lay just below high-water level in the sides of three natural reservoirs called Ain Samha, Ain al Dhila, and Ain Mukhisa. For some years only the first of these has been in actual operation, but they are all of similar character, and I shall select for detailed description the most striking of them, the Ain al Dhila, which lies in a great cleft at the foot of a rocky ridge called Qusaia, (...). The reservoir of Ain al Dhila measures roughly 100 x 70 paces. The limestone wall enclosing it towers above the level of the water some 40 feet on the southern and eastern sides, 30 feet on the north, while on the west the wall slopes down gently, affording an easy approach to the water’s edge. The water, which has apparently sunk in level a few inches below the outlet leading into a kariz on the northern side, appears to be of a deep blackish-green colour as it lies in the reservoir, but is in fact transparently clear and colourless, though with a slight tinge of a light greenish hue.”

During the Comprehensive Survey of Saudi Arabia in 1978, J. Zarins mentioned the presence nearby of a pre-Islamic settlement (1979, p. 27-28). This site received the registration number «207-24». It is described as a settlement with Pre-Islamic material (200 BC-600AD) located to the East of a dried artesian spring.

Outcropping walls circumscribed long and narrow rooms (pl. 17b). They practised a sounding in one of these rooms and unearthed walls in limestone and mudbricks. Natural ground was reached 1 or 2 m below the surface.

They also mentioned a 2-km-long qanat in the neighbourhood oriented toward the east. Its water supply point was located 10 m below above the artesian well [1979, p. 29].

A 1,2-km-long qanat is still visible NE of the well, oriented toward the NE and toward ‘Ayn al-Dhila’ 2 & 3.

#### 14 - Khafs Daghra 1 (Fig. 26)

Coordinates: 23,83458°N - 47,19247°E

Altitude: 482 m

##### *Description*

At the foot of a limestone plateau, East of the wādī Aba adh-Dharr, an empty artesian source forms a natural depression in the rock. It is bordered by several stone structures built in the 1930’s. Due to intensive water pumping in the area, the water table is not high enough to make this spring active. It is occasionally filled by rainfalls [cf. GoogleEarth image - 2002].

#### 15 - Khafs Daghra 2

Coordinates: 23,83185°N - 47,19148°E

Altitude: 483 m

##### *Description*

At the foot of a limestone plateau, East of the wādī Aba adh-Dharr, an empty artesian source forms a natural depression in the rock.

Due to intensive water pumping in the area, the water table is not high enough to make this spring active. It is occasionally filled by rainfalls [cf. GoogleEarth image - 2002].

#### 16 - Khafs Daghra 3 (Fig. 27)

Coordinates: 23,82676°N - 47,1913°E

Altitude: 529 m

##### *Description*

At the top of a limestone plateau, east of the wādī Aba adh-Dharr, a partially collapsed turret grave in dry-stones is built on the edge of the plateau.



Figure 26: Khafs Daghra 1





Figure 27: Khafs Daghra 3

### 17 - Khafs Daghra 4 (Fig. 28)

Coordinates: 23,82321°N - 47,1993°E

Altitude: 565 m

#### *Description*

At the top of a limestone plateau, east of the wâdî Aba adh-Dharr, a necropolis comprises a dozen of tumuli made of limestone taken in the surrounding area.

Some of these graves have a tail; one of them has a winding tail. Its funerary chamber has been plundered and the capstone is still visible, upside down, on the circular wall of the tomb.

### 18 - al-Rufaya' 1

Coordinates: 24,29743°N - 47,16193°E

Altitude: 451 m

#### *Description*

On barren limestone area, 1 km west of the road Kharj-Riyadh, close to cultivated alluvial areas, the remains of a dry-stone circular grave with a tail are preserved. It is built in the local material.

### 19 - al-Rufaya' 2 (Fig. 29)

Coordinates: 24,30313°N - 47,15388°E

Altitude: 460 m

#### *Description*

On barren limestone area, 1.5 km west of the road Kharj-Riyadh, close to cultivated alluvial areas, the remains of a dry-stone circular grave are preserved. It is built in the



Figure 28: Khafs Daghra 4





Figure 29: al-Rufaya' 2

local material and the surrounding wall is still visible on one side. Stones are layered in regular courses.

### 20 – al-Rufaya' 3 (Fig. 30)

Coordinates: 24,30372°N - 47,15849°E

Altitude: 465 m

#### *Description*

On barren limestone area, less than 1.5 km west of the road Kharj-Riyadh, close to cultivated alluvial areas, the remains of a necropolis comprising about 10 dry-stone circular grave are visible. Different kind of tombs have been observed: tapered structure, circular tomb with or without tail. They are built in the local material.

The necropolis has been badly damaged by recent industrial activity in the neighbourhood.

### 21 – As-Salmiyya

Coordinates: 24,19688°N - 47,28334°E

Altitude: 438 m

#### *Description*

The site of Salmiyya is located in the area called by this name, NNW of Kharj. The site has been almost totally destroyed by recent building activities and road construction. By the past, one could have observed the outlet of the 6-km-long qanat of Farzān. Only two wells connected to this qanat are nowadays still visible, filled with rubbles.

Ceramic has been sampled in this area.

### Unlocated sites

If some of the sites discovered during the 1978 Comprehensive survey have been identified and precisely located this campaign, 11 have not been found, either due to the lack of data available to locate them precisely or because of their destruction due to recent building activity or agricultural expansion in the region.

These are sites 207-21; 207-22; 207-23, having yielded pre-Islamic material [*Atlat* 3, p. 27]; 207-25; 207-27, a circular plain tumuli [*Atlat* 3, p. 23]; 207-29, a tumuli field overlooking Wādī Sahba on a prominent ridgeline [*Atlat* 3, p. 23]; 207-32; 207-33; 207-34; 207-35; 207-36.





Figure 30: al-Rufaya' 3 - Tapered structure

## Archaeological exploration of the site of al-Yamāma

On September 28, the archaeological excavation of the site of Yamama began under the direction of J. Schiettecatte and A. al-Ghazzi. The team comprised G. Charloux (archaeologist), A. al-Hamad (archaeologist), J. al-Harbi (surveyor), H. Monchot (zooarchaeologist), M. Mouton (archaeologist), L. Munduteguy (archaeologist, drawer), M. Niveleau (surveyor), P. Simeon (archaeologist-ceramologist). They were assisted by 13 Pakistani workmen (Fig. 31).

Figure 31: the archaeological team on the field



### Topographic survey

By Mathieu Niveleau, surveyor

The topographic survey of the site was carried out by Mathieu Niveleau, accompanied by Jiza al-Harbi. The aim of the first campaign was manifold:

- to establish an orthogonal grid on the site with a pace of 50 m;
- to establish the limits of the soundings according to this grid of reference;
- to draw a map of the site showing the numerous structures that are visible on the ground ;
- to provide archaeologists with altimetric data;
- to draw the archaeological structures unearthed.

All these activities have been carried out with a total station Leica TS06 (Fig. 32).



Figure 32: Surveyors Jiza al-Harbi and Mathieu Niveleau on the field



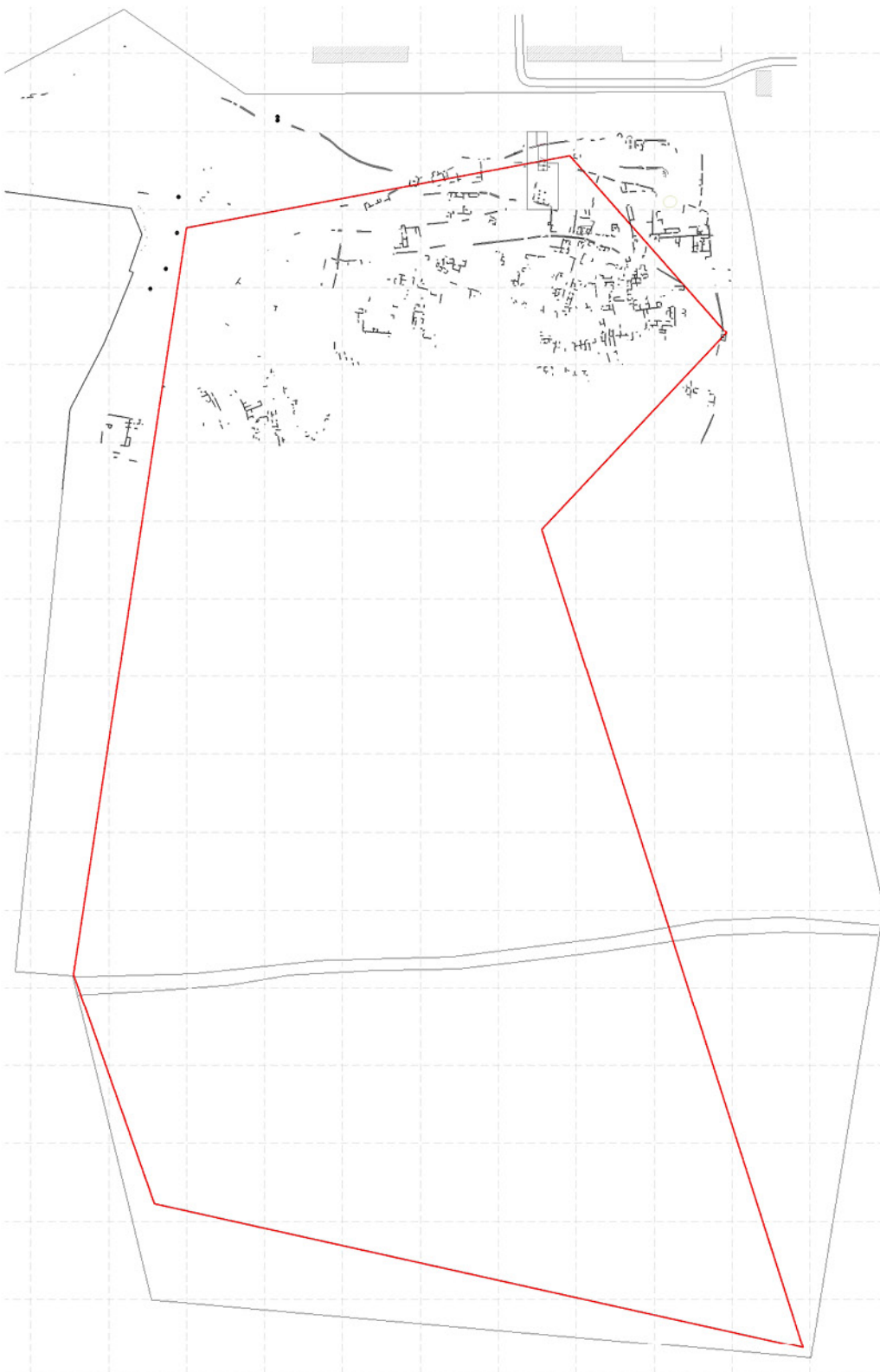
### Preliminary remarks

As no previous topographic works have been carried out on the site, a polygonal had to be set on the site (Fig. 33). So as to avoid any disturbance for the geophysical survey, no metallic material could be used on the site, e.g. iron stakes. Therefore, we started working with wood stakes and PVC stakes.

Later, three permanent ground stations have been set, taking the shape of engraved breeze-blocks buried in the sand and slightly sticking out of the ground.

*Les fermetures angulaires de la polygonale sont de 0,0059 gon, 0,0713 m en planimétrie et -0,0038m en altimétrie.*

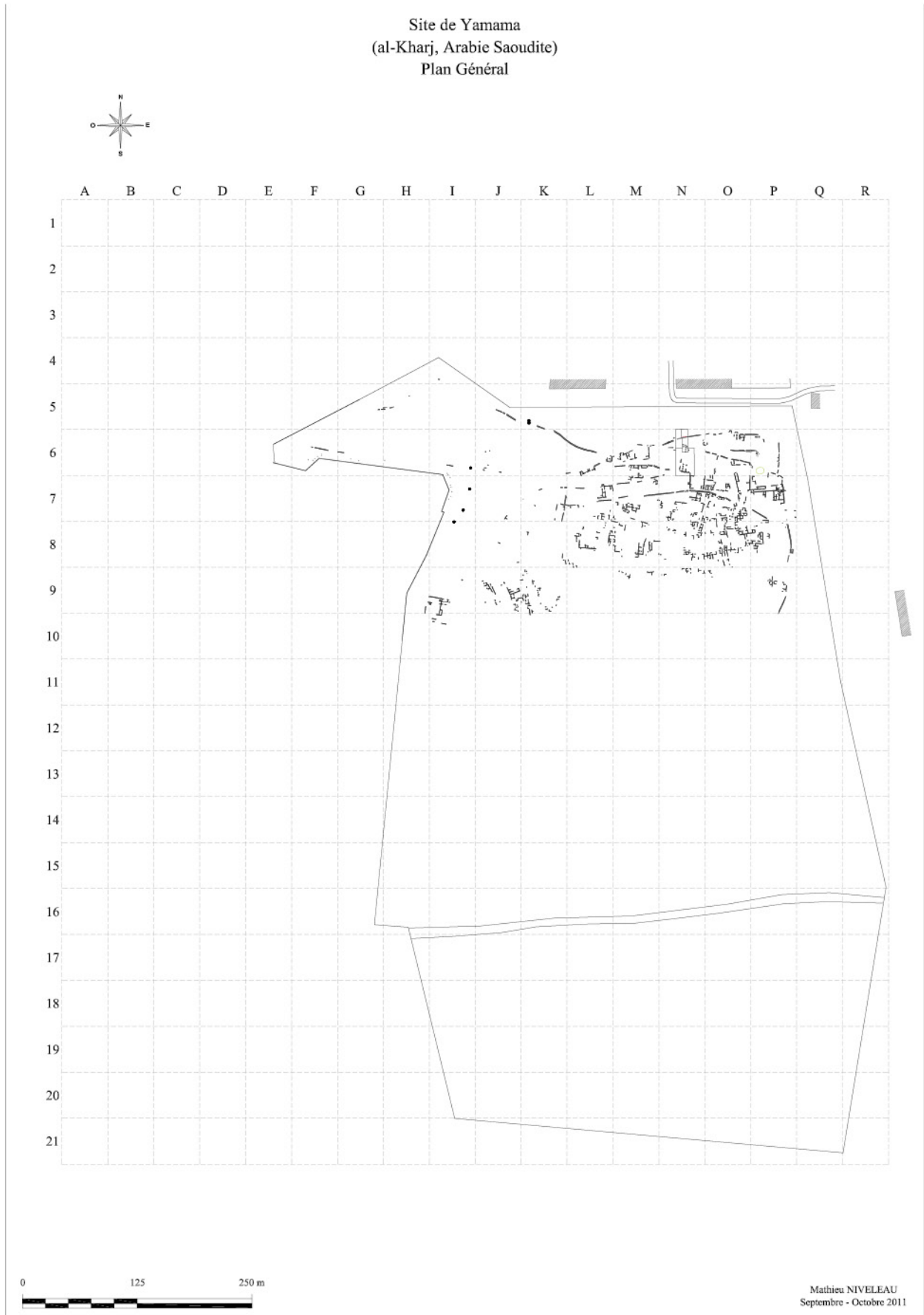
Figure 33: Polygon set up on the site as topographic reference



### Setting up a grid

To facilitate the location of excavated areas, a virtual grid turned toward cardinal points has been realized. It has a pace of 50-m ; every square is named by a letter in abscissa (A, B, C, ...) and a number in ordinate (1, 2, 3, ...) (Fig. 34).

Figure 34: Map of al-Yamāma with the grid delimiting the working areas



### Setting up the limits of the excavated areas

Two excavation areas have been delimited:

Sounding 1, in area N6: a first rectangle measuring 13 m (EW) x 20 m (NS) was drawn, including part of a long wall and part of a columned building (Building 1). It was extended by 5m to the south.

Sounding 2, in area O7 : it measures 5m (NS) x 7m (EW) and includes two rooms of the Building 2.

### Drawing a map of the structures visible on the ground (Fig. 35)

Two kind of walls have been distinguished: those visible on the ground, drawn by continuous lines, those that we can assume the presence, drawn with dotted lines. When the two faces of the wall were visible, 4 points were taken, for those with only a single face visible, only 3 points have been taken (2 on both the extremities of the visible face) and a third one giving the orientation of the wall and an approximate thickness.

The mapping started in the northern part of the site, where the structures are the most numerous and well visible. Only one third of the site has been mapped this campaign due to lack of time. The limits of the mapped area have been pointed out by wood stacks.



Figure 35: Map of the northern third of the fenced site of al-Yamāma with archaeological structures visible on the ground

Geographic coordinates of the site have been obtained thanks to satellite images provided on GoogleEarth©. The fence of the site was mapped on the site and received coordinates afterwards by superimposing it on the satellite photograph where it is easily recognized. The accuracy of the coordinates is less than 5 meters. It will be reduced in the next campaign by the use of a Trimble GPS.

### Altimetric data

It has been decided to attribute the approximate altitude of 430 m a.s.l. to the permanent ground station S1. This altitude is the one obtained on GoogleEarth© on this station. All the altitudes taken on structures and archaeological layers are based on this reference.



## Magnetic mapping of al-Yamāma

By Marc Munsch & Rozan Alkhatib Alkontar, universit  de Strasbourg<sup>3</sup>

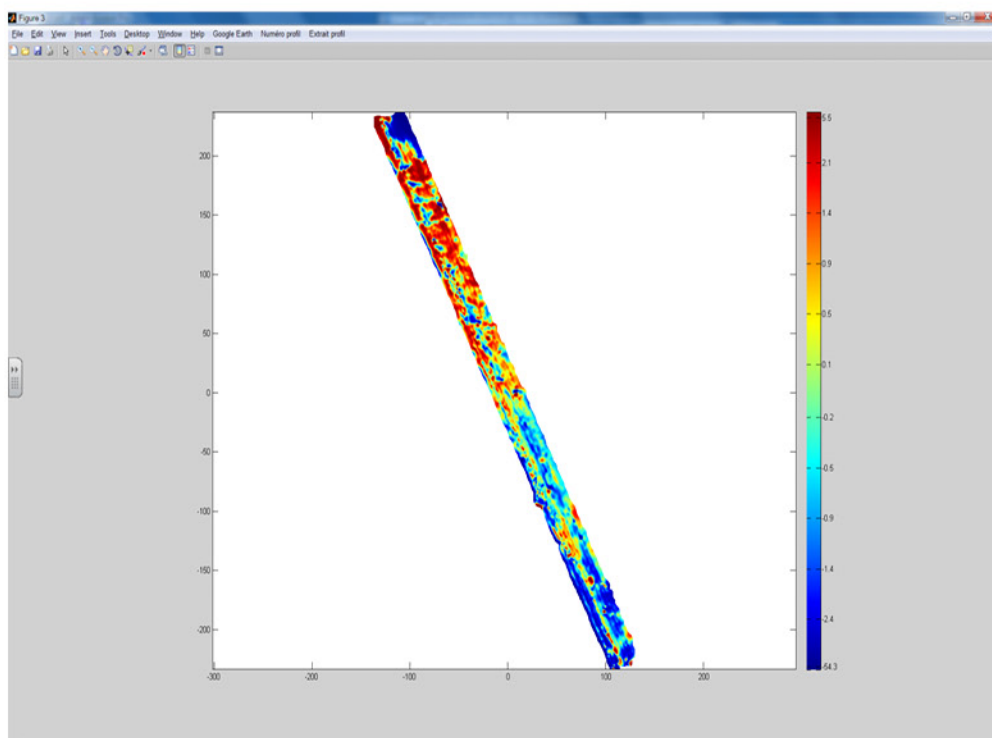
The arrival on fieldwork happened on September 30, 2010. The geophysical devices were received on October, 1, late afternoon. The site was located few kilometers from the place of residence. Taking into account temperatures, measurements have been taken in the early morning, from 6:30 a.m. until 10 to 12 a.m. The devices are those usually used for mapping by walking, plus a real-time laptop and HMD glasses.

### Chronology

#### October 2, 2011

Error in the preparation of the navigation profiles. Profiles are not parallel to the western limit of the site. This is not a difficulty ; we kept walking with the same navigation profiles the following days. Heavy heat from 9 a.m. onwards.

Fichier	Dur�e (mn)	Longueur (m)	Enregistrements	Nature	Commentaire
02100422.PAT	2,2	20,4	131	Etalonnage	
02100425.PAT	2,6	23,4	160	Etalonnage	
02100434.PAT	81,7	3770,5	4901	Carto01	Bruit sur capteur 3
02100559.PAT	16,7	623,4	1004	Carto01	
02100616.PAT	1,4	29,1	83	Etalonnage	
02100621.PAT	29,4	1083,4	1766	Carto02	Bruit sur capteur 3 plus important
02100736.PAT	72,1	2415	4325	Carto02	
02100850.PAT	1,2	25,7	72	Etalonnage	Ecran gauche de la lunette HMD � moiti� noir.
Total	207,3 mn	7990,9 m	12442 enr		



Map of magnetic anomalies on October 2, 2011

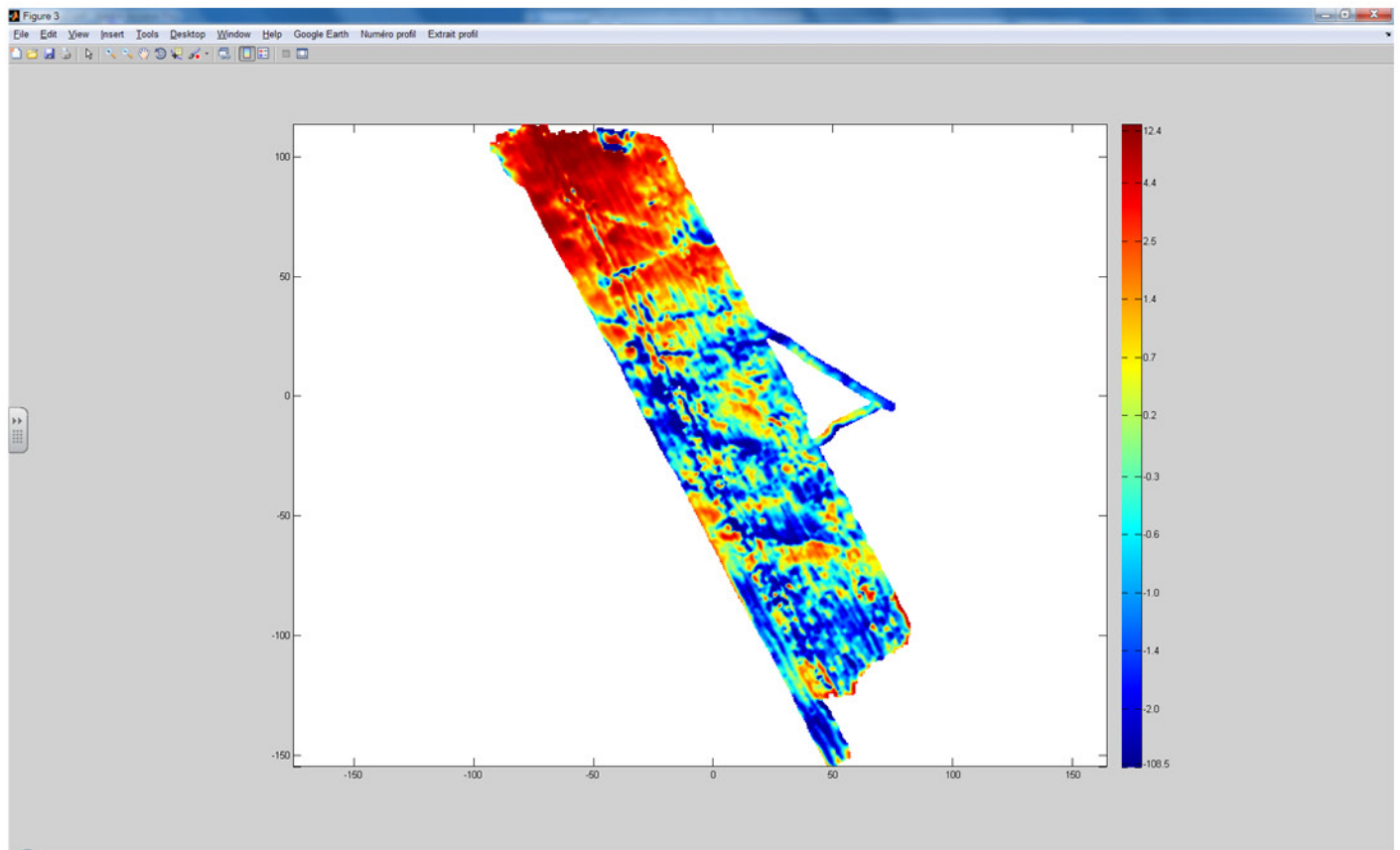
<sup>3</sup> Universit  de Strasbourg -  cole et Observatoire des Sciences de la Terre, Institut de Physique du Globe de Strasbourg (UDS-CNRS UMR 7516),  quipe Dynamique de la lithosph re et des bassins oc aniques.  
Marc Munsch, EOSt - 1, rue Blessig - CS90032 - 67081 STRASBOURG Cedex  
T l : 03 68 85 03 64- Fax :03 68 85 04 02 - Mel : Marc.Munsch@unistra.fr

**October 3, 2011**

The sensor no 3 which had noise is changed: the magnetometer 1421 is replaced by xx. Considering the results, profiles are shortened to ca. 200 m in the northern part.

48

Fichier	Durée (mn)	Longueur (m)	Enregistrements	Nature	Commentaire
03100420.PAT	2,3	20,6	139	Etalonnage	
03100423.PAT	85,8	3960,3	5151	Carto03	Maintenant c'est le capteur 1 qui semble poser des problèmes.
03100550.PAT	63	2342	3783	Carto03	
03100656.PAT	2,1	18,7	127	Etalonnage	
03100701.PAT	30,6	1688,1	1837	Carto04	
03100732.PAT	1,4	27,8	86	Etalonnage	
<b>Total</b>	<b>185,2 mn</b>	<b>8057,5 m</b>	<b>11123 enr</b>		

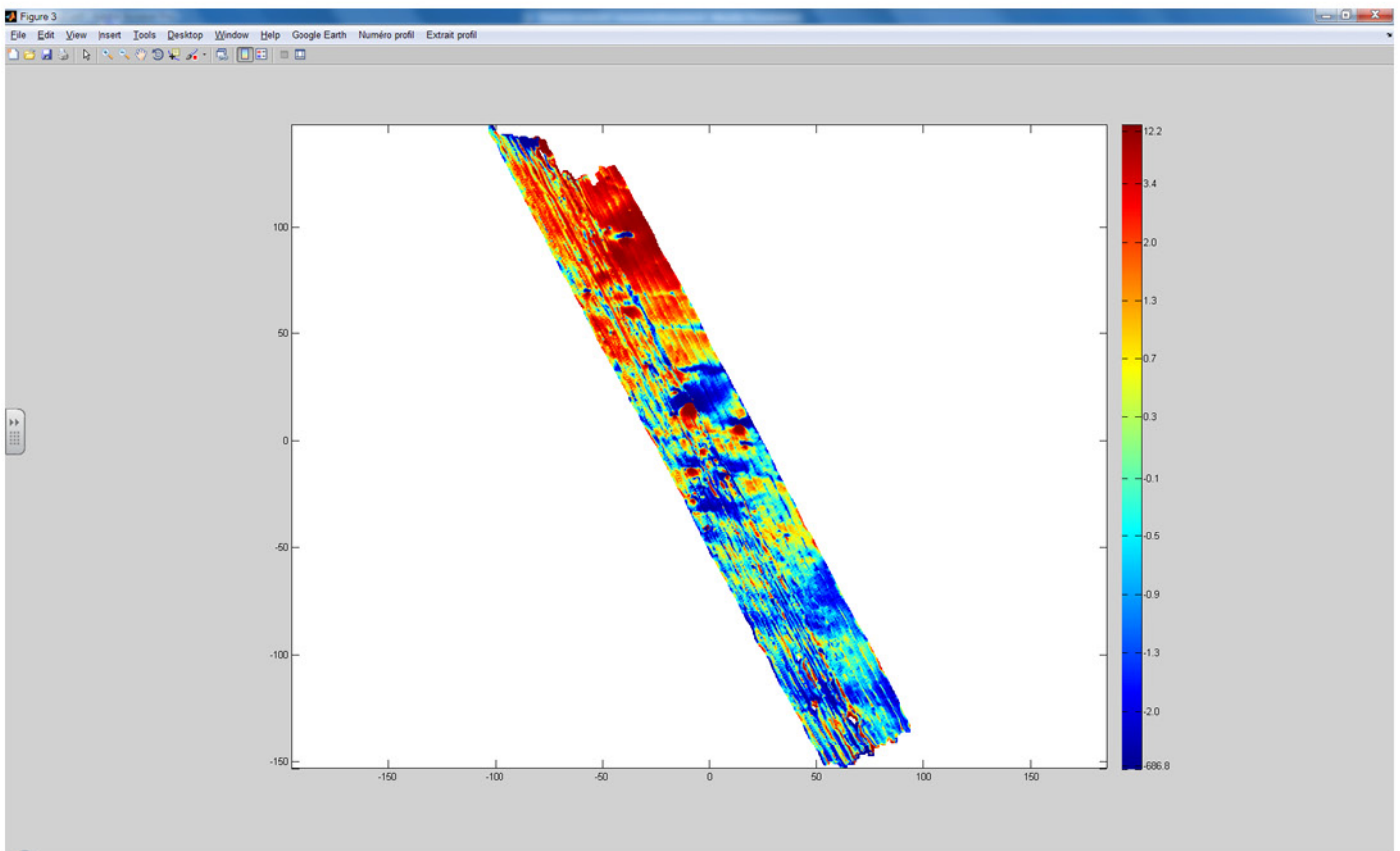


Map of magnetic anomalies on October 3, 2011

## October 4, 2011

Continuation of the mapping toward the west. Nothing to report. Cables should be fixed more firmly. Rozan left and is replaced by Jérémie.

Fichier	Durée (mn)	Longueur (m)	Enregistrements	Nature	Commentaire
04100414.PAT	2,1	41,3	125	Etalonnage	
04100419.PAT	53,1	3045,2	3185	Carto05	
04100549.PAT	51,2	2090,2	3075	Carto05	
04100645.PAT	52,6	2665,5	3155	Carto05	
04100738.PAT	2	41,4	123	Etalonnage	
Total	161 mn	7883,6 m	9663 enr		



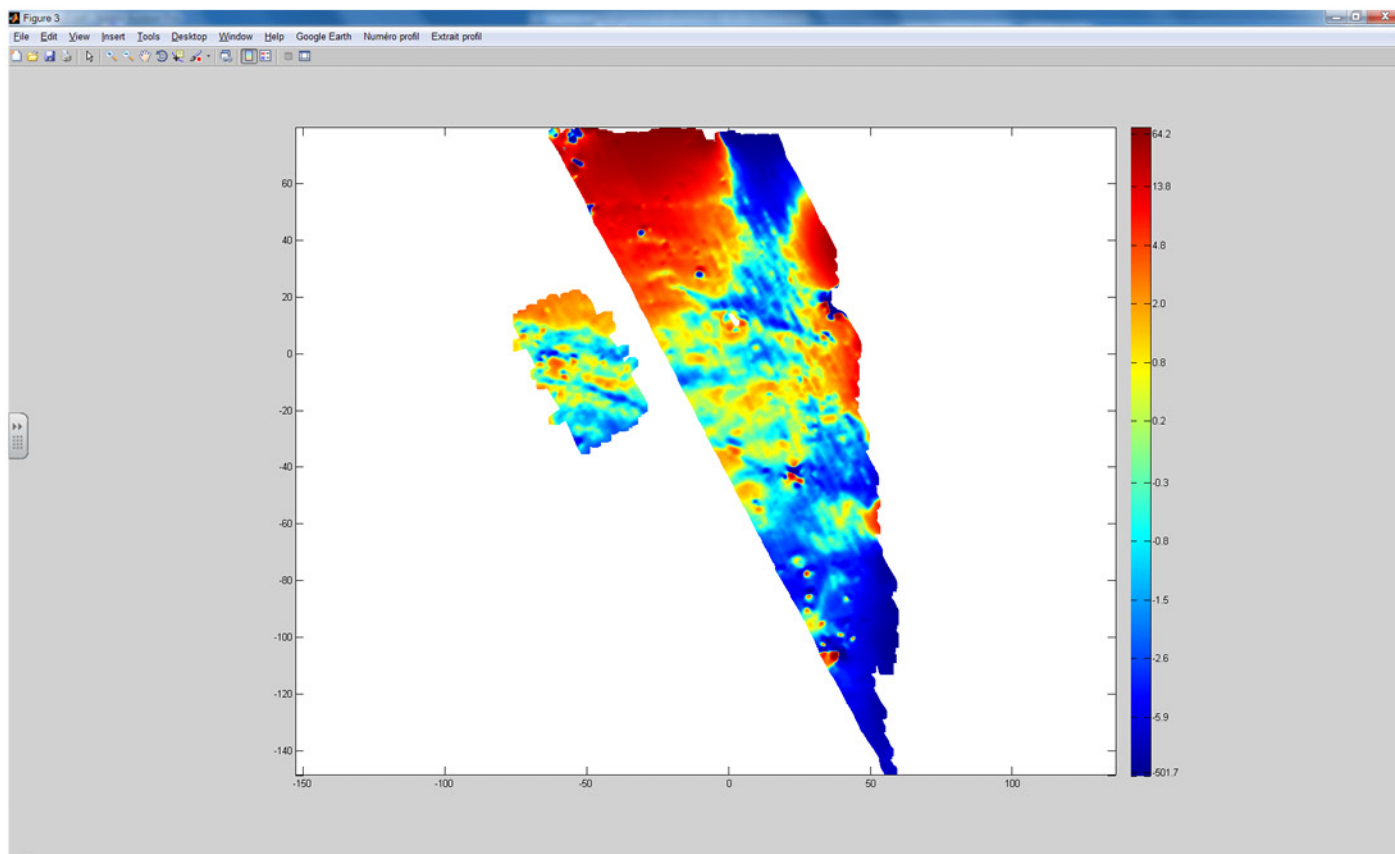
Map of magnetic anomalies on October 4, 2011

October 5, 2011

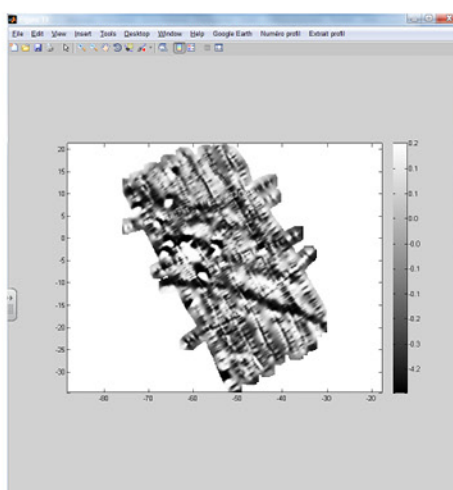
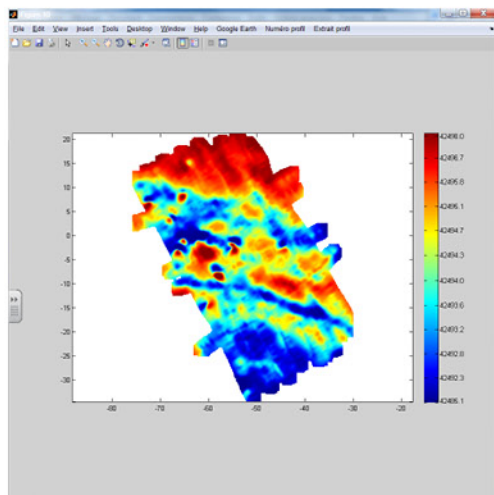
Mapping of the north-east area down to the fence ; mapping of a smaller area where Sounding 2 is about to start.

50

Fichier	Durée (mn)	Longueur (m)	Enregistrements	Nature	Commentaire
05100403.PAT	2,1	42,4	125	Etalonnage	
05100406.PAT	102	5458,3	6123	Carto06	
05100553.PAT	26,8	1214	1610	Carto06	
05100627.PAT	4	48,1	239	Etalonnage	
Total	134,9 mn	6762,8 m	8097 enr		



Magnetic map on October 5, 2011

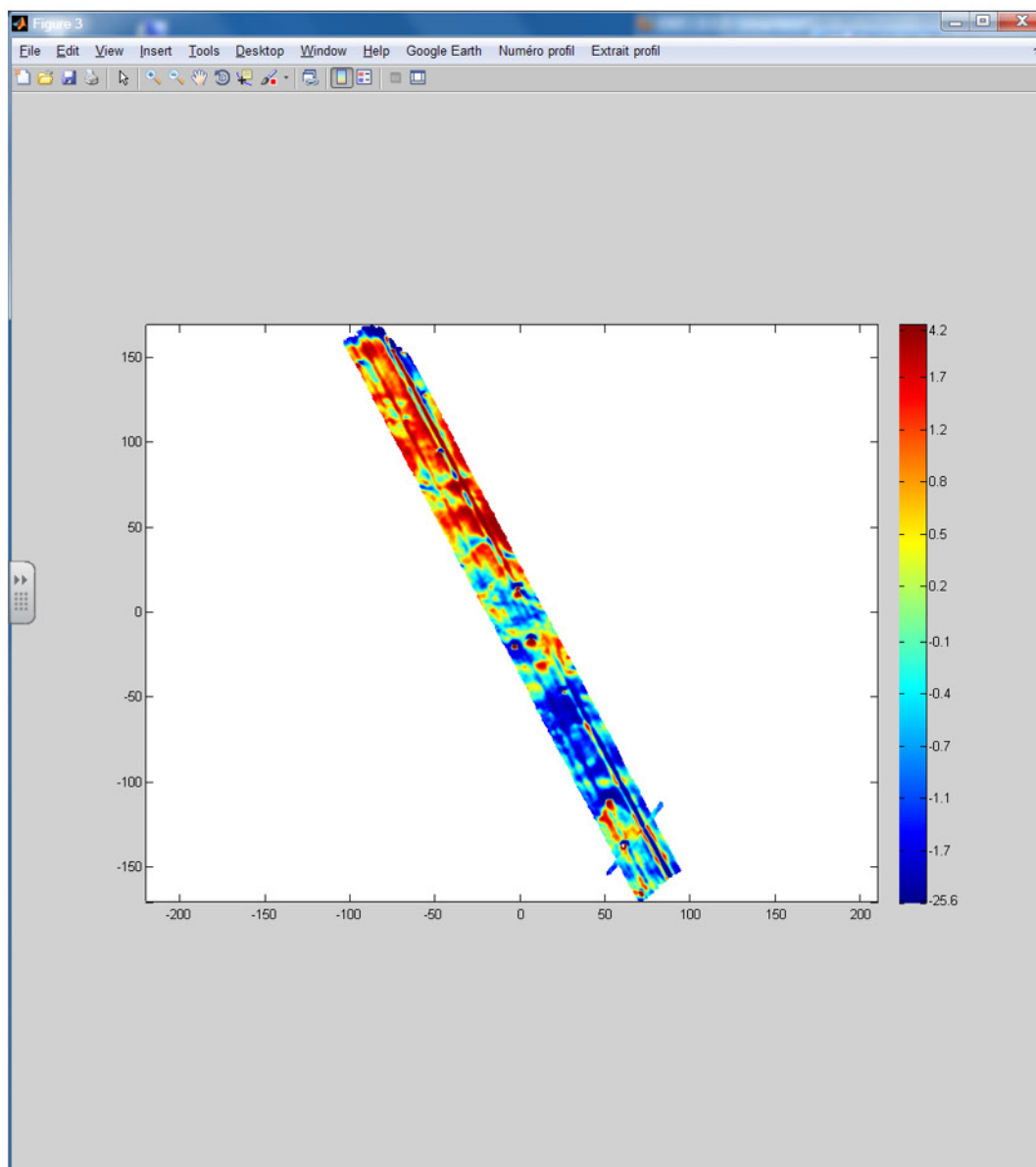


Map of magnetic anomalies in the eastern area (left) and vertical gradient (right)

October 6, 2011

Continuation of mapping toward the East. Stop necessary to locate new navigation profiles. Problems with electronic devices after 9 a.m.; it does not restart automatically.

Fichier	Durée (mn)	Longueur (m)	Enregistrements	Nature	Commentaire
06100405.PAT	06100405.PAT	2,2	44,3	Etalonnage	
06100411.PAT	06100411.PAT	38,7	2195,8	Carto07	
06100452.PAT	06100452.PAT	27,3	1518,6	Carto07	
06100551.PAT	06100551.PAT	42,6	2319,6	Carto07	
06100639.PAT	06100639.PAT	4,3	48,3	Etalonnage	
Total	115,1 mn	6126,6 m	6908 enr		



Magnetic map on October 6, 2011

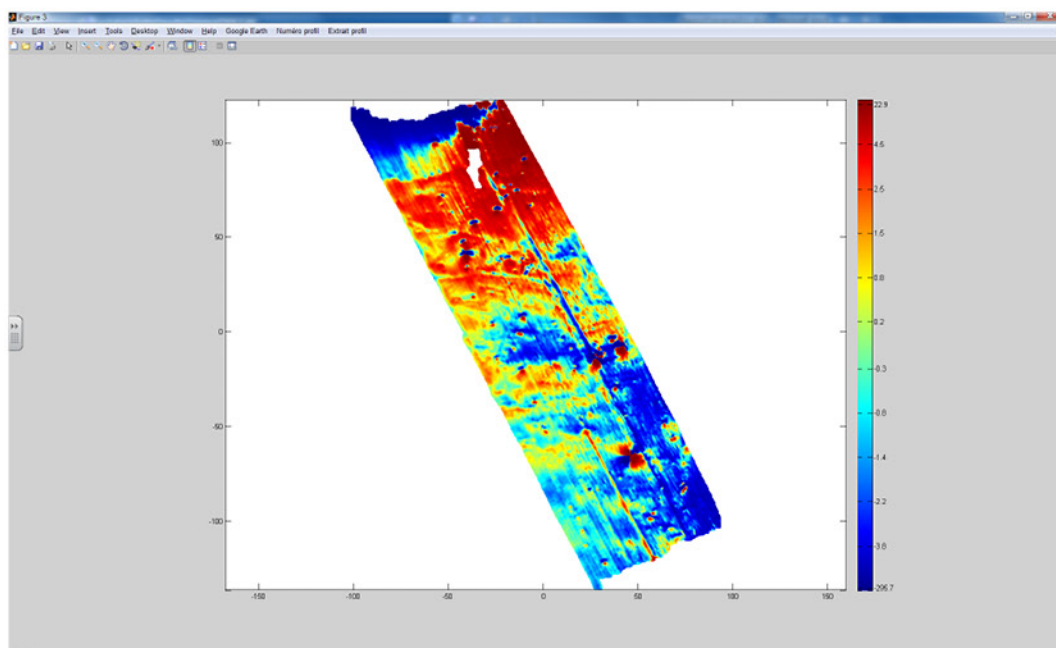


October 7, 2011

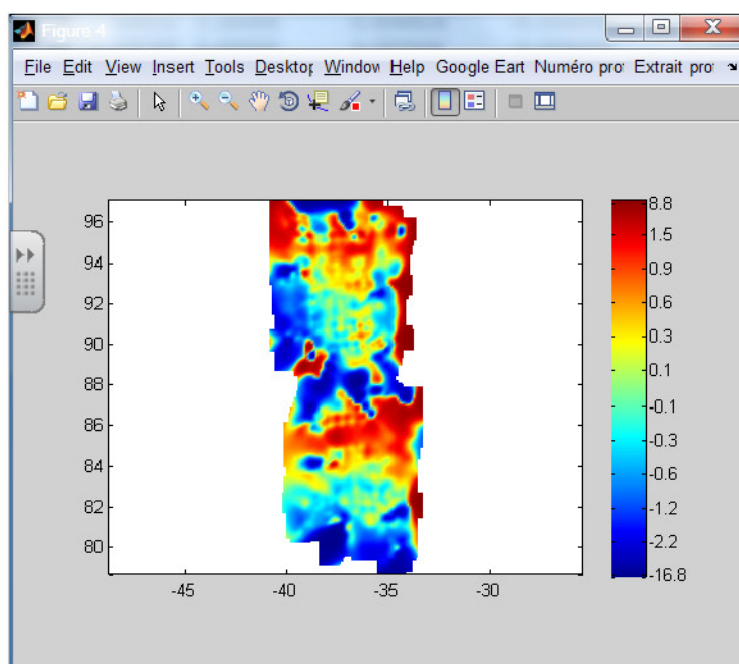
Completion of the northern part. Problem with electronic devices; it does not restart automatically and real-time is stucked. Last file is interrupted as well as calibration at the end.

52

Fichier	Durée (mn)	Longueur (m)	Enregistrements	Nature	Commentaire
07100418.PAT	2,1	42,3	126	Étalonnage	
07100420.PAT	60,8	3474,5	3647	Carto08	
07100547.PAT	21	987,2	1259	Carto08	
07100617.PAT	133,5	6310,6	8010	Carto08 et étalonnage à l fin	
Total	217,4 mn	10814,6 m	13042 enr		



Magnetic map on October 7, 2011



Map of magnetic anomalies in the excavated area



## October 8, 2011

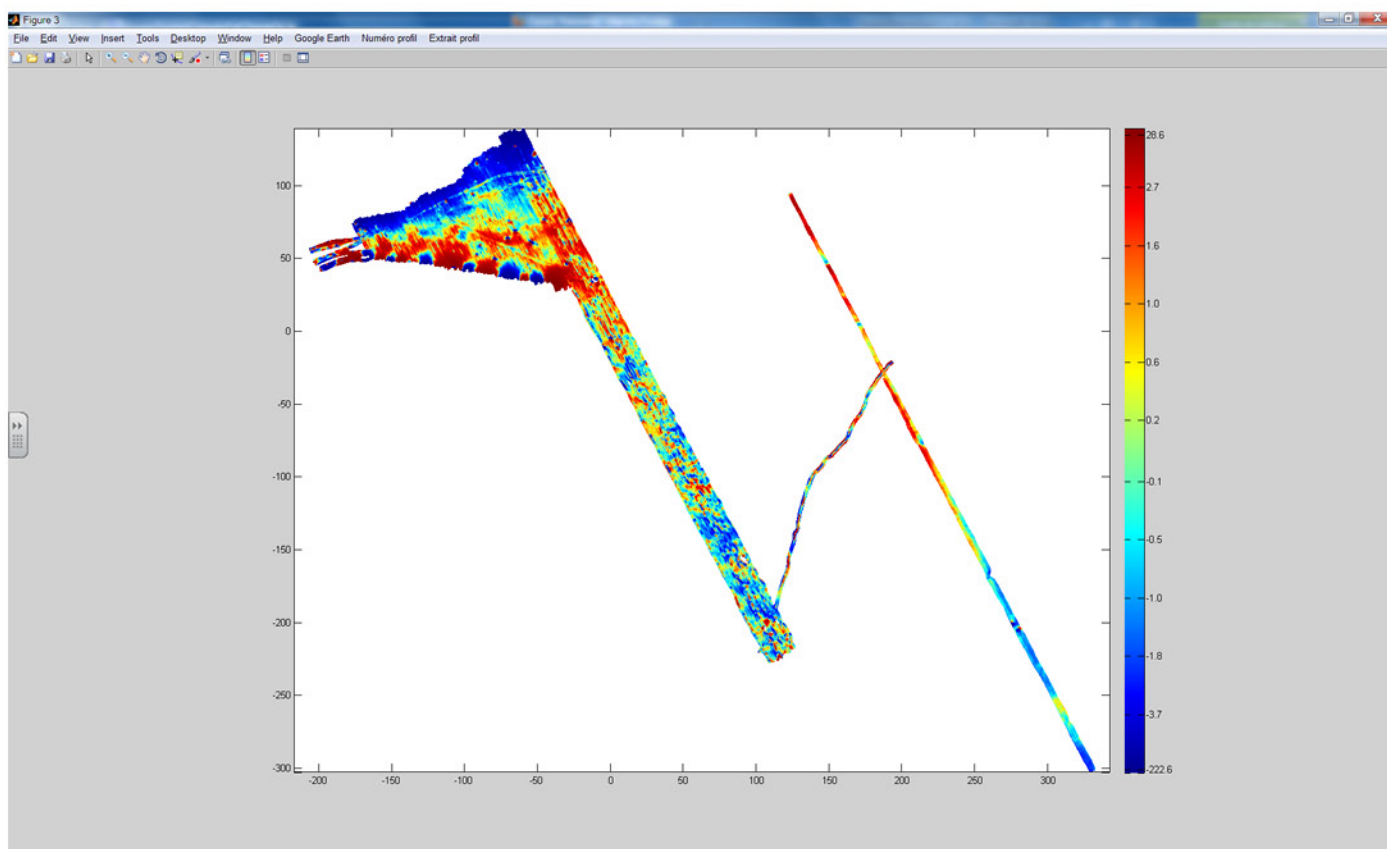
Completion of 2 missing profiles from the day before; then crossing profiles and 5 additional profiles to the west. Last file is interrupted as well as calibration at the end.

Fichier	Durée (mn)	Longueur (m)	Enregistrements	Nature	Commentaire
08100413.PAT	2,1	41	128	Etalonnage	
08100416.PAT	74,2	4280,9	4295	Carto09	Deux profils et traverses
08100531.PAT	2,1	41,4	126	Etalonnage	
08100553.PAT	7	353	419	Carto10	traverse
08100604.PAT	43,7	2259,7	2625	Carto10	5 profils et traverse
Total	132,7 mn	7239,7 m	7964 enr		

## October 9, 2011

Completion of the central area with 1,5 missing profile; end of the mapping to the west.

Fichier	Durée (mn)	Longueur (m)	Enregistrements	Nature	Commentaire
09100408.PAT	2,4	49,5	144	Etalonnage	
09100410.PAT	18,9	833,6	1132	Carto11	
09100435.PAT	78	3548,1	4683	Carto11	
09100557.PAT	108,9	5970	6537	Carto11	Avec étalonnage à la fin
Total	208,2 mn	10401,2 m	12496 enr		



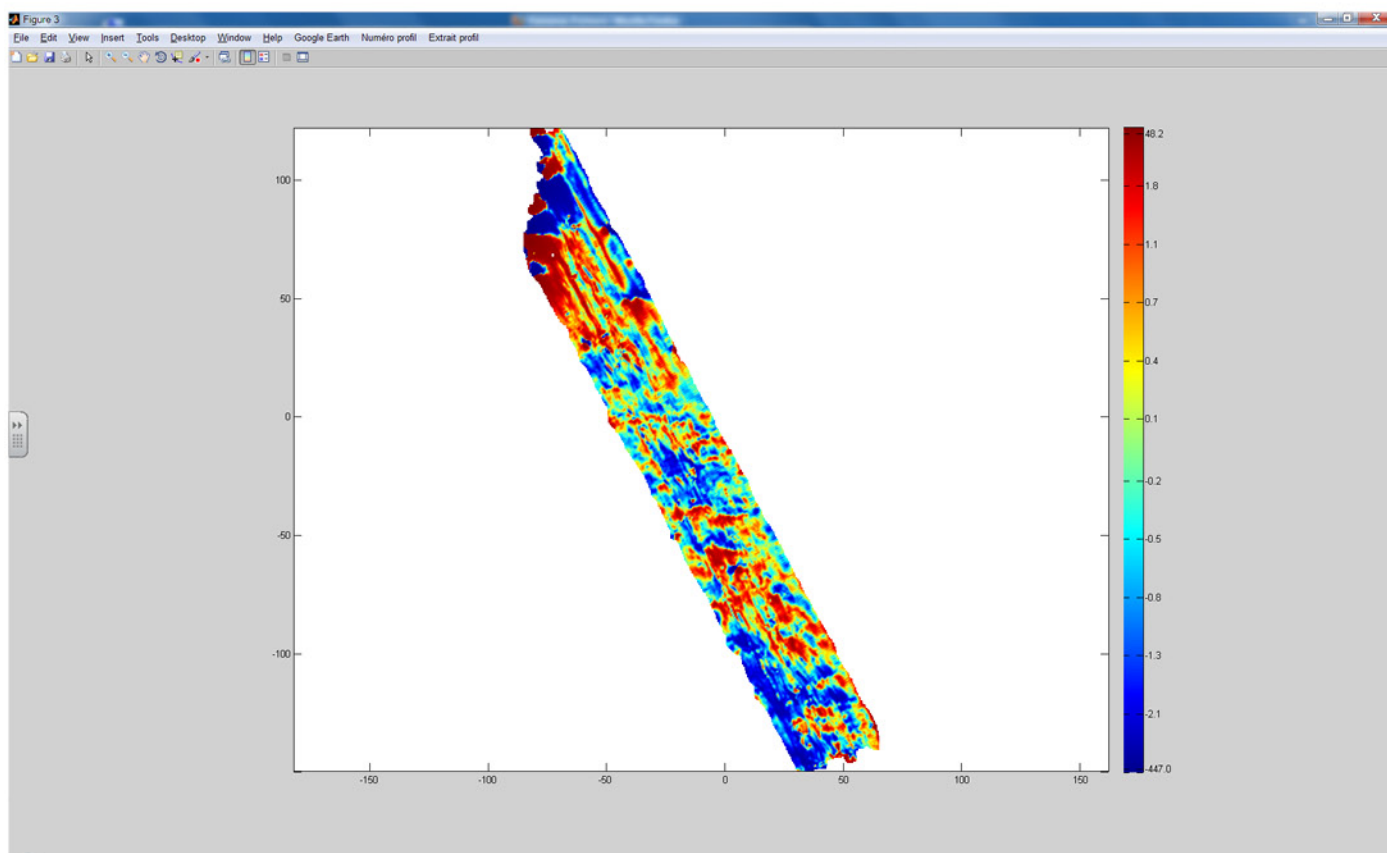
Magnetic map on October 9, 2011

**10 octobre 2011**

Continuation of the mapping to the west by Rozan.

54

Fichier	Durée (mn)	Longueur (m)	Enregistrements	Nature	Commentaire
10100408.PAT	3	41	183	Etalonnage	
10100411.PAT	79,3	3461,8	4757	Carto12	
10100531.PAT	2	24	122	Etalonnage	
10100601.PAT	47,9	1841,6	2873	Carto13	
10100649.PAT	31,9	1160,3	1912	Carto13	
10100721.PAT	2	22,4	122	Etalonnage	
Total	166,1 mn	6551,1 m	9969 enr		

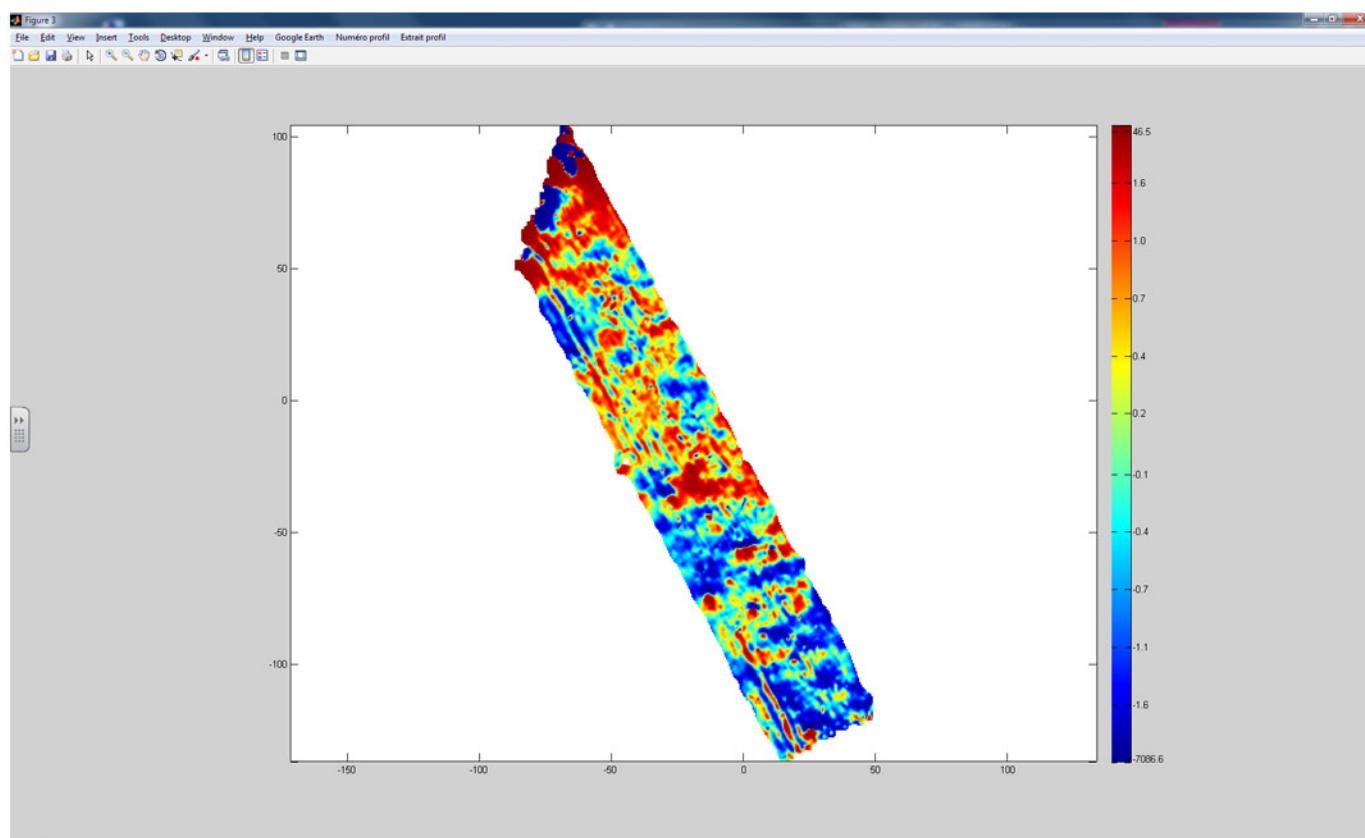


Magnetic map on October 10, 2011

October 12, 2011

Continuation of the mapping to the west by Rozan.

Fichier	Durée (mn)	Longueur (m)	Enregistrements	Nature	Commentaire
12100400.PAT	2,5	21,8	149	Etalonnage	
12100425.PAT	69,6	2839,9	4176	Carto14	
12100600.PAT	46,9	1948,7	2814	Carto14	
12100649.PAT	35,6	1293,6	2135	Carto14	
12100724.PAT	3	35,6	183	Etalonnage	
Total	157,6 mn	6139,6 m	9457 enr		



Magnetic map on October 12, 2011

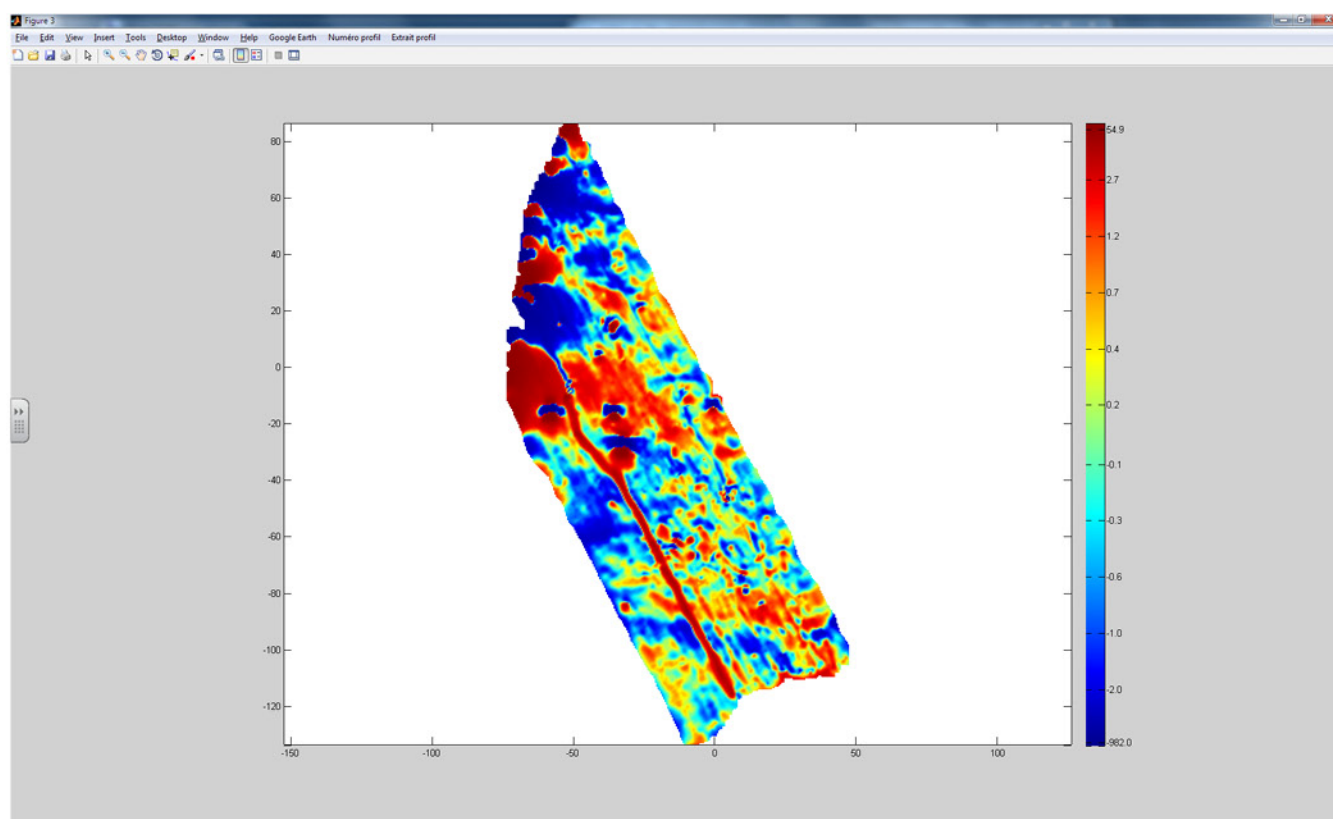


**October 14, 2011**

Continuation of the mapping to the west by Rozan. No measurement on the field on 11 and 13 October (Rozan's sickness).

56

Fichier	Durée (mn)	Longueur (m)	Enregistrements	Nature	Commentaire
14100516.PAT	2,7	29,3	163	Etalonnage	
14100519.PAT	41,5	1527,5	2489	Carto15	
14100601.PAT	44,9	1753,8	2697	Carto15	
14100646.PAT	2,3	29,9	136	Etalonnage	
14100716.PAT	51,4	2218,5	3083	Carto16	
14100807.PAT	44	2031,5	2640	Carto16	
14100852.PAT	1,7	23,6	104	Etalonnage	
Total	188,5 mn	7614,1 m	11312 enr		

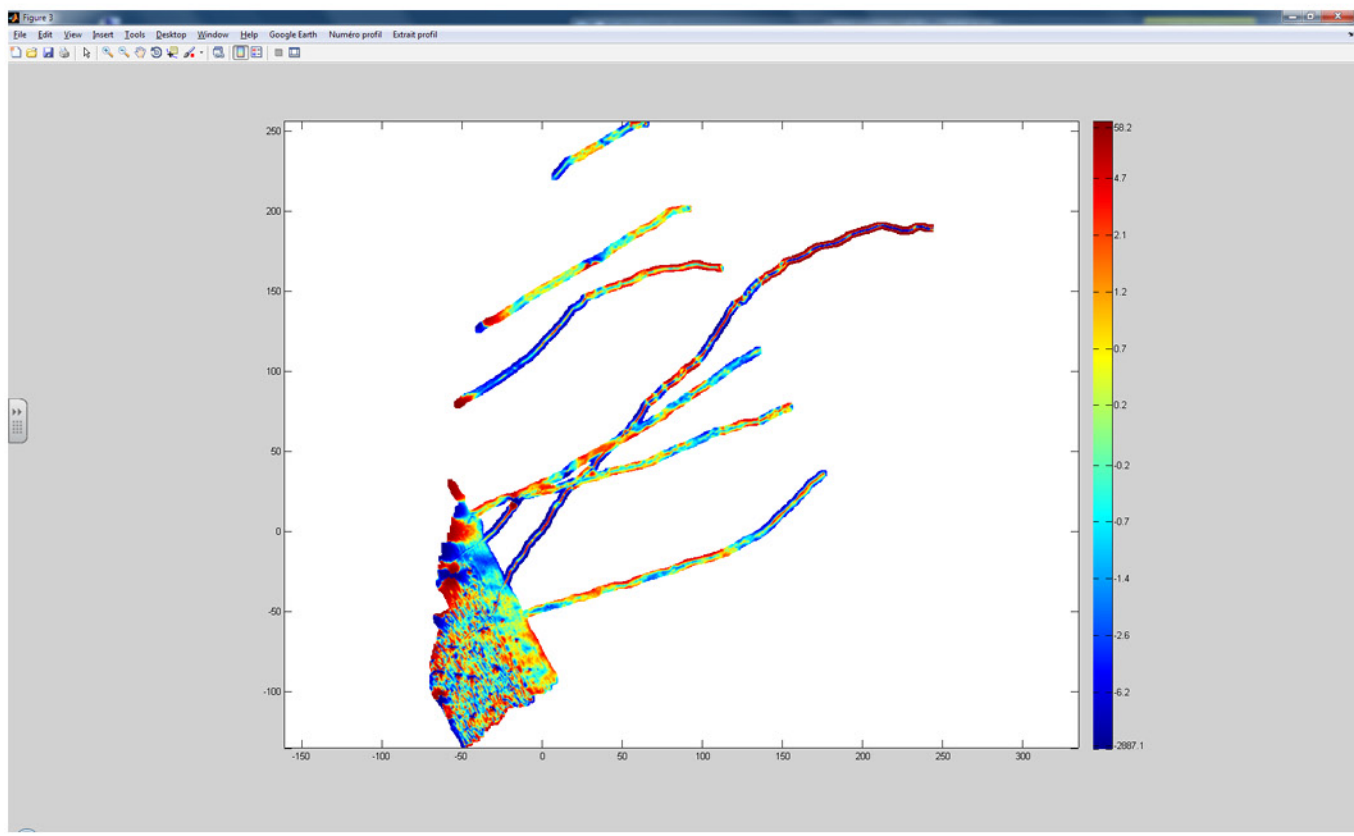


Magnetic map on October 14, 2011

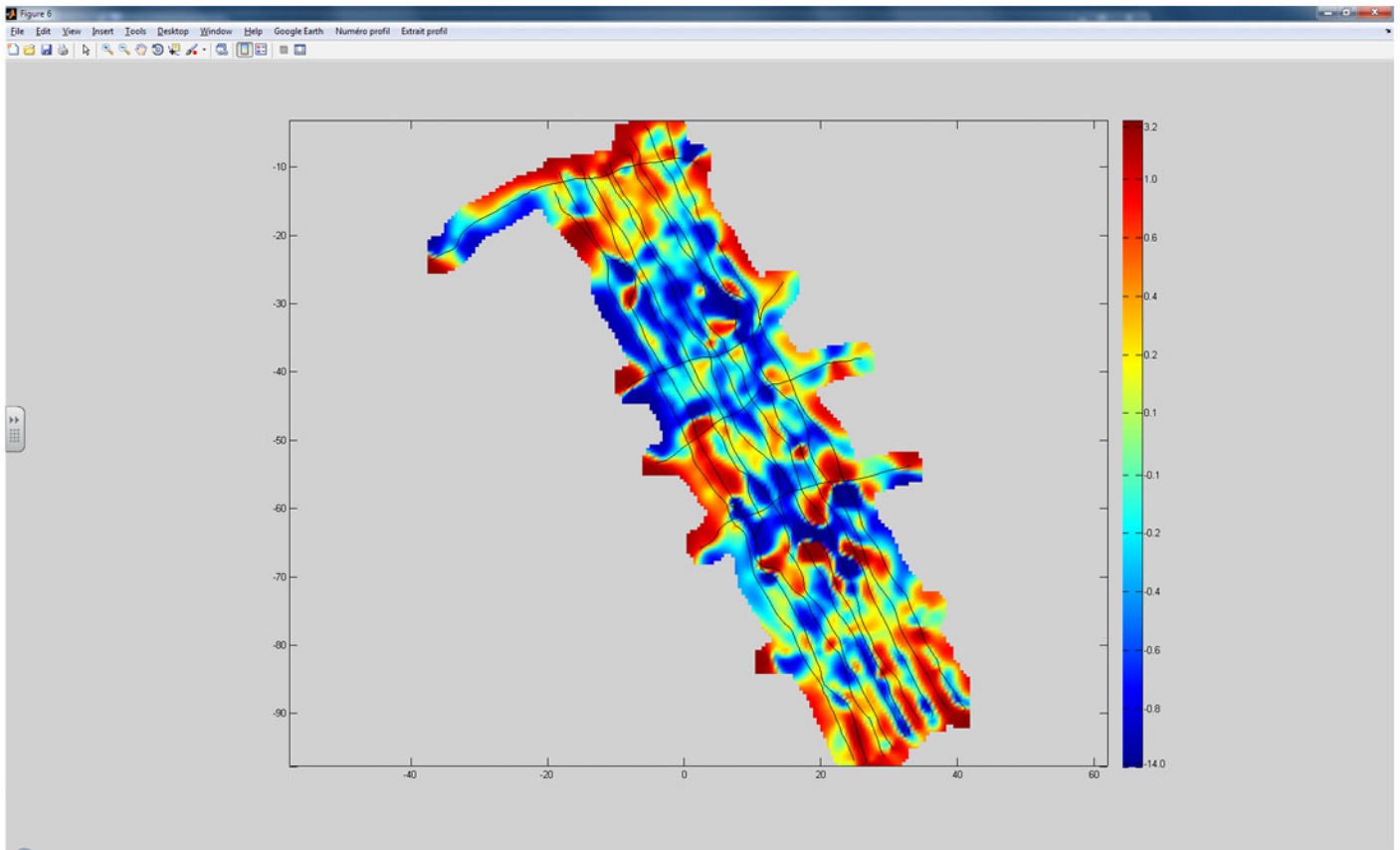
October 15, 2011

Continuation of the mapping to the west by Rozan. Mapping of a small area to the South

Fichier	Durée (mn)	Longueur (m)	Enregistrements	Nature	Commentaire
15100406.PAT	2,9	30,5	175	Etalonnage	
15100413.PAT	36,4	1503,2	2183	Carto17	
15100454.PAT	32,1	1440,7	1929	Carto17	Traverses
15100534.PAT	19,1	686,5	1146	Carto17	Capteur 2 à zéro jusqu'à la fin des mesures
15100609.PAT	45,6	1905,9	2740	Carto17	
15100655.PAT	2,3	27,8	138	Etalonnage	
15100749.PAT	2,3	22,3	136	Etalonnage	
15100754.PAT	6,6	113	396	Carto18	Petite cartographie au sud
15100813.PAT	50	1806,5	3003	Carto18	Problème d'écriture fichier pat. ncapt = 3, alors qu'il est égal à 4 ?
15100904.PAT	1,8	21,3	107	Etalonnage	
Total	199,1 mn	7557,7 m	11953 enr		



Magnetic map no 17 on October 15, 2011



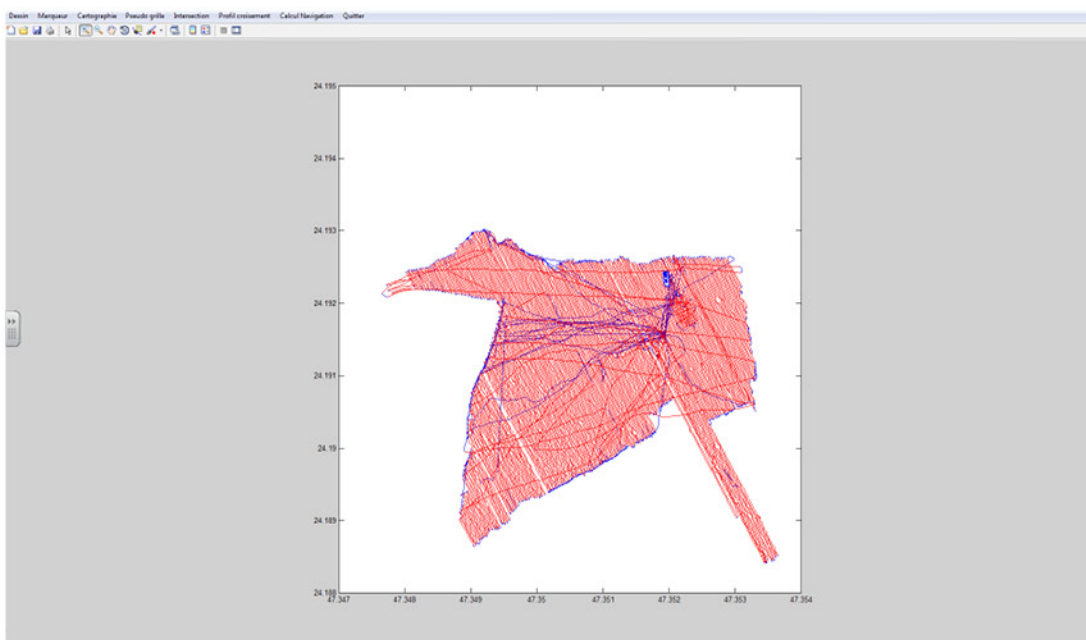
Magnetic map no 18 on October 15, 2011. Very low amplitude and sensor 2 cut out

**Synthesis**

In total 93139,4 m have been covered in 12 days; on 11 and 13 October, no measurement has been taken. The mean distance per day is therefore 7761 m, with a mean speed of 2,7 km per hour. The area that has been mapped is ca. 15 ha wide.

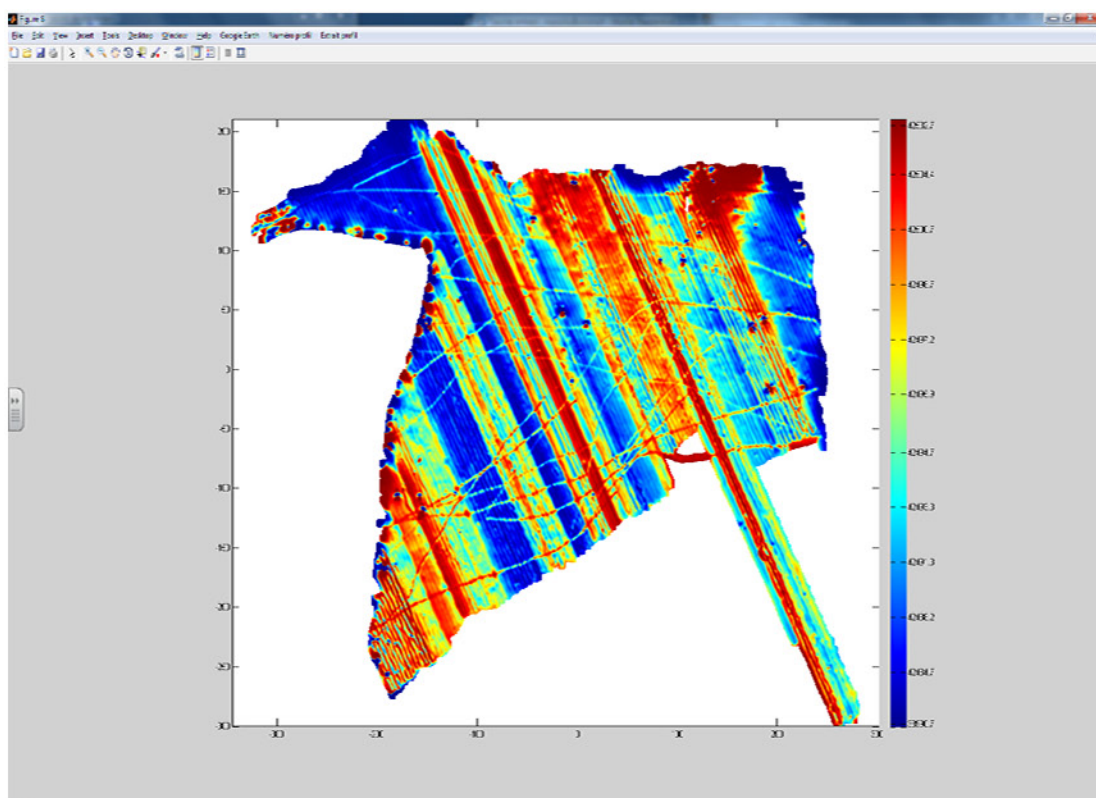
*Cartographic processing - carto01 - carto11*

*Assemblage des cartographies dans Yamama01.mat. Les traverses sont 50, 56, 81, 130-133, 149, 202-212, 287-294, 296, 376-381, 408. Le programme définit les traverses. 40950 points de croisement.*

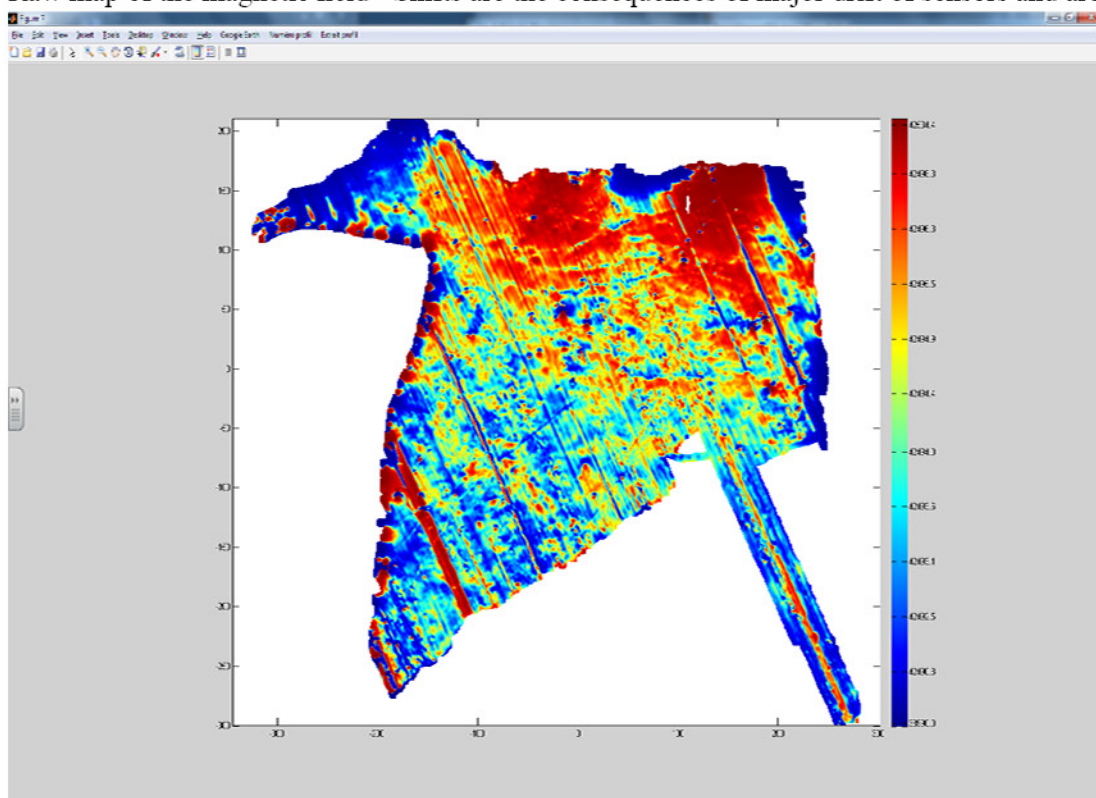


Tracks followed by the operators during the 1st campaign in al-Yamama (2011).





Raw map of the magnetic field - Shifts are the consequences of major drift of sensors and are linked to the heavy heat.



*Anomalie magnétique avec différences de champ aux points de croisement*

*Calcul des différences de champ aux points de croisement avec constante uniquement. Différence de champ avant 10,5 nT, après 4,3 nT. Avec constante et pente on passe à 3,9 nT. Mais défaut habituelle de pente générale sur la grille. On garde la méthode constante.*

*Travail sauvé dans Yamama-01.mat.*

*On recommence en enlevant les profils statiques et certaines portions de données bruitées. Il reste 399 profils. Les traverses sont 45, 51, 122-125, 141, 193-202, 208, 278-285, 287, 367-372, 399. Le programme defnitraverse.m définit les traverses. On obtient 40734 points de croisement. Différences de champ aux points de croisement, avant 10,3 nT, après*

4,3 nT

Sans seuil 40950 avant 10,55 nT après 4,29 nT

Seuil 50 nT, 41011, avant 9,84 nT après 2,45 nT

Seuil 20 nT, 38153, avant 8,07 nT, après 1,84 nT

Seuil 10 nT, 25513, avant 5,11 nT, après 1,61 nT

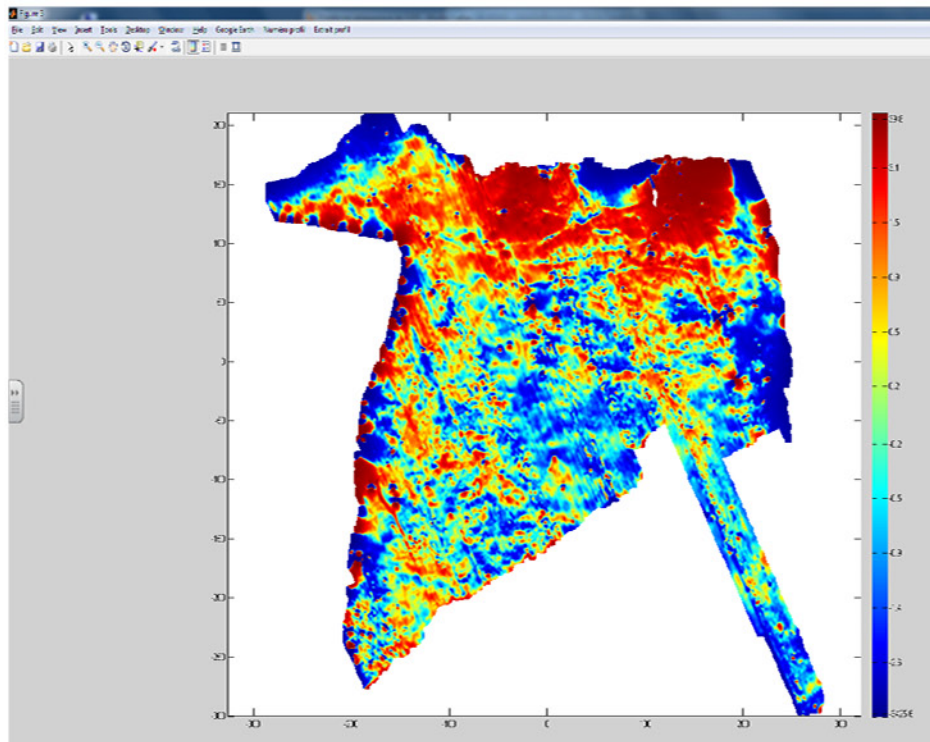
Ensuite MaN = MaO puis pt croisement avec pente.

Résultat mauvais ?? problème sur l'algorithme pente ?

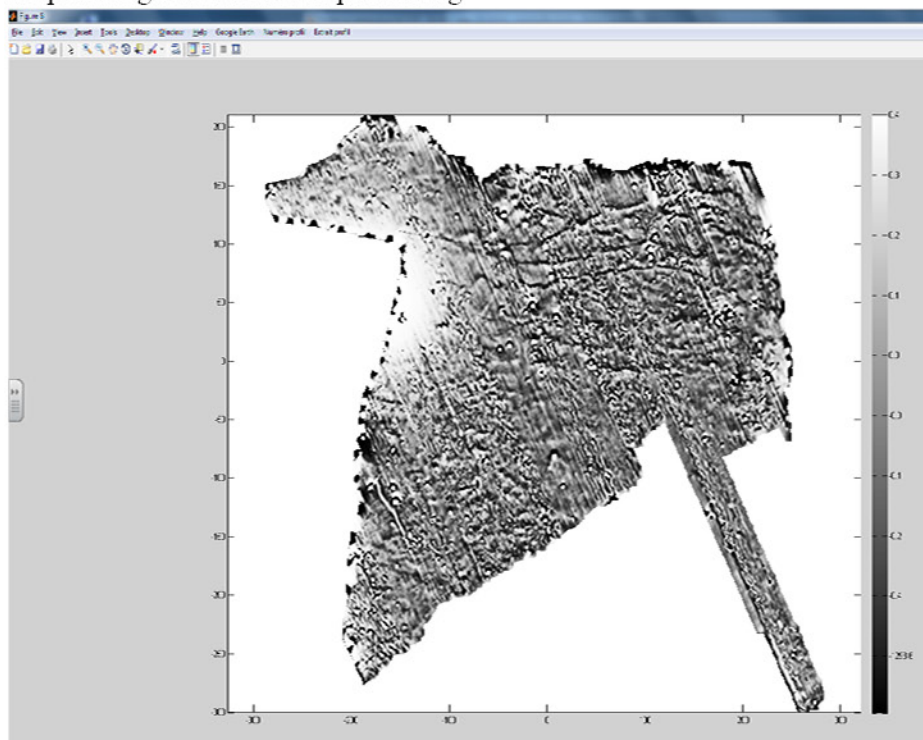
On fait médiane et grille molle puis on fit les données sur la grille molle. Sauvé dans Yamama-02.mat.

Elimination des différences supérieures à 50 nT. Calcule de la grille avec smooth = 0.5. Sauve dans Yamama-02.mat.

60



Map of magnetic field after processing



Dérivée verticale

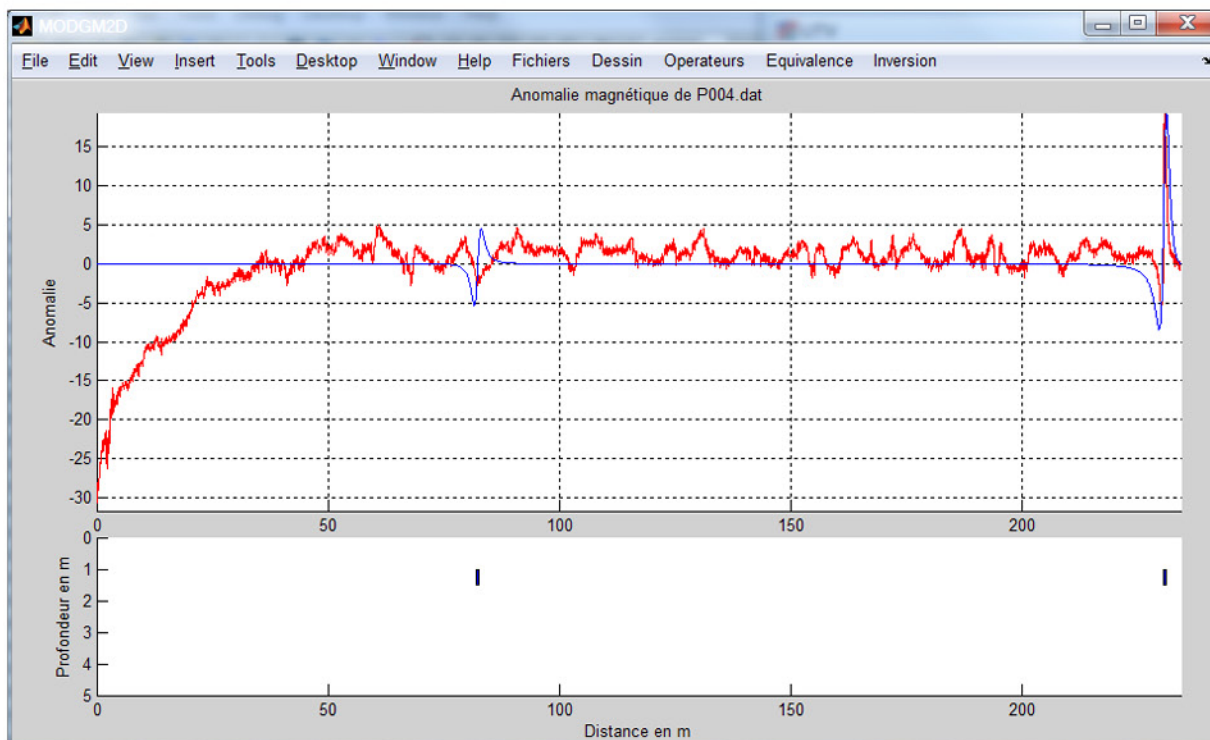
Traitements à poursuivre en recalant les profils ayant les plus fortes dérives.

## 2 dimensions model

Afin de mieux associer les anomalies magnétiques à des objets, on pratique de la modélisation à deux dimensions, c'est-à-dire que les objets sont infinis dans la direction orthogonale aux profils.

### Model of profile 4

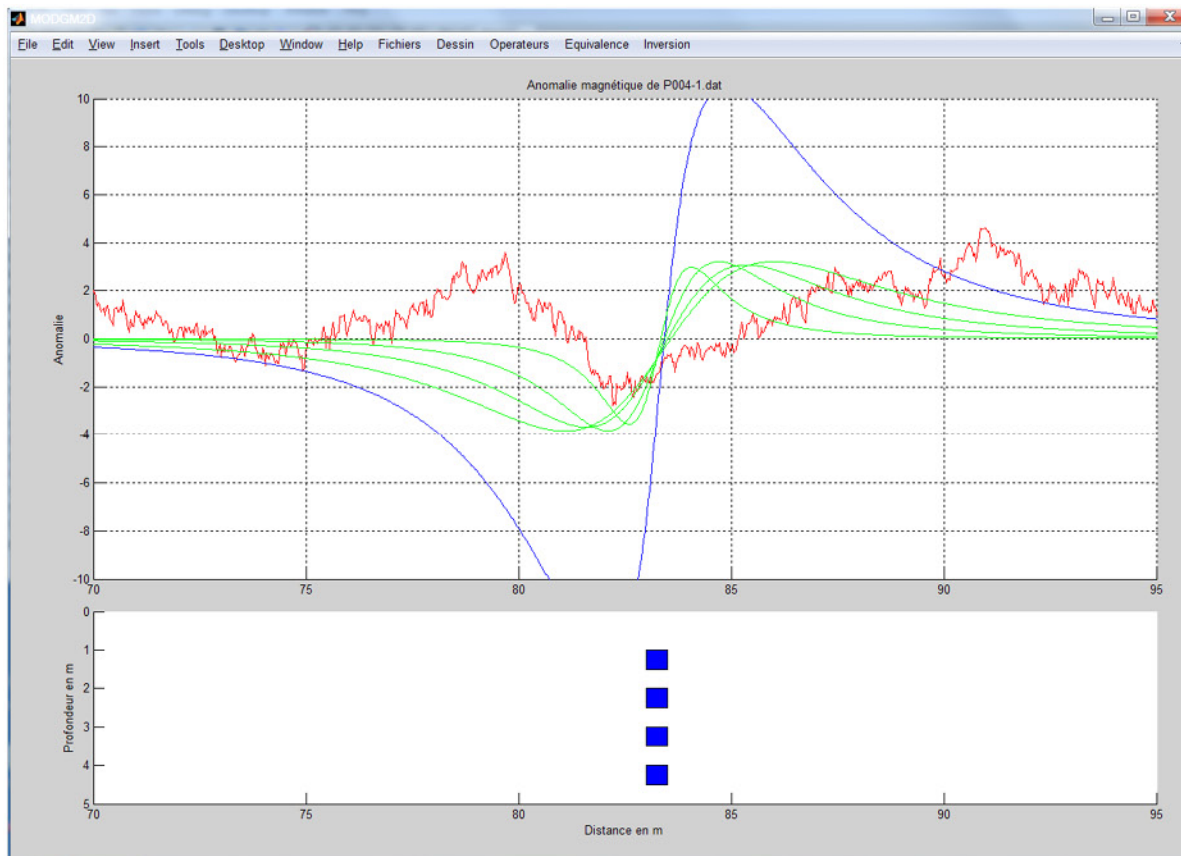
Le profil 4 est orienté N152. Il est représenté ci-dessous en rouge avec les distances en mètres. La décroissance à gauche, c'est-à-dire vers le nord, correspond à l'effet de l'enceinte du site (poteaux métalliques, grillage, béton armé, déchets métalliques). La partie basse de la figure est une coupe verticale du terrain correspondant pour laquelle on place deux objets aimantés en bleu. L'effet de ces objets donne la courbe bleue dans la partie supérieure de la figure. La profondeur donnée verticalement est celle sous le capteur. Le sol est donc à une profondeur de 1 m.



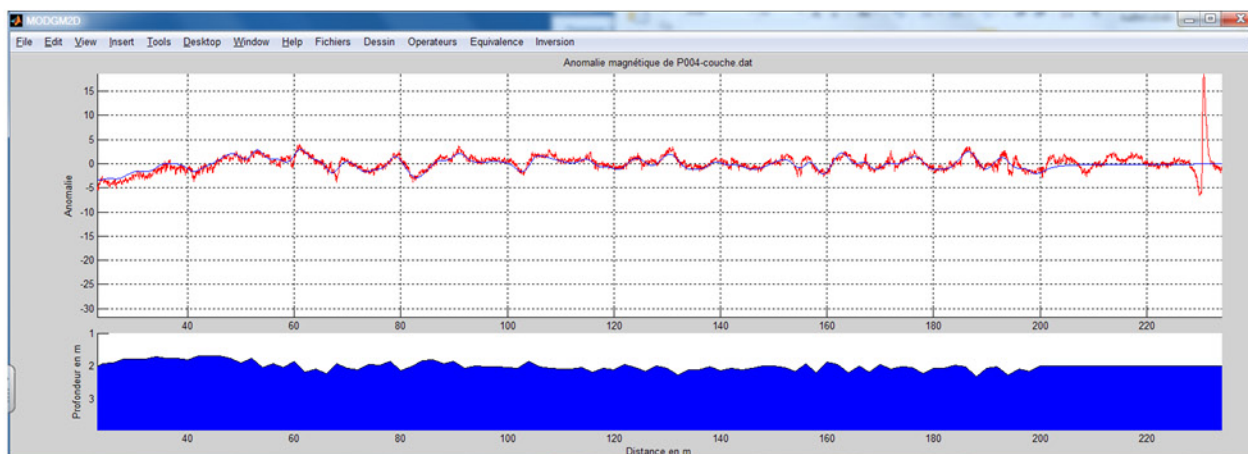
A gauche, on observe que l'anomalie a une trop courte longueur d'onde par rapport aux données. Par contre, à droite, la correspondance est bonne. Il est probable qu'à droite, il s'agisse d'un morceau de métal à la surface du sol. Etant donné qu'il n'est pas infini dans une direction horizontale, cela explique très vraisemblablement la différence de forme entre les données et la courbe du modèle.

L'objet à gauche correspond vraisemblablement à un mur. La question est de voir dans quelle mesure on peut caractériser, sa largeur, la profondeur de son toit et sa hauteur.





Concernant la profondeur, on définit quatre objets de petite taille à des profondeurs de 1 à 4 m. Les courbes vertes sont les anomalies produites par chaque objet. On observe alors que c'est à partir d'environ quatre mètres de profondeur que l'on peut expliquer les anomalies.



Une technique de modélisation différente consiste à définir une couche d'aimantation constante et de calculer la topographie de sa base de manière à expliquer les données. Le modèle obtenu ci-dessus donne donc les variations de profondeur qui expliquent bien les données. La profondeur de la variation d'aimantation est ainsi de 2 m sous le capteur et les oscillations de profondeur sont d'environ 0,5 m.

## Method

### Description of the equipment

Four magnetometers « fluxgate » type Bartington (simultaneous measurement of the magnetic field – arranged at 25 and 75 cm on either sides of the track followed by the operator); they capture data at 1m high above the ground; accuracy: ca. 1 nT; cadence: 30 mesures per second.

Receiver of a GPS Trimble 5800 used for the location of magnetic measurements; accuracy: ca. 10 cm with a cleared sky. The cadence is 1 measure every second. This accuracy can be deteriorated by the presence of buildings or trees obscuring the sky; at worst, losing GPS signal can happen in heavily deteriorated conditions. In such a case, the op-

erator has to walk with a constant pace so as to allow the positioning of magnetic measurements afterwards (by linear interpolation).



Antenna and GPS receiver

4 magnetic sensors

Backpack and pole bearing the electronic measurement system

Each mapping is initiated and ended by magnetic measurements in a fixed reference point so as to calibrate the fluxgate sensors. The mapping itself consists in following a parallel profiles 2 meters from each other ; it allows to obtain a magnetic profile every 0,5 m. Transverse profiles are also realized so as to prevent a possible drift of the magnetic sensors.

An ultra-portable laptop is connected to electronic devices by an internet connection. The laptop records real-time magnetic and GPS data and display them on screen with a software developed with *matlab*. A HMD (head mounted display) device is linked to the laptop and allows the display of data while operator is walking. Only one single operator is required for the mapping process thanks to the presence of a hand keyboard/mouse allowing interactions with the laptop without taking off the back-pack. It is no more necessary to put landmarks nor to be helped by an additional operator checking the path followed by the main operator.

The parameters used for inland navigation are:

P1 : 24.192657°N 47.347336°E

P2 : 24.185304°N 47.351582°E

Length of profiles = 1000 m

Extension = 100 m

Number of profiles = 600

### Data processing

Magnetic and GPS data are stored on a SD flash memory card. The operator can start and stop measurements at any time thanks to a specific device; it also allows to note a specific recording when the button is switched on.

After each mapping, data from the flash memory are downloaded in a laptop and saved. Data processing is done with a specific software developed and updated by the École et Observatoire des Sciences de la Terre. This software allows to control data, to work out a grid with magnetic anomaly. More particularly, the following operations are usually done:

- Reading and control of magnetic data;
- Reading and control of GPS data;
- Calculation of the location of magnetic data by using the GPS data ;
- Check on the start and end of the profiles;
- Check on the magnetic data by editing profiles;
- Calculation of the magnetic anomaly on profiles;
- Calculation of a grid of magnetic anomaly.



## Archaeological soundings

Besides survey and surface study, two soundings (Sounding 1 and Sounding 2) have been done on the site of al-Yamāma (Fig. 36).

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The aim of the **Sounding 1** was to initiate a deep sounding that would provide us with a long stratigraphic sequence and give an idea of the corpus of ceramic for each period of occupation of the site.

Since the Sounding 1 only yielded artefacts from non-domestic contexts – it includes a monumental building (Building 1, most probably a mosque) and open-air areas (streets, waste area) –, the **Sounding 2** was opened in a house (Building 2) built to the South-East of the Building 1, in area O7. It provide us with faunal and ceramic material from a domestic context.

The two last days of excavation, 19 and 20 October, were devoted to the filling up of both the soundings to preserved the mudbrick structures until the intervention of a specialized restorer.

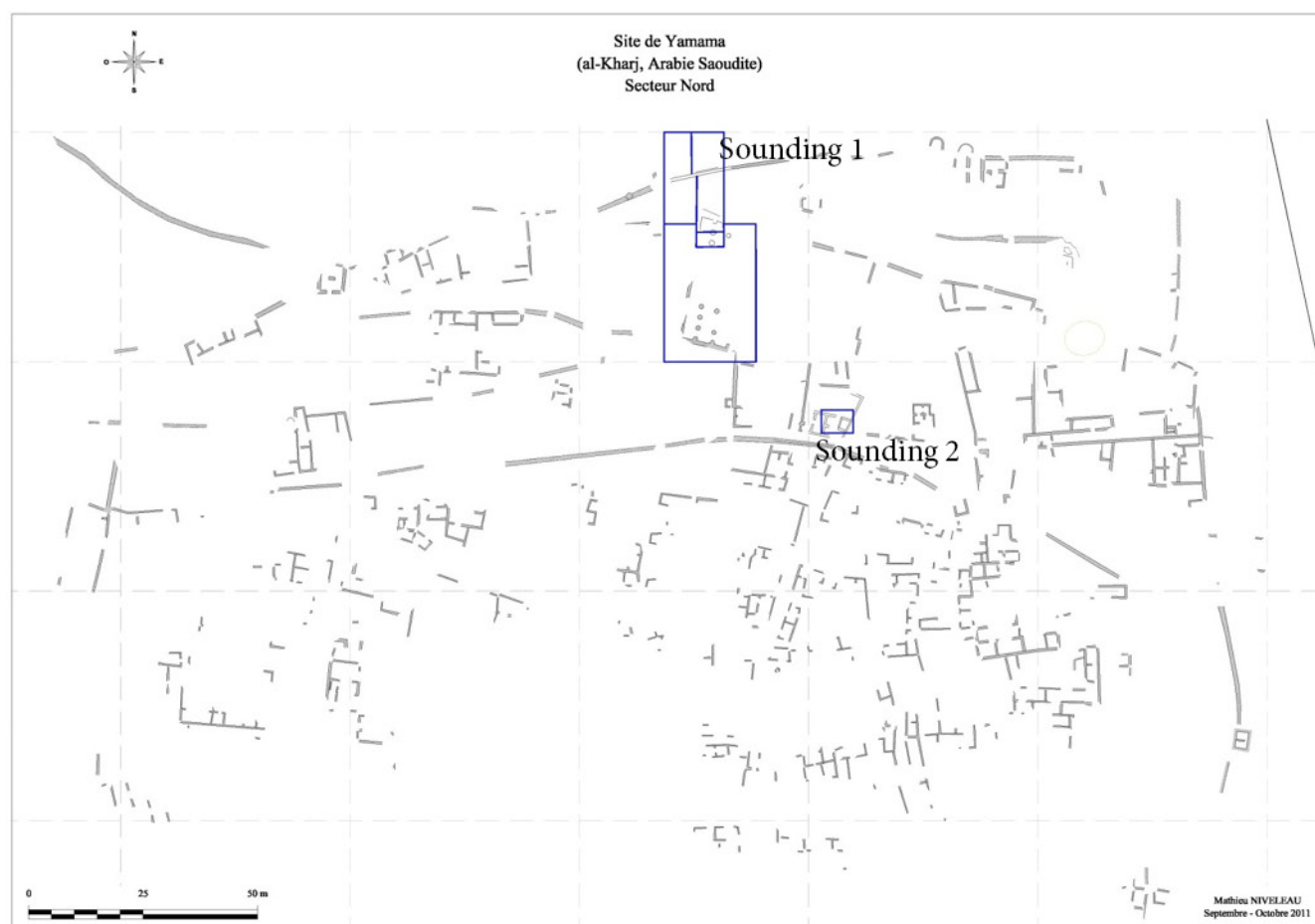


Figure 36: Location of Sounding 1 and 2

### Sounding 1

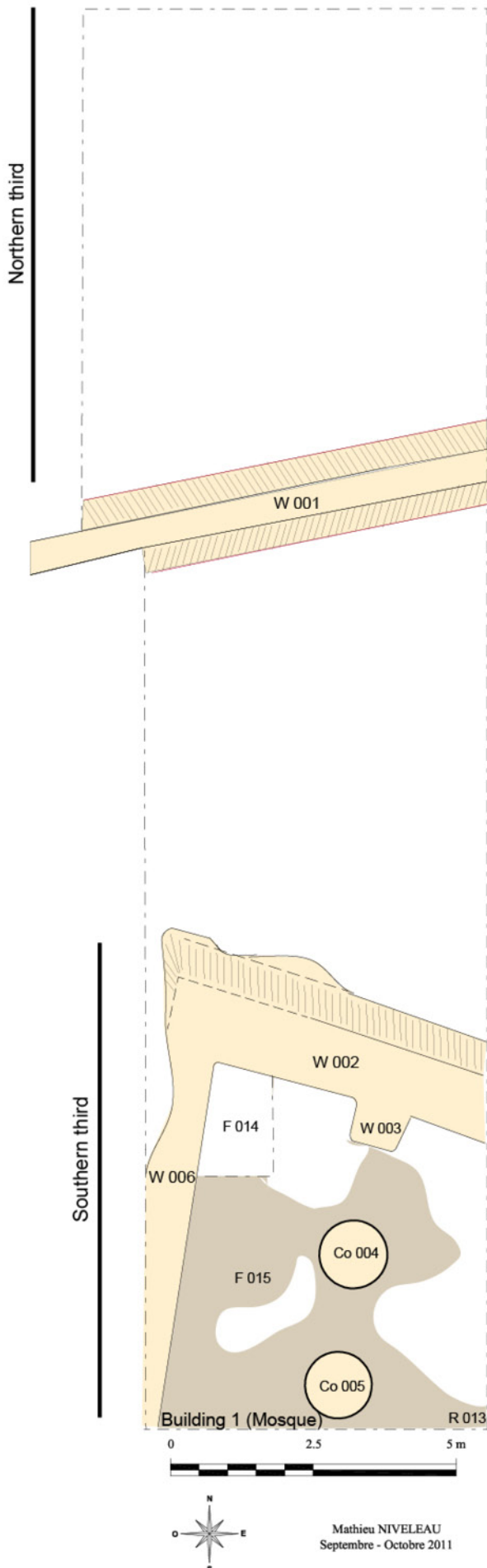
We choose to settle the sounding to the north of the site in a place where the difference in altitude between the higher point and the lower one was sufficient enough to foresee many superimposed occupation sequence in a same place. Moreover, the proximity of a large building with columns visible on the ground, at the top of the excavated mound, was also attractive.

In the square N6 (50 x 50 m), an area of 13 x 25 m oriented N-S was delineated and constituted the frame of this large sounding.

After having removed aeolian deposit from the surface (UF 001), several structures have been unearthed (Fig. 37). They made possible to divide schematically the sounding in three parts :

- the northern third of the sounding is located north of a long mudbrick wall, oriented E-W.
- the central third is located south of this wall and north of a large structure (Building 1).
- the southern third corresponds to the inner part of Building 1.





In the **northern third of Sounding 1**, Wall 001, a mudbrick wall, cuts the sounding crosswise (E-W). North of it, a deep layer of aeolian sand accumulated against the wall has been removed (UF 003). It covered a circulation level (Floor 011) made of hardened sand mixed with melted mudbrick including many bones. It can be seen has a waste deposit. Under this deposit, a thick layer of sand (UF 008) has been removed, down to the basis of W 001. It also contained a large number of bones (mainly camel bones).

The base of Wall 001 has been reached 1.5 m under the surface, at the end of the 2nd week. After having narrowed the area with 1m-wide security bench on the West, South and East side, a thick layer of aeolian sand deposit (UF 012) has been removed (ca. 1.7 m deep). It only included bones that can be seen as remains of waste deposits.

At the base of this layer, a layer of melted mudbrick has been cleared (UF 018-UF 021) [Fig. 38]. Its top is ca. 2 m below the foundation of the Building 1 and characterizes an older occupation. The ceramic material however is not distinct enough to show any evidence for a long interval between these 2 occupations. Only C14 dating will make the duration of the gap between the 2 occupations more accurate.

In the collapsed mudbricks layer, no structure has been clearly evidenced.

**In the central third of Sounding 1**, between Building 1 to the south and W 001 to the north, several layers have been removed:

- Surface aeolian sand (UF 001)
- Aeolian deposit (UF 002)
- Layer of collapsed mudbricks coming from the building to the south (UF 004)
- Sandy accumulation under this collapse (UF 005)
- A circulation level (UF 010): North of the glacis of W 002, under the destruction layer UF 004, a hardened layer made of melted mudbrick and hard sand being most probably a circulation level. To the north, at the foot of W 001, a floor made of melted mudbrick has been unearthed (equivalent to F 011, north of W 001). The sediments have been screened: many bones and sherds were isolated.

- An accumulation level (UF 015): sandy layer partially covered to the south by a layer with pebbles and melted mudbrick.

The sediments have been screened: many bones and sherds were isolated.

- A construction layer (UF 017): to the north, layer of aeolian sand; to the south, sand recovering a hardened ground made of melted mudbrick, nodules of mudbrick and pebbles. This is probably the base of the trench dug for the construction of the walls W 002 / W 006 belonging to Building 1 (mosque).

Figure 37: sketch map of Sounding 1





Figure 38: Collapsed mudbrick structures at the bottom of the northern third of Sounding 1

**In the southern third of Sounding 1**, part of a large columned building visible on surface was excavated. Two perpendicular walls have been put to light (Wall 002, turned E-W, and Wall 006, turned N-S). They delineate the north-west corner of the columned building.

The first two weeks were devoted to the unearthing of the two surrounding walls of Building 1 (W 002 and W 006), of an abutment (W 003) and of two circular columns (Co 004 and Co 005), and to the removal, in the northern half of this area, of a layer of collapsed mudbrick (UF 006). The room excavated has been registered as R. 013. The 3rd week was devoted to the excavation of the northern half of this room. The 4th week was devoted to the extension of this excavation to the whole southern third of Sounding 1.

The succession of excavated layers is as follow:

- A layer of collapsed mudbrick recovered by post-abandonment deposits (UF 006 = UF 007 and UF 014): layer of hardened sand mixed with fragments of mudbrick alternating with layers of melted mudbrick.

- A late occupation level (UF 011 = UF 016): several thin horizontal layers of sand hardened by water thrown on it testify of circulation levels. One of these layers showed imprints of a mat made of palm-tree leaves (Floor F 014) [Fig. 39]. The best preserved part of this floor has been preserved by the way of a wood shoring, in the NW corner of R 013, and recovered with loose sand, in prospect of its restoration.

- A former occupation level (UF 013 and UF 019): 20 to 30 cm under floor F 014, by removing layers of hard sand alternating with layers of soft sand, unearthing of an ancient



Figure 39: Imprint of palm-leaf mat on the floor F 014 of Building 1



floor F 015, probably the main floor of the large columned building. It is made of hard plaster abutting the walls and column Co 004 and Co 005 [Fig. 40]. The plaster floor is not preserved in the whole room R 013. All the sediments have been screened. Only 3 sherds have been found, all of them being not very indicative for the dating or the provenience.



Figure 40: North-western corner of Building 1 with two columns unearthed (Co 004 & Co 005) - The room R 013 has a plaster floor (F 015) – on the left, in the foreground, preserved part of F 014 with mat imprints.

- The excavation stopped on this layer, that characterizes one of the main phase of occupation of the Building 1. A deeper sounding will be needed next year to check the presence of possible older level of occupation in the building.

#### Several evidence indicate that Building 1 was most probably a mosque:

- One can see on the ground that Building 1 is large (28 x 13 m) and comprised most probably only a single room, with at least 2 ranks of 10 columns;
- One can see on the ground that Building 1 was opened onto a large courtyard to the east (28 x 24 m);
- One can see on the ground that Building 1 had a square recess built in the centre of the western wall, the *mihrab* of the mosque [Fig. 41].
- The excavation yielded very few artefacts in spite of the screening of earth and rubbles, which is in agreement with the interpretation of a mosque.
- The excavation led to the unearthing of a floor carefully plastered. After sand had accumulated above this floor and had hidden it, the ground was hardened with water and palm-leaf mats were put on it, leaving imprints still visible.

Considering the very good state of conservation of the building [Fig. 42], preserved up to 2 m high, the excavation of the whole building and its restoration are to be foreseen for the next campaign. Waiting for this step, the 2 columns already unearthed have been protected with sandbags and the excavated area has been carefully filled up with loose sand.



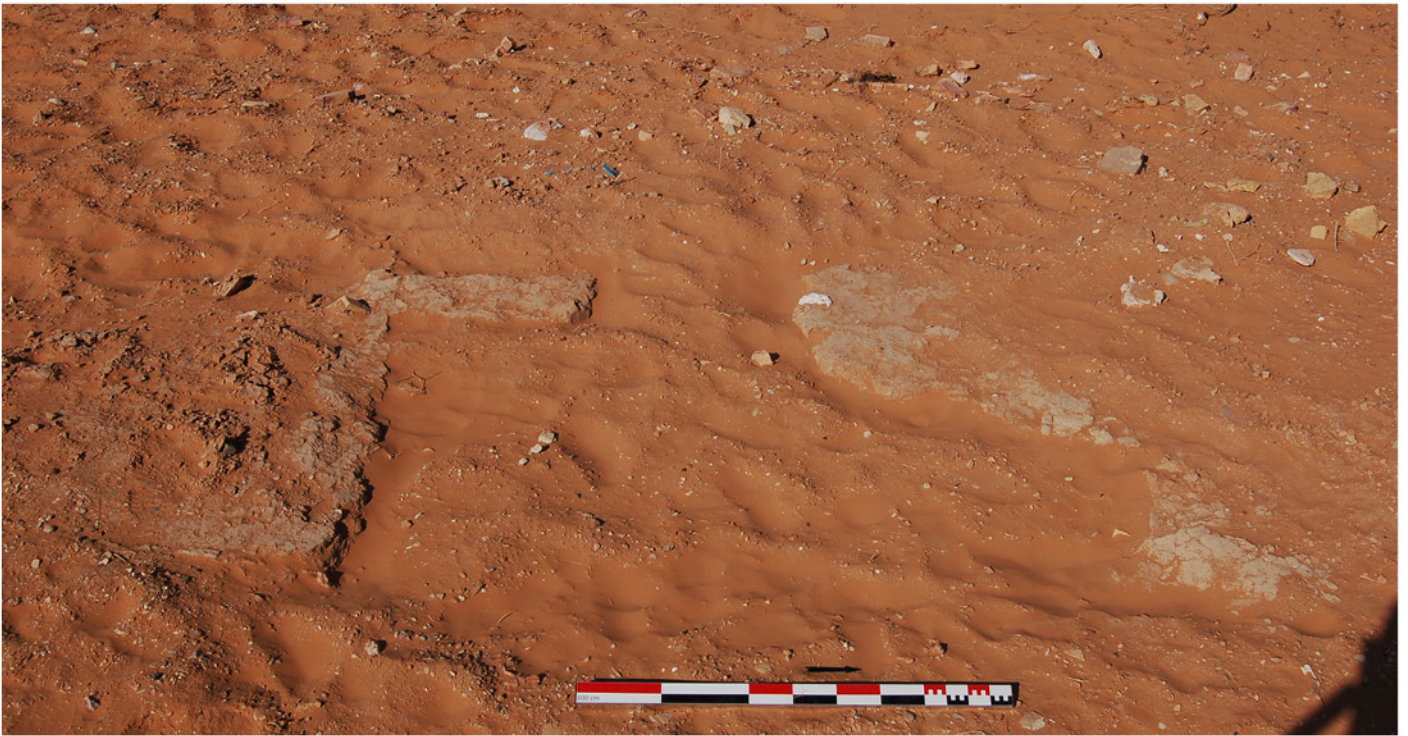


Figure 41: Recess in the middle of the western wall of Building 1 (*mihrab*).



Figure 42: North-west corner of Building 1, preserved on more than 1 m high







*Sounding 2*

A rectangular area measuring 7 x 5 m and oriented North-South/East-West was defined over two of the seven rooms of Building 2 [Fig. 43].

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Figure 43: Sounding 2 (Area O7) - Rooms R 108 & 109 of Building 2

In room R 108, a succession of layers has been excavated [Fig. 44]:

- Aeolian sand deposit (UF 100);
- Collapsed mudbrick structures (UF 101a);
- Aeolian deposit following the abandonment of the house (UF 101b);
- Late occupation level made of sand and ashes coming from the emptying of a mudbrick oven (UF 102/R108). An oven and many stone tools linked to cooking activity were found on the ground;
- Early occupation level continuing to the west under wall W 102 in Room R 109 (UF 103).

In room R 109, only the late occupation has been unearthed [Fig. 45]:

- removing of aeolian sand deposit (UF 100);
- removing of melted mudbrick corresponding to the collapse of the upper part of Building 2 (UF 101);
- unearthing of the late occupation level (UF 102/R109): a hardened ground was recovered with sand and ashes coming from the emptying of a hearth in the very centre of the room.

This area was also used for domestic activities (cooking/craft).

The lack of time did not ensure the entire excavation of these two rooms. Up to now, 2 phases of occupation at least have been put to light: a first one during which R 108 and R 109 constituted a single room; a second one when this room was divided in two rooms, both of them having been used for domestic activities (most probably for cooking).

A large number of bones come from the excavation of R 108 (especially from the ashy layer (UF 102)). Concerning the preliminary conclusions on the species attested, cf. the zooarchaeological report below.



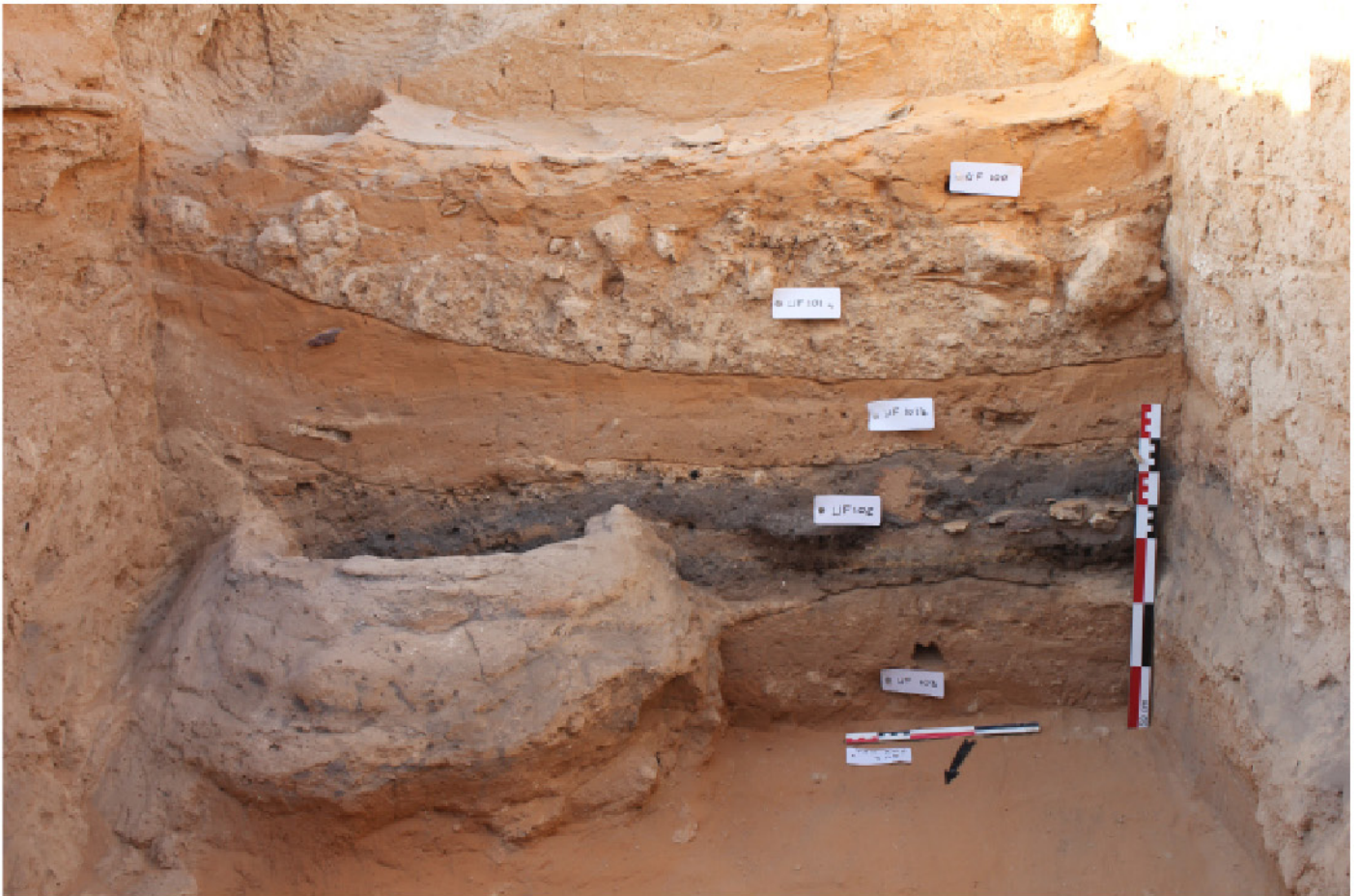


Figure 44: Stratigraphic section of Room R 108



Figure 45: stratigraphic section of room R 109



## Zoo-archaeological study

By Hervé Monchot

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One of the first things you notice while walking on the archaeological site of al-Yamāma, is the abundance of bones on the surface spread everywhere, a result primarily of an intense weathering, the wind action causing sometimes concentrations. It is therefore not surprising to find many faunal remains during this first season of archaeological excavations. Without going into detail, two contexts can be distinguished:

- The bone material came from a filling area or a waste area, essentially in the angle NW of area N6, the north of the ancient Mosque;
- The bone material came from an anthropogenic occupation (floor), essentially in the area O7 where two housing rooms were excavated (R 108 & R 109). Thus, the discovery of many burnt bones associated with an oven (tabūn/tannūr) in room 108 allow us to better understand the alimentary habits.

The analysis of the faunal data is in progress (i.e., quantification in NISP/MNE, skeletal profile, mortality curve etc.). Nevertheless, it is already possible to note some trends regardless of the archaeological context.

### The consumed species

#### The major species (in number of rests)

- From antiquity onwards, the camel (*Camelus dromaderius*) has played an important role in human exploitation of desert regions. It's so not surprising to find camel bones in all stratigraphic unit. If the presence of numerous cutmarks (Fig. 46) and burnt bones undoubtedly attests consumption, the presence of old individuals suggest that they have been rejected as such after their death, at the base of some walls or in filling area (middens). The several uses of the camel are a dietary element, a beast of burden, a source of raw material for artefact manufacture and a cultural symbol<sup>4</sup>.
- Based on teeth eruption/abrasion, the al-Yamāma assemblage does however give the impression of a mortality pattern dominated by mature/older animals. The predominance of adult camels corresponds well to an age profile expected for pack animals. According to Horwitz and Rosen (2005)<sup>5</sup>, three different camel management strategies based on male-female ratio and age profile – one for milk, a second for meat and a third for transport/draught – could be expected. Furthermore, they noted that camel herd composition is expected to differ between an urban site, a camel caravan and herds kept by nomadic camel herders. These assumptions can be tested on al-Yamāma material, trying to identify the sex ratio by a modern statistical method, the mixture analysis<sup>6</sup>. This analysis is based on the premise that males are larger than females.

Present in: UF 001, UF 002, UF 003, UF 004, UF 005, UF 008, UF 009, UF 010, UF 012, UF 015, UF 017, UF 018, UF 020, UF 021, UF 100, UF 101 (in R108, R109), UF 102 (in R108, R109, St. 114), UF 103 (in R108).

- The ovicaprids, goat (*Capra hircus*) and sheep (*Ovis aries*), are well represented too. These animals are a good source of meat, milk and wool, but the scarcity of teeth limits the study of age at death.

Present in: UF 001, UF 002, UF 003, UF 004, UF 005, UF 007, UF 008, UF 009, UF 010, UF 012, UF 015, UF 017, UF 018, UF 020, UF 100, UF 101 (in R108, R109), UF 102 (in R108, R109, St. 114), UF 103 (in R108).

- Most surprising, a small gazelle (*Gazella* sp., Fig. 47) was largely consumed by the inhabitants of al-Yamāma, suggesting an important hunting activity. A biometric study should determine the species of gazelle (e.g., the Arabian gazelle, *Gazella arabica*; the mountain gazelle, *Gazella gazella* etc.). It's important to note that the Arabian gazelle, the smallest one, was an elusive gazelle that was apparently hunted to extinction in its Middle Eastern homeland, Saudi Arabia.

Present in: UF 001, UF 002, UF 003, UF 004, UF 008, UF 010, UF 012, UF 015, UF 017, UF 020, UF 101 (in R 108), UF 102 (in R 108), UF 102 (in R 109),

#### The minor species (in number of rests)

- Several elements suggest the presence of a medium sized antelope (*Oryx leucoryx*) among the assemblage (for instance in UF 012, UF 020 and in UF 102 (in R 108)). The Oryx is often cited but rarely abundant among faunal

4 Studer J., Schneider A., 2008. Camel use in the Petra Region, Jordan: 1st century AD. In, Vila, E., Gourichon, L., Choyke, A.M. & Buitenhuis, H. (Eds.). *Archaeozoology of the Near East VIII*, 2. International Symposium on the Archaeozoology of Southwestern Asia and Adjacent Areas, 8, Lyon: Maison de l'Orient et de la Méditerranée, p. 581-596.

5 Horwitz L.K., Rosen B. 2005, A review of camel milking in the Southern Levant. In Mulville, J. & Outram, A.K. (Eds), *The Zoo-archaeology of Fats, Oils, Milk and Dairying*, Proceedings of the 9th ICAZ Conference, Durham 2002, Oxbow Books, Oxford, p. 121-131.

6 Monchot H, Léchelle J. 2002. Statistical non parametric methods for the study of fossil populations. *Paleobiology*, 28(1), p. 55-69.

archaeological assemblage of the Arabian Peninsula. Historically the Oryx probably ranged throughout most of the Middle East. In the early 1800s they could still be found in the Levant, the Transjordan, much of Iraq, and most of the Arabian Peninsula. During the 19th and early 20th centuries, the range of the Arabian Oryx was pushed back towards Saudi Arabia, and by 1914 there were only a few survivors outside that country.

- The ostrich (*Struthio camelus*) is represented by two fragment of eggshell found in the UF 102 (in R 108) of the housing 2 and in UF 015 (Fig. 47). Other remains of eggshell were also uncovered across the surface on the site (i.e., sector P9). The Middle Eastern Ostrich or Arabian Ostrich (*Struthio camelus syriacus*) is an extinct subspecies of the ostrich which once lived on the Arabian Peninsula and in the Near East. Ostriches also appear frequently on petroglyphs from prehistoric time and then in Islamic verse, especially in the poetry from Arabia itself, where the birds were common. The pleasures of ostrich hunting, for example, were extolled, and large numbers of ostriches and eggs were considered an indication of prosperity<sup>7</sup>.
- Only, one skull (Fig. 47) and a distal fragment of a tarsometatarsus found in UF 102 (in R 108) represent the domestic fowl (*Gallus gallus* f. *domesticus*). The scarcity of remains of these kinds of bird can be explained by the non-systematic screening of the sediment.
- A right carpometacarpus of spotted sandgrouse (cf *Pterocles senegallus*) found in UF 101 (in R 109) is present and could be consumed.

## The non-consumed species

### Domestic species

- Some remains of donkey (*Equus* cf *asinus*) were discovered in UF 003 and in UF 101 (in R 109). Like the camel, the donkey is mainly used as a beast of burden.
- Some remains attest to the presence of a large canid in UF 003, in UF 101 (in R 108) and in UF 102 (R 108), probably a dog (*Canis lupus* f. *familiaris*).
- Two mandibles, one right and one left belonging to the same individual, of a cat (*Felis silvestris* f. *catus*), were found in UF 102.

These animals do not appear having been consumed as suggested by the absence of cutmarks. If the cats are considered as Holy animals in Islam, the Muslims generally cast dogs in a negative light because of their ritual impurity.

### The wilds species

- In the UF 012, two mandibles, right and left, show clearly the presence of a small-sized canid, certainly a fox (*Vulpes* sp., Fig. 47). The exact species will be determined (e.g., red fox, Ruppell's fox or Blanford's fox). A small canid is represented too in UF 001 by a proximal radius.
- A rear of a skull found in the UF 012 (Fig. 47) and a right hemi-mandible of a honey badger or ratel (*Mellivora capensis*) in UF 101 (in R 109) were identified in the structure 2 (house). Honey badgers often become serious poultry predators. Because of their strength and persistence, they are difficult to deter. They are known to rip thick planks from hen-houses or burrow underneath stone foundations.

### Absent species

- No diagnostics elements of cattle (*Bos taurus*) have been found, although some items such as fragments of bone diaphysis may suggest its presence. The absence of cattle can be explained by its strong ecological requirements (e.g., water and pasture) and is easily replaced by the camel.
- Nothing in pigs has been identified, which seems quite consistent with the period and Muslim habits.
- Except a fragment of shell in sector N6, no fish and no molluscs were found.

### Preliminary interpretations

The preliminary zooarchaeological results clearly show that in Yamāma camel, sheep/goats, and gazelle provide staple meats. Besides that, the share of wild animals, eaten or not, is relatively important. For the herbivores, gazelle and Oryx could be hunted by the Yamama's inhabitants in the vicinity of the city or brought by different visitors as they pass in the oasis. Carnivores could be killed during hunting sessions, or simply killed within the walls of the city, attracted by food or garbage.

<sup>7</sup> Stone C. 1982. The camel bird of Arabia. 1982. *Saudi Aramco World*. Ed., pp. 10-11 (March/April).



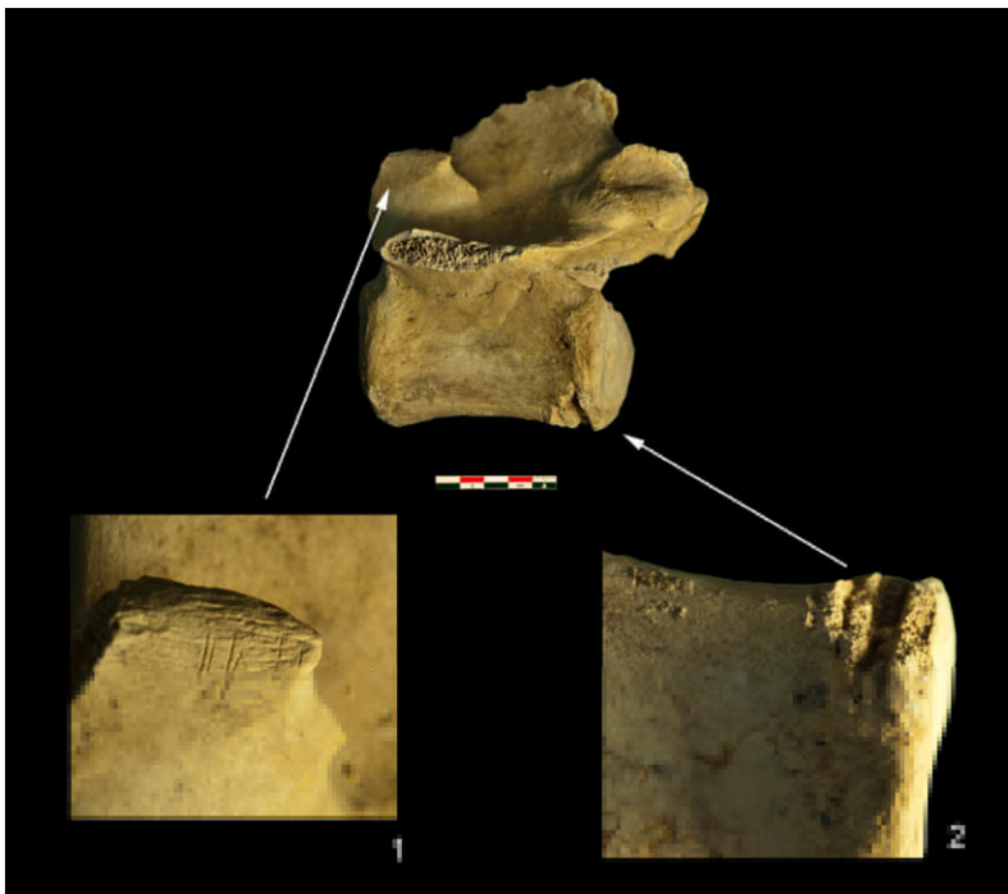
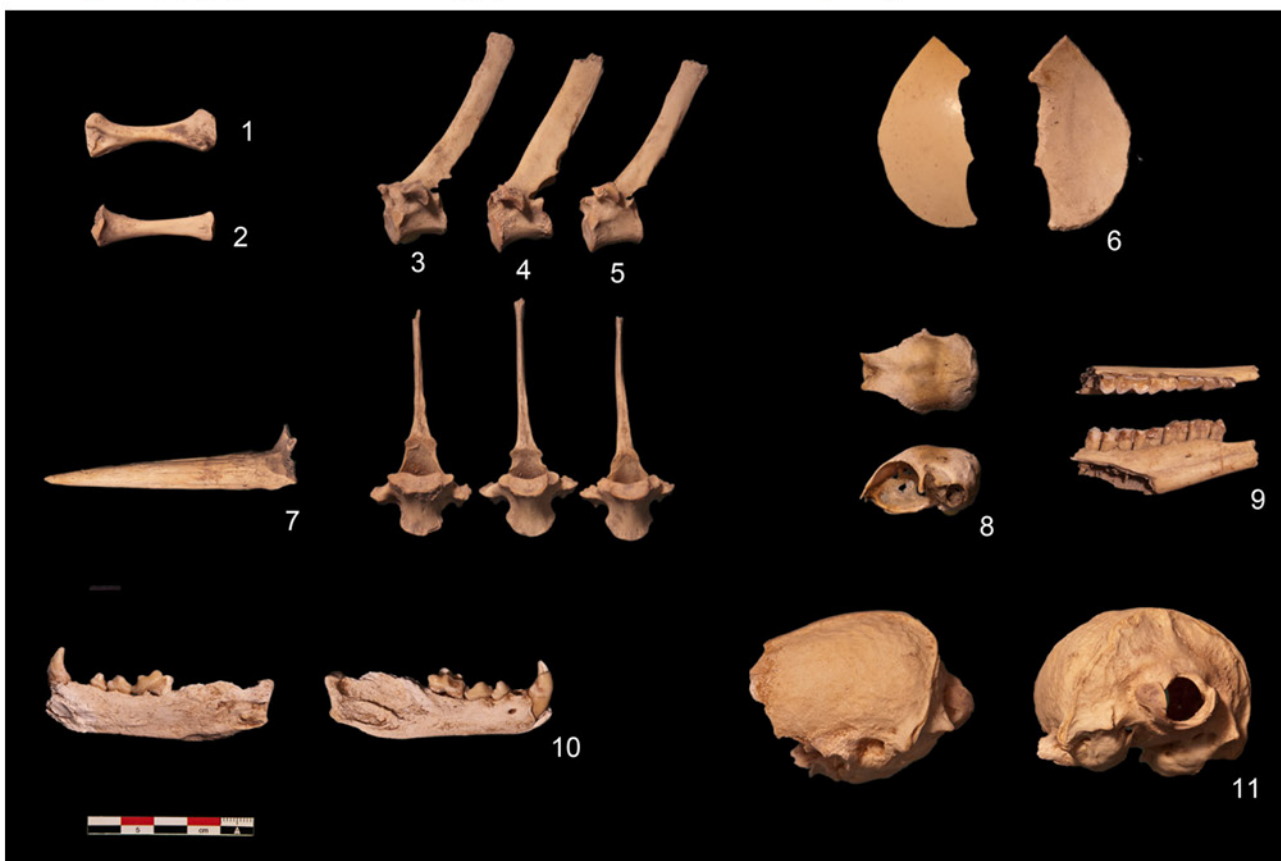


Figure 46: Lumbar vertebra of camel (*Camelus dromaderius*) showing cutmarks on the processus articularis (1) and chopmark (2) on the body.

Figure 47: Some species discovered in Yamama: (1-2) foetal bones; (3-4-5) thoracic vertebrae of gazelle; (6) fragment of ostrych eggshell; (7) horncore of a female gazelle; (8) chicken skull; (9) mandible of gazelle; (10) right mandible of a fox; (11) a rear of a skull of a ratel/honey badger.



## Ceramic study

### The provisional typology of the pottery

By Michel Mouton (CNRS, Nanterre)

The pottery typology has been established on the base of the fabrics. The shapes were not taken into account. The number of classes have been reduced to a minima; more detailed observations based on a larger corpus in the future season will probably need to determine more precise classes. In contrast, some fabrics have been divided in different classes in relation with coarse and fine aspect, and finally will be put together. The first classes were called “common” mostly because some fragments waste of cooking of that kind of industry were found attesting potter workshops in the site.

Layla ware was called by the name given by previous excavators and surveyors at the site and in the central region.

Most of the classes were define on the base of the material found during the survey of the site. Three more classes (25-27) were found on the surface of al-Salmiyya site and have been added to the typology.

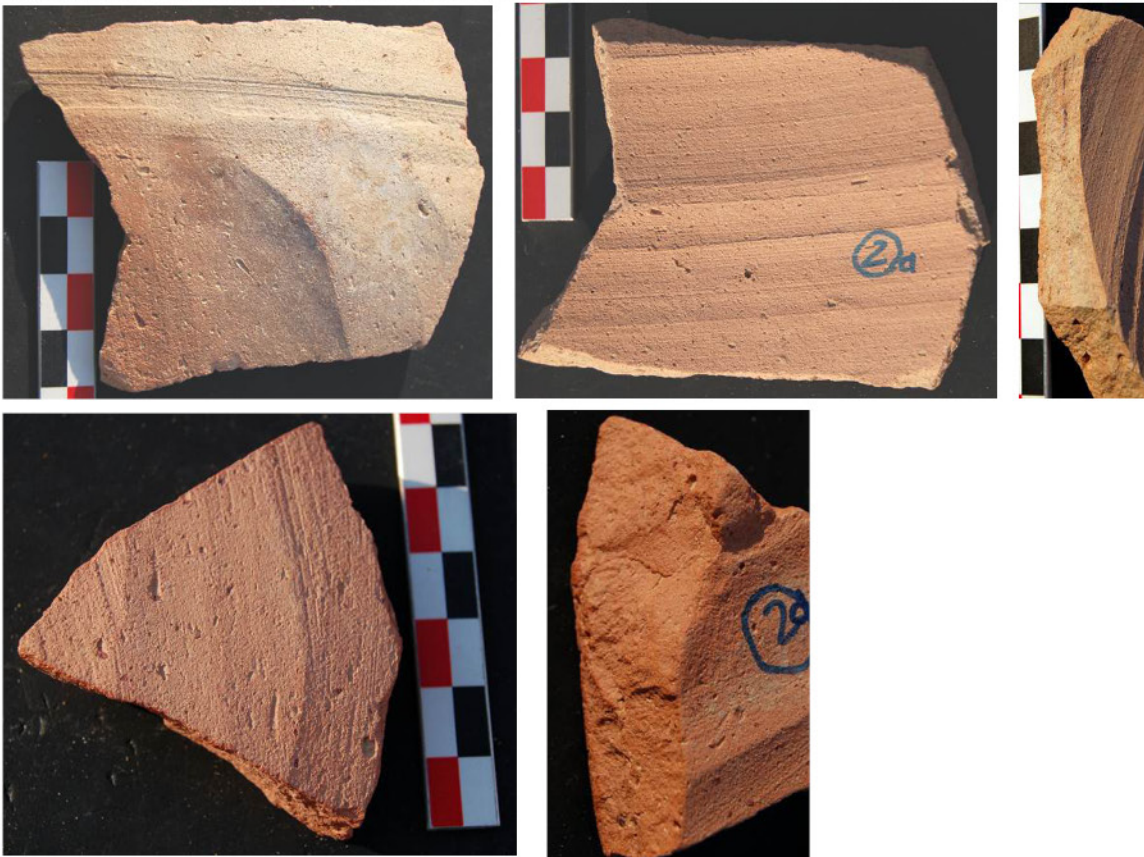
#### 1 - Coarse Buff Greenish ware

Well fired buff orange to greenish ware, some with red core; medium to thick wall; medium to large black (red) grits, some with yellow exploded grits. Incised decoration: horizontal lines, wavy lines, hatched patterns



#### 2a - Common Reddish Buff ware

Well fired buff to reddish ware; medium to thin wall; few medium black (red) grits; Plane or whitish to greenish surfaces; rare slip (black). Incised decoration, and combed decoration: horizontal lines, wavy lines, hatched patterns





*2b - Common Yellow Greenish ware*

Medium to well fired yellow buff to greenish ware; medium to thin wall; few medium black (red) grits and sandy temper; Plane or whitish to greenish surfaces

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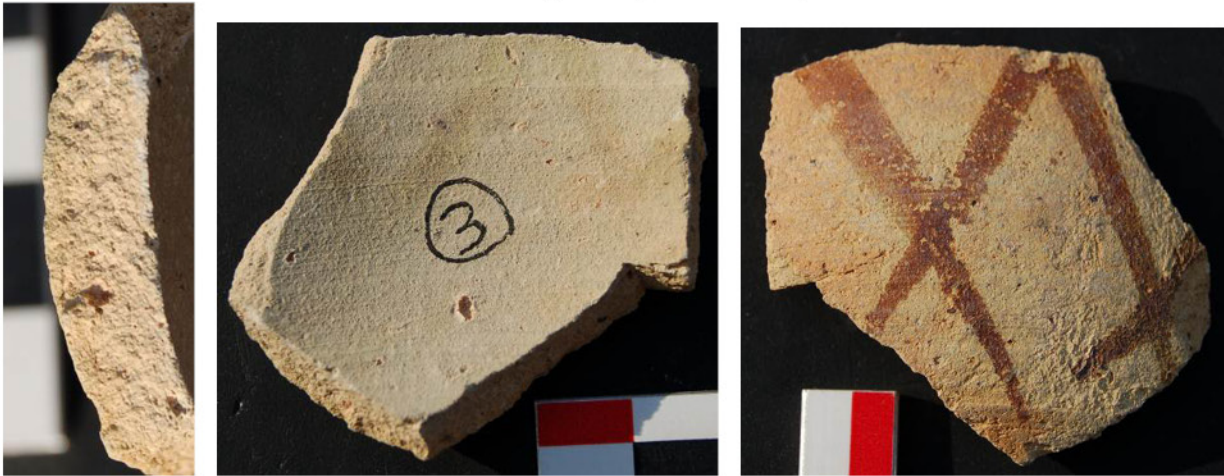
Incised decoration, and combed decoration: horizontal lines, wavy lines, hatched patterns



*3 - Common Painted ware*

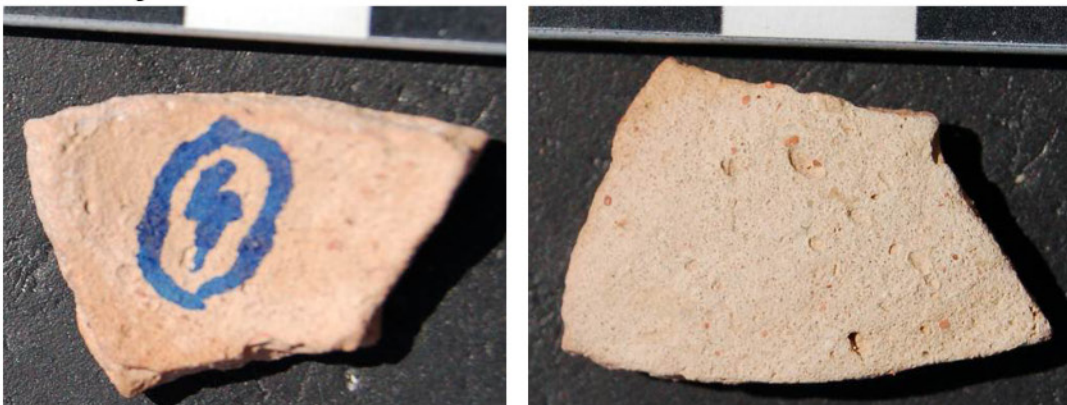
Well fired buff to reddish ware; medium to thin wall; few medium black (red) grits; Whitish to greenish surfaces

Painted decoration in red to brown: crisscross pattern (ca. Rumeilah)



*4 - Common Fine ware*

Well fired buff to reddish ware, clinky; medium to thin wall; few medium black (red) grits and thin sandy temper; Whitish to greenish surfaces



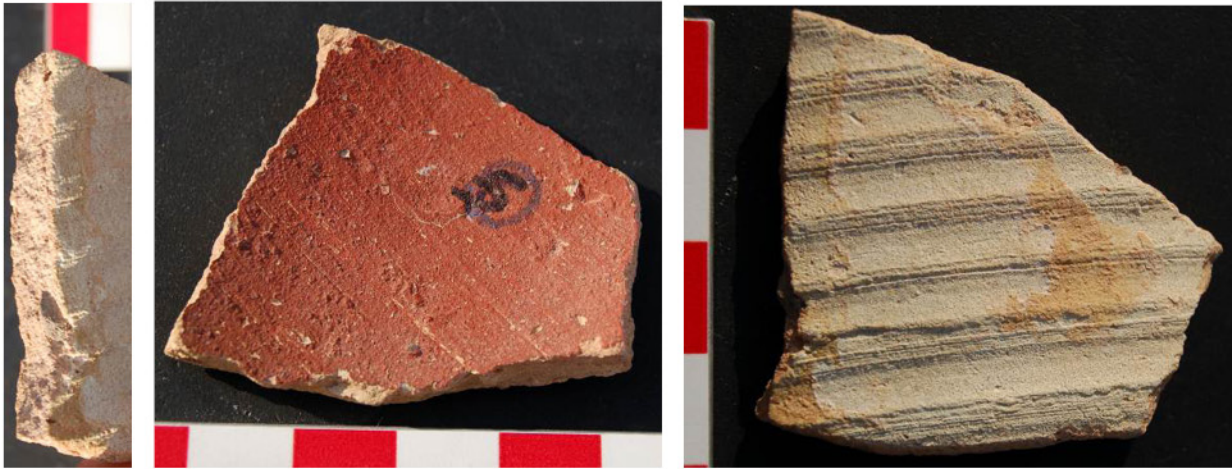


### 5 - Common Fine Red Slipped ware

Less well fired reddish ware with grey core; medium to thin wall; few medium black (red) grits; not clinky, slightly smoothy

Whitish external surface; red slipped internal surface

Painted red on large strips on the external surface; grooved wall; horizontal incisions



### 6 - Red ware

Well fired red ware; thin to thick wall; some with grey core; few medium black (red) grits and dense very thin white inclusions; the thicker vessels have white medium grits on the surface; very abundant yellow exploded grits on the surfaces

Plane or external whitish surface





*7 - Sandy Red ware*

Well fired dense red to light brown ware; medium thick wall; yellow buff to light brown surfaces; thin black sandy temper very abundant

Close to Sandy Red coarse ware

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*8 - Sandy Red coarse ware*

Well fired dense red ware; medium to thick wall; yellowish to whitish external surface (or plane); black and white sandy temper very abundant, thin and medium

Abundant yellow white inclusions and exploded grits

Rare incised decoration: lines and patterns filled with points

Close to Sandy Red ware



*9 - Layla ware*

Very well fired clinky grey black ware, some with reddish core; medium wall, rarely thick; scratchy surfaces, some with deep purple stains

Combed and incised decoration in a large diversity of patterns



*10 - Layla ware overfired*

Very well fired clinky grey black ware, some with reddish core; medium wall, rarely thick; surfaces glossy or roughly vitrified, deep purple stains



### 11 - Red Brown ware

Medium to well fired brown, red or buff ware; slightly smoothy, not clinky; medium to thick wall; small red grits and few very thin whitish inclusions

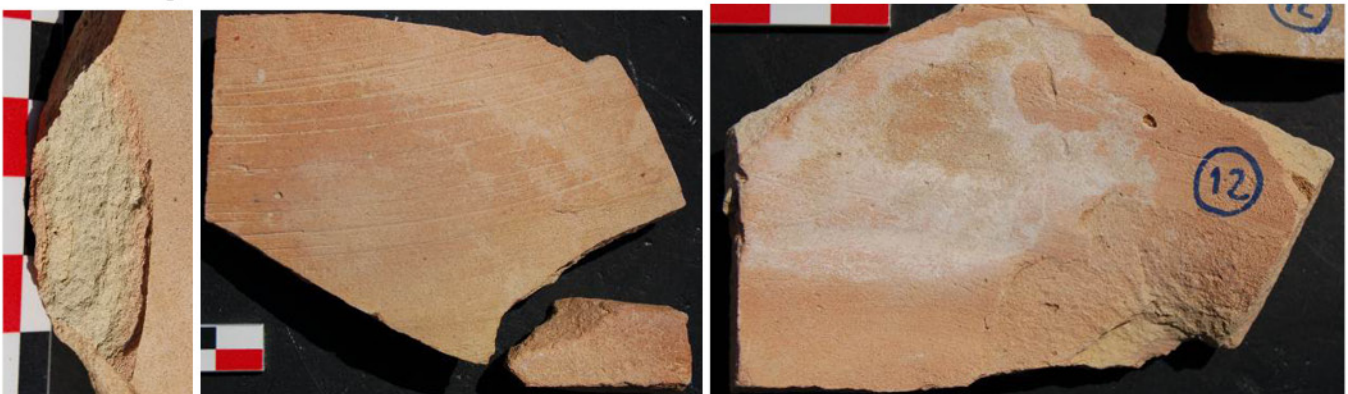
Reddish (black) slip

Incised decoration of alternated strips of zig-zag and horizontal lines



### 12 - Fine Buff ware

Well levigated buff brown ware; medium thick walls; well fired but not clinky; no visible temper, vegetal prints; similar to western amphorae.



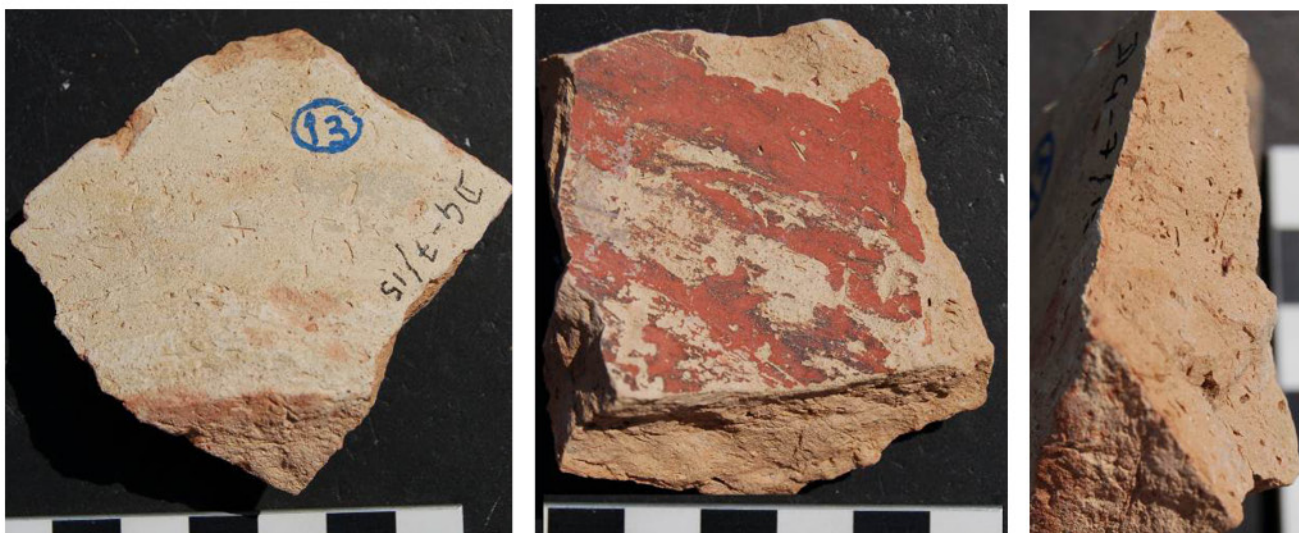
### 13 - Black striped ware

Medium fired buff to light brown ware; thin to medium thick walls; thin air cavities and few vegetal prints; very thin mineral temper red or black

Yellowish to white surfaces

Red slip in the internal surface (rare external) with irregular strips in black (marble effect)





*14 - Grey temper ware*

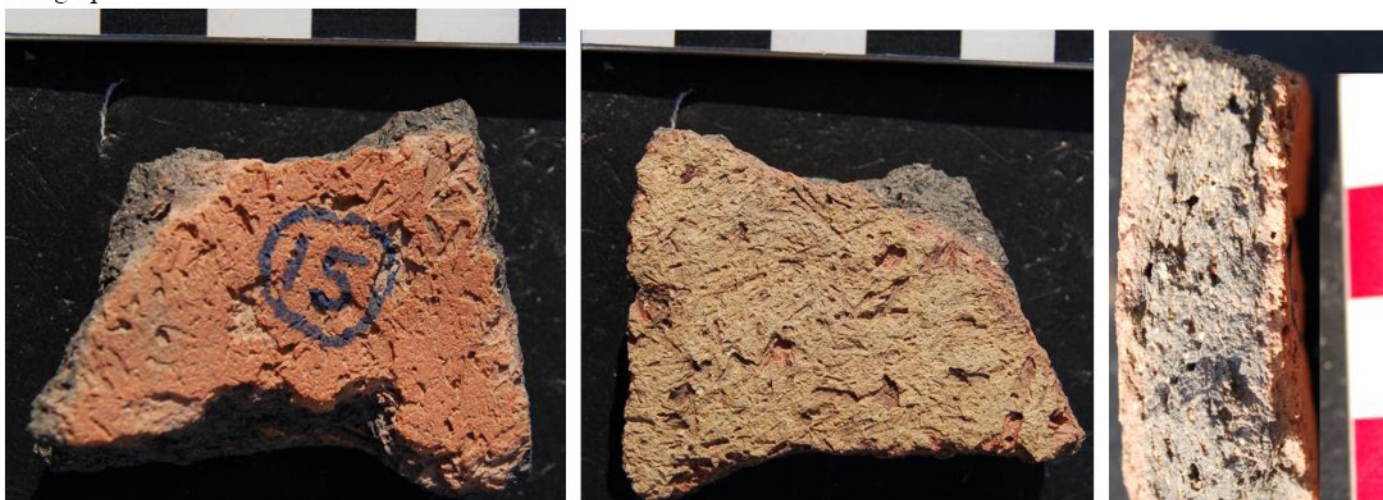
Well levigated buff brown to reddish (with grey core) ware; medium thick walls; well fired but not clinky; grey temper given an ashy aspect around small cavities

Incised decoration of alternated strips of zig-zag and horizontal lines (idem Red Brown ware)



*15 - Black and Red ware*

Medium fired reddish ware with large grey black core; medium to thick wall; mineral and chaff temper  
Rough plane surfaces





*16 - Coarse Grey ware*

Well fired grey ware; thin to thick wall; irregular plane rough surfaces, some partially reddish; abundant medium whitish inclusions and white exploded grits



*17 - Black Brown Cooking ware*

Medium fired black or deep brown ware; medium thick wall; handmade; very thick quartzite grits; irregular rough surfaces



*18 - Red Brown Cooking ware*

Medium fired red ware; medium thick wall; handmade or in low wheel; thick to medium angular grits; planed surfaces  
Red and black thick slip







*19 - Coarse chaff & sandy temper*

Medium fired yellow greenish ware (light buff core); thick wall; the clay is stratified with thin empty spaces; sandy temper and vegetal prints

Plane surfaces



*20 - Blue and Green Glazed ware*

Yellow to light buff well levigated ware; medium to thick wall

Green to blue glazed surfaces

Relief decorations: stepped horizontal lines

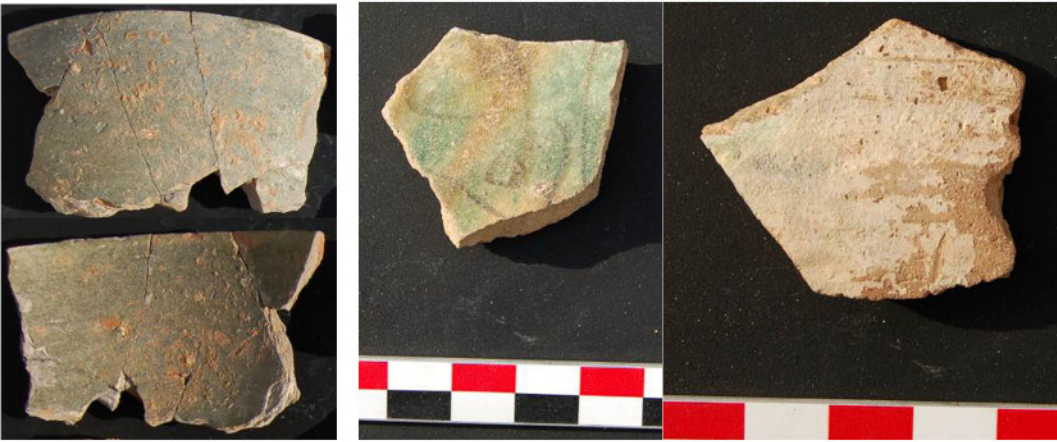


*21 - Islamic Glazed wares*

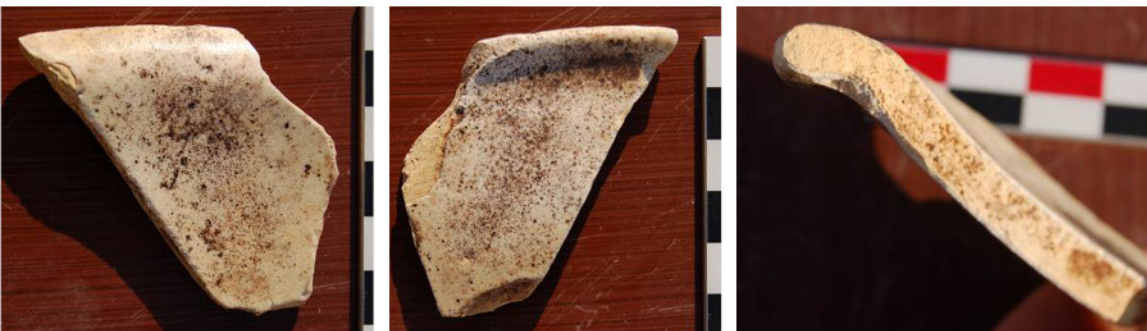


Abbasid glazed



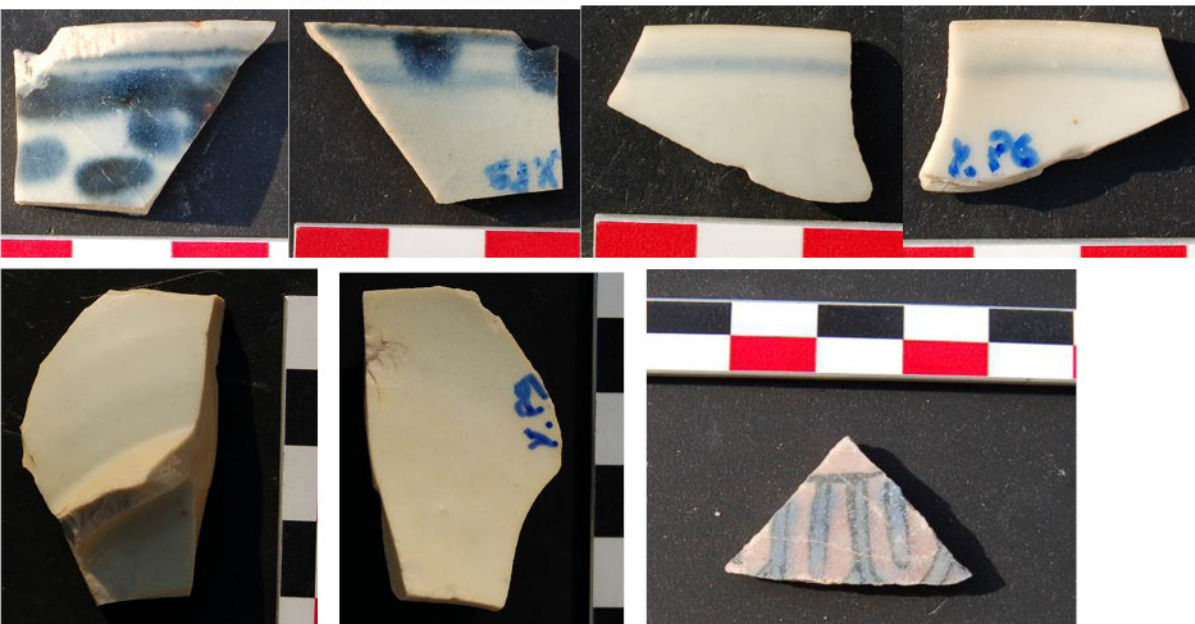


Medieval glazed



Tin glazed bowls that can be dated from 835 AD onwards to about late 9th in this case (Kennet 2004, IBTIN of the Samarra horizon)

*22 - Eastern Porcelain and Stoneware*





23 - Western Amphorae



Palestinian amphora?

24 - Others

As-Salmiyya

25 - Blackish with Red/Brown core ware

Medium to well fired red or brown ware; medium to thick wall; thin scratchy clay with many air inclusions, and a few medium red and black grits

Grey external (and internal) surface

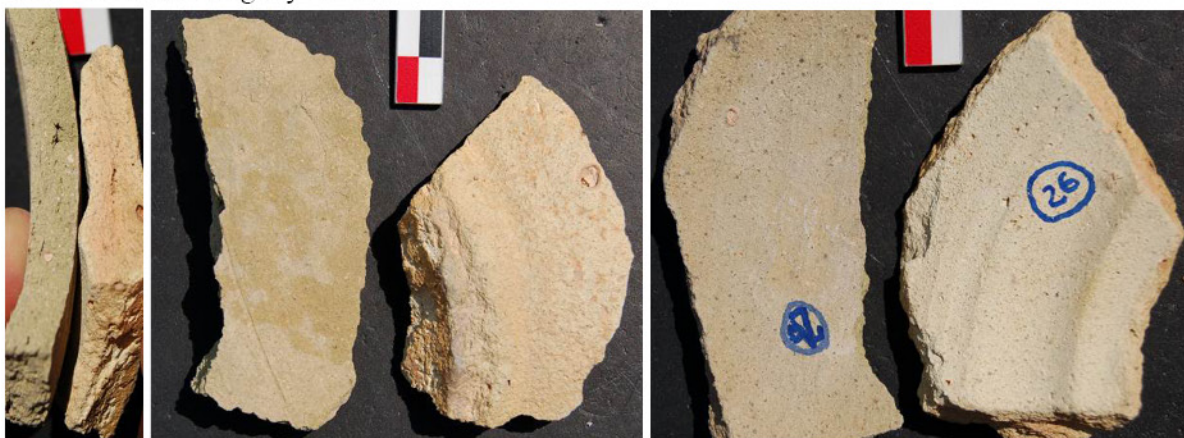
Ondulated wall, thick incised decorations (horizontal lines, pressions)



26 - Sandy Yellow ware

Well fired yellow buff ware; medium thick wall; very dense sandy temper

Plane surfaces or slightly clearer



27 - Sandy orange ware

Very well fired light orange to brown ware; medium thick wall; dense thin black sandy temper; slight finger pressions on the internal surface

Yellow whitish surface, not systematic; bitumen coated in the inside wall (Gulf ovoid transport jars).





## Considerations on spatial distribution of pottery and the occupation of al-Yamāma area

By Dr Michel Mouton (CNRS, Nanterre)

A non systematic survey was carried out inside the fenced archaeological site of al-Yamāma and around it in order to evaluate the extension of the settlement and eventually to differentiate chronological and functional sectors.

The observation of the pottery distribution can offer some information on the basis of two criteria:

- by comparing the collected pottery we can underline the relevant differences or similarities between the sampled areas of the site
- the absence or the presence of diagnostic chronological potteries can be a first indication of the period of occupation in some areas.

The main difficulty was to define the type of occupation on the base of a pottery assemblage that we did not precisely classify, nor distribute in a chronological sequence.

The main wares locally represented are industries not well known and dated by comparisons to other sites of the Peninsula where the pottery sequences are more precisely defined.

A provisional typology was therefore established on the base of the collected pottery. The main wares in al-Yamāma still need to be related in stratigraphy with diagnostic material to become a value reference (in survey and excavations). The samples registered would be, in a later step of the work, confronted to the material found in stratigraphy.

### *The Pre-Islamic occupation*

One of the main aims of the survey was to evidence the areas occupied during the Pre-Islamic period. But the material found cannot help to clearly localised the early settlement of al-Yamāma.

In fact, the Pre-Islamic occupation of al-Yamāma is archaeologically attested:

- by previous excavations and surveys carried out in the site that revealed 3 coins of Pre-Islamic period, all found out of context (surface) in the south-west part of the fenced area (a low area with constructions visible on the ground).
- just along the fence in the same area to the west is a farm where a well has been dug in the 1990's (?); during the work a so-called "Hellenistic bowl" was found 3-4 metres under the ground.

Three remarks at first:

- no diagnostic material from the Late Pre-Islamic period nor from the Iron Age (1st millennium BC - 6th cent. AD) was found during the survey.
- diagnostic material dating back to the Islamic / medieval period was found in some of the sampled areas, not in all of them.
- the large majority of the pottery material collected belongs to a few regional industries, which are the more representative of the assemblage at the site and have still to be dated: they can be Late Pre-Islamic or / and Islamic productions.

If no absolute evidence of a Late Pre-Islamic occupation was found during the 2011 season of work, which could help to localise the early settlement of al-Yamāma, two major phases of occupation could be distinguished, on the base of the field observations.

The larger one seems to be the earliest one. It characterises by low mounds and deposits at the natural level of the plain. The ground surface is made of a sandy clay deposit (mud brick walls destruction) full of animal bones and very fragmentary pot-shards, as a result of an aeolian erosion and a progressive consolidation due to the episodic precipitations.

The surface of that level is in most of fenced part of site covered by moving sand dunes and by the deposits of the later phase of occupation. It extends clearly to the south-west of the fence, in the deserted farm where a Hellenistic bowl is said to have been found, and to the north/north-east approximately 700-800 m far from the fence. Out of the fenced area, the land has been systematically levelled by bulldozer. Pottery shards and a few mud brick dwellings can be seen where modern house are not already built.

The second main phase of occupation of the site lies on the top of this early deposits and accumulated aeolian sand. It seems smaller in extension, and mainly concentrated in the two northern thirds of the fenced area. It forms the higher mounds of the site. In many places mudbrick constructions are visible, filled with loose sand. The sediment in the ground is not so compact and levelled as for the earliest phase.

This general distribution of the remains may be indicative of two main phases of occupation of the site, maybe separated by a period of desertion whose duration cannot be estimated. The early phase could correspond to the pre-Islamic oc-



cupation that would last until the beginning of Islam. The second phase to a later medieval period, the discovery of a white glazed plate down the northern wall of the mosque seems to date back to the 9th century. But that date needs to be confirmed by the study of the entire corpus gathered in this building.

The distribution of the ceramic categories at the surface of the site does not provide clear guidance on possible differences in the time space, nor does in the functional differentiation.

The samples were made in an unsystematic way.

The sectors were selected randomly according to their interest (distribution of samples, information), to the remains visible on the ground (buildings and artefacts) and to the topography (site boundaries, low areas or mounds). The collection was carried out to define recognizable types, and to map their distribution on the site without any need to quantify. After defining the ceramics classes, a table of presence / absence was established stating if it was found as a single fragment (x) or more than one fragment (xx) of each class. The very loose sandy sediment and the constant movement of men and animals in the archaeological area since centuries has certainly facilitated the movement of ceramics on the ground making useless greater accuracy in the sampling.

We cannot safely distinguish different types of occupations on the basis of the distribution of the survey material. All possible combinations of classes were found. Nevertheless, a few remarks can be formulate:

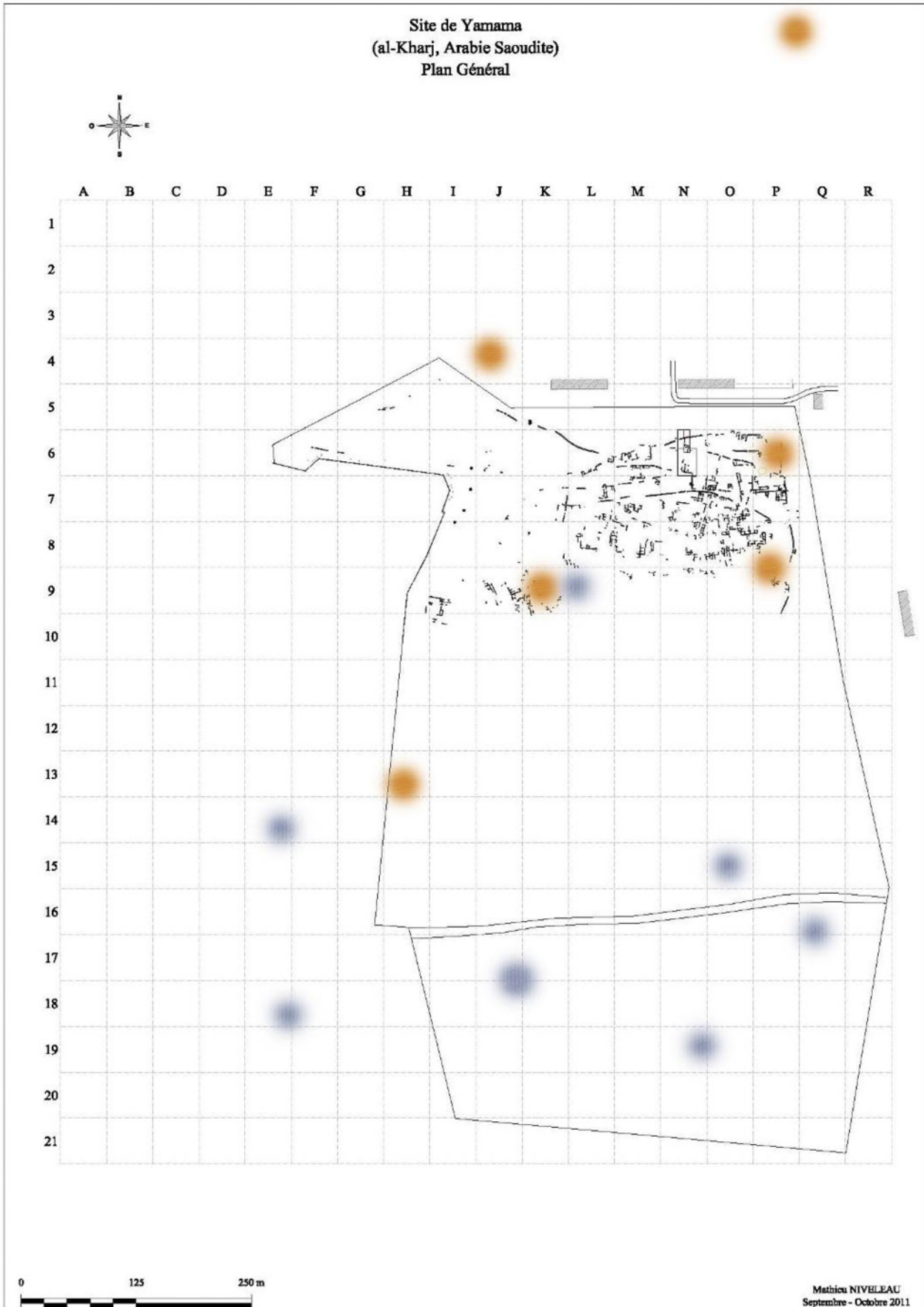
- if one combines the two types of grey/ black ceramics, it shows a clear distribution of Layla ware south of the site, and Coarse Grey ware north of it (Fig. 48).
- the finer ceramic categories of the so-called "common" fabric (because very common on the site and represented by some overfired waste of oven) are located south of the site (Common Painted ware and Common Fine Red Slipped Ware) (Fig. 49).
- the few areas without any fragment of Coarse Buff Greenish ware are to be found in the southern half of the archaeological area.

These remarks will have a meaning once confronted with the stratigraphical data: preliminary typology established on the base of the survey material must now be ordered in a sequence based on the excavations of the most representative areas. The distribution of typological classes would be read in the space when ordered in chronology.

	Q 16/17	JK 17/18	DG 7/15	FG 18/19	0 15	K 9	NO 19	P 8/9	N 12	I 17/18	QRST - 5/8	P 6	H 12/15	I 7	PQ 12/14	EJ 2/4	SAL
1 Coarse Buff Greenish ware		xx	xx		x			xx	xx	xx	xx	x	x	x	x	xx	xx
2a Common Reddish Buff ware	x		xx	xx				xx	xx	xx	x	xx	x		xx	xx	x
2b Common Yellow Greenish ware	x	x	xx	xx	x		xx		xx	xx		x	xx	x	xx		
3 Common Painted ware		x		xx			x								x		
4 Common Fine ware				x					xx					xx	x		
5 Common Fine Red Slipped ware			x				x						x				
6 Red ware	x	x	xx							xx	x			xx	xx	x	
7 Sandy Red ware	xx	xx	x	xx	xx		xx	x			x	x	xx	x			xx
8 Sandy Red coarse ware	x	x	x	xx	x			xx	xx		xx	x					
9 Layla ware	xx	xx	xx	xx	xx	x	x	x									x
10 Layla ware overfired				xx													
11 Red Brown ware							x	xx	xx	x		x		xx		xx	
12 Fine Buff ware																	
13 Black Striped ware			xx										x	xx			
14 Grey Temper ware												xx		x			
15 Black and Red ware						x		x		x						x	
16 Coarse Grey ware						x		x			xx	xx	xx			xx	x
17 Black Brown cooking ware					x				x						xx		x
18 Red Brown cooking ware	x														x	x	x
19 Coarse chaff and sandy temper																	
20 Blue and Green Glazed ware		x	xx		x	x		x			x		x	x		x	x
21 Islamic Glazed ware							x	xx					x	xx	x	xx	
22 Eastern Porcelain & Stoneware								x				x					
23 Western Amphorae																xx	
24 Others						x											
25 Blackish with Red/Brown core			x														xx
26 Sandy Yellow ware																	x
27 Sandy Orange ware																	xx

Table 2: list of the categories of pottery in the sampled areas of al-Yamāma





**Figure 48: Distribution of the of Layla ware (grey) south of the site, and Coarse Grey ware (brown) north**

NB : The location of the 3 pre-Islamic coins and the Hellenistic bowl on the south-eastern part of the site can indicate that the Layla ware and the fine painted and slipped wares could be related with the earliest deposits in the site.

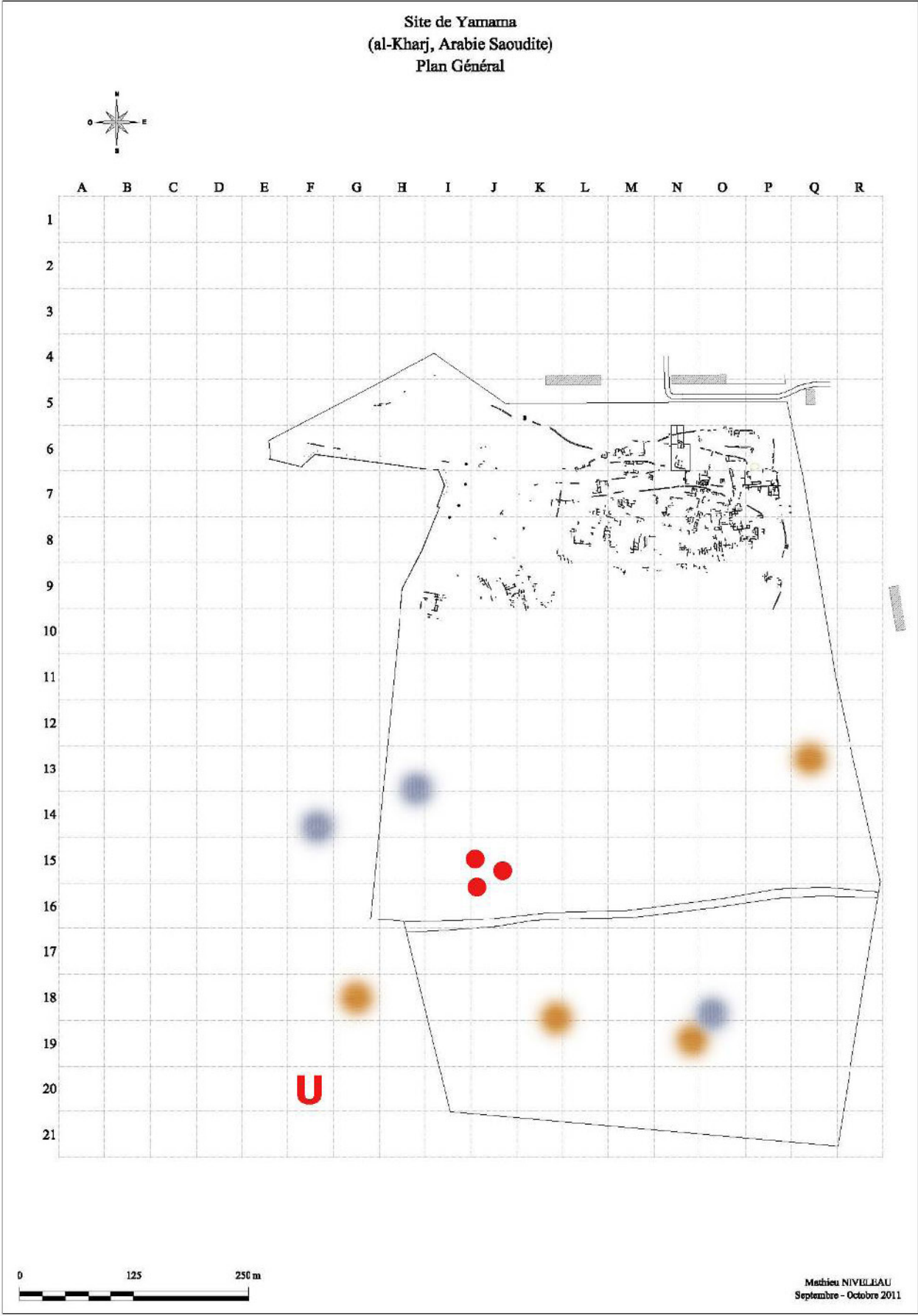


Figure 49: Distribution of the Common Painted ware ((Brown) and Common Fine Red Slipped Ware (Grey); location of the 3 Hellenistic coins and the bowl found in previous works and excavations on the site



### *The survey out of the fenced area*

To the north north-east of the site, beyond the allotment that borders the archaeological zone, extends a very flat area free of any culture that has not been affected by modern constructions. Although crossed by lines of low dunes, we can see the ground made of alluvial deposits now progressively eroded (wind erosion). Their rapid accumulation in the past has trapped few lenses of aeolian sand, indicating a regular setting in water of this area (wadi sayls?). The terrain is very flat for kilometers: it is assumed that the land flooded covered a large area. Fragments of pottery comparable to types collected at the site indicate the use of that land since that early periods. The presence of several lines of mudbrick walls forming small groups of houses in the south (700 / 800 m north of the fenced archaeological area) and of small canals and crop areas in rectangles unearthed by deflation beneath silt crusts eroded by the wind to the north (ca. 2 km from the archaeological fenced area) indicate that dwellings and agricultural activities were related with that land in ancient times, probably in relation with the occupation of the explored site of al-Yamāma.

Generally, the settlement pattern of the Arabian oasis and fertile valleys of southern Arabia associated scattered implantations to a major centre, villages or small groups of dwellings associated with agricultural areas. Oasis settlements were organized in that way in medieval and modern times. It is likely that a large oasis as al-Kharj has hosted several settlements related to a major population centre. The modern urbanization makes today a comprehensive exploration impossible. At least two sites could be contemporary to al-Yamāma:

- the 1978 comprehensive survey of the region refers to a late pre-Islamic site located close to the sources of 'Ayn Dīla' (No 207-24); we were not able to find it anymore, probably due to recent building activities in this area.
- al-Salmiyya site lined to the south by the qanat carrying the water from Farzān. At ca. 200-300 m from the qanat aperture, mudbrick buildings are visible on the ground, and ceramics in part comparable to that gathered at al-Yamāma were collected.

## Considerations on dating and provenience of pottery in al-Yamāma area

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The study of ceramic material was carried out on site, between September 26 and October 7- 2011, during the first campaign of the joint French-Saudi archaeological mission. This work allowed among others to understand the nature of the various occupation levels, providing clues for dating and identify circulations of goods and people.

I studied the material from the higher excavated layers, providing only with a few quantity of pottery, and sherds from the Kharj oasis survey.

After explaining the methodology, I will introduce a number of preliminaries results and some study aspects to continue during next archaeological campaign.

### Methodology of the field-work

The fieldwork was conducted according to the following steps :

1. Sorting (for fabrics, shapes and designs), which was performed after washing the ceramic sets.

It provides an initial assessment of the nature of the layer as well as permits some easy restoration.

2. Selection and marking of significant sherds. The recording system consists on the first letter of the site, the stratigraphical unit number (U.F.), following by the number of fragment (eg. Y.001.4), written on the inside wall of the sherd. The significant sherds, were numbered with a black indelible pen, and marked with a black dot for photos and a red dot for drawings to avoid omissions during further study.

3. All sherds of a same level (U.F.), or a same survey sector, was photographed on both sides.

The body sherds were systematically positionned following the wheeling orientation. The black background textile used for pictures allows easier drawings and photomontages.

4. Only significant sherds were drawn on tracing and graph papers (A3 format) at the scale 1/1.

The vessel profile is placed to the left and the outer diameter is noted. Under the drawing is indicated the number of the pottery sherd, and a short description of it (colour, texture, inclusions, surface treatment and decoration). Later on, the drawings should be vectorized.

5. Significant Pottery sherds were recorded in the Pottery Database, then stored away in plastic bags.

### Fieldwork and preliminary results

First of all we registered the material from the first week of excavation in the sector N6 [U.F. number 001 to 007] :

No clear diagnostic sherds were found, except a base fragment of celadon cup (UF 001), datation should be precised later on. About fifty forms were drawn, in order to begin the comparative work. Comparative corpus in the region is rare, first important work was done by the current co-director of the mission, M. Al Ghazzi, who defended a thesis in 1990 , based on a ceramic corpus from the site. This material consist of about 651 sherds from the surface (pl. 31-207) and 81 sherds from excavations (pl. 1-18). is classified in 29 types (5 glazeware and 3 porcelaine), this work is useful and will be increased, in particular regarding chronological sequences with the correlated material.

- Table 3: Preliminary treatment of pottery after surveys in Kharj oasis :

Sites	Surface material
Wādī Nisah 1 (site n°8)	undetermined pottery
Wādī Nisah 3 (site n°10)	undetermined pottery
Wādī Nisah 5 (site n°12)	sherds so-called « sasanian-islamic”, sherd with pink fabric, green glazed ware, molded form and design typical from ‘Abbasid production from the IX <sup>th</sup> . (fig.50.1)
‘Ayn al-Ḍīla’ 3 (site n°4)	sherds with red fabric, with beige slip with painted black or red braces and lines design. Probably Protohistoric, to precise later.
Ḥazm ‘Aqīla ( site n°7)	undetermined pottery

We noticed ‘Abbasid occupation traces in the Wādī Nisah never attested before.



- Table 4: Treatment of pottery from the eight sectors surveyed in Yamâma site :

Sectors <sup>1</sup>	Flints	Sherds with blue-green colored glaze so-called « sasanian-islamic » VII-IX <sup>th</sup> (fig.50.2)	Sherds with slip under colored glaze X-XIII <sup>th</sup>	Stoneware sherd with brown glazed so-called « martaban » XIV-XVII <sup>th</sup> (fig.51)	Others
1 [Q15]		X	X		glass
2 [Q14]		X			glass
3 [P9]	x			X	ostrich egg
4 [P7]					glass bracelet, porcelaine
5 [N6]	x			X	Copper slag, glass bracelet
6 [G7]					glass
7 [J10]		X			porcelaine, glass bracelet
8 [I13]		X			glass

We noticed the presence of retouched flint in significant amount on the surface (ten pieces), no sherds clearly associated with the early history of the site, bronze or iron age, were found at the moment. No diagnostic sherds were found yet, regarding Achaemenid, Seleucid, Parth and Sasanian times (500 BC- 600 AD). Within the undetermined pottery, several sherds beige or orange color fabrics are similar to sherds found in Dumât al-Jandal (levels 5 and 10, excavation Area A, from the 1<sup>st</sup> BC-6<sup>th</sup> c. AD) where we study the material since 2010. We also noted in the surface material, the lack of ceramic types clearly early 'Abbasid (IX<sup>th</sup>) and the scarcity of sherds from the X-XIII<sup>th</sup> c.

During the survey we highlighted potential sectors of potters workshops (L7-K7) (to complete with the geophysical data). On the surface we found six or seven wasters (pottery rims of unglazed jug) which attest of the local production (fig.52), a sherd of white glaze ware over fired with bubbles in surface (?) suggest also the production of glazeware on the site. We notice also the presence of metallic slag rich in copper which testifies the metal handcraft in the city.

### 3. Further developments

In order to highlight local or regional productions, importations of material and various contacts with Northern region, Iraq and the Gulf area :

- Establishing a typo-morphology of the pottery from Yamâma with the archaeologist
- Identifying the local fabrics, and sample the fabrics from the site and Kharj area. Furthermore, characterise the well known, two clay deposits (rich in kaolin) near Kharj, the first in the South-East of the city (between Kharj and Darb Si'id), the second to the East in the wâdi Sallah, 36 km far<sup>8</sup>.

At the end, locate precisely the workshops into urban planning of the Islamic city, will bring numerous indications relative to the occupation of this part of the city. It should be interesting to understand their period of use, contemporaneous or not of the functioning of the big mosque and the South quarter behind. Generally such kinds of handcraft activities are strongly correlated with settlements in the vicinity<sup>9</sup>.

The better understanding of the pottery from Yamâma site will provide important chronological milestones, regarding material culture of central Arabia on a long historical sequence. Archaeological clues regarding the production of pottery, still rare at the moment, they will bring interesting data about handcraft and economy. Further study on the survey material will help archaeologist to understand the whole populating of the oasis.

<sup>8</sup> Fujii, N., 1977 ; Villalard, P., 1978 ; Villalard, P., Prian, J.P., and Baron, M., 1982.

<sup>9</sup> The presence of workshops of potters on the North-West side of the city, suggest on one hand the existence of water supply in the proximity, canal or spring, maybe related to the anomaly shown in the geophysical images from North-West border of the site. In another hand these workshops produce some pollutions, like the smokes from the kilns, their orientations should be compared with the direction of dominant winds (to be precise later on), for this they are most part of the time, situated in the periphery of the cities.

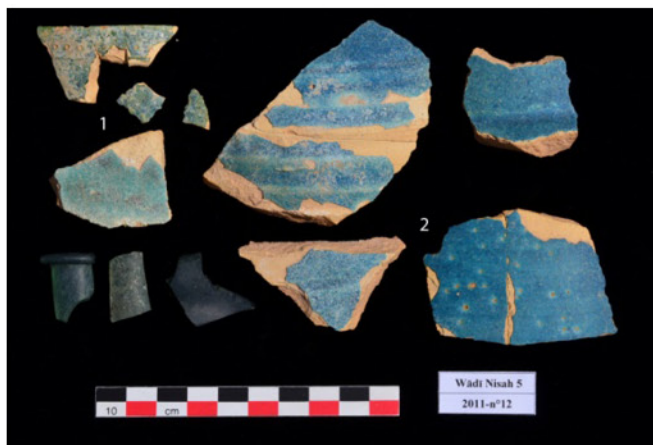


Figure 50 1. Molded bowl and decoration under a green glaze 'Abbasid IXth - Figure 50.2. Sherds of so called "sasanian-islamique" VII-IXth c.



Figure 51: Sherds of so called "martaban" (open and closed forms), XIV-XVII<sup>th</sup> c.

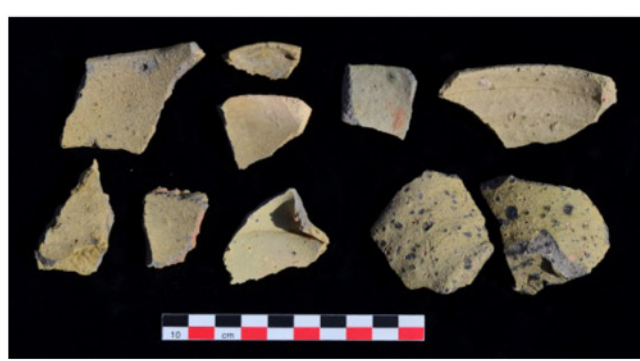


Figure 52: Wasters of local ceramic production (closed forms) from sector L7-K7



## Conclusion and perspectives for future work

The 1st campaign of the Saudi-French archaeological mission in al-Kharj was conclusive in several respects.

1/ The Prehistoric survey led to the discovery of Middle Paleolithic sites. One of them, AK-22, appears as a great referent for discussion and comparisons with assemblages from the main Middle Paleolithic sites known in both the north of the Arabian Peninsula (Jubbah) and the South (Najran, Hadramawt, Dhofar, Fayah and Fili).

2/ The historical survey of several areas in al-Kharj region led to the identification and registering, in a systematic way, of the main archaeological sites from the Bronze Age to the Islamic period in the oasis. They give a hint of the evolution of the settlement pattern in the area through these periods.

During this survey, we have been struck by the threat of extensive urbanization in the region. Many sites registered during the Comprehensive Survey of Central Arabia in 1978 had already disappeared. If not, they are currently being damaged (tombs in al-Afja area; qanat in 'Ayn Farzān) or destroyed (settlement and outlet of a qanat in al-Salmiyya). If nothing is done in the next few years to protect them, they will definitely soon disappear.

3/ In the site of al-Yamāma, the Sounding 1 laid the foundations for the drawing up of a chronological sequence of the occupation. If the base of the occupation has not been reached, different architectural phases have already been highlighted. It has been completed by a topographical and geomagnetic mapping of a third of the site, indicating the contour lines of the urbanism and the density of the settlement pattern. It has also been completed by the achievement of a preliminary typology of the ceramic which is now to be set in a chronological frame. Excavation of a domestic structure (Sounding 2) completed by a zooarchaeological study enlightened as to the livelihood of the inhabitants of the site during the latest phase of occupation.

Finally, a monumental mud-brick building has been identified and partly excavated. Many evidence led us to see it as a large mosque.

The perspectives for future work in the area are manifold:

1/ Because no Early/Mid-Holocene occupation has been detected during the 2011 survey, it would be important to accentuate the work on this topic for the next season of survey at Al-Kharj. The study of the geological maps has revealed the presence of lacustrine sediments that represent a good potentiality for surveying, especially around the Ghufa area, north of the Nisāh graben. The area around al-Yamāma site, and the area southeast of Al-Kharj are also promising.

2/ Considering the quick spread of the city and the fast disappearing of the archaeological remains in the oasis, the completion of the registering of protohistorical and historical sites is necessary. This documentation will be useful for the comprehension of the evolution of the settlement pattern in the area. Moreover, a geomorphological study of the whole area is planned to help understanding how communities took advantage of water resources through the time.

3/ In al-Yamāma site, no preislamic material has definitely been identified during this campaign. The search of the early occupation of the site shall be done through the completion of the deep sounding initiated this campaign and through tests in lower areas of the site. This will be completed by the pursuing of the mapping of the site (geomagnetic and topographic).

As regards Building 1 (Mosque), the extensive unearthing of the building and its restoration is a priority. Indeed, with at least 20 large columns, the mudbrick structure is preserved up to 2 meters and offers therefore a stimulating perspective for restoration and touristic developments of the area.

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تم التعرف على مبنى ضخم مبني من اللبن الطيني الذي تم تنقيبه جزئياً. تشير الأجزاء الظاهرة منه بأنه مسجد جامع كبير.

الآفاق المستقبلية للبعثة الأثرية في واحة الخرج عديدة :

1 لم يتم العثور خلال موسم مسح مواقع العصر الحجري في الخرج عام 2011 على أي موقع استيطان يمكن تأريخه في بداية وأواسط الإيلوسين Holocene. فمن المهم في الموسم القادم التركيز على اكتشاف مواقع تعود إلى عصر الإيلوسين. من ناحية أخرى فإنّ أظهرت دراسة الخرائط الجيولوجية لواحة الخرج وجود مناطق طبقات طمي غنية بالمعلومات سيكون لها أولويات للمسح الأثري وللدراسة في المستقبل وخصوصاً في شمال وادي نساج. ومنطقة موقع اليمامة بالذات وجنوب-شرق الخرج غنيتان أيضاً وتبشران بمفاجآت أثرية.

2 إذا أخذنا بعين الاعتبار سرعة التوسع العمراني لمدينة الخرج وأيضاً سرعة اندثار الآثار في واحة الخرج فإن متابعة توثيق وتسجيل المواقع التي تعود إلى العصور التي سبقت مباشرة العصر التاريخي والمواقع التي تعود إلى العصور التاريخية سيكون من أولويات المواسم المقبلة. يعتبر تجميع المعلومات عنصراً أساسياً لفهم تطور الاستيطان السكاني للمنطقة. بالإضافة إلى ذلك فإنه من ضمن برنامج المواسم القادمة دراسة جيومورفولوجية للمنطقة المدروسة بأكملها لفهم الوسيلة التي استخدمها سكان المنطقة لاستثمار الموارد المائية عبر العصور.

3 لم يتم حتى الآن العثور في موقع اليمامة على لقي أثرية تعود بشكل واضح إلى عصر ما قبل الإسلام. سيتم تحديد طبقات الاستيطان هذه التي سبقت العصر الإسلامي في الموسم المقبل من خلال متابعة الحفريات في الجحس العميق الذي تم البدء به خلال هذا الموسم وأيضاً من خلال تنفيذ محسات متناثرة في المنطقة السفلى من الموقع. سيرافق تنفيذ هذه المحسات رفع طبوغرافي وجيومغناطيسي للموقع.

وفي الختام فإن المبنى رقم 1 الذي تم اعتباره بأنه مسجد جامع كبير فإن التنقيب فيه بشكل كامل وترميمه سيكونان من أولويات الموسم المقبل. والجدير بالذكر هنا فإنّ أعمدة هذا المسجد الجامع التي يبلغ عددها 20 عموداً على الأقل وارتفاعها المتبقي ما يقارب 2 متراً والمبنية من اللبن الطيني، بالإضافة إلى ذلك يعطي مخطط المسجد وطريقة بناءه آفاق مستقبلية مشيرة للترميم ولتطوير السياحة في المنطقة.



## النتائج والمشاريع المستقبلية

أعطى الموسم الأول للبعثة السعودي-الفرنسية للآثار في اليمامة بواحة الخرج نتائج مثمرة في عدة مجالات.

1 أدت للمسوحات الأثرية لعصور ما قبل التاريخ باكتشاف عدة مواقع تعود إلى العصر الحجري الوسيط. فالموقع المشار إليه بالرمز AK-22 هو استثنائي باعتباره مرجعاً نادراً للدراسات المقارنة التي يمكن القيام بها للأدوات الحجرية التي تم العثور عليها سابقاً في المواقع الموجودة في شمال جزيرة العرب (موقع الجبة) وفي جنوبها (بحران، حضرموت، ظفار، هلة، فيلي).

2 أثمرت المسوحات الأثرية للمواقع التي سبقت مباشرة العصور التاريخية وللمواقع التاريخية التي تم القيام بها في مناطق عديدة في واحة الخرج بالتعرف على عدة مواقع تم تسجيلها بشكل منتظم والتي يعود تاريخ أغلبها إلى العصرين البرونزي والإسلامي. تعطينا هذه المواقع مواداً تساعد على فهم تطور استيطان الإنسان في المنطقة عبر العصور. مما لفت نظرنا بشكل كبير ومخيف خلال عملية المسح الأثري هو التوسع والتضخم العمراني الذي يشكل الخطر الأكبر لمواقع الواحة. فعدة مواقع تم توثيقها وتسجيلها سابقاً ضمن برنامج *Comprehensive Survey* في أواسط جزيرة العرب عام 1978 قد اندثرت تماماً. وأما بعض المواقع النادرة التي ما زالت موجودة فأغلبها في حالة الانحيار (قبور منطقة الأفجة، قناة عين فرزان) أو تتعرض الآن للتدمير (موقع سكني ومخرج قناة السلمية). فإذا لم يتم التدخل فوراً لحماية ما تبقى من المواقع الأثرية فإنها ستندثر بأكملها وبشكل نهائي.

3 في موقع اليمامة، سمح الحفريات 1 بوضع أساسات تسلسل زمني لاستيطان الموقع. بالرغم من أننا لم نصل حتى الآن إلى الطبقات الأكثر قدماً ولكننا تمكنا من تحديد وبوضوح عدة مراحل زمنية عمرانية. فقد تم في وقت تنفيذ المحس المقطعي رفع طبوغرافي وجيومغناطيسي لثلث مساحة الموقع. وستساعد هذه العملية بتحديد الخطوط العريضة للأشكال العمرانية وكثافة الاستيطان في الموقع. واعتباراً من هنا يجب علينا التأكد من نوعية هذا الاستيطان وإدراجه ضمن إطار تسلسل زمني. من ناحية أخرى، فإن التنقيب في مبنى سكني (الحفريات 2) ودراسة بقايا عظام الحيوانات الأهلية سلطت أضواءً جديدة على مستوى العيش لسكان الموقع المراحل المتأخرة له. وأخيراً وليس آخراً،

# تقرير أولي

الموسم الأول للبعثة السعودي-الفرنسية للآثار

في اليمامة

– منطقة الخرج –

20 سبتمبر – 21 أكتوبر 2011

