
INTEGRATED METHOD FOR THE STUDY AND CONSERVATION OF RELIGIOUS BUILDINGS THE CASE OF THE CHURCH OF SAINT POTENTE IN TUSCANIA

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Abstract

The territory of the province of Viterbo (Italy) is characterised by the presence of many structures serving in the past as Christian places for cult, but now deconsecrated and in a state of neglect. Many of these churches have ancient origins and replace pagan places of worship, often located along main roads that cross the entire region, serving as refreshment places for travellers and pilgrims. The church of Saint Potente in the territory of Tuscania is one interesting example of this kind of place. There is no much information about this church, and furthermore no specialized studies have been addressed to its history. For this reason we decided to reconstruct a possible history of the worship and of the phases of the building, through the use of computer software for 3D reconstruction such as Agisoft PhotoScan[®], Autocad[®], 3D Studio Max[®] and V-Ray[®].

Keywords: via Clodia, cult, Saint Michael, archaeology, photogrammetry

1. Introduction

The church known as Saint Potente is an ancient Italian place of worship in northern Lazio in the province of Viterbo, located at South-South east of Tuscania city. The church, today in a state of ruin, derived its name from the district and the Etruscan necropolis in which it is located, and it is part of the estate of the Ancient Guado, which in the IGM (Istituto Geografico Militare) maps is identified with the toponym of Casale Galeotti, from the name of the owner of the early twentieth century [1] (Figure 1).

The documentation concerning the church and its cult is scarce. Probably, it is a building of the pre-Carolingian age, being mentioned for the first time in a papal bull of 750 AD [*Necropoli di San Potente*, <http://www.tusciaweb.eu/2011/09/visita-alla-necropoli-di-san-potente/>, accessed on 25.09.2018].

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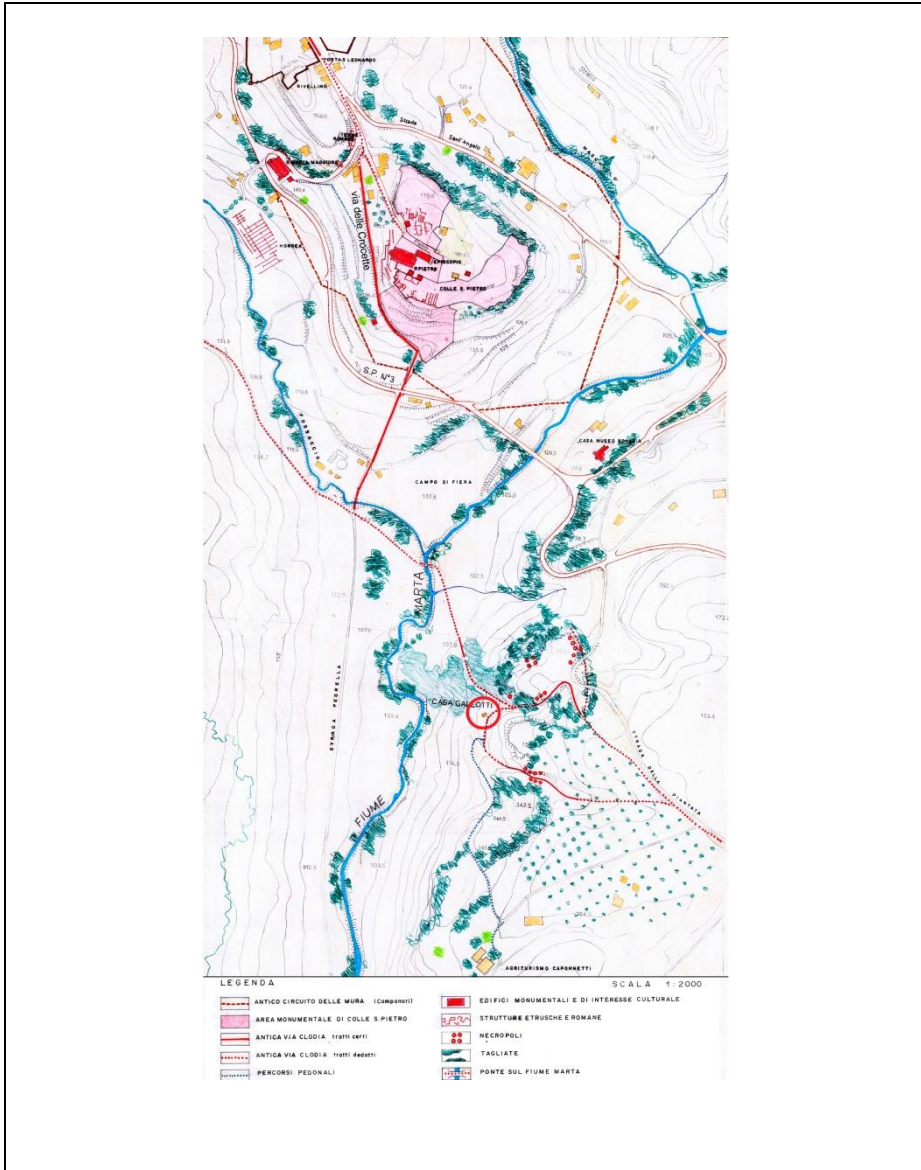


Figure 1. Route of the Via Clodia in the territory of Tuscania [Via Clodia, <http://www.laviaclochia.it/il-tracciato/verso-tuscania/>, accessed on 26.09.2018]; the red circle indicates the position of the church.

A 1217 document from the Tuscania Capitular Archive [2] quotes the priest Detaiuti as rector of the church of Saint Potente and therefore certifies its continuity of use. The church divested its activity probably before and no later than 1704, the year in which it appears in the Barbacci report as an unofficial church [A. Barbacci, *Relatione dello stato antico e moderno della città e chiesa di toscanella*, manoscritto conservato nell'Archivio Capitolare di Tuscania, invent. N. 317].

2. Archaeological evidence and worship

The church is located along the ancient Via Clodia, built by the Romans in the 3rd century BC on a pre-existing Etruscan route. In correspondence of the church, Via Clodia is characterized by a vast cave to the right of the downhill part of the road, a source of water fed by an Etruscan tunnel and an extensive necropolis with tombs ranging from the 7th to the 2nd century BC. All these archaeological emergencies attest the strong symbolic value of this place and consequently the presence of human activity and the interest in this site that lasted over time. It is therefore likely that the church of Saint Potente seals in the Christian era a more ancient place of pagan worship. Mario Tizi, due to the presence of the road and the water source, hypothesized an ancient cult of Hermes that was also a protector of travellers and traders. Concerning the name of the church, 'Potente', Tizi suggests it being a distinctive attribute of the Archangel Michael [1]. Cult was probably introduced in Tuscania, according to the scholar, by the Lombards who settled there between the end of the 6th and 8th centuries AD [A. Barbacci, *Relatione dello stato antico e moderno della città e chiesa di toscanello*, manoscritto conservato nell'Archivio Capitolare di Tuscania, invent. N. 317].

The Michaelic cult is typical of the Lombard culture. The case study of Tuscania can be well-associated to the cult of Saint Michele al Gargano, dated back to the 5th century AD, of the Lombard foundation, and also linked to the presence of a cave and water. The definition 'Potente' could derive from the need to distinguish this small church from others dedicated to the same Michaelic cult arisen almost simultaneously in the territory of Tuscania [1].

3. Operational goals

The existing studies on the church of Saint Potente are scarce and generic, more interested in the territory and in the location of the church, in the archaeological - topographical context rather than in the building itself.

The historical researcher Joselita Raspi Serra dedicates to this church a data sheet among those of the churches that have been demolished or disappeared, in which she describes it with brief notations [3]. She reports some information such as of the presence of blocks of tuffs on the lower left side that seem to belong to an earlier period. Another note concerns the right-hand side where two shutters of arch and one on the left side seem to allude to an arched division of the room, which cannot be explained if we consider the dimension of the space. The church, oriented in the South West (apse) - North East (front), is almost devoid of the roof; only the perimeter walls remain, a small apse in the back wall and the pillars of three arches that had to mark the space of the single nave (Figure 2) [3, p. 176].

The absence of other information on the church, led to perform direct on-site surveys that allowed us to document the state of the edifice, but above all to investigate the construction phases of the wall still surviving. To better highlight

these phases, it was decided to document the structure with the creation of a 3D model through the use of the Agisoft PhotoScan[®] software. This system uses automatic extraction methods, identification of homologous points and orientation of sequences of digital images in order to automatically determine the spatial structure of a scene starting from a sequence of images without the need for other data related to images or photographic conditions [4, 5]. The first step of the procedure was addressed to image acquisition made from all four sides of the church with a Nikon D3100 digital camera. Totally 159 images were acquired. These images were managed with the above mentioned software that identified 76.082 homologous points; then it created a dense cloud of 12.891.424 points and finally the 3D model characterized by 718.911 faces.



Figure 2. Church of Saint Potente as it appears today.

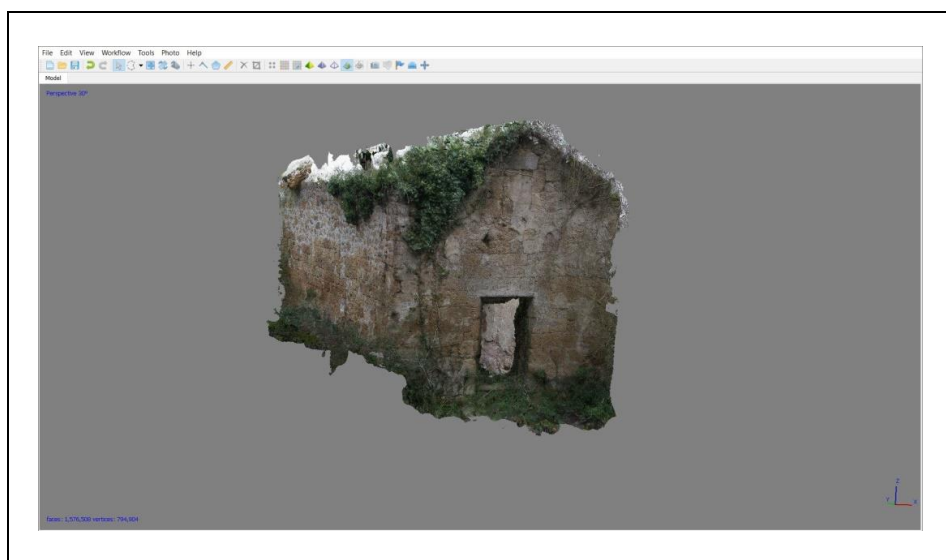


Figure 3. 3D model obtained through Agisoft PhotoScan[®].

The model was then returned to the original scale through the inclusion of 6 GCP (Ground Control Point) measured with a Total Station model Topcon GPT 7005 with angular precision of 5" (Figure 3).

The work performed with Agisoft PhotoScan® aimed at creating a real 3D model of the today situation of the building, but for a better understanding of the structural asset it was decided to create a hypothetical 3D model of the church as it possibly appeared when still officiated.

For the reconstruction of the church three different software were used: AutoCad 2018® and Autocad Architecture 2017® for the creation of raw models of the architectures, 3ds Max® and the V-Ray® rendering engine for the final phase of rendering and the photorealistic restitution of the surfaces.

From a methodological point of view, the workflow was organized in several phases. The first step was devoted to import on AutoCad 2018® the orthophotos created by the 3D model in Agisoft PhotoScan® for obtaining the planimetry and the sections (Figure 4). Plants and sections have been brought back to the 1:1 scale, and vectorized, to have the actual dimensions of the church. Subsequently, a two-dimensional model of the church was created, which was then imported into AutoCad Architecture 2017® for the creation of the building's volumes.

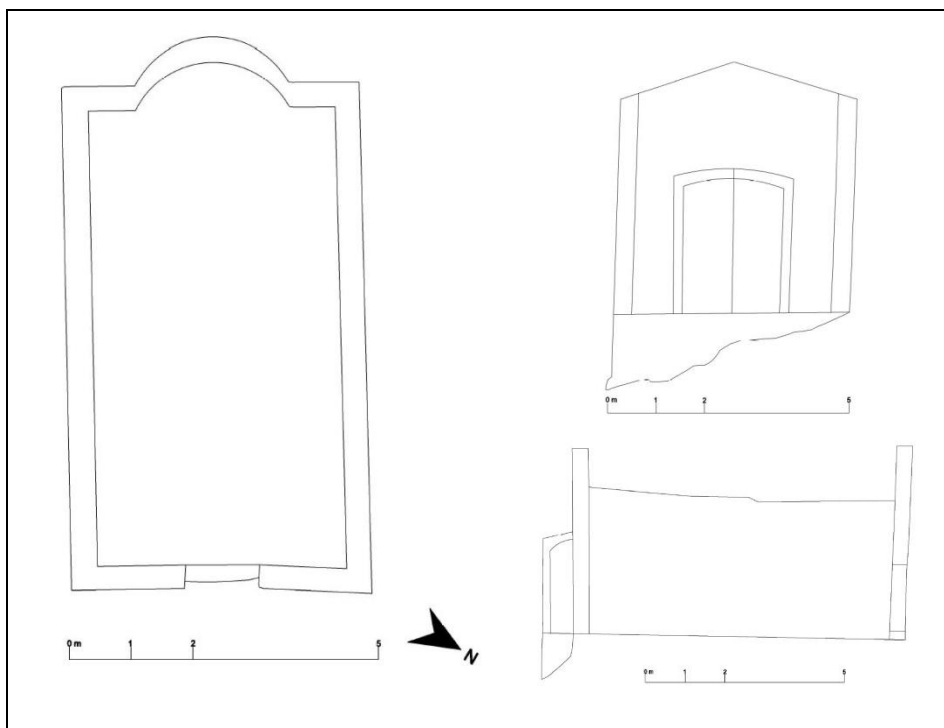


Figure 4. Planimetry and sections of the church of Saint Potente realized through the orthophotos created with Agisoft PhotoScan®.

The main purpose of this first phase is to return the volumetric aspect of the church using the data that can be deduced from floor plans and sections. After the phase of volumetric reconstruction of the church in the CAD environment, we moved on to the rendering phase in which the volumetric elements take shape through the application of high resolution textures in the 3ds Max[®] environment.

The choice of materials for the mapping of the surfaces was carried out through the research on exempla available online. The selected textures exhibit characteristics similar to those of the tuff block constituting the church, those of the roof tiles and the wood of the door.

The mapping of the material is strictly connected to the lighting of the scene, as it will not be possible to appreciate the mapping until a reference lighting system is inserted and set up. Among the innumerable sources of lighting available in 3ds Max[®] to replicate the behaviour of real daylight, the Daylight System was selected. This light source is able to reproduce the natural lighting conditions by setting the time, date, latitude and longitude to which the subject is exposed.



Figure 5. Hypothetical 3D reconstruction of the church of Saint Potente realized with AutoCad 2018[®], Autocad Architecture 2017[®] for the creation of raw models of the architectures, 3ds Max[®] and the V-Ray[®] rendering engine for the final phase of rendering and photorealistic restitution of the surfaces.

Once the setting of the textures and lighting has been completed, the next step concerned the selection of the frame and the composition of the final image. This process goes through the use of 3ds Max[®] with the creation of ‘chambers’:

an instrument comparable to a camera that photographs the scene and selects the parameters of shooting and framing.

Specifically for the camera, the following parameters were selected: 18 mm focal length, ISO 200 exposure, 1/60 second exposure time, diaphragm f 10.

Finally, after setting the parameters described above, the model is rendered using the V-Ray[®] software.

The image has been post-produced in PhotoshopCC[®], in order to improve light and contrast (Figure 5).

4. Conclusions

This paper reported a detailed study of the church of Saint Potente, located in the territory of Tuscania in Central Italy. The position of the church along the passage of the Clodia and near a source of water suggests its possible use as resting area for the travellers and the pilgrims who ran across this path during the Middle Ages.

Today the church is almost completely covered by vegetation so that it can be considered as a ruin. This condition of the church made difficult the interpretation of the evolutionary history of the structure, for this reason it was decided to use a three-dimensional reconstruction based on direct in-situ observations.

The used approach allowed reconstructing a metrically correct model of the church with the precise measurements of the single blocks that was difficult due to the presence of vegetation. It was also possible to date back the masonry phases through the comparison with the studies conducted by David Andrews on the evolution of the masonry technique in Northern Lazio [6].

One of the main results of the present study is the evidence of three construction phases: the first phase consists of pre-existing buildings that are not well identifiable due to the dense vegetation that today covers most of the structure, but partially guarantees its support. Part of the basement to the North-East side of the building is clearly visible and is carved in the tuff bench with square shapes for a height of 1m. The second phase represents the main part of the structure and consists of squared tuff blocks of rectangular shape, placed at the tip and cutting, averagely between 0.25 and 0.45m long. The dimension of these blocks allows us to date the phase between the twelfth and thirteenth centuries AD [6]. To this phase probably belong the three shutters for arches, highlighted inside the church by Joselita Raspi Serra [3, p. 176], and the only remained and visible apse. Moreover, to this phase probably pertain two now buffered windows, above the entrance door of the church, and above the apse.

The third and last phase is more evident above the blocks dated back to 12nd-13rd century AD, but also in other parts of the building. It consists of an irregular wall formed by fragments of tuff and stone mixed with lime, then plastered.

The 3D reconstruction with Agisoft PhotoScan® also allows documenting the state of conservation through a non-invasive study that could be a valid support in case of desirable future protection and conservation interventions.

Lastly, the result of the hypothetical 3D reconstruction may be considered ‘not far’ from reproducing the original form of the church. The work done provided further confirmations about the advanced typological hypotheses, making this 3D model metrically measurable and comparable with other more well-preserved edifices. Therefore, the 3D model, representing a sort of ‘container’ of archaeological and metrological data, can be considered a useful tool both for the scientific community and for non-professionals people.

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References

- [1] M. Tizi, *Archeotuscia News*, **2** (2001) 9-13.
- [2] G. Giontella, *Le Pergamene dell’Archivio Capitolare di Tuscania*, Vecchiarelli, Manziana, 1998, 9.
- [3] J. Raspi Serra, *Tuscania. Cultura ed espressione artistica di un centro medievale*, Electa, Venezia, 1971.
- [4] C. Pelosi, L. Lanteri, G. Agresti and U. Santamaria, *Eur. J. Sci. Theol.*, **12(1)** (2016) 271-281.
- [5] L. Lanteri and C. Abramo, *Eur. J. Sci. Theol.*, **14(1)** (2018) 173-180.
- [6] D. Andrews, *Biblioteca e Società*, **11(1-2)** (1982) 1-16.