

APPLYING SATELLITE DATA SOURCES IN THE DOCUMENTATION AND LANDSCAPE MODELLING FOR GRAECO-ROMAN/BYZANTINE FORTIFIED SITES IN THE TÜR ABDIN AREA, EASTERN TURKEY

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ABSTRACT:

In 2015-2016 the Finnish-Swedish Archaeological Project in Mesopotamia (FSAPM) initiated a pilot study of an unexplored area in the Tūr Abdin region in Northern Mesopotamia (present-day Mardin Province in southeastern Turkey). FSAPM is reliant on satellite image data sources for prospecting, identifying, recording, and mapping largely unknown archaeological sites as well as studying their landscapes in the region. The purpose is to record and document sites in this endangered area for saving its cultural heritage. The sites in question consist of fortified architectural remains in an ancient border zone between the Graeco-Roman/Byzantine world and Parthia/Persia. The location of the archaeological sites in the terrain and the visible archaeological remains, as well as their dimensions and sizes were determined from the orthorectified satellite images, which also provided coordinates. In addition, field documentation was carried out *in situ* with photographs and notes. The applicability of various satellite data sources for the archaeological documentation of the project was evaluated. Satellite photographs from three 1968 CORONA missions, i.e. the declassified US government satellite photograph archives were acquired. Furthermore, satellite images included a recent GeoEye-1 Satellite Sensor Image from 2010 with a resolution of 0.5 m. Its applicability for prospecting archaeological sites, studying the terrain and producing landscape models in 3D was confirmed. The GeoEye-1 revealed the ruins of a fortified town and a fortress for their documentation and study. Landscape models for the area of these sites were constructed fusing GeoEye-1 with EU-DEM (European Digital Elevation Model data using SRTM and ASTER GDEM data) in order to understand their locations in the terrain.

1. INTRODUCTION

1.1. The aim and strategy of the Finnish-Swedish Archaeological Project in Mesopotamia

The aim of the Finnish-Swedish Archaeological Project in Mesopotamia (FSAPM), launched in 2015, was to record, document and map some hitherto little or unknown archaeological sites in the Tūr Abdin region in the present-day Mardin Province in southeastern Turkey. The first visit to an area of interest in Ömerli was made in 2014, remote sensing studies were carried out in 2015-2016, and the fieldwork took place in 2016. The area is currently an endangered region as far as archaeological sites are concerned. The strategy of FSAPM to trace and document some archaeological sites in the area was based on remote sensing by satellite imagery as well as surface survey and photographic documentation *in situ* on the ground.

The area belongs to the Tigris valley of Northern Mesopotamia in which limestone massifs of the Taurus Mountains are forming a natural frontier. Deep valleys surround the hilly areas (Sinclair, 1989, 240). The region belongs to the ancient border zone between the Graeco-Roman/Byzantine world and Parthia/Persia. There are a number of undocumented and to the scholarly world little known or completely unknown sites that belong to the military defences and cultural borders of the mentioned great empires.

The target area of the Finnish-Swedish project falls in the area of present-day Ömerli (ancient Matzaron). The town of Ömerli is situated ca. 35 km northeast of Mardin. Further down from Mardin are Dara and Nisibis, the Late Roman/Byzantine sites. In some isolated cases over the years, local representatives of antiquities authorities, such as museum personnel, have conducted *ad hoc* documentation of some endangered archaeological sites, but a systematic research and the big picture is still missing (cf. Lewin, 2007; Speidel, 2009, Gregory and Kennedy 1985, 385-386, 393, 402).

It is urgent that unknown sites and monuments would be documented in the region. Hopefully, the protection and conservation plan will be implemented by the Turkish authorities, and the information made available to the scholarly community. Further to the northeast from Mardin and Ömerli, the construction of a Tigris dam has affected the important archaeological site of Hasankeyf, which has been under World Monuments Watch since 2008 (see Arango, 2016, Sinclair, 1989, 230, see www.wmf.org). In this paper we only wish to present preliminary data of remote sensing and field observations. The purpose is also to evaluate the applicability of some satellite data sources used in prospecting and field studies of specific fortified sites from the Late Roman/Byzantine period. The final mapping and publishing will follow when more in-depth studies have been carried out.

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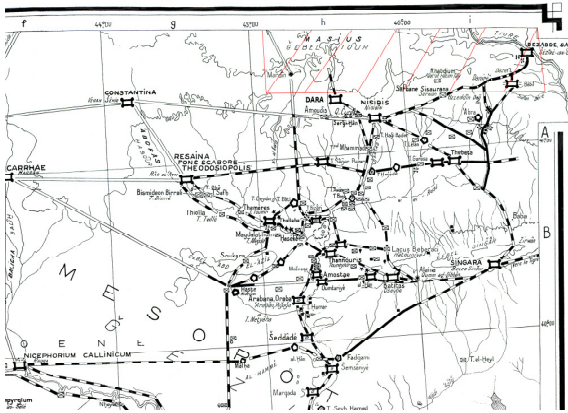


Fig. 1. Poidebard, 1934. Original scale 1:100 000. SE corner of map illustrating the area east of Mardin to the River Tigris. Area of the FSAPM research project is shown in the red rectangular

1.2. History of earlier research

Ancient sources such as Ptolemy's *Geography*, *Tabula Peutingeriana* and *Notitia Dignitatum* list sites and routes in the northern Tigris region, but only few can be identified. However, several monasteries dating already from the 4th century AD have been known in the region of Tūr Abdin (Sinclair, 1989, 240-258). Gertrude Bell documented ancient monuments in the neighbourhood in the turn of the 19th and the 20th century, also by photographing them (see Johnson, 2007). *The archaeological and architectural survey of the Tūr Abdin* by Sinclair has, however, remained one of the few general and basic written works. Apart from Dara and Nisibis, the sites on the Eastern Roman *limes*, i.e. frontier studies in the region have remained, however, scanty.

Pioneers of aerial archaeology such as A. Poidebard and R. Mouterde and Sir A. Stein surveyed large parts of the eastern Roman frontier already in the 1920s-1940s (Poidebard, 1934; Mouterde and Poidebard, 1945; Gregory and Kennedy, 1985). The studied areas concentrated on Syria, Iraq and Jordan, but eastern Turkey was largely omitted. As can be seen from Fig. 1 above, the northern limit for Poidebard's (1934) reconnaissance flights was the edge of the Jezirah at Dara (Turkey). Poidebard did apparently not venture up to the mountainous region beyond Mardin into the Tigris frontier because that was outside the French Mandate. Furthermore, the aerial cartography of the time, however thoroughly it was done, does not actually date the structures of the Roman *limes*, which can only be done by studying the material remains on the ground, such as the layout of the forts and fortresses and the associated finds like pottery. This point was verified during the Finnish Mission in Syria (SYGIS) in 2000-2010 in the surveys of Jebel Bishri in central Syria (Lönnqvist *et alii*, 2011).

Typically, the presentations of the Eastern *limes* of the Late Antiquity include the Euphrates frontier in Syria (Dura Europos), Israel, and Jordan or the Red Sea area, the *Limes Arabicus*, Northern Iraq (Matoušková *et al.*, 2015), and even Africa. The areas in Turkey to the north of Nisibis, Dara and Mardin have been largely portrayed as a blank on older maps. *The Barrington Atlas of the Greek and Roman World* presents some fortified sites, however. Interestingly, from Ammianus's *History* or the *Barrington Atlas* (Barrington, 1938, 1281) we learn that in the mid 4th century AD, there actually were several

Roman strongholds in the area west of the Tigris or the Tūr Abdin, though there is not much information to identify many of these to specific ruins. In recent years, however, The Digital Atlas of the Roman Empire has been able to include some ancient sites situated to the north of Dara (<http://imperium.ahlfeldt.se/places/34746.html>).

Archaeologists G. Çoskunsu and M. Lönnqvist (present Silver) (2014) from the Mardin University have studied ancient quarries inside the city of Mardin dating from the Graeco-Roman/Byzantine period. These sites are evidence of the large building projects that took place in the Tūr Abdin district at the time. Some of the quarries had also been used for habitation. Turkish archaeological teams from the Mardin Museum have also been studying and excavating at the ancient sites of Mardin, Dara and Nisibis in recent years. General works, like B. Isaac's (1990, 254-255) *The Limits of Empire*, deal with historian Ammianus's descriptions of the Roman and Persian conflicts in the region, in the 4th to 6th centuries AD. Recently R. Palermo (2014) has also covered the area of Nisibis in his studies of the Roman Empire. Dara and Nisibis in the 6th century AD was discussed by C. Lillington-Martin, (2007).

1.3. The research area, topography and climate

Finnish-Swedish archaeologists started studying a largely unexplored area and a relatively well-preserved fortified ancient settlement at Keferde in Ömerli in Mardin Province (Fig. 2) for a pilot project in 2015. The area ca. 13 km southeast of Ömerli had been first introduced to the Finns in 2014 by the locals including the mayor of Ömerli. The archaeological project started as a single-site study, but in 2016 it was expanded to include an extended target area due to the extraordinary archaeological finds that started to emerge. Soon the project was expanded to include viewing a larger area from the point of view of remote sensing because it turned out that there were a host of unknown sites in the region. The larger area excluding most of the sites is, for example, depicted in the *Barrington Atlas* (Map 89: Armenia), flanked in the east by the Mount Gaugalion and in the north by Mount Izala (ancient Mount Masius/Mount Kashyari) (Palmer, 1990, xix).

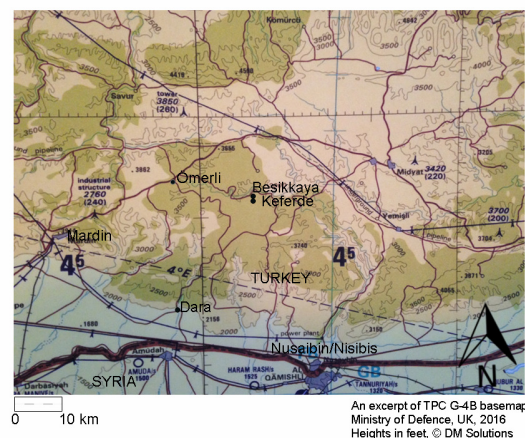


Fig. 2. The area of the FSAPM

Geographically, the sites are located in a high plateau formed of a corridor of valleys and hilltops in a predominantly agricultural district, which is traversed with ancient and modern travel routes and paths (Figs. 2, 3 and 8). Topographically, the settlements are situated in an elevation contour of ca. 1000 m a.s.l. There are two seasons, hot dry summers and cool wet winters with very short transitional periods in between. The

climate is temperate with a mean annual temperature of ca. 15-17° C. Nevertheless, average wind energy in this region is high and gale-force winds frequent, meaning that sand and dust storms occur regularly (Turkish State Meteorological Service, 2016). According to the official climate classification, the area of Mardin is mainly semi-humid. Climatologically, the area lies in a surprisingly fertile landscape, which is still characterized by the cultivation of various crops such as vegetables, fruits, and grapes for the production of local wine. Already in antiquity, in this region agriculture depended primarily on rainfall. However, with an annual precipitation and a total rainfall of up to ca. 800 mm, agriculture is certain. The agricultural potential with emphasis on wine and fruits was also duly noted in Palmer (Palmer, 1990, 5 and 8), and is still valid. Annually, two or three crops are harvested, one every three or four months. However, the area in general is heavily deforested, a phenomenon that goes back to antiquity and the over-grazing and the heavy use of wood for fuel and building material.

1.4. Remote sensing and geospatial data

The FSAPM is reliant on remote sensing by satellite imagery for the identification of the archaeological sites, their mapping and the study of the landscape. The images also provided means to build digital landscape models in 3D. This is partly because of the difficult terrain in the region where sites are not easily accessible. Using satellite images thus has become a preferred choice because of the quickly improved spatial resolution and pricing of commercially available images. GoogleEarth serves basic searching of sites, but its professional use is limited, as we shall in due course explain. The location of the sites as well as their dimensions, measurements and sizes were determined from the purchased orthorectified satellite GeoEye-1 image, which provided coordinates of visible archaeological remains. All that could - could not - be determined from the satellite images, was verified during fieldwork by taking photographs on-site and a visual examination including field notes.

In the course of the work, the project has also compiled a database of sites identified and landscape features in this region. The data has been acquired using three CORONA missions, i.e. firstly the declassified US government satellite photographs, which have before been used in the prospecting of archaeological sites in the Near East (e.g. Kennedy, 1998). The most useful photographs for us came from the Mission 1047 acquired on the 26th of August 1968, and Mission 1104 acquired on the 9th of August 1968. They have been useful for studying the terrain and the changes in the landscape reflecting environmental and human impact. All three missions have been shot in 70 mm Panoramic covering three different approximately E-W orientated flight orbits over the target area. Secondly, purchased satellite images include a recent GeoEye-1 Satellite Sensor Image from April 2010 (Fig. 4). The GeoEye-1 system was launched on September 6th, 2008, to replace the ageing QuickBird satellite images, which we have previously successfully utilized in archaeological limes studies in Syria (Lönnqvist *et al.*, 2011, 275-280). GeoEye has also been used in archaeological remote sensing studies before (e.g. Lin *et al.*, 2011). The purchased image was orthorectified, mosaiced, and colour balanced. The advantage of the GeoEye-1 system is that it is capable of acquiring data with the amazing resolution of 0.46 m in panchromatic (B&W) and 1.84 m resolution in colour (multispectral). The set of images purchased included an 18-Bit and an 8-Bit GeoTiff Panchromatic Multispectral and Raw GeoEye-1 image, covering a square of ca. 5 x 5 km (25 km²) in the Tūr Abdin region. Archaeological sites can be located on the

image within 3 m of their actual physical location on the ground, which is at least the average of handheld GPS devices.

Topographic maps belonging to the series TPC (sheet G-4B, 340, 2014), and an Operational Navigational Chart issued by the Military Survey, Ministry of Defence, UK, were also digitized and used for general mapping purposes. Based on the acquired GeoEye-1 satellite image, georeferenced maps were produced of the sites investigated, including the identification of the structures and materials in their historic environment. Digital landscape models in 3D were created for the sites of Keferde (963 m a.s.l.) and Beşikkaya (995 m a.s.l.) by fusing GeoEye-1 image 2010 data with EU-DEM v.1.0. and STRM as well as ASTER DEM data. This modelling enabled us to understand the terrain with undulating hills, valleys and the potential for visibility and defence (Figs. 3 and 8).

1.5. Targeted field survey

However, the identification of the archaeological sites at Keferde and Beşikkaya did not only rely on satellite imagery. The sites were also visited on several occasions, numerous photographs were taken and notes made of the significant archaeological structures visible on the ground. A systematic field walk covering the research area of the visible archaeological ruins was also made in the summer of 2016 at Keferde to record and photograph major structures on the ground visible from the satellite images. The interpretation and dating of the archaeological artefacts was made from the field documentation and the photographs. Archaeological finds such as diagnostic potsherds and any other significant artefacts or structures etc. were examined and photographed, though no attempt was made to collect any items at this stage of the work.

2. THE PRELIMINARY ARCHAEOLOGICAL DATA OF THE SITES

2.1. The fieldwork in 2016

Two sites were studied in Ömerli: Göllü, Keferde and Beşikkaya, Fafe, Köyü, identified here as ancient Beioubaita. Keferde is obviously carrying an old Aramaic/Syriac site name comparable with Beioubaita. Beşikkaya has been identified with Beioubaita/Beioudades (Barrington, 1938, 1272; Palmer, 1990, 23, 152; Gelzer, 1890, 930H, Sinclair, 1989, 378). Keferde is presently uninhabited. It seems that it was abandoned in antiquity. The habitation of Beşikkaya has, however, continued until modern times. However, before this project started, both sites have basically remained archaeologically unexplored. Not much was known of their history, construction and layout, and very little of their possible dating.

2.2. Keferde

UTM: 4136106-4135462, 418154-419023, 963 m a.s.l.
Size of the site: ca. 650 m (N-S) and 870 m (E-W) or ca 50 ha

The site at Keferde is a fortified town situating on a hill. Especially the southern slope of the hill include visible structures. The layout of the town can be well detected on the GeoEye-1 (Fig. 4) image. Three distinctive features in the layout of the town could be discerned, an acropolis, an upper and a lower town, to be discussed. The area was divided into 25 coordinate squares (100 m x 100 m) and the visible remains were investigated preliminary for main archaeological features by remote sensing and photographing on the ground in 2016.

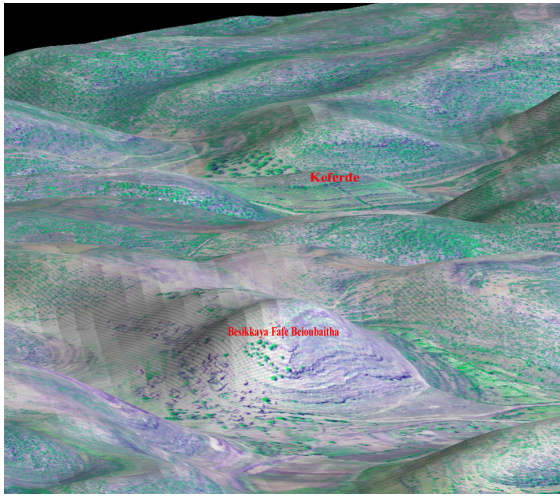


Fig. 3. A landscape model displaying the sites of Keferde (963 m a.s.l.) and Beşikkaya (995 m a.s.l.). View from north to south with Beşikkaya in the front. Created by Markus Törmä using ERDAS ER Mapper 2016.

The satellite image in Fig. 4 reveals a commanding rectangular tower in the east, surrounding walls and rectangular houses. Some of the information such as the measurements of the buildings identified as *Insulae* is of preliminary nature as long as no archaeological excavations have been carried out.

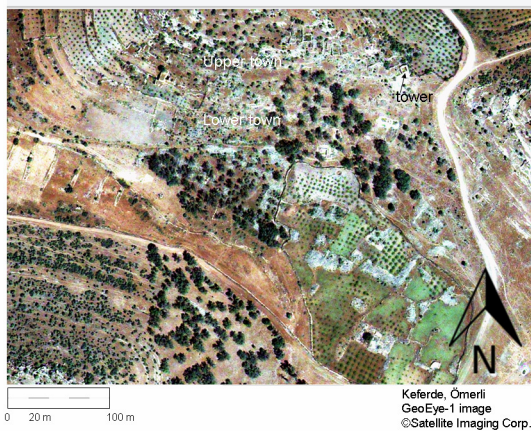


Fig. 4. The layout and structures of Keferde visible on a GeoEye-1 satellite image.

2.3. The Acropolis of Keferde

There are no permanent visible architectural structures on the top of Keferde, apart from one small, carved platform, and underground water cisterns hollowed out in the bedrock in the shape of huge jars. The cisterns are evidence of the importance of water harvesting also within the walls of the ancient town, in a region characterised by dry and hot summers and wet winters.

2.4. The Upper Town of Keferde (Fig. 4.)

Located on the southern slope of the hill is the Upper Town of Keferde, which was surrounded by a masonry wall already in antiquity. Technically, the inhabitable area on the south slope was enlarged by terracing it with several E-W aligned massive

stone walls, which helped to raise and level the ground providing more space for housing. Three such terraced levels were recorded. On the higher Levels 1 and 2, at least five *Insulae* were identified (*Insulae* 1-3, 5-6) on an altitude of ca. 953-960 m a.s.l. Feature 4 was a street that separated the houses (Fig. 5). All *Insulae* on Levels 1 and 2 are geographically aligned on an N-S axis, i.e. the buildings feature two or more rooms built from the north down to the south. On Level 3, the lowest terrace, an additional ten buildings could be seen (*Insulae* 7-8, 10-18) on an altitude of ca. 949-952 m a.s.l., and two or three more in the NW corner of square Ξ , as well as Features 7-18, 27-28. Altogether, the remains of ca. 20 large or medium sized buildings called *Insulae*, structures or open spaces were recorded in the Upper Town. The uniform size ca. 90-110 m², as well as the shape of the buildings and their alignment, suggests they were residential buildings with magnificent views to the south and the entrance of the city.



Fig. 5. The entrance to the Upper Town of Keferde with a tower. View from the south. Photo: Minna Silver 2014.

The most impressive architectural remains were found in the eastern end of the settlement where a large tower and adjacent large buildings once rose to overlook the nearby dirt road (Fig. 6). The square, freestanding military tower (ca. 7.2 x 8.0 m, and 1.55 m thick walls. Preserved height of ca. 4 m) was built of dressed stones on large foundational stones. The size of the tower is common in the Near East (e.g. Decker, 2006). Interestingly, the architectural structure of *Insulae* 7-8 on Level 3 next to the tower was different from *Insulae* 1-6. *Insulae* 7-8 were constructed on an E-W axis one room deep, suggesting perhaps that they served another purpose compared to the smaller *Insulae*. Because of their proximity to the tower depicted in Fig. 6, it may well be that these buildings were annexes or storehouses for the garrison.

Nearly 50 archaeological features were recorded and documented in the Lower Town. No large public spaces were visible, though large architectonic remains in the form of buildings or massive fortification walls were omnipresent. At

least 35 of the archaeological features documented were buildings, usually in blocks of three to six buildings. In some cases, there was a clear space between the buildings indicating streets. However, the general layout in the Lower Town appears to be different from the one in the Upper Town emphasizing there more the E-W axis. The buildings in the Lower Town were also considerably larger. The largest building, *Insula* 13, covered close to 900 m² (24 x 37 m) and had a gate to the east.



Fig. 6. Keferde. Panorama of the watchtower in the east of the settlement. View from the west. Photo: Kenneth Silver 2016.

2.5. The Lower Town of Keferde (Fig. 4.)

The Lower Town of Keferde was built on terraces extending ca. 300-400 m on the E-W axis. This area has suffered the biggest damage from modern agriculture and the clearing of fields from ancient archaeological remains. On the southern slope, traces of buildings can be seen from the GeoEye-1 satellite image on an overall distance of at least 200 m. It seems that the fortified site was entered from the south (Feature 51), where a city gate leading north and up to the Lower Town apparently stood. Also in the Upper Town, clear N-S aligned streets were documented, some gates with lintel stones still intact, suggesting that the site was constructed as a fortress to be entered from south to the north (Fig. 4 above) through gates.

The thickness of the walls up to 1.5 m indicates that some of the buildings most likely were multi-storey. There are no indications as to what the function of the buildings may have been, apart from that they were prominent spaces and thus may have been in communal use. A peculiarity was that the northern wall of some of the buildings ended in the bedrock with rock-cut entrances to the underground galleries or stone quarries. As some tunnel entrances to the underground galleries were decorated from the outside with arches and lined with dressed masonry, they obviously had been integrated in the housing arrangements, suggesting some sort of important secondary use. In the western part of the settlement, in squares M and N, the single largest massive remains of fortifications and walls were found (Fig. 7 below), demonstrating that the defensive systems of the town once covered also the south slope of Keferde. It showed an imposing intact corner of a defence wall constructed partly in the trapezoidal masonry technique and preserved up to the height of ca. 3.2 m with six courses of cold-fitted large dressed ashlar, producing an E-shaped wall structure that opened due south, thus creating a niche, which was overlooked by massive corners in the east and west.



Fig. 7. Keferde, the wall on the southwestern slope with a corner showing trapezoidal masonry technique. View from the W. Photo: Minna Silver 2016.

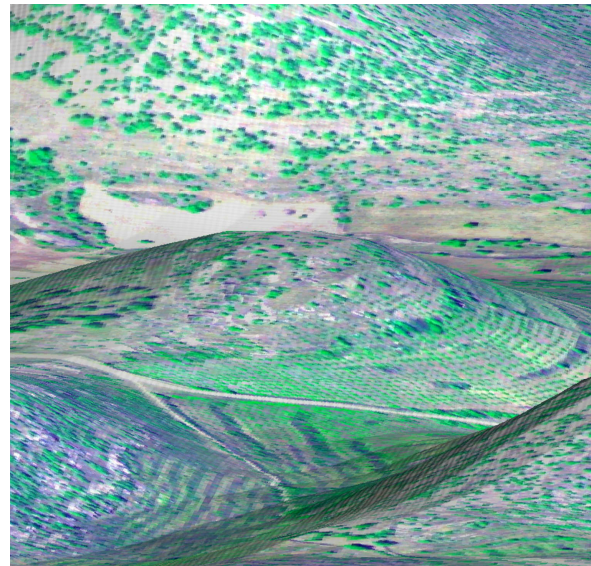


Fig. 8. Keferde, a landscape model view in 3D from SE. The dominance of the hill in the terrain is clearly visible. Technical information as in Fig. 3 above. Created by Markus Törmä.

Altogether, a stretch of more than a 20 m long and one-metre thick (Feature 36) wall remained. It is clear that local bedrock was used for acquiring stones for the houses and defences, producing the well known underground galleries spoken of with one, two or several 'rooms' typical to the Roman and Byzantine period in the Mardin region, and also at these sites.

2.6. Smaller archaeological finds

No larger architectural fragments such as pillars, columns, drums, paved streets or mosaics were seen. However, in the Lower Town three architectural fragments were seen: a small cornish (?), a profiled fragment of a base/capital, and in a modern stone fence a round ca. 50 cm long stone cylinder with a non-penetrating hole. Nevertheless, the area is scattered with a huge amount of dressed stones in addition to fragments of brick.

In 2014, fragments of Roman glass were seen on the ground, but surprisingly few sherds of pottery. In July-August 2016, following that local farmers had ploughed parts of the north hill slope into terraces to plant vineyards, we saw that the entire area had been used as a dump for domestic waste in antiquity. Large amounts of pottery were seen, originating in large storage jars, amphorae, different types of handles, cups, plates etc, some of which had decoration and were profiled. On the southwest slope where vineyards also had been planted, a larger quantity of pottery was seen in 2016. Lesser amounts of finds were seen on the south slope of the Lower Town, consisting of pottery, fragments of brick and glass. Therefore, it seems that the lack of visible finds such as pottery on the ground is partly deceptive as the finds are covered by the topsoil and vegetation. The finds are from the Late Roman and Byzantine period, which agrees very well with the historical information on the site.

Ancient rock-cut galleries covered an area of ca. 300 (N-S) x 100 m (E-W) to the east and west of the hill, some of which may also have served as quarries before being turned into tombs. On the hill south of Keferde in the midst of rock-cut galleries, another peculiarity was documented. In some of the galleries, there were niches in the walls surrounded by symbols painted with red ochre and associated with solar cults. Also, a row of ca. 12 round and fat bellied underground cisterns for the storage of liquids was found in the bedrock sloping to the north. Fragments of an open U-shaped basalt aqueduct were found on the ground, suggesting the underground vats were used for storage of either water or wine unless they were used for dyeing cloths. In conclusion, it seems clear that Keferde was a heavily fortified town, a type of *oppidum* that included a possible garrison inside the town walls. The surface finds indicate that the site was inhabited in the Late Roman and Byzantine period. The rock-cut galleries around the town shows longevity of occupation and a well-developed infrastructure with water harvesting and industries indicating the cultivation of vine.

2.7. Beşikkaya

UTM: 4138478-4137503, 419054-419844, 995 m a.s.l.
Size of the site: ca. 1000 m (N-S) and 800 m (E-W) or ca. 70 ha

A significantly larger Roman-Byzantine fortress with massive walls built of dressed stones was observed at Beşikkaya, ca. 2.3 km northeast of Keferde. Unfortunately, a modern village mostly covers the site making archaeological studies impossible. Visible archaeological remains of the ancient fortress are present on the northwestern and eastern slope. Because of the modern habitation on the site and the extensive damage, it is difficult to outline much else than the general limits of the site, which is urgently in need of protection.

There are six types of remains on the top of hill. The largest one located on the northwestern slope, is an E-W aligned massive Roman-Byzantine curtain wall which may have had square towers (ca. 15 x 15 m) (Fig. 9 below).



Fig. 9. The Roman-Byzantine curtain wall of Beşikkaya, view from SW to NE. Photo: Kenneth Silver 2016.

The 2-3 m thick and several meters high walls have been preserved for ca. 45 m in length. In the west at the edge of the ravine appears to be a large trapezoidal shaped tower ca. 20 x 14 x 15 x 15 m in size (Fig. 10). East of the curtain wall on the same axis is another building (10 x 6 m) or tower (tower tomb?). Thirdly, there is a Byzantine church, presently used as an animal pen. Fourthly, there are walls or buildings also on the eastern slope of the hill on the same axis as the curtain wall. Fifthly, as photographed by the Mardin Museum, there are various ancient rectangular houses built of dressed/undressed stones scattered around the hilltop with walls up to roof-level or including vaulted roofs with mortar. Technically, the Beşikkaya walls show the trapezoidal masonry technique known from the curtain walls in the Roman-Byzantine fortresses (McAllister, 2005, 10), and may be reminiscent of later walls of Roman Amida (present Diyarbakir) with parallel straight wall sections making angles at intervals (Halifeoglu, 2013, 211, Figs. 4-5).

2.8. Smaller archaeological finds

Finally, there are ancient architectural elements reused in modern buildings scattered around the village of Beşikkaya. A lime stone frieze was documented in a modern house above a door depicting a Sassanide-type of a lion chasing an antelope. Another one may be part of a procession with a man. Two separate *stelae*/slabs similar in design show males in profile facing. In addition, Roman pottery was seen on the western slope by the wall, consisting, e.g. of *terra sigillata*. This may indicate that the site was, in fact, pre-Diocletian.



Fig. 10. Beşikkaya, a Roman-Byzantine curtain wall, view from SE to NW with the trapezoidal shaped tower in the background. Photo: Kenneth Silver 2016.

3. THE TIGRIS FRONTIER AND THE EASTERN ROMAN BORDER ZONE

3.1. Discussion

The use of remote sensing methods such as satellite imagery in archaeological work on the Tigris frontier in Mesopotamia in the region of the Tūr Abdin has provided means to trace the location and layouts of hitherto little or unknown ancient fortified sites from the Graeco-Roman/Byzantine period in their landscape. The applicability of CORONA satellite photographs was only for contextual use to understand the terrain, landscape and its changes since the 1960s. GeoEye-1 imagery has been a valuable data source for the archaeological prospection and field studies for the present study from several aspects.

Google Earth can be used for archaeological prospecting and site recording, but it does not provide professionally required inter-operational properties for building real Geographic Information Systems (GIS), carrying out data classification such as cluster analyses and producing tailored landscape models in 3D. Besides GeoEye-1 data provide higher spatial resolution operating also in the UTM coordinate system that is the best system for recording archaeological sites. The images thus have means to produce landscape models in higher resolution. Our intention is to be able to use the Excel-based site and image database in an inter-operational GIS environment in the future.

We assumed from the start that the town of Keferde was not a separate phenomenon. Consequently, we traced with the GeoEye-1 image the larger fortress of Beşikkaya, only 2.3 km northeast of Keferde. The studied sites are unknown to the scientific community from before, though the borders of the sites were determined and some of archaeological stray-finds had been photographed by the staff of the Mardin Museum in 2011. In addition, near Keferde and Beşikkaya we also saw and photographed a third Roman-Byzantine site, a few kilometres west of Beşikkaya, with large columns and capitals in basalt originating without doubt in a Byzantine church. GeoEye-1 also provides a more precise identification of the location of the archaeological sites in the valleys, for studying site layouts and structures. It provides means for further mapping archaeological structures. Also the use for landscape modelling was tested with useful results to gain a view of the connection to the valleys and two sites between each other.

Following in the footsteps of Poidebard (Poidebard, 1934), it can be assumed that there was an extension of the Diocletian *limes* from Circesium along the Khabur in Syria to Singara in northern Iraq and to Nisibis on the border of Syria and Turkey. As indicated on Poidebard's map, he assumed that there was an extension of the *limes* from Syria that continued north across the Mardin mountains rising above Nisibis and Dara on the Mesopotamian plains. However, Poidebard never surveyed the mountains in Mardin and above because it fell outside the French Mandate. Since then nobody else have attempted this either. Thus, the date and precise arrangement of the Roman defence system in eastern Turkey is only now emerging and is groundbreaking in importance.

The archaeological remote sensing and field documentation of Keferde and Beşikkaya/Beioubaita, allows the sites to be put into a broader regional and chronological context. According to the surveys conducted, the sites were occupied in the Late Roman/Byzantine periods, which is confirmed by the dating of the surface pottery. This also agrees very well with the

historical information. Unfortunately, evidence of Hellenistic occupation remained inconclusive in the surface survey in 2016. The documented remains of town walls and the foundations of massive towers, is evidence of that there were external threats and an active need for defence. The towers were military watchtowers and an important part of the defence of the fortified cities. A watchtower meant usually that there was visibility (Figs. 3 and 8), which was essential in signalling and transmitting messages to the next fort or fortress, meaning that e.g. Keferde was only one in a chain of many Roman sites.

This situation prevailed probably until the 8th century AD when sources say that the mountains of Dara, the Tūr Abdin and Mardin were once Roman, whereas the rest lay in Persian hands (Palmer, 1990, 7). According to Palmer, Beioubaita was right on the Julian frontier already in 360s AD (Palmer, 1990, xx-xxi, Fig 1). He was also convinced that Beioubaita was a Roman fort, although it appeared by name for the first time in early Byzantine sources. Our survey and the dating of the pottery suggests that Palmer may have been right. In other words, the border of the Roman Empire that crossed the central Tūr Abdin area, was *de facto* the 'international border' east to Parthia/Persia, partly explaining the rich culture that we later encounter at Tūr Abdin because it was in the confluence of four great civilisations. Tūr Abdin was actually the bulwark of the Roman Empire eastwards, with Amida/Ad Tygrem/Diyarbakir as the back bone in the north (Palmer, 1990, 4-5) and Beşikkaya, and probably Mardin in the south.

Therefore, the region of Tūr Abdin was like a "no-man's-land" under dispute between various parties, changing frequently hands over the centuries. This is well illustrated by the Persian Wars in the late 6th century AD (Palmer, 1990, 23). According to the historian Theophylact Simocatta, the inhabitants of Tūr Abdin were fervent supporters of the Romans in the war with Persia in AD 572-591 (Palmer, 1990, 152). However, Beioubaita fell into the hands of the Persians prior to AD 587 or in AD 604-606, based on the History of Theophylact Simocatta. Our prospection and studies of 2015-2016 confirm archaeologically that the area of Tūr Abdin belonged to the Tigris frontier of the Roman Empire in the late Roman and early Byzantine period. It may well have been part of Emperor Diocletian attempts to extend the Roman influence to the Tigris, and to create a new military line of defence here. This study in the Tūr Abdin valley demonstrates that there are to the scientific community hitherto largely unknown Roman and Byzantine forts, fortresses and settlements in the Ömerli area. It seems preliminarily possible to suggest that they may have formed one or more parallel N-S aligned defence lines to which Keferde and Beşikkaya/Beioubaita belonged, similar to the ones recorded in Syria (cf. Lönnqvist *et alii*, 2011). One of the goals of FSAPM in the future is further to update the information regarding the discovered new Roman *limes* sites in the Tūr Abdin valley, which will increase our understanding of how the Roman eastern defence was organised.

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