

A Series of Photogrammetry for Protection of Syrian Cultural Heritage

Ancient Villages of Northern Syria Vol. 4

# Kirkbizeh

Akira Tsuneki  
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## Acknowledgements

All photographs used in this publication were taken by our colleagues, the members of Idlib Antiquity Center in Idlib. Without their effort, our project was never completed. We deeply thank them who carried out photography for our project regardless of serious danger in the great difficulty under the civil war.

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A Series of Photogrammetry for Protection of Syrian Cultural Heritage  
Ancient Villages of Northern Syria Vol.4, Kirkbizeh

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# Digital Data Records of the World Heritage Site, *Ancient Villages of Northern Syria*, in the Idlib District

Akira Tsuneki (University of Tsukuba)

There are six world heritage sites (they have all now been appointed as world heritage in danger) in Syria. The site entitled *Ancient Villages of Northern Syria* in the Idlib district has most recently been enrolled as a world heritage site. These archaeological locations run from the first to the seventh century AD, or from the time of the Roman Empire to the Byzantine era. There are more than 700 villages within this site, which was very prosperous in the limestone mountains of northwest Syria; information from this area can provide extremely valuable data for studies regarding the opening of the initial church and the development of the olive oil industry. In this project, we focus on the initial churches in particular, and recording them using digital data. We executed 3D documentation of the initial churches at the sites of Qalb Lozeh, Al-Bara, and Serjilla. It is vital for academic purposes to record the information from these churches using the latest techniques, and these data can be used in the reconstruction of these important initial churches if they were to be damaged.



The locations of Qalb Lozeh, Kirkbizeh, Al-Bara, and Serjilla (based on Abdulkarim and Charpentier 2016).

However, recording these important cultural heritages by ourselves is difficult, because the area is unfortunately currently in conflict. Therefore, we asked our young colleagues in Idlib, the group called Idlib Antiquity Center, to take a large quantity of digital photographs and videos, which we used to make 3D images of the initial churches in the area. The staff of the Idlib Antiquity Center repeatedly traveled to the churches in spite of such severe situations, took high quality photographs, and then sent these digital data to us via the Internet. The assistance of Idlib Antiquity Center helped make it possible to accomplish this operation. Dr. Sari Jammo, who studied archaeology at the University of Tsukuba and is now a research fellow of JSPS at the University of Tokyo, initiated communication with the Idlib Antiquity Center regarding detailed photography shooting methods for the reconstruction of 3D images. Dr. Nobuya Watanabe, Associate Professor at Chubu University, is a specialist for GIS studies and kindly contributed to the creation of high quality 3D images of the initial churches based on a large quantity of images that had been sent by the Idlib Antiquity Center. Dr. Watanabe pointed out when there was a lack of photographs needed to develop the 3D images, and the staff of the Idlib Antiquity Center repeatedly returned to the initial churches to capture missing images. Both of the two sides were required to devotedly put forth much work. Please see the descriptions of Dr. Sari Jammo and Dr. Nobuya Watanabe in the following sections for an

understanding of how they managed these performances. Here, I will refer to the ancient villages of Northern Syria and their initial churches.

### **Ancient Villages of Northern Syria**

A large limestone mountainous zone spreads out between the Idlib and Aleppo Districts in northwestern Syria. Many people began to settle in this limestone mountainous zone for olive oil production starting from about AD, and a large olive plantation was constructed. Monocultural villages that were specialized in olive oil production were quite prosperous on the limestone mountains. The olive oil produced on these plantations was conducted in various locations throughout the Roman Empire, and this industry became one of the



Limestone mountains with olive plantation near modern Idlib city  
(Photograph taken by AT).

frameworks of the Roman Empire economy and satisfied the empire. The prosperity in the limestone mountains continued into the subsequent Byzantine Era, and the villages gradually declined for several centuries after the Islamic power flocked into this region in the seventh century. Therefore, we can observe many olive oil presses throughout many archaeological sites in this mountainous limestone zone. In addition, Christian persecution by the Roman Empire until the reception and country's enlightenment accumulated from the first century to the seventh century, and this mountainous limestone zone witnessed such changes through history.

### **Initial Churches in Syria**

The churches began as places where the believers pray to God and Jesus Christ with friends who share in their faith, while believers were afraid of persecution from Rome posthumously of Christ. This place was called *ekklesiai* (meeting ground) and came to be called *kyriakon* (house belonging to Adonoy) in Greek by the fourth century. It is said that *cirice* (Old English) and *kirche* (German), which are etymological roots of "church," come from the word *ecclesia* and *kyriakon*. However, it is difficult to divide places for worship from general buildings of the Roman Empire period. It is said that a definite church where believers gathered and expressed faith to God and Christ appeared in the middle of the third century. For example, such an initial church was excavated from the site of Dura Europos, which was a trade center located on the west bank of Euphrates in eastern Syria. It was a small building, distinguished as a church by the presence of a baptism room with a fresco of the Christ tradition drawn on its wall, but the room is morphologically similar to a general Roman building in the third century. Therefore, we may refer to such building as "house churches"

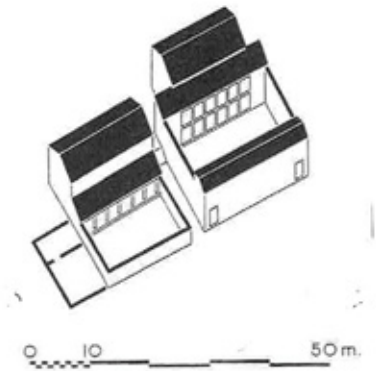
Until the end of the third century, with the increase in Christian populations, there was an increase in the size of the places of prayer in the church. The style of such “church” was a compromise model between large public facilities in the Roman period, *basilica* style (basilica), and general house style (*domus ecclesiae*). One of such initial style church in the beginning of 4<sup>th</sup> century was excavated at one of the settlements in the *Ancient Villages of Northern Syria*, Kirkbizeh. Therefore, we chose this Kirkbizeh initial church as a target for imaging the 3D model in this season. I touch the back once again. The churches came to be gradually discovered in the ancient villages in a clear form after Christianity was recognized officially for AD 313 by the Constantine Emperor. The churches between the fourth and sixth centuries made up the early church architecture group. Some early stage churches of the Roman style were discovered in the temple group in several villages in the *Ancient Villages of Northern Syria*. The



3<sup>rd</sup> century house-church at Dura Europos

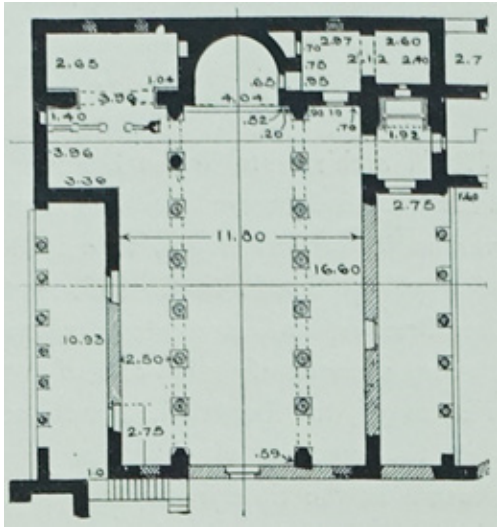


Baptism room with an illustrated fresco (Yale University Art Gallery).



Kirkbizeh church (4<sup>th</sup> Century) Tchalenko 1953 Pl. CIII

church of this time mainly adopted the basilica style with a large-scale rectangular plan, which is found in public buildings of the Roman Empire. It is thought that one of the oldest churches was made in the style of the church of Serjilla; we created a 3D model of this church in a previous project. It is said that this church dates around the mid-fourth century. The *apse* (reserve force) remains only at half of the height, but a concubine is established on both sides of the apse, and it shows the style of the old basilica remains. A nave spreads out toward the apse from the entrance, and an aisle is established across a colonnade on both sides. The colonnade might have an arched structure in a quadratic prism rather than being a column. The outward opening-type passage of the aisle seemed to be attached.



Plan of the 4<sup>th</sup> Century church at Serjilla (Butler 1920. III.22)



3D image of the 4<sup>th</sup> Century church at Serjilla

A representative of fifth-century churches seen in the *Ancient Villages of Northern Syria* is the Qalb Lozeh church. Qalb Lozeh means "the heart of the almond" in Arabic, and it is one of the best preserved churches, with impressions left from the time of construction. The apse completely remains, up to the ceiling, and arches built over the colonnade of the quadratic prism connecting a nave and the aisle also remains, showing the model of the Syrian basilica church. In the entrance, an eardrum was built over head and two towers attached to both sides are characteristic of this type of church; a loggia (open corridor) seemed to be established. The tower might be a bell tower. The style, with an eardrum and a twin tower in the basilica of this Qalb Lozeh Church, influenced old Western churches, and some researchers believe that one part influenced the French Notre Dame Church in Medieval Europe, which recently collapsed due to a fire.



5<sup>th</sup> Century church at Qalb Lozeh (photographs by UAV)

Over the fifth to sixth centuries, many churches were built in the *Ancient Villages of Northern Syria*. Most are in the basilica style, like the Qalb Lozeh Church; the most well-known of these is the famous St. Simeon Church dedicated to Saint Simeon with a pillar. However, unfortunately, most have suffered greatly from a civil war. For example, the Hosn (horse) Church of the settlement of Al-Bara in Jabal Zawiye, one of the limestone mountains, has almost been destroyed for the reconstruction of local inhabitant houses. At least five churches were built in large vestiges of a colony at Al-Bara, which was an olive distribution center in the 5th and 6th centuries; however, to date, most have been hit by extinction or intense destruction. We chose one of the churches, Church No. 4 (from the sixth century) at Al-Bara for 3D modeling, which is relatively well maintained. It is the smallest church in the village, but this church depicts the characteristics of churches of the basilica style of Syria well in the Al-Bara village.



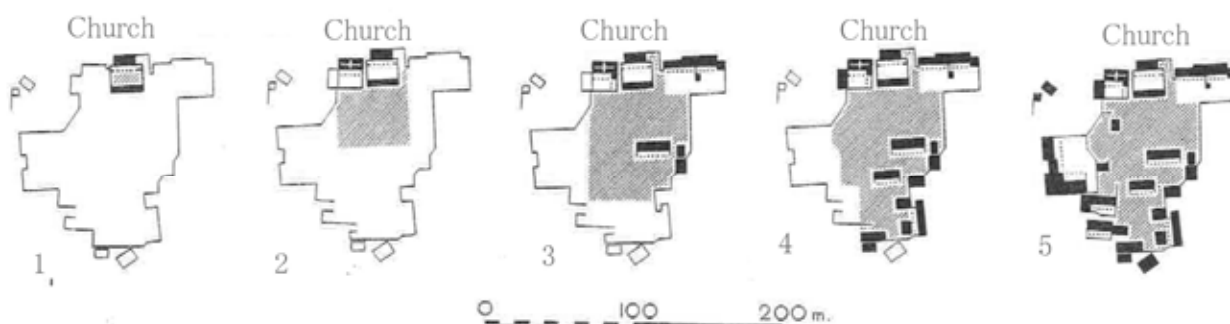
3D image of no. 4 church al-Bara

The *Ancient Villages of Northern Syria* have an irreplaceable value for the study of the development of the initial church and the olive oil industry in the Roman - Byzantine era. We continue to make a small contribution, working to mitigate the destruction of archaeological sites by creating 3D models for the future.



**Kirkbizeh (36° 10' 19.45" N, 36° 35' 04.67" E, elev. 642m)**

Kirkbizeh is a small ancient village near Qalb Lozeh on Jabal al-Ala. It is located approximately 0.8k m northeast of Qalb Lozeh. According to Tchalenko, a church complex of Kirkbizeh was on the northern edge of a small village. It is a large rectangular building with courtyards. It can be understood that this is a church complex because of the existence of an altar and a fountain. As the building style is an ordinary large Roman rectangular house without an apse, it could be called a house-church. However, the size and style are larger than an ordinary house, and we can understand that it was one step in the development from house-churches to basilica churches. Tchalenko asserted that this church complex was developed from the end of 3<sup>rd</sup> century to the beginning of 4<sup>th</sup> century and continued to be used until the 6<sup>th</sup> century.



Kirkbizeh village from 3<sup>rd</sup> to 6<sup>th</sup> century. Church is always on the northern edge. (Tchalenko 1953, Pl CII)



Plan of Kirkbizeh church (6<sup>th</sup> century) (ibid. Pl CIII)

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# Kirkbizeh

## Documentation Steps and Current Condition

Sari Jammo (University of Tokyo)

### 1. Abstract

The Ancient Villages of Northern Syria are a cluster of 40 villages in 8 sites located in northwestern Syria. Churches, villas, temples, residential houses, cisterns, and bathhouses represent archeological ruins that mark the cultural landscape in this region. These Ancient Villages provide insights into the lifestyles and cultural diversity from the 1st through 7th centuries in Syria. UNESCO has deemed The Ancient Villages of Northern Syria a World Heritage Site in 2011 and inscribed in the World Heritage in Danger list in 2013. For years, and due to the ongoing war, the Ancient Villages of Northern Syria have been subjected to different endangering factors, including warfare, looting, and destruction. Due to these circumstances, we have chosen to carry out our documentation projects for the past three years in Qalb Lozeh Church,<sup>1</sup> al-Bara Ancient city,<sup>2</sup> and Serjilla.<sup>3</sup> Because of its significance, we selected Kirkbizeh for 3D modeling, especially the house-church.

Kirkbizeh is a Byzantine settlement located to the northwest of Idlib city on a northern foothill of al-‘Ala mountain (Fig. 1). The site is well preserved, sits between the ridges of al- ‘Ala mountain, and overlooks the open plains in the region. It is approximately 800m from Qalb Lozeh, the famous 5th-century Byzantine church. The settlement consists of different types of buildings, but mostly houses dating from the 3rd to the 6th century (Fig. 2). Archaeologist suggest that these houses were built before the construction of the Qalb Lozeh Church. Archaeological evidence indicates the use of a house to meet and practice Christian ceremonies.



Figure 1 A view of the plains from Kirkbizeh



Figure 2 Aerial view of Kirkbizeh

## 2. Building Description

The settlement at Kirkbizeh has several different types of buildings that include residential houses, villas, and residential homes that had been converted into churches (Fig. 3), and thus, the church was selected for 3D documentation. The house-church was adjacent to a residential villa, separated by a corridor. The door on the eastern side opened onto the corridor and led into the southern courtyard (Fig. 4).



Figure 3 The house and adjoining church



Figure 4 The eastern side's access door



Figure 5 The Church's altar

The eastern and northern sides of the southern courtyard were surrounded by a series of columns that were arranged at regular intervals. Unlike typical churches, the congregation hall (southern courtyard) was separated from the altar hall arcade by a wall with two access doors to the altar's hall (Fig. 5). In general, the south courtyard consists of a fountain, two southern doors, iconostasis, and altar.<sup>4</sup>

### 3. Assessment of Damages and Current Conditions of Kirkbizeh

Several archeological sites have been subjected to various levels of destruction and vandalism. Damage has been reported in most of the Ancient Villages of Northern Syrian sites. However, the sites located in the 'Ala and Barisha mountains reported fewer damages compared to that in the Saiman and Zawiye mountains. Illegal excavations at the el-Bara and Serjilla sites and the theft of stone that people carve into blocks and sell to the local residents such as Behio has caused a great deal of damage.

In general, the current level of preservation at Kirkbizeh is good. However, we can find areas of moderate to severe damage. Based on our survey and discussions with local witnesses, the site was used for a period as a military base and training camp for a militant group, and damage was observed on the house-church walls. Furthermore, illegal excavation was reported in five places (Fig. 6). Most of the buildings were intact and did not show evidence of evidence of collapse or that stones had been recycled. It is likely that the use of the site as a training camp discouraged people from approaching, and thus, the site remained undamaged for a period of time. However, we did document ten digging pits in five places near the walls of the buildings or in open areas between buildings (Fig. 6, red color). It is not clear when the illicit digging occurred, but all of the buildings were in good condition. Although some digging pits were small (1 × 1 m), the others were bigger though not deep enough to cause severe damage.

At the end of the road that leads to the western side of the site, the local farmers built a new concrete water container. This was probably used to irrigate the lands surrounding the site (Fig. 6, green color).



Figure 6 Damage assessment at Kirkbizeh

Red color: Illegal digging pits; Green color: a new water tank; Blue color: traces of munitions fire.

We documented severe damage to the site on the external walls of the house-church building and the adjoining villa. As mentioned earlier, the site was used as a training camp, and there are traces of munitions fire on the walls (Fig. 7). The adjoining villa's southern wall shows evidence of shooting, but the damage is less severe than that of the house-church.



Figure 7 Traces of munitions fire on the south-side walls of the southern courtyard and altar's hall

The north-side wall of the house-church shows traces of shooting targets drawn in red on the wall (Fig. 8). It seems that each shooter shot at the same target in this process, and thus. traces of munitions fire can be seen on the wall.



Figure 8 Traces of munitions fire on the house-church's north-side wall

#### 4. Photogrammetric process

The house-church at Kirkbizeh was relatively short, which allows us to take photos freely from all sides and directions. The tools, as usual, were simple and limited to a camera, handmade pole, and rental drone. We took most of the photos with the handheld camera and the camera pole. These tools were sufficient to reach the top of the walls but not to take photos from above, which we did with the drone. We accomplished the work and overlapped the photos horizontally and vertically, utilizing all the written instructions in the Photogrammetry for Cultural Heritage brochure.<sup>5</sup> A civil organization group collected approximately 5,800 ground and aerial (UAV) photographs, and these were sufficient to successfully process a 3D model of Kirkbizeh.

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**Photo annex**



General view from the east



The house-church and adjoining villa from the southwest direction



Northeast part of the site



The house-church and adjoining villa from the south





A view from the northeastern direction



A view from the southeastern direction



Traces of shooting on the courtyard walls



The southern courtyard from the east



# 3D Documentation of Kirkbizeh

Nobuya Watanabe (Chubu University)

## 1. The 3D model

We processed the 3D model of Kirkbizeh based on approximately 5,800 photographs. Local cooperators collected photographs with a handheld camera and from the UAV (drone). 3D models generated from each set of photographs (i.e., photographs from handheld and UAV) were combined into a single 3D model to complement their blind angles. The UAV was especially useful because it enabled us to capture images of the top side of the high walls, which are often difficult to obtain using hand-held photography. The processing of the 3D model turned out to be mostly successful.

### 1.1. View from the north

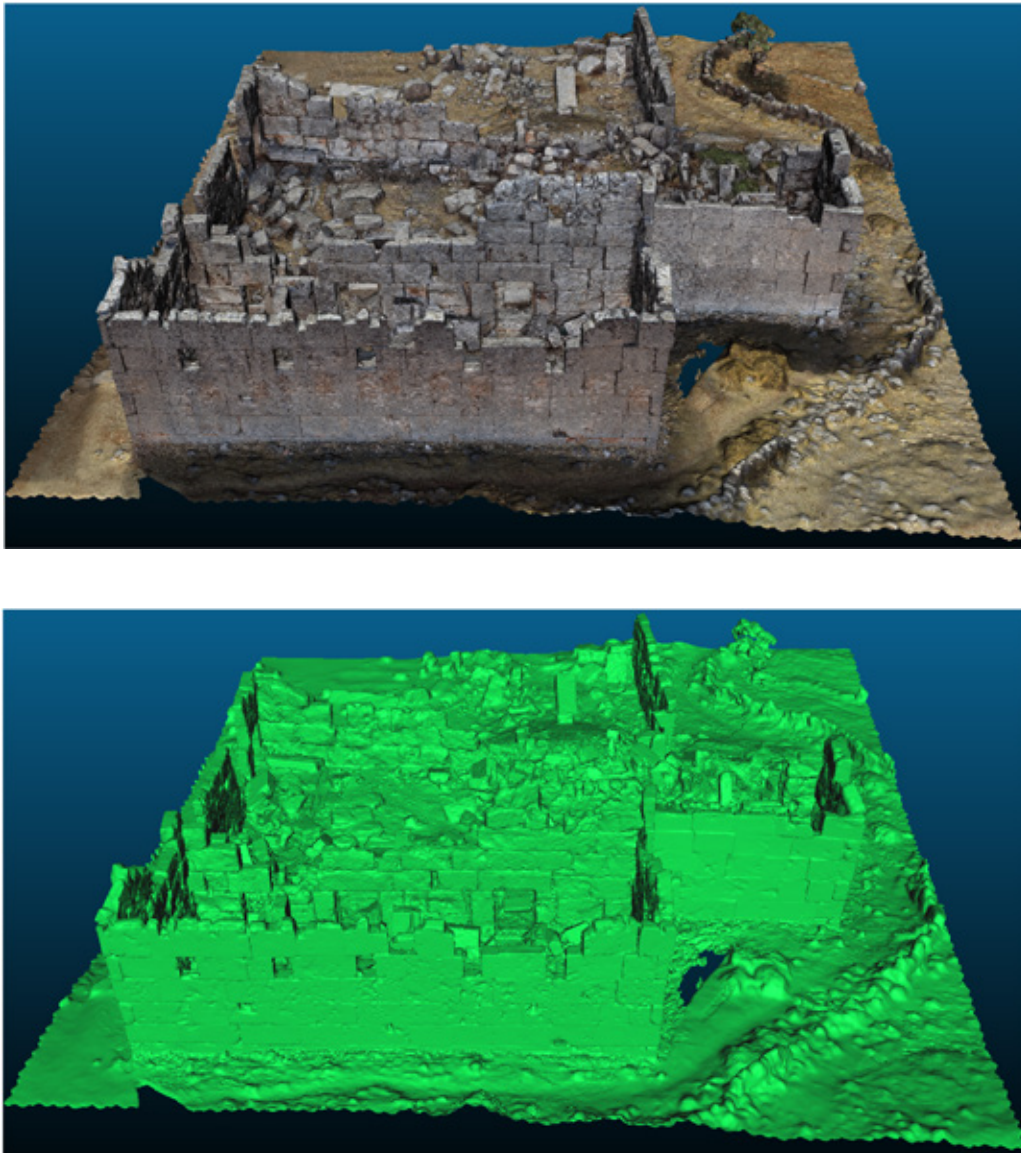


Fig. 1 Upper: Textured 3D model from the north side.  
Lower: Shaded 3D model from the same viewpoint.

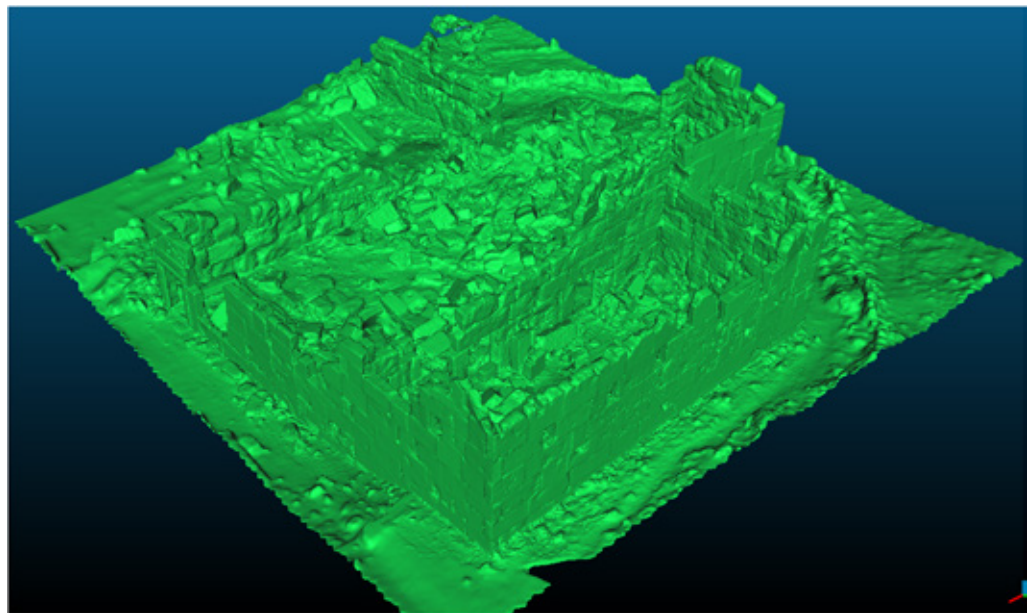
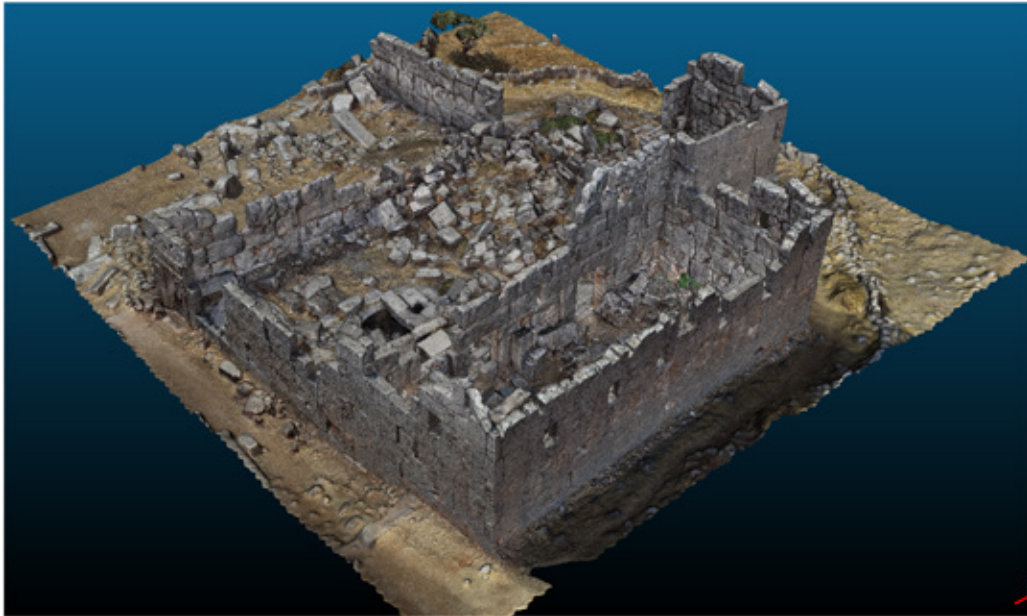


Fig. 2 Upper: Textured 3D model from the northeast side.  
Lower: Shaded 3D model from the same viewpoint.

## 1.2. View from the south

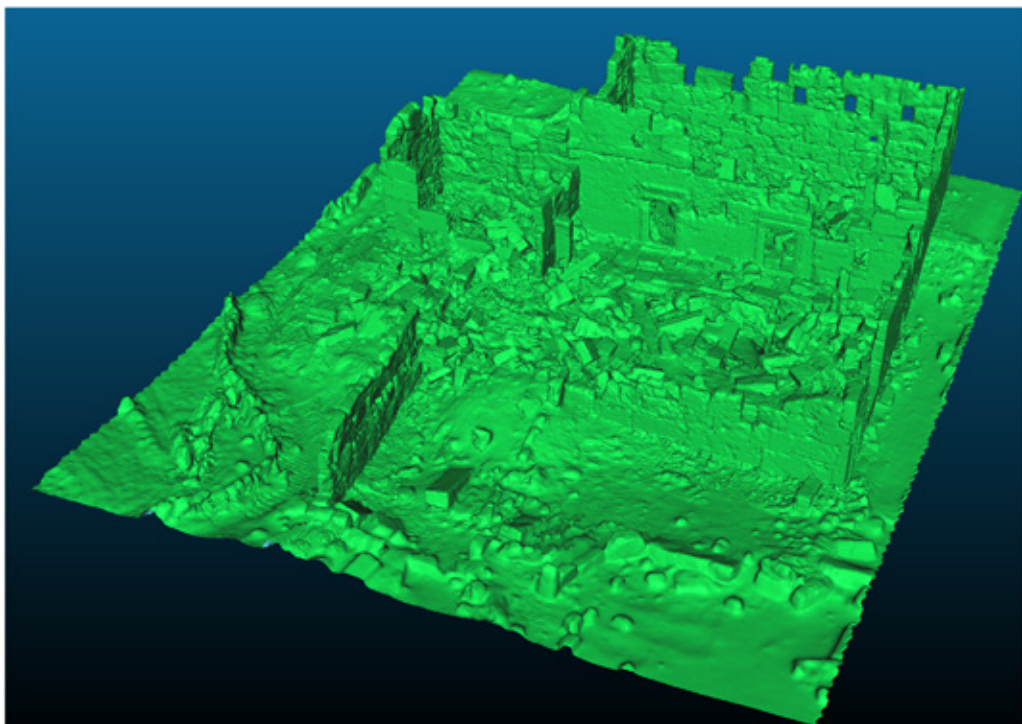
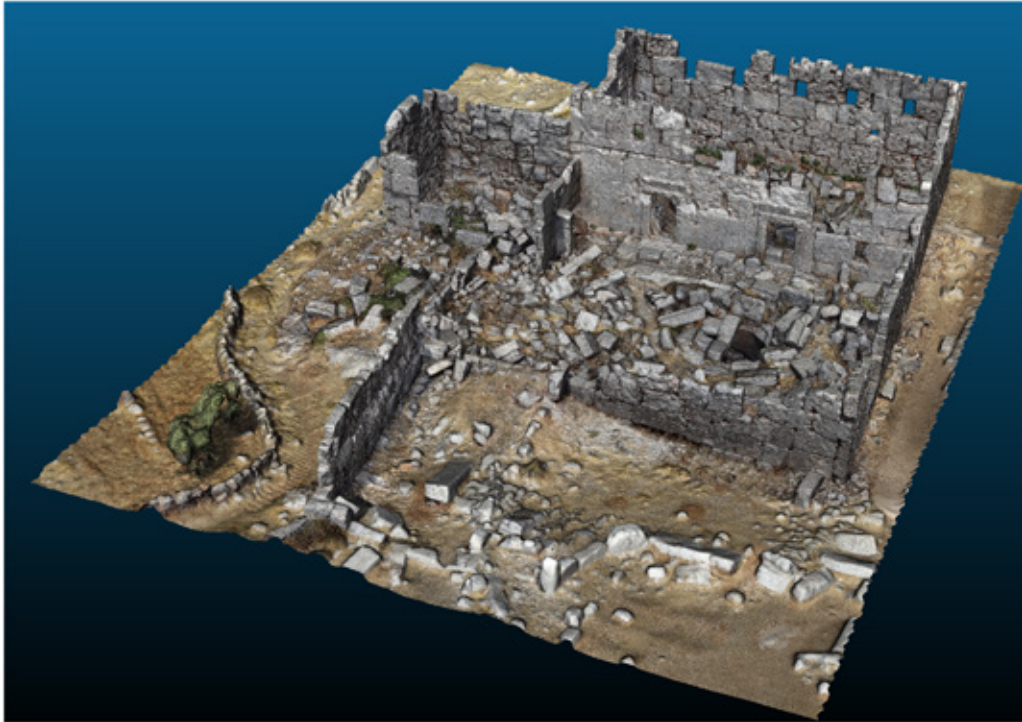


Fig. 3 Upper: Textured 3D model from the southeast side.  
Lower: Shaded 3D model from the same viewpoint.

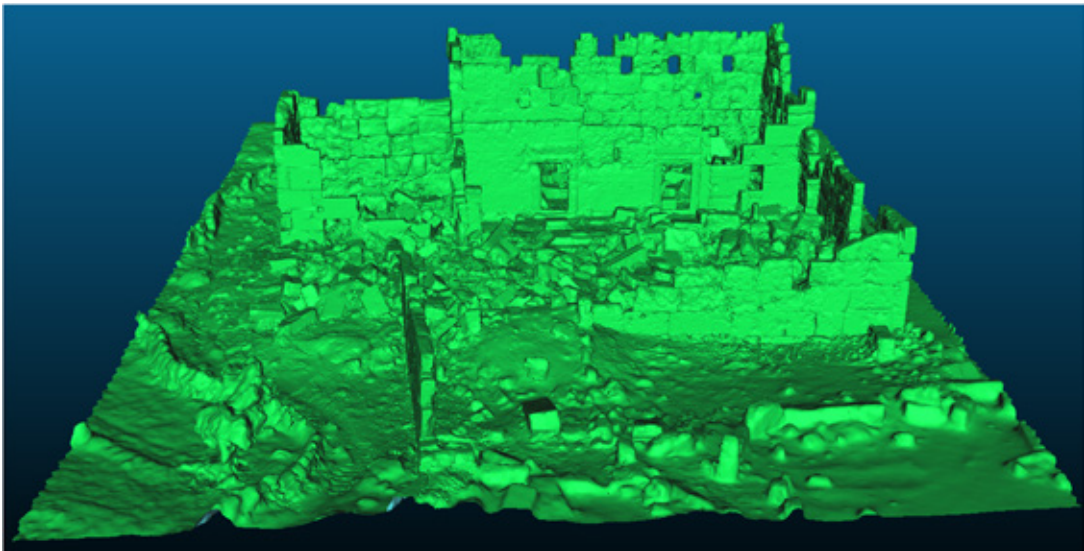


Fig. 4 Upper: Textured 3D model from the south side.  
Lower: Shaded 3D model from the same viewpoint.

### 1.3. View from the east

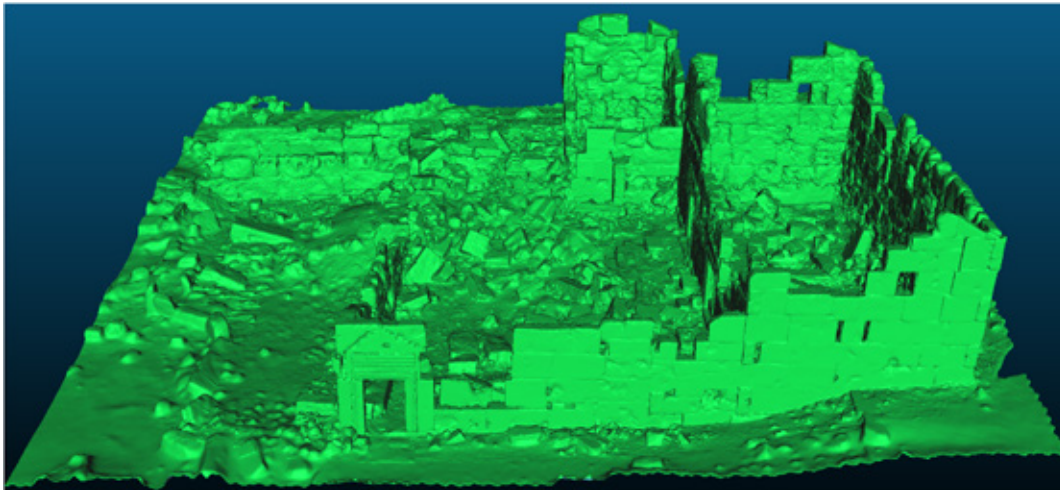


Fig. 5 Upper: Textured 3D model from the east side.  
Lower: Shaded 3D model from the same viewpoint.



#### 1.4. View from the west

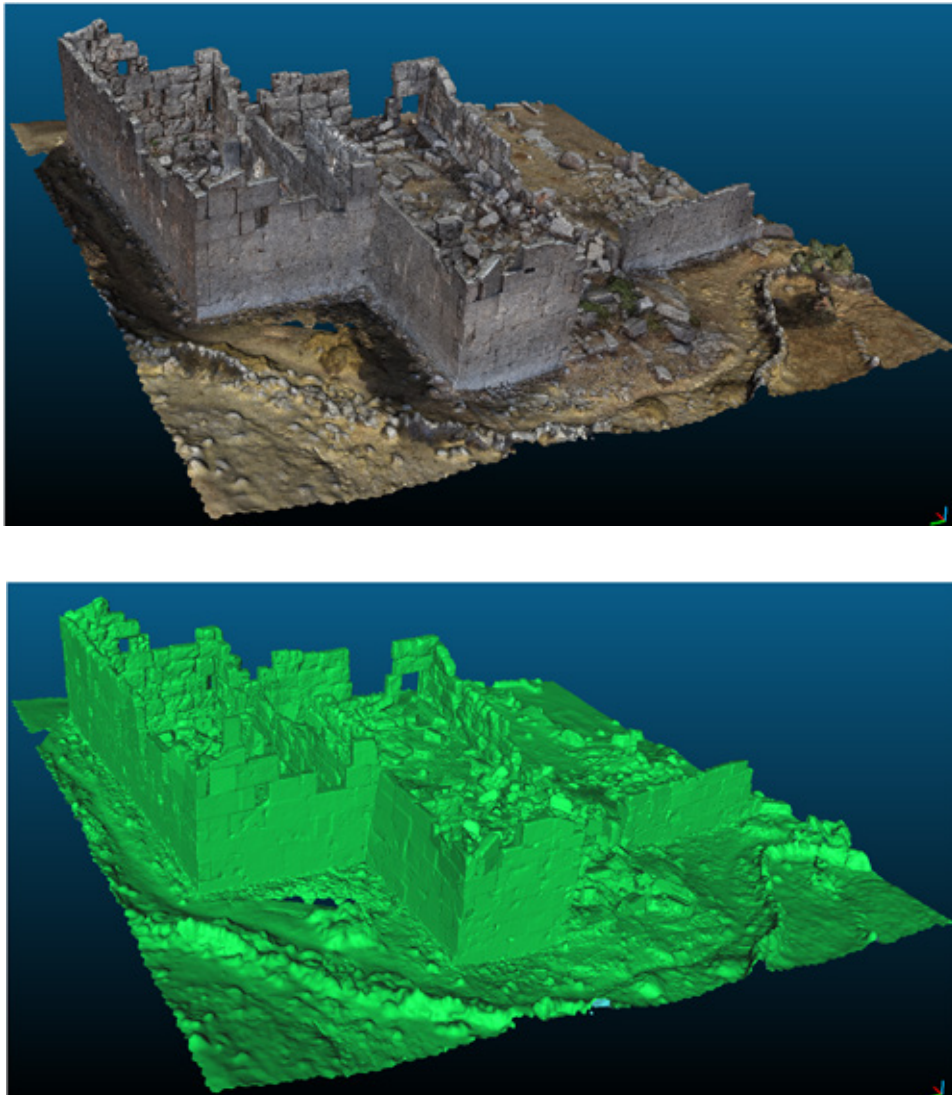


Fig. 6 Upper: Textured 3D model from the northwest side.  
Lower: Shaded 3D model from the same viewpoint.

### 2. GIS data (Geocoded orthophoto data)

The absolute coordinates were given to the 3D model based on the values from the internal GPS of the UAV, whose accuracy is lower than that of kinematic GPS. Thus, the data can be dislocated several meters from the actual location (perhaps  $\pm 5\text{--}7\text{m}$ ). Several meter differences were observed when overlaid with online-satellite maps.<sup>1</sup>

### 3. Orthophotographs and plan drawing

Further, our team prepared orthophotographs and plans for documentation. Plans were made by digitally tracing the orthophotographs.

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<sup>1</sup> However, satellite ortho image may also contain several meter errors, depending on their methods and the quality of geometric correction. For example, Kirkbizeh in Google and Bing satellite maps will not be overlaid perfectly.

### 3.1. Top orthophotograph and plan

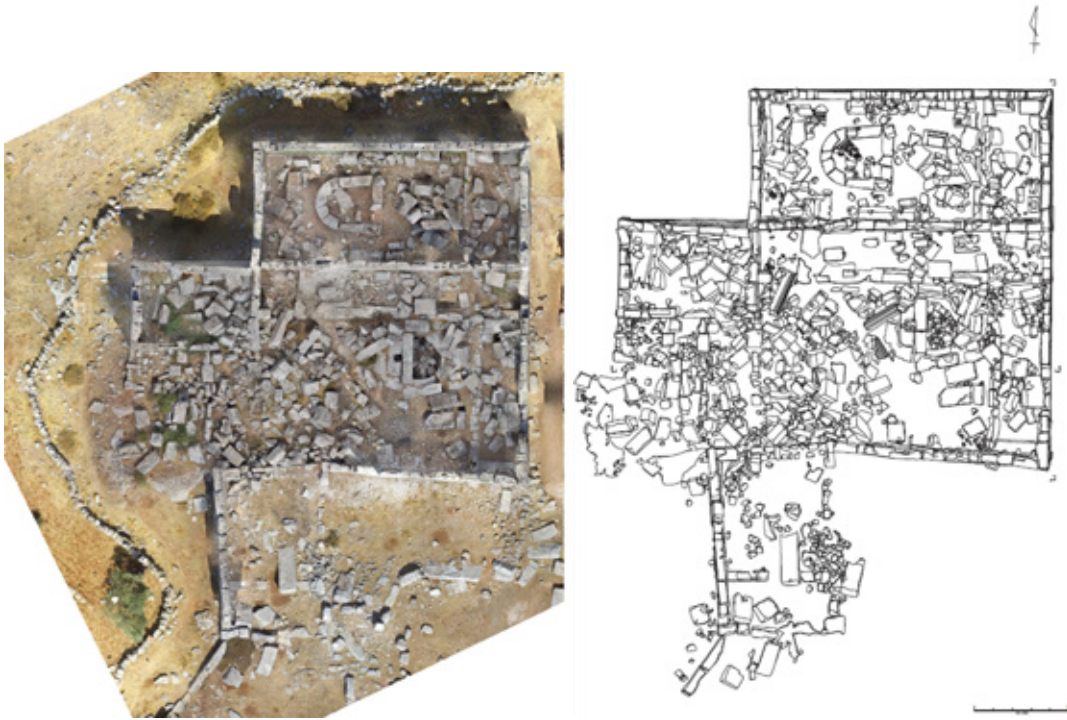


Fig. 7 Left: Orthophotograph from top view.  
Right: Top plan from the orthophotograph

### 3.2. Front orthophotograph and plan

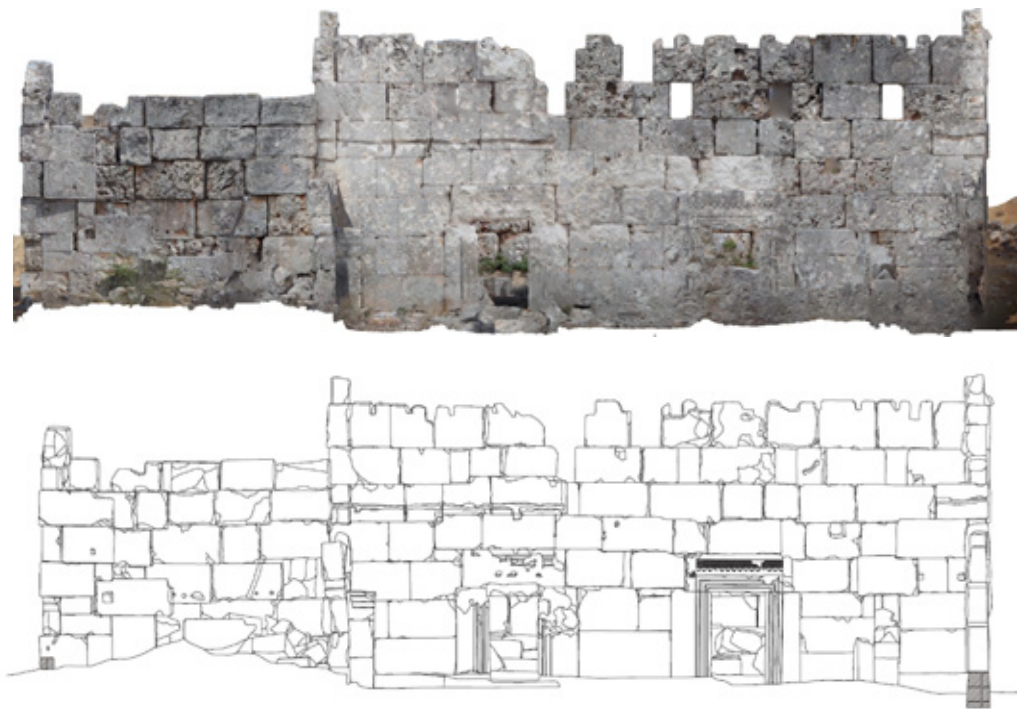


Fig. Upper: Orthophotograph from top view.  
Lower: Top plan from the orthophotograph

### 3.3. Elevation orthophotograph and plan



Fig. 8 Upper: Orthophotograph from top view.  
Lower: Top plan from the orthophotograph

## 4. Movies, VR, and AR contents

### 4.1. 360°3D Movie (for PC and HMD)

This 360° 3D movie (mp4 format) is compatible with both PCs (only 360° is available) and HMD (360° degrees and 3D).

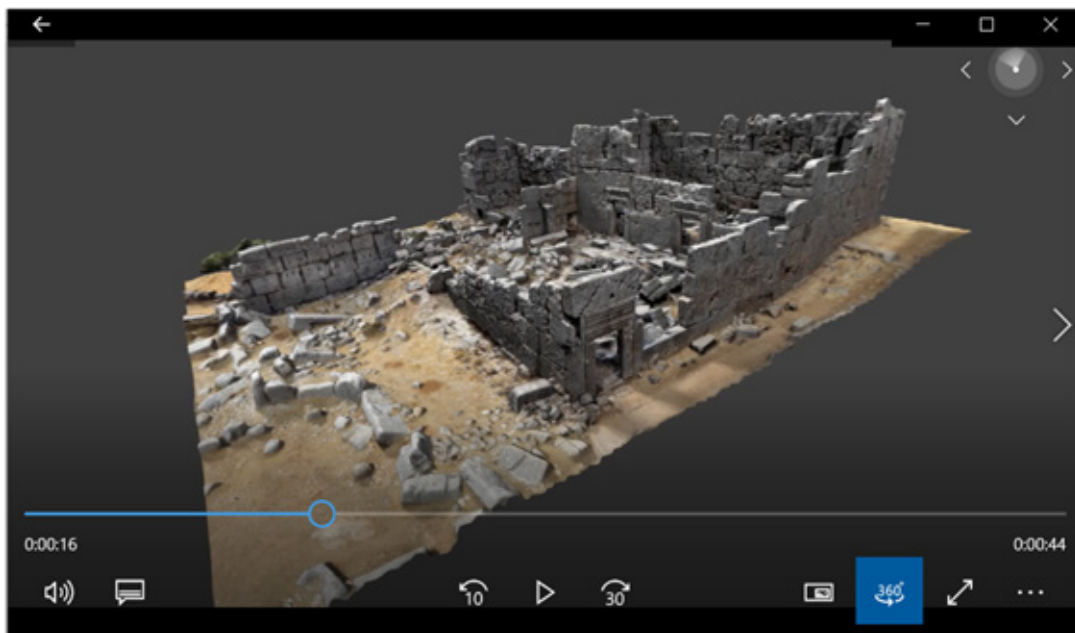


Fig. 9

#### 4.2. Virtual tours for HMD / PC

Our software, called “Virtual tour of Kirkbizeh,” enables people to “walk” around and observe locations within the 3D model. A 3D tour is available when using HMD.

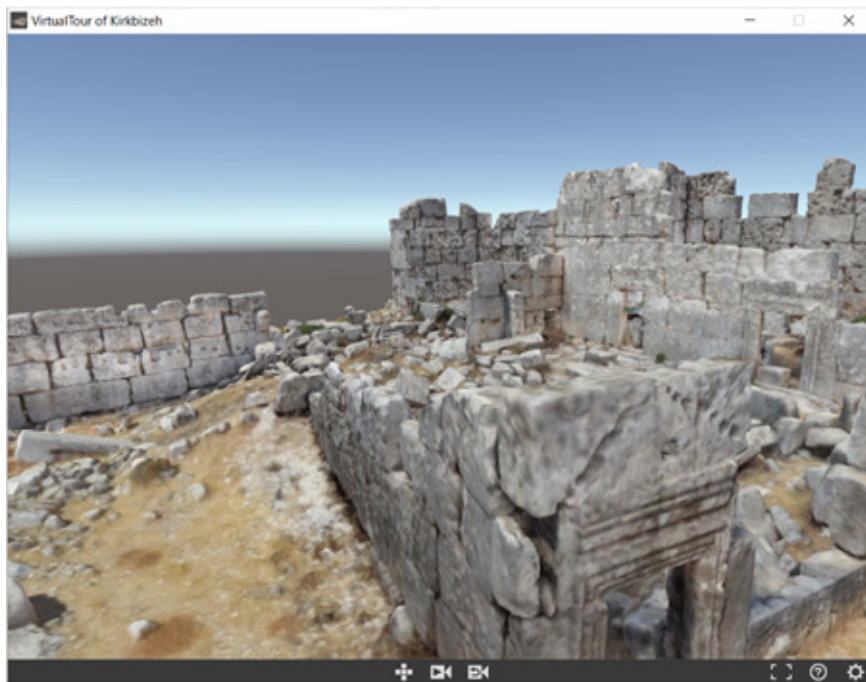


Fig. 10 Software : “Virtual tour of Kirkbizeh”

#### 4.3. 3D model for 3D printing

An STL-format 3D model was prepared for 3D printing. The 3D printed physical model provides different impressions and understandings.

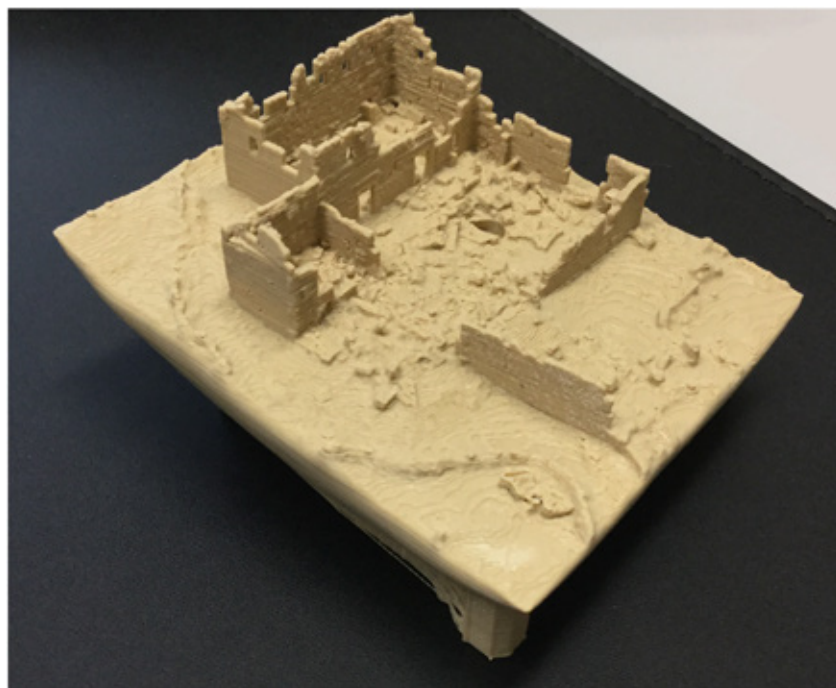


Fig. 11 3D printed model

#### 4.4. Augmented Reality (AR ) for tablets and smartphones

The number of people who use smartphones and tablets is rapidly increasing. Although 3D models can be viewed with viewer applications, AR can be more adaptive for a wider range of generations, including children. Thus, we made an AR card and application for Android OS—“HERITAGE AR”—to view the 3D model and movie in an easier, more playful manner.



Fig. 12 AR card (“HERITAGE AR”)

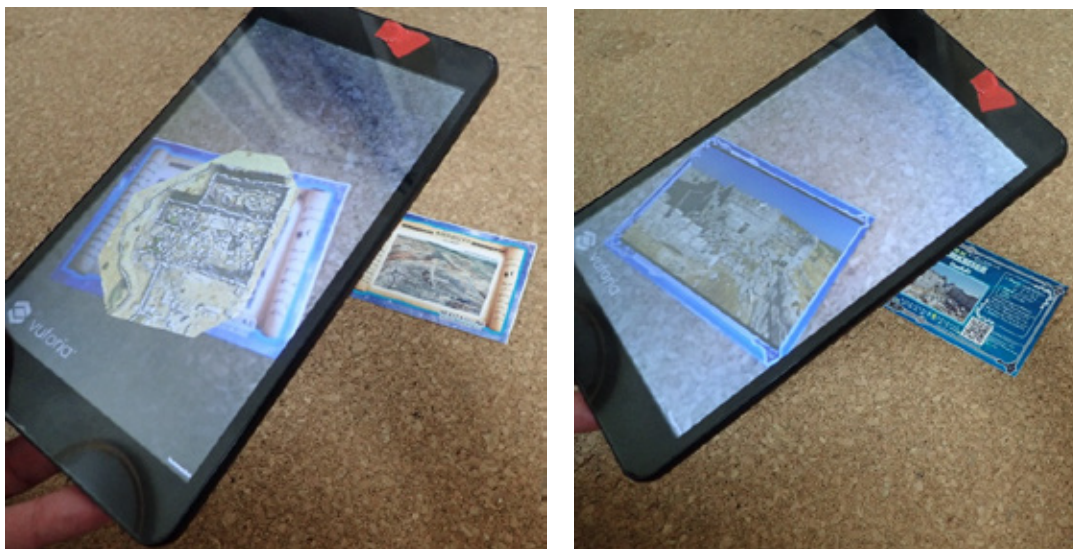


Fig. 13 Using the AR card with a tablet.

