

# **AcrossBorders**

## **Fieldwork 2014 on SAI ISLAND (NORTH PROVINCE, SUDAN)**



## **2014 SEASON REPORT**

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## **1. General**

The 2014 mission on Sai Island was carried out from December 31 2013 to March 01 2014. AcrossBorders is conducted with the approval and in cooperation with the concession holder, Prof. Didier DEVAUCHELLE, Director of the Committee of the Sai Island Excavations, UMR 8164 HALMA-IPEL (University Charles-de-Gaulle Lille 3 (France). Permission to work in the field is kindly granted by the National Corporation for Antiquities and Museums of Sudan (NCAM), sincere thanks go in particular to Abdelrahman Ali Mohamed (Director General) and El-Hassan Ahmed Mohamed (Director of Fieldwork).

Fieldwork with workmen under the supervision of Rais Imad Shorbagi MOHAMED FARAH was conducted from January 04 to February 13. Excavations were carried out in two areas (SAV1 East and SAV1 West, fig. 1) and documentation work continued in SAV1 North.

The inspector of NCAM of the 2014 season was Huda MAGZOUB—we would like to express our sincere thanks for her kind cooperation and support.

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## **2. Excavations at SAV1E, fieldwork report (by Julia Budka)**

### **Objectives**

In 2013, an orthogonal structure, visible on the magnetometric survey results from 2011 and measuring roughly 15 x 10m, was partly exposed in the area called SAV1 East. The structure, labelled Building A, is in line with Temple A and also follows the alignment of the buildings in the Southern part. Excavation in 2013 confirmed its date to the mid-18<sup>th</sup> Dynasty, not prior to Thutmose III.<sup>1</sup>

Based on the results from the 2013 season, a northern extension (5 x 10m), and two 10 x 10m plus one 2 x 10m western extensions were added to SAV1 East, aiming to understand Building A better by exposing more of this New Kingdom building.

### **SAV1 East, Squares 1B, 3 and 4**

Prior to excavation, the surface at SAV1 East was covered with pottery sherds, pebbles, stone tools and some slag. The ground is uneven and generally sloping towards the East; the western squares are situated on a higher level than the eastern area excavated in 2013.

Square 1B (5 x 10m) was partly excavated in order to check the northern area of Building A. Squares 3 and 4 are the direct western extensions of Squares 1 and 2 and provided interesting results—immediately below the surface a destruction layer with mud brick fragments, charcoal, pottery and worked stones was detected. This layer may vary in its thickness; along the western edge of Square 3 it was only between 5-10cm thick, while in other places more than 20cm of the same material was found.

As observed in 2013, there are many Post-Pharaonic pits dug into the area; their filling is usually composed of sand, some mud brick debris and mixed ceramics. The filling material suggests a date in Late Christian/Medieval time, but also some Ottoman pieces were present. All in all, the destruction layer seems to originate from Late Post-Meroitic and Early Christian times; the backfilling of the pits happened a bit later.

### **The 18<sup>th</sup> Dynasty remains SAV1East**

Despite of the Post-Pharaonic pitting, substantial remains datable to the 18<sup>th</sup> Dynasty have been exposed in 2014. In Square 1B, a small, half-brick thick wall was exposed at the bottom of a pit dug into the natural gravel (feature 29). It seems to be some kind of dividing wall for a storage installation.

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<sup>1</sup> See J. BUDKA, Die 18. Dynastie auf Sai Island (Nordsudan) – neue Puzzlesteine als Ergebnisse der Feldkampagne 2013, *Sokar* 26, 2013, 78–87.



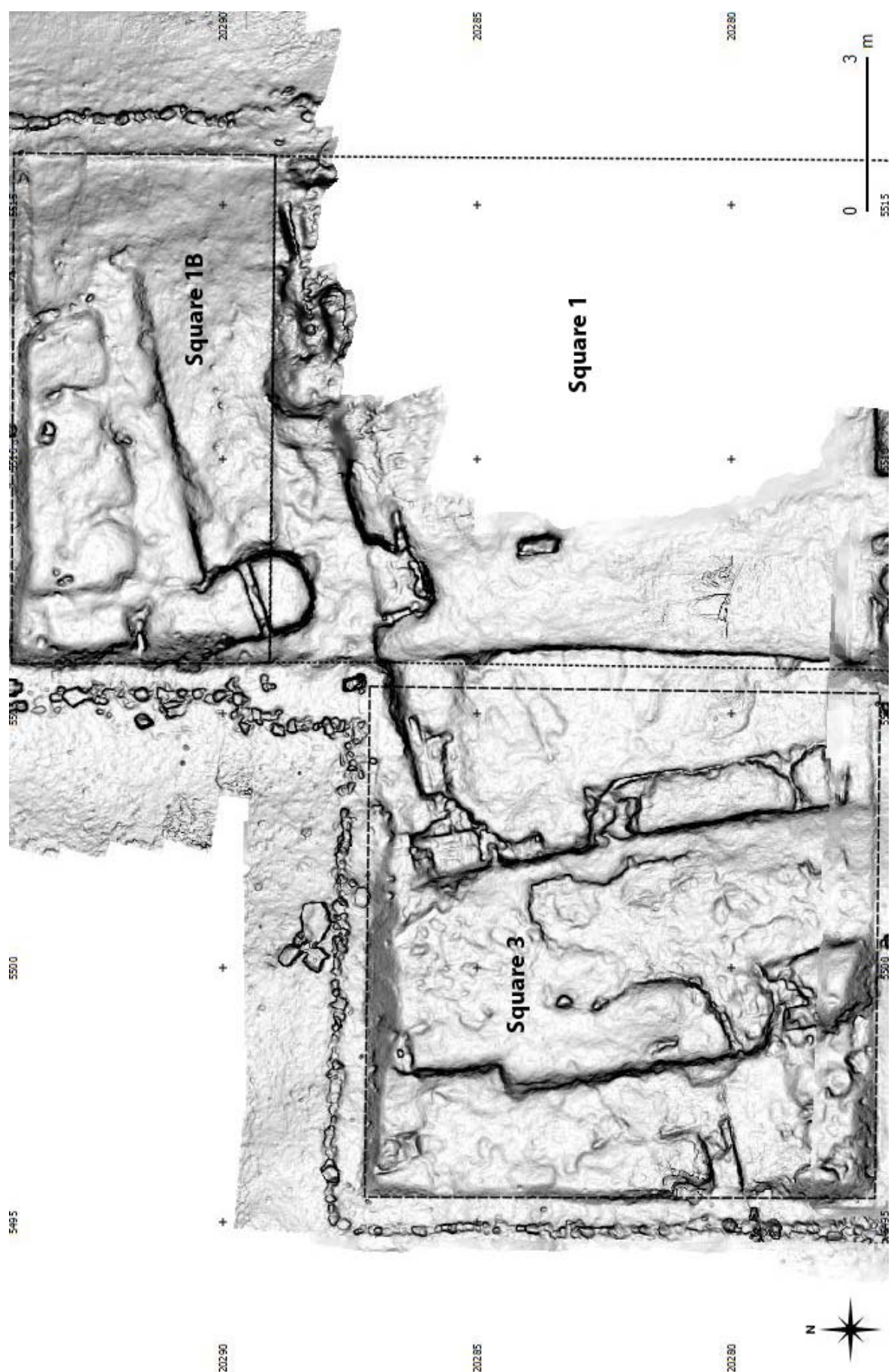


Fig. 2: Plan of Square 1B and Square 3: situation at the end of the 2014 season (M. Fera).

In the centre of Square 1B, a negative wall was relocated—only the remains of a completely plundered foundation bed have survived. The alignment follows the “northern wall” of Building A in Square 1, suggesting a new part/room of the building. At the western edge of Square 1B some more remaining mud bricks of 18<sup>th</sup> Dynasty date were found—they once formed a north-south aligned wall, indicating a possible corner of the new room.

In Square 3, the continuation of wall 15 was located in the north-eastern corner. After approx. 3m, this wall joins a north-south aligned one (feature 44). This new wall extends towards the north and disappears in the baulk of the square. Towards the south, it was traced as a negative outline and with parts of its foundation trench (feature 43), running all the way through Square 4 until it meets wall 16, the “southern wall” of Building A. Wall 16 continued towards the west and joins another north-south wall (wall 34) in a well-defined corner (Fig. 3). The filling of the foundation trenches was not yet excavated in the southern part of Square 4.



**Fig. 3: Square 4, south-western corner of newly found negative walls of Building A (feature 34 to the left and feature 44 to the right).**

Wall 34 and its foundation bed 33, running approximately north-south from Square 3 to Square 4, are parallel to wall 44 with its foundation bed 43 (Fig. 3). Some mud floor pavement was still preserved between the walls, connecting these features as once belonging to a single structure (Fig. 4).





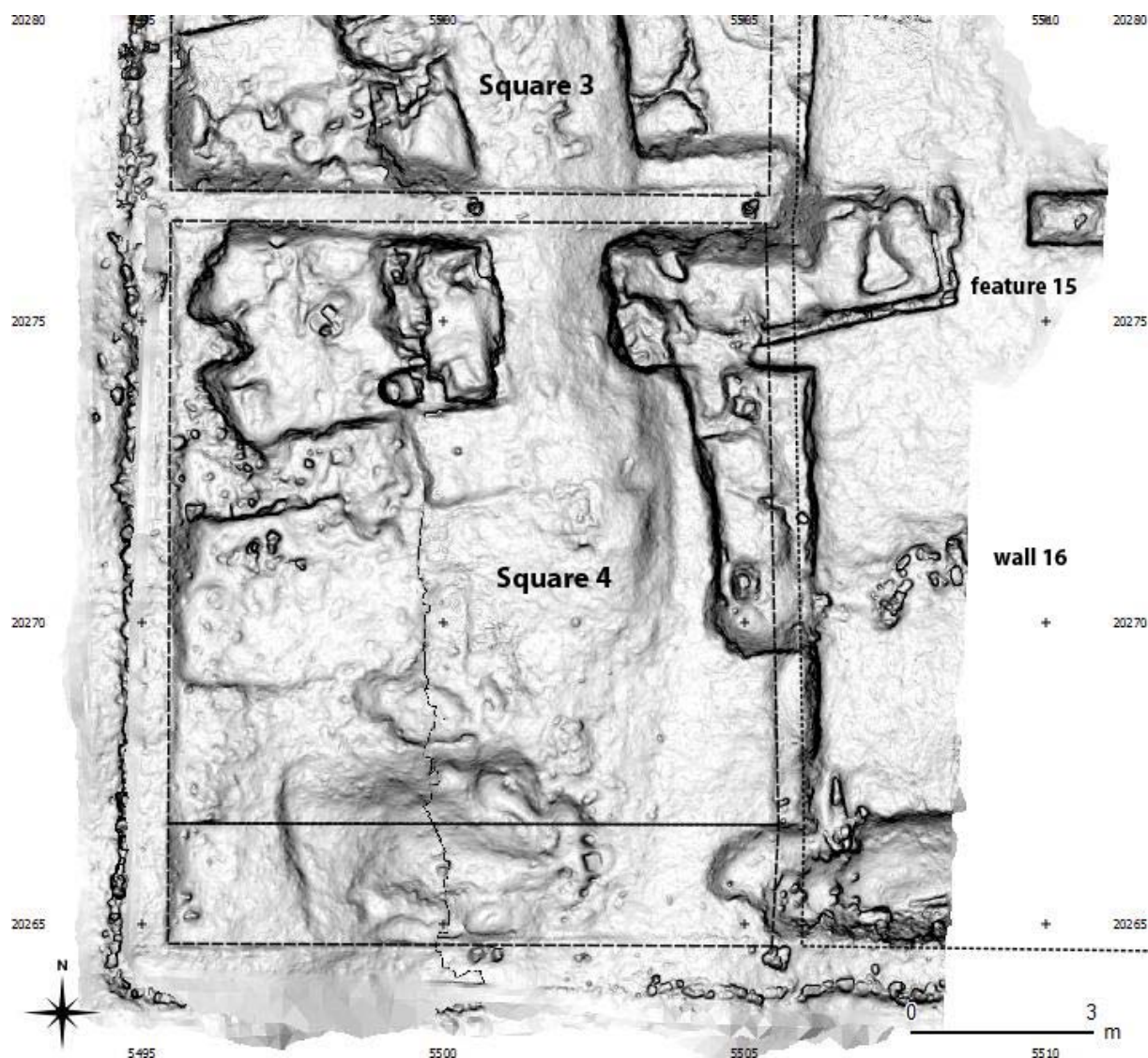
**Fig. 4: Square 3, overview of mud pavement remains between walls 34 (west) and 44 (east).**

Along the western edge of Square 3, several traces of small east-west orientated interior walls were found. This area was also very rich in fragmented schist plates, many of them still covered with plaster/gypsum. It can be proposed that this part of the Building A, probably once the western entrance area, was covered with a schist pavement. This finds good parallel in the southern part of the Pharaonic town where such pavements are attested in large magazines.

Square 4 was not yet excavated in all its extension, the southern part was only cleaned from the uppermost destruction layer (Fig. 5).

The most interesting find in Square 4 is the western part of feature 15 (Fig. 6). Excavated in 2013, the eastern part of this feature was described as intrusive structure of Post-Pharaonic date and of unclear function. It is half-brick thick with the inner side lined with red-bricks and a plaster coating. The new findings in 2014 now change the picture—feature 15 has a minimum extension of 5.6m west-east and 2.2m north-south. Its western wall is set against the natural gravel pebble in Square 4. In this area a small hole was found directly 20 cm above the mud bricks, dug into the gravel. Its diameter is roughly 18cm and it seems to have once held a wooden beam. The southern wall of feature 15 is preserved to a height of 55cm and the bottom edge has not yet been reached. The complete western part of the structure is still covered with very loose backfill of gravel, mud bricks and ceramics. Interestingly, the ceramics deriving from the newly exposed sections of the walls of feature 15 are all consistently mid-18<sup>th</sup> Dynasty in date. All in all, the present working hypothesis is that feature 15 represents a New Kingdom storage installation of a rectangular shape, with a vaulted roof located below the floor level of

Building A. It can be labelled as a cellar and excavation will continue in the next season. Due to a number of ashy deposits, charcoal and a large number of conical bread moulds, feature 15 might have been used as bakery or kitchen.



**Fig. 5: Plan of Square 4 with outline of negative walls and feature 15 (M. Fera)**



**Fig. 6: Feature 15 in Squares 4 and 1; the western part is not yet excavated.**



All in all, much progress has been made in 2014 to understand the outline of the major structure at SAV1 East, “Building A”. Its date to the mid-18<sup>th</sup> Dynasty was confirmed and it is clear that it extends further to the north and to the west, exactly as mirrored on the magnetometer image. Schist pavements and mud pavements have been noted and with feature 15 there is evidence of a large storage installation. The western part with small interior walls resembles closely the front rooms of SAF2, the so-called governor’s residence in the southern part of the Pharaonic town. The functional interpretation of Building A must still stay open for the moment, but with the results from 2014 a domestic character can definitely be excluded. It is not a simple dwelling place, but seems to be linked with Temple A and with the storage of goods (or maybe bread production, see feature 15).

### **3. Excavations at SAV1W, fieldwork report (by Julia Budka)**

#### **Objectives**

One of the goals this season was to investigate the enclosure wall of the fortified New Kingdom town on its western side, just north of the main town gate. At the new site towards the west, labelled SAV1 West, two new trenches were opened—Square 1 (10 x 10m) and Square 2 (5 x 15m).<sup>2</sup> An extension to the west was added to Square 1 (Square 1W, 5 x 10m) and to the northwest (Square 1NW, 2 x 5m).

#### **Method**

Based on our experience from SAV1 East in 2013, we changed our excavation method to a one surface documentation, conducting a stratigraphical excavation. For removing the deposits according to their stratigraphical position, thus cleaning out the later disturbances aiming to expose the Pharaonic remains, a new way of documenting was introduced. With a camera (Canon EOS 70D) and a monopod each working step was documented by photographs, processed with PhotoSCAN, thus resulting in Structure from Motion models of each surface on a daily basis.

#### **Square 1**

Starting to remove the upper debris levels of Square 1, it soon became clear that its western half is occupied by the remains of the New Kingdom town enclosure, while its eastern part displayed large sandy pits with much 18<sup>th</sup> Dynasty pottery, loose mud bricks and many worked stone fragments.

In the southwestern corner of Square 1, a large pit filled with mostly Christian pottery was cut into the enclosure wall. Similar holes have been dug into the brick work of the enclosure wall at SAV1

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<sup>2</sup> See J. BUDKA, Neues zur Tempelstadt der 18. Dynastie auf Sai Island (Nordsudan) – Ergebnisse der Feldkampagne 2014, *Sokar* 28, 2014, 28–37.

North.<sup>3</sup> As was already observed by Azim in the 1970s, the Sai fortification suffered from several destructions, but also restoration phases in its use-life.<sup>4</sup> This is now confirmed by work at SAV1 West.

Despite much ancient destruction work and disturbing pits, the complete thickness of the town wall is visible (4.3-4.5m) and the foundation level has been reached in the northern part. The outline of the enclosure wall follows exactly the plan as assumed by previous surveying.

A later addition to the western outline of the 18<sup>th</sup> Dynasty wall was traceable with the extension towards the west, Square 1W. Secondary constructions were set outside of the New Kingdom brick work, partly reusing the bricks from the enclosure wall. A layer holding much organic material, charcoal and pottery of a domestic character may indicate a small occupation spot, maybe a modest hut or shelter. Its date remains to be established, but the pottery points to a Late Christian origin.

Towards the east of the enclosure wall, thus within the New Kingdom Pharaonic town, large amounts of sandy backfilling of pits and collapsed mud bricks have been removed. At the end of the season, a level was reached in the eastern half of Square 1 where *in situ* New Kingdom structures are visible (Fig. 7). In the southeastern corner, a pit was dug into the Pharaonic remains—cleaning this hole, we exposed a north-south wall of bricks and another East-West wall, forming a rectangular structure. The gap between the north-south wall and the enclosure wall nicely corresponds to the distance one would estimate for a “wall street” running along the enclosures wall. Several floor levels and ashy layers attest to a multi-period use of this small building in the southeastern corner.

Occupation layers are also visible in a section created by a Post-Pharaonic pit just to the east of the enclosure wall in the northern part. Again, several floor levels testify that this area was in use for a considerable time span during the New Kingdom. Based on the assessment deriving from the ceramics, the mud brick structures and remains in Square 1 seem to originate from the mid until the late 18<sup>th</sup> Dynasty. No material earlier than Thutmose III was found, seemingly providing a *terminus ante quem non* for the building of the town wall and the visible structures belonging to the interior occupation.

## Square 2

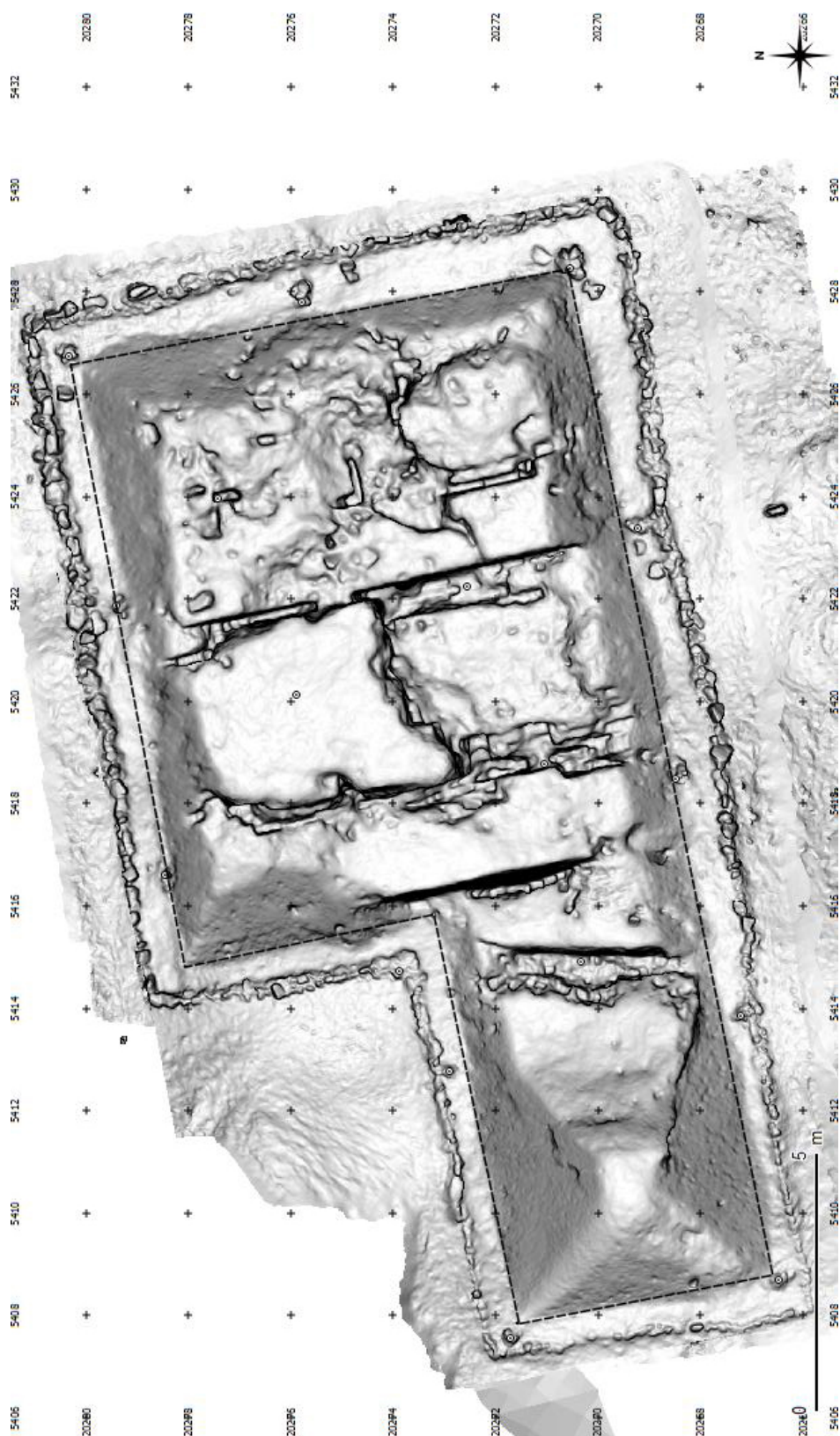
Square 2 is located in a shallow depression close to the Western city gate. Some mud bricks have been visible on the surface and after cleaning a superficial deposit, the remains of the New Kingdom town enclosure were exposed in the eastern part of the trench. Similar to Square 1, the structure has been pitted in antiquity and most of the mud bricks have been removed. However, the outline of the 18<sup>th</sup> Dynasty wall is now understandable. A deep sandy pit has cut off the New Kingdom enclosure wall in the southeastern corner. From this sandy filling, reaching down to the foundation of the town wall, came one of the most interesting finds this season: SAV1W 532, a complete dummy brick, a cartouche shaped plaque with hieroglyphic inscription (see below, Fig. 11).

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<sup>3</sup> See F. DOYEN, The New Kingdom Town on Sai Island (Northern Sudan), *Sudan & Nubia* 13, 2009, 17–20.

<sup>4</sup> M. AZIM, Quatre campagnes de fouilles sur la Forteresse de Saï, 1970-1973. 1<sup>ère</sup> partie: l'installation pharaonique, *CRIPEL* 3, 1975, 122.

In the north-eastern corner of Square 2 a Post-Pharaonic feature was documented, comprising of some mud brick walls and adjacent occupation levels, corresponding well to the findings in Square 1.



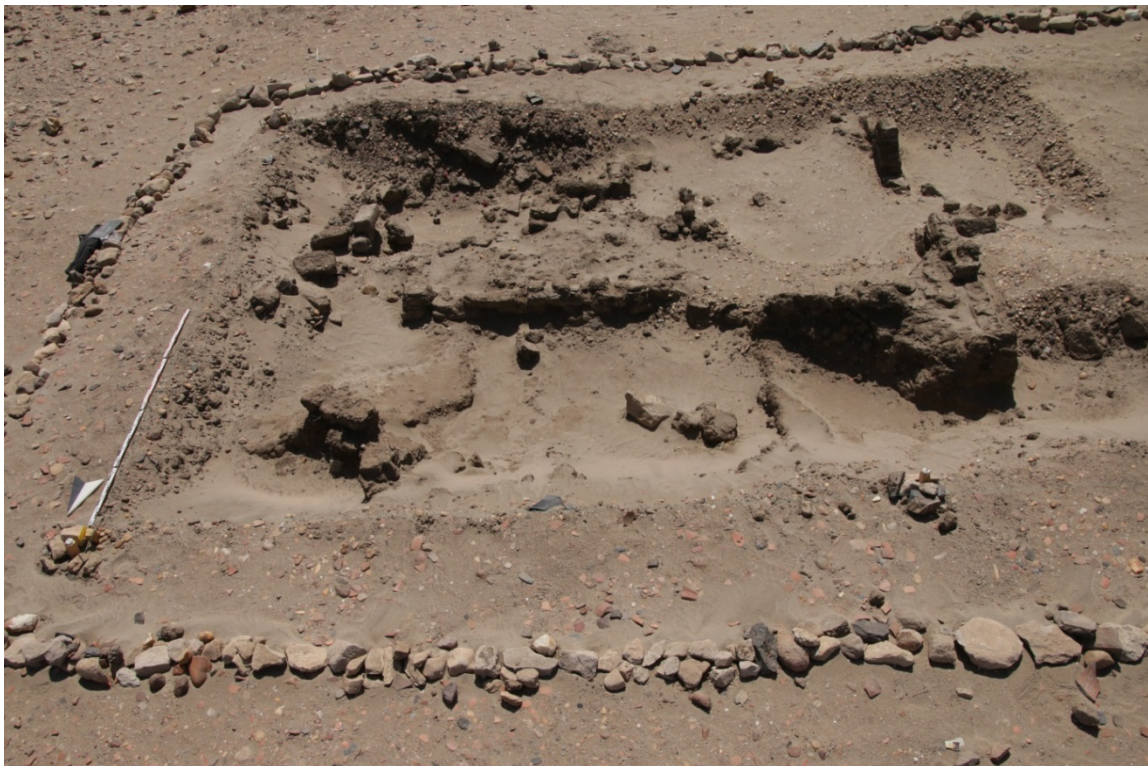
**Fig. 7: Plan of Square 1 with its extensions, end of 2014 season (M. Fera).**



## Summary

To conclude, excavation work in SAV1 West provided some important results:

- The outline of the western town wall was exposed in the trenches 1 and 2. Its location fits perfectly to what Azim reconstructed as the western border of the Pharaonic town (see fig. 1).
- The “one surface documentation” provided a better understanding of the later destruction and also the re-use of the town wall. The destruction happened mostly in Christian times, additions and secondary structures seem to have been added later, partly using the taken out brick work.
- Despite the pitting and disturbances, very promising New Kingdom deposits have been traced within the town, east of the enclosure wall—several phases for these structures are visible in sections of the Post-Pharaonic pits.
- According to the finds and the pottery, there is no evidence of an early 18<sup>th</sup> Dynasty activity at SAV1 West – no material pre-dating Thutmose III has been found. Most of it is of mid-18<sup>th</sup> Dynasty date, some late 19<sup>th</sup> Dynasty material is also present as well as few Ramesside and Napatan sherds. This seems to indicate that the enclosure wall and the adjacent Pharaonic buildings have been set up during the reign of Thutmose III—corresponding nicely to the textual evidence from Sai and also the archaeological remains at SAV1 North and SAV1 East.



**Fig. 8:** Eastern half of Square 2, looking south. Note the remains of the enclosure wall and the later pits which have largely destroyed it. Towards the east, small remains of *in situ* New Kingdom deposits are visible below the debris. Along the northern edge of the square, a later installation is preserved with some occupation layers.

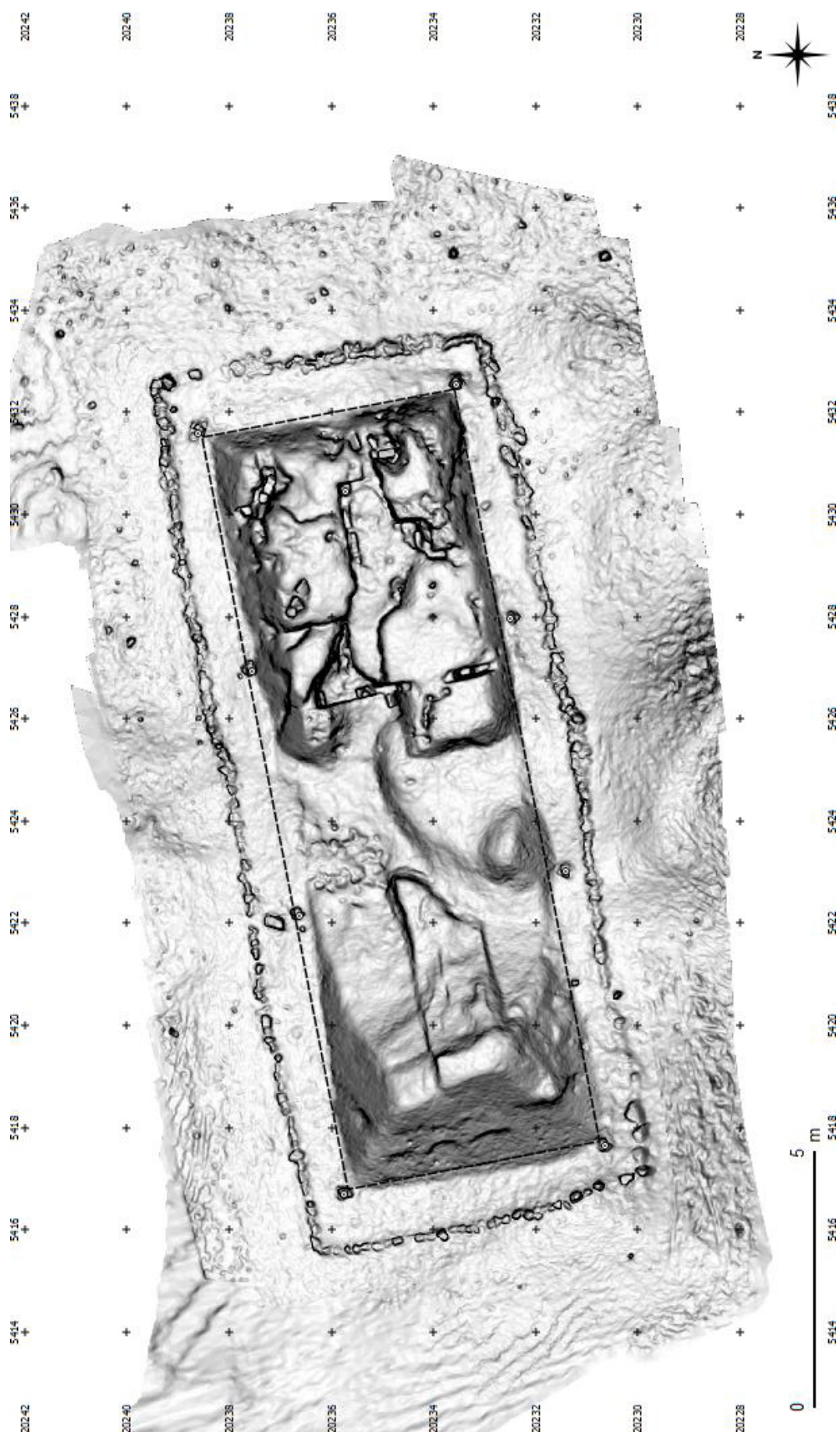


Fig. 9: Plan of Square 2 with remains of the enclosure wall in the east, end of 2014 season.

#### 4. Processing finds and pottery from the New Kingdom town (by Julia Budka)

##### Objects from SAV1 East and SAV1 West

The registration of the objects and finds from the new excavation site, SAV1 West, and from SAV1 East was carried out in 2014.<sup>5</sup> The File Maker database with a total of 1733 objects comprises 1412 finds from the 2014 season. These are mostly stone tools, grinding stone fragments, and re-used sherds, as well as some faience beads and clay objects. Selected pieces have been recorded by digital photographs and 1:1 drawings of 16 important pieces have been created.

The material from the 2014 season at SAV1 East mirrors the 2013 season; especially in the upper levels the material is very mixed, comprising many Medieval and Ottoman finds including glazed ware and glass. Among the objects safely attributable to the 18<sup>th</sup> Dynasty there are fragments of Nun-bowls, female figurines, stone vessels and one seal.

The finds from SAV1 West are more consistently of 18<sup>th</sup> Dynasty date—a large number of re-used sherds, stone tools and worked stones were found. In addition, there are also female figurines, animal figurines, Nun-bowls (Fig. 10), stone vessels, net weights and inscribed finds.

The highlight of the 2014 season is for sure SAV1W 532 (Fig. 11). It is a mud object of oval shape, representing a cartouche (11.4 x 6.1 x 3.4cm). This oval plaque bears incised hieroglyphs on the front, giving the name and epithet of a god (possibly Horus or Hauron). Such an object can be called a “dummy brick” and it has a symbolic character, being part of a foundation deposit. SAV1W 532, found in the sandy pit cutting the enclosure wall in Square 2, probably once belonged to a foundation deposit for the town enclosure.



**Fig. 10: Faience Nun-bowl fragment from SAV1 West (SAV1W 032).**

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<sup>5</sup> By Nicole Mosiniak, Julia Preisigke and Julia Budka.





**Fig. 11: Dummy brick/cartouche plaque SAV1W 532.**

### **Pottery from SAV1 East and SAV1 West**

The three main working steps conducted during the 2014 season of the New Kingdom pottery study were: 1) continuation of **drawing material** already stored in the magazine, with a special focus on locally produced vessels; 2) documenting the **statistics** & establish dating for **newly excavated material** from SAV1 East and SAV1 West; 3) detailed documentation of diagnostic pieces excavated in 2014. A total of 264 pottery drawings have been produced in 2014.<sup>6</sup> 120 diagnostic pieces from SAV1 West have been registered and included into the form corpus.

The material from SAV1 East closely resembles the pottery excavated in 2013—comprising a large number of New Kingdom bread moulds and Nubian sherds. The material from SAV1 West is slightly more diverse—the majority is clearly Thutmoside in date, but there is also late 18<sup>th</sup> Dynasty, some Ramesside material and much Post-Pharaonic material (Napatan, Meroitic, Post-Meroitic, Early and Late Christian as well as Ottoman). Especially from the area east of the enclosure wall in Square 1 the amounts of 18<sup>th</sup> Dynasty pottery are very large. The assemblages compare well to both SAV1 North and SAV1 East, but they are better preserved with many complete profiles. In particular pot stands have survived intact. Remarkable are the considerable number of Nubian cooking pots, so-called Fire dogs, fish dishes and painted wares.

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<sup>6</sup> By Nicole Mosiniak, Julia Preisigke, Elke Schuster and Julia Budka.

## **5. The 3D Laser Scanning campaign of the southern part of the New Kingdom town (by Robert Kalasek and Ingrid Adenstedt)**

The key responsibility for the 3D scanning process (February 3-10, 2014) lay with Robert Kalasek and scientific assistance was provided by Ingrid Adenstedt. The work was carried out with an Image Laser Scanner Riegl VZ-1000, and a Nikon D200 camera with a 14mm lens was mounted on the scanner in order to record the texture.

The main goal of this campaign was to achieve a complete geometric documentation of the remaining walls and floors of the southern part of the New Kingdom town. This was achieved by 155 different scan positions, from which 360 degree scans were taken each time. The scans can be joined together with the help of a multitude of reflector points, which were distributed throughout the ruins. These reflector points were also measured with a total station so that the registered scans can be placed into a geo-referenced net. The result of the scans is a dense point cloud of all the surfaces.

In addition to the standing remains of the Pharaonic town in the South, the newly excavated trenches (SAV1E and SAV1W) and SAV1N were scanned and geo-referenced as well. In order to collect data for the topographic understanding of the surroundings, four long-range scans (range: 1.2km) from elevated points were also undertaken.

## **6. Sampling of New Kingdom pottery from the Pharaonic town (by Giulia d'Ercole)**

The sampling of ceramic sherds for laboratory analyses<sup>7</sup> was continued during the 2014 season (January, 4<sup>th</sup> to 30<sup>th</sup>). 103 pieces were selected (81 from SAV1 North, 5 from SAV1 East and 17 from SAV1 West). The 2014 samples consists of: 24 hand-made Nubian wares, 46 Egyptian and local wheel-made Nile clays wares, 11 Marl clays (Marl A2, A3, A4, B and D of the Vienna System), 8 possible Mix clays, 24 imports from Canaan, the Levant and the Egyptian Oases plus three unclassifiable sherds. All the samples have been photographed and registered according to their find position and pottery number. A preliminary macroscopic classification of the fabrics was realized using a lens with 20x magnification (TM 20 Eschenbach).

### *Ethnographic samples*

The 2014 samples also include three 'ethnographic' specimens which will be used as comparative samples for the ancient production. They come from a modern ceramic workshop located in the near-by village of Abri where we went in order to interview the two potters working there and to collect information concerning the manufacturing sequence (Fig. 12).

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<sup>7</sup> The laboratories of the Department of Lithospheric Research and the Department of Geodynamics and Sedimentology of the University of Vienna hosted the petrographic analyses (OM); Instrumental Neutron Activation analyses (INAA) are ongoing at the Institute of Atomic and Subatomic Physics (AI) of Vienna. Further, on a selected number of samples, *Electron Microprobe analyses* (EMPA) are in progress at the Natural History Museum of Vienna.



**Fig. 12: Potter at the wheel from the ceramic workshop in Abri.**

## **7. Faunal remains from sector SAV1 North in the Pharaonic town (by Konstantina Saliari)**

The faunal material from SAV1 North, excavated between 2008 and 2012, was studied during the 2014 field season. The aims of this season concerning the animal remains were to collect and record primary data and to establish future perspectives for scientific analysis. A total number of 455 bones were identified, coming from levels 3, 4 and 5. Modern animal and human bones indicated mixed assemblages (level 3). Bones of young animals as well as of small-bodied individuals were found in a relatively good state of preservation. Although the taphonomical processes did not reduce the ability to identify the material, it was not always possible to assess human activity patterns due to post depositional fragmentation.

### **Recording of primary data**

The primary data included elements represented, taxonomic identification, specimen count, modifications, pathologies, anatomical features of age and sex, measurements, specimen weight, and morphological observations. Before the examination of the material, a number (no / level) was given to every bone for recording purposes and to avoid mixing the different archaeological contexts.

#### *a. Cleaning, identification and quantification*

The first step was to clean the material and to recognize the human remains using the manual of White and Folkens (2005) and the osteological collection at the excavation house. After separating the human bones, the identification of the animal remains followed.

Firstly the elements were identified and then the species. Taxonomic attribution was based on morphological features, age, sex and individual variation. This required comparing the archaeological specimens with some reference specimens collected during the field survey and using 3d models,



together with the manuals of Boessneck et al. (1964), Schmid (1972), Pucher and Engl (1997), Halstead et al. (2002) and Gillis et al. (2011) as well as personal drawings and photos. NISP and MNI were mainly applied for presenting quantitative data analysis. Crossmendable specimens were counted as one piece. The specimen weight was recorded for each taxon; all the information noted following the anatomical terminology.<sup>8</sup>

The preliminary examination of the material demonstrates that the majority of finds derives from domesticated taxa. The analysis of the domesticated specimens indicates that cattle, ovicaprine, pigs, donkeys and dogs are present. Additional information will derive from further identification and quantification in Vienna.<sup>9</sup>

*b. Biological profile*

For the age assessment the state of fusion of the epiphyses as well as the eruption and the wear stages of the deciduous and permanent teeth were documented (Pd<sub>4</sub>, M<sup>3</sup>) following Habermehl's criteria (Habermehl 1975). Sex distribution was estimated utilizing metrical methods and morphological observations on pelvis and metapodials on adult body sizes of cattle and sheep/goats.

*c. Modifications*

The term modification is used to describe marks on the specimens and breakage patterns recorded during the examination. The description of the modification characteristics followed the standard by Reitz and Wing (2008), whereas the evidence of anthropogenic marks (butchery, possible artefacts) was recorded in descriptive terms. In addition, the color of burned specimens together with the gnaw marks were noted. Congenital anomalies and pathological specimens have not been detected.

*d. Morphological observations*

The withers height for goat individuals was calculated following the factors defined by Schramm (1967); the measurements were taken for full adults following the standard developed by Driesch (1976) and were recorded in millimeters using a digital caliper.

*e. Record modern secondary butchery techniques*

Modern secondary butchery techniques were recorded in the excavation house at on February 18 aiming for a better understanding of the complex variation in meat processing (in the markets, the households, the local restaurants). This variation can help to establish the background for butchery marks and can reveal aspects of technical knowledge, transfer and ethnicity etc. (Seetah 2006).

*f. Photos and storage of the material*

The last step was to take pictures and store the remains.

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<sup>8</sup> Modern specimens will not be included in the final calculations.

<sup>9</sup> The number of bones identified is not yet the final one as some of them will be determined in Vienna by comparison with the reference collections of the University of Vienna (Department of Palaeontology) and the Museum of Natural History in Vienna (1<sup>st</sup> Zoological Department, Archaeozoology).

## Discussion

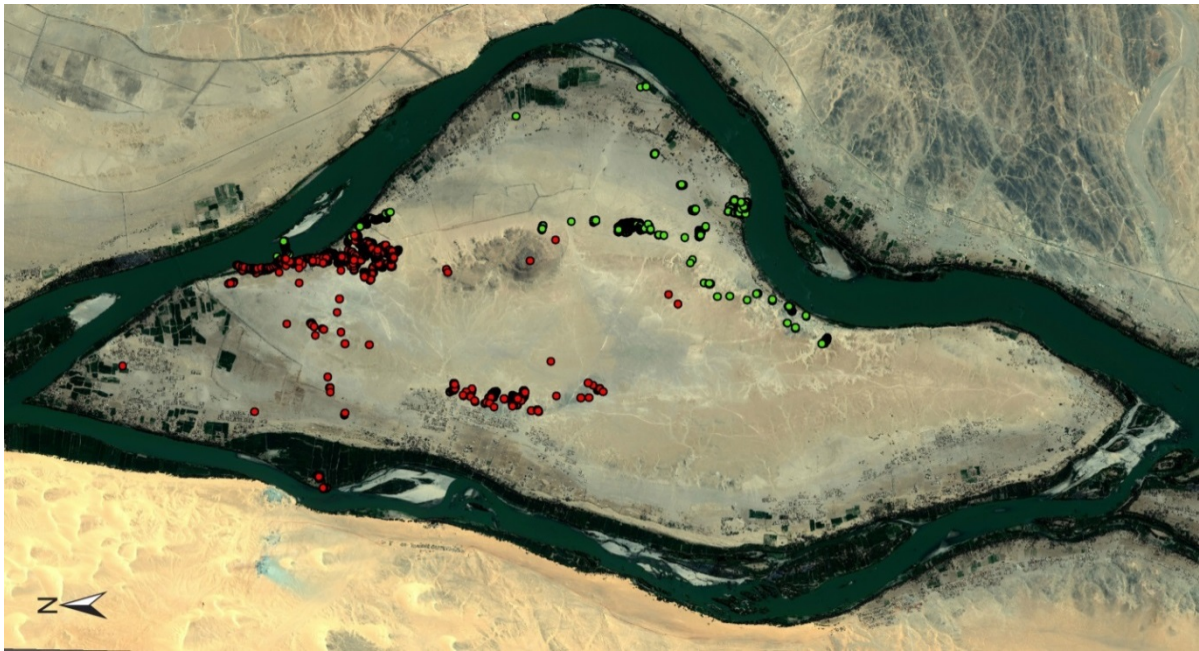
The collection of the primary data was of key significance for the upcoming scientific analysis to be carried out in Austria. The analysis of the aforementioned data will provide information on the body dimensions, skeletal frequencies, relative frequencies of taxa, nature of refuse, urban ecology and distribution of the refuse deposits, food preferences or even some sort of economic strategies, contributing to the interpretation of the site and the people who lived there. Comparative archaeological and zoological study with other Nubian and Egyptian sites shall be conducted together with observations concerning African and European animal populations.

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## 8. Geoarchaeological Investigations on Sai Island (by Erich Draganits)

Within the framework of AcrossBorders geoarchaeological fieldwork was carried out from January 4<sup>th</sup> to 17<sup>th</sup> 2014. The regional focus of the fieldwork was the area of the Pharaonic town and its hinterland. In total 1368 GPS waypoints have been taken for locating geological samples, lithological boundaries and different kinds of observations (Fig. 13).



**Fig. 13:** Bing maps satellite image of Sai Island with GPS waypoints showing the main fieldwork areas.

### *General geological situation and resources*

Sai Island comprises medium-grade metamorphic Precambrian rocks (amphibolite, dolomite, quartzite, biotite gneiss, calcite marble) in the west and southeast, dipping around 30° towards the northwest. These rocks are commonly cross-cut by large quartz-veins. In the central and northern part of the island these meta-volcano-sedimentary rocks are overlain by subhorizontal Nubian sandstone, mainly consisting of medium-coarse-grained fluvial quartz sandstone, conglomerate, rare siltstone and occasional silicified wood. Almost all of these rocks are covered by thin layers of comparably much younger Nile sediments (in some places with Palaeolithic artefacts) and only the Nubian sandstone of Jebel Adu raises as an inselberg from the flat terrace surfaces (van Peer et al. 2003, Anonymous 2005).

The pre-Holocene Nile sediments mainly comprise gravely channel deposits and fine-grained floodplain sediments. The sub-rounded to rounded gravel of the pre-Holocene Nile terraces are strongly dominated by quartz clasts, followed by chert and beautiful agate and virtually free of carbonate clasts, while the fine-grained floodplain sediments commonly show soil formation processes and related calcrete (Lewis et al. 2011).

Holocene Nile sediments are found around the margin of Sai Island up to ca. 7m above the Nile level during the first half of January. These sediments comprise of sand, silt and clay sized deposits.



### *Rock types in the Pharaonic town*

The rock types occurring within the Pharaonic town in general reflect the geological reality of the island and most of them are locally available. By far the most common rock types are quartz sandstone and amphibolite, while vein quartz, calcrete, biotite gneiss, calcite marble are comparable rare. Rock types which probably have been brought to the island include granite, diorite, gabbro and gypsum.

### *Provenance of stones from the Pharaonic town*

Concerning the provenance of these rocks, quartz sandstone (“Nubian sandstone”) is very common in northern and central Sudan (Anonymous 2005) and also directly in the area of the Pharaonic town and around Jebel Adu. The dark amphibolite can be found in the western part of the island and in its southeast. However no substantial quarries could be located so far. Several quartz sandstone outcrops show traces of working by stonemason tools, for example directly east of the excavation house and next to the houses south of the Ottoman fortress. However, they are very small scale and could provide only minor quantities of dressed stones. Additionally, the coarse grained and friable sandstone in this area is of rather poor quality for dressed stones (Fig. 14). The search for the provenance of the quartz sandstone as well as the amphibolite should not neglect areas just across both Nile branches opposite of Sai Island.



**Fig. 14: Nubian sandstone outcrop with traces of working by stonemason tools (east of the Pharaonic town, Post-Pharaonic).**

### *Possible erosion of the eastern part of the Pharaonic town*

The extent of Nile erosion in the area of the Pharaonic town is related to the question of the possible existence of an eastern fortification wall. There are several examples of slope failure close to the Nile, probably caused by undercutting of slope toe and raised groundwater tables during flood periods. Many of the examples involving Nubian sandstone show toppling failures, for example at spots east and northeast of the excavation house. From the geoarchaeological point of view severe erosion in this part of the island is unlikely mainly based on the observation of the low incision rate of the Nile (van Peer et al. 2003). Additional arguments against erosion are the existence of a broad Nile terrace east of the Pharaonic town and the presence of Nubian sandstone without indications for slope failure below the town. Further, possibly *in situ* mud bricks to the east of Temple A, which are exactly in line with a 6 m long, straight linear structure in the geophysical survey from 2011 have been documented and visualized by means of a GIS project. The orientation of the mud bricks fits to the alignment of the general town grid and they might represent remains of an eastern fortification wall.

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## **9. Summary (by Julia Budka)**

To conclude, the 2014 field season resulted in very important insights and added information about the evolution of the Pharaonic town of Sai Island. The three most important results are as follows:

- (1) Building A at SAV1 East provides a close parallel to the so-called residence SAF2 in the southern part of the Pharaonic town. It is now firmly established that it belongs to the major remodelling of Sai during the reign of Thutmose III, being contemporaneous with Temple A.
- (2) The earliest remains at SAV1 West are dating to the mid-18<sup>th</sup> Dynasty; there is nothing earlier than Thutmose III, indicating that the enclosure wall was built during the reign of this king.
- (3) The sandstone cliff east of the town did not collapse into the Nile as previously thought (see the report by Erich Draganits), and possible remains of an eastern town wall have been located. The east-west extension of the Pharaonic town is therefore much shorter than previously thought (a maximum of 120m instead of 140m can be assumed) and will be investigated by means of excavations in the upcoming season.