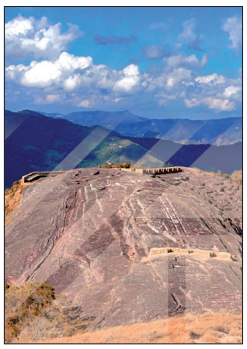

Architectus

2020
2(62)

DOI: 10.37190/arc200210

Jacek Kościuk*, Giuseppe Orefici, Mariusz Ziółkowski***, Anna Kubicka****, Rosario Muñóz Risolazo*******

Description and analysis of El Fuerte de Samaipata in the light of new research, and a proposal of the relative chronology of its main elements

Opis i analiza El Fuerte de Samaipata w świetle nowych badań oraz propozycja względnej chronologii jego głównych elementów

Introduction

The importance, history, and past investigations of the UNESCO World Heritage Site of El Fuerte de Samaipata have already been studied by numerous scholars [1]–[9]. A more comprehensive current study of former research is included in the same issue of this journal[1]. Here, we will concentrate on describing particular sectors of the rock in light of the results of our multidisciplinary documentation project carried out in the years 2016–2019.

Applied techniques and methods

During this project, we used several methods to document the site – 3D terrestrial laser scanning (TLS)[2] and multisensory close-range digital photogrammetry[3] for the whole site, as well as structured light scanning for the most important petroglyphs[4]. The data from TLS and digital photogrammetry were collected during the fieldwork season in June and July 2016, and from structured light scanning in July 2017. All data were compiled in the Laboratory of 3D Scanning and Modeling at the Department of History of Architecture, Arts and Technology at Wrocław University of Science and Technology.

* ORCID: 0000-0003-0623-8071. Faculty of Architecture, Wrocław University of Science and Technology, e-mail: jacek.kosciuk@pwr.edu.pl

** Italian Centre for Pre-Columbian Archaeological Studies and Research in Nazca (Peru).

*** ORCID: 0000-0003-4137-0799. Centre of Andean Studies of the University of Warsaw in Cusco (Peru).

**** ORCID: 0000-0001-5442-3947. Faculty of Architecture, Wrocław University of Science and Technology.

***** Italian Centre for Pre-Columbian Archaeological Studies and Research in Nazca (Peru).

[1] Cf. M. Ziółkowski, *El Fuerte de Samaipata in the light of current research*, in the same issue of "Architectus".

[2] Cf. J. Kościuk, B. Ćmielewski, M. Telesińska, A. Kubicka, *3D terrestrial laser scanning of El Fuerte de Samaipata*, in the same issue of "Architectus".

[3] Cf. B. Ćmielewski, I. Wilczyńska, C. Patrzałek, J. Kościuk, *Digital close-range photogrammetry of El Fuerte de Samaipata*, in the same issue of "Architectus".

[4] Cf. J. Kościuk, M. Telesińska, M. Nisztuk, M. Pakowska, *Documentation of the most important petroglyphs by structured light scanning and analysis of the most damaged petroglyphs by vPTM and vRTI methods*, in the same issue of "Architectus".

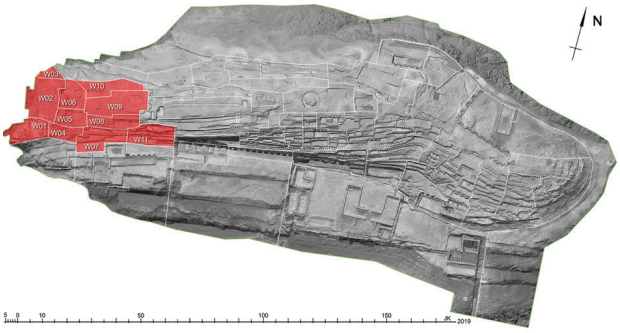

Fig. 1. The western group of sectors of the rock[5]

Fig. 2. The northern group of sectors of the rock

Fig. 3. The southern group of sectors of the rock

Fig. 4. The central and eastern groups of sectors of the rock

The results of the data compilation were raster orthoimages (monochromatic and in RGB) with a resolution of 1 mm for photogrammetry and 10 mm for TLS. For both, different hill-shading algorithms were used to emphasise characteristic features of the rock surface. This proved extremely important in the next stage of work, when orthoimages were used to prepare vector plans for the entire rock, including all its terraces, niches, reservoirs, canals, and petroglyphs. Replacing raster references during on-screen vectorisation facilitated the interpretation of details invisible on colour imagery or, on the contrary, provided additional information for the grayscale terrain model. Vector maps obtained courtesy of Albert Meyers, the head of the German research project at Samaipata carried out by the University of Bonn from 1992 to 1997, were also very helpful when interpreting the most eroded parts of the rock [9, p. 28, Fig. 9]. At this stage of our project, we also consulted all previous topographical plans. The vector plan resulting from this back-office work was brought to the site during the 2017 fieldwork season to check for possible omissions or misinterpretations. The final plan, together with raster references, is now available in open geographic information system (GIS) format[6].

Since the part of Samaipata rock that has been surveyed in detail measures roughly 110 × 240 m, it is technically impossible to present it on one illustration in this paper. Therefore, the site has been divided into five areas. Each area, according to principal morphological, and to some degree, functional, features, was then split into several further sectors. Each sector name starts with the letter defining its rough location – "W" for the western part (Fig. 1), "N" for the northern part (Fig. 2), "S" for the southern part (Fig. 3), and "C" for the central and "E" for the eastern parts (Fig. 4). Sector names are then completed with numbers. These numbers begin at "01" for each of the five areas of the site and follow on sequentially from this.

Results and discussion

The description of the results will follow the naming convention described above. It will start with the western part of the site; then it will cover the northern and southern slopes of the rock, continue with the central sectors, and terminate with the easternmost end of the rock.

Western part of the rock

Sector W01

This sector lies in the westernmost part of the rock, just below and behind the modern viewing platform erected for visitors (Fig. 1). In this sector, earth has accumulated and covers the natural rock. Three circular structures and an L-shaped fragment of a wall, all contemporary reconstructions made of stone and clay, are extant there. Since the main aim of the project was to document and analyse original, Incan or pre-Inca carvings on the rock, this sector is out of the scope of this paper and is mentioned only for the sake of completeness.

[5] Unless otherwise stated, all illustrations are by J. Kościuk. The legend for the graphics on the plans can be found on page 78.

[6] I. Wilczyńska, P.B. Dąbek, B. Ćmielewski, J. Kościuk, *Integration of project results on a GIS platform and its impact on conservation strategies*, in the same issue of "Architectus".

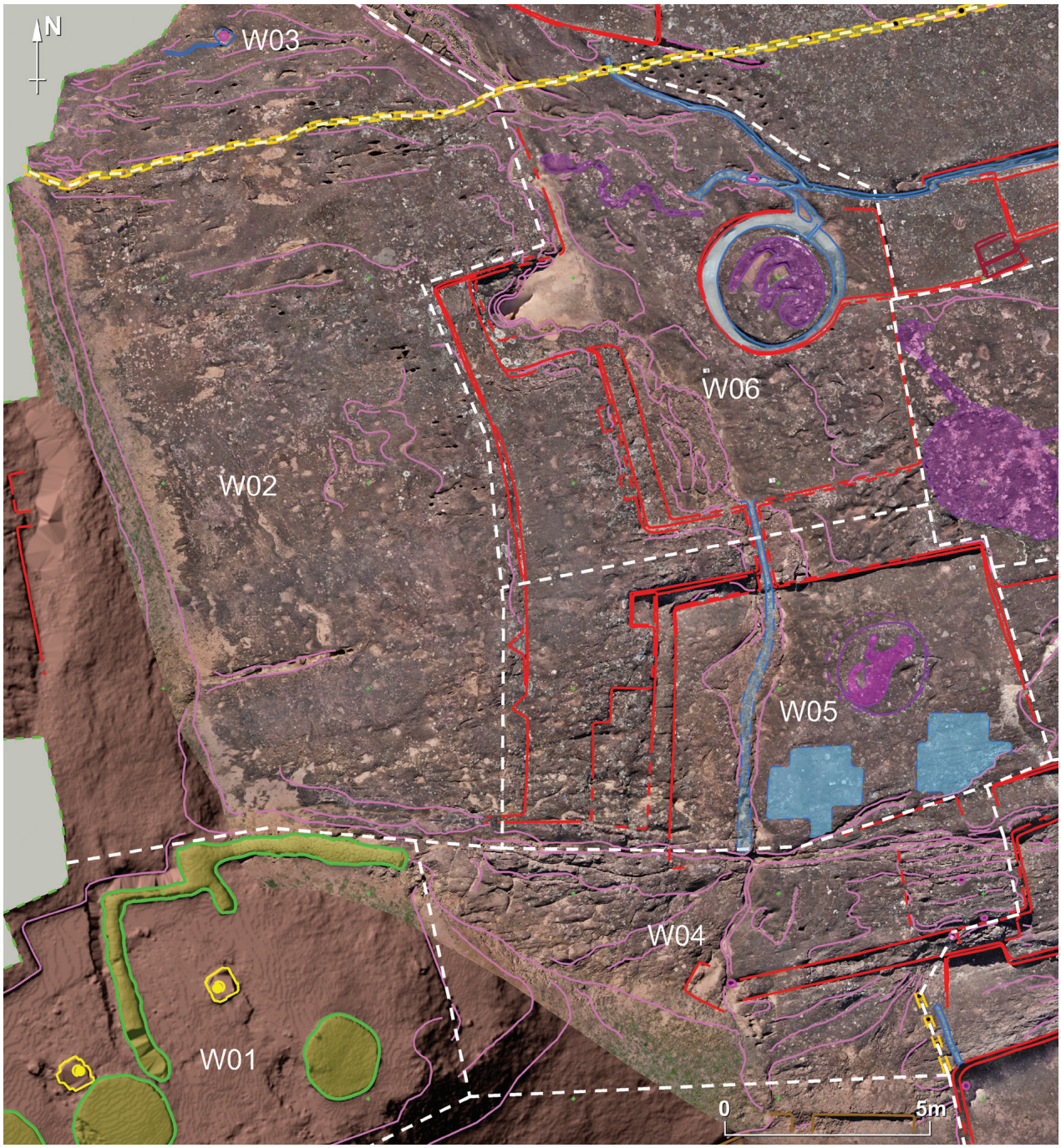

Fig. 5. Sectors W01–W06

Sector W02

Sector W02 lies directly northward from sector W01, and it gently slopes downwards to the east (Fig. 5). The eastern limit of sector W02 forms a well-defined edge with traces of two triangular recesses in its southern part. Close to the western border of the sector, two raised terraces can be seen. The area further to the west is currently unexcavated, and earth, as well as small bushes, are possibly covering the next sequence of terraces. The slope of this sector provides perfect conditions for spectators watching events and celebrations in the central part of the rock located to the east.

A line of circular holes (ca. 16 cm in diameter) drilled into the rock marks the northern extent of sector W02. These are easily distinguishable from natural cavities in the sandstone, which are typically ellipsoid in shape. The circular holes are irregularly spaced with distances from ranging from 0.4 m to 1.2 m. According to our interpretation, they were used to place the wooden posts of a *quincha* wall that was once standing there[7].

Sector W03

This triangular sector lies to the north of the *quincha* wall line (Fig. 5). The remaining borders are the natural(?), very eroded edge of the rock (north-eastern border)

[7] Cf. J. Kogut, J. Kościuk, A. Kubicka, *Interpretation of traces of hypothetical* quincha *walls in Samaipata*, in the same issue of "Architectus".

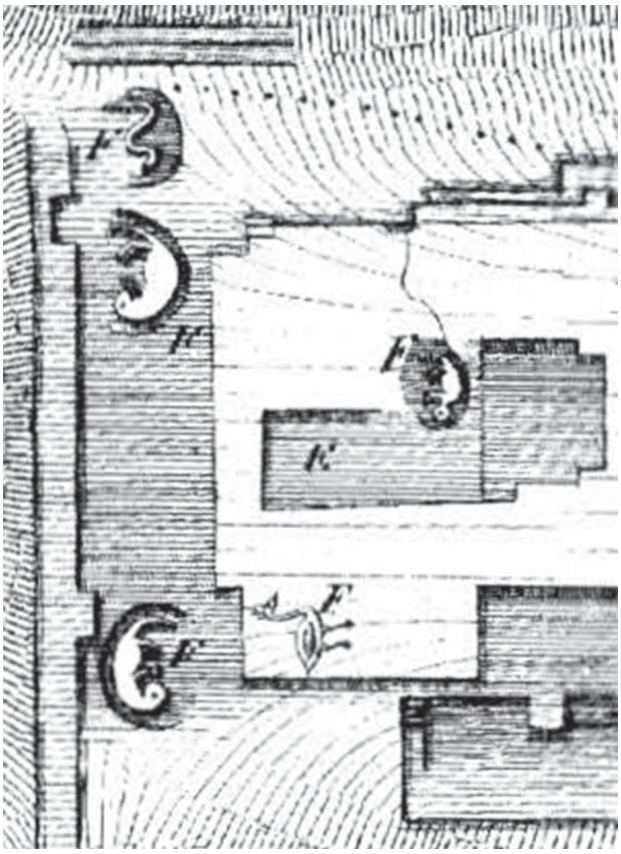

Fig. 6. Fragment of drawing by Alcide d'Orbigny en Ponce from 1832 (reproduced from [9, p. 25, Fig. 5])

and the north-western extent of the excavated area where the rock is still visible. The only anthropogenic feature in this sector is a small natural cavity in the rock that might have been used as an offering (libation) hole, as it has traces of an intensely eroded channel running to it.

Sector W04

Sector W04 lies directly to the east of sector W01, and it slopes downwards to the south (Fig. 5). The south-western part is covered with accumulated earth, while the face of the natural rock is exposed on the remaining part of the sector. A line of natural cracks in the rock marks the northern limit of the sector. A similar crack, this time north–south orientated, divides the sector into two parts. Aside from traces of what might once have been a small rectangular shelf, there are no other identifiable signs of intentional shaping of the rock in the western part of the sector. Many more traces, although extremely eroded, are found in the eastern section. In the northern area of the eastern section, a shallow terrace ca. 1.2 m wide cuts into the slope of the rock. Its upper edge marks the northern extent of this part of the sector. Another east–west orientated terrace, this time only ca. 0.75 m wide, is located further towards the south.

In the northern part, the eastern boundary of the sector corresponds with a step leading down to a wide terrace located further to the east, while in the southern part, a row of four round holes drilled into the surface of the rock mark the edge of the sector. The arrangement of these holes strongly resembles those found in the northern part of sector W02. Thus, we interpret them as traces of another *quincha* wall. We do not exclude the possibility that this hypothetical *quincha* wall continued further in a north-eastern direction, and climbed the narrow terrace described above.

Sector W05

The main feature of this sector is a spacious (ca. 8.5 × 6.0 m), roughly horizontal platform with well-defined edges on its northern and eastern side (Fig. 5). In the central part of this platform, a circular shape (roughly 2.25 m in diameter) rises ca. 10 cm above the platform level. In the centre of this shape, very weather-beaten traces of a figural petroglyph are extant. Earlier research described it as a representation of a felid – possibly a puma or jaguar. Today, it is difficult to see the figure, let alone assign it to a particular subspecies. However, with some help from virtual polynomial texture mapping (vPTM) and virtual reflectance transformation imaging (vRTI) techniques, it was possible to recognise a shape suggesting the representation of a puma. Nevertheless, this interpretation must be treated with great caution since the surface of the petroglyph is highly eroded and additionally disturbed by mosses and lichens. Further doubts are raised when comparing our reconstruction with a drawing by Alcide d'Orbigny en Ponce from 1832, where the schematic representation of the puma(?) is turned 180 degrees (Fig. 6). On the other hand, in the textual description of the drawing clearly representing animalistic figures, d'Orbigny writes *Dentro de esta hipótesis, sería lícito creer también que las medias lunas FF de la parte baja representarían los primeros y los últimos cuartos de la luna, andando de este a oeste* [1, p. 1465] so perhaps the figure in question is rotated in order to fit his hypothesis.

The rough rock surface, especially around the north-western edge of the circle, may suggest that the figure has been intentionally recut (and perhaps also erased) by later occupants of the site. This observation may point to the pre-Inca origin of this petroglyph.

One can get a similar impression by analysing the very shallow carvings of two T-shaped reservoirs(?) located south of the petroglyph. They are visible only on the hill-shaded 3D model without texture, as texture obscures the weak traces of these shapes. These carved reservoirs show further evidence of a second phase of rock shaping, as the upper edge of the northern terrace of sector W04 cuts into the eastern reservoir. Thus, both carved reservoirs can be attributed to the pre-Inca phase of the shaping of the rock.

The western edge of the central platform of W05 has two steps. The first one forms a roughly 50 cm-wide bench elevated ca. 12–25 cm above the main platform level. It continues along the northern edge of the sector and runs until it reaches a narrow channel connecting this sector with sector W06. The position of this channel corresponds with a natural crack in the rock, and probably this connection between both the sectors is also of late provenance.

The second step on the western edge of the central platform consists of two recesses cut into the slope. The

northern one is smaller (60 × 80 cm) and forms a small seat, while the southern one is much more spacious and has a less regular shape. Further to the west lies a flat area that extends until another step about 25 cm in height.

Sector W06

This sector lies directly north of sector W05 and is very similar (Fig. 5). Its central part is also a large (6.5 × 10.5 m), roughly horizontal platform with a figural petroglyph embedded into a circular shape raised above the platform level. However, in this case, the circle is surrounded by a ca. 35 cm-wide and 15–25 cm-deep channel that directs water to the north.

The figural representation is relatively well preserved, and the silhouette of a sneaking felid (possibly a jaguar) is easy to recognise. The petroglyph gives some evidence that it was altered in later periods. The channel surrounding it might be a later addition or at least have been recut.

Further to the north-west in sector W06 lies the area where, according to the earlier investigators [5], a representation of a coiled snake was once clear. Today, no traces of it can be seen. Using vPTM and vRTI techniques, we were able to identify at most a vague outline of a snake crawling towards the north-west. We did not find any archival photographs that could indisputably confirm that there was a depiction of a coiled snake. Instead, we found the opposite – d'Orbigny in his drawing from 1834 (Fig. 6) clearly shows, although schematically, a snake crawling towards the north-west. However, this random possible coincidence does not prove the correctness of our reconstruction. The preserved traces are so indecipherable that they also allow for several other interpretations. Despite this, the one proposed here seems to be the most reliable.

In this area of the sector, there are traces of another small channel running to the east and joining the other channel at a position where yet another channel joins from the west. All three channels disperse water down the slope in a north-western direction, across the line of a hypothetical *quincha* wall.

The main platform of sector W06 is well defined from the south and the west. Its southern border is a 6 m-wide edge separating sectors W06 and W05. To the west, there is a bench (roughly 50 cm wide) elevated ca. 12–25 cm above the main platform level – similar to that in sector W05. Two small (roughly 30 × 60 cm) symmetrical seats have been cut into the upper edge of the back of the bench. Further to the west lies a 3 m-wide flat area that continues until another step about 50 cm high.

In the middle of the western margin of the platform, roughly adjacent to the figural petroglyph, a spacious (ca. 2.5 × 2.5 m) recess with three nearly vertical sides at least 70 cm high cuts into the slope. At present, the bottom of this recess lies ca. 0.5 m below the level of the central platform, but this might be due to local erosion of the rock or later modifications. The original bottom surface of the recess is still visible on the western side in the northern and southern corners. It is ca. 30–40 cm higher than the level of the central platform. One can only speculate about the original function of this recess. Perhaps it was a kind of ceremonial seat associated with rituals celebrated around the two petroglyphs in the central part of this sector.

The eastern margin of sector W06 is not as sharply defined as the western one. Only a very shallow step, not more than 20 cm high, separates it from neighbouring sector W09. Since this step cuts into a flat area where there was once a representation of a rhea (*ñandú*), the main platform of sector W06 must have been arranged (or recut) in later periods, with the rhea representation pre-dating it. The same applies to the central platform of sector W05. Its north-eastern corner also cuts into the area of the rhea representation. This observation does not exclude the possibility that the representations of the rhea, puma or jaguar are contemporary and that the two central platforms of sectors W05 and W06 were recut when all three petroglyphs already existed. However, due to the differences in the state of preservation of particular petroglyphs, we are inclined to suggest that the representation of the jaguar(?) amended an earlier, probably pre-Inca petroglyph.

Sector W07

This sector shares its western border with sector W04 (Fig. 7). Accumulated earth covers its southern, lowest part. The original rock emerges further to the north in two steps. The first one leads to an irregularly shaped platform raised roughly 1 m above the southern, lowest part of this sector. It forms an east–west elongated trapezium. The second step leads to a rectangular (ca. 2.4 × 17 m) platform situated ca. 60 cm higher. The southern edge of this platform is highly eroded due to natural cracks in the rock. At the back of this platform, there is a sharp step more than 1.5 m high separating this sector from sector W08 in the north. A stairway with at least five steps located in the centre of the platform probably facilitated movement between both sectors.

In the east, another stairway marks the border of the sector. This one is much longer, and consists of 14 steps enabling access to sector S02, located further down the slope.

Sector W08

Sector W08 can be divided into three distinct parts (Fig. 7). The westernmost part that neighbours sector W05 does not show any traces of intentional shaping. Its incline towards the south is disturbed by several parallel natural cracks. In the north of the central part, three small (ca. 1 × 2.5 m) platforms can be found. These could be a continuation of the stairway that reaches this point from sector W07 below.

In the eastern part of the sector, two terraces, nearly 10 m long, are extant. The lowest one, which is more than 3 m deep, can be directly accessed from the stairway on the border between sectors W07 and W11. In front of the last step of this stairway, an oval shape (ca. 2 × 1.4 m) protrudes ca. 15 cm from the surface of the terrace. We consider this to be an eroded, intentionally destroyed, or unfinished petroglyph – possibly figural. Since all of the figural petroglyphs identified on Samaipata rock are associated with traces of water used for rituals performed there, our interpretation is further supported by the presence of

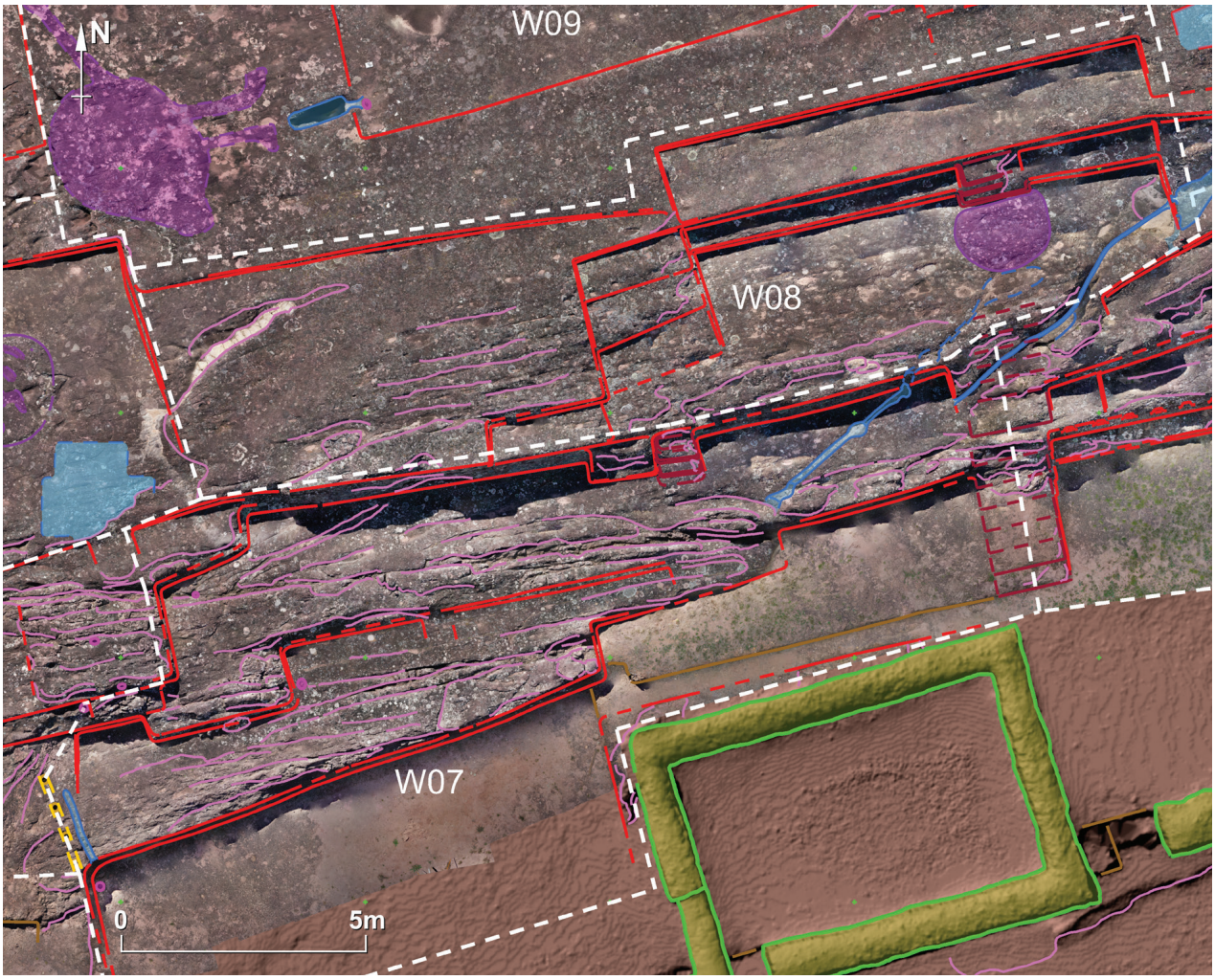

Fig. 7. Sectors W07 and W08

shallow traces of what might be a small basin in front of the petroglyph.

Behind the remains of the petroglyph, four steps lead to the upper terrace, which is about 1 m high. On both sides of the steps, there are narrow benches not more than 0.5 m deep.

Sector W09

Sector W09 is situated on the top of the western part of the rock (Fig. 8). Its surface is slightly inclined to the west (the difference in height between the eastern and the western part is ca. 1 m), and on its northern and southern edges, rapidly slopes down. It borders sector W06 in the west, sector W08 in the south, and sector W10 in the north. The western side of a north–south oriented wall across the top of the rock is the eastern border of sector W09. The southern section of this wall runs through a ca. 35 cm-deep reservoir that collects rainwater. Thus, the wall must be of a later origin.

Although the wall is a modern reconstruction, several lines engraved and still visible on the rock surface well attest its original shape and dimensions. Three niches are extant on each side of the wall. The niches looking to the west have double recesses. This is typical in Incan architecture, which clearly points to the origin of this wall.

Since the modern reconstruction well follows original dimensions, the Incan provenance of the wall can be further confirmed using the cosine quantogram metrological analysis of niches. When comparing dimensions of all the recesses (Fig. 9), the results are inconclusive. However, if we limit our investigation only to the inner small recesses, the resulting quantogram matches units of measurement typical for Incan buildings of high prestige, as proposed by Anna Kubicka in her doctoral thesis [10].

Two other elements in this sector can however be attributed to the pre-Inca period – the already mentioned representation of the rhea in the western part and a circular depression in the eastern part of the sector. Of the depression, only its eastern edge – a small, ca. 3 cm-high step – can be identified, but this is enough to reconstruct its diameter as ca. 4 m. No traces are left on the surface of this depression that might point to its function. It is too shallow to have been used only as a place to collect rainwater, but perhaps it once housed another (figural?) petroglyph in its centre. If so, this must have been entirely erased by later occupants of the site – probably during the same time that a T-shaped platform with a small

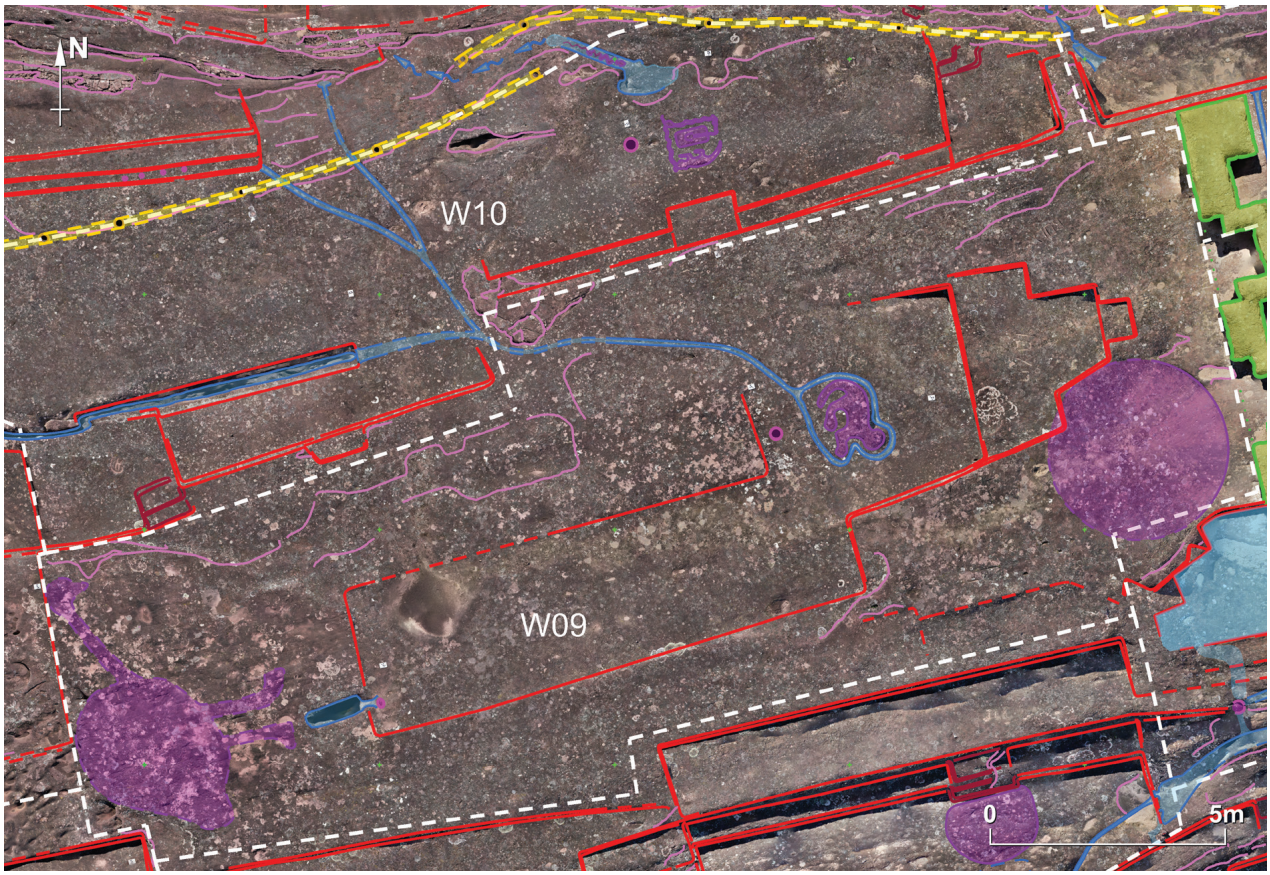

Fig. 8. Sectors W09 and W10

recess pointing to the east was carved. The outline of this platform overlaps the reconstructed extent of the circular depression. The petroglyph representing the rhea has also probably been intentionally hammered out. Our attempts to reconstruct it using vPTM and vRTI ended only with a general suggestion about the size and orientation of the figure. Generally, this suggestion is similar to the schematic *icon* on d'Orbigny's drawing (Fig. 6). There, the figure of the rhea is shown in an entirely different manner than all other petroglyphs, which, as we can see today, are bas-relief. Can this difference in the way of depicting the rhea on d'Orbigny's drawing mean that in this case, we are dealing with a sunken relief? If so, this might be one of the reasons that it has completely disappeared[8].

The central part of sector W09 has been further reshaped during the last phases of occupation. A shallow, Z-shaped platform cuts into the rock surface. In the middle of the eastern, roughly square part of this platform, a representation of another felid (possibly puma) is carved in bas-relief. A flat water channel surrounds it. This channel continues further down the slope in a north-western direction (Fig. 8). A rounded hole (ca. 25 cm in diameter) drilled into the rock in front of this petroglyph might have been used for offerings. It seems that the petroglyph was created together with the platform around it. The highest points of the "Puma(?)" petroglyph are well below the reconstructed line of the ridge of the rock from the time before the platform was carved (Fig. 10). Thus, the wall with niches, the Z-shaped platform, and the puma representation could all be attributed to the period of Inca occupation of the site.

Another offering hole has been cut into the rock at the western end of the Z-shaped platform, in front of the place where the rhea is no longer extant. A small channel connects it with a natural crack in the rock that is more than 35 cm deep.

Sector W10

Sector W10 forms a nearly horizontal platform (ca. 5 × 28 m) on the northern slope of the rock (Fig. 8). The *quincha* wall already described marks the northern extent of the sector. Two steps starting on a nearly square (ca. 2.5 × 3 m) platform in the south-western corner of the sector probably facilitated movement between this sector and sector W09 in the south, as there is nearly 1 m difference in height between these two sectors. The steps lead directly to the area where the representation of the rhea was once extant. This observation goes hand in hand with our previous remark about the earlier provenience of this petroglyph.

In front of the platform with steps, a water channel ca. 6 m long and 0.5 m wide cuts into the surface of the rock. It collects water running down from the puma petroglyph located in sector W09. The second branch of water flowing from sector W09 goes directly to the north and splits into two streams.

[8] Our attention was drawn to this possibility by Marta Pakowska.

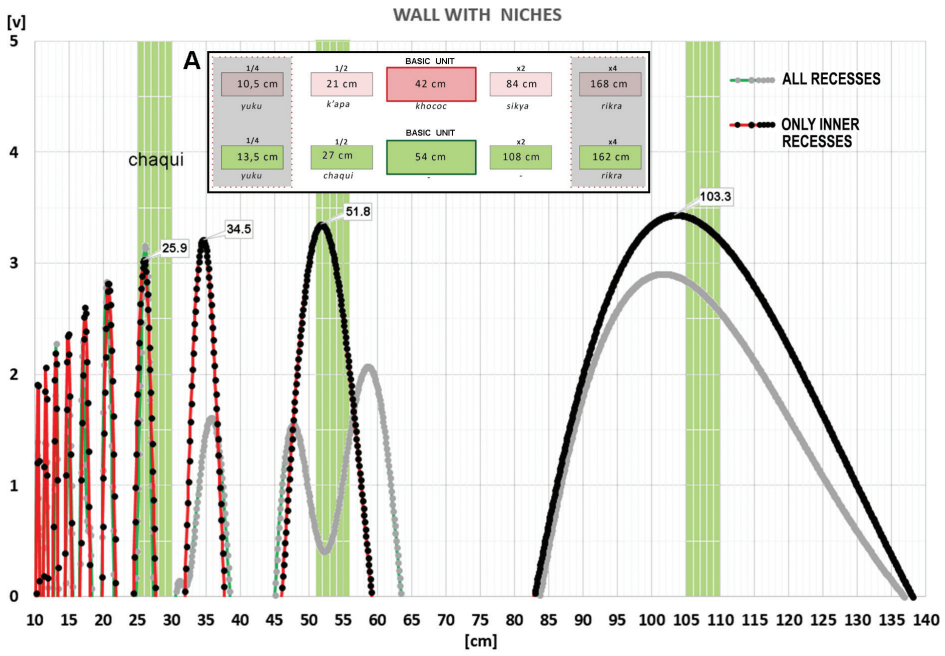

Fig. 9. Cosine quantogram analysis of the wall with niches. A – The double system of Incan units of measurement proposed by A. Kubicka [10, p. 171, ryc. 114]

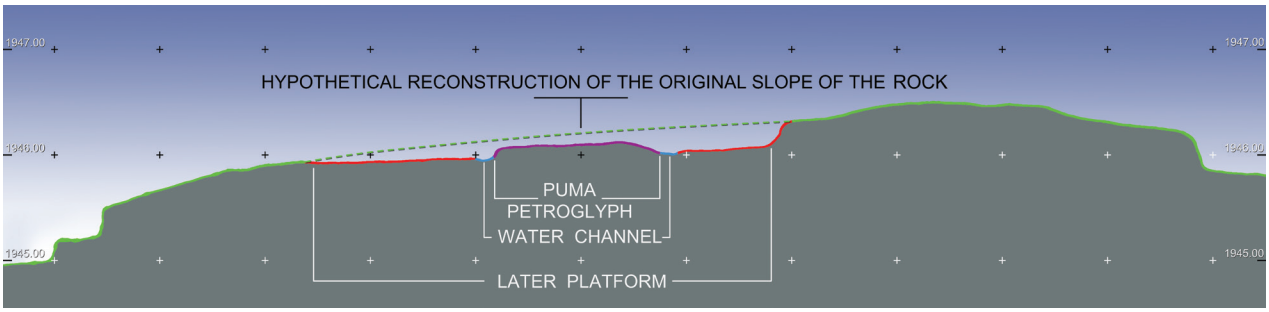

Fig. 10. North–south section across sector W09

The eastern part of sector W10 is organised differently. Although in the far east, there is a platform similar to that found at the western end, the southern and northern borders differ. A ca. 50 cm-wide bench runs along the southern edge. A small (ca. 1 × 1.5 m) platform or possibly seat projects from the middle of this bench. In front of it, traces of an extremely eroded petroglyph are extant. Again, using vPTM and vRTI, we were able to identify this as the representation of an animal that has caught a snake's head with its snout. Another snake is grabbing the tail of the first one, and yet another, emerging from a hole in the rectangular centre of the whole scene, is catching the tail of the second one. This complicated layout of four interacting animals covers approximately 1 m^2. It has no parallel on Samaipata rock. The representation of the main animal is also very untypical and points rather to being carved during the pre-Inca period. It does not resemble the puma or jaguar petroglyphs on the rock[9]. An offering hole (ca. 25 cm in diameter) accompanies this petroglyph in the west.

The northern perimeter of sector W10 has further peculiarities. Roughly adjacent to the snake-catching petroglyph described above, the *quincha* wall is split into two parts running parallel for a distance of ca. 2 m. Between them, traces of a channel directing water down the slope are visible. The upper part of this channel is ca. 25 cm wide and has well defined, straight edges. In the middle, extremely eroded traces of yet another petroglyph representing a snake crawling up the slope were detected.

Sector W11

Sector W11 is located at the base of the opposite, southern slope of the rock (Fig. 11). From the south, it borders a flat area covered with reconstructed remains of Incan habitation [9].

In the west, the flight of steps already described for sector W07 separates these two sectors. Similar steps mark the eastern extent of the sector. There, 18 narrow steps (ca. 75 cm wide) climb to the north from the foot of the rock. Traces of other, less regular steps are extant in the middle of the sector. East of these, an oval shape protrudes

[9] Attempts to identify the species suggest that it is the white-nosed coati (lat.: *Nasua narica*; local names: *pizote*, *antoon*, *tejón*), the only similar animal from the area, known as a snake catcher. Cf. https://en.m.wikipedia.org/wiki/White-nosed_coati [accessed: 15.03.2019].

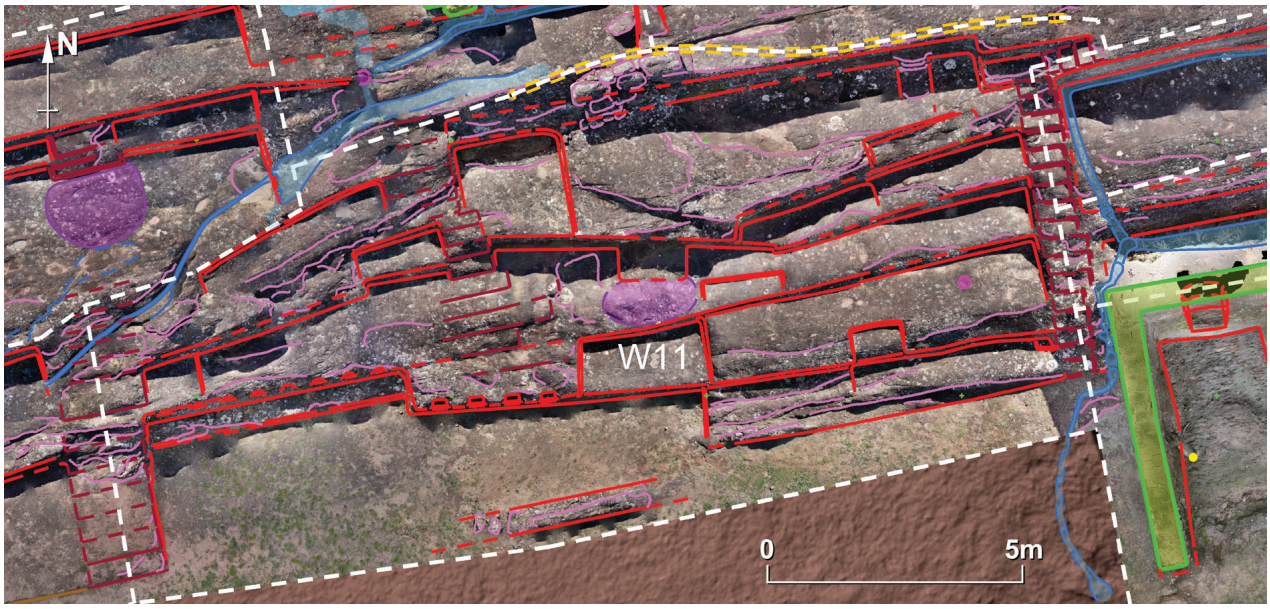

Fig. 11. Sector W11

10–15 cm from the surface of the rock. It is probably a relic of another petroglyph that is impossible to see today. The presence of a small platform to the north of this shape renders this interpretation even more likely.

Further to the north, irregularly arranged terraces and platforms are probably the result of many modifications that the rock underwent during various phases of occupation.

The southern area of sector W11 is divided into three distinct units. Four double-recessed, square niches decorate the face of the central part that protrudes to the south. A narrow, 50 cm-wide bench continues to the west. The back of the bench, which is ca. 75 cm above the bench level, is decorated with eight small, square niches. To the east of the double-recessed niches, a small platform (ca. 1 × 2.5 m) cuts into the slope. A sequence of four, rectangular terraces can be seen in the easternmost part of the area.

In front of the four double-recessed niches, there is a 50 cm-wide and 3.50 m-long possible fragment of a wall. Its eastern and western extents are not clear. It may be the remains of the front wall of a roofed room that once existed in this place, but no confirmation of such a hypothesis has been found in any of the archaeological reports.

Northern part of the rock

Sector N01

Sector N01 is located in the western part of the northern slope of the rock, on the edge of the area covered with vegetation (Fig. 12). The sector comprises three different zones:

– A small plateau in the south-western part shaped as a system of flat-stepped terraces;

– A steep slope running latitudinally in the central part of the sector at the foot of which traces of five differently sized terraces are preserved;

– A flat zone in the northern part that marks the northern extent of currently identifiable traces of anthropogenic shaping of the rock.

The difference in levels between the southern and northern zones reaches 1.5 m in some places. In the steep,

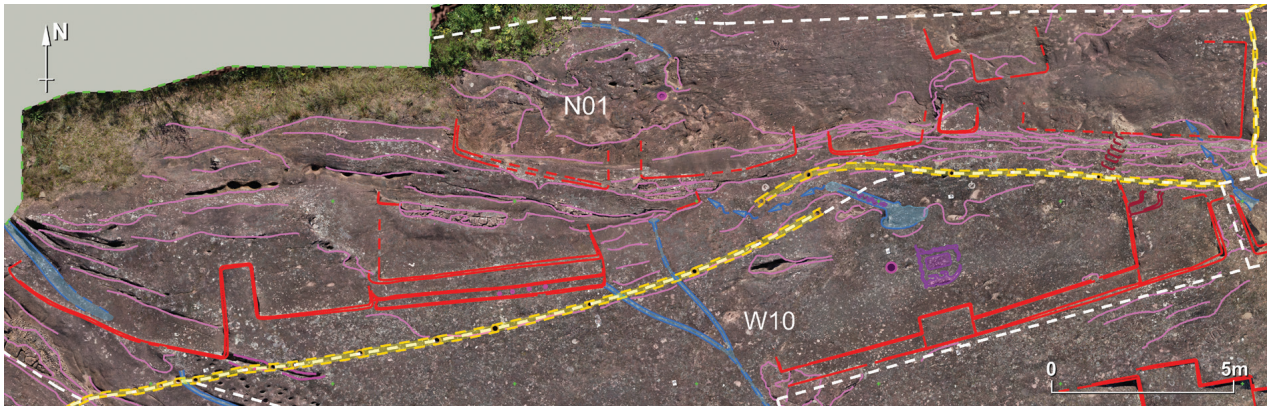

Fig. 12. Sector N01

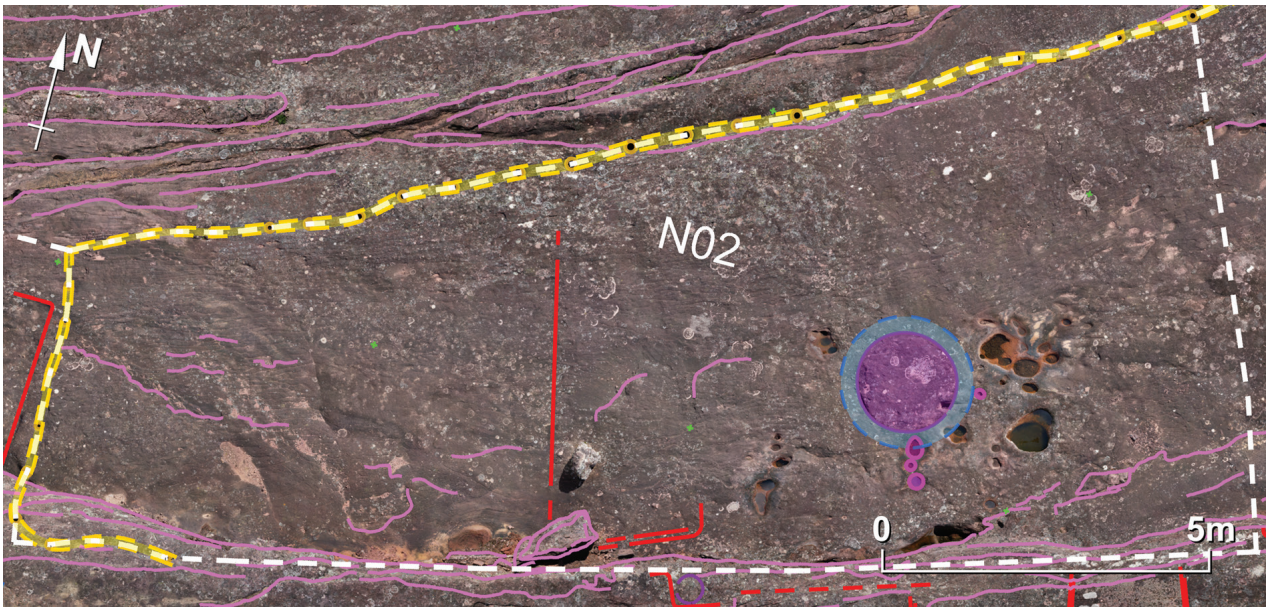

Fig. 13. Sector N02

eastern part of the slope, where the difference in levels is particularly significant, six narrow, not more than 40 cm wide, steps have been carved. They lead directly to the foot of a *quincha* wall running along the upper edge of the slope. Either they precede the construction of this wall, or they were hewn in the rock when the wall ceased to exist. They could also have been used only during the construction of the *quincha* wall. The very negligent manner of execution may speak in favour of the last interpretation.

In three places, flat rainwater channels intersect sector N01. They drain water from sectors W06, W10, and C02 located higher up the slope.

Sector N02

Sector N02 is a continuation of the lowest, flat part of sector N01 (Fig. 13). The *quincha* wall mentioned above surrounds it from the north, west, and partly from the south. The southern boundary is a steep, nearly 1.5 m-high, cliff that separates this sector from sector C02.

In the eastern, almost flat part of sector N02, there are relics of an indecipherable petroglyph in the form of a round disk about 1.5 m in diameter. The disk was once surrounded by a ca. 25 cm-wide water channel. The difference in elevation between the centre of the disk and the surrounding channel does not exceed 10 cm. In the vicinity, a few offering holes have been drilled into the rock.

The only other features of anthropogenic origin are a small fault across the sector and the outline of a ca. 2.3 m-wide platform at the foot of the cliff.

Sectors N03 and N04

The topography of sector N03, which is located further to the east, is similar to sector N02. Its northern border is the continuation of the *quincha* wall traversing the slope of the rock that descends towards the north (Fig. 14). A terraced rock edge almost 2 m high marks the southern border of this sector.

In the northern part of the sector, no traces of intentional carving of the rock have been found. A sequence of parallel natural cracks running east to west cuts this sloping surface. In the higher, southern part of this sector, three flat terraces bear traces of intentional shaping. The overall state of preservation of the rock in this sector does not allow for a more conclusive interpretation of these terraces. However, one can get the impression that the layout of the terraces is a continuation of the layout of the much more well preserved terraces in sector N04 located to the east.

Sector N04 has a clearer layout (Fig. 14). The line of circular holes that we interpret as traces of a *quincha* wall again marks its northern border, while a more than 60 cm-high, sharp step delimits its southern perimeter. Between these two borders, four terraces are arranged. To the east, they end at a narrow stairway ca. 70 cm wide. Seventeen steps negotiate nearly a 3 m difference in height between the northernmost terrace of N04 and sector N05 located further to the south.

The southernmost terrace in sector N04 is trapezoidal in shape, but the remaining three are rectangular, and their perfectly parallel edges suggest one coherent concept of layout.

Sector N05

This sector (Fig. 15) has the shape of an irregular, elongated, polygon (ca. 6 × 40 m). It is located on the northern slope of the rock, just to the south of sectors above sectors N04 and N06. The main elements of sector N05 are three terraces, 2.5–3.5 m wide, falling gently towards the west. The differences in levels between terraces do not exceed 30 cm.

The most interesting element of this sector is the trace of a rounded shape, located in the northern part of the sector, protruding 5–15 cm from the surface of the terraces. Only one-quarter of the original shape has survived, but it is enough to reconstruct the extent of the whole shape,

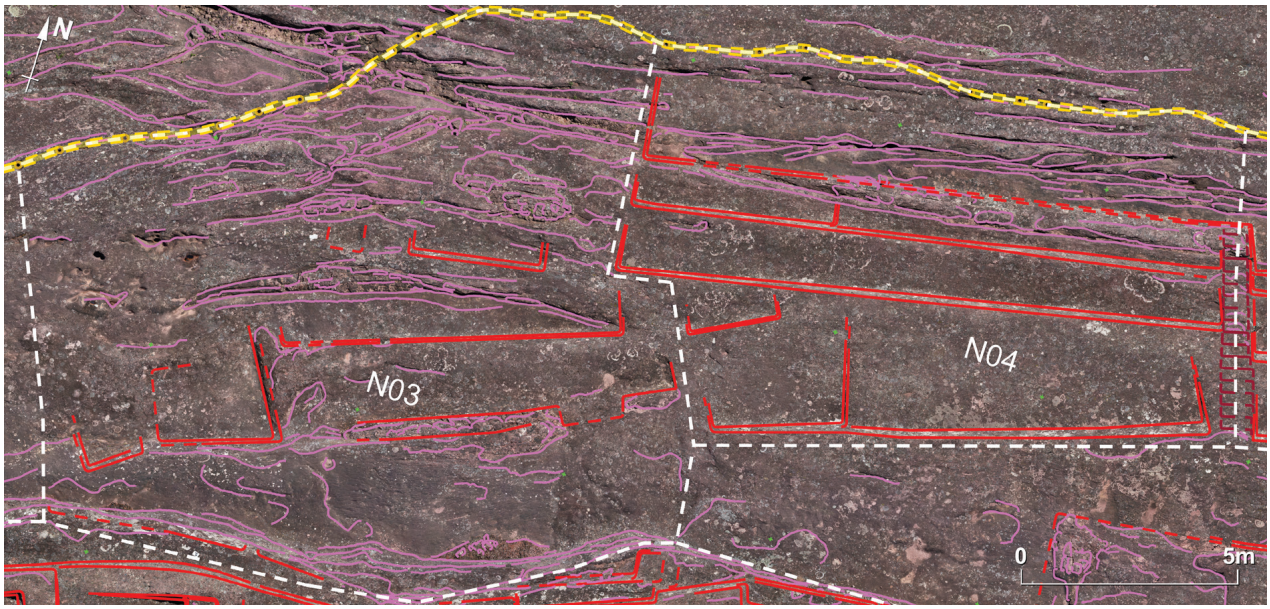

Fig. 14. Sectors N03 and N04

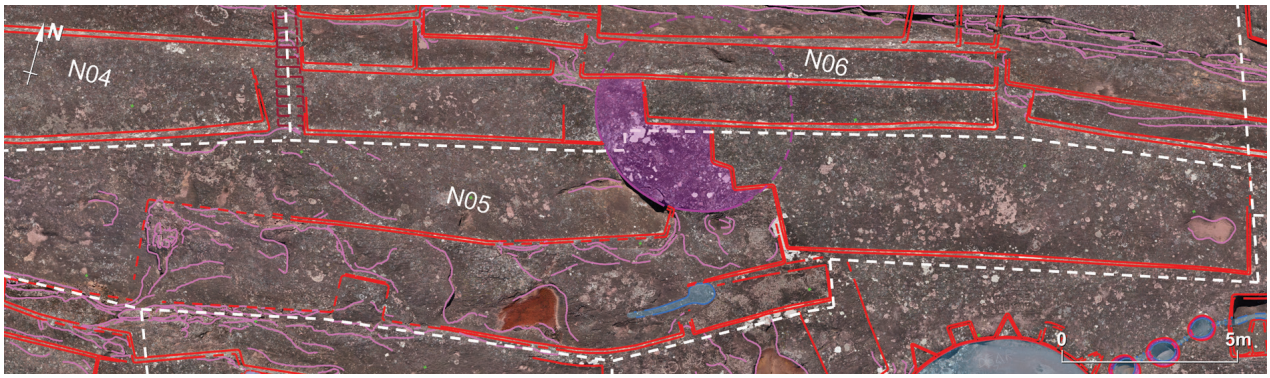

Fig. 15. Sector N05

which must have been over 5.5 m in diameter. The remaining three-quarters of the shape was destroyed when the eastern and western terraces of sector N05 and the terraces of sector N06 in the north were carved. Undoubtedly, this is a relic of an earlier phase of carving the rock surface – probably the pre-Inca one. Perhaps the eastern part of the central terrace of sector N05 belongs to the same chronological phase.

There are no traces on the surface of the circular shape clear enough to attempt a reliable reconstruction of the petroglyph that may have been carved here. Local height differences (no more than a few centimetres) on the shape surface suggest that there may once have been a figural representation. It would have been one of the largest known petroglyphs in Samaipata had it survived to this day, comparable in size only to the "Choir of the Priests" carving situated slightly further south-east in sector C05.

Sector N06

Sector N06 (Fig. 16) is similar to sector N04. A long set of steps separate both the sectors. The northern and southern borders of sector N06 are respectively also the *quincha* wall and the sharp step of the rock. Between two and four terraces step down the slope in a northern direction. Since the slope of the rock also inclines to the west, some terraces are split into horizontal sections separated by steps 10–30 cm high. The surface of the lowest, northernmost terrace is disturbed by a series of parallel, natural cracks running east to west.

The eastern boundary of the sector is marked by the place where the last traces of the *quincha* wall vanish. It should be stated, however, that the easternmost section of sector N06 shows continuation with neighbouring sector N07. The division is therefore arbitrary in this case.

Sector N07

Four different areas constitute this sector (Fig. 17): an area alongside the sector's northern border, five platforms in the centre that step down to the west, two spacious platforms located to the south, the southern edge with a sequence of narrow shelves and two water reservoirs(?), and an irregularly shaped platform at the westernmost end of the sector.

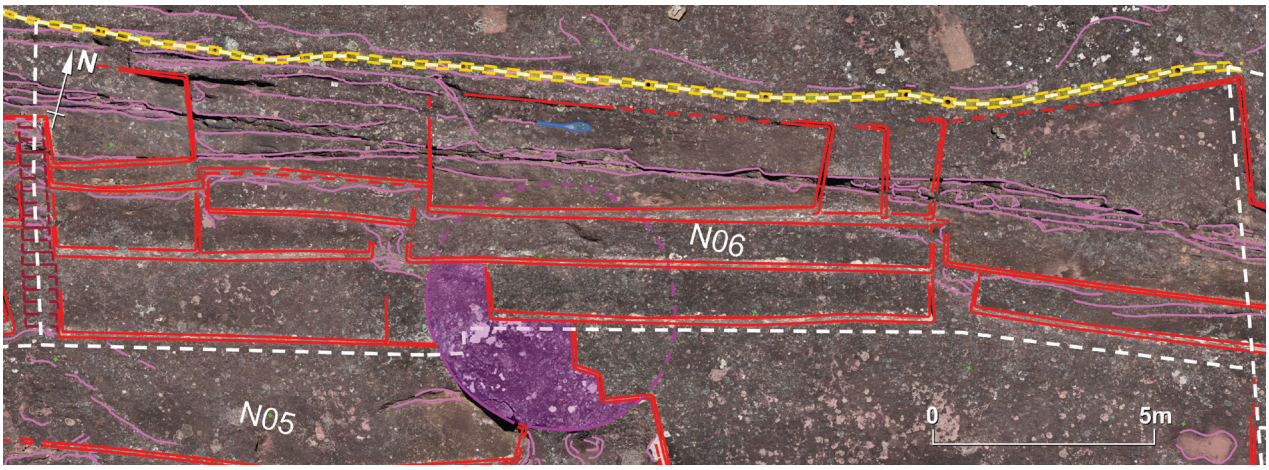

Fig. 16. Sector N06

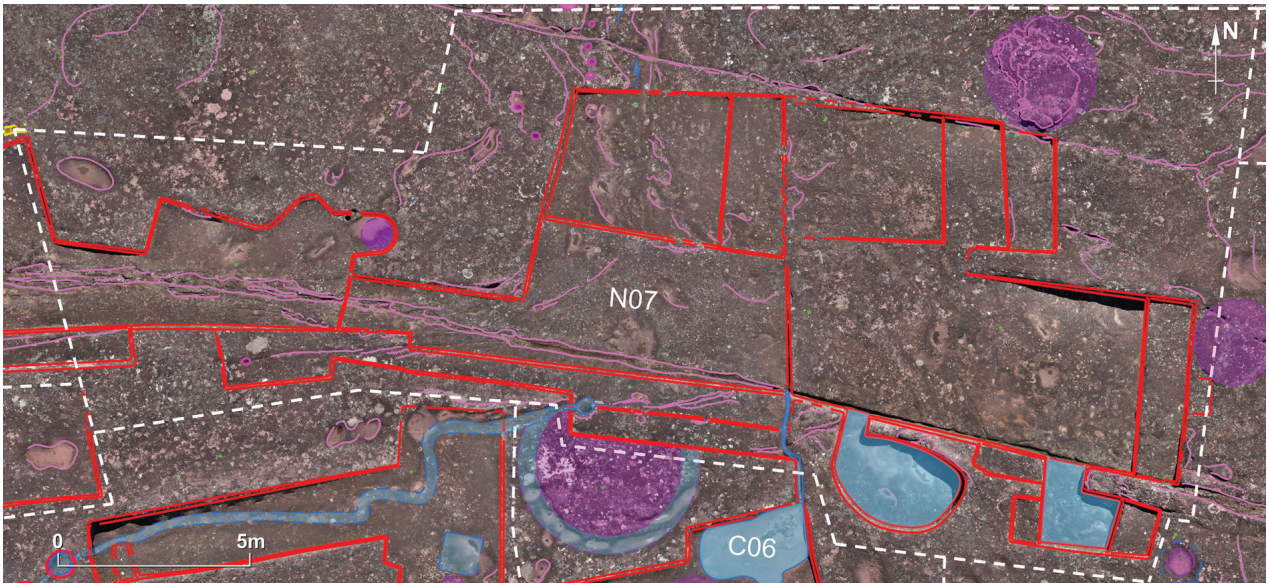

Fig. 17. Sector N07

Two natural cracks cut the whole area. The smaller one runs alongside the northern edge of the sequence of five platforms. The much deeper, southern crack is a continuation of a series of fissures running alongside the northern slope of the rock, already known from sectors N04 and N06.

The northern, irregular edge of the westernmost platform has no parallel on the whole rock, as all other platforms are trapezoidal or rectangular in shape with angles nearing 90°. It might be that this platform did not get finished, thus can be associated with the last stages of the rock being carved. The question of whether this was during the last pre-Inca phase or the last stage of Inca activity remains open. A semi-circular recess in the eastern part of the platform looks, however, like it has been carved intentionally. Very unclear traces suggest that once this could have been a circular (ca. 60 cm in diameter) protrusion raised a few centimetres above the surrounding surface – perhaps another petroglyph.

The levels of all platforms in sector N07 have been shaped so that rainwater flows towards the northern, lowest platform, and thus down the slope (Fig. 18). This observation also applies to two recesses, one elliptical and the other L-shaped, cut into the southern edge of sector N07. The inclination of the bottoms of these recesses excludes the possibility that they could be reservoirs for collecting rainwater – any water on the bottom of both recesses would have immediately flowed to the lower platform. Such a situation leads to the supposition that both recesses were supposed to remain dry, even if water was in use here. It is not possible to point to more specific functions that both recesses could have served, but they could have been related to rituals in the "Choir of the Priests" located about 25 m to the west, or more likely, with rituals in sector C06 adjacent from the south.

Since the southern edge of sector N07 cuts into an earlier circular petroglyph, a fragment of which can be found in sector C06, we can conclude that the platforms of

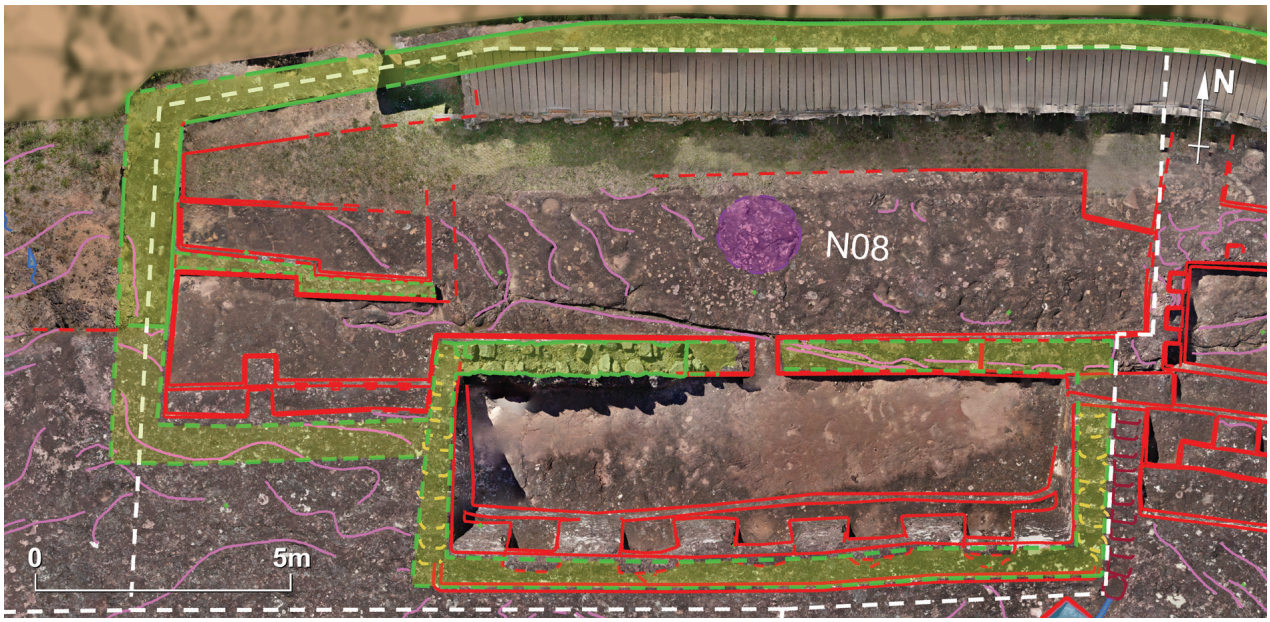

Fig. 18. Sector N08

sector N07 as well as the recesses came from a relatively late, probably Inca phase of carving the rock.

In the north-eastern corner of sector N07, an irregular, roughly circular protrusion can be interpreted as traces of another petroglyph whose original form cannot be recognised today. Its diameter was probably up to 3 m.

Sector N08

Sector N08 (Fig. 18) is located on the edge of a steep northern slope and in the northernmost part of the rock where traces of intentional human activity are still preserved. It is one of the most architecturally interesting sectors.

Three distinctly separate units can be distinguished here. The most important is that of what is known as the "Temple of Five Niches". It was once a roofed building measuring ca. 5 × 13.3 m. From the northern side, its front wall is still preserved. The lower part of it survived only as a 25–35 cm protrusion from the rock surface. The upper part is a ca. 60 cm-thick wall constructed from unshaped stones with local soil as a binder. Although partially reconstructed, the stone wall is still visible in the westernmost part of the temple front.

A narrow, ca. 50 cm-wide passage in the centre of the front wall leads to the single room (ca. 2.5 × 11.5 m) of this building. Its floor is a carefully levelled rock surface. Additionally, the back wall of the room has been carved in the natural rock. A well levelled bench, ca. 30–40 cm high, extends for the whole length of this wall. In the upper part of the wall, five niches (0.99–1.07 × 1.70 m) are regularly distributed. The back wall of the niches is semi-circular, so their depth varies from 45 to 75 cm.

Metrological analysis[10] of the width of the niches and the distances between them indicates that in the process of their planning, a basic unit of measurement was used whose metric value corresponds to 54.5 cm. This observation fits with the results of the metrological research on the Machu Picchu sanctuary, indicating the use of such a measurement in buildings of high prestige [10], and confirms assumptions about the Incan provenance of the "Temple of Five Niches".

The natural rock on the rear side of the room extends 30–50 cm above the niches, so the total height of the back wall of the room reaches 2.6 m in some places. On the top of this back wall is a 60 cm-wide shelf with shallow, irregular elliptical depressions – apparently troughs for stone blocks of the upper-most part of the back wall of the room. However, no single block has survived, and we do not have any indication of the height of this extension of the wall. We can only estimate that it was at least 40–50 cm – just enough to put canopy beams over the entire room, since there is no doubt that the building was once roofed.

In his study, Rolando Marulanda [11, p. 47, Fig. 25] came to similar conclusions as ours given above. However, his hypothetical reconstruction assumes the existence of a gable roof. Due to the lack of a typical channel draining rainwater from the southern roof slope, such a reconstruction seems doubtful. A single-pitched roof seems more likely – similar to the one proposed by Boero Rojo [12, p. 90, Fig. 45]. However, the latter reconstruction does not take into account the existence of a stone front wall of the building, and Rojo erroneously interprets its traces.

Irregular elliptical depressions (troughs for stone blocks) are visible on the top of the side walls of the room. Due to the nature of the slope of the rock, the tops of the lower parts of the side walls that are carved in the natural rock are also sloping. As a result, the troughs for the stones in the side walls are similar to roughly cut steps. However, they should not be confused with them. The real steps are on the east side of the building and run parallel to the line of troughs.

[10] Again, the cosine quantogram method was used for metrological analysis.

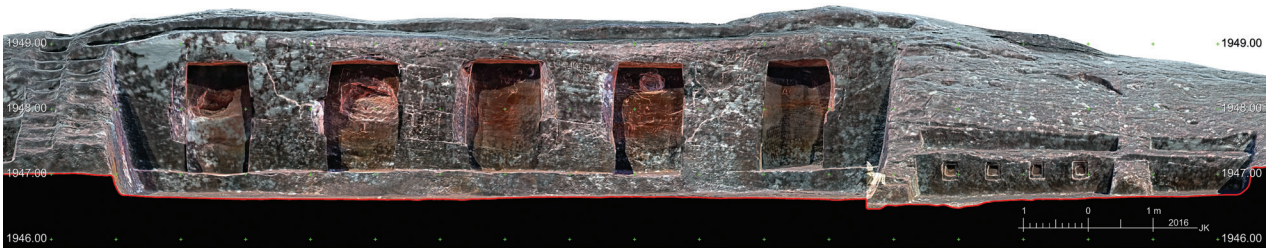

Fig. 19. Sector N08. The northern façade of the "Temple of Five Niches". Ortho-image from TLS

In front of the "Temple of Five Niches", a spacious, roughly horizontal, platform (5.5 × 14 m) has been cut into the rock. In the centre, in front of the entrance to the room with five niches, traces of another circular petroglyph have been identified, but the poor state of preservation prevents any attempts to identify the nature of this petroglyph. From the northern side, the platform is limited by a reconstructed stone wall standing on the edge of the cliff. The eastern border is another protrusion that is 30–40 cm higher than the surface of the rock and separates this sector from neighbouring sector N09.

To the west, the platform borders a group of four terraces separated by a Z-shaped protrusion. The three northernmost terraces were probably open to the sky, while the last one most likely functioned as a separate room, covered by a roof. The only entrance was from the east, at the corner of the room – a feature not typical for Incan architecture. It should be noted, however, that the traces allowing for the hypothetical reconstruction of the southern and western walls of this room are not as apparent as in the "Temple of Five Niches", so the existence of a roofed room here cannot be taken for granted.

The most interesting element in this part of sector N08 is the southern wall of the highest terrace, which, according to our hypothesis, was roofed. The wall consists of two parts separated by a rectangular projection. The smaller, western part is devoid of decorations. In the eastern part, however, four small niches (ca. 25 × 28 cm) with characteristic double recesses have been arranged symmetrically (Fig. 19). Here, too, metrological analysis indicates the use of an Incan unit of measurement typical for high-prestige buildings – this time, due to the smaller dimensions (13.3 cm) of the niches, this is *yuku* [13] – a fractional part of the previously identified unit of measurement [10]. This observation can be considered as further confirmation that the relics in sector N08 relate to the Incan phase of occupation of El Fuerte de Samaipata.

Sector N09

Sector N09 (Fig. 20) consists of three separate areas. Remnants in the northernmost area form a T-shaped protrusion elevated 20–40 cm above the rock surface. This separates the sector from sector N08 in the west and at the same time divides the lowest, northernmost unit of this sector into two parts. Several small niches or seats (ca. 30 × 45 cm) are preserved in this protrusion. Six of them face a bigger, rectangular area (ca. 2.5 × 6.0 m) and two others point to the north, where much smaller and less regular space has been arranged. The form and the way this T-shaped protrusion has been carved into the rock are very similar to the bottom part of the front wall of the "Temple of Five Niches". Perhaps, here too, it served as a foundation for a stone wall that stood on it. However, clear traces allowing for a convincing reconstruction of the shape of the rooms that could have been separated by such a wall are missing. Besides, it is highly possible that either the original intention was abandoned or the original form of this protrusion was disturbed by later work in the central part of the area.

There, two distinct groups of rock carving can be distinguished. The bigger, more westerly located carving consists of three terraces (ca. 1.0 × 6.5 m) cut into the northern slope of the rock. The middle terrace has a more complicated form than the two others (Fig. 21). Two platforms (ca. 52 × 206 cm), each roughly 45 cm high, are set symmetrically against the back of the terrace. In front of them, ca. 27 cm-high, rectangular steps (51 × 82 cm) are placed. The surface of the rock is well finished there and the edges of the platforms and steps are sharp and well defined. All this gives the impression that skilled stonecutters worked on this area. Metrological analysis of main dimensions reveals again a unit of measurement typical for Incan architecture of high prestige[11].

The lowest of the terraces described above continues to the east. Approximately 10–15 cm above the surface of this terrace, five semi-circular seats (each ca. 60 cm in diameter) have been carved in its rear wall (Fig. 22). The semi-circular shape is somewhat surprising, as is their upper part, which gives the impression of having never been finished. It is, therefore, possible that work in this area was abandoned. Perhaps the seats were intended to be rectangular, and their present shape is a kind of semi-finished product – the first stage of carving them. Since metrological analysis again indicates the use of units of measurement typical of Incan high-prestige architecture, one can risk the hypothesis that the work was interrupted in the last phase of Inca presence at El Fuerte de Samaipata.

On the slope above the terraces to the south, traces of intentional carving are limited to only two rectangular water

[11] This time, the results obtained were more unambiguous than in the "Temple of Five Niches". Measurements of 13.8 [13.5], 26.0 [27.0], and 50.3 [54.0] cm were detected. Incan units of measurement observed by Kubicka [10] in the central part of Machu Picchu are given in square brackets.

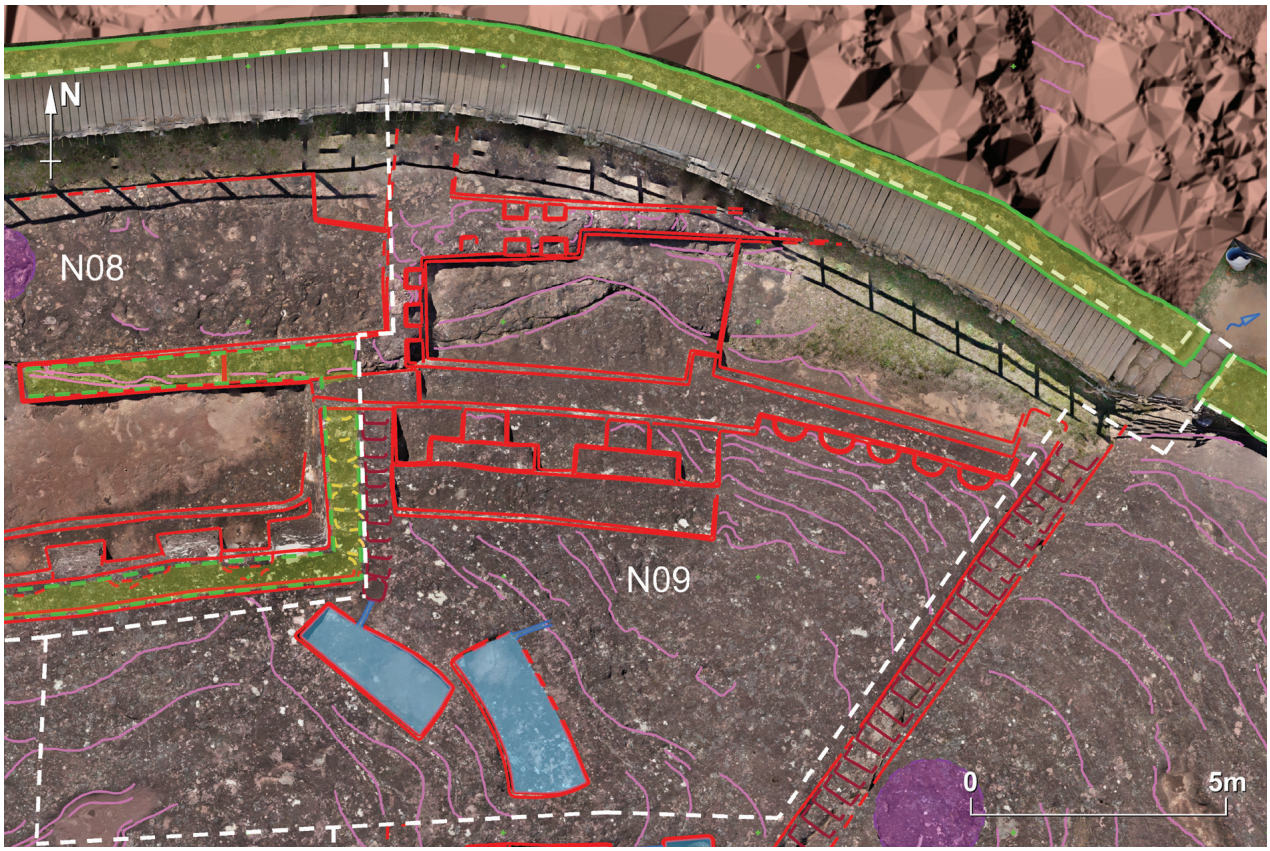

Fig. 20. Sector N09

Fig. 21. Terraces in the central part of sector N09 as recorded with TLS

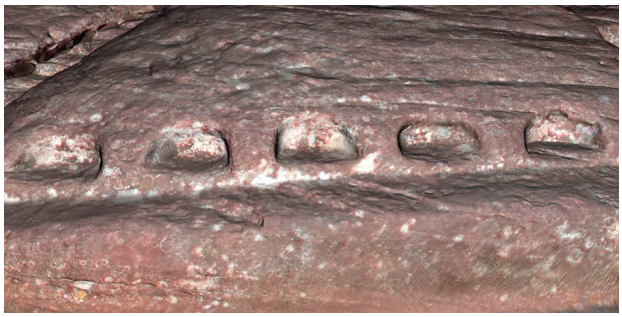

Fig. 22. Semi-circular niches in sector N09 as recorded with TLS

reservoirs (ca. 1.1 × 3.1 m and 1.25 × 3.35 m). Their depth does not exceed 7–10 cm. The outlet of the first of them leads towards the steps separating sectors N08 and N09. The second reservoir discharges water to the slope above the terraces located in the central part of sector N09.

Sector N10

Sector N10 is located east of sector N09 (Fig. 23). 10 m-long series of 26 steps, each less than 80 cm wide, separates both the sectors. The eastern border of sector N10 is an L-shaped wall decorated on both faces with double-recessed niches.

The main feature of this sector is a group of three water reservoirs located in the highest, north-western part. The surface of the largest L-shaped reservoir exceeds 12 m^2, but the slope of its bottom and the elevation of the outlet mean that it could accumulate at most about a quarter of a cubic metre of water. Water overflowing from this reservoir ran to a much smaller one (0.9 × 1.3 m) located on the eastern side, and then to another slightly larger one (ca. 2.0 × 3.0 m). A small intermediate reservoir could act as a sediment trap where all impurities flowing down with the water could accumulate.

The last of the reservoirs is also very shallow, and taking into account the fact that its outlet is only 3–4 cm above the bottom, it could not store more than about 150 litres of water. It supplied water to a carefully carved channel on its eastern side. The preserved traces of this channel allow its course to be traced to over a length of ca. 4 m, but it was probably much longer. The bottom of the channel has the form of a meandering snake. On both sides of the channel are shelves about 25 cm wide on

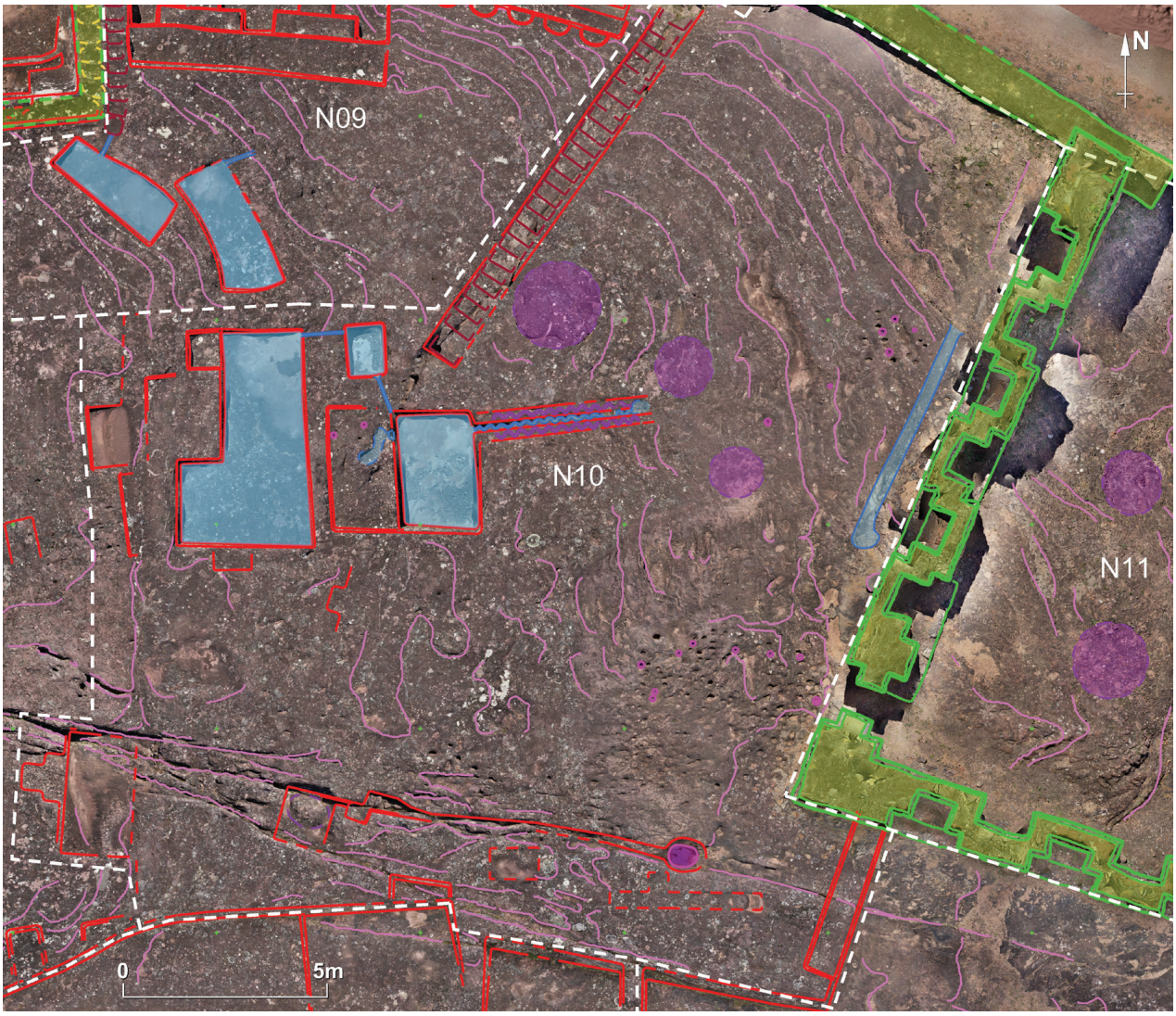

Fig. 23. Sectors N10 and N11

which a similar meandering pattern has been carved, but this time as a bas-relief.

From the west, the lowest of the reservoirs is accompanied by a small platform (ca. 1.65 × 3.00 m) raised around 0.5 m above the bottom of the reservoir. Poorly decipherable traces preserved on the surface of this platform may suggest that another zoomorphic petroglyph once existed at this place [11, p. 38]. Due to the poor state of preservation, attempts to reconstruct the form of the petroglyph should be treated with extreme caution. It cannot be excluded that the traces are the result of natural weathering and erosion. This reservation also applies to two round openings interpreted as offering holes – their anthropogenic origin is not indisputably confirmed.

Marulanda also puts forward a hypothetical reconstruction of a building (a temple, as he calls it) erected on the slope above the lowest reservoir and the accompanying platform [11, Fig. 28, p. 50]. Similarly to the "Temple of the Five Niches", placing the walls of such a building on a slope would require preparation of a proper base on the ground (troughs for the lowest row of stones), so that the foundation part of the walls would not slip down the slope. No such traces can be found today, which makes the whole hypothesis disputable.

Near to the reservoirs, almost entirely blurred edges of subsequent recesses and small platforms or niches can be observed. To the east of the reservoirs, there are also traces of numerous offering holes and three circular petroglyphs. Their poor state of preservation prevents any interpretation.

Traces of artificially shaped surface are also extant in the natural rock crack along the southern border of the sector. Perhaps it was used as another channel to drain rainwater.

Sector N11

A few traces of pre-Hispanic activity can be found in the area bordered from the west and south by an L-shaped stone wall decorated on both faces with double-recessed niches (Fig. 23). These include traces of two round petroglyphs in the western part that are hard to interpret, and very eroded edges of two terraces in the eastern part. The remains of a rectangular building (ca. 6–12 m) standing in the central part of the sector were built during the Hispanic phase.

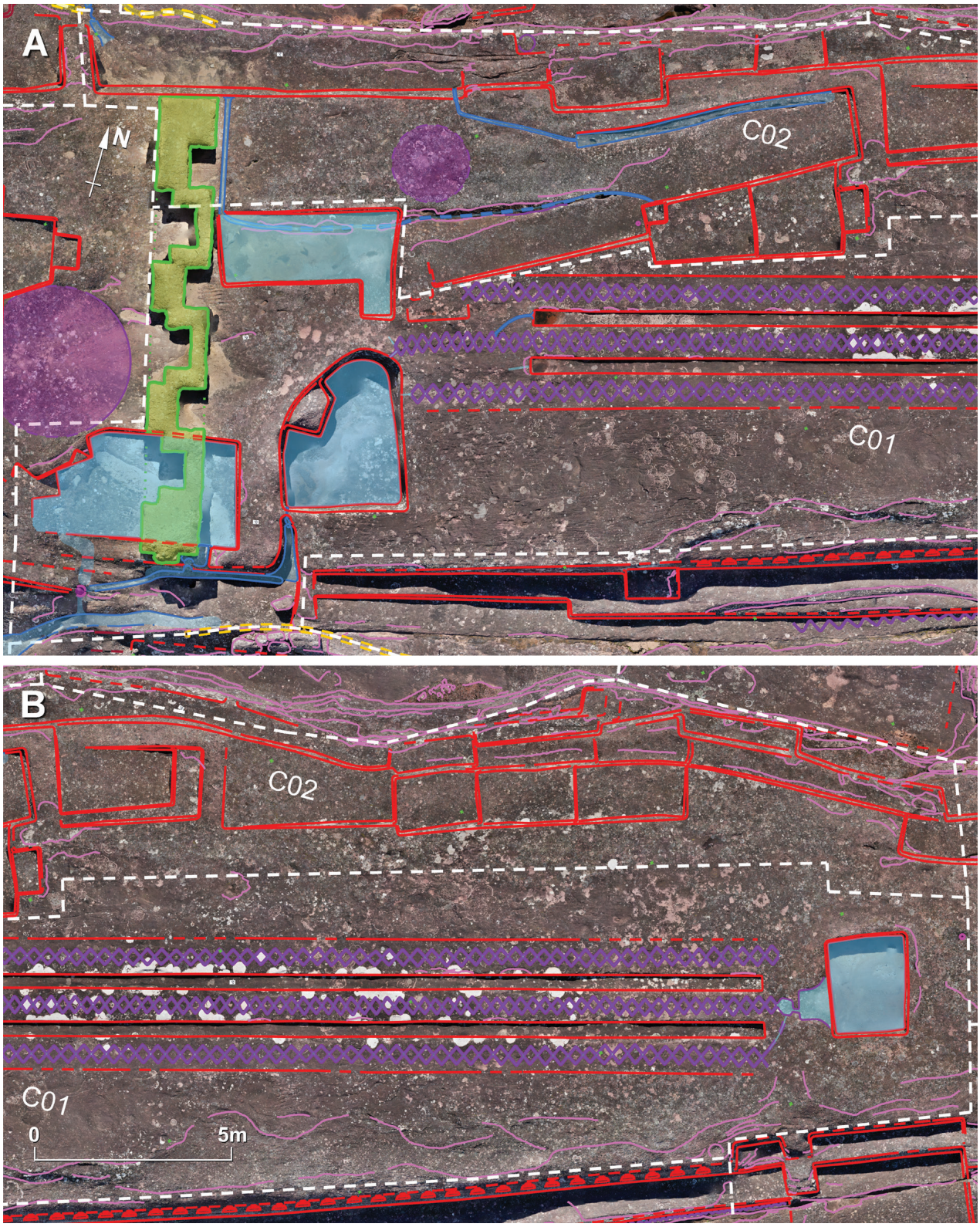

Fig. 24. Sectors C01 and C02: A – the western part; B – the eastern part

Central part of the rock

Sectors C01 and C02

Sector C01 (Fig. 24A, B) is located on the ridge of the rock, east of a transverse wall decorated with double-recessed niches. Three water reservoirs are located in the westernmost, lowest part of this sector. Most probably, the L-shaped northern one belongs to the later Incan phase of carving Samaipata rock. It links with the sequence of shallow terraces in sector C02, from where it is also supplied with water. In turn, the south-western reservoir, across which the transverse wall decorated with double-recessed

niches has been built, is evidently of earlier origin and might be associated with the remains of the circular petroglyph from sector W09. The third, south-eastern reservoir has a semi-oblong form and is ca. 1 m deep. It could have held nearly 10,000 litres of water if only the outlet in its south-western corner was closed.

The last reservoir is part of a more significant arrangement called the "Big Snake" or "Rattlesnake". The most characteristic feature of this arrangement is three stripes, each almost 30 m long, covered with rhomboid decorations imitating the pattern on the back of a rattlesnake. Between the stripes, two channels have been cut into the rock – both slightly shorter (ca. 26.8 m long), 36–30 cm wide, and only 10–12 cm deep. The whole design is recessed 1–2 cm below the surrounding surface of the rock. This creates additional shadows along the longer edges, emphasising the entire composition.

The rhomboid pattern is essentially a system of shallow channels, 1–2 cm deep and ca. 2 cm wide. Water from the reservoir (with a capacity of ca. 2,000 litres) located in the highest, eastern part of the sector (Fig. 24B) could flow into them. There are well-preserved traces of a shallow channel facilitating supplying the middle stripe with water. Slightly less well preserved is a small channel that directed water to the southern stripe. Although the eastern end of all three patterns is well preserved, no traces have been discovered of a channel leading to the northern stripe.

The western ends of the stripes are in a much worse condition. The northernmost is partially erased by shallow terraces (and possibly steps) in sector C02, so there is no evidence of where water running through it could have been directed. The most extended stripe is the middle one. It ends with a short channel directing water to the already mentioned semi-oblong reservoir, as does the southernmost one.

It is worth noticing that the geometry of each of the rhomboid patterns differs, resulting in a different number of rhombuses in each. Supposing that the western extent of all stripes ended at more or less the same position, there would have been 85 rhombuses in the northern stripe, 101 in the middle, and 81 in the southern one. These differences could have had a significant role if one assumed that the whole system could have been used for magical divination purposes. By knowing the number of shapes in each of the patterns, it was possible to predict in which of them water would appear first at the western end when simultaneously poured into their eastern ends.

Sector C02 (Fig. 24A, B) runs parallel to the northern border of sector C01 described above. It consists of two, and in some places three, levels of terraces located on the southern slope of the rock. They descend towards the east.

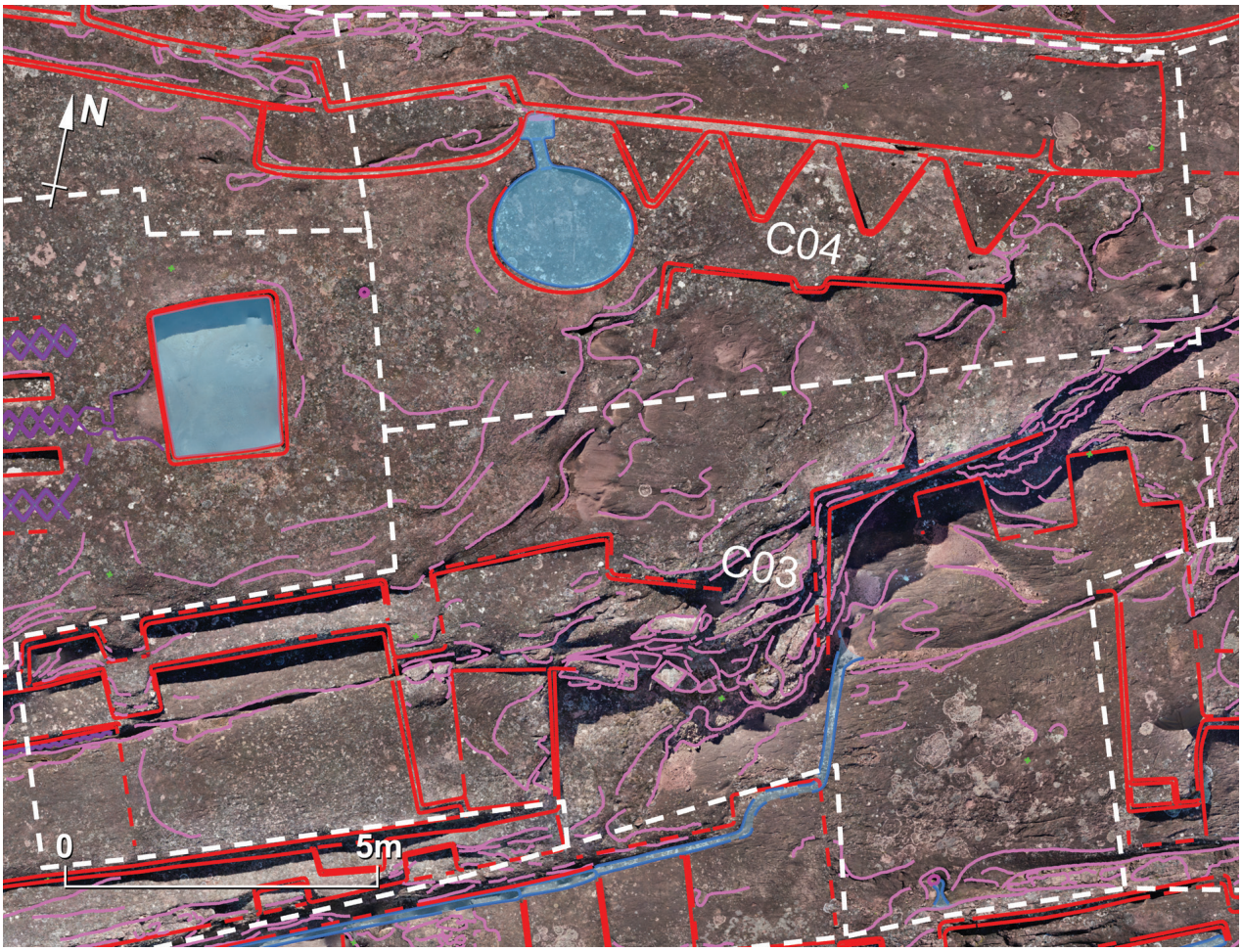

Fig. 25. Sectors C03 and C04

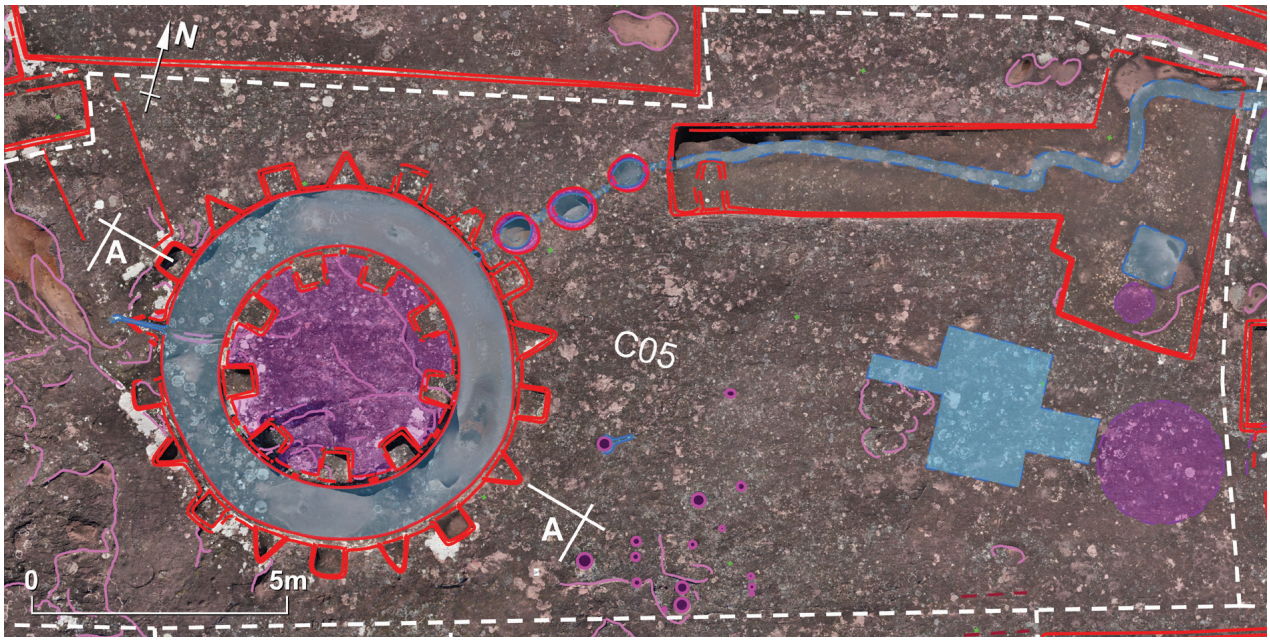

Fig. 26. Sector C05

The largest of them, located in the eastern part at the base of the wall with double niches (Fig. 24A), has an elongated, complicated shape and several interesting features. Along its northern edge runs a channel draining water to the next, lower level of terraces. A similar channel runs along the southern border of the sector, but this time it discharges water to the already mentioned L-shaped reservoir. There are faint traces between both channels that can be interpreted as relics of an earlier petroglyph that existed here before this terrace was cut into the surface of the rock.

Sectors C03 and C04

Both sectors are located east of sectors C01 and C02. The western part of sector C03 (Fig. 25) might be considered as a continuation of sector S12, but its character is different. There are still two terraces descending southwards, but there are none of the double-recessed niches that are characteristic for sector S12. This is also where the petroglyph in the form of a meandering snake ends after running for more than 20 m alongside the middle terrace of sector S12. Further to the east, the arrangement of terraces is less regular, and the original layout is difficult to identify due to the highly eroded surface of the rock and many natural cracks that pass through this area. It is, however, evident that there, on a bigger platform located in the eastern part of this sector, a long channel begins that runs to the west alongside the northern border of sector S11.

Sector C04 occupies the northern part of the ridge of the rock and descends in a northern direction in two terraced steps. The most characteristic features are four triangular recesses (or possibly seats) facing the north and an oval reservoir located to the west of them. The recesses have the shape of equilateral triangles with sides about 1.5 m long. The inside and outside corners are chamfered. Although such recesses can be found in other sectors (for example, W05, S10, S13, S14, S29, E01, and E02), their character differs from the forms typical for Incan architecture. Therefore, they might belong to an earlier phase of the carving of Samaipata rock.

The oval reservoir has a diameter of about 2 m, and its depth does not exceed 30 cm. The shape of the rock surface in the immediate surroundings excludes the idea that this place could have acted as a reservoir for rainwater flowing there. Its bottom part is also slightly inclined towards the north, where a channel leading to the lower terrace is located. It could have served as a water reservoir only if this channel was blocked off and water was poured there manually.

Sector C05

Sector C05 (Fig. 26) is situated on the ridge of the rock, almost at the highest part of it. It is here that the most famous, symbolic petroglyph is located – the "Choir of the Priests". The main element of the whole composition is a circular channel with an outer diameter exceeding 7 m and a width of just over 1 m. It surrounds a central, circular section (diameter of about 4.75 m) which at the highest point is raised about 75 cm above the bottom of the channel. The outer edge of the circular section is decorated with nine square niches or seats (roughly 65 × 65 cm) cut nearly 40 cm into the rock. On the vertical surface between each niche, traces of small (15 × 15 cm) square, double-recessed niches are extant.

Outside the circular channel, there is an alternating pattern of nine square (also ca. 65 × 65 cm) and nine triangular seats (or possibly recesses) that could have had a decorative function. The latter are in the form of equilateral triangles with sides of ca. 75 cm and they are embedded less deeply into the rock surface than the square seats. The whole arrangement, when looked at from above, resembles a solar symbol, although solar symbology is not particularly

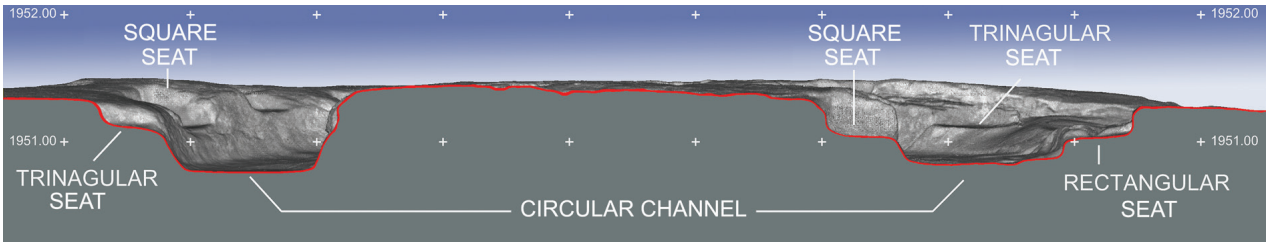

Fig. 27. Section A-A across the "Choir of the Priests"

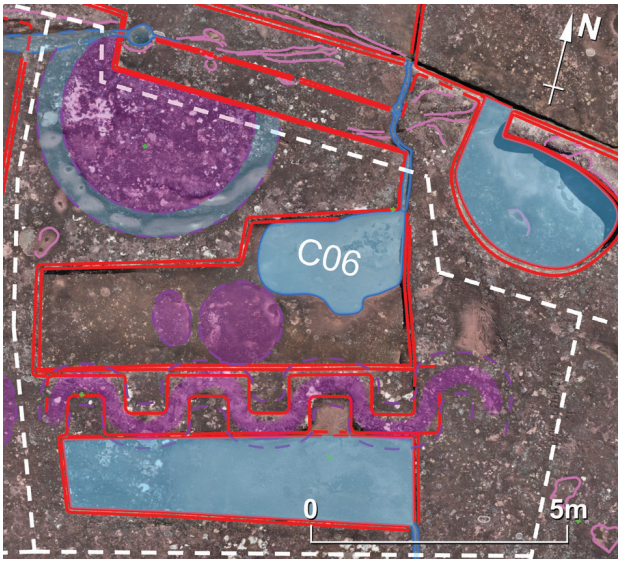

Fig. 28. Sector C06

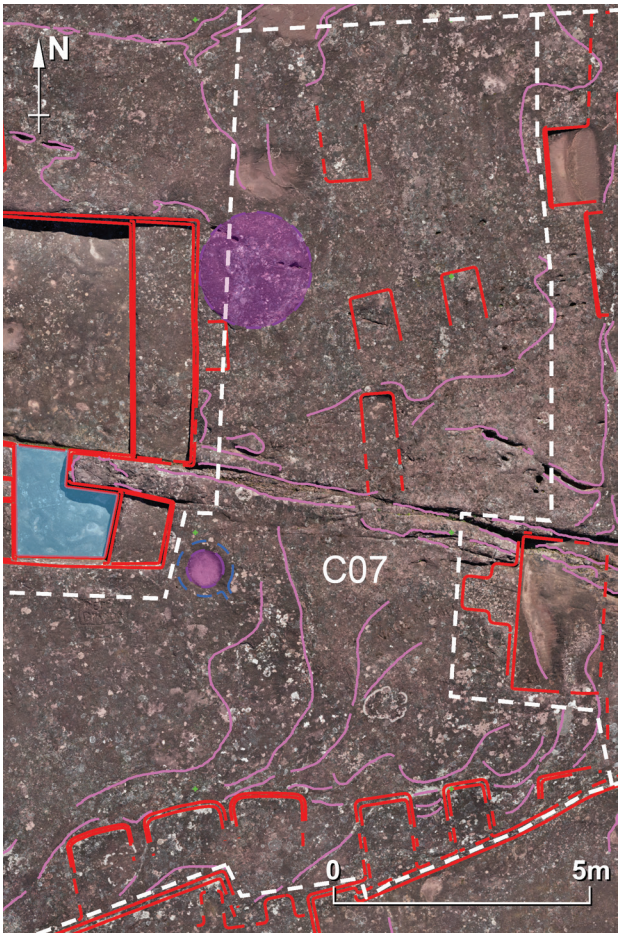

Fig. 29. Sector C07

common in this region of South America. Much more typical for the area would be a representation of a feline. Very weak trace of what once might have been such a symbol preceding the sculpturing of the "Choir of the Priests" can be seen in the central part of the sector (Fig. 27).

The bottom of the circular channel is inclined slightly northwards so that the water that accumulates there flows into a channel drilled below the surface of the rock. The underground part of the channel is over 4 m long, and it does not follow a straight line. This observation may explain the function of three oval openings spaced evenly along this channel – each of them with a diameter of at least 75 cm. They were to facilitate drilling short, ca. 50 cm long, sections of the underground channel between the openings. They may have also provided some ritual functions in the celebrations performed here.

The channel leads to a T-shaped reservoir located in the north-east of the sector. Its shape is connected to Pan-American ancestral cosmological symbolism and is particularly common in the Amazonian area[12]. It is possible that this reservoir that collects the water coming from the "Choir of the Priests" was modified, and it erased some older figures in bas-relief, of which we can still identify some traces in its deepest parts (on its western and eastern sides). A shallow meandering channel has been cut in the bottom of this reservoir to direct the flow of water to its north-east corner. Several round holes (10–30 cm in diameter) are extant east of the "Choir of the Priests". Further to the east, very light traces of a cross-shaped water reservoir are still preserved. Additionally, close to the border with sector C06, a very low oval protrusion suggests the remains of yet another petroglyph.

Sector C06

Two large water reservoirs are the main feature of this sector (Fig. 28). From these, water drains to either the southern or northern slope of the rock. On the bottom of the northern, L-shaped reservoir, highly eroded traces of two (or possibly only one) petroglyph are visible.

[12] One of the most characteristic examples can be found in Pantiacolla in Peru.

The most interesting feature of this sector is evidence of a large sculpture of a snake that separates both the reservoirs. It has been modified, probably during the Inca occupation, into a sequence of small niches or seats to hide the original ophidian form. Three of the seats are facing towards the north, and another three southward.

Once, the snakelike effigy had its head directed to the east, but it has been intentionally(?) erased after its shape, as a symbol related to the cult of water, was deformed by the abovementioned seats. It is possible that the faint traces of the snake on the opposite, western side of the figure are also its erased parts.

Remains of the one of the biggest round petroglyphs (ca. 3.75 m in diameter) occupy the northern part of this sector. It was split in half when platforms of neighbouring sector N07 were sculptured.

Sector C07

Sector C07 (Fig. 29) lies where the top of the rock begins to drop slightly eastwards. Only very faint traces of one circular petroglyph on the border with sector N07, and four, small rectangular platforms in the centre part, remain. All of them, judging from their state of preservation and interference with evidently latter carvings, can be attributed to the earlier, possibly pre-Inca phases of carving Samaipata rock.

On the southern margin of this sector, on the southern slope of the rock, traces of six slightly better preserved niches are extant. They seem to form two separate groups. The three niches on the western side are roughly of the same dimensions. The other three are narrower, but the distances between them are wider. Both groups were probably carved during two different phases, but there is neither evidence of the sequence of their execution, nor any hints to attribute them to the Inca or pre-Inca period.

Southern part of the rock

Sectors S01–S05

Sectors S01–S05 are located on the flat area at the foot of the southern slope of the rock. Four housing complexes can be identified there. They were examined in detail during work by the German Samaipata Archeological Research Project (Proyecto Arqueológico en Samaipata, PIAS) [9]. According to the results of these investigations, all of the housing complexes, except the central, U-shaped group of buildings that is dated to the post-Conquest period, were built during the Inca phase of occupation. All these sectors are outside of the scope of this study, which is limited to Samaipata rock itself.

Sector S06

The architectural structures that constitute sector S06 are carved in the lithic wall at the base of the southern slope of Samaipata rock (Fig. 30). They consist of five units that evidently were once roofed (Fig. 31). The roof,

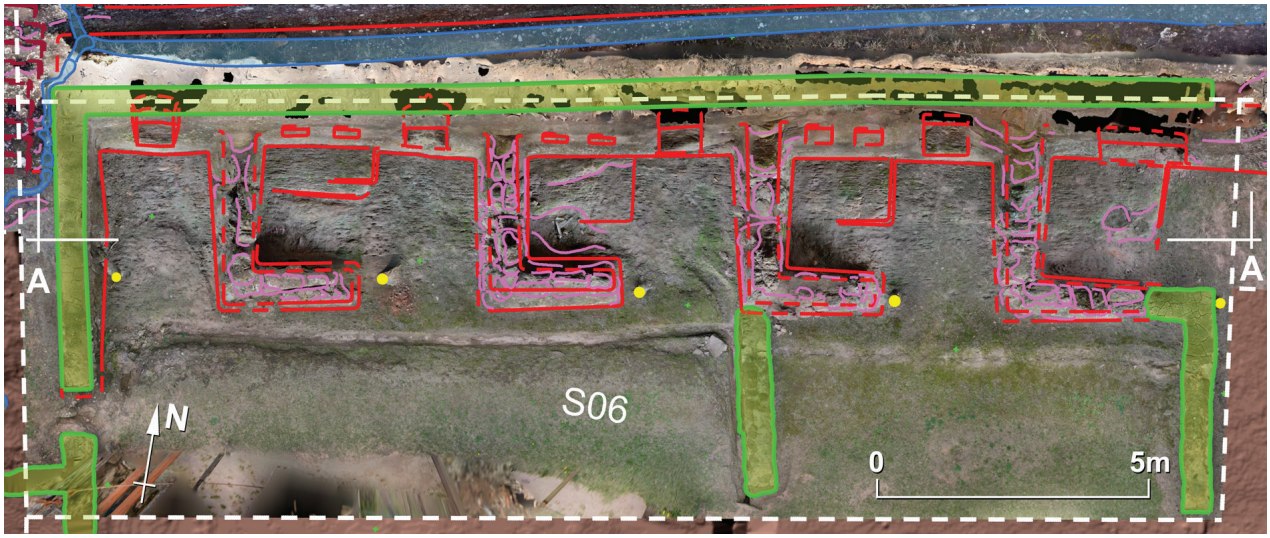

Fig. 30. Sector S06

Fig. 31. Section A-A across sector S06

today convincingly reconstructed, rests on one side on a wall built on the slope of the rock. The front side of the roof is supported by single row of wooden posts.

The three central units, measuring roughly 4 × 2 m, have a very similar layout. From the west and south, the units are enclosed by an L-shaped wall. A more than 2 m wide entrance provides access to each room. On the back wall, opposite these entrances, rectangular niches (75–80 × 160–167 cm) have been carved. These are accompanied by a pair of smaller (roughly 50 × 50 cm), almost square niches or blind windows, under which platforms protruding ca. 25 cm from the floor level are located. It seems that originally the floors of these units as well as the platforms were sculptured directly into the rock. In the same way, the L-shaped walls separating individual units were executed, or at least their lower parts. The upper parts might have been built as stone rubble walls.

The easternmost and westernmost units show different layouts. The westernmost is smaller (only ca. 2 × 3 m), and it lacks a front wall. On the centre of its back wall is one rectangular niche without a platform in front of it. The easternmost unit has undergone several modifications. From the west and south, it is enclosed by an L-shaped wall analogous to the kind already described. However, there is no access from this side. It has been blocked by a later stone rubble wall and a new entrance has been arranged from the east by pulling down a stone wall that once existed there. The negative of this wall is still visible on the back wall of this room. The presence of the platform in the north-western corner of the room suggests that the back wall might have been arranged in a similar way as in the three central units. Unfortunately, it has been badly damaged by treasure hunters, so its original layout cannot be unambiguously reconstructed. Originally, there was clearly no large rectangular niche here, as can be seen today. Preserved traces suggest one, ca. 2 m long and 50 cm high, niche placed ca. 80 cm above the mentioned stone platform. This niche might have had extensions in its lower part, so its shape resembles the letter "T". The lower part of the back wall is so badly damaged that such reconstruction must remain only hypothetical.

Rectangular-shaped niches, and in some cases with a kind of enthasis, are not typical for Incan architecture. This kind of form is more related to Tiwanacota tradition than to Inca. This whole sector is often referred as the "Sacristy".

Sector S07

The main feature of this sector is a ca. 80 m-long ramp enabling movement between western and eastern sectors of the rock (Fig. 32). It runs just above sectors S06, S08, and S09, and connects two flights of steps – the western

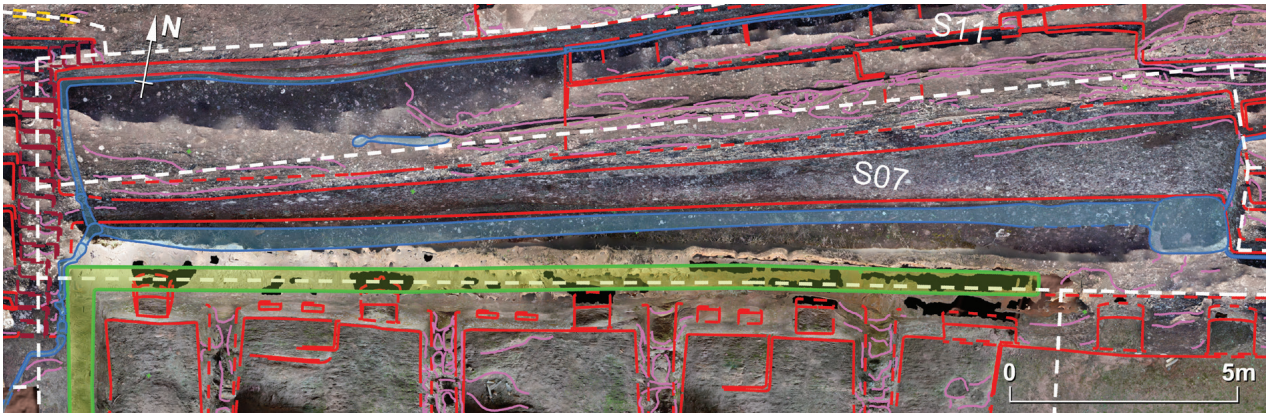

Fig. 32. Sector S07

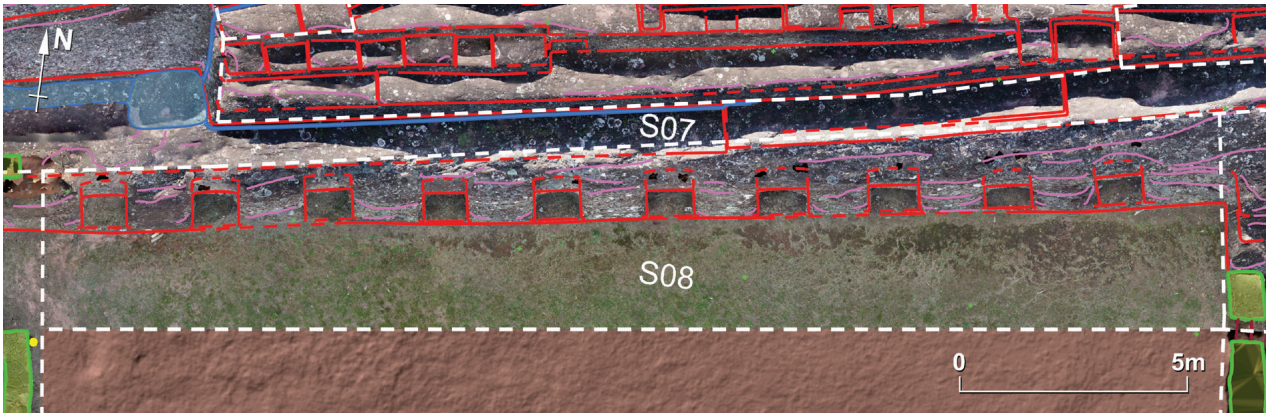

Fig. 33. Sector S08

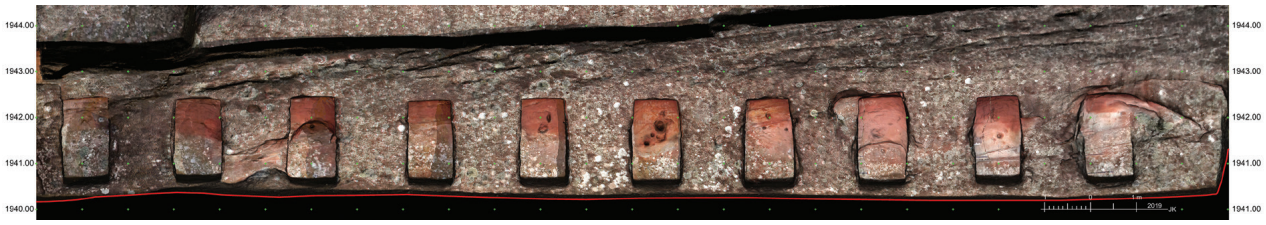

Fig. 34. Front view of sector S08

one located between sector W011 and S07, and the eastern steps on the border between sectors S09 and S23. This ramp, also played an important role in draining rainwater. Along its entire course runs a channel collecting water from the terraces located above.

Sector S08

Sector S08 is located at the foot of the southern slope of the rock (Fig. 33), east of sector S06. It seems that the sculpting of this part of the rock began after the completion of sector S06, but this is only a technological phase; it does not necessarily reflect subsequent cultural changes. From a formal point of view, sector S08 presents an almost vertical wall, over 3 m high and almost 25 m long, with 10 roughly rectangular niches carved at equal intervals (Fig. 34).

The niches are slightly bigger than those of sector S06. Their width ranges from 105 to 112 cm while their height is between 180 and 200 cm. Their shape is however not uniform. Some are nearly rectangular, in some cases we can see a kind of enthasis in the middle, and one of them is trapezoidal in shape. This variety of shapes does not point to any specific period, but the overall impression is similar to that of sector S06. Above this set of niches, the long ramp leading from sector S07 continues in an eastern direction

Sector S09

Sector S09 (Fig. 35) can be divided into two zones: the lower one located at the foot of the southern slope of the rock and the upper one stretching up to the long ramp constituting sector S07.

In the lower zone, which is an almost vertical wall 2.3–3.5 m high, three separate groups of niches can be distinguished (Fig. 36). The first group adjoins the almost 11 m-long series of steps connecting the foot of the rock

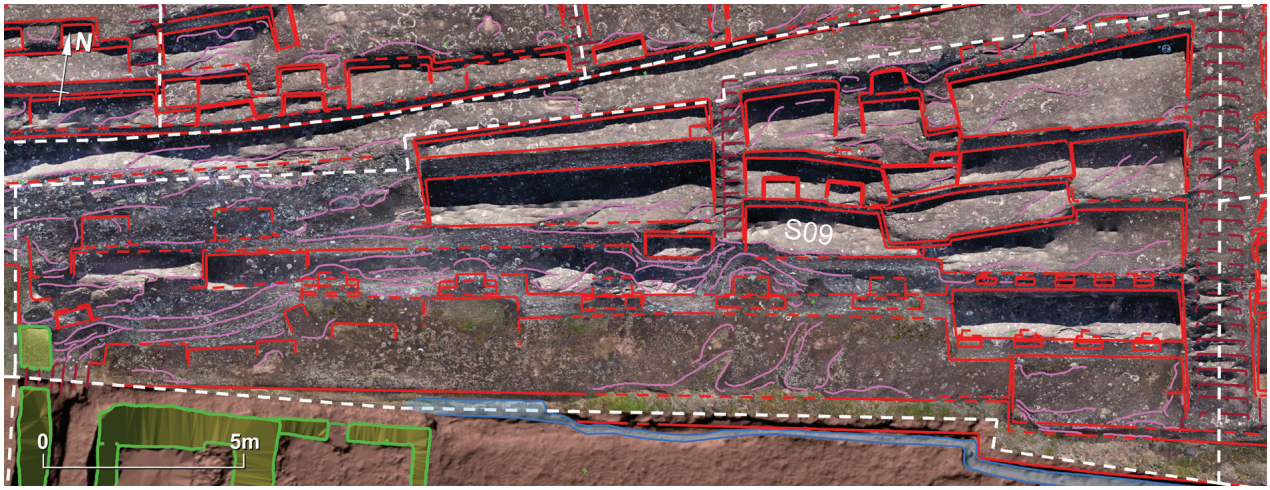

Fig. 35. Sector S09

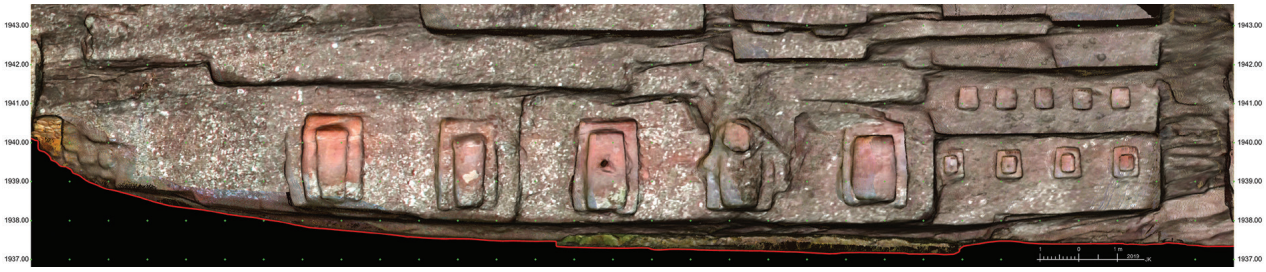

Fig. 36. Front view of sector S09

with the eastern end of sector S07. They are four small (68–72 cm wide and 77–81 cm high) double-recessed niches of a trapezoidal shape, which is characteristic of Incan architecture. The front wall where these niches are located is almost 6 m wide and ca. 2.3 m high, and finishes with a nearly horizontal ca. 1.25 m-wide platform from which the next slightly inclined wall extends by ca. 1.6 m. Five smaller (49–54 × 54–58 cm) niches are placed symmetrically on this wall, conversely to the lower row of niches where only four are extant. This asymmetry might be the result of a later modification in this sector.

In the central part of the 2.5–3.5 m-high wall, the front wall is retracted by more than 1 m and three large (1.56–1.59 × 2.35–2.45 m) double-recessed niches have been carved here. They are rectangular rather than trapezoidal and all of them have been altered in some way by robbers. Nevertheless, the niches have the look of being never fully completed.

Further to the west, the front wall of sector S09 is again retraced by ca. 0.5 m. Another two double-recessed niches are placed there. Their width corresponds with the niches from the central part of the wall, but they have a slightly smaller height of between 2.29 and 2.34 m. Their shape is even less regular, and the inner recesses also look unfinished. Perhaps the carving of the front part of this sector was interrupted by the collapse of Incan control related to the arrival of the Spaniards.

In front of all these three groups of niches are three flat platforms carved in the solid rock. From the south, they are bordered by a channel draining rainwater. All three platforms are located approximately 2 m lower than the area directly to the west (sector S08). The difference in levels is overcome by narrow (ca. 60 cm wide) steps connecting both sectors.

The upper zone of sector S09 consists of a sequence of irregular terraces that climb up a further 5 m until they reach the eastern end of the ramp in sector S07. At least five platforms are furnished with niches or seats that vary in size. Four of these platforms are in the eastern part of this zone, which is separated from its western counterpart by a long, ca. 4.5 m, sequence of steps that also leads to the ramp in sector S07. It seems that these steps may be from an earlier time than the three groups of niches in the lower zone, which are clearly from the Incan period. The inclination of these steps may correspond to the original, virgin slope of the rock from the period before first terraces and platforms were cut in.

It looks like in this area, the base of the rock underwent decisive changes, most probably in the Inca epoch. However, the possibility that some of these modifications were made during the Chané occupation of the site cannot be excluded.

Sector S10

Another unfinished part of Samaipata rock can be found in sector S10 (Fig. 37), directly to the east of the steps separating this sector from sector S09.

There might have been similar steps on the eastern border of sector S10, but the highly eroded rock surface in this area render a convincing interpretation impossible.

A room more than 13 m long and 2 m wide is located in the lowest, southern part of the sector. The room was cut in into the slope of the rock, so its roughly horizontal floor is solid rock. The lower part of its southern wall, which is more than 1 m wide, was sculptured into the solid rock. There are no indications as to whether the upper part of this wall was ever built, but evidently the intention was to build it, like in other cases, from unshaped stones set on clay mortar.

The entrance, less than 70 cm wide, that leads to this room is decorated with double-recessed jambs that point to an Incan origin and the importance of this room. Two shallow steps are placed in the entrance passage.

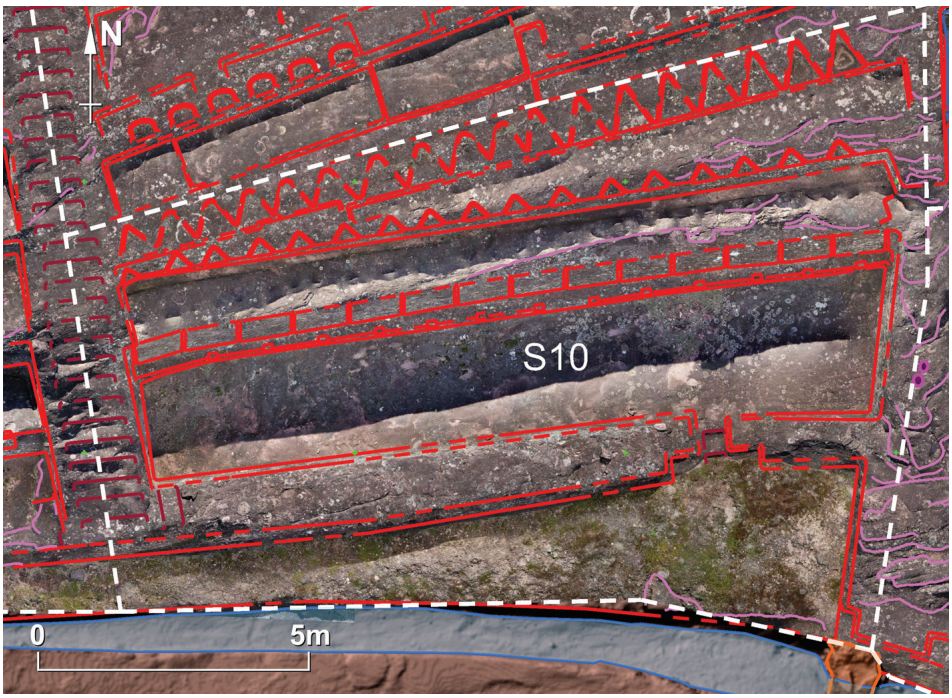

Fig. 37. Sector S10

Fig. 38. The back wall of the room in the lowest part of sector S10

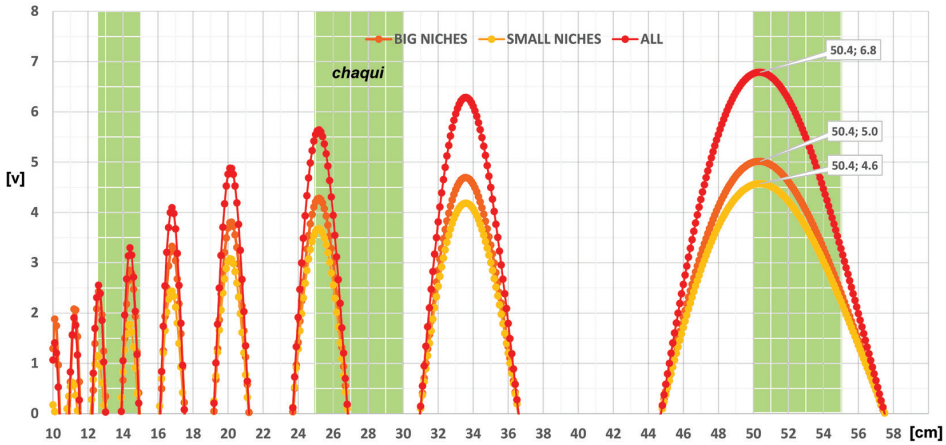

Fig. 39. Cosine quantogram analysis of niches in the back wall of the room in the lowest part of sector S10. Green areas mark the Incan units of measurement found by A. Kubicka [10, pp. 171–175] as typical for high-prestige buildings at Machu Picchu

On the back wall of the room, which is nearly 3 m high, several vertical grooves (6–7 cm wide) are placed in nearly equal intervals ranging from 95 to 105 cm. The most plausible interpretation is that the grooves mark the edges of niches that were planned to be carved there but were never finished. A small bench (ca. 30 cm wide and ca. 40 cm high) runs alongside the base of this wall. On the vertical face of the bench, a sequence of small square (ca. 17 × 17 cm) niches has been carved – nearly perfectly in between the ends of the grooves above (Fig. 38). Misalignment does not exceed 1.5 cm.

When applying the cosine quantogram method for analysing distances between grooves marking the edges of future big niches and the distances between the centres of the small square niches below, we find a unit of measurement of 50.4 cm, which might have been used to lay out their plan (Fig. 39). According to Kubicka's studies on Machu Picchu metrology [10, p. 171–175], units of measurement between 50 and 55 cm are typical at Machu Picchu for high-prestige buildings. This observation fits well with the entrance adorned with double-recessed door jambs.

On the back wall of the room, which is nearly 3 m high, several vertical grooves (6–7 cm wide) are placed in nearly equal intervals ranging from 95 to 105 cm (Fig. 38). The most plausible interpretation is that the grooves mark the edges of niches that were planned to be.

We can presume that this room was planned to serve some important functions. As such, it was undoubtedly intended to be roofed – probably with a one-pitched roof sloping south. The shelf, almost 1 m wide, above the back wall of the room could have been successfully used to support rafters whose other ends would have rested on the front wall. This room has several features that suggest it was built during the Inca occupation of the site. The fact that it was never completed suggests that construction may have been interrupted due to the fall of Inca rule in these areas.

Two terraces, nearly 15 m long, located in the upper part of sector S10 are decorated with rows of triangular recesses. Although triangular recesses are not foreign to Incan architecture [14], these decorative patterns are probably of earlier, pre-Incan origin. The lower terrace is decorated with 17 small (ca. 50 cm wide and 30 cm deep) triangular niches. A total of 18 much bigger and deeper (ca. 80 × 70 cm) niches decorate the upper terrace.

Sectors S11 and S12

Sectors S11 and S12 lie in the central part of the southern slope of the rock, to the north of sector S07 (Fig. 40). Together with the latter, they form three long, east-rising ramps connecting sectors located in the western and eastern parts of Samaipata rock.

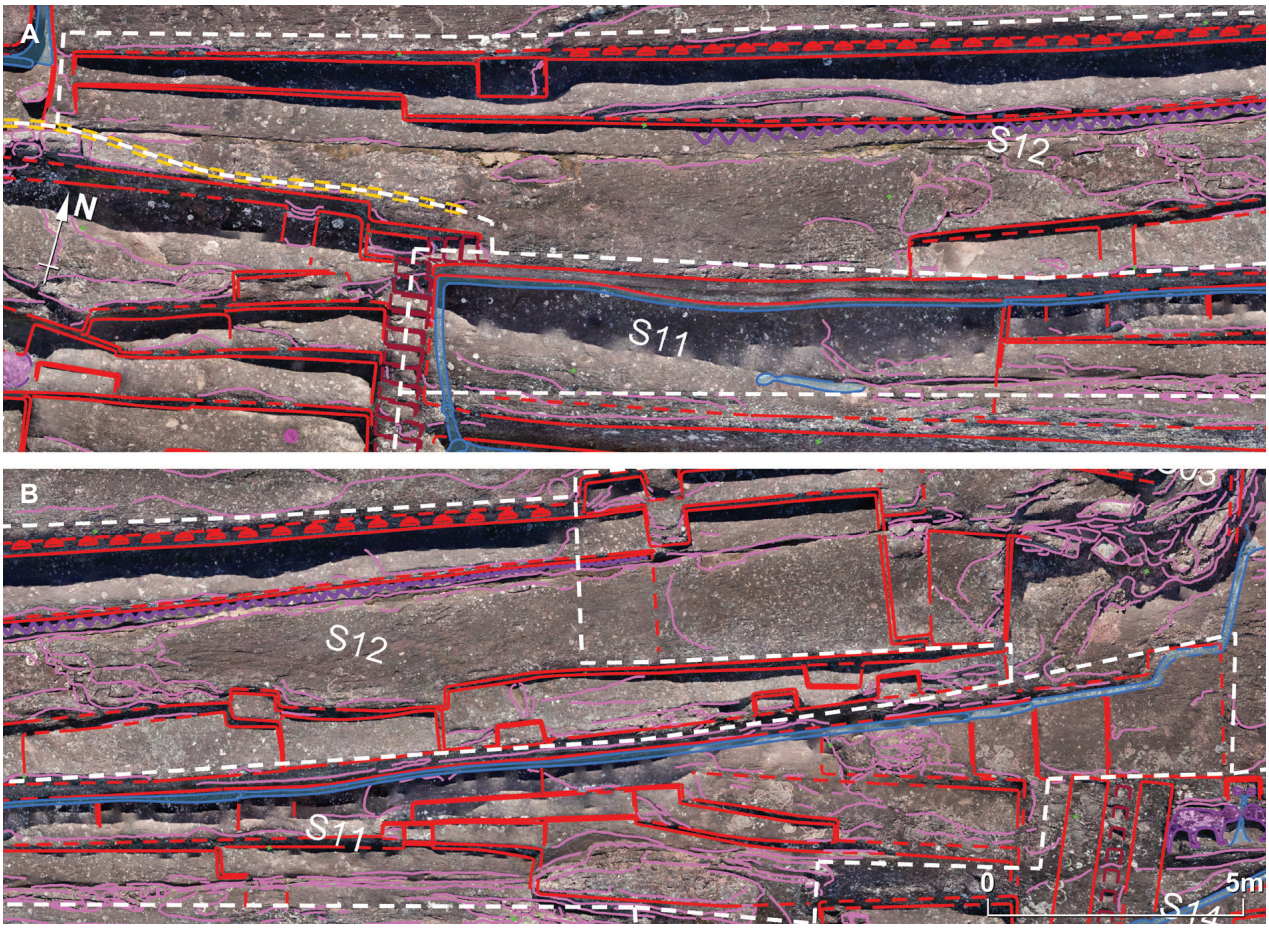

Fig. 40. The western (A) part and eastern (B) part of sectors S11 and S12

The steeply rising, over 38 m long, sector S11 is divided by a series of terraces that help overcome a height difference of over 5 m between the sector's eastern and western ends. Along the rear wall of this sector, which is over 2 m high, there is a channel draining rainwater from sectors C03 and C04. Next to the series of steps constituting the western border of sector S11, this channel connects to its counterpart in sector S07.

Sector S12 (Fig. 40) lies ca. 1.8 m higher than sector 11. It has a similar length to its southern neighbour, but it is much wider. In the middle, its width exceeds 4.5 m. A series of five narrow (1–1.5 m wide) irregular platforms rising east have been cut into the southern edge of the sector, except in the western end. Another platform (0.5–1.3 m wide) runs alongside the sector's northern border, at the foot of a nearly vertical wall ca. 2 m high that separates this sector from the ridge of the rock (sector C01). This platform rises not more than 15–20 cm above the central part of the sector. Along the southern edge of this platform runs a narrow, at least 21 m long, meandering channel resembling a crawling snake. Originally, it was probably much longer, but its western part has vanished due to rock erosion.

There are 34 square, double-recessed niches evenly distributed on the vertical surface of the already mentioned back wall. They are all severely eroded, so their dimensions can be only roughly estimated as around 30 × 30 cm. The average distance between the niches is 63.7 cm, which with a good approximation corresponds to three values of the Incan *yuku* unit of measurement reconstructed as 12–14 cm [13]. This observation, along with the distinctive, double-recessed niches, may again indicate Incan origin. At the western end of sector S12, alongside its southern edge, are four round openings (ca. 13.5 cm in diameter) very reminiscent of the holes for the posts of the *quincha* wall located on the northern slope of the rock. Perhaps a similar structure was also erected here.

Sector S13

Sector S13 (Fig. 41) is located to the north of the central part of sector S07, and consists of several roughly horizontal platforms elongated in an east–west direction.

The lowest platform, which is not more than 1 m wide, runs alongside the southern border of the sector and is elevated roughly 2 m above the surface of sector S07. Above the western end of the lowest platform, three seats (ca. 90 × 60 cm) are overlooking the *plaza* in front of the "Sacristy" (sector S06). The seats are separated by protrusions ca. 1.15 m wide projecting from the back wall of the platform.

The uppermost platform borders sector S14 and consist of two sections. The most interesting is the western one. Its distinguishing feature is a set of five triangular recesses (or possibly seats) attached to each other. Small (30 × 60 cm) steps are in front of each seat. This part of sector S13 is

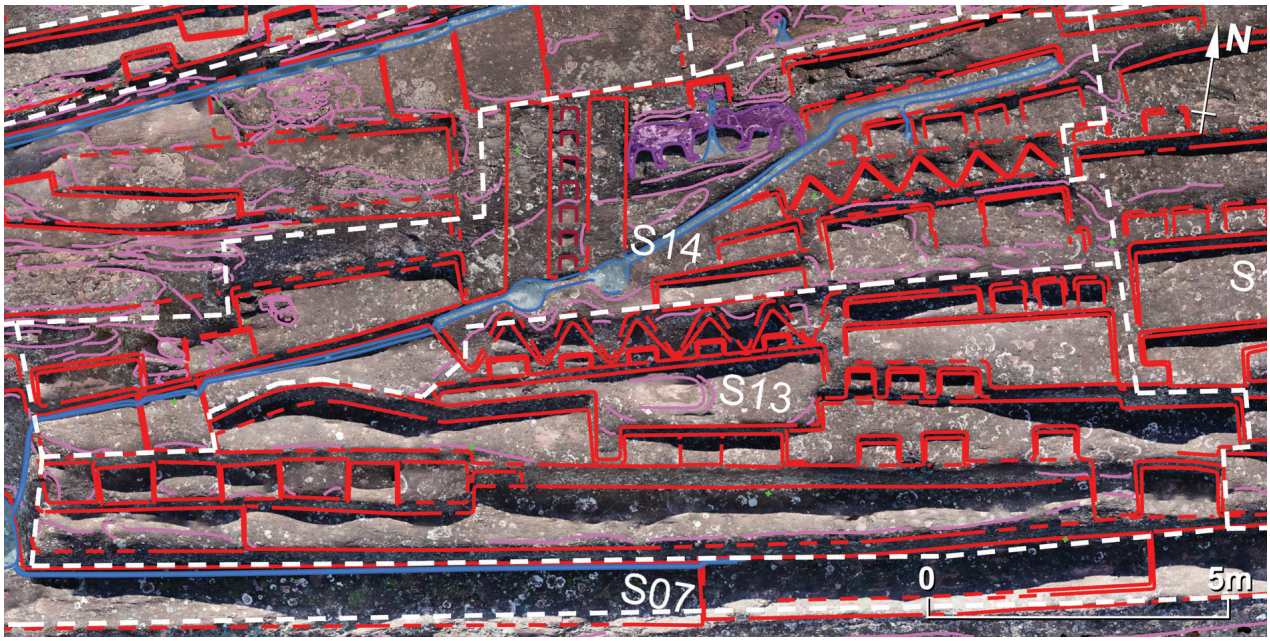

Fig. 41. Sectors S13 and S14

likely to be of an earlier, pre-Incan origin but triangular niches are also known in Incan architecture [14].

The eastern section of the northernmost terraces consists of small platforms with two sets of small, triple seats – one in the upper, north-eastern corner and the other in the lower, south-western corner of the platform. Between the uppermost and the lowest platforms, there is an irregular arrangement of single and double seats – all looking to the south.

Sector S14

Sector S14 is located up the rock, directly above sector S13 (Fig. 41). A channel that diagonally crosses the slope from the north-eastern corner of this sector and terminates with a small cascade at the westernmost end divides the sector into two parts. At the western end of the channel, water runs down from a height of almost 2.5 m into a shallow pool at the foot of the rear wall of sector S07.

The most spectacular feature of the upper part of this sector is the well-known representation of two felines (pumas?) facing each other. A small (45 × 70 cm) rectangular depression above the heads of the felines resembles the face of a creature (possibly a feline head as seen from the front) from whose mouth originates a channel leading between the heads of both pumas[13].

Two flat gutters 65 cm wide border the "Double Puma(?)" petroglyph on its western side. Both of them terminate with two elliptical pools along the channel running below the petroglyph. Between the gutters, a ca. 35 cm-wide flight of steps has been cut into the rock surface. Similar steps might have once existed further to the west, but the degree of rock erosion does not allow for unambiguous interpretation there. West of these gutters and steps, alongside the channel, a series of irregular platforms and seats are extant.

It is difficult to unequivocally interpret whether both of the elements described above ("Double Puma(?)" petroglyph and two gutters with accompanying steps) were carved at the same time, or were created and functioned independently. Nevertheless, both of the elements had a very great significance in the liturgical life of Samaipata, as can be attested by their predominant position on the southern slope of the rock, in front of the terraced *plaza* located below.

The south-eastern section of sector S14 (below the diagonal channel) consists of three rows of platforms. The most spacious (ca. 1.20 m deep) is the southern one. A nearly 1 m-wide protrusion divides it into two equal parts. Three narrow (ca. 50 cm wide) platforms extend west of it. The highest platform is only partially preserved. The diagonal channel cuts its western part.

The middle platform has the form of a set of five triangular recesses (or possibly seats). They are slightly smaller than those in the neighbouring sector S13. It is possible that this sequence of triangular recesses once extended further to the west, but later on, one of the platforms neighbouring from the west (that split by the channel) was cut into it.

The last, northernmost platform consists of four rectangular seats separated by narrow (ca. 20 cm wide) protrusions. The area gives the impression of being of an earlier origin. At the western end of this platform, there are traces (just the corner) of the next seat, but the diagonal channel has disturbed it.

To summarise, one can speculate that the oldest part of this sector is the set of triangular recesses and perhaps the platform above them with the series of rectangular seats. The next chronological group would be the set of three narrow platforms, the northernmost one cutting into the triangular recesses. The diagonal channel that disturbs

[13] Cf. J. Kościuk, M. Ziółkowski, M. Pakowska, *Formal and iconographic analysis and interpretation of the most damaged petroglyphs*, in the same issue of "Architectus".

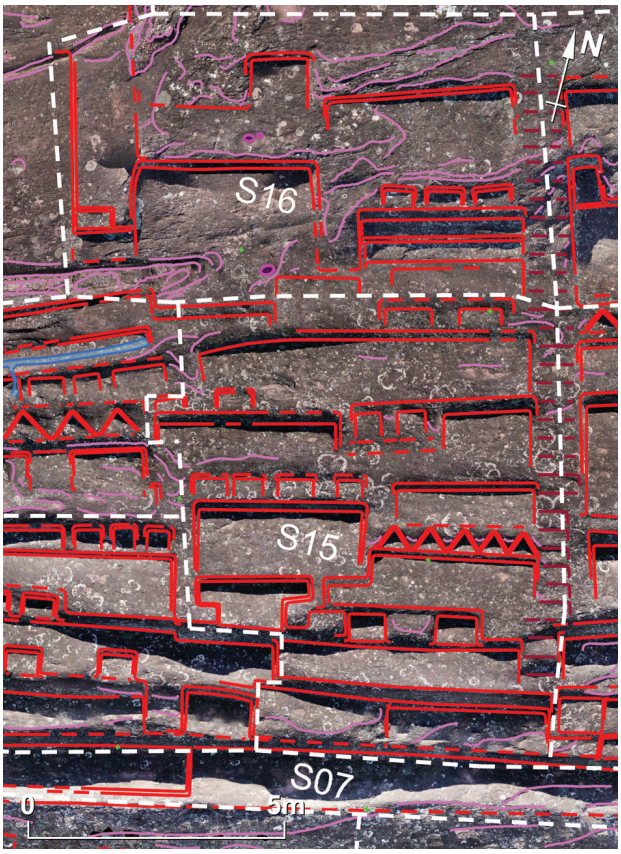

Fig. 42. Sectors S15 and S16

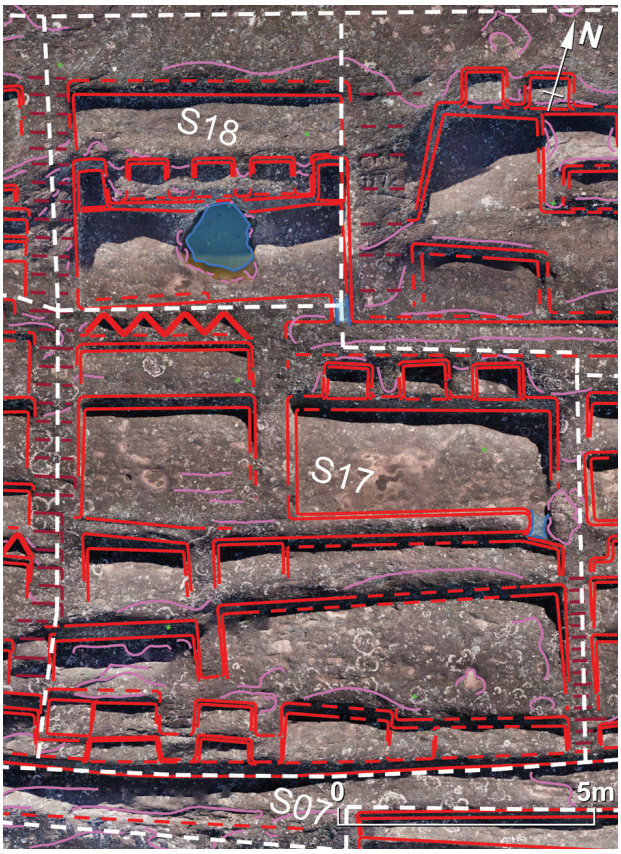

Fig. 43. Sectors S17 and S18

both the set of rectangular recesses in the uppermost platform and the three narrow platforms on the western side probably constitutes the third chronological phase.

The chronological relationship between the "Double Puma(?)" petroglyph (together with the two gutters and steps to the west) and the diagonal channel is not clear. Since the cult of water and venerating felines go well together in Andean cultures, both the parts are ideologically and functionally combined. However, there is no physical evidence confirming that both were actually executed together.

Sectors S15 and S16

Sectors S15 and S16 (Fig. 42) border sectors S13, S14, and sector C03 in the west. The eastern edge of both sectors is a 12 m-long series of steps leading from the top of the rock down the slope. However, these steps reach neither the base of the slope nor even the ramp of sector S07. They could have served to enable movement between the significant petroglyph the "Choir of the Priests" located in sector C05 on the top of the rock and sectors S15–S18 below, thus they would have played an essential role in the rituals performed there.

Sector S15 is a complex system of platforms, seats, and recesses. It does not give the impression of being a homogeneous creation, but looks rather like the result of many independent activities not necessarily far apart in time. However, among this rich diversity of forms, some elements are particularly striking due to their thoughtful layout.

Two symmetrically placed rectangular seats separated by a protrusion nearly 1 m wide are extant in the lowest part of the sector. Above these is another set of five triangular recesses (seats?) with a broad platform in front of them. West of this platform is an even broader platform with four nearly uniform rectangular seats placed above it.

The last interesting feature is a small platform located directly to the west of the two symmetrical, rectangular seats in the lower part of this sector, just on the edge of a 1 m-high, nearly vertical rock fault. Two recesses were added to the back of this platform, giving the platform an unusual T-like shape. The uppermost platforms bordering sector S16 no longer give the impression of a thoughtful layout, although they are also equipped with one or two rectangular seats.

Sector S16 (Fig. 42), located further up the rock, borders sector C05 in the north and it does not have a consistent layout. Only in its south-eastern corner is one deliberately planned feature. Three rectangular seats are placed 30 cm above two narrow, only ca. 35 cm-deep platforms, which look like they may have been wide steps.

Sectors S17–S20

Sectors S17 and S18 (Fig. 43) are on the eastern side of the long steps leading down from sector C05. In the east, they border two different sets of steps separating them from neighbouring sectors S19 and S20.

Sector S17, located further in the south than sector S18, consists of several platforms of different sizes and shapes. However, it can be divided into three groups showing some common features and traces of a more orderly layout.

Two small trapezoidal platforms separated by a centrally placed 1 m-wide projection are located on the steep

edge to the north of the long ramp of sector S07. West of these, the same design is repeated twice, although on a much smaller scale.

Each of the two terraces lying above the trapezoidal platforms is divided into unequal parts by very eroded ledges 60 cm wide – perhaps relics of two steps used to negotiate the relatively large difference in levels between the terraces. A similar ledge separates two spacious platforms located above these terraces. To the west, four triangular seats with two descending platforms in front of them is the next important feature of sector S17. Particularly interesting is, however, the eastern platform. Three deep, rectangular recesses are set into the wall behind the platform at regular intervals. At the same time, the southern edge of the platform is raised ca. 15–20 cm.

Using analogies with some constructions at the foot of the southern slope of the rock (sectors S06, S27, and probably W11) and with the "Temple of Five Niches" (sector N08 on the northern slope), one can conclude that this platform was once walled up and probably also roofed. In this case, the traces on the eastern and western sides of this platform should be interpreted not as steps, but as foundations for the upper part of the structure built of rouble stones.

Located to the north of sector S17, sector S18 (Fig. 43) is an example of a homogeneous complex with a clear layout. Its main feature is the set of three equal rectangular seats raised above the platform in front of them. Two deep recesses on both sides complete this symmetrical design. An irregular hole cut into the rock surface in front of the middle seat seems to be a later addition.

Sector S19, situated east of sector S17 and to the north of the long ramp of sector S07 (Fig. 44) has a very uniform plan. In its lower part, a narrow strip running from north to south and raised above the neighbouring platforms separates three pairs of terraces. Located above this, another pair of platforms is devoid of such a partition. It appears again in the highest part of the sector, but it is much broader here and both terraces differ significantly in width. Except for a small recess in the south-western corner of the lowest terrace, no other special features like seats or benches can be found in this sector. Most likely, the whole of sector S19 was created from one concept, and it probably comes from the same period as the adjacent sectors of S17 and S21.

Sector S20 (Fig. 44) shows a much more appealing layout. A big seat measuring ca 1.90 × 2.60 m can be found in the centre of the back wall of its only platform. The sides and back of this seat are raised, so it resembles a large stone armchair. Behind it, a deep rectangular recess has been cut into the rock. Two pairs of rectangular recesses (ca. 70 × 90 cm each) have been cut into the back wall symmetrically on both sides of this undoubtedly ceremonial seat. This symmetry is additionally emphasised by steps flanking the platform on both sides. They enabled movement to sector C05, where one of the most important elements of the rock is located – the "Choir of the Priests".

In the middle of the eastern part of this sector, there is a small (ca. 1.2–1.5 m) space. It is adjacent to small steps

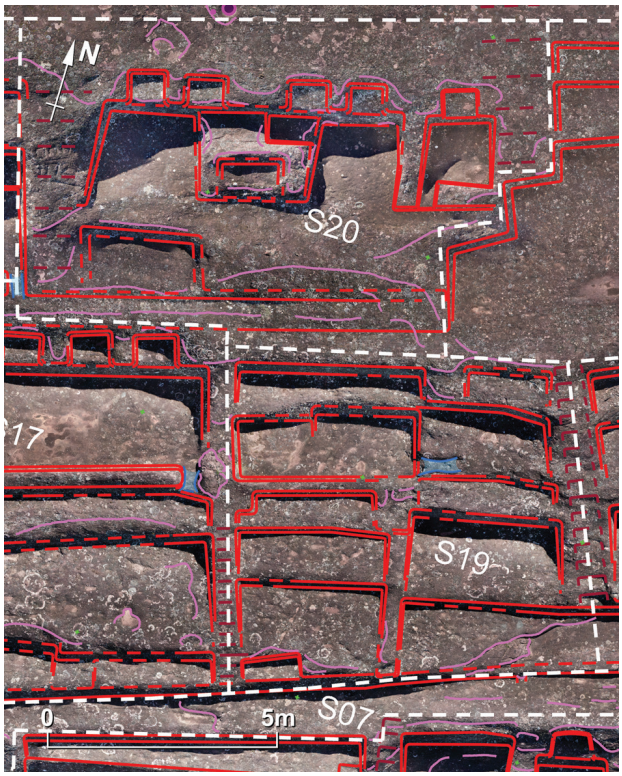

Fig. 44. Sectors S19 and S20

separating this sector from neighbouring sector S22. The front and western edges of this area are raised, and the only passage is in the south-western corner. In the back wall of this "room", a single recess is centrally placed. Its size is similar to the recesses adorning the ceremonial seat. Probably, this "room" was associated with some ceremonial rites performed on the platform.

Sector S20 is one of the best sectors for allowing us to understand the principles of composition that the builders were guided by, and their attempts to construct possible functional relationships with neighbouring elements. It is also preserved in almost complete shape. A small recess in the south-western corner of the sector may have been added later. The south-eastern corner was also slightly modified by a large platform in sector S22 that was another later addition.

Sector S21

Sector S21 (Fig. 45) occupies the east–west extended area at the eastern end of the long ramp of sector S07. It is accessible by the steps leading down from sector S22 located further to the north. This sector does not have any regular layout. It consists of sequences of many irregular terraces, platforms, and recesses. Its present state is rather the result of many transformations that have altered the southern slope of the rock.

However, two parts of this sector are particularly interesting. The first is a trapezoidal platform located across from the beginning of the steps leading up from the foot of the rock. Three rectangular recesses have been symmetrically cut into its rear wall. This part of the whole complex distinguishes itself as it seems to have a regular

Fig. 45. Sector S21

plan. Chronologically, it was created during the most recent – probably Incan – phase of rock transformation. It was cut into an earlier platform located in the west and disturbs one of its recesses. Possibly, it also intruded into a narrow rock ridge leading to the north, located just behind the central recess of the platform in question. This ridge might be the last remains of earlier steps that once led down from sectors C06 and C07.

The other interesting part is a ca. 8.5 m-long trapezoidal platform in the north-eastern corner of the sector. Ten niches of a semi-elliptical shape, untypical for Incan architecture, decorate its back. Close to the western end, eroded remains of what might have been once a small (45 × 80 cm) petroglyph projects from the surface of the platform.

Sector S22

Sector S22 (Fig. 46) lies to the north of sector S21, and from the west it borders sector S20. Its layout is dominated by a spacious (4.5 × 7.5 m) triple-recessed platform. Its shape bears no similarity to anything else on Samaipata rock and may resemble half of the twelve-cornered form commonly known as the Chakana or Andean Cross.

This motif was frequently chiselled in stone or embedded in ceramics and textiles. It can be found in many Andean civilisations, including Marcavalle and Pukara cultures, the Tiawanako and Wari civilisations, and finally, Inca culture, so alone cannot be considered as providing a conclusive date of construction. However, the fact that this platform cuts into an earlier, well planned and homogeneous sector S20 points to a later origin – most likely that of Inca occupation of the site. An interesting observation that may also influence our understanding of the relative chronology of the site is the fact that the principal axis of this platform is parallel to the steps that separate sectors S19 and S21. The orientation of some terraces adjacent to these steps also corresponds with this axis. Although not decisive alone, it may suggest a close temporal relationship for all these elements.

Further to the east of Chakana-like platform lies another small unit with a typical layout. Its plan resembles a small room rather than any other platform known from Samaipata rock. A central passage leads to the C-shaped unit, which is surrounded by raised sides upon which rouble stone walls might have once been erected. However, no traces of such are in evidence to support this hypothesis.

Four terraces of an earlier origin are located on two parallel platforms (each about 1 m deep) above the Chakana-like platform and C-shaped room.

Fig. 46. Sector S22

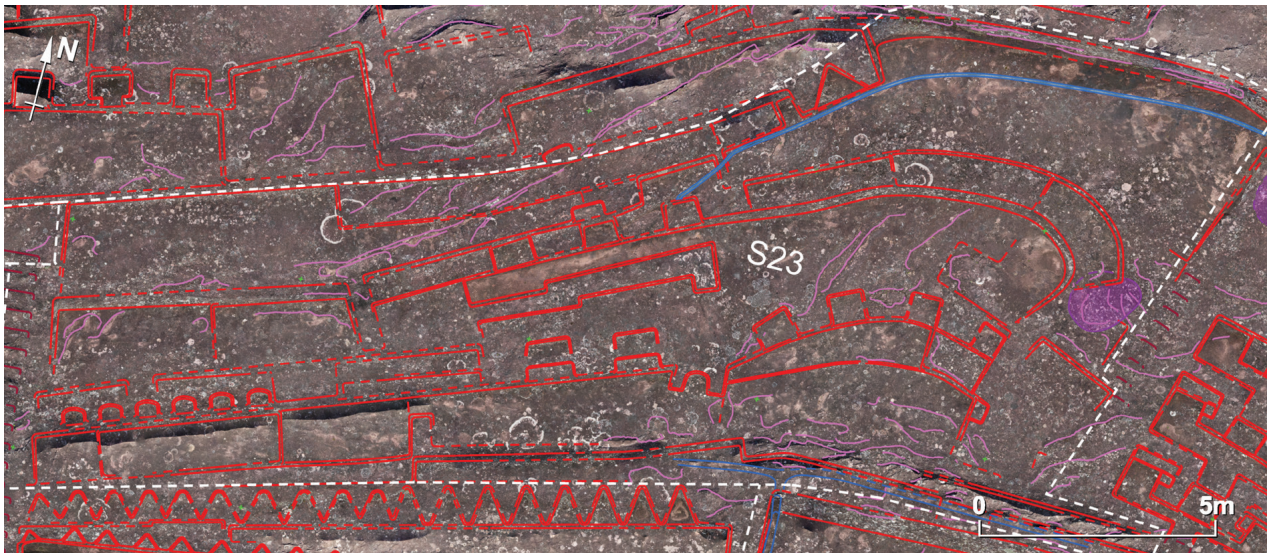

Fig. 47. Sector S23

Sector S23

Sector S23 (Fig. 47) extends to the east of the steps that separate it from sectors S07 and S09. It consists of several smaller units – each of them of a different layout, so as a whole, it cannot be treated as one coherent complex. The single name of "sector S23" was given to all these units only for ease of description.

A long terrace divided into five platforms extends along the southern border of this sector. A small channel collects water at its base. On the back of this terrace, one can distinguish four different units. The first from the west is a set of six semi-circular seats (roughly 30 × 50 cm in size) embedded into the rear wall of the first two platforms. Their axial distances range between 79 and 81 cm, and might fit well with the Incan unit of measurement *sikya* [13], [15]. Further to the east, two benches over 3 m long and ca. 45 cm deep are placed on top of each other. They are framed on both sides with roughly 1 m-long sections of rear wall without any decoration. The next unit consists of two pairs of short benches (ca. 90 cm wide and 30 cm deep), again on top of one another. This sequence of differently arranged seats ends with an elliptical recess framed with two buttresses projecting from the rear wall of the terrace. This recess, which looks more like the lower part of a niche than a regular seat, is orientated in a different direction to the seats already described. Its line of sight orientation points in the same direction as the seats of sectors S15–S20 located further to the west.

The back wall of the remaining, eastern part of the lowest terrace of sector S23 is curved and follows the natural shape of the original rock surface at this part. As a consequence, the line of sight axes of four roughly square (ca. 60 × 60 cm) seats cut into the back wall intersect just at the lower, southern border of the sector. We do not know whether this had any significance or if it was only the result of natural conditions, but it bears a distant similarity with the circular "Orchestra" from the western part of sector S25 (Fig. 49).

Behind these four seats lies another curved platform. Its backside is equipped with three curved benches with the same orientation as the lower seats. The easternmost bench disturbs the earlier, now completely indecipherable, remains of an oval petroglyph in bas-relief. Back to the west, three rectangular seats are cut into the back of the platform. On the western side, they are flanked by yet another bench. Between them and the two pairs of benches below, there is long and narrow protrusion from the surface of the platform. Its surface, as well as the surface of the western end of this platform, is rough and differs considerably from the relatively smooth and even face at the eastern part. One of the possible interpretations assumes that the work of shaping the platform was never completed there. This, in turn, may imply that this part of the sector dates back to either the arrival of the Inca or the end of their occupation of the site. The orientation of all the seats in this sector, consistent with the orientation of the seats in sector S21, and in particular with the orientation of the Chakana-like platform (sector S22) may indicate the second of these two possibilities more likely.

Further to the west lie two platforms and a spacious (ca. 2 × 6 m) terrace above them. At the opposite north-eastern corner of this sector, this terrace has its counterpart, although of a much more irregular shape. A narrow water channel that starts in the northern part of sector S26 passes through it diagonally following a natural crack in the rock.

Sector S24

Little can be said about sector S24 (Fig. 48), which is squeezed between the top of the rock (sectors C07 and N10) and sectors S21 and S23 on the southern slope of the rock. It consists of a series of irregular platforms and terraces with no consistent layout; however, they all seem oriented in the same direction – towards the same part of the *plaza* located to the south of the rock.

The only noteworthy observation in this sector concerns the relative chronology. Two terraces at the eastern

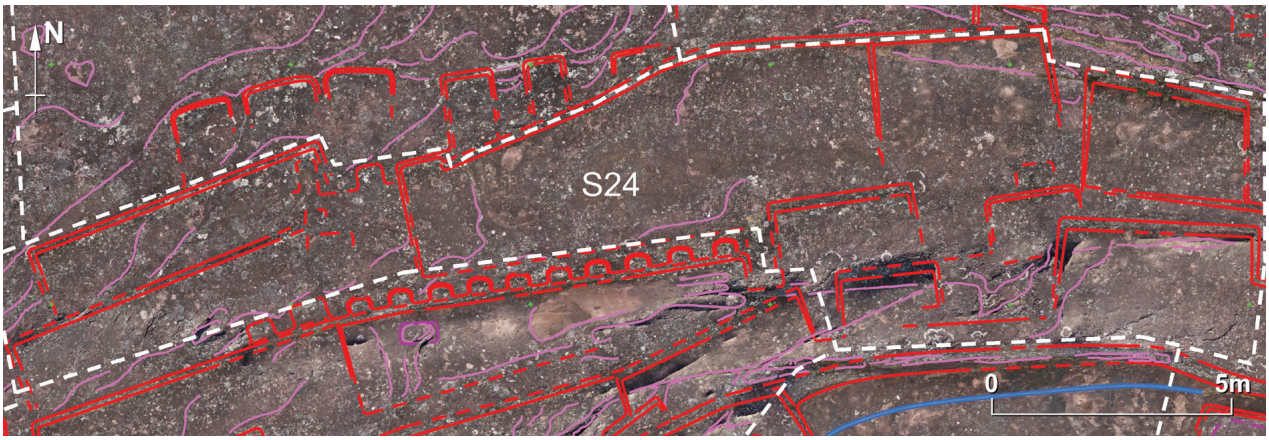

Fig. 48. Sector S24

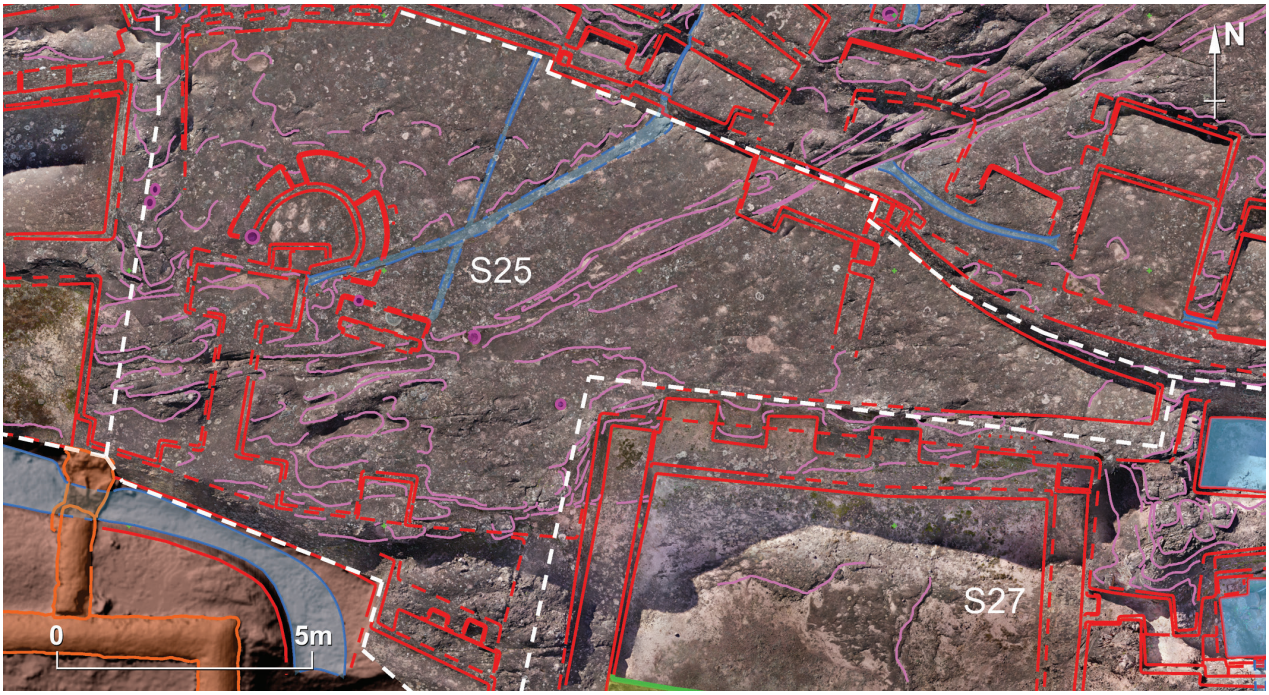

Fig. 49. Sector S25

end of this sector seem to be of a later origin since they cut into small platforms located to the west.

Sector S25

Sector S25 (Fig. 49) lies at the foot of the southern slope of the rock. From the west, it borders an extremely eroded ramp climbing up the rock. Perhaps this is the remains of earlier steps leading to sector S23, but at the present state of preservation, no traces resembling steps could be identified. From the north, sector S25 borders sector S28.

The western end of the southern border of this sector reaches the foot of the rock and ends with a nearly vertical rock fault more than 1 m high. Below, but more to the east, a small (ca. 2.35 × 0.35 m) terrace with two rectangular, unequal recesses is set. Their line of sight orientation strongly resembles that of platforms and seats from sector S26 located higher up the rock. Still further to the east, the western part of neighbouring sector S27 cuts into the flat, horizontal platform constituting the central part of sector S25.

An interesting feature of the western part of sector S25 is a semi-circular "Orchestra" (roughly 2 m in diameter) accompanied by three benches at the back. No other arrangements of this kind have been found on Samaipata rock. Small rectangular recesses cut into the front part of the "Orchestra" do not fit the design and might be a later alteration.

In front of the "Orchestra" are highly eroded traces of a shallow, double-T-shaped depression. It abruptly ends at the southern part of the rock. It seems the vertical face of the rock was cut down there when the U-shaped building from the colonial period was erected in the eastern part of sector S04.

The western part of the central platform of sector S25 is separated from the rest by a narrow water channel that leads from the north down the rock. The part of it that lies behind the "Orchestra" borders a steep rock scarp ca. 1.2 m high in the north. Four double-recessed niches are equidistantly placed on its western section. This decoration seems to be an Incan addition to this evidently earlier sector.

Another channel that follows the natural crack in the rock crosses the platform roughly at the centre. It brings water from as far as the northern part of sector S28 and terminates in front of the semi-circular "Orchestra".

The remaining, eastern part of the central platform in sector 25 does not bear any features except for a small L-shaped terrace and very flat, unclear traces of what might once have been a small recess and a bench separating the slightly raised eastern end of the platform.

Sectors S26 and 28

These two adjacent sectors (Fig. 50) are probably the most interesting and intriguing parts of Samaipata rock. Both lie to the north of sectors S25 and S27 and extend up the rock until the big flat area that constitutes sector S29.

The more westerly located sector S26 shows a very consistent arrangement. Its main part is composed of three successive platforms climbing to the north. Except for small modifications in the uppermost one, all of them have an identical layout.

Their main part is a centrally located rectangular (roughly 50 × 70 cm) seat flanked by two raised buttresses ca. 60 cm wide. Small benches are placed symmetrically on both sides of these possibly ceremonial seats, except on the third platform. The symmetrical layout of these platforms is additionally emphasised by the coaxial steps leading from the south.

Further to the north, another platform, this time of a double-T shape, has been cut into the surface of the rock. A rectangular, centrally located seat is placed at the back of the platform. Faint traces of smaller seats accompanying this seat on both sides are still noticeable. Directly to the east, there might once have been a similar platform. However, its rear side is arranged in a slightly different manner, and the front side is very eroded. The rock surface behind these two platforms is very irregular. It might be that once a kind of east–west elongated petroglyph existed there. It must have been of an earlier origin since both the platforms cut into it.

Behind this elongated petroglyph, there is a corridor, 0.45 m wide, ca. 1 m deep, and more than 5 m long, that leads from sector S23 to yet another platform situated in the north-eastern corner of the sector. Three rectangular seats, the central one bigger and slightly raised, are set against the back wall of this platform. Both the corridor and the platform were apparently executed at the same time as the upper terrace in sector S23.

Nearly ten separate units make up sector S28 (Fig. 50), located adjacent from the east from sector S26. The first unit in the west consists of two terraces towering above the western part of sector S25. The lowest one is divided

Fig. 50. Sectors S26 and S28

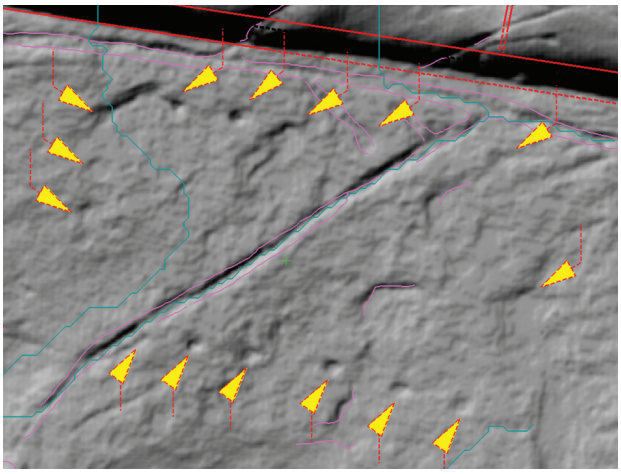

Fig. 51. Round marks visible on the hill-shaded 3D model of the central part of the upper terrace of sector S28

into three platforms, with the side ones being slightly elevated. An interesting feature is the rhomboid shape of platforms, not seen in other sectors. The back wall of this terrace is 0.7 m high. Even higher (ca. 1 m) is the back wall of the next terrace adjacent from the north. Such significant differences in levels must have resulted in an impressive cascade of water flowing down the channel cut along the side walls of both platforms.

The next unit of this sector has a very irregular arrangement. Several small, differently shaped platforms have been cut to the east and west of the water channel running from the north. Above the uppermost platform of this unit, this water channel flows through a small (ca. 1 × 1.5 m) rectangular reservoir at the bottom of which there are traces of three, no longer identifiable, petroglyphs. The whole layout of this unit seems to be subordinated to the cult of water, and this is further emphasised by the two rectangular ceremonial seats adjacent from the east of this unit. In front of them, in the centre of a small (roughly 50 × 50 cm) rectangular depression, traces of a rounded (ca. 23 cm in diameter) offering hole are preserved. A small channel branching from the area of the three petroglyphs might have "fed" this offering hole. Below this, traces of some other terraces, probably created earlier based on the state of their preservation, are extant.

Two rectangular platforms located further to the east are much better preserved. In the east, they border a much bigger unit laid out over three terraces climbing the slope. The lower one consists of a spacious (ca. 1.7 × 7.3 m) platform with raised western and eastern borders isolating it from neighbouring units. Four rectangular seats are placed against the rear wall. Three buttresses, nearly 1.5 m wide, separate them. Poorly preserved traces of much smaller seats (ca. 50 × 60 cm) are visible on the top of each of the buttresses. The front (southern) edge of this platform is slightly raised so that the rainwater accumulates in a flat rectangular (ca. 60 × 80 cm) reservoir with indecipherable traces of an oval petroglyph on its bottom. From there, water passes a small meandering channel and runs down from the edge of a nearly 2 m-high slope into the reservoir located below. The level of the next, located further to the north, terrace is raised for about 1 m. Three steps placed in the centre of its back wall lead to another terrace that completes the whole unit. There, in the centre of its 1.2 m-high rear wall, two benches are set on top of one another. They probably played the role of a ceremonial podium towering over the terraces below.

Located above, the northern part of sector S28 narrows gradually, squeezing between the neighbouring sectors S26 and S31. Three further units constituting independent entities can be distinguished there. The westernmost one starts with a terrace over 6 m long. The already mentioned reservoir with the three unclear petroglyphs on the bottom attaches at the south-western corner of the terrace. The rear wall of this terrace is nearly 1 m high and five triangular recesses decorate the top of it. Behind, difficult to interpret traces of two narrow depressions accompanied by traces of rectangular recesses (or seats) are extant. Possibly, these were sculpted earlier than the triangular decorations. East of this terrace lies a unit of a much consistent layout. A trapezoidal (ca. 3.0 × 3.7 m) platform there opens to the south and is surrounded on three sides by low benches. Two narrow buttresses in the centre of the northern bench separate a more prominent individual seat. Traces of rectangular recesses (or possibly seats) to the east might be of an earlier origin, so the whole unit was probably cut into an earlier (pre-Incan?) phase.

The uppermost part of sector S28 is occupied by a flat, spacious (more than 5 × 10 m) terrace. Two small platforms in its north-eastern corner facilitate movement up to sector S29 located ca. 1 m above. Traces of at least three flat depressions in the western part of the terrace are signs of an earlier decoration that was erased when this terrace was arranged.

Other vestiges of earlier phases can be found on the central part of this terrace. Fifteen round flat holes (ca. 10 cm in diameter), visible only on the hill-shaded monochromatic 3D model, form a rectangular enclosure of 2.4 × 4.6 m (Fig. 51). One possible interpretation assumes the existence of a small hut here with *quincha* type walls. Round marks would then be remnants of the holes for the wooden posts of the wall. The hut, if it really existed in this place, would have to have been from an earlier period than the present form of this platform. *Quincha* wall post holes are usually over 20 cm deep – in this case, levelling the platform surface has led to almost completely erasing them.

Sector S27

Sector S27 (Fig. 52) lies in the most southerly part of Samaipata rock. It consists of two functionally distinct parts that are connected by a special passage.

On the western side of sector S27 is a spacious court separated from the south by a wall built of stone rubble. A narrow entrance leads to it directly from the plaza at the foot of the rock. The rear side of the court is bordered by a steep edge of the rock and decorated with four niches. The average width of niches and distances between them is 105.2 cm, and again, this is a good approximation of the unit of measurement used according to Kubicka [10]

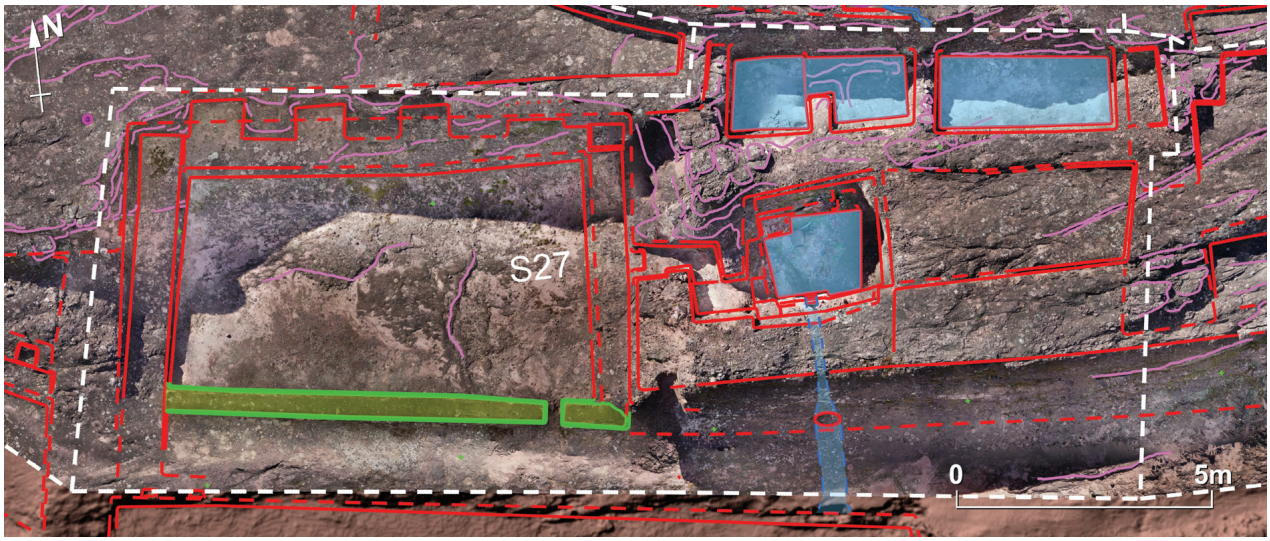

Fig. 52. Sector S27

for buildings with the most prestigious function at Machu Picchu.

Spacious benches surround the court from the west, north, and east. This courtyard was initially roofed, as is clear from the presence of the front wall with the well defined entrance and the side walls rising 2.25 m above the stone floor inside.

The eastern part of sector S27 had a more utilitarian function. A set of three deep reservoirs has been cut into the rock there. The southernmost reservoir, 2 m deep, collects water overflowing from the other two reservoirs located up the rock and has an outlet at a level close to its bottom. Interestingly, a special Z-shaped entranceway connects this reservoir with the court (building?) on the western side.

The side walls of the southernmost reservoir show many steps and recesses perhaps facilitating climbing down for inspection and cleaning of the bottom part. On the northern wall, Giuseppe Orefici found remains of what might have once been an Andean Cross (Fig. 53). Besides the already mentioned Chakana-like platform, it is the only example of this symbol found on Samaipata rock, and probably manifests the influence of the Tiwanaku civilisation or was created during the period of Wari culture expansion into the area of Bolivia, as can be attested by similar examples found in the areas of Bolivia and Brazil.

It is then evident that at least the upper part of the reservoir in question had an earlier origin – however, during Inca occupation of the site it was probably deepened. The outlet on its bottom might also be of Incan origin and probably provided water for the Incan building located directly to the south.

Fig. 53. Andean Cross partially preserved in a reservoir in sector S27 (photo by G. Orefici, 25.06.2016)

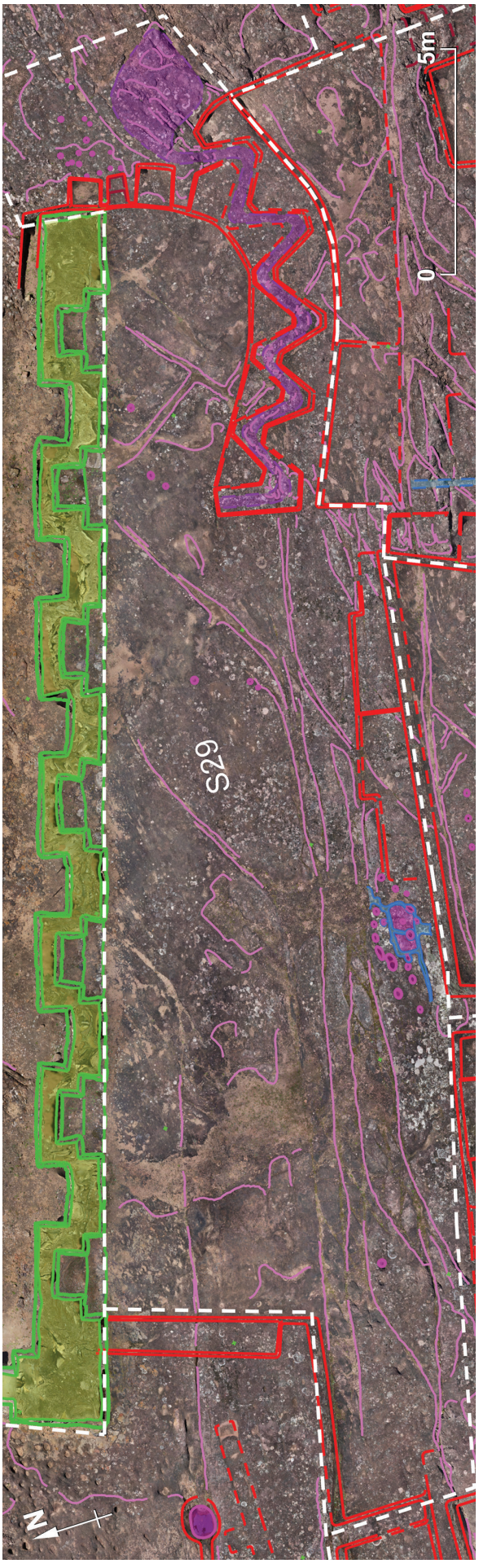

Fig. 54. Sector S29

Sector S29

Sector S29 is located at the top of the rock (Fig. 54). Its southern margin borders sectors S26 and S28. The northern extent is limited by the eastern wing of an L-shaped wall with double-recessed niches.

The central part of sector S29 was radically modified in the Inca era, at the time when the L-shaped wall was built. The archaeology of this wall was already examined by the German mission led by Albert Meyers [12]. Ismael Montero and Joanna Broda also studied it in 2006, determining that it functioned as an astronomical observatory [16].

On the southern edge of this sector, traces of a presently indecipherable petroglyph can be seen. This petroglyph is surrounded by narrow water channels and eight small, irregularly distributed offering holes.

At the eastern border of sector S29, remains of what might have once been a representation of a meandering snake executed in bas-relief are extant. Its overall length of more than 11 m makes it the largest snakelike sculpture on the entire Samaipata rock. The origin of this image, closely related to the cult of water and fertility, might go back to the period when the site was occupied by Chané-Arawak cultures (ca. between 800 and 1450 AD). During Inca dominance, or even earlier, the snake figure was severely modified with triangular seats cut into both of its sides. The head of the snake also completely disappeared, although this was partially due to intentional erasing and partially to natural erosion.

Some modifications were also introduced in the narrow area between the snake and the eastern end of the L-shaped wall. Two rectangular seats were cut in with two narrow (ca. 45 cm wide) steps between them facilitating access to the area above where several round offering holes are irregularly distributed. In the present state of preservation, only a few centimetres are left between the L-shaped wall and the northernmost seat, making the latter completely afunctional. Since the rectangular seats seem to have been sculptured at the same time as the triangular ones, this suggests that both alterations were executed before the L-shaped wall was erected.

Sector S30

Sector S30 occupies the south-eastern edge of the rock and borders sector S27 from the west and sectors S31 and S32 from the north. A steep slope forms its southern border. Two elongated terraces have been cut into this slope. Steps leading from the north provide a secure entrance to the uppermost terrace. However, there are no traces of any access to the lower terrace located down the slope. It only had the technical function of collecting rainwater flowing down the slope and channelling it off the rock. None of the terraces show traces of any seats or decoration, which may be due to the very poor state of preservation of this part of the rock.

Sectors S31 and S32

Sector S31 extends between sector S30 in the south and S29 on the top of the rock (Fig. 55). Two long flights of steps set ca. 12 m apart delimit its western and eastern borders. Along the western edge of the sector runs a long channel that drains rainwater from the top of the rock and the terraces located below.

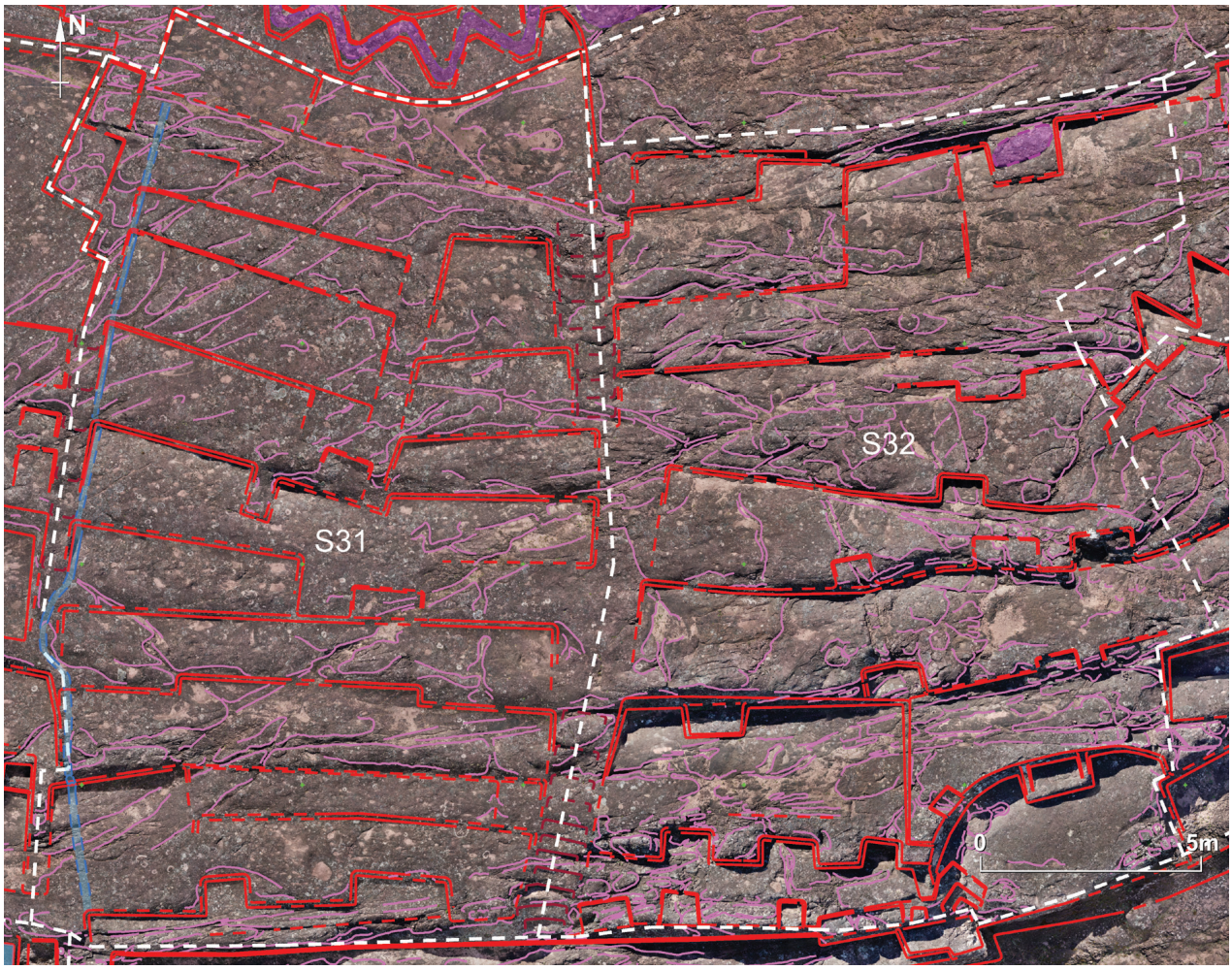

Fig. 55. Sectors S31 and S32

Six consecutive terraces extend across the entire width of the sector in its lower part. Apart from the southernmost one, where two rectangular recesses of unequal size tower above the steep slope, the layout of the terraces is simple.

The upper part of the sector is divided into two units separated by a narrow, very eroded strip that might once have been a flight of steps. Now, no traces of such are visible. The slightly broader western unit consists of a sequence of four towering terraces. Again, their layout is very simple and except for the first platform (the lowest one), no any additional features such as seats or recesses are present. The eastern unit is composed of four simple trapezoidal platforms of which the uppermost one is the narrowest.

Located to the east, sector S32 shows a much more complicated arrangement (Fig. 55). Two units constitute its lowest, southern part. The western one consists of two platforms. The front edge of the lowest one is decorated with three unequal recesses. A more symmetrical layout is shown on its rear side, where three recesses have also been carved, but in a more orderly equidistant manner. Two of them of an equal size (ca. 0.7 × 1.0 m), while the last one is much smaller so as to avoid cutting into the semi-circular unit located to the east. The upper terrace of this unit is much deeper and extends for more than 3 m in a north–south direction. A single trapezoidal bench (or possibly seat) is asymmetrically placed against its 0.8 m-high rear wall.

The second, more easterly unit consists of a semi-circular platform nearly 6 m in diameter. At its apex, a ceremonial seat with raised shorter edges is attached to the 0.8 m high rear wall. There is a small (45 × 65 cm) recess cut into the upper edge of this wall to the west of the seat. A similar one probably also existed on the eastern, now completely eroded side. The front part of this platform has also already collapsed. Only at its western end are three rhomboid recesses preserved. They form a diamond-like pattern that is unusual for Samaipata.

Above these two units is a sequence of several terraces that extend for the whole width of this sector. The first two show an orientation similar to the lower, westerly unit, although they are probably of an earlier origin since the last cuts into the central recess of the lowest of these two terraces. Their much more eroded surface further confirms this relative dating. The uppermost terraces of sector S32 are differently orientated and are probably even older than the middle ones. The surface of the rock is very weather-beaten there, and it is difficult to determine the planning concept at this part of the rock.

Eastern part of the rock

In this part of Samaipata rock, three separate sectors can be distinguished: E01, E02 and E03 (Fig. 56). All of them show traces of very advanced erosion; therefore, little can be determined about their original layout. What can still be seen today is a sequence of terraces along the arched, eastern slope of the rock.

The only features that may attract more attention are two sets of double, triangular recesses in sectors E01 and E02. In sector E02, they flank a big trapezoidal terrace, to which a smaller, also trapezoidal, platform attaches

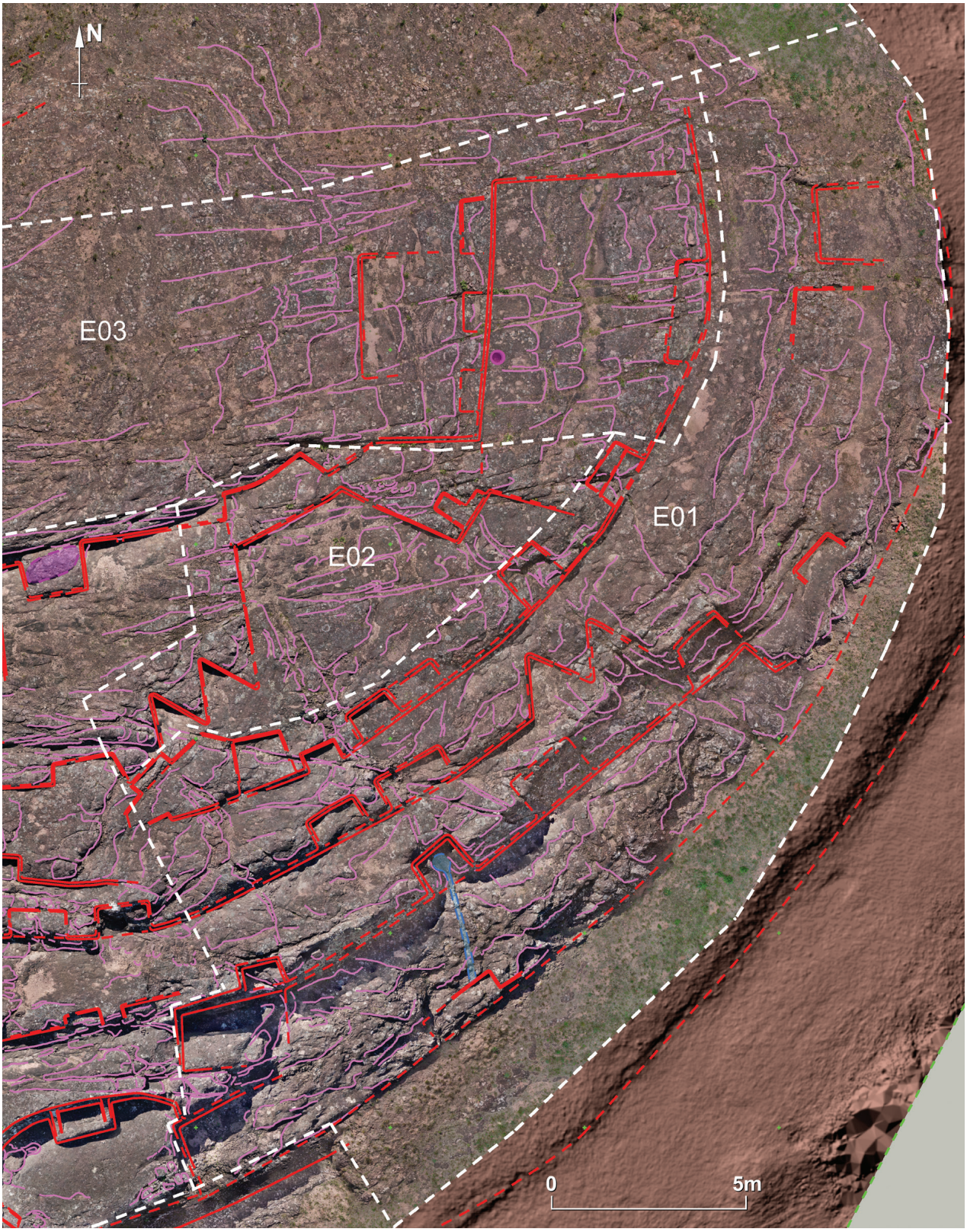

Fig. 56. Sectors E01, E02, and E03

from the north. Similar triangular recesses are however missing on the eastern side of the big trapezoidal terrace. The other two triangular recesses are in the central part of sector E01. They have been cut into the rear side of the eastern end of the middle terrace, but a further continuation of this kind of layout cannot be traced. The surface of sector E03, as well as the northern part of sector E01, is very fractured and battered due to harsh climatic conditions at this part of the rock. The less compact structure of the sandstone rock also contributes to this quickly progressing erosion.

The only anthropogenic traces preserved in this sector are two terraces in its eastern part. They are both orientated directly to the east. The more spacious (ca. 5.5 by more than 7.0? m), lower one has a centrally placed recess in its oblong front edge. The rear side also shows a symmetrical layout – three small, rectangular benches of roughly similar size (ca. 0.5 × 1.0 m) have been carved there at equal intervals. Behind these, a much smaller (ca. 2.6 × 3 m) platform completes the layout. It seems that this unit could be from an earlier period than the neighbouring trapezoidal platform from sector E02. Perhaps two similarly oriented terraces with the same kind of layout once existed in the northernmost part of sector E01. However, only very faint traces of them have survived, visible only under the right angle of oblique lighting

Summary and conclusions

Generally, chronological data for rock art are very limited, and few studies attempt to determine a chronological sequence for this form of expression. Due to this, it is difficult to obtain reliable data. However, in the last 30 years, considerable progress has been made in dating some sites. Studies about archaeological sites in the Cochabamba Department [17], [18] and from the area of de la Serranía San José in the Santa Cruz Department [19], particularly that of Santa María Chica Cave, have shown that for some kinds of rock engravings and paintings, absolute dating can be provided.

The relative or absolute chronology of this class of rock art can be, at least theoretically, established with the following techniques and methods:

1. Superposition analysis that makes it possible in several cases to establish which of the engravings is earlier or later than others.
2. Stylistic and formal comparative analysis that allows some of the representations to be associated with ones from other, better dated sites.
3. Analysis of the technique of execution, taking into account not only the type of rock art (e.g., rock painting, relief) but also the technologies used to create them, for example, in the case of reliefs, concave, convex, incised, or dotted relief. Such analyses may allow particular images to be linked with specific cultural circles of a known dating.
4. Some techniques for the absolute dating of engravings such as lichenometry or the analysis of the micro-erosion of the petroglyph surface.
5. Dating of the archaeological contexts associated with the rock. However, this method only points since when human presence existed in the investigated area; it does not determine when the engravings began to be made.

We will start with this last method. Ceramics from the Formative Period (at least the end of the first millennium BC) have been found in the excavations carried out near Samaipata rock [12, p. 79], particularly in the residential area and in the filling of the terraces [20], [21, p. 121]. However, for the moment, it is not possible to attribute such an ancient dating to any of the petroglyphs of the rock.

In terms of absolute dating (point 4 above), there was some hope that analysing the micro-erosion of petroglyph surfaces would be useful [22], [23]. Unfortunately, this method is limited only to crystalline rocks, so at the present stage of its development, it cannot be used for the sedimentary rock at Samaipata. Lichenometry cannot be used for various reasons, either. The main one is that the rock surface has been modified several times by different anthropic factors, making it practically impossible to determine places in which lichens began to grow immediately after the execution of any particular petroglyph. Additionally, the climatic conditions of Samaipata result in a different growth process of lichens compared to, for example, North America or Easter Island, where lichenometry was relatively successful. The third and final reason is that there is no calibration curve based on growth rate data for local lichens at Samaipata [24].

Going back to the first method, superposition analysis, chronological differentiation can be based on observations of rock shaping phases, marks of intentional recutting, and characteristic formal features. Analysis of those features makes it possible to create a tentative "relative chronology" map of the engravings (Figs. 57 and 58). The main distinction achieved in this map is between "earlier" and "later" phases (A and B on Figs. 57 and 58). Only in some cases was it possible to suggest particular features as "possibly Incaic" (C on Figs. 57 and 58). It is, however, important to mention that category "B" should not always be considered as before the Incaic period. Sometimes the carvings in this category may be modifications made in Inca times but without the typical stylistic features of this period. From this point of view, one cannot add much more to the findings of previous researchers, who differentiated two main stages in the cultural activities at the rock:

– pre-Incaic period, probably divided into different cultural phases,
– Incaic period, of which, apart from the buildings on top of the rock, the most outstanding feature is the ceremonial "reorientation" towards the great plaza south of the rock (see below).

Stylistic and formal comparative analysis, as well as analysis of the technique of execution of particular engravings (methods 2 and 3 above), bring other problems, particularly with respect to the pre-Incaic phases of the shaping of the rock. The difficulty in absolute or even relative dating of carvings at Samaipata rock also arises from the universality of the occurrence of specific iconographic motifs. Several rock art symbols are common in the territory of South America, and they are related to ancestral themes that characterise the Amazonian and

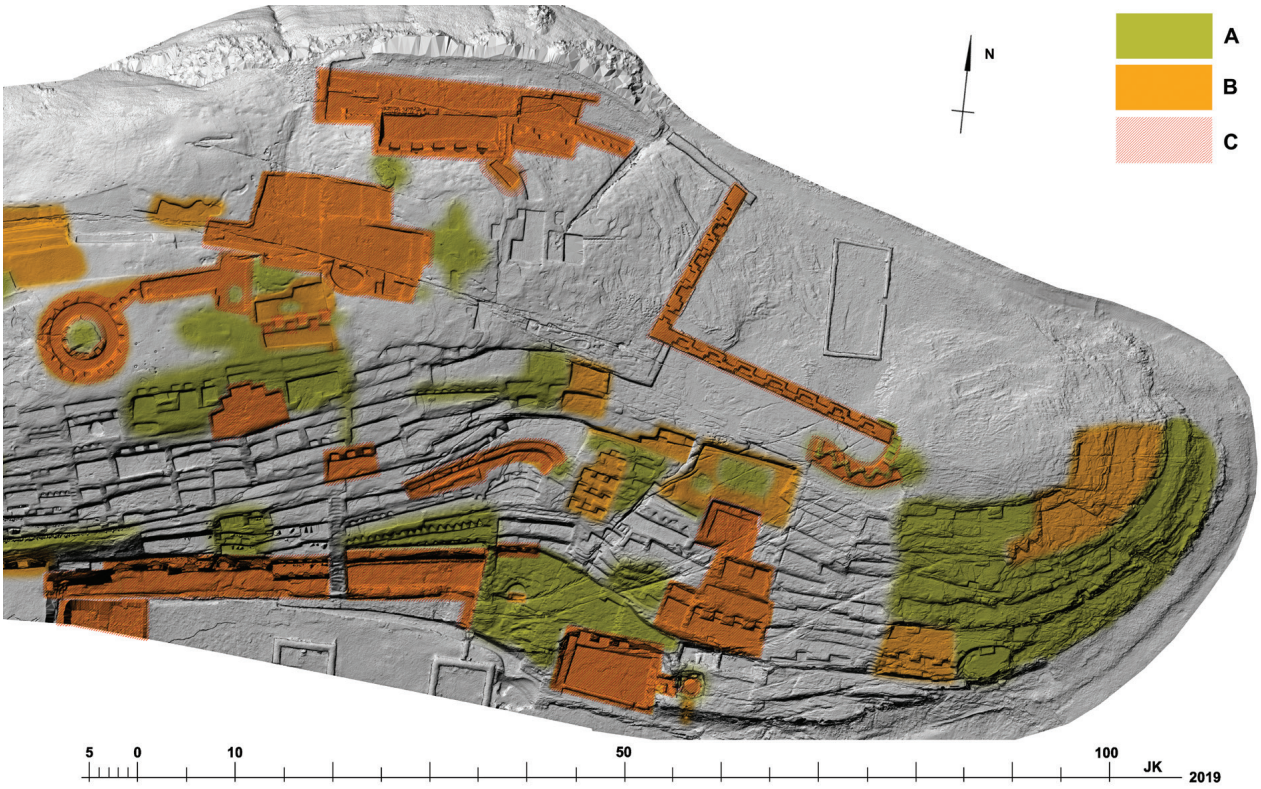

Fig. 57. Eastern part of the rock – relative chronology:
A – earlier;
B – later;
C – possibly Incaic

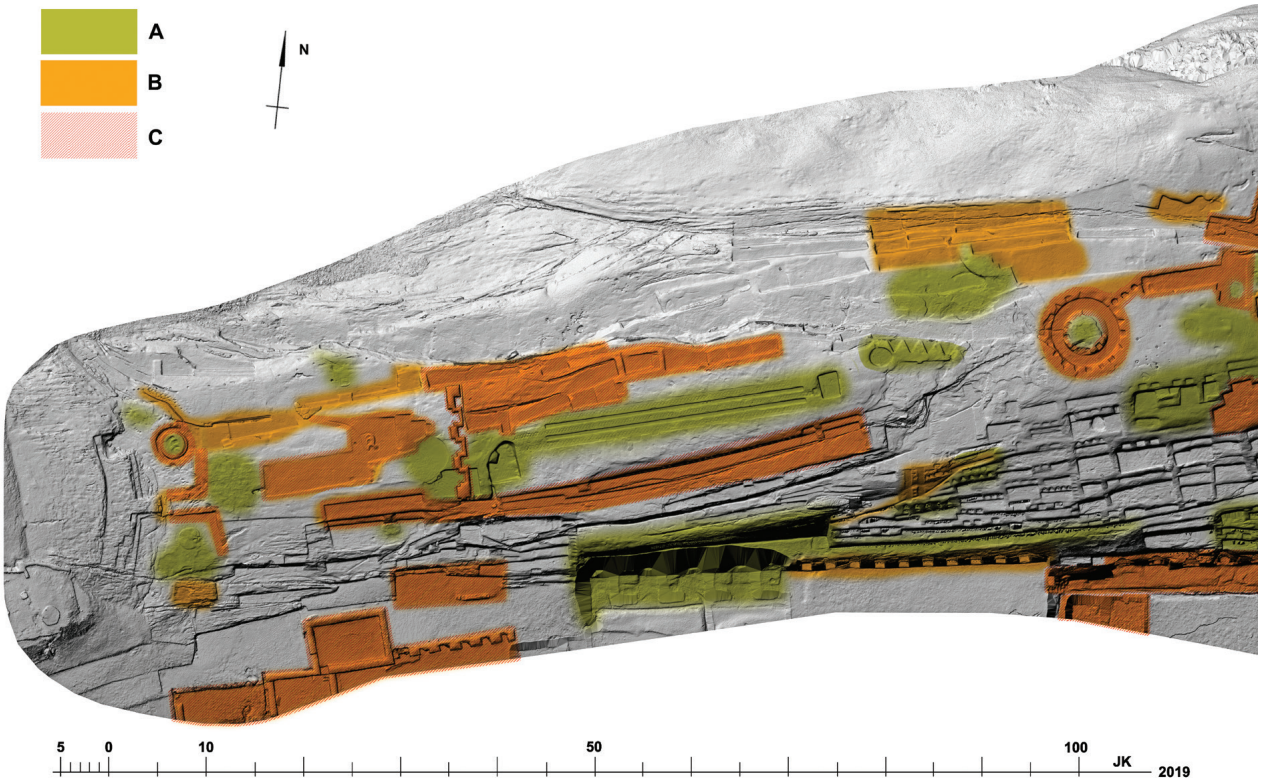

Fig. 58. Western part of the rock – relative chronology:
A – earlier;
B – later;
C – possibly Incaic

Fig. 59. Representation of a rhea (*ñandú*) on a petroglyph no. 2 from Tarija/Orozas (source: extract from YouTube movie, https://www.youtube.com/watch?v=jXvhVrpvDB0)

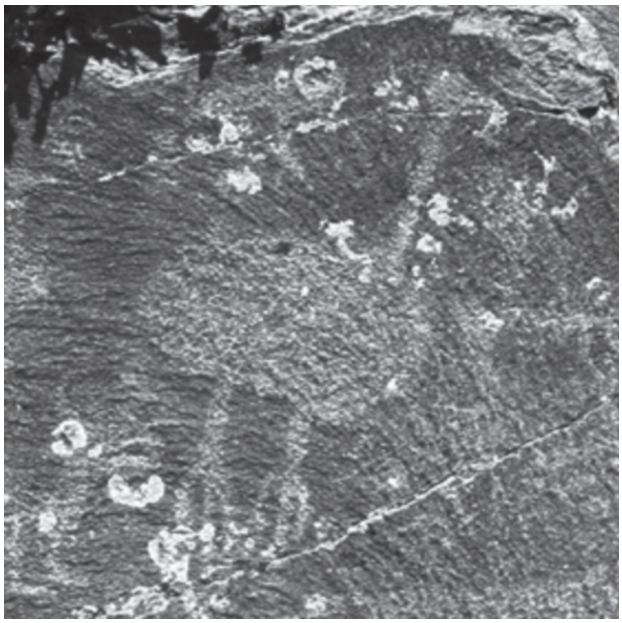

Fig. 60. Representation of a rhea (*ñandú*) on a petroglyph from Poopó/Oruro (photo by M. Strecker, March 2012, source: [26])

Andean area. For example, representations of serpents and felines are typical over all the South American territory, and these iconographic motifs are the most common expressions of the main divinities of the religious world. Thus, for example, the meandering snake is found on the site of the large El Buey rock shelter. Roy Querejazu Lewis [17] identifies the El Buey site as belonging to different moments in the development of several agro-pottery periods and compares them to Yampará ceramics (1100–1470 AD). However, interpreting the iconography of the reliefs sculptured on Samaipata rock as belonging exclusively to the Late Intermediate Period or Late Regional Development (800/1000–1400 AD) seems to be a bit extreme. There are several examples of reliefs with serpentine elements, for example on stelae at the Khonkho Wankane site in the Lake Titicaca Basin [25], which can be dated back to the Late Formative Period (approximately 200 BC–500 AD), if not earlier, to the Middle Formative Period (ca. 800–200 BC).

In Eastern Bolivia, generally, examples of sculpted rocks related to rituals of water worship and fertility are most frequent in the vicinity of rivers and at the confluence of them. They are often associated with round holes serving as offering pits to be filled with rainwater or special liquids. This strong association between petroglyphs and offering holes is also present at Samaipata rock.

As already stated, the figural and geometrical petroglyphs found on Samaipata rock do not belong to a single chronological moment. We can rather assume that the sculpturing of these images had an intense dynamic and that even though they all exist in the same place, the importance of different symbols has varied throughout time. Therefore, there were probably many more figural representations sculptured on the rock surface from since the time that it became a spiritual centre for the local population. These were added, modified, or erased according to the evolution of local beliefs and changes in associated rites.

Among different zoomorphic petroglyphs, those of snakes are particularly frequent and important. We found them on the top of the rock as well as in the lower parts. They are usually in the form of a meandering snake. The only exception might have been the representation of a coiled serpent, which, according to historical sources [5], was located in the western part of the rock, just north of the two depictions of felids. Today it is difficult to even identify this spot exactly, let alone recognise the image. It seems, however, that this petroglyph might have been rather a representation of a meandering snake[14], as represented by d'Orbigny on his drawing (Fig. 6).

Both the representations of felids and the now lost coiled(?) serpent are coeval and can be possibly dated to the Late Intermediate Period (ca. 1000–1400 AD). However, the neighbouring, nowadays completely indecipherable, image of a rhea can be of even earlier provenance since as an exception, it was probably executed in sunk-relief[15]. Known examples representing rheas might be petroglyph no. 2 from Tarija, Orozas (Fig. 59), or a petroglyph from Poopó, Oruro (Fig. 60). Generally, representations of rheas can be traced back to as early as the second millennium BC [27], [28].

On the other hand, all these petroglyphs belong to the feline-snake-bird triad, which is the most representative

[14] Cf. J. Kościuk, M. Ziółkowski, M. Pakowska, *Formal and iconographic analysis and interpretation of the most damaged petroglyphs*, in the same issue of "Architectus".

[15] Cf. J. Kościuk, M. Ziółkowski, M. Pakowska, *Formal and iconographic analysis and interpretation of the most damaged petroglyphs*, in the same issue of "Architectus".

for the religious world of the South American area and for the eastern Bolivian jungle; therefore, despite possible differences in sculpturing technique, all of them may have the same cultural provenance that however cannot be precisely dated. This type of iconography already existed at least from the second millennium before our era, and can be seen in petroglyphs from Argentina, Peru, and Bolivia [29], [30].

All the figural petroglyphs found on Samaipata rock are connected to the cult of water. The two felids in the western part of the rock and the so-called Altar ("Choir of the Priests") are even surrounded by circular water channels. For other petroglyphs, water channels pass beside or through the petroglyphs (for example, the "Double Puma(?)" or "Triple Snake", both in the eastern part of the rock), or rounded pits for liquid offerings are located nearby (the "Big Snake", "Snake-catching Animal", or the lost rhea petroglyphs). The eastern part of the rock is particularly abundant with this kind of pit. They can be distinguished from natural openings in the rock by the shape and character of the inner surface, and in some cases by the presence of channels that guide liquid into the holes. Possibly, they formed part of rituals related to sunrise or water. Similar circular holes, which were elements of water worship, can also be seen in the Roca de Mairana [31]. Samaipata rock also has another type of rounded hole meant for offering deposits. These are found on the entire surface of the rock and in particular on the southern and northern sides.

They are also many traces of now indecipherable circular petroglyphs. Typically, these are between 1.5 and 3 m big, but some of them have a diameter of more than 5 m. They are mostly located on the top of the rock and its northern slope. As they were erased or even cut through by later activities (sculpturing terraces, benches, or seats), they are evidently of an earlier, pre-Incaic origin. The fact that they bear not only traces of intentional erasing, but they are generally much more eroded than the other examples, also suggests a much earlier origin.

The association of circular petroglyphs with earlier phases of the sculpturing of Samaipata rock may lead to a conclusion about preferences for circular shapes in earlier periods. However, since there are other, non-circular, petroglyphs attributed to earlier periods (for example, two big meandering snakes into which zig-zag seats were cut during later times), a circular shape cannot be considered as the only decisive factor in chronological analysis.

The most emblematic figure on Samaipata rock is the "Big Snake" – the long geometric petroglyph more than 30 m long that is interpreted as a representation of a rattlesnake. Since generally, the edges of the rhomboid patterns as well as of the two accompanying gutters are relatively sharp, this petroglyph has probably not been exposed for a long time to atmospheric and bio-erosion factors. Therefore, the most probable dating is not very much earlier than the Late Intermediate Period. During the Inca period, this petroglyph lost or changed its symbolic and religious significance. A north–south oriented wall erected across the top of the rock made the petroglyph inaccessible for viewing from the only place from where it might have been admired – from the slope of the hill rising to the west.

The earliest anthropogenic traces on Samaipata rock are to be found on its eastern side. From there, access to the top of the rock was also the most convenient. Possibly, this was the oldest main route to the summit of the rock, from where one could proceed further to the west or down the southern slope. Several steps, often separating different groups of terraces and platforms, facilitated movement down the steep southern slope. Some of these were modified over time due to the erosion affecting the structural integrity of the rock and changes in the function of particular sectors. Modifications were also made to other features sculptured on the rock – offering pits, water reservoirs, seats and benches, as well as many petroglyphs.

The triangular seats(?) that frequently appear on the rock, often in long rows, are also worth attention. Although this shape is untypical for Incan architecture, some examples of triangular niches are known [14, p. 256, Fig. 242]. However, generally, they were more likely to have been made during earlier periods of Samaipata rock shaping. This is also true for the triangular seats in the "Choir of the Priests".

One of the typical architectural forms on Samaipata rock is niches. Some of these are double-recessed, trapezoidal in shape, or show metrological similarities with Incan architecture. None of these features, however, can be considered as clearly indicating Incan origin. Such architectural elements are also typical for the Tiwanaku culture; therefore, they are considered by us only as "possibly Incan".

The possible influence of Tiwanaku culture on Samaipata carvings presents another problem. This influence may be seen in the architectural elements of the niches as well as the traces of the Andean Cross found in Sector S27 and the Chakana-like platforms. On the one hand, we have clear evidence of the influence of Tiwanaku culture in the Cochabamba valley [32] – so approximately halfway between Samaipata and Lake Titicaca. However, there is generally a view that in Bolivia, there is no evidence of the influence of Tiwanaku culture on rock art. In a UNESCO report about rock art in Bolivia, Matthias Strecker even states […] *An absence of rock art belonging to the Tiwanaku culture has been noted by several investigators* […] *It is a curious fact that the only clear case of Tiwanaku style rock art has been found outside Bolivia, in northern Chile* […] [33, p. 142].

The restructuring of the rock in Inca times

Summarising, we can state that over time, all the sculptured forms, including petroglyphs, platforms, seats, niches, terraces, and the steps connecting them, underwent several modifications due to the changing religious and ceremonial needs. In most cases, it is not possible to determine the exact sequence of these changes and the specific, pre-Incaic, periods in which they were made. There is no doubt that generally the Inca expansion to new areas often eliminated previous cultural elements, particularly when they were deeply rooted in the social, political, and especially religious structure of the populations that had previously used the site. One other place of the many where this

occurred is the Intihuatana in Pisaq, which was erected in a place where much older symbols had been engraved in the rock. Everything was removed from the previous sacred element and replaced with the Intihuatana [34].

We must not forget a very specific factor: the Incas erected a large ceremonial complex, with a great plaza and *kallanka*, immediately south of the rock. As the main Incan ceremonial activities were carried out in large squares, usually located in the centre of settlements, presumably this was also the case at Samaipata. An interesting analogy to this particular relationship between the rock sculpted with niches and benches and the adjacent plaza is found in the Incan ceremonial centre of Coyoctor in the province of Cañar in Ecuador [35].

The areas of worship and sacrifices with ceremonial seats or thrones, often of considerable dimensions and often several times remodelled, are generally oriented toward the south. This southern edge of the rock, especially in its eastern and central parts, was modified very drastically during the Inca occupation of the site. The edge of the rock was cut almost vertically, and several sets of niches were placed there. Subsequent carving of platforms and terraces, as well as the addition of new functions in some sectors, caused remarkable transformations to be made to this part of the rock. It seems that except for a long row of ten niches in the central part of the southern edge of the rock, all other niches might have been roofed. A similar arrangement was also introduced at the northern edge of the rock – at the "Temple of Five Niches". It is, however, a possibility that some of these modifications were executed during the Middle Period or the Chané occupation of the site.

Since our knowledge about rites performed at the rock is less than limited, we cannot reconstruct the "choreography" of any ceremonies. Theoretically, two options are possible. Certain rituals were performed on the rock, and spectators gathered on the southern side, at the foot of the rock. On the other hand, the presence of long benches that could accommodate many people on the rock points to another possibility. Seats and benches were indeed meant for celebrants and their acolytes, but in addition to performing certain rites, they watched processions and ceremonies that took place at the foot of the rock. Most likely, depending on the particular occasion, both scenarios were possible.

Visibility analysis (analysis of the line of sight) can shed some light on this. Benches, seats, and terraces, especially on the southern slope of the rock, mostly follow the natural shape of the rock. However, drawing sightlines perpendicular to the backside of the seat or bench leads to some interesting observations (Fig. 61). Along the southern side of the rock, within a range of 20–30 m, there are four zones suitable for spectators where sightlines tend to concentrate (Figs. 61A–D). However, the results of analysis of the line of sight do not determine whether the designated zones were intended for viewers observing the rites on the rock, or they were the route (or places) of the celebrations that were observed by privileged spectators gathering on the benches and seats on the rock. The following analyses ignore the vast area further south, where a much larger audience could gather. Due to the

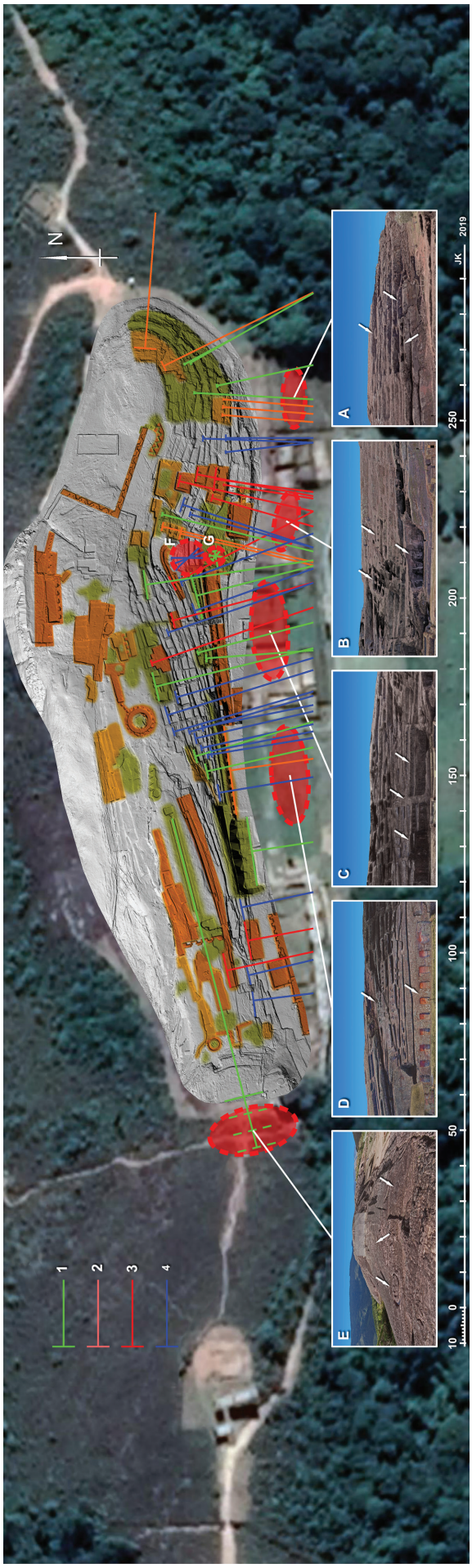

Fig. 61. Analysis of sightlines for benches and seats of earlier (1), later (2), possibly Incaic periods (3) and of unknown provenance (4). A–G – areas convenient for spectators (explained in the text)

considerable distance (75–150 m), anyone gathered there could probably only participate in ceremonies as a passive viewer.

Area A has a visible preference for benches and seats of a later period and gives a good view for at least three big ceremonial seats of sector S32 (arrows on Fig. 61A). Area B shows the concentration of most sightlines coming from benches and seats of probably Incaic origin. In this case, viewers gathered in front of the roofed(?) building located in sector S27. Above, sets of seats and platforms in sectors S26 and S28 towered over the southern slope of the hill (arrows on Fig. 61B).

The sightlines of two areas located further to the west (C and D) do not show any consistent chronological preferences. Area C – where a U-shaped building was erected in colonial times, gives direct access to the terraces on the southern slope of the rock. There, on the border between sectors S09 and S10, starts a long stairway leading up the hill (the middle arrow on Fig. 61C). A spacious building with unfinished niches on its back wall flanked its eastern side (the right arrow on Fig. 61C). To the east, a set of platforms with several niches (some of them double-recessed) adorned the rock face (the left arrow on Fig. 61C).

Nearly all petroglyphs on Samaipata rock were sculptured on flat parts of the hill, either on its top or on artificially created horizontal terraces and platforms; therefore, they were visible only to those who were gathering directly on the rock. Exceptions, besides the already mentioned "Double Puma", are the felines on the western edge of the rock, and the petroglyph most emblematic for Samaipata – the over 30 m-long representation of a rattlesnake ("Big Snake"). All these petroglyphs were practically invisible to viewers assembling on the southern side of the rock. The only place from which a bigger group of spectators could view them was area E on the slope of the hill rising to the west (Fig. 61E). This area has not been excavated yet, but the terrain suggests that there could have been several terraces falling to the east. This possibility, however, is severely limited by the construction of the aforementioned transverse wall across the hill. It practically wholly obscured the view to the "Big Snake", so only three petroglyphs depicting felines (three arrows on Fig. 61E) remained visible to a bigger audience. These alterations introduced apparently during the Inca occupation of the site may reflect changes in ritual symbology and associated rites.

In this context, one must also mention two specific areas – F and G on Figure 61. In these areas, the arrangement of seats and benches focuses on the area in close vicinity. Both areas, rather poorly visible from the area south of the hill, were probably meant for special, collective rituals.

* * *

In summary of this attempt to address the problem of the chronology of the rock art on Samaipata rock, we want to emphasise that the objective of the entire project was mainly technical – that is, to prepare high-precision 3D documentation of this exceptional site.

Our primary goal was not to carry out a detailed comparative study, in a Pan-American context, on the symbolic and chronological interpretation of the rock art. Looking for possible analogies, we have tried to limit ourselves to these territorially and culturally closest to Samaipata: mostly, according to terminology from the Bolivian Rock Art Research Society [36], from the Valles or Subandina regions [31], [37]. The only exceptions were, in this case, comparisons with similar monuments of Incan origin scattered throughout the Tahuantinsuyu [37], [38].

More comprehensive analysis of chronological phases of Samaipata rock shaping would require profound comparative studies on beliefs, symbology, and rituals of several South American cultures that left their traces in this region.

We must, however, remember that Samaipata, which is the largest and most important site of its kind in South America, due to its conformation, type of rock, and geographical position, was considered by its ancient inhabitants as a very important sanctuary from the earliest times. Its central geographical position with regards to communication flows between the jungle and the valleys determined its importance not only during the Middle Horizon and Early Regional Development. Most probably the site might have been considered as a cult place at least from the Formative Period.

As mentioned, the detailed chronology of the site as well as its cultural interpretation are outside of the scope of this particular project. Its main aim was to document the vanishing traces of this important site of rock art. The observations we have presented above should be considered only as working hypotheses or directions for future studies, but in no way as firmly established evidence. We hope that our work will serve experts in more advanced studies on the subject.

References/Bibliografia

[1] d'Orbigny A., *Viaje a la América Meridional*, T. 4, Institut Français d'Études Andines, Lima 2002, doi: 10.4000/books.ifea.6812, http://books.openedition.org/ifea/6812 [accessed: 14.04.2019].

[2] Nordenskiöld E., *Meine Reise in Bolivien 1908–1909*, "Globus" 1910, Bd. 97, 213–219.

[3] Nordenskiöld E., *The Guarani Invasion of the Inca Empire in the Sixteenth Century: An Historical Indian Migration*, "Geographical Review" 1917, Vol. 4, No. 2, 103–121, https://www.jstor.org/stable/pdf/207290.pdf [accessed: 18.02.2019].

[4] Nordenskiöld E., *Indianer und Weisse in Nordost Bolivien*, Strecker und Schröder Verlag, Stuttgart 1922, https://www.yumpu.com/de/document/read/20650859/indianer-und-weisse-in-nordostbolivien [accessed: 24.05.2019].

[5] Pucher L., *Ensayo sobre el arte prehistórico de Samaypata*, "Revista de la Universidad de San Francisco Xavier", Universidad Mayor de San Francisco Xavier Sucre, Sucre 1945, 17–61.

[6] Ponce Sanginés C., *Tadeo Haenke y su viaje a Samaipata en 1795*, Centro de Investigaciones Arqueológicas, INAR, La Paz 1974.

[7] Trimborn H., *Der skulptierte Berg von Samaipata*, "Archäologische Studien in den Kordilleren Boliviens", Bd. 3, "Baessler Archiv, Beiträge zur Völkerkunde" 1967, NF 5, 130–169.
[8] *Tadeo Haenke. Su obra en los Andes y la selva boliviana*, G. Ovando-Sanz (ed.), Los Amigos del Libro, Cochabamba 1974.
[9] *El Fuerte de Samaipata: Estudios arqueológicos*, A. Meyers, I. Combès (comp.), Biblioteca del Museo de Historia Universidad Autónoma Gabriel René Moreno, Santa Cruz de la Sierra 2015.
[10] Kubicka A., *Zastosowanie metody cosine quantogram do analizy metrologicznej kompleksu Machu Picchu/Application of a cosine quantogram method in metrological analysis of the Machu Picchu settlement*, Doctoral thesis submitted to the Faculty of Architecture, Wrocław University of Science and Technology, Wrocław 2019.
[11] Marulanda R., *La roca esculpida del fuerte de Samaipata: Elementos de discusión para un enfoque interpretativo*, [in:] A. Meyers, I. Combès (comp.), *El Fuerte de Samaipata. Estudios arqueológicos*, Biblioteca del Museo de Historia Universidad Autónoma Gabriel René Moreno, Santa Cruz de la Sierra 2015, 34–51.
[12] Meyers A., *Los trabajos arqueológicos en "El Fuerte de Samaipata", 1992–1996*, [in:] A. Meyers, I. Combès (comp.), *El Fuerte de Samaipata. Estudios arqueológicos*, Biblioteca del Museo de Historia Universidad Autónoma Gabriel René Moreno, Santa Cruz de la Sierra 2015, 52–115.
[13] Rowe J.H., *Inca culture at the time of the Spanish conquest*, [in:] J. Steward (ed.), *Handbook of South American Indians*, Vol. 2, Smithsonian Institution, Washington, DC 1946.
[14] Gasparini G., Margolies L., *Inca Architecture*, Indiana University Press, Bloomington–London 1984.
[15] Farrington I., *Cusco. Urbanism an Archaeology in the Inka World*, University Press of Florida, Gainesville–Tallahasseee–Tampa–Boca Raton–Pensacola–Orlando–Miami–Jacksonville–Ft. Myers–Sarasota 2013.
[16] Alcázar De La Fuente R., *El Sitio Ceremonial y Administrativo de El Fuerte de Samaipata*, "Boletín Tesape Arandu" 2015, Año 4, Nº 21, 2–9, https://www.academia.edu/12331379/El_Sitio_Ceremonial_y_Administrativo_de_El_Fuerte_de_samaipata [accessed: 10.07.2019].
[17] Querejazu Lewis R., *El arte rupestre de "El Buey", Departamento de Cochabamba, Bolivia*, "Boletín SIARB" 1989, Nº 3, 30–35.
[18] Querejazu Lewis R., *Arte Rupestre en la Cuenca del Río Mizque*, [in:] M. Strecker, F. Huaranca (eds.), *Arte Rupestre en los Andes de Bolivia*, SIARB, Sociedad de Investigación del Arte Rupestre de Bolivia, La Paz 1986, 17–19.
[19] Kaifler C., *Tres sitios de pinturas rupestres en la parte occidental de la Serranía San José, Departamento de Santa Cruz, Bolivia*, "Boletín SIARB" 1993, Nº 7, 59–95.
[20] Meyers A., *Toward a Reconceptualisation of the Late Horizon and the Inka Period: Perspectives from Cochasquí, Ecuador, and Samaipata, Bolivia*, [in:] R.L. Burger, C. Morris, R. Matos Mendieta (eds.), *Variations in the Expression of Inka Power. A Symposium at Dumbarton Oaks 18 and 19 October 1997*, Dumbarton Oaks Research Library and Collection, Washington, DC 2007, 223–254.
[21] Szykulski J., *Investigaciones en los Sectores 1 y 2*, [in:] A. Meyers, I. Combès (comp.), *El Fuerte de Samaipata. Estudios arqueológicos*, Biblioteca del Museo de Historia Universidad Autónoma Gabriel René Moreno, Santa Cruz de la Sierra 2015, 116–132.
[22] Bednarik R., *Age Estimates for the Petroglyph Sequence of Inca Huasi, Mizque, Bolivia*, "Andean Past" 2000, Nº 6, 279–291.
[23] Bednarik R., *A new method to date petroglyphs*, "Archaeometry" 2007, Vol. 34, Iss. 2, 279–291.
[24] Benedict J.B., *A Review of Lichenometric Dating and Its Applications to Archaeology*, "American Antiquity" 2009, Vol. 74, No. 1, 143–172.
[25] Janusek J.W., *Of Monoliths and Men: Human-Lithic Encounters and the Production of an Animistic Ecology at Khonkho Wankane*, [in:] T.L. Bray (ed.), *The Archaeology of Wak'as: Explorations of the Sacred in the Pre-Columbian Andes*, University Press of Colorado, Boulder (Colorado) 2015, 335–365.
[26] Strecker M., Methfesse L., Rivera C., Taboada F., Lima P., *Caminos destruyen sitios de arte rupestre en Bolivia*, "Boletín SIARB" 2012, Nº 26, 33–40.
[27] Recalde A., Colqui E., *Las representaciones rupestres zoomorfas en el centro de Argentina y la construcción de identidades (ca. 1500–450 AP)*, "Boletín del Museo Chileno de Arte Precolombinom" 2019, Vol. 24, No. 1, https://scielo.conicyt.cl/scielo.php?script=sci_arttext&pid=S0718-68942019000100083&lng=es&nrm=iso [accessed: 21.05.2019].
[28] Zárate Bernardi M.S., *Arte rupestre del Cerro Tunduqueral: definición estilística y perspectivas cronoculturales*, [in:] *I Jornadas de Ciencia, Técnica y Posgrado de la Facultad de Filosofia y Letras*, Universidad Nacional de Cuyo, Argentina, 2017, https://www.academia.edu/36552429/ARTE_RUPESTRE_DEL_CERRO_TUNDUQUERAL_DEFINICI%C3%93N_ESTIL%C3%8DSTICA_Y_PERSPECTIVAS_CRONOCULTURALES [accessed: 20.04.2019].
[29] Hostnig R., *Los petroglifos de Boca Chaquimayo: reliquia arqueológica de la Amazonía puneña, Perú*, 2009, http://www.rupestreweb.info/chaquimayo.html [accessed: 6.07.2019].
[30] Guffroy J., *El Arte Rupestre del Antiguo Perú*, Institut Français d'Études Andines, Lima 1999.
[31] Avilés Loaiza S.V., *Piedras sagradas: Samaipata, Achira y Mairana: ¿Casos aislados o una tradición por descubrir en tierras bajas de Bolivia?*, 2015, http://www.rupestreweb.info/piedrassagradas.html [accessed: 12.08.2019].
[32] Anderson K., *Tiwanaku Influence on the Central Valley of Cochabamba*, [in:] A. Vranich, Ch. Stanisch (eds.), *Visions of Tiwanaku*, The Cotsen Institute of Archaeology Press, [s. l.] 2013, 87–112.
[33] Strecker M., *Zone 4: West-north-west South America (north of the Andes, Peru, Bolivia, Paraguay)*, 138–150, https://www.icomos.org/studies/rockart-latinamerica/zone4.pdf [accessed: 16.07.2019].
[34] Angles Vargas V., *Písac and the sacred valley of the Incas*, Industrial Gráfica, Cusco 2001, 16–29.
[35] Siguencia Pinos R., *Coyoctor*, Casa de la Cultura Núcleo del Cañar, Quito 2007.
[36] http://siarb-bolivia.org/regiones/ [accessed: 24.08.2019].
[37] Querejazu Lewis R., *Arte Rupestre en el límite andino-amazónico*, "Boletín Oficial de la Asociación Peruana de Arte Rupestre" 2012, Vol. 4, Nº 13–14, 349–360, https://issuu.com/apar/docs/boletina-par4_13_14 [accessed: 3.08.2019].
[38] Van de Guchte M.J.D., *Carving the World: Inca Monumental Sculpture and Landscape*, PhD dissertation, University of Illinois, Urbana-Champaign 1990, https://www.scribd.com/document/269527866/Van-de-Guchte-1990-Thesis-1 [accessed: 17.06.2019].

Acknowledgements / Podziękowania

The presented work is a part of the research sponsored by the grant given to the Wrocław University of Science and Technology by the Polish National Science Centre (grant No. 2014/15/B/HS2/01108). Additionally, the municipality of Samaipata, represented by Mayor Falvio López Escalera, contributed to this research by providing the accommodation during the fieldwork in June and July 2016, as well as in July 2017. The Ministry of Culture and Tourism of Bolivia kindly granted all necessary permits (UDAM No. 014/2016; UDAM No. 060/2017). The research was conducted in close cooperation with the Centre for Pre-Columbian Studies of the University of Warsaw in Cusco. Specialists from many other universities and research centres also joined the project.

Abstract

The study describes the results of the documentation of El Fuerte de Samaipata, a pre-Hispanic archaeological site in Bolivia on the UNESCO World Heritage List. It summarizes the most recent observations of the carvings on the rock of Samaipata, which, due to progressing erosion, are slowly vanishing. Thanks to modern documentation technologies, laser scanning, structural light scanning, digital photogrammetry, and advanced digital analysis of images and 3D models of the site, all still visible traces of petroglyphs as well as "architectural" elements like terraces, platform, niches and seats have been documented and described.

Key words: Samaipata, Bolivia, rock art, Andean archaeology, UNESCO World Heritage List

Streszczenie

W pracy opisano wyniki projektu dokumentującego El Fuerte de Samaipata, prehiszpańskie stanowisko archeologiczne w Boliwii wpisane na Listę Światowego Dziedzictwa UNESCO. Artykuł podsumowuje najnowsze obserwacje dotyczące rytów naskalnych w Samaipata, które powoli zanikają z powodu postępującej erozji. Dzięki nowoczesnym technologiom dokumentacji, skanowaniu laserowemu, skanowaniu światłem strukturalnym, cyfrowej fotogrametrii oraz zaawansowanej cyfrowej analizie obrazów i modeli 3D terenu wszystkie nadal widoczne ślady petroglifów, a także elementów „architektury" takich jak tarasy, platformy, nisze i siedziska zostały udokumentowane i opisane.

Słowa kluczowe: Samaipata, Boliwia, sztuka naskalna, archeologia andyjska, Lista Światowego Dziedzictwa UNESCO