

The history of research and making an inventory of Early Christian, sacred architecture in Old Dongola (Sudan)

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Abstract. For over fifty years of excavation work a lot of palaces, houses, crypts and a dozen churches and other sacred buildings have been unearthed. Based on excavation work in a Polish archaeological site in Old Dongola (Sudan), different ways of conducting an inventory in desert conditions are presented. Various methods of making an inventory and its advantages and disadvantages were considered as well as using them in such conditions, especially for the purpose of archaeological documentation of Christian sacred architecture.

1 Introduction

The Polish Archaeological and Conservation Mission in Old Dongola is located in Sudan. The country lies in north-eastern Africa. It borders on seven countries and the Red Sea. The capital is situated in Khartoum [1]. Old Dongola lies on the eastern bank of the Nile, halfway between the third and the fourth cataract. The agglomeration spreads over two kilometres along the bank of the Nile [2].



Fig. 1. Localisation of Old Dongola in Sudan (Africa). Own elaboration.

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2 The Polish Archaeological and Conservation Mission in Old Dongola

2.1 Brief history

Old Dongola (Nubian *Tungul*, Arabic *Dunqula*, nowadays named *Gaddar*) was the capital of the Christian Kingdom of Makuria between the 5th and 14th century [3]. There are many churches, palaces, houses and other different building at the site. The walls of a dozen of them are decorated with frescoes. Old Dongola is part of the Tentative List in order to qualify for inclusion in the World Heritage List [4].

2.2 The heads of the expedition

Somers Clarke has started the history of excavation in Dongola. He initiated the work there because of his studies on Egyptian and Nubian ecclesiastical architecture. At first, he was the only researcher who was certain of the importance of this site.

The initiative to continue archaeological investigation was taken up by the Polish side [5]. Having completed the salvage excavation of cathedral at Faras, Kazimierz Michałowski was given the permission to continue research in Ancient Nubia by Sudan's antiquities organization [6]. The first campaign took place in 1964. At first the whole project was headed by prof. Kazimierz Michałowski, but the works during the first two campaigns were directed by Antoni Ostrasz [7] and then by Stefan Jakobielski until 2006. Then (from 2007) the project was headed by Włodzimierz Godlewski and in 2018 Artur Obłuski took over as head of the expedition [8].

2.3 The site

The area of the site is one of the biggest of all The Polish Archaeological and Conservation Missions. The excavation concession includes about 1.5 sq kilometres in area [9]. There is a hot, desert climate. The relative humidity is very low. Strong and frequent winds, insolation and large temperature fluctuations erode exposed buildings. Rains are rare but during the rainy season they are very intense. It has a very bad influence on most of the buildings because of their mud-brick construction [10].

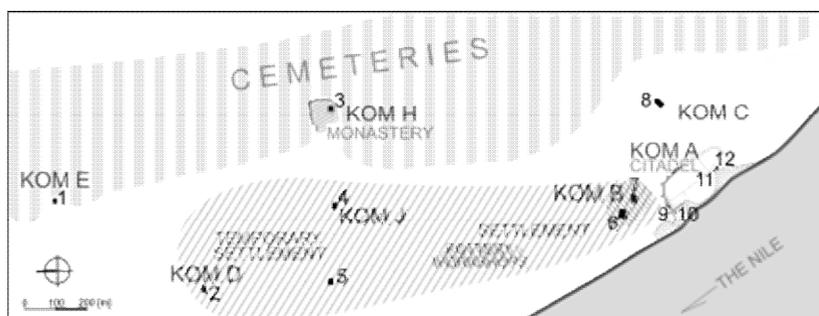


Fig. 2. Map of the site in Old Dongola. Own elaboration based on P.M. Gartkiewicz and W. Godlewski, 1–Mosaic Church, 2–Church D, 3–Monastery Church, 4–North Church, 5–Northwest Church, 6–Cathedral, 7–Crusiform Church, 8–Throne Hall/Mosque, 9–Tower Church, 10–Pillar Church, 11–Cruciform building, 12–King’s Church

* Mud-bricks are not fired in contrast to red bricks. That is why they are not so resistant. They are only sun-dried and made from clay, silt, sand and organic materials like straw or dung. They were (and still are) most popular in places where there was not enough wood to build with it or to fire bricks. The study of building materials including mud-bricks in Old Dongola was done by Szymon Maślak.

3 The excavation

There are plenty of exposed building on the archaeological site in Old Dongola. For example, the Throne Hall/Mosque, palaces, houses, monastery, crypts, cemeteries and a lot of sacred buildings including churches [11]. Although the excavations have been continued since 1964, there are new findings all the time. That is why the majority but not every one of them are inventoried and studied. The names of the churches and sacred buildings are connected with their localisations or qualities. Below there are short characteristics of some of them.

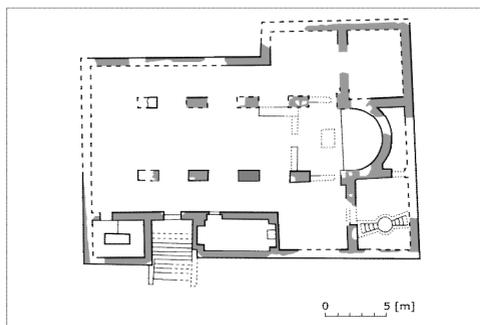


Fig. 3. Old Church (OC). Based on P.M. Gartkiewicz, M. Puzzkarski.

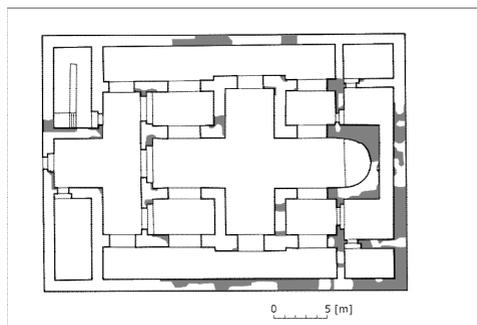


Fig. 4. Building X (BX). Based on W. Godlewski, M. Puzzkarski.

Old Church is the oldest discovered church in Old Dongola. It is located on Kom B and was erected around the 6th–7th century. The construction is made of mud-bricks that have very similar dimensions (differences about 1 cm in case of length). The plan, in general concept, looks like a short rectangle widened to the north in the eastern part (27.15 × 19.1 m). Inside it resembles three-aisled, pillared basilica. There seems to be only one entrance to the church by stairs. In the southwestern corner there was a staircase that suggests emporia [12–13].

Building X remains are located on Kom B near the Old Church. It was also erected around the 6th–7th century of red brick with a brick floor. Based on the appearance of remains it had a rectangular plan (22.4 × 23.6 m) with a cruciform central part surrounded mostly by rectangular rooms [14].

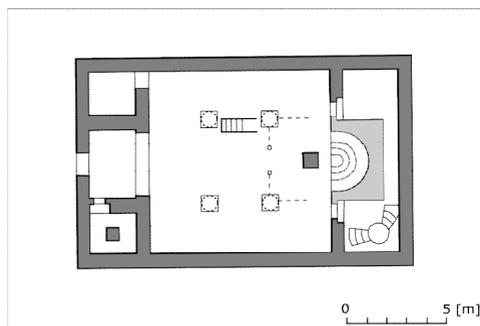


Fig. 5. First Mosaic Church (MC.I). Based on W. Godlewski, M. Puzzkarski, B. Żurawski.

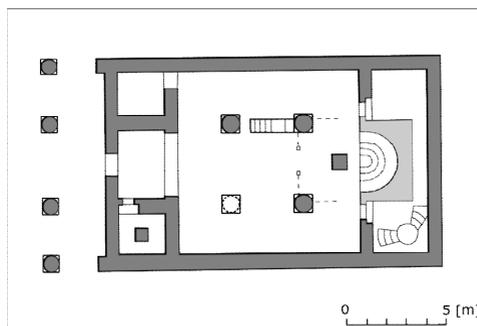


Fig. 6. Second Mosaic Church (MC.II). Based on W. Godlewski, M. Puzzkarski, B. Żurawski.

First Mosaic Church (Kom E) was discovered in 1993 during an excavation carried out by B. Żurawski and K. Misiewicz. The whole floor was paved with a black and white geometrical mosaic pattern made of pebbles (that is analogous with the floor in the

presbytery in Church of Stone Pavement). It is rectangular, like a three-aisled basilica in plan (16.7×10.4 m) with mud-brick construction that was faced with red brick outside. In the eastern part there were *pastophories* with a passage behind the apse and the western side was tripartite (there was a staircase installed in the southern corner room). There was at least one reconstruction (7th–9th century, when among others the narthex was built and the mosaic floor was changed for a more curvilinear design – the phase is called: Second Mosaic Church). [15–17]

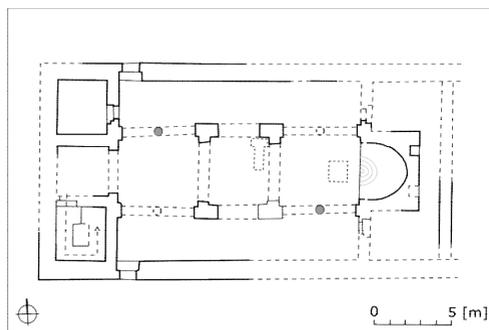


Fig. 7. Monastery Church (HC) – reconstruction. Based on S. Maślak.

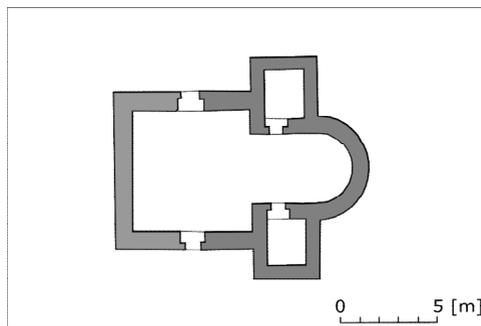


Fig. 8. Early Church D (EDC). Based on J. Dobrowolski, M. Puzkarski.

Monastery Church is situated on Kom H near the monastery. It was unearthed (2002–2006) by D. Gazda (with the help of B. Żurawski's aerial photographs). The inventory documentation was made including D. Gazda, N. Wiewiśra, H. Koziońska-Sowa, M. Puzkarski. The probable date of erecting the church is the 6th–7th century. It looks like a three-aisled columnar basilica. Three phases in construction can be seen, which is mostly mud-brick with stone columns which were the base for a dome or a tower. The western part of the church was tripartite with a staircase in the southwestern corner room. The floor is panelled in ceramic tiles of light red colour and bricks in the presbytery. There were also three tombs in the church (two of them in the presbytery, the third in the eastern end of the southern aisle and the fourth outside east of the church) [18–21].

Early Church (Site D) was widely described by J. Dobrowolski. The building is dated from the 7th–9th century. The church is quite small (13×12.5 m). It seems to be a Latin cross plan because of the single-aisle with an apse and two symmetrically planned *pastophories* [22].

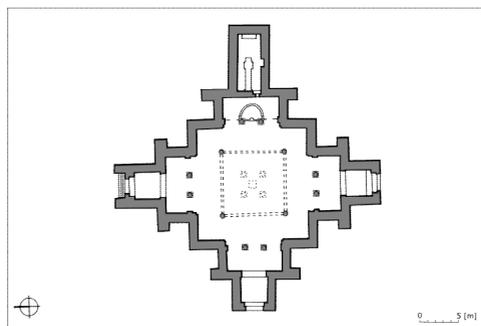


Fig. 9. First Cruciform Church (CC). Based on W. Godlewski, M. Puzkarski, D. Zielińska.

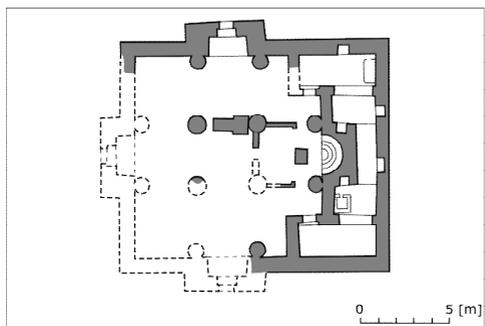


Fig. 10. Pillar Church (PC). Based on W. Godlewski, S. Maślak.

First Cruciform Church is dated to the 9th–11th century and is located on Kom B where the Second Cathedral was. It is in the form of a cross (37.7×34.8 m) made of red brick,

there were grey and red granite columns inside. Probably there were a central dome and barrel-vaults as the arms of the building. It appears the building included a commemorative function. The First Cruciform Church was destroyed and rebuilt in the 13th–14th century with several changes (like blocking the western entrance and narrowing others, building the altar etc.). This phase is known as Second Cruciform Church [23].

Pillar Church is located on Kom A close to the north-western side of fortifications. It was unearthed by W. Godlewski in 1994 and 1995 who made inventory documentation. It was probably erected in the 9th century in red brick construction (there is also a special shape of the bricks used for construction of the round pillars and pilasters). It seems to be a cross-over-rectangular type of plan (16 × 15 m). The eastern part of the building is better preserved. There is an apse with a synthronon and L-shaped lateral chambers (connected by a passage) and a brick altar. There was probably a central dome based on four pillars [24–25].

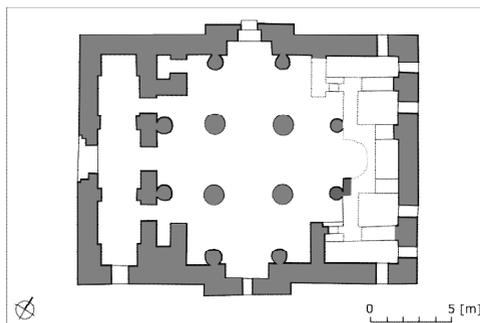


Fig. 11. King's Church (B.V). Based on S. Maślak.

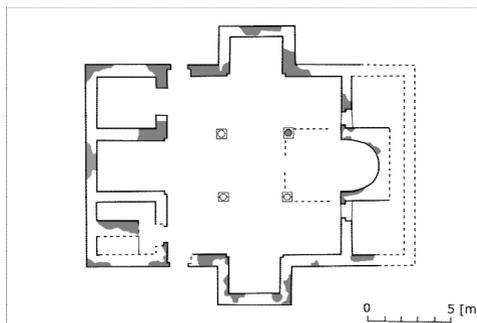


Fig. 12. Church D (DC). Based on J. Dobrowolski, M. Puzkarski.

King's Church (B.V=Building V) is located on Kom C (SWN site) just 4.0 m from the southern arm of Cruciform Building (B.III – described below). It was discovered in 2005 (unearthing the whole building took the next few seasons) by W. Godlewski and inventoried by W. Godlewski, D. Zielińska, S. Maślak. It was probably erected in the 9th century with red brick. The building has a cross-over-rectangle plan (about 21 × 17 m) and presumably a dome. In the southwestern corner of the naos there are remains of a staircase. There are also many preserved murals and inscriptions, written in Greek and Old Nubian, on the walls inside [26–30].

Church of site D was widely described by J. Dobrowolski. It was built on top of the earlier mentioned Early Church in the 9th–11th century on a cross-over-rectangle plan (19.2 × 16.2 m). The construction was made of stone blocks and bricks. It is supposed there was a wooden roof with a central wooden dome based on four granite columns. The eastern part of the building was quite likely tripartite and in the southwestern corner there was a staircase. It is believed there was a *synthronon* in the apse in the eastern part of the church [31].

Northwest Church was found before 1990 and documented by S. Jakobielski and S. Medeksza. It was erected presumably in the 12th century on a cross-over-rectangle plan. There are thick walls, two massive cross pillars and a staircase in the southwestern corner chamber suggested some kind of emporia [32].

Cruciform building (B.III.1 and B.III.2) is located on Kom A at the edge of a rocky elevation on the riverbank. It was unearthed by W. Godlewski in 2001 and 2003 and the inventory documentation was made by W. Godlewski, M. Puzkarski and D. Zielińska. It was built around the 7th century with red brick, it has a cruciform plan (outer dimensions 6.8x6.8 m), a central dome and most likely a barrel-vault covering the arms. There were two distinct periods of exploiting it, firstly as a commemorative building and then (from about 14th century) as a small church. During first phase there were four entrances, one in

every arm of the cross. Later there was only one passage in the southern arm and the level of the floor was raised about 40 cm [33–35].

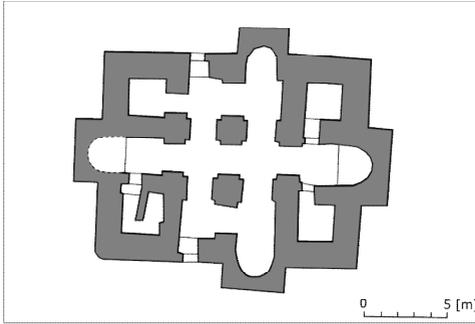


Fig. 13. Northwest Church (NWC). Based on S. Medeksza, M. Puzkarski.



Fig. 14. Church B.III.2. Based on W. Godlewski, D. Zielnińska.

North Church is situated on Kom J, found before 1910 and presumably erected in 13th century. In the plan it looks like cross-in-square. The walls are massive and mud-brick. In the southwestern chamber there are remains of a staircase, so there were probably something like emporia upstairs. It seems there was a dome in the central part of the naos [36].

Tower Church is located on Kom A on top of the heavily damaged tower as a part of fortifications. It was unearthed by W. Godlewski in 1995 who made inventory documentation. The church was erected in 13th-14th century. It is probably rectangular (13.4 × 9.2 m) in plan. The building material is mud-brick as usual. It is believed that there was a central dome supported on four pillars. In the eastern end of the church there is an apse with the remains of a masonry altar [37–38].

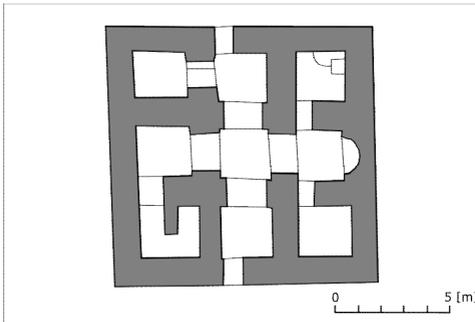


Fig. 15. North Church (NC). Based on J. Dobrowolski, M. Puzkarski.

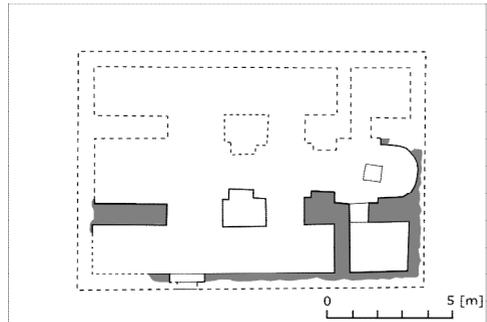


Fig. 16. Tower Church (TC). Based on W. Godlewski, M. Puzkarski.

Apart from that there are so called cathedrals: First Cathedral = Church of Stone Pavement (Kom B, replaced Building X, rectangular plan as a five-aisled basilica, built around the 6th century of red brick, 33.4 × 23.6 m) and Second Cathedral = Church of the Stone Pavement (changes were made in some parts of First Cathedral around the 7th century such as building four massive pillars probably to support a central dome, reducing baptismal pool and refurbishing of the interior decoration) as well as Third Cathedral = Church of the Granite columns (Kom B, erected on ruins of the Old church) and Fourth Cathedral = Church of the Granite Columns but opinions about dating and reconstructions of last two are arguable [39].

4 The ways of inventory

Within the last 54 years of excavation in Old Dongola, the technological advances have been significant. They have an influence on the ways of taking inventory which we can observe around us. In common use there is the laser range finder, laser level, or more and more popular, the 3D scanner. They are very helpful and provide a precise survey in a temperate climate, however, in climate or weather conditions such as Old Dongola this surveying instrument is almost useless.

The laser range finder and level are not exploitable on the archaeological site in Sudan because of very strong insolation. The beam of the laser in this particular equipment is too weak to work properly in such conditions. They could work in the shade, which is very hard to find due to the height of the Sun, and inside, but there are very few preserved interiors in the site in Old Dongola. The 3D scanner also cannot work properly because of ubiquitous sand. During the scanning, enough time passes for an unearthed object or building to become covered by a sand. The sand in the air also disturbs surveying.

The most reliable surveying instrument is also the simplest, for instance a tape measure, a plumb line or a level. Although the equipment is reliable, using it is laborious and is not accurate enough. That is why a measurement done with them is usually supported by newer and more precise equipment. One of them is a levelling instrument that is used to determinate relative height in the site among different locations of a surveying land or part of the unearthed buildings. Another piece of equipment is a total station that allows measuring coordinates of a particular point. There are also some difficulties with using this equipment. Due to the fact that sand is everywhere, the equipment is getting soiled quicker. For example, sand gets into its levelling foot screw, optical plummet focusing ring and other moving parts. In the case of the total station with a prism, the prism gets soiled outside and inside. Because of smutting of the prism the surveying can be constricted, for the beam of the laser is not reflected properly. It also needs to be serviced, which is another impediment, because there are very few service centres in Sudan. Another very helpful instrument during inventory of an archaeological site is aerial photography taken from kites. Because of the high level of the Sun, the best time to take photographs is just before sunset as then there are the longest shadows, and because of them the image looks more relief and three-dimensional. To take photographs like that a proper wind is necessary – not too soft, not too strong. Drones are more and more popular so they could replace kites, but currently they are considered as military equipment and are not allowed to be imported.

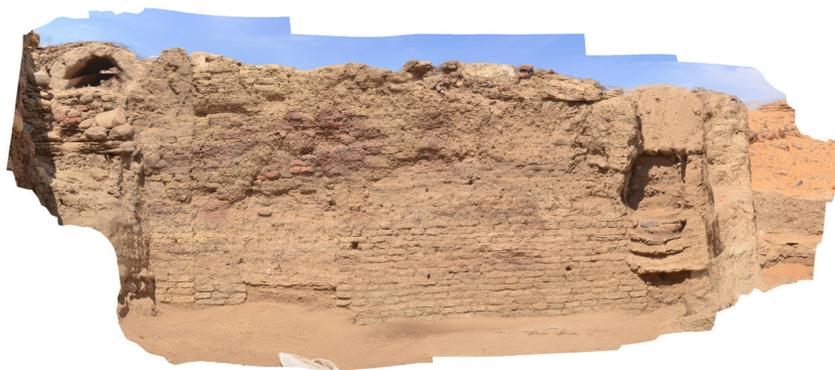


Fig. 17. Orthophoto of a wall in monastery complex. Own elaboration based on photos by Agata Deptuła.

Another way of taking orthophoto is merging photos by special software to achieve an image without distortion (without foreshortening). This method is very useful to make an inventory of walls or floors.

During the 26th season of excavations in Old Dongola in 1993 there was only one trial of usefulness of computer technology – geophysical and topographical surveying in archaeology [40–41].



Fig. 18. Aerial photograph B. Żurawski of monastery complex on Kom H in 2001 [42].

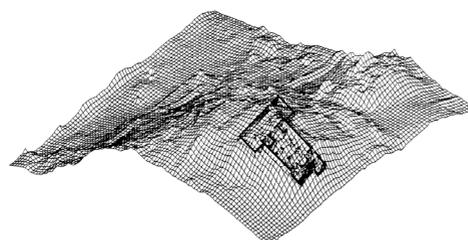


Fig. 19. Computerized model of Kom E with scanned-in church outline [43].

Table 1. The pictorial comparison of inventory method and different factors.

geometer equipment/ factor	total station	manual*	laser range finder and level	3D scanner	orthophoto	kite
insolation	+	+			~	~
strong	+		+	+	+	
wind medium	+	~	+	+	+	+
weak	+	+	+	+	+	
sand in the air	~	+			~	
long-distance surveying	+					+
productivity	+		+	+	+	+

+ - method works properly, ~ - different results depending on factor's intensity etc.

5 Conclusion

As one can observe there are a lot of different ways of making an inventory and it is important to use the appropriate one, in a proper way in certain conditions.

The most popular way to make an inventory is surveying the most characteristic points with a total station and then completing by manual surveying or orthophotos. Such a method provides the best accuracy with the lowest expenditure of labour. Kites are used to make basic pictures of sites or buildings. Other previously mentioned methods of making an inventory could be useful but in very specific conditions.

There are also a lot of different kinds and types of sacred architecture on the archaeological site in Old Dongola. The question is - where does this variety come from? Is it the influence of other Christian centres, or is it maybe the work of local architects?

* It means the surveying is made with usage of a tape measure, a plumb line and a level.

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