

# SUDAN & NUBIA

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The Sudan Archaeological Research Society



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- Front cover:* Examining the pharaonic inscriptions at Khashm el-Bab on the Korosko Road, November 2013 (photo: D. A. Welsby).
- Sudan & Nubia* is a peer-reviewed journal



# Meroitic Hamadab – a century after its discovery

*Pawel Wolf, Ulrike Nowotnick and Florian Wößl*

When John Garstang excavated the stelae of Akinidad and Amanirenas and a small Meroitic temple 3km south of Meroe City in 1914, he introduced an amazing site to Sudan archaeology that subsequently, however, received little attention. New excavations began in 2001<sup>2</sup> and have meanwhile yielded a detailed plan of the urban core of the site, the Meroitic Upper Town, as well as a plan of its suburbs (Figures 1 and 2).<sup>3</sup> In addition, we can now distinguish four urban occupation horizons of the site, dating from the Early Meroitic to Post-Meroitic periods. Hence, the plan shows structures of different periods, since the erosion of the mound after its abandonment exposed earlier settlement horizons at its perimeter, while later phases have only been preserved in the centre of the mound (Figure 3).

The town wall, the temple and the main avenue,

<sup>1</sup> This article is based on internal reports of Ulrike Nowotnick (UN), Florian Wößl (FW), Petra Weschenfelder (PeWe), Arnaud Malterer (AM), Christian Weiß (CW), and Pawel Wolf (PW), the initials of whom are set below the respective paragraphs.

<sup>2</sup> The Hamadab mission, directed by Pawel Wolf, is currently housed by the German Archaeological Institute (DAI) and funded by the Qatar-Sudan Archaeological Project. Since 2007 it was financially supported, together with the DAI-project of Simone Wolf in the 'Royal Bath' of Meroe City, by the DAI and the German Research Foundation. We would like to express our gratitude to all these institutions as well as to all our partners – especially the National Corporation for Antiquities and Museums and the University of Shendi – and all our team members over the years.

<sup>3</sup> For preliminary reports see the literature cited in Wolf and Nowotnick 2013. The map of the Upper Town was established by surface clearings between 2002 and 2014. The Lower Town was surveyed in 2014 using ground penetrating radar by Eastern Atlas (Berlin).

connecting the temple with the western town gate, as well as administrative buildings in the settlement's eastern quarter, were the core elements of a deliberate town-planning in period C, presumably in the 1<sup>st</sup> century BC. However, most of the town's area of 105 x 105m was occupied by domestic mud-brick structures that were organised in large blocks and



Figure 1. Schematic plan of the Upper Town.

divided by narrow lanes in a more or less orthogonal manner – almost uninterrupted by communal and public space. During the later horizons B and A, most of the town's original elements were gradually overbuilt by less regular structures. We assume that for example the town wall, the temple H 1000 and the official building H 3000, were no longer existent in the latest stages of the town's lifetime. However, the basic layout of the town persisted and thus Figure 1 illuminates the development from an orthogonally planned town in horizon C to a rather irregular settlement structure in horizon A.

Excavations at key locations, such as the temple and its forecourt, the fortification wall and its gates, domestic and official buildings, helped to clarify their function and the town's development. The temple forecourt, for example, was



Figure 2. Plan of the Meroitic urban settlement with the Upper Town (top) and the suburbs as GPR plot (bottom). Excavation trenches referred to in the text are represented in yellow.

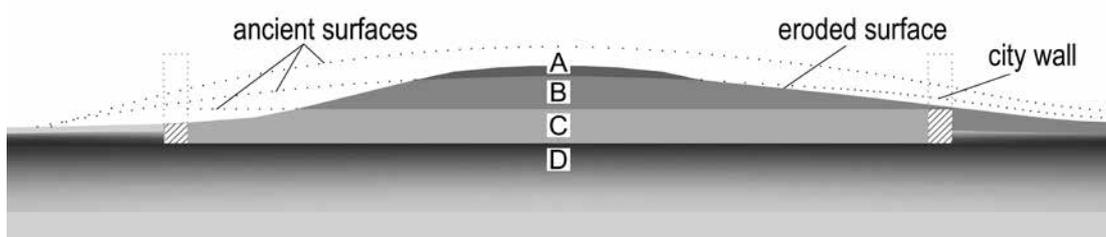


Figure 3. Schematic section through the North Mound illustrating the occupation horizons A–D as well as their erosion after the abandonment of the settlement.



originally much wider, subsequently witnessing a considerable usurpation of public space by private buildings that expanded along the main road. Some of the side streets branching off this main avenue were already part of the initial town planning, others originated in later phases. The interiors of the large house blocks, which cover almost the entire Upper Town, do not display uniform architectural types. Instead they grew by enlarging, splitting and merging single house units, as detailed excavations within blocks H 1200 and H 1600 suggest, which provided valuable information on their development and domestic function (Wolf and Nowotnick 2013, 437-439; Wolf *et al.* 2014). The eastern settlement quarter, which contrasts with these units by its representative and sacral architecture, may have been originally reserved for sacral institutions. Access to the town was provided through gates in the east and west walls. Initially made of sandstone blocks, later repairs were executed in fired bricks. The western gate, *c.* 1.6m wide, was the main entrance to the town (Plate 1). It



Plate 1. The main city gate after excavation in 2012 from the west. The gate, with hard rock threshold and sandstone pavement, was later overbuilt by late Meroitic mud-brick houses.

was furnished with a massive stone threshold and a wooden door as is implied by the large iron nails found close by.

Investigations at the town wall hitherto revealed no bastions or similar outer defensive structures, but at least strategical parts like the corner in the south-east had been strengthened by retaining walls, accessible by a staircase. Its south-eastern corner formed an angle of  $85^\circ$  (Plate 2), implying that the Upper Town was laid out as a parallelogram since the very beginning. After occupation horizon C, the wall was gradually abandoned and partially overbuilt. Thereafter, the town must have spread into its suburbs which lacked a perimeter wall and were similarly built and oriented, but characterised by larger open spaces and courtyards than inside the Upper Town (cf. Figure 2). Houses and rooms in the Lower Town were arranged in large blocks showing



Plate 2. The south-eastern corner of the mud-brick masonry town wall, faced with fired bricks. Already in Meroitic times large pits were dug into the wall to obtain brick material.

certain rectangularity, but no strict spatial arrangement according to a master plan. The house blocks display different ground plans, suggesting a greater functional variety than in the Upper Town. However, aside from the pottery workshop with its circular ceramic kilns (Wolf and Nowotnick 2013, 439-443, Abb. 6-7), which was enclosed by its own courtyard but fully integrated into the suburban structures, no obvious workshops and production areas have as yet been discerned. The preserved iron slag heaps overlay the suburban house remains, as was attested by archaeological soundings and radiocarbon dates of mainly the 5<sup>th</sup>-6<sup>th</sup> century AD<sup>4</sup>, attesting that larger-scale iron production developed at Hamadab after the decline of the Kushite kingdom.

Remains of a much more recent settlement have been discovered at the western perimeter of the North Mound (cf. Figure 2). They comprise round huts of *c.* 5.5m and several rectangular houses made of *jalous* walls as well as small structures, presumably for feeding and watering animals. According to a radiocarbon date obtained from one of the round huts and our ethnographic research, this hamlet belongs to an Islamic resettlement of the North Mound from the 15<sup>th</sup> to 19<sup>th</sup> centuries AD.

(PW, UN)

## Excavations in the Upper Town

### *The temple forecourt*

Two trenches in the temple forecourt yielded valuable information on its original layout. We discovered the lower end of a ramp which attests to an altar on the axis of the temple (Plate 3). Analogous structures provide a good idea of its layout,<sup>5</sup> consisting of a long sloping ramp giving access up

<sup>4</sup> Radiocarbon dates were derived from the iron slag heaps H 100-300 and H 800 excavated by the UCL-Qatar mission (cf. Jane Humphris in this volume).

<sup>5</sup> For instance Kawa 448, Meroe M 246, Naqa 165 and the altar in el-Hassa (Hinkel 2001, 64-67, fig. 8; for el-Hassa see [http://www.sfdas.com/IMG/pdf/report\\_el-hassa2012.pdf](http://www.sfdas.com/IMG/pdf/report_el-hassa2012.pdf) [acquisition date 13.5.2014]).



Plate 3. The 1.02m broad entrance to an altar ramp in the forecourt of the temple showing several periods of rebuilding and repairs with reused construction materials.



Plate 4. Irregular setting of stones and fired bricks presumably representing a well head in the forecourt of the temple.

clearance already revealed the monumental character of this free-standing building (cf. Figure 1). It is a square structure of 20 x 20m, made of massive mud-brick walls 1.8m thick (Figure 4). Its outer façade was reinforced with fired bricks

to a square podium. Such altars might have been used for fire offerings, as is implied by a depiction of an altar with flames on the western wall of the 'Sun Temple' M 250 (Hinkel 2001, 234, fig. 82). The altar ramp in Hamadab was founded in a sandy occupation layer above the sand ridge, on which the town was built. The altar can, therefore, be associated with the planned Upper Town's horizon C. Originally executed in white-plastered red-brick masonry and furnished with sandstone pilasters, it was repeatedly rebuilt. Each rebuilding showed a noticeable decrease in the quality of construction and building materials employed, incorporating reused sandstone blocks and un-rendered bricks. At approximately the same distance from the temple, a well 1.5m in diameter has been found close to the northern house façades of the forecourt. The well head was irregularly lined with sandstone blocks, ferricrete slabs and scattered red bricks (Plate 4). It is a fundamental infrastructural installation and is the first evidence of public water management in Meroitic Hamadab.

#### *Building H 3000*

H 3000 is a massive mud-brick structure in the south-eastern corner of the Upper Town, outstanding in its size and layout. Previous surface



Figure 4. Plan of building H 3000 indicating the foyer H 3004 and the main entrance in the west, staircase H 3002 and casemate H 3003 (scale 1:200).



and rendered with a smooth white lime plaster. While its walls have survived to 1.2m above floor level, its foundations with red bricks in their lowest courses extended down for more than 1m (Plates 5 and 6).

The building's square plan and its construction technique are reminiscent of similar edifices in the regional centres of the Meroitic kingdom like Karanog, Napata, the Royal City of Meroe, Wad ban Naqa, Muweis and Naqa. Usually referred to as residential houses or "palaces", these were erected on top of mud-brick platforms consisting of casemate foundations, serving as a basement for an upper storey. Several architectural features of H 3000 indicate that it is another example of such a representative structure on an elevated podium.

The podium was divided into chambers of different sizes. A major entrance was situated in the centre of its western side, apparently accessed by a ramp (Plate 5). The 1.45m wide doorway was reinforced by jambs of fired bricks, once fitted with a wooden sill and jambs, as is suggested by marks in the ground and in the masonry. The entry opens into the foyer H 3004 of 11.5m<sup>2</sup> with a sandy floor and mud-plastered, white-washed walls. The rubble fill of this room consisted of building debris that most likely comes from the collapse of the building's upper storey. Fired and unfired brick rubble, white lime plaster and polychromous-decorated mud plaster as well as a faience fragment point to a more lavish decoration of the second storey. A luxurious embellishment of the upper floor is supported by similar findings in the palaces at Jebel Barkal and at Wad ban Naqa (Roccati 2008, 258; Vercoutter 1962, 281).



Plate 5. General view from the north east over the excavation units at H 3000. Room H 3004 (foreground) is already excavated below its floor level, exposing the remains of the earlier building.

Passing the entrance hall, one approaches the 1.02m wide staircase (H 3002) in the back right-hand corner. The access to the stair was likewise blocked by a wooden door.<sup>6</sup> Behind, a lower landing, nine heavily worn steps made of fired bricks

<sup>6</sup> Gaps in the wall plaster at the corner and holes on either side of the door sill originate from the violent retrieval of the door frame.

are still preserved, leading up towards the south. Each step is one brick high, i.e. 80-90mm. With its unusual dimensions of 3.45 x 0.36m, the long narrow void (H 3001) situated immediately to the west might represent the substructure for the remainder of the stair. The stair can thus be reconstructed as U-shaped with a midway landing before reversing direction for the second flight of steps.

Room H 3003, a square cell of 7.5m<sup>2</sup>, had crude un-plastered masonry walls preserved up to 2.5m including foundation courses (Plate 6). Lacking any doorways, windows and floor levels and completely filled with building debris<sup>7</sup>, it was certainly a casemate. Casemates originally designate internal spaces for example in fortifications, but in Egyptology this term is used for inaccessible and non-interconnected cells of mud-brick masonry in foundation platforms (Spencer 1999). When creating a podium to support an elevated building,



Plate 6. Casemate H 3003 with wall remains of the earlier building at the bottom of the trench.

such 'blind rooms' were either vaulted or filled with rubble dumped into the room. Mud-brick platforms with casemates are common architectural features of ancient Egyptian official buildings from the New Kingdom and are typical for the Late Period.<sup>8</sup> Despite variations in layout and size, they share common elements like a square plan of monumental proportions and a raised platform. Ramps and/or stairs, giving access to the raised floor level, are usually situated along the buildings' central axes. The second storeys were

<sup>7</sup> Of interest was a previously unfamiliar, thin red-brick format (360 x 180 x 40mm) that was employed in the rowlock-courses of the foundations. Similar bricks have been recorded in the area of the Meroitic cemetery at the South Mound of Hamadab as well as in the rubble fill of an iron furnace excavated in March 2014 by Jane Humphris of the UCL-Qatar mission at the southern mound at Meroe City and also in the debris of the so-called Typhonium at Wad ban Naqa (excavated by the mission of the Charles-University of Prague, directed by Pavel Onderka).

<sup>8</sup> For instance in Tell el-Daba, Tell el-Balamun or Naukratis (see Bietak 2010; Maillot 2013; Pagliari 2011 and Spencer 1999).

elaborately decorated and are thought to have accommodated representative and private rooms (Bietak 2010, 22-23).

Not only the famous palaces of Wad ban Naqa and Napata, which are over 50m square, but also smaller structures at e.g. Karanog, Naqa and within the Royal City of Meroe show that casemate foundations were also commonly used throughout the Middle Nile Valley for a wider range of buildings.<sup>9</sup> Their ground floor housed both rubble-filled casemate compartments and accessible rooms like corridors, columned halls or store rooms. Besides the obvious influence of ancient Egyptian palatial architecture, a strong Mediterranean stimulus is reflected by constructional details and small finds. Graeco-Roman taste is particularly expressed in column capitals, faience inlays and gilded stucco work, being part of the decoration of the upper storey, where the representative and living rooms were located, presumably destined for persons of high rank (Roccati 2004; 2008; 2013; Sievertsen 2013; Sist 2006; Vercoutter 1962).

Building H 3000 reproduces the main architectural features of the large palatial structures in Egypt and the Middle Nile Valley in a down-sized manner. Although its exact function is yet unknown, its elevated main rooms and deliberate separation from the domestic quarters, however, characterise H 3000 as part of the official infrastructure, possibly the seat of a higher authority or an administrative institution for the regulation of communal or commercial matters.

H 3000, with only a single period of use, was built presumably around the same time as the town wall. After its abandonment it was overbuilt, still in the Meroitic period, by more flimsy mud-brick structures. Massive mud-brick walls below the floor level of rooms H 3003 and H 3004 are remains of earlier buildings (cf. Figure 4 and Plate 6). They were associated with a compact sandy stratum covering the sterile sand ridge already mentioned, which contained potsherds, charcoal, bone and mud-brick fragments. As we consider H 3000 one of the primary installations of the planned Upper Town, its predecessor must belong to the preceding occupation horizon D, which was obviously much more substantial than previously considered. Thus, the walled Upper Town does not represent the original foundation of Hamadab, but a new building program on top of a previous, presumably Early Meroitic settlement with substantial building structures.

(UN)

### Phasing and chronology of the Upper Town in the Meroitic period

Excavations inside and outside the Upper Town permit a first generalised phasing of the Meroitic urban settlement

<sup>9</sup> Varying considerably in outer dimensions from 20m to 60m, they are mostly square but occasionally rectangular in shape (Adams 1984, 262-264; Maillot 2013 and Sievertsen 2003; for excavation reports see Dunham 1970, 7-9; Roccati 2004; 2008; Vercoutter 1962 and Woolley 1911).

(cf. Wolf and Nowotnick 2013).<sup>10</sup> At the present state of research, we divide the occupation of the Upper Town into four horizons designated D to A, which are more or less well documented in the archaeological record by stratigraphy and archaeological features in several of the trenches (Plate 7, cf. Figure 3). However, as customary in settlement excavations, these idealised periods and especially their individual phases cannot unambiguously be generalised across the entire Upper Town. They rather indicate a general urban transformation process that in detail may not have happened contemporaneously in all areas.

**Horizon D** is a Meroitic level that predates the fortified Upper Town. It has been recognised in several excavation spots of the North Mound as a sandy occupation layer with small-sized artefacts but also with large oven pots above sterile sand layers. It furthermore comprises substantial mud-brick and red-brick structures, for example below H 3000 and below the main street, that do not correspond to the general plan of the Upper Town in horizon C. It thus represents an early period of habitation, but its extent and layout remain as yet unknown.



Plate 7. View from the north into trench 2013-03, illustrating the occupation horizons A–D in the centre of the Upper Town.

**Horizon C** denotes the foundation of the walled Upper Town with the gates, the temple and the main avenue between them as well as the domestic houses and official buildings like H 3000. It also includes the early development of the planned Upper Town within the physical boundary of the town wall. This large-scale building program completely restructured the urban space and must have required a considerable degree of planning and expenditure of resources.

<sup>10</sup> The phasing of the Post-Meroitic occupation as well as of the much later Islamic re-occupation of the North mound is not established yet.



**Horizon B** – While the foundation of the Upper Town and the beginning of period C are clear in the archaeological record, the upper limit of horizon C cannot be readily defined and rather represents an arbitrary boundary. By horizon B we, therefore, summarise later construction and occupation levels at different spots, which correspond to a period after the abandonment of the town wall, i.e. the gradual process during which the wall was consciously neglected and left to fall into ruin, losing its demarcation character. The spread of the settlement into its suburbs might have already begun during this period. Domestic blocks inside the Upper Town were rebuilt more or less respecting the previous property lines.

**Horizon A** is a building level that is preserved as shallow remains in the uppermost stratum in the centre of the North Mound, for example around house H 1600. It indicates a phase of compaction and densification by splitting larger rooms into smaller ones and probably by the addition of a second storey. It presumably represents the final development stage of the Meroitic urban settlement (Wolf and Nowotnick 2013; Wolf *et al.* 2014).

It seems that during these periods an initially well regulated urban organisation has weakened, which is reflected in the increasing disorganization such as the emergence of dead-end streets or the deviation from the original orthogonal layout. However, despite such developments, the basic plan of the Upper Town was maintained throughout its history.

Charcoal samples from the above mentioned horizons provided a series of radiocarbon dates to establish an absolute chronology for the Upper Town. The dates have been used to calculate a Bayesian model to achieve the statistically most probable differentiation between periods A to D (Figure 5 and Table 1).<sup>11</sup> The included dates range from *c.* 300 BC to AD 400 for the settlement of Hamadab and cover the entire period commonly described as Meroitic. With the help of the calculated Bayesian sequence, we can propose the approximate time range for the four Meroitic occupation horizons at Hamadab:

- **Horizon D** *c.* 300 – 50 BC (i.e. Early Meroitic period)
- **Horizon C** *c.* 100 BC – AD 100  
(i.e. Classic Meroitic period)
- **Horizon B** *c.* AD 50 – 300  
(i.e. Classic to Late Meroitic periods)
- **Horizon A** *c.* AD 300 – 400  
(i.e. Late to early Post-Meroitic periods).

(PW, UN, FW)

<sup>11</sup> Using calibration curve IntCal13 (Reimer *et al.* 2013) and OxCal v4.2.3 (Bronk Ramsey 2009). The samples have been dated by the Poznań Radiocarbon Laboratory (T. Goszlar; c.fourteen@radiocarbon.pl). Uncertain samples and outliers, for example from re-deposited layers, have been excluded. Cf. Wolf and Nowotnick 2013, 444, Abb. 9; Wolf *et al.* 2014.

## The hinterland of Hamadab

For at least one millennium, the Meroe–Kabushiya region was the nucleus of the Kushite kingdom and thus belongs to one of the most important cultural and historic landscapes of ancient Sudan. Its significance is best demonstrated by the dense settlement pattern comprising sites like Meroe, Hamadab, Abu Erteila and Awlib, smaller settlement remains between Hamadab and Meroe and pottery scatters in the present farmlands, the pyramid cemeteries and tumulus fields as well as medieval and Islamic occupation sites. In order to gain a better understanding of the history of human habitation within this region, the project reported up on here, under the umbrella of the Qatar-Sudan Archaeological Project, aims at studying land use and settlement patterns in the region, taking into consideration its geographic, palaeo-climatic and environmental dynamics over the past millennia. Focusing on human activity in its various aspects, we hope to achieve a diachronic synopsis of the region's cultural development in relation to its changing environment.

## The archaeological reconnaissance survey

We commenced an archaeological reconnaissance survey to systematically document the archaeological sites in the region between the Wadi el-Hawad and Meroe City, comprising the western range of the mountainous area, the desert towards these *jubal*, the present-day settlements and the floodplain, complemented by the west bank with its fertile floodplain and adjoining settlement areas.

Preparations included a study of records in the *Friedrich-Hinkel-Forschungszentrum* at the German Archaeological Institute<sup>12</sup> and the preparation of maps of the greater Meroe region (Figure 6),<sup>13</sup> establishing a basis for our archaeological, geomorphological and ecological fieldwork and intended as a support for all missions working in the region. The geographical grid and the designation system of Friedrich Hinkel were adopted for the numbering of archaeological sites (Hinkel 1977). Fieldwork during the first season in the winter of 2013/14 focused on the eastern side of the villages between Wadi el-Hawad and Begrawiya (Figure 7), since its archaeological sites are very much endangered by settlement activities, while the survey in the floodplain focused on the elevated sand ridges. One hundred and sixteen sites with more than 460 features have been surveyed by field walking and recorded by surface observation, without excavations. Selected sites were documented by Gerald Raab by air photography to create orthographic images and 3D animated views.

The most common site type are cemeteries of which 40 were noted with up to several dozen graves, as well as isolated tombs. Rather densely occupied cemeteries have been

<sup>12</sup> With the kind support of Simone Wolf, director of the archive.

<sup>13</sup> The maps in scale 1:7500 and 1:25000 are based on geo-referenced satellite imagery and ground control points. Arabic geographic names of present-day settlements and geographic features have been included. Thanks to the kind support of UCL-Qatar, we were able to include basic topographic information assembled by Frank Stremke in 2012.

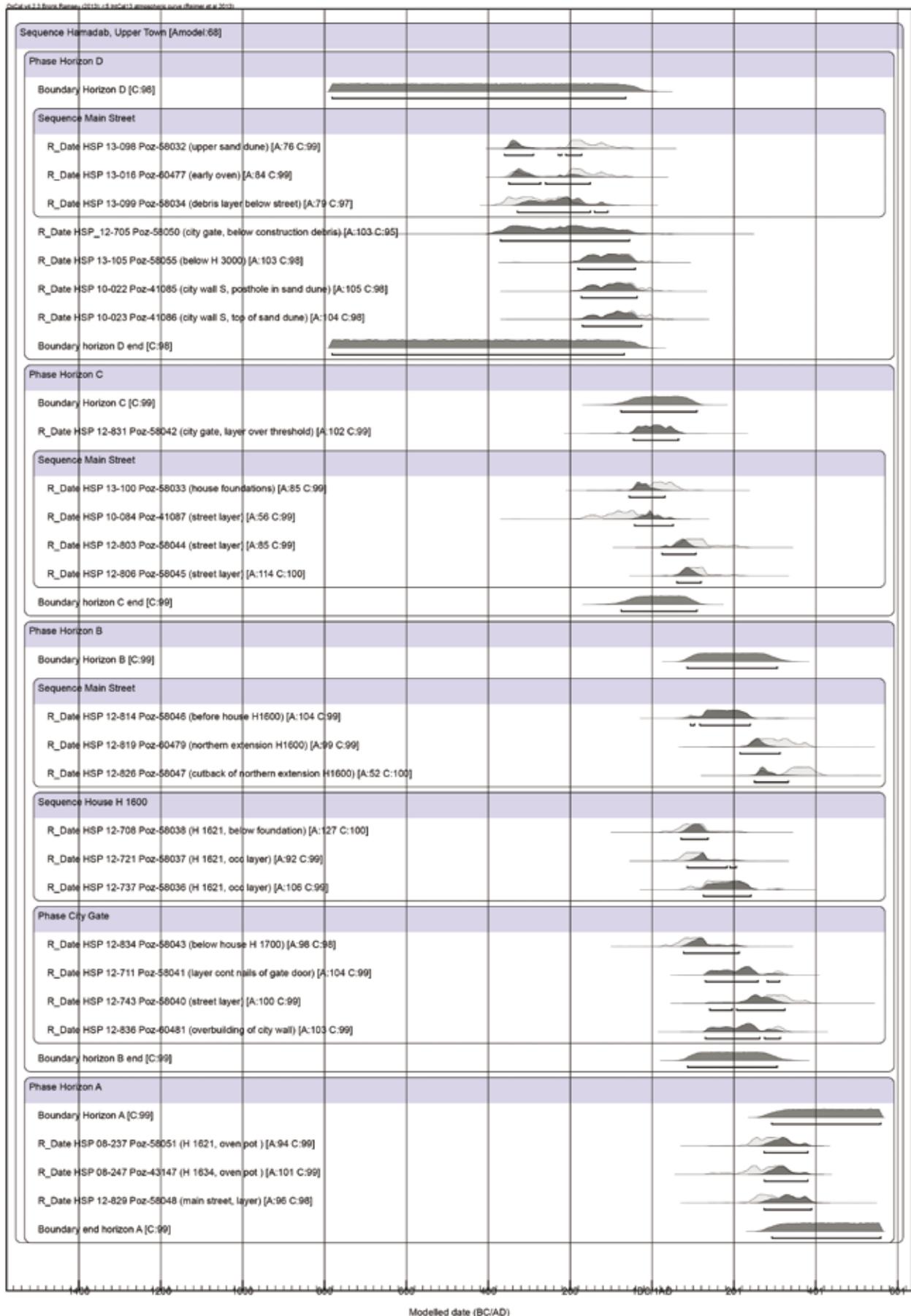


Figure 5. Bayesian sequence of radiocarbon dates related to the occupation periods D – A of the Upper Town.



Table 1. Radiocarbon dates relating to the Upper Town's occupation horizons (raw and calibrated dates, as well as results of the Bayesian sequence modelling).

Sequence Hamadab, Upper Town	BP	Unmodelled (BC/AD) 95.4%		Modelled (BC/AD) 95.4%		A	C
		from	to	from	to		
<b>Horizon D</b>				-782	-65		98
R_Date HSP 13-098 Poz-58032 (upper sand dune)	2140, 30	-353	-57	-361	-173	75.9	98.7
R_Date HSP 13-016 Poz-60477 (early oven)	2145, 30	-355	-58	-350	-152	84.2	98.7
R_Date HSP 13-099 Poz-58034 (debris layer below street)	2200, 35	-371	-179	-330	-109	79.4	97
R_Date HSP_12-705 Poz-58050 (city gate, below construction debris)	2160, 70	-382	-46	-371	-56	102.9	95.2
R_Date HSP 13-105 Poz-58055 (below H 3000)	2080, 30	-191	-3	-181	-42	102.9	98
R_Date HSP 10-022 Poz-41085 (city wall S, post-hole in sand dune)	2065, 30	-171	2	-173	-37	104.9	97.7
R_Date HSP 10-023 Poz-41086 (city wall S, top of sand dune)	2055, 30	-168	16	-171	-26	103.7	97.6
<b>Horizon C</b>				-77	110		99.4
R_Date HSP 12-831 Poz-58042 (city gate, layer over threshold)	1995, 30	-52	71	-46	65	102.2	99
R_Date HSP 13-100 Poz-58033 (house foundations)	1985, 30	-47	74	-56	32	84.7	99.4
R_Date HSP 10-084 Poz-41087 (street layer)	2055, 30	-168	16	-43	52	56.4	98.5
R_Date HSP 12-803 Poz-58044 (street layer)	1895, 30	52	215	25	108	85.4	99.4
R_Date HSP 12-806 Poz-58045 (street layer)	1895, 25	55	211	62	120	114	99.6
<b>Horizon B</b>				87	306		99.4
R_Date HSP 12-814 Poz-58046 (before house H1600)	1840, 30	86	242	94	241	103.8	99
R_Date HSP 12-819 Poz-60479 (northern extension H1600)	1740, 30	236	386	216	313	99	98.8
R_Date HSP 12-826 Poz-58047 (cutback of northern extension H1600)	1690, 30	256	416	251	334	51.7	99.7
R_Date HSP 12-708 Poz-58038 (H 1621, below foundation)	1900, 30	28	214	72	137	126.7	99.6
R_Date HSP 12-721 Poz-58037 (H 1621, occ layer)	1895, 25	55	211	87	206	91.6	99.4
R_Date HSP 12-737 Poz-58036 (H 1621, occ layer)	1840, 30	86	242	126	242	106.3	98.6
R_Date HSP 12-834 Poz-58043 (below house H 1700)	1900, 30	28	214	78	213	97.8	98.4
R_Date HSP 12-711 Poz-58041 (layer cont nails of gate door)	1800, 25	132	322	131	313	104.3	98.5
R_Date HSP 12-743 Poz-58040 (street layer)	1755, 35	146	387	142	325	100.1	98.6
R_Date HSP 12-836 Poz-60481 (overbuilding of city wall)	1795, 30	132	328	131	314	103.4	98.7
<b>Horizon A</b>				293	559		99.2
R_Date HSP 08-237 Poz-58051 (H 1621, oven pot )	1750, 25	232	380	275	381	94.3	98.5
R_Date HSP 08-247 Poz-43147 (H 1634, oven pot )	1765, 30	142	379	275	381	100.6	99
R_Date HSP 12-829 Poz-58048 (main street, layer)	1730, 30	243	386	275	390	95.5	98.3

identified within and adjacent to the present-day settlements on gravel ridges and at elevated positions, as well as on the mountains' slopes and plateaus in the northeast. Tumuli with different features represent the common form of burial practice in the region (cf. Lenoble 1987a; 1987b; Garstang *et al.* 1911, 10, 29-36). Dating of these surface features is problematic without excavation, since finds are rare or non-existent. Most of the cemeteries are probably Meroitic in date, although a later date seems likely for the tumuli and cairn graves east of the asphalt road and on the lower plateaus and

slopes of Jebel Hadjies (Plate 8).<sup>14</sup> Similar grave structures north of the royal pyramid fields date to the Post-Meroitic period.<sup>15</sup> At least two box-shaped superstructures covering earlier burial structures at NE-36-O/4-F-030 and 4-F-032<sup>16</sup> presumably date to the medieval period. Multi-period cemeteries seem to be common.

<sup>14</sup> E.g. sites NE-36-O/4-F-030, NE-36-O/4-F-032, NE-36-O/4-F-034.

<sup>15</sup> Excavated by Shendi-University (Abd el Muneim Ahmed, pers. comm.).

<sup>16</sup> The general prefix for this region "NE-36-O /" is omitted.

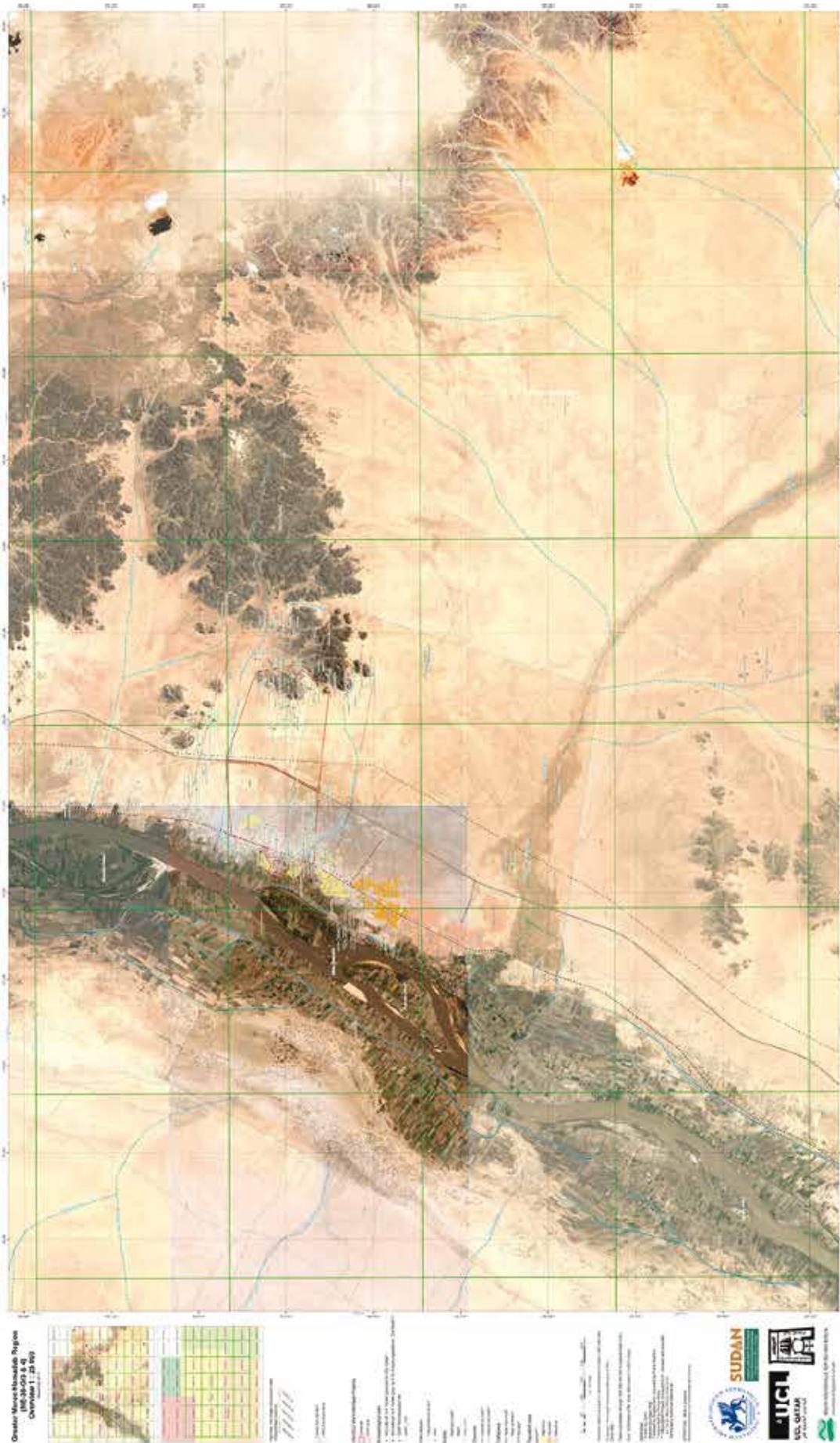


Figure 6. Worksheet of the greater Meroe region prepared by the Hamadab project.

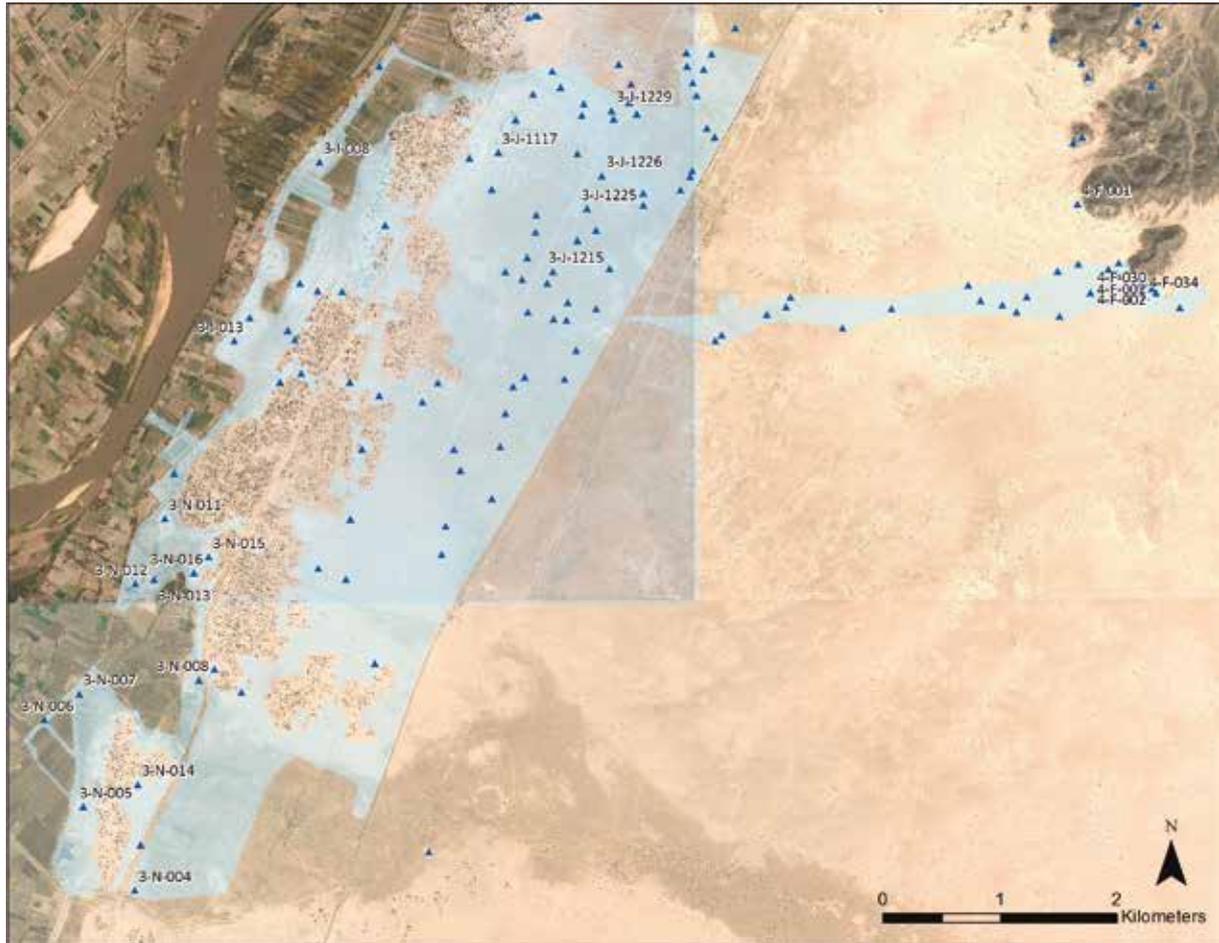


Figure 7. Area of the archaeological reconnaissance survey in winter 2013–2014.



Plate 8. Airborne ortho-photo of cairn cemetery 4-F-002 (left) and tumulus cemetery 4-F-032 (right).

Settlement sites are rare, but nevertheless indicate a continuous occupation of the region since the Napatan period. Larger occupation sites are situated mainly in the present-day floodplains along the river banks. While several sites<sup>17</sup> show remains of substantial fired and unfired-brick structures,

<sup>17</sup> Like sites 3-N-014, 3-I-013, and 3-J-1117.

other sites like 3-I-008 are characterized by large quantities of artefacts suggesting a long term occupation as well. Artefacts are notably abundant on the sand ridges near the mouth of the Wadi el-Hawad at Kabushab and around Kabushiya. These areas were obviously frequently inhabited in ancient times.<sup>18</sup> Some of them<sup>19</sup> were occupied until the devastating floods of 1946 and 1988 which destroyed buildings over large parts of the area. Islamic-period occupation frequently overlay older, mostly Meroitic remains. Site 3-I-008 represents probably a larger Napatan habitation, while site 3-I-013 (the South Mound of Domat el-Hamadab) was most probably a medieval settlement. Besides the large quantity of Meroitic and later sites, there are a few places of Neolithic activities particularly in the plateaus of the eastern mountain ranges, indicated by lithic concentrations.<sup>20</sup>

The lower desert areas exhibit little evidence of occupation activities besides the well known sites such as the ‘Sun Temple’ M 250 in the vicinity of Meroe City. Here, a

<sup>18</sup> For example sites 3-N-004 to 3-N-008 and 3-N-011 to 3-N-016.

<sup>19</sup> For example sites 3-N-11 and 3-N-16.

<sup>20</sup> Unlike at the site of es-Sour (Azhari Mustafa Sadig 2005), located near the river less than 2km north of Meroe City and showing a well defined Neolithic occupation with tools and pot burials, the so far discovered spots were identified by concentrations of flakes only, without distinct evidence of elaborated tools or any signs of substantial remains.

number of smaller sites – often near *wadi* beds – comprise loose, insubstantial stone or gravel arrangements, usually associated with potsherds and grinding tools. Such sites were designated activity zones, probably related to food production or similar.<sup>21</sup>

Occupation and settlement sites of various dates have also been identified at the foot of the mountains in the east. Amongst these, a large stone structure to the west of Jebel Qudeim might have been related to the wide ranging Meroitic quarry activities in the area (Plate 9).<sup>22</sup> A remarkably large



Plate 9. Airborne ortho-photo of site 4-F-001 at the foot of Jebel Qudeim.

settlement of recent date, abandoned less than a decade ago, has been found south of Jebel el-Hadjies. It comprises ruined stone structures, remains of storage facilities, kitchens, and a number of waste dumps. Besides artefacts of Islamic date, a number of potsherds indicate earlier occupation. It was possible to interview one of its former inhabitants during our ethnographic survey. Round or sub-rectangular shelter-like structures of gravel and small sandstones like at site 3-J-1215, occasionally supplemented by *jalous* walls as at 3-J-1229, occur in our area such as have been noted further north in the region of the SARS survey conducted in 1990 (Mallinson *et al.* 1996, 24-26), but in fewer numbers. These are most probably pre-modern in date. A further common site type of recent date are prayer zones, consisting of single-lined stone settings of circular, oval or rectangular shape with niches in their north-eastern part oriented towards Mekka, often situated in *wadis*.

(FW)

<sup>21</sup> For example sites 3-J-1225, 3-J-1226 and 3-J-1228.

<sup>22</sup> Site 4-F-001.1 (cf. Hintze 1959, 176; Hinkel, DAI Berlin, Friedrich-Hinkel-Forschungszentrum, Aktenordner F. W. Hinkel 092, Blatt 088 bis 093).

## Palaeoenvironmental studies and landscape archaeology

The study of the region's landscape development comprises aspects of the palaeoclimate, geomorphological and ecological changes. Results of the first field investigations presented below shall serve as starting point to better understand the environment of the past.

### *Ecology and land use*

A survey of the present-day ecology and land use in the Meroe-Hamadab region was carried out by Arnaud Malterer focusing on the various ecological zones in the region like riverbanks, farmland, present-day settlement areas, desert and semi-desert regions, the mountains, and three different sectors of the Wadi el-Hawad. Interviews with the farmers regarding the present land use constituted a second focus of this study.

The region is characterised by a hot and dry climate, with high daytime temperatures and an average annual rainfall of about 70mm. Thus, river oases and semi-desert vegetation determine the regional wild plant population of today (Figure 8). About 50 plant species have been recorded and classified into five plant communities, including acacia alluvial forests and tamarisk bushes in the floodplain as well as acacia and small shrub communities in the semi-desert areas. The river banks are dominated by lush and in places dense vegetation with *Acacia nilotica*, *Acacia seyal*, and *Acacia albida* indicating the maximum flood level. After inundation, pioneer vegetation like *Tamarix nilotica* communities use the residual moisture in the nutrient-rich muddy plains. In the *wadis*, depressions and troughs of the semi-desert, on dry valley terraces in the floodplain as well as sporadically on sand ridges, vegetation is sparse and consists predominantly of thorn trees, low bushes and sparse grasses. These dry sites depend exclusively on the July–September rains. The limited water supply forces the plants to grow far apart due to root competition. *Acacia tortilis ssp. raddiana* is the characteristic tree species in these areas, in addition to *Maerua crassifolia* and *Balanites aegyptiaca*. The bottom layers are covered by pasture grass (*Panicum turgidum*), the poisonous shrub *Citrullus colocynthis* and smaller shrubs such as *Aerva persiva*, *Cassia senna* and *Fagonia cretica*, producing a relatively dense ground cover within *wadis* and gullies especially after the rainy season. Cause for concern to farmers is *Prosopis chilensis* (mesquite), an invasive buckthorn shrub from South America, spreading progressively into the farmlands over the last 20 years.<sup>23</sup> Farmers try to stop its spread by mechanical methods of uprooting and burning. However, beyond irrigated farmlands, at roadsides, canal edges and especially at archaeological sites, it increasingly poses problems by widely covering the ground.

Irrigated agriculture is carried out on small family farms in the narrow river oasis formed by the Nile (Figure 9). In more recent times farmers increasingly focus on market-oriented

<sup>23</sup> Introduced in 1917 by the British, the shrub was originally used for erosion control (Babiker 2006).

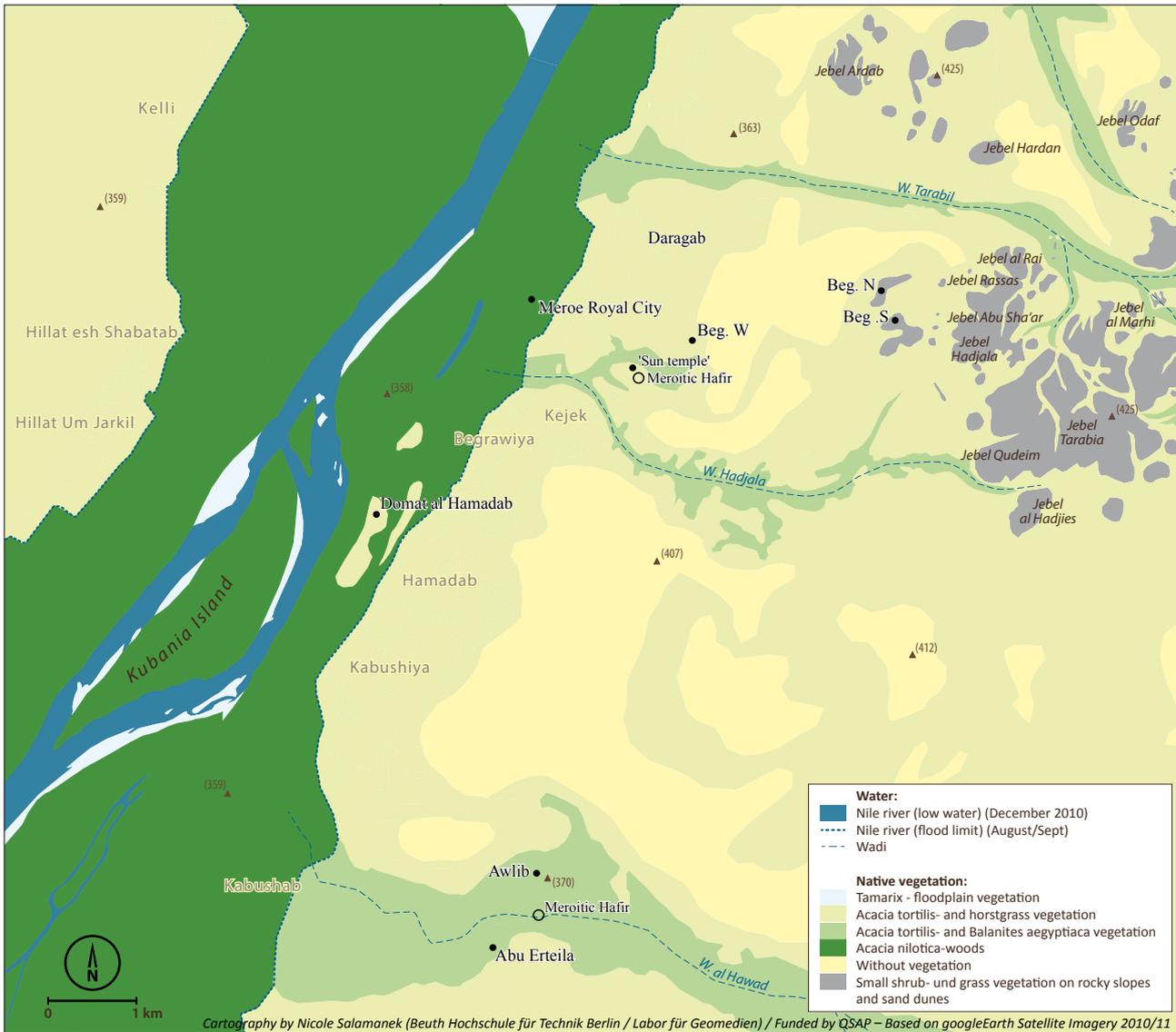


Figure 8. Map of the present-day vegetation in the Meroe-Kabushiya region.

cultivation of onions, beans, millet, wheat, corn, potatoes and alfalfa in combination with sheep and goat herding. Here, the summer inundations supported by intensive pump irrigation in the dry season ensure three growing seasons per year, while after the decrease of the high flood in September residual moisture is used for additional cultivation of millet and cowpeas. Based on the rather flat landscape relief, the agriculture in the Meroe-Hamadab region is less complex than for example at the Nile cataracts, differing in particular by the absence of date plantations. The wide meadows and floodplains along the Nile permit intensive large-scale farming by traditional cultivation as well as supported by mechanical means. In addition, higher rainfall than in the north permits rain-fed sorghum cultivation in the large *nadis*, for example in the middle reach of the Wadi el-Hawad around Basa.

The increasingly dry desert-terraces to the east of the present-day settlements are predominantly used for cemeteries, schools and other communal buildings, clay pits and semi-

nomadic settlements, as well as by modern infrastructure like asphalt roads, power lines and oil and gas pipelines. About 3km east of the Nile, the flat land changes to the semi-desert of the Keraba with individual mounds of rubble, sand ridges and dry water courses.

(AM)

### First investigations into the palaeoclimate of the region

An assessment of the region's geology and climate proxies has been carried out by Christian Weiß notably in the floodplains along the Nile, which have the greatest impact on the local sediment systems, the Wadi el-Hawad with its own sediment system, the desert regions and the Nubian Sandstone formations in the northeast of the region (cf. Figure 6).

The river banks are dominated by soils and fluvial sediments consisting of very fine-grained, homogenous clay minerals with a dark brown colour. They are deposited during

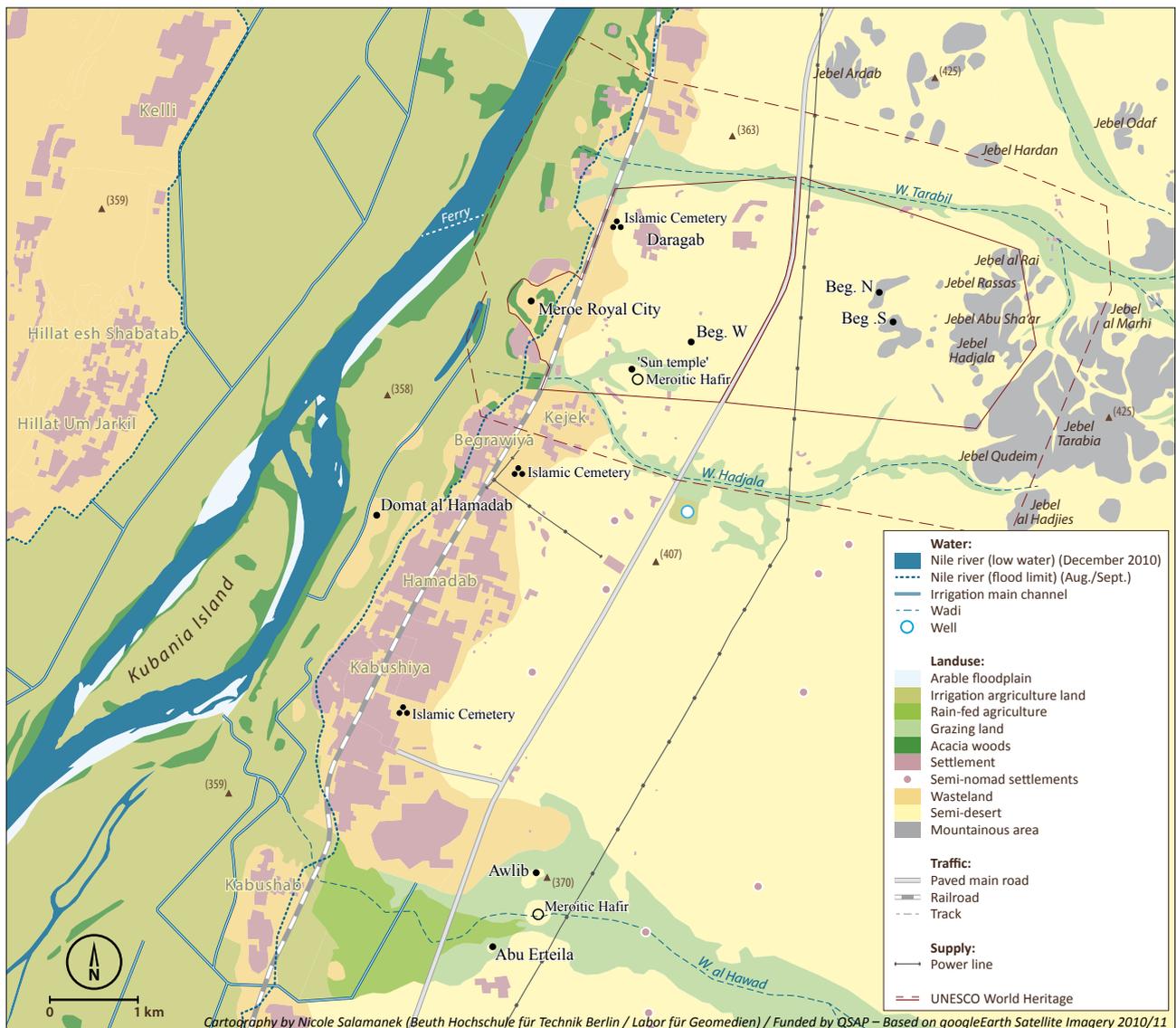


Figure 9. Map of the present-day land use in the Meroe-Kabushiya region (November 2013).

the summer inundation in the floodplains along the river and in the delta of the Wadi el-Hawad. By contrast, the sediments of the latter are dark red to brown coloured clay rich sands that contain a fine lamination if they are undisturbed. At first glance, they seem to have a different clay mineral association. The accumulated sand ridges in the floodplain consist of fine to medium-grained sands of quartz, feldspar and rock fragments at their lower edges. They show significant differences in grain size and rounding within the same strata, suggesting that water was the transport medium. In addition, the grains differ from those of typical dune sands which are usually of equal size, well-rounded and having an unpolished grain surface. Thus these sediment accumulations seem to be fossil sandbars like the fluvial deposited sands which cover several hundred square kilometres in the Atbara region. However, the surface of the sandbars might be covered by aeolian sands. The age of these deposits is early quaternary and older.

*Calcretes* (cryptocrystalline carbonate crusts) of usually grey colour can be found in the west and the south of the region.

They are mostly preserved as nodular, micritic and thin laminated lime stones, sometimes forming dense laminated crusts, embedded in sands and gravels and usually covered by desert sediments. Genetically, calcretes result from evaporating interstitial water, being evidence of a beginning of desertification. At the southern bank of the Wadi el-Hawad these calcretes are the base sediment into which graves were cut.

Palaeo-soils are distributed to the east of the present-day villages. They appear as dense, dark brown to black layers with a minimum thickness of 500mm, with a high clay mineral content, partially mixed with carbonates and rizolithes (carbonized root traces). Their base is covered by *hamada* sediments of 100mm to 300mm in thickness.

The region beyond the Nile margins and the *wadi* courses are dominated by recent desert sediments such as sand dunes and gravels. Proxies like palaeo-soils, water-related sediments or *caliche* are missing in this region. The desert plains and the basements of these sediments consist of heavy weathered sandstones and consolidated sands, cretaceous sandstones



and iron crusts. The *jubal* consist of thick bedded Nubian Sandstone intercalating ironstones and iron crusts, sometimes with a thickness of several meters, being the product of tropical humid weathering. Smaller hills that are covered by black ironstones may have cores of weathered silt- and sandstones belonging to the Nubian Sandstone Group.

Sediment samples have been taken from existing natural and artificial ground openings like *wadi* bank slopes or water pump pits as well as from several archaeological trenches dug at the outer perimeter of the North Mound, providing well datable evidence of environmental changes during the last millennia. The samples taken will be analyzed regarding their sediment-parameters, silt ratio, carbonate content, organic carbon, mineralogy, clay mineral associations, aquatic organisms and stable isotopes of aquatic organisms.

(CW)

### *Geomorphological observations*

Geomorphological studies are intended to reconstruct the dynamics of the landscape, for example by fluvial and/or aeolian agencies like Nile shifts, water catchment increases or drops, sand dunes etc. After an on-site inspection of the research area by Mark Macklin and Jamie Woodward, preliminary hypotheses have been formulated for further geomorphological studies in the coming seasons. As part of a meta-analysis of available radiocarbon and OSL dated Holocene fluvial units in the entire Nile valley, Macklin and Woodward were able to provide evidence for a significant decrease of the Nile's water catchment during the Kushite period (pers. comm.). Regarding the geomorphology of the Meroe–Kabushiya floodplains, the sand ridges (amongst them the North and South Mound of Hamadab) presumably developed during this dry period and thus provided the base for riverine Meroitic habitations like Hamadab. The fact that the large Meroitic *bafair* in the region, the *bafir* between Abu Erteila and Awlib in the Wadi el-Hawad and the *bafir* at the 'Sun Temple' M 250 in the Wadi Hadjala (Figure 10, cf. Figures 8 and 9), have large inlets at their western Nile facing sides as well, are clear signs that they were primarily designed to retain water from the Nile flood and not (only) seasonal *wadi* water run-off.<sup>24</sup> The location of Abu Erteila and Awlib very close to the *wadi* banks and the position of the *bafir* in the middle of its stream confirm that the *wadi* water catchment regime was relatively slow and non-destructive already in Meroitic times (cf. Akhtar-Schuster 1995). On the other hand, present-day observation indicates that large areas of the floodplain in the Kabushiya–Meroe region are flooded by waters of the Wadi el-Hawad independently of the Nile and already before the peak of the annual Nile flood (cf.

<sup>24</sup> In recent years, the Nile flood regularly reaches the *bafir* in the Wadi el-Hawad. With the help of a digital elevation model of the entire Meroe–Kabushiya region, to be prepared in the coming season, we hope to find out whether in antiquity a Nile flood could have reached the *bafir* at the 'Sun Temple' without flooding the large settlements like Meroe City and Hamadab, which are located in the present-day floodplains.

Figure 10).<sup>25</sup> These observations suggest that the interaction of the Nile and the regional *wadi*-systems constituted a geomorphological setting producing huge arable land areas, steadily irrigated every summer by water sources relatively independent of each other, which must have been beneficial for the historical development of the region during the Meroitic period.

(PW)

### **The ethno-archaeological survey**

The ethno-archaeological survey directed by Petra Weschenfelder provided details on the settlement history in the wider Hamadab area and linked the occupation at Hamadab to the Islamic settlement on the ancient site of Domat el-Hamadab that is evident in the archaeological record. It furthermore provides a starting point to investigate the social and economic relations of the wider Hamadab area to the hinterland and via the hinterland to other areas especially in the eastern Sudanese lowlands. While this study is of ethno-historical relevance it can furthermore provide suggestions for interpreting the archaeological record of the Meroitic capital with regard to its links to the eastern and western long-distance trade routes.

The settlement history was investigated by interviews with members of different families of the Jaaliyin who are widely considered as the earliest pre-modern group settling in Hamadab. The histories of the individual families suggest that an extended family – that of Hamad of the Jaaliyin – first settled at the site of Domat el-Hamadab where they lived in non-permanent *birish*-structures. Since their number gradually grew they chose to resettle further east. The earliest history of present-day Hamadab is connected to the digging of wells. Several families link their ancestry to the family of the well diggers and use this to back their claims to farmland and houses. The date of the first well is highly debated among them and ranges from AD 1707 to 1865.

The area of wider Hamadab was and is attractive for its market and job opportunities and for animal breeders because of its water quality. The descendants of Hamad mediated the integration of several incoming groups of different ethnicity. For members of mobile groups, like the Fadniya from the eastern hinterland, intermarriage with the Jaaliyin provides the way to use these resources of the Nile Valley and to settle down inside the wider village. Nomadic Fadniya-groups come to the Nile Valley to sell animal products and products of craftsmanship at the markets. During the dry season they stay with their settled relatives to use water and fodder for the animals and to take up temporary jobs. During the rainy season, they in turn take the herds of their settled relatives but also of the Jaaliyin to the hinterland. Being widely scattered within the hinterland, the nomadic groups nevertheless maintain close family relations not only to Hamadab but also to Atbara and ed-Damer, to Medani and the White Nile. Their

<sup>25</sup> Cf. high-resolution satellite imagery (GoogleMaps capture, acquisition date 18.8.2013).

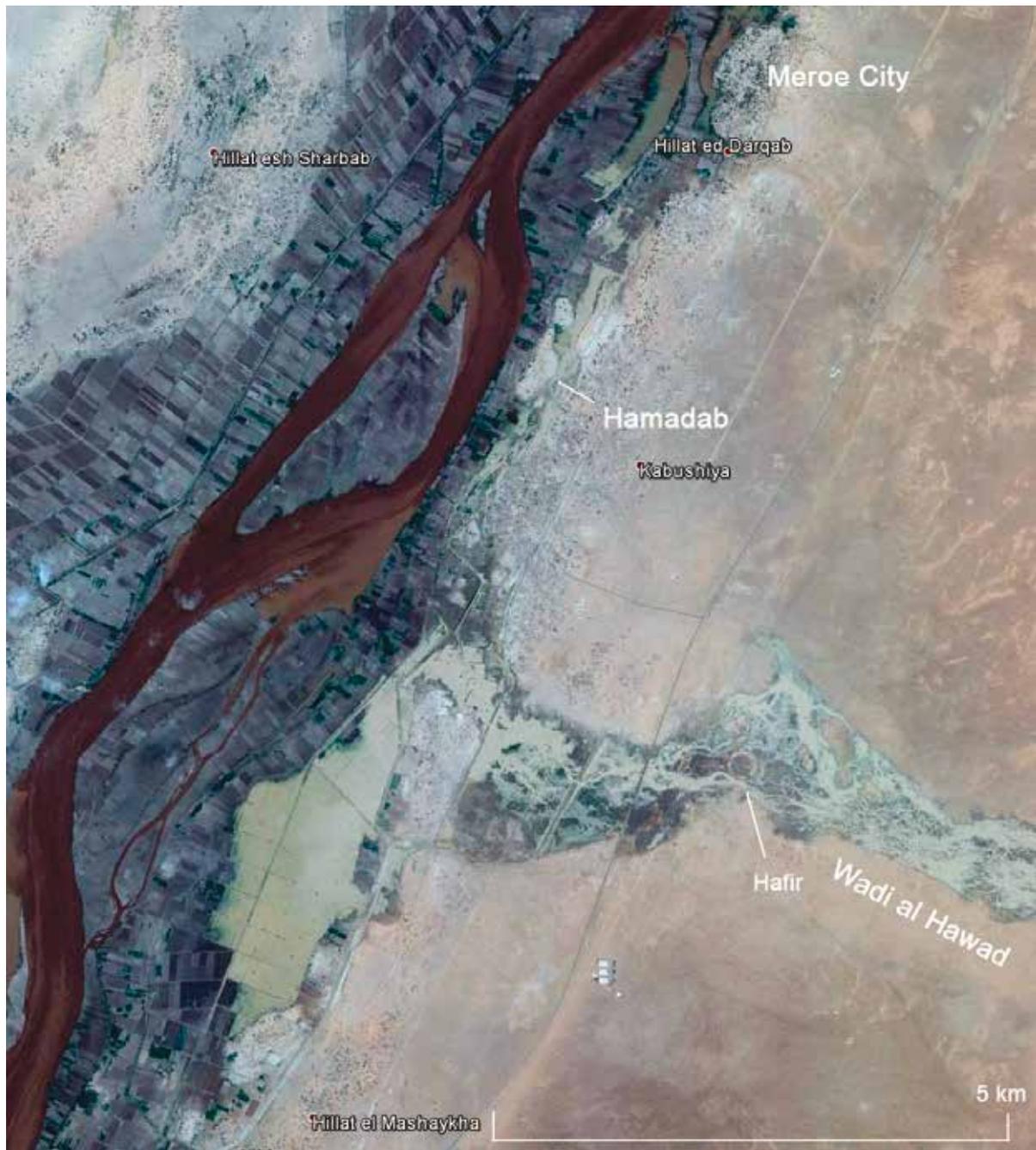


Figure 10. Satellite image showing the inundation of parts of the floodplain by the Wadi el-Hawad in August 2013 (GoogleEarth capture [acquisition date 18.8.2013]).

links with family members through the *wadis* might reflect similar relations in the past.

(PeWe)

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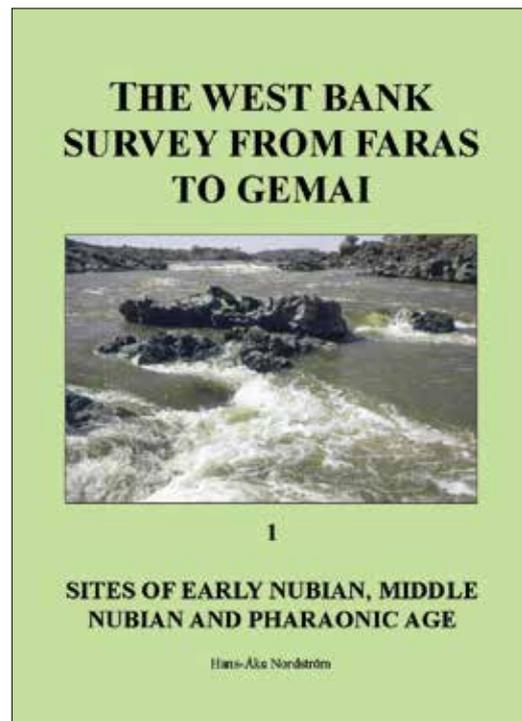
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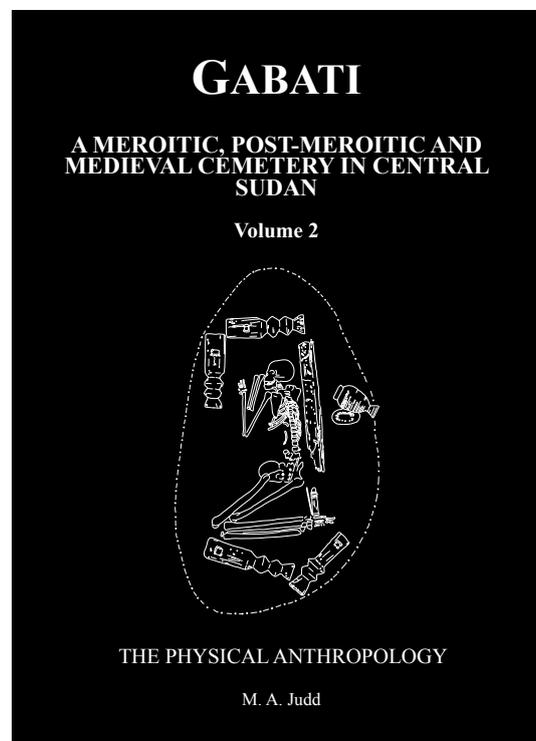
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*View upstream along the Wadi Murrat from the late 19<sup>th</sup> century Anglo-Egyptian fort.  
The pharaonic inscriptions are amongst the trees at the wadi edge in the far centre (photo D. A. Welsby).*



*Horus, Lord of the Desert. A natural rock outcrop along the route from Buben towards Wadi Murrat (photo D. A. Welsby).*