A BRIEF REPORT ON THE 2019 SEASON IN DUWEYM WAD HAJ

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This article reports on the results of archaeological, soil, geoinformatical, engineering and other interdisciplinary research and surveys in Duweym Wad Haj in 2019. Debris of arches and columns of *riwaq* were discovered inside the old mosque and sand deposits ca 2.5 m thick were excavated here, interleaved with traces of settlement dated to the 13th and 14th centuries AD. In other squares thick sand deposits were also excavated, covering walls and debris, containing dressed stones. A probable channel was discovered in pre-mosque layers. The pottery discovered dates to a broad range from the Mesolithic/ Neolithic to the Islamic periods. The torso of a statue, presumably of Napatan origin, has been discovered by the survey. Soil research has determined that the old mosque might stand on an at least 7 metres high complex of Aeolian sands. Two phases of the floor of the mosque, sloping down from the south-eastern corner towards the north-western corner and the very accurate orientation of the *qibla* wall towards the Kaaba have been corroborated. The construction of the *minbar* was examined and traces of its wooden railing have been discovered. Samples from lintels in the windows of the mosque indicate the use of coniferous wood. The old mosque may have served for hajj pilgrims from central and western Africa and links to the Red Sea coast have been indicated.

Keywords: Sudan, Duweym Wad Haj, archaeology, soil, survey, ^{14}C, mudbrick, mosque

The research season took place from January 12 to February 10, 2019. The team of the *Slovak Archaeological Mission in the Sudan* (SAMS) at Duweym Wad Haj[1] consisted of Jozef Hudec (director); Branislav Kovar (deputy director), Tibor Lieskovský, Květa Smoláriková; Veronika Dubcová; Lenka Horáková, Emil Fulajtár (fellows of the Institute of Oriental Studies, Slovak Academy of Sciences); Miroslav Černý (Aigyptos Foundation); Lucia Kovárová (Institute of Archeology, SAS); and Mongeda Khalid Magzoub Ali (National Corporation for Antiquities and Museums/NCAM).
The mission's objectives were as follows:

1. Archaeological excavations following up the results of the GPR survey from 2018;
2. Geodetic documentation of the older mosque on the site;
3. Contextual archaeological survey around the Duweym Wad Haj site;
4. Sampling for dendrochronological and ^{14}C research;
5. Soil science research in layers sedimentation;
6. Research on mud bricks structures and mud bricks sampling.

[1] Project APVV-17-0579

1. Archaeological Excavations

A geophysical and surface survey carried out in 2018 indicated the occurrence of archaeological monuments in areas P1 – P7[2]. The archaeological excavations were conducted in a total of 20 squares (Fig. 1): X335-Y125, X340-Y130, X355-Y130, X370-Y135, X370-Y140, X365-Y145, in the P1 area; X375-Y115, X370-Y135, X370-Y140 and X365-Y145 in areas P2, X380-Y140 and X380-Y130 in areas P3, X345-Y145, X350-Y150, X350-Y155 in areas P5A, X345-Y175 in areas P5B, X290-Y170 in areas P6 and X250-Y145, X315-Y140 and X315-Y145 outside the geophysical survey area. The squares usually had the regular size of 5 x 5 m.

1.1 Area P1

Two squares, X335-Y125 and X340-Y130, were set in the western part of Area 1, inside the mosque close to its NW corner.

In square **X335-Y125** the uppermost stratigraphic unit (SU)1 consisted of a 10YR 7/4 very pale brown sand layer, about 20 – 30 cm thick. The sand covered mudbrick destruction (SU2), which was up to 20 cm thick.

After cleaning of the destruction, specifically formed mudbricks of columns of the *riwaq* (Fig. 2) and standard bricks of arches/arcades appeared in the debris. Residua of two columns were identified among the mudbricks – one on the southern side section and another on the western side section of the square (Fig. 3). A grey sand layer below the debris (i.e. SU5) continued to a depth of ca 70 cm. The layer included, in about the middle of its depth, pieces of clay (approx. at the level of SU15/16 in square X340-Y130).

Below SU5 there was a layer of grey sand (SU11) containing pieces of clay and charcoals. The top of SU11 was at a depth of 256.95 m AMSL. Below SU11 an olive-grey, sand-filled channel-like depression (SU14), was evident in the section (Fig. 4). At a depth of about 1.5 m fine yellowish SU13 contained ceramic sherds above a fireplace in the SE corner of SU14. The channel-like depression was identified also in Area P5A, squares X350-Y150 and X345-Y145 (see below). There was an ash-rich accumulation in the upper part of

[2] HUDEC, J. et al. Report on Surveys in Duweym Wad Haj. In *Asian and African Studies*, 2019, Vol. 28, No. 2, , pp. 168 – 179 + plates 418 – 428; HUDEC, J., CHEBEN, M., KOVÁR, B. Výskumy na lokalite Duwejm Wad Hadž v Sudáne – sezóny 2017 a 2018 [Investigation of the site of Duwejm Wad Haj in Sudan in 2017 and 2018]. In *Študijné zvesti*, 2019, Vol. 64, pp. 207 – 220.

SU14 in the NW corner of the square. Charcoals from these layers were dated by radiocarbon to the 13th and the 14th centuries calAD.

The excavation of sand deposits continued to a depth of ca 2.3 – 2.5 m in the eastern third of the square. There was a thin darker line beneath SU14, below which was a lighter sand layer and again an olive-grey sand layer. At the bottom of the excavated depth, there was cement-like coloured light sand, in which there were ash layers (SU17) at the north-eastern and south-eastern corners of the square. The excavation stopped at about this level for safety reasons.

The square **X340-Y130** was also covered by a thin layer of very pale brown sand (SU1), under which was a ca 15 cm thick layer of destruction of the *riwaq* (SU2), accumulated in the central and eastern part of the square. The main destruction was oriented from ca middle of the northern side towards the south-eastern corner and resulted from the destroyed arch of the *riwaq*. The lower termination of a column (SU29) with a diameter of ca 60 cm, on a core with a diameter of ca 16 cm, was discovered in the main debris, at a distance of 4 m from a half column of the northern wall. Another eroded column termination (SU30) was discovered at the south–eastern corner of the square (Fig. 5). Debris was also unearthed at the south-western corner of the square.

Below the debris of the *riwaq* was a 20 cm layer of yellow sand, covering the SU15 sandy layer with pieces of clay, ca 15 cm thick. In the western part of the square a reddish (red-brown) thin layer SU16 was discovered below the sandy-clay debris. This layer of ca 3 – 5 cm might be of organic origin, probably a result of decayed *pirish* mats, made of palm leaves, used to cover the floor of local mosques. Due to time constraints the excavation did not continue deeper.

The square **X355-Y130** was set at the last standing pillar of the *riwaq*, near the centre of the old mosque (Fig. 6). Ca 30 cm thick SU1 was excavated above a hardened level, which might represent a more recent floor level of the mosque, as the plaster on the column continued deeper.

The mudbrick debris of an arch was unearthed in the NW part of the square. This layer (SU26) was about 15 – 20 cm thick and probably laid on an older floor level. Due to time constraints the excavation of the square stopped at this level.

Squares **X370-Y135, X370-Y140, X365-Y145** (Fig. 7) were cleaned to a depth of about 10 – 20 cm in a 5 m wide strip along the internal face of the *qibla* wall, northwards of the *mihrab*. Plaster was discovered at the foot of the *qibla* wall. Two levels of floor were ascertained by the shape of the plaster at the bottom of the *qibla* wall. A shattered, recent *zeer* pot was discovered at the north-eastern internal corner of the mosque; a decayed wooden lintel was unearthed more southwards.

1.2 Area P2

The square **X375-Y115** was set across the debris of the southern wall of the old mosque, near its south-eastern internal corner, to ascertain the depth/fundament of the destroyed wall and the existence of another entrance to the mosque, opposite the northern entrance. An accumulation of stones and clay uncovered in the NW corner of the square might indicate the base of a column of the *riwaq* in this part of the mosque (Fig. 8). Close to the SE corner the bottom line of the fundament of the wall was at a depth of 259.24 m AMSL. The floor level was here ascertained at 259.32 m AMSL. Samples of the plaster of the mosque, preserved on the wall at floor level, were taken and wall coloured decoration was documented.

On the opposite side of the mosque, at the NW corner, the bottom line of the fundament of the wall was measured at a depth of 256.70 m AMSL and the floor level was either at level 257.40 m or 258 m AMSL. The difference of floor levels was at least 1.3 m. Even the floor at the northern entrance was ca 0.9 m lower (258.43 m AMSL) than at the SE corner.

The area in squares **X370-Y130, X375-Y130, X370-Y135** was partially cleaned around the *mihrab* and *minbar*; a layer of sand thick about 15 – 20 cm was removed (Fig. 9). Cleaning unearthed the first step of the *minbar*, covered by a white colour; other steps above were eroded. On the sides of upper level of the *minbar*, which is above the arch in the body of the *minbar*, three rectangular openings were discovered. They probably served for the fixation of a wooden railing. Traces of wood were also discovered in the openings.

1.3 Area P3

The square **X380-Y140** was filled with a thick layer of very pale brown sand. Mudbrick debris (SU19) was unearthed towards the centre of the square and in the southern section, at a depth of about 1 meter (Fig. 10). Below the very pale brown sand was a layer of whitish cement-like coloured sand at the bottom of the excavation square at a depth of ca 2 m.

The square **X380 –Y130** was partly cut by the fence of an inaccessible modern Muslim cemetery. Very pale brown sand was excavated to a depth of ca 80 − 100 cm.

1.4 Areas P5A and P5B

The areas were situated north of the old mosque, as far as the end of the elevation (*tell*). Excavation was carried out in squares X350-Y150, X325-Y145, X350-Y155, X345-Y145, and X345-Y175. The areas were limited by the old

mosque and its forward wall in the south and by a concrete construction in the centre (Fig. 1). Loose sand kept complicating the work.

In the square **X350-Y150** a geophysical survey[3] indicated the presence of architecture. The surface SU1 was 40-50 cm thick and was identical to SU1 in square X345-Y145. It contained loose sand of a very pale brown colour (10 YR 7/4).[4] The pottery discovered dated to a wide time span. The next SU3 was artificially separated and was basically identical with SU1. It contained pottery and grinders. A more compact sandy SU10 of 10 − 15 cm thickness contained pottery and was identified approx. 70 cm below the surface. It was present in almost a whole square, just in the eastern part it was disturbed by SU3. SU10 could have been the original walking level of the nearby old mosque. However, this hypothesis cannot yet be confirmed. Nevertheless, the mosque entrance is situated nearby and similar layers were detected also in other squares.

Below SU10, the excavation continued along the eastern, northern and western sides of the square by sections about 1 m wide. The method was chosen due to the looseness of SU3 and the disintegration of profiles. Sand similar to SU3 was excavated below SU10 at a depth of 2 m from the surface. Architecture, detected by geophysics at a depth of 1.3 m in the whole area of the square, has not been confirmed by excavation. Nevertheless, a mudbrick element of architecture SU18/23 was detected in section at the NW corner (Fig. 11). A mudbrick wall ca 1 m long and 1.2 m high was discovered ca 50 cm below the surface; its originally observed two phases were not confirmed by further research. Square X350-Y155 was set to investigate the wall (see below).

The square X350-Y150 was excavated down to a depth of 1.7 − 1.9 m. Under SU10, only SU3 contained pottery, probably of post-medieval date. Flints and grinders also occured in SU3. It seems that grinders occured mainly close to the mudbrick wall SU23. Unidentified animal bones were found in SU3, but their provenance from humans cannot be excluded either.

In the southern section, a dark and medium compact – probably anthropogenic – layer was identified approx. 80-100 cm below the walking level SU10 (Fig. 12). A similar layer was detected in the eastern section of X345-Y145 and it also occured in X335-Y125 inside the old mosque (SU14; see above); according to a soil survey it might have been an anthropogenic channel (see also below).

[3] HUDEC, J. et al. Report on Surveys in Duweym Wad Haj. In *Asian and African Studies*, 2019, Vol. 28, No. 2, p. 174.

[4] MUNSELL Soil Color Charts: Year 2000 Revised Washable Edition. Gretag Macbeth, 2000.

In square **X345-Y145** a geophysical survey[5] also predicted elements of architecture.The uppermost very pale brown (10 YR 7/4) sandy and loose SU1 was 40 − 50 cm thick, with various pottery fragments on its surface. Charcoals were discovered at a depth of approx. 30 cm. The next SU4 was identical with SU1; it has been separated for practical reasons only. A charcoal layer occurred also at a depth of ca 50 cm in the whole square, though its source was not identified. Two parts of more compact sand SU12, approx. 10 cm thick, occurred in the western section at a depth of about 60 cm; it was similar to SU10 from trench X350-Y150. SU10 and SU12 could have been the walking level of the nearby mosque.The progress of the work changed at SU12 level, due to the considerable looseness of SU4, which was 1.9 − 2 m thick. Excavation continued in 1 m wide cuts along the eastern and northern sides of the square. SU12 and SU4 contained pottery of recent, postmedieval or medieval date. Unspecified animal bones were discovered in SU4, together with processed lithic artefacts and various flints.

A thin dark medium compact layer – probably anthropogenic – was detected in the profile of the south-eastern corner. It was under SU12, approx. 60 cm below surface (Fig. 13). A similar layer, only situated in a higher position, was detected in the eastern profile of squares X350-Y150 and X335-Y125 (see above).

Square **X350-Y155** was set to research a continuation of masonry SU23 from X350-Y155. Sandy and loose (10 YR 7/4) SU1 was identical with the uppermost layer in X345-Y145. A compact sand SU21, identical with SU10 and SU12 (see above), was separated underneath SU1 in the whole square, at a depth of about 20 cm below the surface. Here also it might be the original walking level of the old mosque. SU21 contained mixed pottery from various periods and unspecified animal bones.

A mudbrick wall SU23, observed in the corner of X350-Y150, was discovered in the southern part of the square, below SU21. SU18 represents the disintegrated remains of the upper part of SU23 masonry. The excavated part of SU23 was approx. 5 m long, 1.2 m high and 0.5 m wide, with an E-W orientation (Fig. 14). Yellowish brown bricks (10 YR 5/4)[6] of the wall were bonded by rat-trap (Chinese) bond. The dimensions of the individual bricks differed, their length varying between 10 and 20 cm, width between 8 − 12 cm and thickess between 5 − 7 cm. The date of the masonry remains open. There were houses in the area not long ago, according to the local people.

[5] HUDEC, J. et al. Report on Surveys in Duweym Wad Haj. In *Asian and African Studies*, 2019, Vol. 28, No. 2, p. 174.

[6] MUNSELL Soil Color Charts: Year 2000 Revised Washable Edition. Gretag Macbeth, 2000.

Nevertheless, the masonry was discovered just under the compact SU21, which might have been the original walking level of the old mosque. This might suggest a rather older origin for the masonry. According to a preliminary analysis, the discovered pottery, found in the wall itself, seems to be older rather than recent. Ancient-dated pottery might also, however, come into the masonry secondarily, during brick production. Loose layers of sand (SU24 and SU3) were discovered around the wall, identical with similar layers all over the site, including pottery of rather more recent date. Thus, the chronology of the masonry remains open, although, with regard to the character of the site, it might rather be related to the older mosque.

SU24 adjacent to the wall was excavated in the southern half of the square. Its very pale brown (10 YR 7/4) loose sand was identical with SU3 and SU4 in squares X350-Y150 and X345-Y145. SU24 was excavated down to a depth of 1.6 m. In the northern half of the squarea loose sandy layer SU25 was excavated, identical with SU24, dug to the same depth as SU24. Both SU 24 and 25 contained pottery from various periods and unspecified animal bones.

Square **X345-Y175** had a triangular shape (5x 1.8 – 2.75 m) and was located near the ruins of a recent mudbrick house on the northern edge of the *tell* (elevation). The aim of the square was to prove the existence of the mudbrick structures, comparable to masonry SU23 in X350-Y155. Very pale brown (10 YR 7/4) loose sandy SU1 contained mixed pottery. A S-N oriented mudbrick wall (SU28) was detected at a depth of 40 cm (Fig. 15). It was about 1.8 m long, 0.3 m high and 0.3 m wide. The bricks had rat-trap (Chinese) bond. The sizes of the yellowish brown (10 YR 5/4) bricks varied between 10 and 20 cm in length, 8 and 12 cm in width and 5 − 7 cm in thickness. The wall might have a relation to a standing house on the northern side of the elevation. SU28 divided the square into approx. two halves, filled by very pale brown (10 YR 7/4) loose sand (SU27). Such a sandy layer was detected within the whole northern part of the site. SU27 contained postmedieval ceramic material. Stratigraphy: SU1down to 40 cm; SU27 and SU 28 down to1.2 − 1.4 m.

1.5 Area P6

Square **X290-Y170** was situated at the foot of the north-eastern elevation (*tell*). Only the area along the eastern and northern sides of the square were investigated more deeply. An about 2.5 m wide cut was excavated at the eastern section and it was 1.5 m wide at the northern section. It was filled by a very pale brown (10 YR 7/4) loose layer of sand, considered SU1 to a depth of 1.2 − 1.4 m. A geophysical indication of the architecture was not confirmed by the excavation. Only postmedieval and recent pottery was found in the square. It seems that the Nile floods used not to rise to this location.

1.6 Areas Outside the Geophysical Survey

Square **X250-Y145** was located 40 m westwards of X290-Y145. Its aim was to check local information that processed stones had been discovered here in a water pipeline trench. A broken stone has been documented here (Fig. 16). The square overlapped with an inhabited house, so it was irregular (3 x 5 x 5.8 m). The excavation was situated beside a dusty local road. The surface was thus covered by a recent layer, approx. 20 cm or more thick; there was a typical very pale brown (10 YR 7/4) loose sandy layer. Only a few indeterminate archaeological artefacts were discovered in the trench. Due to the public road and private house the square was not able to continue deeper for reasons of public safety.

In squares **X315-Y140** and **X315-Y145** the tops of several walls were cleaned. One of the walls was parallel with the old mosque.

1.7 Pottery

The majority of items of pottery collected can be dated to the Islamic period. The pottery was fragmentary; no complete vessels were recovered. Most of the pottery was hand-made, only a small portion of the sherds recovered coming from wheel-made vessels. The most common fabric contained a large amount of organic inclusions (CF1), followed by similar fabric with a significant proportion of sand inclusions (CF2). Other types of inclusions include mica (rare − CF3) or grog (CF4).

Pottery made of CF1 and CF2 was fired in both a reduced and oxidized atmosphere. The most common decoration of these fragments consisted of incised lines or a horizontal band of crosshatching near the rim (Fig. 17 a–b), or incised lines on the body of the vessel (Fig. 17 c–d). A comparable type of decoration was also among the most common types of decoration in Dongola[7]. These sherds can be dated to the Funj period. Only a few examples of impressions were documented. These include mat impressions with a "wickerwork" basketry weave pattern (Fig. 18 a). Similar sherds were recovered for example during the South Dongola Research Survey (SDRS) between Old Dongola and El-Zuma.[8]

The 'twined' mat pattern represents an interesting feature. This type of decoration can be dated to several periods, from the Meroitic to the

[7] WODZIŃSKA, A. *Some remarks on technological and functional aspects of Funj-period pottery from Dongola*, p. 241.
[8] PHILLIPS, J. *Preliminary analysis of the 'mat'- and 'basket'- impressed ceramics from the Southern Dongola Reach Survey*, pp. 230–232.

Funj/modern[9]. All of the recovered fragments with this type of decoration were too small to reconstruct the type of vessel or other details. The distinguishing feature in these cases is clay fabric. In some cases, the fabric contained finely crushed grog inclusions, the decoration was often combined with red slip (Fig. 18 b–d). These fragments can be dated to the Funj period. The remaining fragments with similar decoration are more difficult to interpret. These are possibly much older and represent a different method of decoration − 'rocker stamp' (Fig. 18 e–f), which was typical ofthe Mesolithic/Neolithic period[10] However, this issue requires further research.

The most interesting ceramic find of the 2019 field season was an ostracon from the Islamic period (Fig. 19). An Arabic inscription indicates a connection with the Shaigiya tribe and the Egyptian invasion at the beginning of the 19th century. The vessel was made of clay fabric with organic inclusions and significant amount of grog inclusions. The surface of the vessel was well-burnished. The exterior of the vessel was decorated with an incised band composed of two horizontal lines with the space between them filled with crosshatching. The ostracon will be published separately.

Examples of finer ceramic fabrics or decoration types were also recovered. Surface treatment varied from roughened to smoothed; burnishing was less common. In some cases, a layer of slip was applied. A more detailed examination of pottery will be carried out after a larger quantity of material from more stratified contexts is recovered, hopefully during the future field seasons.

2. Geodetic Documentation of the Old Mosque

Beside geodetic documentation of the old mosque and its surroundings a 3D model of its architecture and the civil engineering ground plan (Fig. 20) was also produced and drawn. Based on geodetic measurements and mapping data, an elevation relief of the site location and a model of possible water levels during flooding were worked out (Fig. 21).

Geodetic measurements also confirmed the precise orientation of the *qibla* wall. The wall, however, was not built at right angles to its neighbouring walls; it had a deviation of about 5 degrees. Thus, a civil engineer formulated a working hypothesis on the interpretation of the mosque's construction.

[9] PHILLIPS, J. *Preliminary analysis of the 'mat'- and 'basket'- impressed ceramics from the Southern Dongola Reach Survey*, pp. 233–234.

[10] ANTONELLI, F., CANEVA, I., LAZZARINI, L., MARITAN, L. *Pottery Production at the Mesolithic Site of Kabbashi Haitah (Central Sudan)*, p. 4.

According to this the western, northern and southern walls of the mosque were built first, having right angles between them. Subsequently the *qibla* wall, i.e. eastern wall was finished. The very accurate orientation of the *qibla* wall towards the Kaaba was based on astronomical observations and/or measurements.[11]

3. Contextual Archaeological Survey

3.1. Survey Zone

The mission proposed to the NCAM the outline of a survey zone (Fig. 22) defined by GPS coordinates as follows:

	Coordinates UTM 36N (EPSG:3263)	
Point nr.	**UTM Easting (X)**	**UTM Northing (Y)**
1	375347.35	2044948.40
2	386174.04	2054967.10
3	387467.20	2053695.47
4	383706.58	2049277.60
5	383323.79	2049612.71
6	377432.66	2043149.03

3.2. Processed Stones

Thanks to several pieces of information provided by the local inhabitants on the presence of processed stones or archaeological finds/pottery, several systematic surveys were carried out around the site (Fig. 23).

Several stone blocks, which were not *in situ* and whose origin could not be verified, were also examined. An already known black granite block with an opening[12] was turned upside down. There was a basin on the other side. The

[11] KING, D. A. *Astronomy and Islamic society: Qibla, gnomonics and time keeping*. pp. 128 – 184.

[12] HUDEC, J. et al. Report on surveys in Duweym Wad Haj. In *Asian and African Studies*, 2019, Vol. 28, No. 2, p. 177.

stone covers the well of a certain Ibrahim; allegedly it was brought from the Ghazali monastery (?). Another stone oval basin was documented in the village.

An undecorated broken black granite slab has been documented in the square X250-Y145. It was allegedly found during the digging of a water-pipe trench. This information was not verified by excavation at the square.

A sandstone cube decorated with rosettes (Fig. 24), kept beside a well in a private house several dozen meters westward of NW corner of the old mosque, has been also measured and photographed. Its origin is unknown.

An enigmatic stone with an alleged inscription was looked for in a house close to a local school. As the owners were not at home, the research had to be postponed.

Pink sandstone lintels were also surveyed in abandoned old houses northwards of the square X250−Y145. One stone was decorated with incised *basmala*, another one with a Star of David (?). The stones have been photographed. It seems that the abandoned older houses at the foot of the hill/dune/*tell* represent an older phase of local settlement; the recent/later phase moved to the hill.

The mission plans to continue the survey in the abovesaid area in coming seasons, also with the help of geoinformatic and geophysical methods and in cooperation with the local people.

3.3. Ancient Black Granite Statue

The survey also focused on a **black granite block** to the left side of the western entrance to the old mosque. After its cleaning it turned out to be the torso of the lower part of an unfinished statue of a seated pharaoh (Fig. 25). The torso was documented, including photogrammetry and a 3D model, and stored on site.

With regard to the other blocks of black granite, it is possible to presume that a sculpture workshop could have been on the site (maybe during the Napata period). However, it is also possible that stone material was brought to Duweym from other locations (e. g. Sanam, el-Ghazali, Gebel Barkal). The statue will be published in a separate study.

3.4. Ancient Amulets

A local inhabitant also brought to the mission two larger faience beads, a wedjat-eye, and amulet of a goddess (Taweret?), allegedly coming from a site on Duweym's/left bank of the Nile, but accessible by boat only. The promised visit was postponed several times, so the search will continue in the next season.

4. Dendrochronological and ^{14}C Samples

Several wooden lintels are preserved in the upper parts of the windows in the northern wall of the mosque (Fig. 26). Samples for dendrochronological research were taken by a hollow drill. A sample was also taken from a window lintel dropped beside the *qibla* wall. Based on the aroma of sawn wood, the use of juniper[13] and/or pine wood could be supposed. The microscopic-anatomical determination of wood and chronometric research will be published elsewhere.

Charcoals for ^{14}C dating were collected from the fireplaces discovered in the settlement layers. NCAM allowed transfer of the samples to Europe. The charcoals from two archaeobotanical samples DWH 2019 1/AEB (from SU11; 256.96 m AMSL top) and DWH 2019 3/AEB (from SU13) were analysed. The fragments of charred wood were mechanically cleaned of the remains of sediment and a subsample from each has been retained for microscopical-anatomical determination. The samples were checked for rootlets under a binocular microscope with 5–10x magnification, their surfaces were scraped off by a degreased scalpel, and they were packed in aluminium foil and submitted to MKL Radiocarbon Laboratory in Skala, Poland.

Radiocarbon calibration of measured determinations was performed by OxCal 4.4 with IntCal 20 set to 5-year resolution.[14] At 95.4% confidence level, DWH 2019 1/AEB is dated to 1212 – 1274 calCE, DWH 2019 3/AEB to 1292 – 1328 (39.9%) or 1340 – 1396 (55.5%) calCE (Tab. 1). The radiocarbon dates were measured on fragments of charred wood without indication of cambial ring. Accordingly, the time passed between the measured dates and archaeological events cannot be quantified and if dated samples represent recycled timbers, the age offset may amount to decades or centuries.

Conventional radiocarbon ages and calibrated dates are as follows:

DWH 2019 1/AEB
MKL-A5033:809±23 BP
68.3% probability

[13] *Juniperus procera* (African Juniperus) called Arar is a coniferous tree native to the mountains of eastern Africa from east Sudan to Zimbabwe, and southwest of the Arabian Peninsula, reaching 20–25 m and occasionally 40 m in height. See MUJWAHA, A. A., MOHAMMED, M. A., AHMED, M. H. *First Isolation of a Flavonoid from Juniperus Procera Using Ethyl Acetate Extract*, p. 85−88

[14] BRONK RAMSEY R., C. Bayesian Analysis of Radiocarbon Dates. In *Radiocarbon*, 2009, Vol. 51, pp. 337–360; REIMER, P. et al. The IntCal20 Northern Hemisphere Radiocarbon Age Calibration Curve (0–55 cal kBP). In *Radiocarbon*, 2020, Vol. 62, pp. 725 – 757.

1224AD (68.3%) 1260 calCE
95.4% probability
1212AD (95.4%) 1274 calCE
DWH 2019 3/AEB
MKL-A5034:634±23 BP
68.3% probability
1301AD (30.9%) 1322 calCE
1358AD (18.2%) 1370 calCE
1378AD (19.2%) 1390 calCE
95.4% probability
1292AD (39.9%) 1328 calCE
1340AD (55.5%) 1396 calCE

5. Soil and Geomorphological Survey

The general purpose of the soil survey was to provide information on soilscape of the area and its surrounding, which may be relevant for the identification of ancient settlements and the comprehensive interpretation of archaeological findings.

5.1. Context

The site (Fig. 1) is situated at the boundary of the alluvial plain of the Nile and the slightly elevated flat surface of the Nile Valley, alongside the intensively agriculturally exploited alluvial plain. The plain is covered by thick dark loamy soils (rich in organic matter and Nile mud deposited by flooding). Apart from annual crops at irrigated plots there are abundant date palm groves occupying the peripheries of the alluvial plain further from the river, where the alluvial soils are covered by wind-blown sand. This peripheral area is very dry and has poorly developed soils with very poor fertility. In the surroundings of the agriculturally exploited alluvial plain the slightly elevated part of the lowland is covered by wind blown sands which are entirely dry and do not support any vegetation.

The site is at the edge of two contrasting environmental units. It occupies a small elongated hill, slightly elevated above its surroundings. Its longer axis coincides with the boundary of the alluvial plain. The site is surrounded by traditional farmers' settlements, at least in the last two to three centuries. Two mosques, a *gubba* and Islamic cemetery are the dominant structures on the tell. The soil survey started two weeks after the beginning of archaeological works on thick layers of wind-blown sand contaminated by artefacts and pottery. The objectives of soil survey were as follow:

- Identification of the boundary between the archaeological cultural layers, natural soil and geological basement.
- Characterization of the stratigraphy of eolian deposits covering the site studied.
- Identification of possible cultural layers below the eolian sand formation.

5.2. Methods of Soil Survey

The objectives of soil survey required the characterization of deep soil and parent material profile. Therefore, the survey was based on a borehole investigation. The auger used for drilling could reach ca 3.5 m. Three boreholes were situated in excavated archaeological trenches, therefore the deepest profile exceeded 6 m. The number of drills was limited by physical and time constraints. The upper layers of eolian sand were very dry and the drills immediately slumped and the loose sand filled the drill, so to enable drilling the water was poured to drilled holes to moisten the sand and prevent its slumping. This approach reduced the capability to distinguish less visible morphological features of the drilled material. However, the most important characteristics (soil texture, colour, carbonate content, presence of artefacts, charcoal, possible soil nodules and concretions, roots and the groundwater table) were able to be identified.

The soil profiles were distributed along two irregular polygonal transects crossing each other on the hilltop. The main transect was oriented across the long axis of the hill (i.e. from Nile towards the desert). It involved 6 profiles: (1) in irrigated field; (2) in palm grove; (3) at footslope; (4) in front of the old mosque; (5) in the old mosque; (6) behind the road. The second transect involved the profile 5, which is involved also in the first transect and other two profiles: (7) behind the old mosque; (8) in front of the new mosque. The distance between profiles 5 and 8 is largest (ca 230 m) because the whole south-east slope of the hill is occupied by a cemetery where observations were not possible.

5.3. Characterization and Sampling of Pedological Profiles

Eight pedological boreholes were drilled in different parts of the site (Fig. 27). Based on field observations, it can be said that the site is located on an at least 7 metres thick complex of eolian sands. The upper layers of these sands are contaminated by anthropogenic activities. With a few exceptions, a formation of soil horizon (*pedogenesis*) cannot be traced in the sand profiles. In the lower part, the lighter colour of the complex may indicate a slight impact of

groundwater (indicated by reduction of iron, which results in a change of colour).

Visual observations are not sufficient for more precise conclusions. The boundary between cultural and natural layers is unclear; rare artefacts are the only element that indicates anthropogenic activities. The artefacts are very rare, and they are represented mainly by small stones (0.5 – 2 cm) which were admixed to sands by man. Their anthropogenic origin at the site can be deduced from their size, as they are too large and too heavy to be transported by the wind and from their stratigraphical position which is evidently artificial. Very few fragments of charcoal were noticed. The sand is almost uniform in texture and colour throughout the soil profiles. It is not yet possible to determine whether the eolian sand complex covers older cultural layers, because eolian sands can accumulate rather quickly and during short period very thick layers may be formed. To be sure that there are no cultural layers beneath the eolian sand, it would be necessary to reach by drilling the basement of the eolian sand complex. It was presumed that below the eolian sand some alluvial deposits (most probably humiferous loams) would be present. The basement of the eolian sand complex could not be reached yet, because it exceeds the drilling depth of the used auger.

Geodetical measurements (coordinates and elevations, distances between the profiles) were done using a total station for all soil profiles and by GPS for a complementary transect across the alluvial plain. The data were processed in ARC MAP. Measured points related to soil survey were combined with all other geodetical measurements of archaeological objects and the whole grid was used to develop the DTM of the hill.

The characterization of individual soil and sedimentary profiles is as follows:

1. **Profile in irrigated fields:** Well developed original typical alluvial mollisol with loamy texture.
2. **Profile in palm groves:** Loamy alluvial mollisol developed on Nile deposits buried under eolian sand situated below the hill at the periphery of the agriculturally exploited part of the alluvial plain. The cover of eolian sand is much thinner here (ca 190 cm) than at the archeological site (more than 7 m).
3. **Profile at footslope (square X290-Y170):** Thick (over 3 m) complex of eolian sand is slightly contaminated by organic matter from neighbouring alluvial plain. The thin, black sand layer at a depth of 130 – 140 cm is an anthropogenous contamination (either a local dump site or it may be material from alluvial soil transferred by man). In the bottom of the drill there occurred a yellowish-reddish layer, which is probably a remnant of buried B horizon (Bw of Bt) of original alluvial soil which had its A horizon eroded

before it was buried by eolian sand. This could be old alluvial soil with B horizon (vega) corresponding to the traditional German concept of alluvial soil development (rambla-patternia-vega) according to which vega is old soil developed at an alluvial deposit but having already brown weathering horizon.

4. **Profile in front of the old mosque:** Thick complex of sandy layers of eolian origin with anthropogenic contamination in its upper layer (0 – 140 cm) similar to profiles 5, 7 and 8. The boundary of anthropogenic contamination is very diffuse and difficult to identify. It is most probably at a depth of ca 140 cm (perhaps deeper). No significant cultural layers corresponding to intensive settlement were identified.
5. **Profile in the old mosque:** Thick complex of sandy layers of eolian origin situated in the deepest archaeological section, in **square X335-Y125**; therefore, the auger observation reached here its greatest depth (over 6 m). The upper part of the profile could be described from the archaeological section (Fig. 4). A more than 6 m thick complex of sandy layers with anthropogenic contamination in its upper layer (0 – 210 cm) of predominantly eolian origin (at least the upper part, the lower part might be redeposited or influenced by flooding (which is difficult to identify clearly from the auger observation). The eolian sand complex was covered by layers of fallen mud bricks from the mosque ruins, alternating with thin layers of pure eolian sand showing original eolian stratigraphy. This shows that the collapse of the mosque was discontinuous and went on in several phases interrupted by sedimentation of eolian sand. These phases were short (which is indicated by small thickness of the sand layers alternating with brick layers and by lack of anthropogenic contamination). The lower boundary of anthropogenic contamination is very diffuse and difficult to identify. No significant cultural layers corresponding to intensive settlement were identified.
6. **Profile behind the road:** Grayish clay (probably alluvial deposit of the Nile) covered by a 90 cm thick layer of eolian sand. The alluvial clay represents most probably the flood deposit of the Nile. It is significantly elevated above the recent level of the alluvial plain. It does not show an original humiferous A horizon, which is very thick (ca. 170 cm) in the recent alluvial plain. The clay layer is very homogeneous in colour and texture over the observed depth (140 cm). These deposits are much finer than loams and fine sands in the recent alluvial plain (Profile 1). This is logical because with distance increasing from the riverbed the alluvial deposits became finer. There probably existed a phase of geomorphological development when the peripheral parts of the alluvial plain were slightly uplifted, the deposition

was stopped and the humiferous A-horizon (probably also with upper part of the clay layer) was completely eroded.

7. **Profile behind the old mosque:** The profile is situated similarly like Profile 5 in archeological pit (square **X380-Y140**). There is a more than 5 m thick complex of sandy layers with anthropogenic contamination in its upper layer (0 – 150 cm) of predominantly eolian origin (at least the upper part, the lower part might be influenced by flooding, which is difficult to identify clearly from the auger). The boundary of anthropogenic contamination is very diffuse and difficult to identify. It is most probably at a depth of 150 cm (perhaps deeper). No significant cultural layers corresponding to intensive settlement were identified.
8. **Profile in front of the new mosque:** Thick complex of eolian sand (over 350 cm) with anthropogenic contamination in its upper layer (0 – 130 cm). No significant cultural layers corresponding to intensive settlement were identified.

5.4. General characterization of the soilscape of the site and its surroundings

The site is built up of a thick (more than 7 m) complex of eolian sand deposits, in the upper part showing slight anthropogenic contamination, but showing almost no pedogenesis except for calcareous impregnations of channel pores and some irregular impregnations of matrix in Profile 5. In the lower part of most profiles the whitish soil colour may indicate a slight influence of the gorundwater table (reduction of iron). However, it is difficult to prove solely on the basis of auger observations. The basement of this complex is formed by alluvial soils (mollisols) developed from thick loamy to clayey humiferous deposits of Nile sediments underlaid by alluvial sands deposited by flooding. The alluvial mollisol was observed in Profile 1 and 2. Other alluvial deposits (grayish clays) were found in Profile 8. Here the humiferous A horizon is missing. The missing A horizon is probably the result of erosion which took place before this area was buried by eolian sand. The flood plain elevation slowly increases from the riverbanks towards the periphery of the plain and in the more elevated peripheral part of the plain the soils had probably a much thinner A horizon than the soils near the river. In Profiles 3, 4, 5, 6, 7 the alluvial basement was not reached by boreholes, but according to geodetical measurements should be expected at a depth of ca 7 – 7.5 m below the hilltop. This means that in the Profile 5 the alluvial basement should be about 1 − 1.5 m below the bottom of the drill.

An extraordinary feature is the rusty sandy layer with slight clay content found in the lowest part of the Profile 3. This layer may represent a remnant of Bw (or even Bt) soil horizon of weathering (and eventually clay translocation).

This could indicate that soil genesis was more advanced in the peripheral part of the alluvial plain. Here, on the older part of alluvial deposits, which were less frequently affected by floods, the weathering was advancing and the more mature alluvial soils with brown (cambic) horizon were created.

5.5. Reconstruction of the Living Environment of Ancient Societies

The accumulation of sand at the investigated site is thicker than in its surrounding probably because the wind transporting sand from desert with poor or lacking vegetation cover was stopped here by dense vegetation occupying alluvial plain and the transported sand was sticking to moist alluvial soils. This is the optimal place for human settlement because it is at the margin of the alluvial plain where the fertile soil supports agriculture, and the desert. The site was close to fields, but because of being elevated it could provide for potential settlement protection from flooding. Also many recent villages are distributed along the margin of the alluvial plain not only in Nile valley but elsewhere. At such positions the settlements can avoid occupying fertile soil while being very close to that.

Searching for ancient settlements buried by sand is difficult because the sedimentation of eolian sand can be very quick and the deposits can be very thick. Moreover, the distinction between natural undisturbed sand deposits and sands that might be slightly affected by human activities (mainly grazing) is very vague. The boundary between archaeological cultural layers and the natural basement is almost invisible and very diffuse at the studied site. Artefacts are the only feature to identify it. In the upper part of the eolian sandy complex the anthropogenic influence is well evidenced by artefacts and the irregular stratification of lenses and pockets of slightly different material (sands with slightly different colours). The number of artefacts decreases with depth; sand becomes more homogeneous, without a distinct visible boundary of anthropogenic impact they are underlied with natural sandy deposits without human influence. In Profiles 6 and 7 the boundary seems to be ca 150 cm deep, in Profile 5 it is ca 210 cm deep (the deepest ceramic fragment being at 190 cm and the deepest ash lens at 205 cm).

The stratigraphy of eolian deposits covering the site is very monotonous. It can be divided into three major layers: a ca 0 to 100 − 120 cm thick layer with a yellowish colour containing artefacts; a 100 − 120 cm to 150 − 210 cm thick layer of whitish sand with a very rare occurrence of artefacts; and 150 − 210 cm to the bottom of the drills is the layer of whitish-grayish sand free of artefacts, which could be slightly affected by reduction conditions caused by water saturation.

The identification of possible cultural layers below the eolian sand could be addressed only after making deeper drills through the whole complex of eolian sand deposits. The basement of eolian sand was not reached due to the drilling depth limitations of the used auger technology. Therefore, the presence of cultural layers within or immediately below this stratigraphic complex cannot be denied. In future a better drilling technology with deeper access can be used to reach the alluvial basement of the eolian sand and prove whether an ancient settlement may be hidden under the oldest part of the eolian sand deposits.

6. Civil Engineering Research and Sampling

Civil engineering research and sampling of mudbricks and plasters was done in both (1) structures discovered by archaeological research and (2) architectural elements of the old mosque. The samples were partly processed at the base in Karima, and some were transported to Slovakia for further laboratory tests and research (see soil samples in Table 2) at the Faculty of Civil Engineering, STU in Bratislava. The results will be the subject of a separate report.

Samples of sand have been analysed by a grain size curve (Fig. 28) during the archaeological excavations in Sudan, as well as visual description, admixtures and Munsell colour classification.

Mud bricks are used until now for their economic viability and availability of the material and the working procedure is almost unchanged. Mud bricks dried in the sun were already in use from the pre-dynastic period. The production of mud bricks is recorded inthe tomb of Rekhmire (18th dynasty).[15] Men moisturize dugout soil, knead it with minced straw and transport it to a place where itis mouldedin rectangular blocks into mudbricks and placed in the sun to dry out completely – see recent mudbrick production in Meroe and Duweym (Fig. 29 a, b).

The research has identified several mudbrick structures, most probably parts of foundations and walls. The old mosque has been documented by photogrammetry and detailed research intoits architecture, structure technique, used materials, etc.

The standard mudbrick of the old mosque has the dimensions of 26 x 13 x 6.5 cm. The thickness of the mud mortar was ca 15 to 25 mm. The mudbrick contains the visible signs of straw, rarely shards and gravel. The thickness of the wall plaster is ca. 10 to 25 mm. A more detailed report will be prepared in a separate article.

[15] HODEL-HOENES, S. *Life and Death in Ancient Egypt: Scenes from Private Tombs in New Kingdom Thebes*, pp. 140–178.

7. Conclusions

The mission met all its scientific objectives in general. Archaeological excavations aimed at the verification of the geophysical survey from 2018 were partly successful. The research confirmed architecture in Area P1, where debris of arches and columns of the *riwaq* of the mosque were unearthed. The mudbrick wall SU23 in Area P5A was situated further northwards from the position originally assumed by the georadar. A probable channel, detected in several squares, seems to be an older pre-mosque structure. Discovered pottery could be dated to a broad spectrum ranging from the Mesolithic/ Neolithic periods to the Islamic period. The location of the torso of the statue could be explained either by the undiscovered presence of Napata architecture, or the presence of a sculpture workshop, or by transporting it from locations near to Duweym; further research will be needed to prove this hypothesis.

The excavations contributed to a better understanding of the collapsed internal structuresof the mosque in Areas P1 and P2 and examined the construction of its *minbar* (pulpit). As no half columns are preserved on the *qibla*/eastern wall, it is possible to assume that the arches of the *riwaq* were parallel to the *qibla* wall. The whole *riwaq* was probably U-shaped, along northern, eastern and southern walls. The side of the *riwaq* along the northern wall was ca 12 m wide and consisted of three aisles, ca 4 m wide – i.e. pairs of arcade columns supported arches between preserved pillars and half columns on the northern wall. The number of columns along the *qibla* and southern walls is so far unknown. It is also not known whether palm tree trunks were also used as columns and what the roofing of the *riwaq* could look like.

The research of the floor level of the old mosque indicates at least two phases of floor beside the *qibla* wall. It seems that the floor was covered by palm leaf mats. However, it seems that the floor of the mosque was quite uneven, sloping down from the highest point in the south-eastern corner towards the north and west. The floor had its lowest point in the north-western corner. This feature is not characteristic of Egyptian mosques[16] and could therefore have a chronological impact on the date of origin of the old mosque.

A compact sand layer was detected in several trenches near the old mosque. With regard to the nearby northern entrance to the mosque, it could have some relation to the walking level of the mosque (SU10, SU12 and SU21). The masonry SU23 might be either of the same age as or older than the old mosque. Thus, the SUs could have a chronological relation to the mosque but so far without making any specific contribution to its date of use (ca 200 years?).

[16] O' KANE, B. *The Mosques of Egypt. American University in Cairo Press*, 2016.

Geodetic, geoinformatic and photogrammetric documentation of the older mosque and other structures discovered on the site was very effective and successful. The very accurate orientation of the *qibla* wall of the old mosque towards the Kaaba has been corroborated. The contextual archaeological survey has provided several lines for further research.

Sampling for dendrochronological and ^{14}C research also attained its aims. The acquired radiocarbon dates are of utmost importance for stratigraphy and further research. The lintels in the window of the mosque probably used juniper (*Juniperus*) wood and/or pine wood. Links between the Duweym site and the Red Sea coast have been indicated by the discovery of a cowrie shell (*Cypraeidae*) and other sea shells.

The hypothesis of Nubian sandstone rock below the site was not confirmed. Soil science research has determined that the site is located on a complex of eolian sands which is at least 7 metres high. In the deeper sand layers there were ash layers of fireplaces with pottery, irrigation (?) channels (P1 and P5A) and calcified vegetation root systems (P1), probably from the end of the 13th and/or beginning of the 14th century AD. Thus, the hypothesis of Dr. Kendall,[17] that an ancient temple may be located under the old mosque, has not yet been confirmed. It would be necessary to make more and deeper boreholes to obtain a full picture of the soilscape. Although the soil survey did not entirely fulfil its goals, it has provided much useful information, answered most of the questions posed and also provided several lines for further research.

Research in mud bricks structures and mud bricks sampling was successful. However, the reason why such an extensive mudbrick mosque was built in this rural enviroment and the date of its construction should be further studied. Also the working hypothesis that the old mosque could have served for hajj pilgrims from central and western Africa (who might have used the mudbrick constructions on the site to recover after a hard journey and in order to prepare themselves for crossing the river Nile, a journey to the Red Sea and sailing to the Arabian Peninsula), should be investigated.

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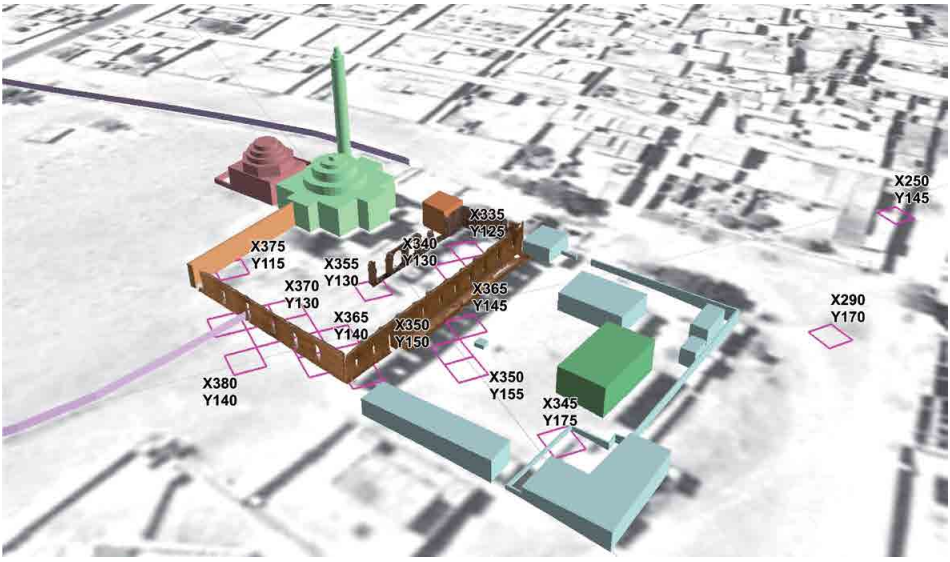
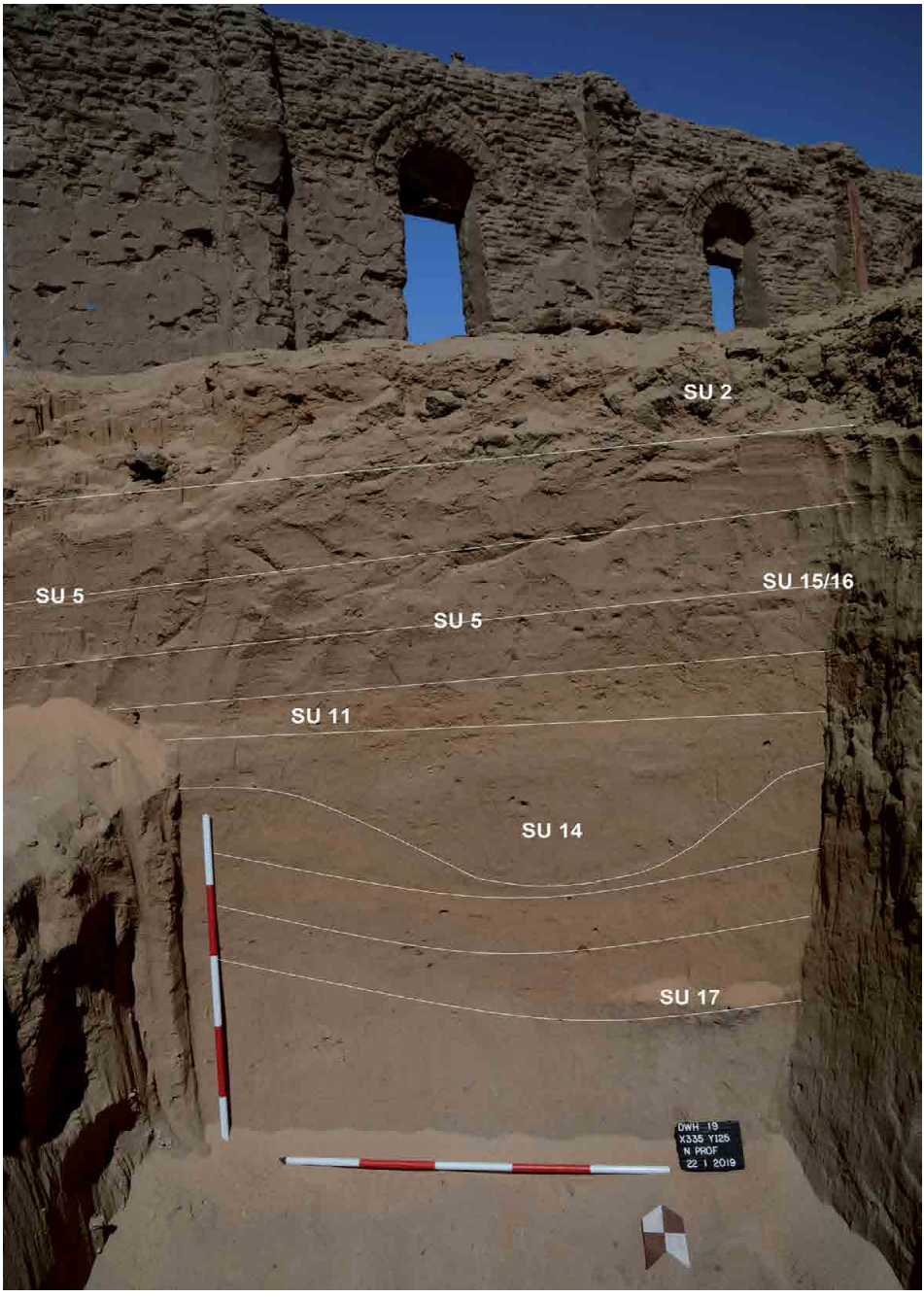


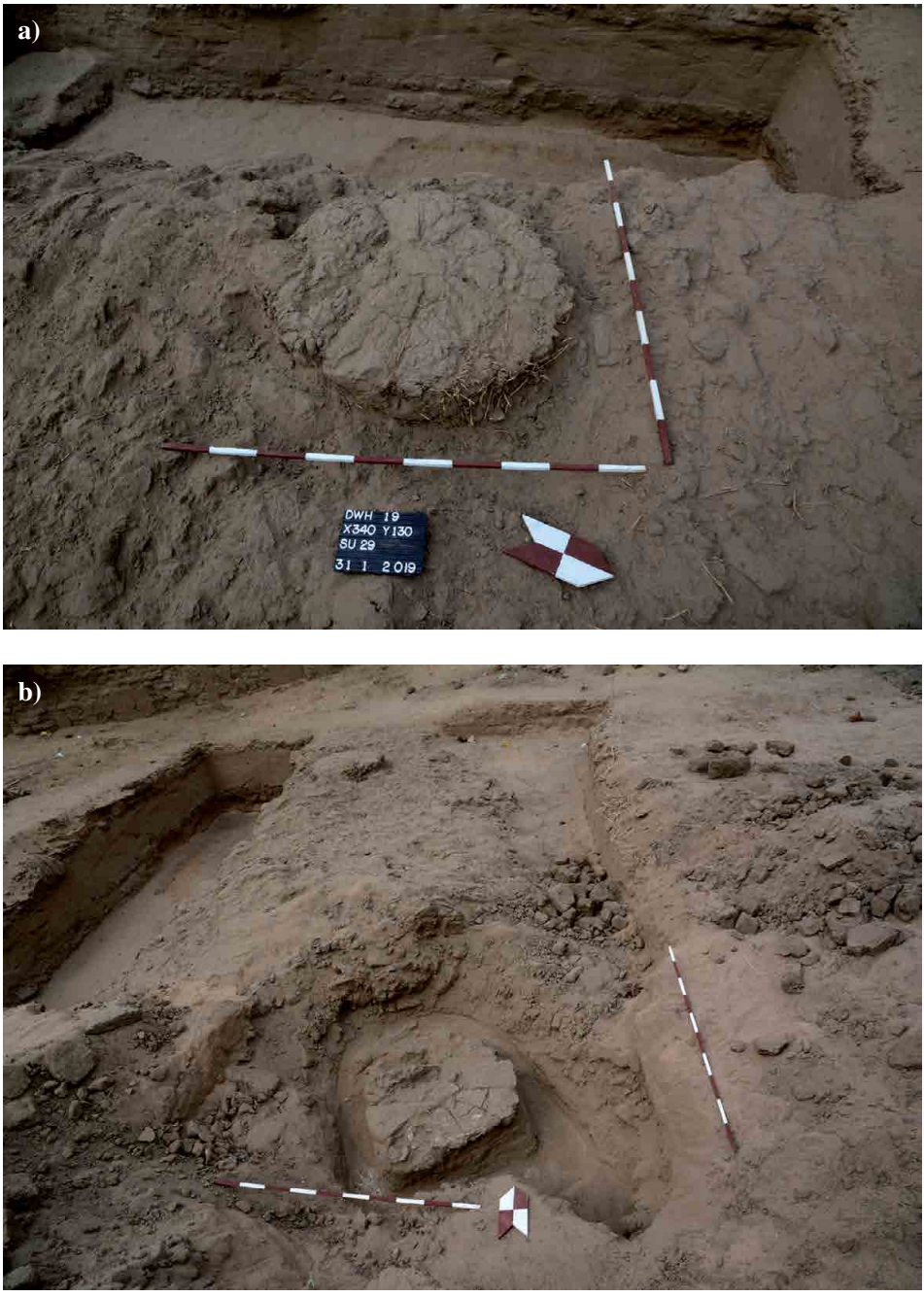
Hudec, Fig. 1. Site and the excavated squares (Image by T. Lieskovský)

Hudec, Fig. 2. Trapezoid mudbricks of riwaq's columns (Photo by J. Hudec)

Hudec, Fig. 3 a, b. Columns around X335-Y125 square a) western column; b) southern one (Photo by J. Hudec)

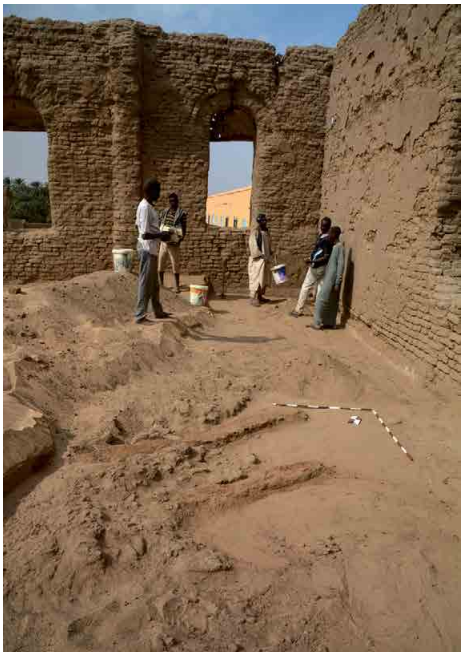


Hudec, Fig. 4. Northern section of X335-Y125 square (Photo by J. Hudec)



Hudec, Fig. 5 a, b. Columns in square X340-Y130 a) northern column; b) both columns (Photo by J. Hudec)

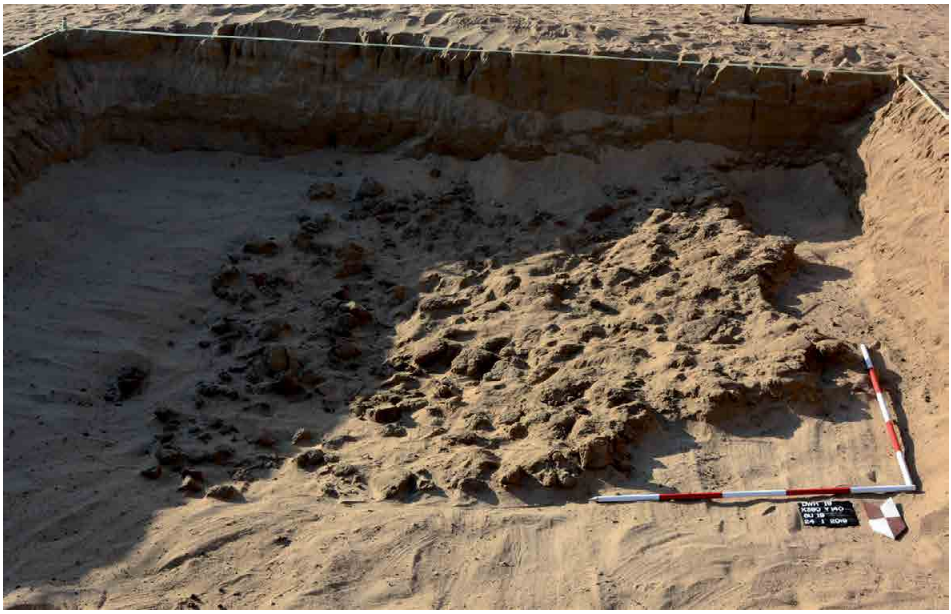
Hudec, Fig. 6. The riwaq's pillar in square X355-Y130 (Photo by J. Hudec)



Hudec, Fig. 7. Squares X370-Y140, X365-Y140, X365-Y145 (Photo by J. Hudec)

Hudec, Fig. 8. Base of riwaq's column in the square X375-Y115 (Photo by J. Hudec)

Hudec, Fig. 9. Squares X370-Y130, X375-Y130, X370-Y135 with minbar (Photo by J. Hudec)



Hudec, Fig. 10. Mudbrick debris in the square X380-Y140 (Photo by K. Smoláriková)

Hudec, Fig. 11. Wall SU23 in square X350-Y150 (Photo by: B. Kovár)

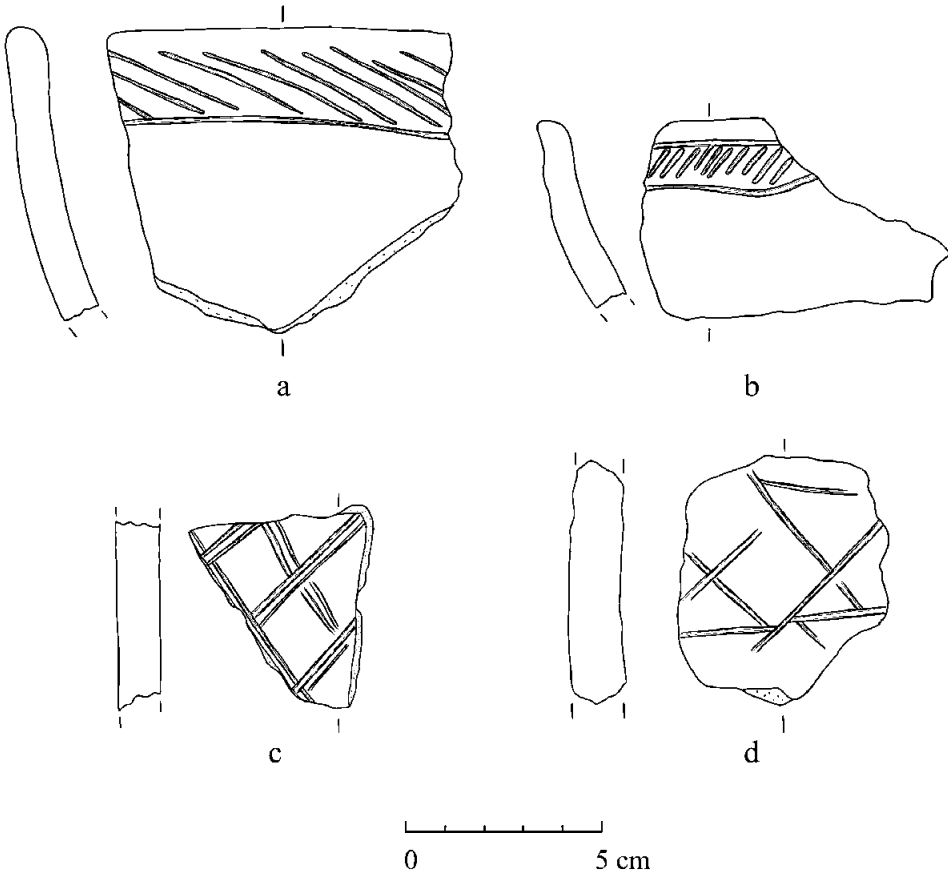
Hudec, Fig. 12. Possible old sluiceway in square X350-Y150 (Photo by B. Kovár)

Hudec, Fig. 13. Possible old sluiceway in trench X345-Y145 (Photo by B. Kovár)

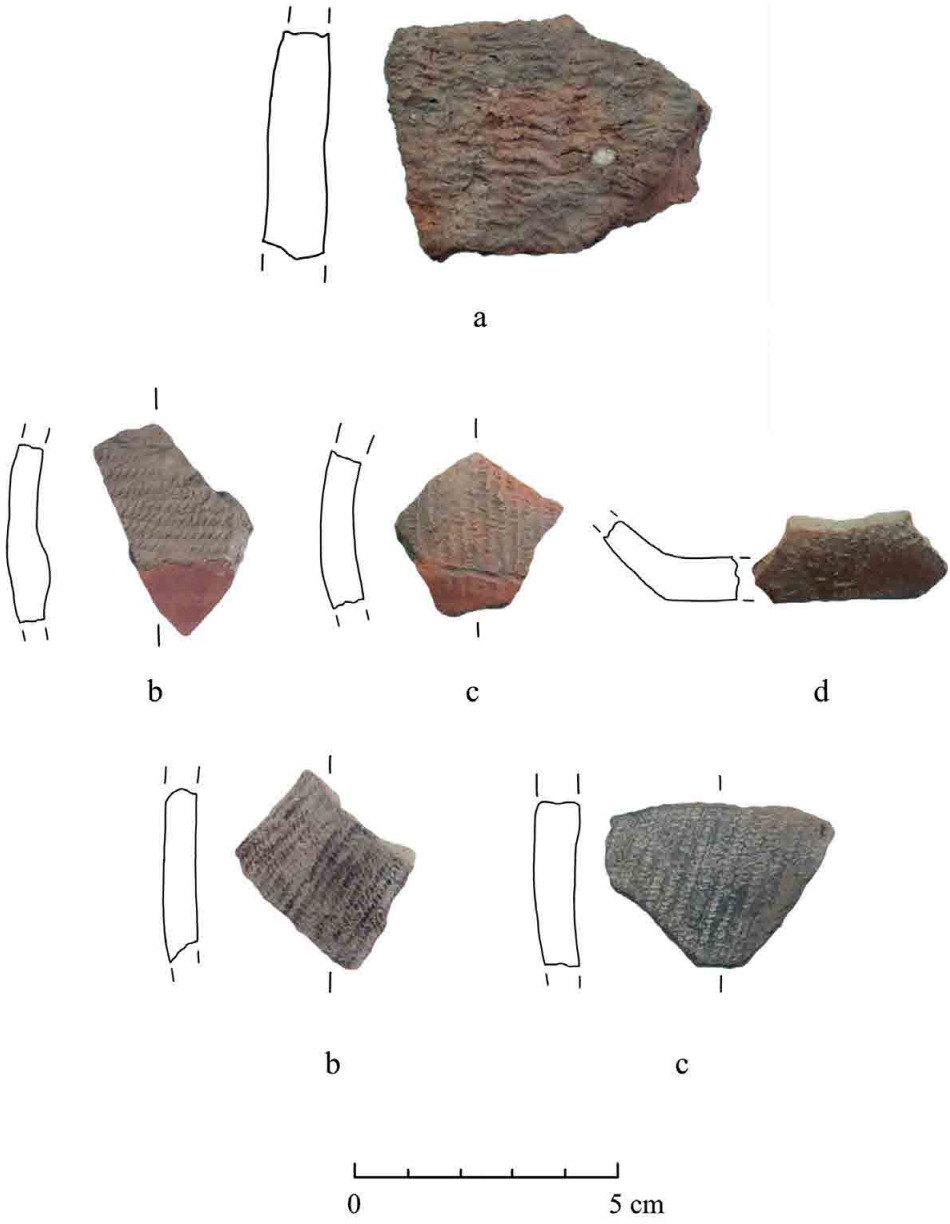
Hudec, Fig. 14 a, b. Mudbrick wall SU23 (Photo by B. Kovár)

Hudec, Fig. 15. Mudbrick wall SU28 (Photo by L. Kovárová)

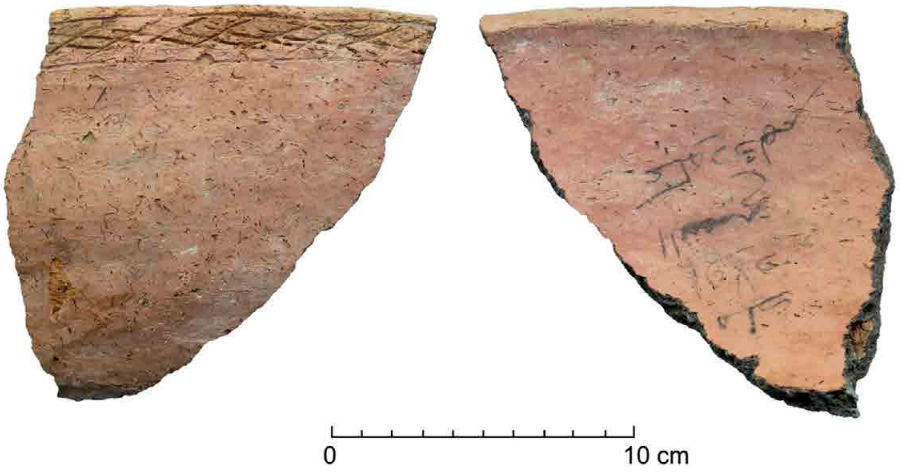
Hudec, Fig. 16. Broken stone(s) in square X250-Y145 (Photo by J. Hudec)



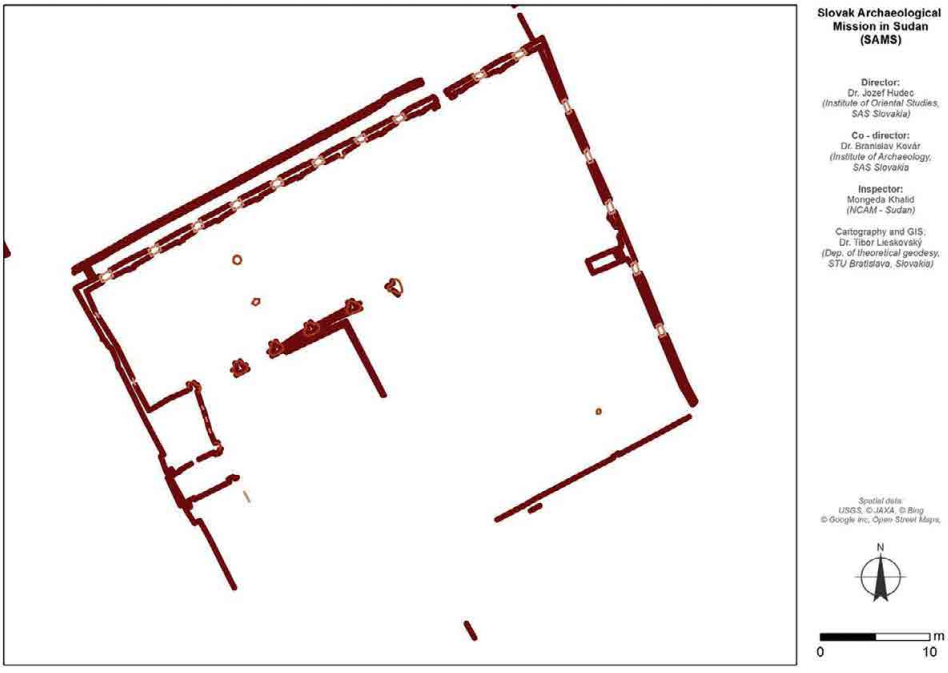
Hudec, Fig. 17. Funj pottery with incised decoration near the rim (a, b) or on the body of the vessel (c, d). (Photo by L. Horáková)



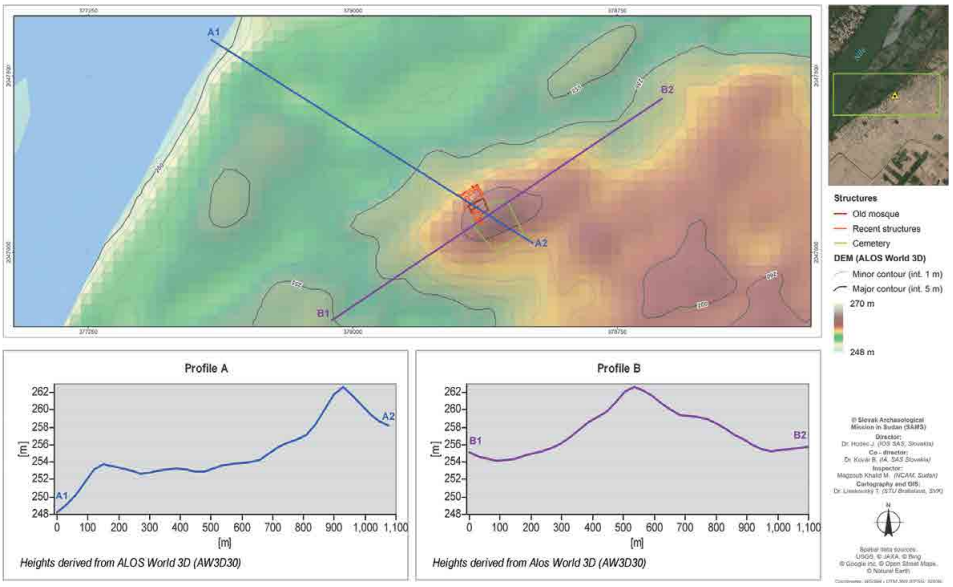
Hudec, Fig. 18. Pottery with impressed decoration. Fragments with 'wickerwork' basketry pattern (a) and 'twined' pattern (b, c, d); 'rocker stamp' decoration (e, f). (Photo by L. Horáková)



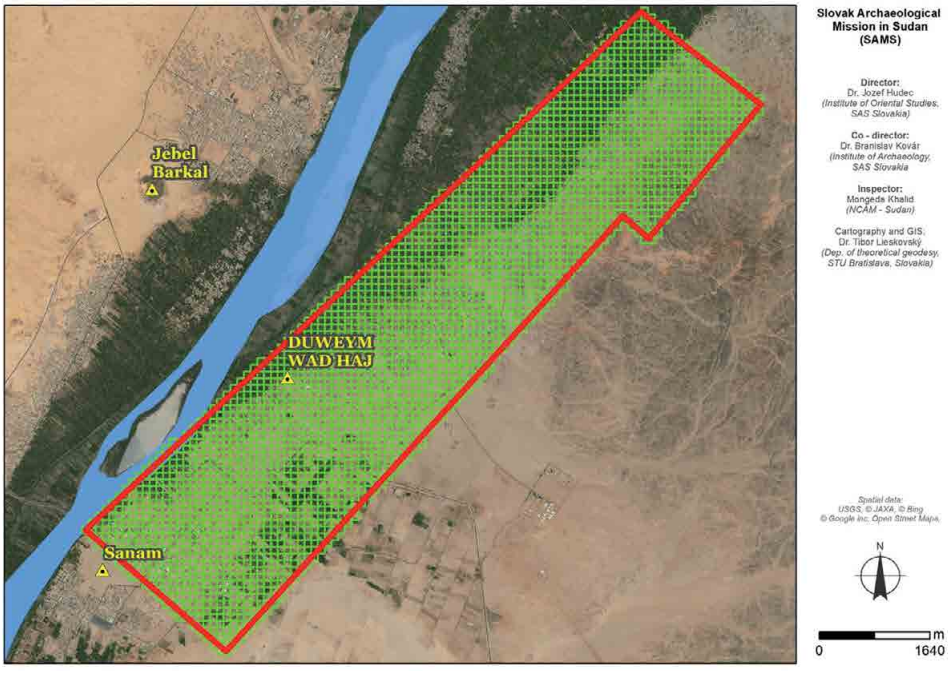
Hudec, Fig. 19. Funj pottery ostracon. (Photo and drawing by L. Horáková)



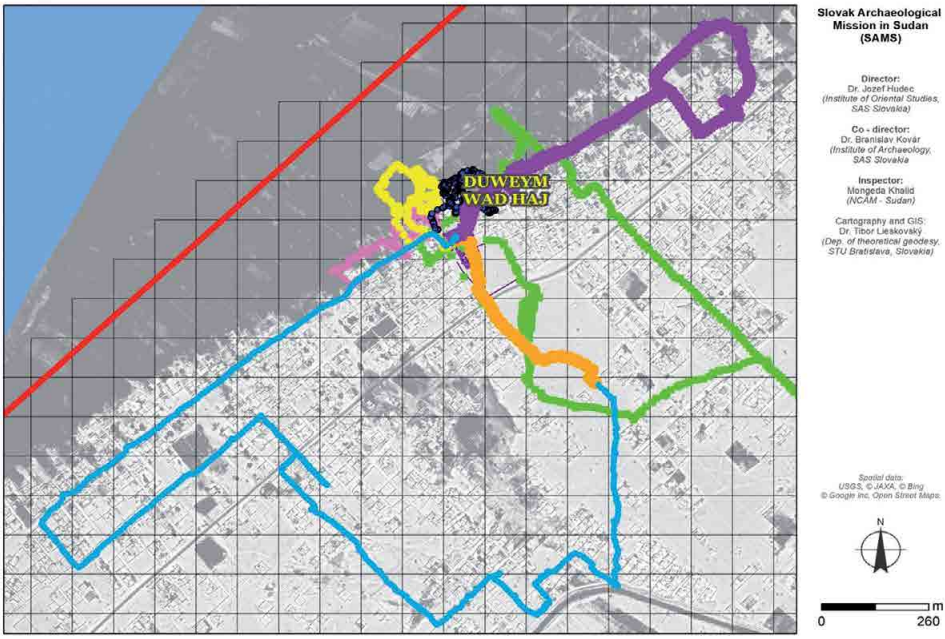
Hudec, Fig. 20. Ground plan of the old mosque (Drawing by T. Lieskovský)



Hudec, Fig. 21. Elevation relief of the site. (Graphic by T. Lieskovský)



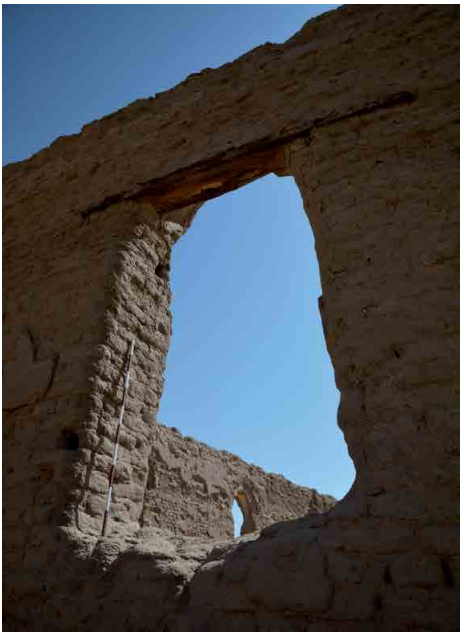
Hudec, Fig. 22. Survey zone (Map by T. Lieskovský)



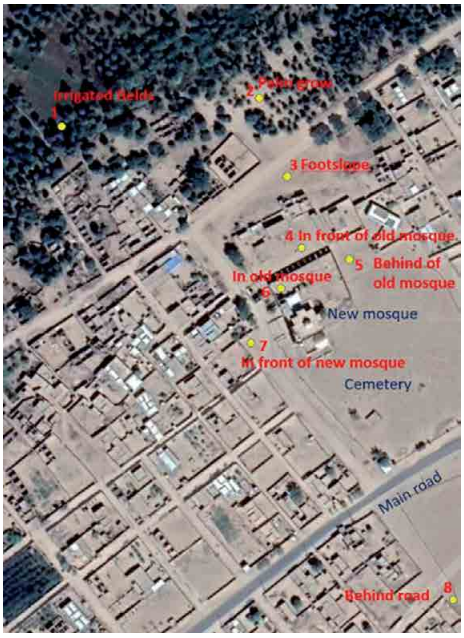
Hudec, Fig. 23. Systematic surveys map (Map by T. Lieskovský)

Hudec, Fig. 24. Sandstone block decorated by rosettes (Photo by J. Hudec)

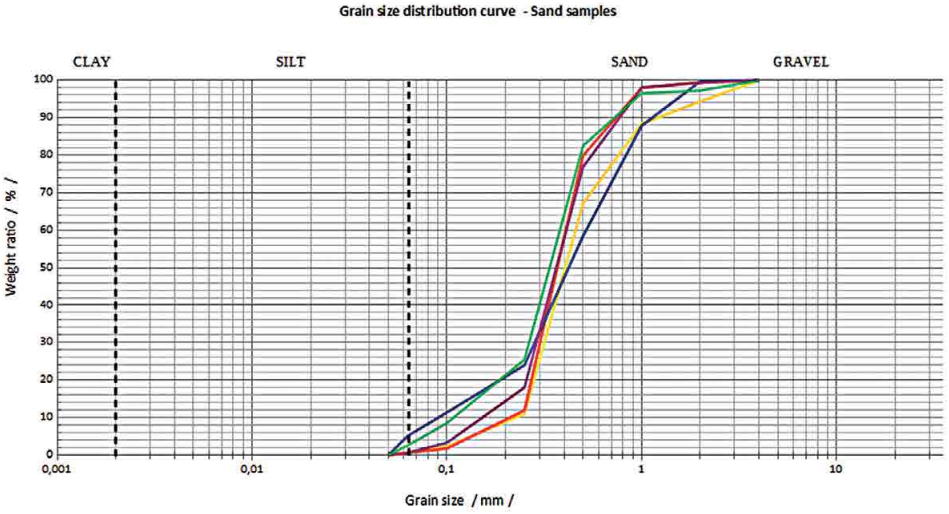
Hudec, Fig. 25. Statue of a seated pharaoh (Photo by K. Smoláriková)



Hudec, Fig. 26. Wooden windows lintels of the old mosque's northern wall (Photo by J. Hudec)

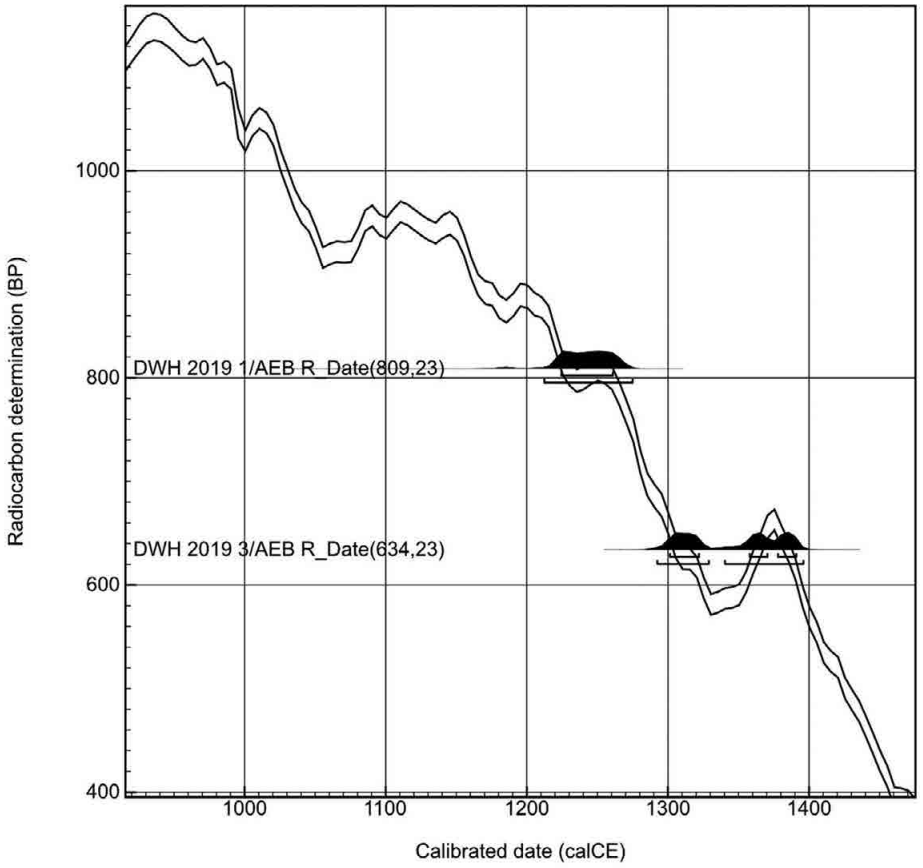


Hudec, Fig. 27. Map of 8 pedological boreholes (Map by E. Fulajtár and T. Lieskovský)



Hudec, Fig. 28. Grain size curve – a comparison of sand samples (Graphic by M. Černý)

Hudec, Fig. 29 a, b. Sun drying of a mudbricks (a) in Meroe and (b) Duweym (Photo by M. Černý)



Hudec, Tab. 1. Calibrated radiocarbon determinations measured on charcoal samples from SU (68.3% and 95.4% probability) (Graphic by P. Barta)

Table of samples – season 2019				
type of sample	name	location	stratigraphy unit	description
mud brick	1/DEP	X355 Y125	SU 2	a mud brick from a collapse
sand	2/DEP	X355 Y125	SU 5	a sand under a brick collapse
mud brick	3/DEP	X380 Y120	SU 6	Mosque – a corner (S-W) near the cemetary, 6th row
sand	4/DEP	X385 Y125	SU 14	a sample from ca. 2,4 m under the surface
mud brick	5/DEP	X335 Y125	SU 1	a mud brick from a collapse (rounded shape mud brick)
sand	6/DEP	X335 Y120	below SU 17	the bedrock ? A natural sand layer ? Contain concretions, a bit wet sand
sand	7/DEP	X380 Y140	SU 1	a blowed sand, ca. 0,3 m under surface
mud brick	9/DEP	X375 Y115	SU 6	Mosque – a 1th row from a wall foundation
mud brick	10/DEP	X350 Y150	SU 18	a part of brick wall ca. 0,3 m under the surface
sand	11/DEP	X380 Y140	SU 20	a sample from ca. 1,1 m under a collapse SU 19
plaster	12/DEP	X370 Y150	SU 7	Mosque, a plaster from N - wall
plaster	13/DEP	X340 Y130	SU 30	Mosque, a plaster from S – wall, column
mud brick	14/DEP	X350 Y155	SU 23	a mud brick from a wall

Hudec, Tab. 2. Soil, plaster and mud brick samples (Graphic by M. Černý)