KEYWORDS: ***Machupicchu – Inka road – Quilca – T'oqo – Ritual – Peru***

QUILCAS OR ROCK ART AT THE HISTORIC SANCTUARY OF MACHUPICCHU, CUSCO, PERU: DISCOVERY AND PERSPECTIVES

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Abstract. The present article reviews the quilcas or rock art at the Machupicchu archaeological complex and two additional rock art sites in its vicinity, located in the valley of the Vilcanota River in Cusco, Peru. The research was carried out to establish the first cultural articulation of these man-made manifestations in the setting of the Historical Sanctuary of Machupicchu. Based on a survey and analytical observations the authors evaluate the technical and formal nature of this evidence, its state of preservation and propose a relative chronology.

Introduction

In May 2016, the Archaeological and Interdisciplinary Research Program in the Historical Sanctuary of Machupicchu (PIAISHM) conducted the first technical survey of *quilcas* or rock art in the Machupicchu Archaeological Park. The objectives of the research were to evaluate the presence of this evidence, determine its typological and graphic variation, propose a relative chronology and estimate its state of conservation. As the evidence was extensive and the objectives were ambitious, this assessment must be considered as the beginning of long-term research on the *quilcas* of Machupicchu[1].

The survey was conducted in the settlement or *Llaqta* of Machupicchu and on the right bank of the Vilcanota River, at km 108 (Parawachayoq) and 109 (Inkaterra) of the Cusco-Machupicchu railway. *Quilcas* — the native term for graphic phenomena in Peru (cf. Pulgar 1946; Porras 1963; De la Jara 2010; Echevarría López 2013) — were documented in all the mentioned areas, showing a wide technological and formal-representative variation. The archaeological data from each of the sites surveyed will be described independently and based on its analysis a general cultural and chronological scheme is then proposed. The results have implications in the sequence of cultural occupation of the area and for understanding past human interactions and social behaviour within the Machupicchu Archaeological Park.

1 We use the correct spelling of the site's name; the Machupicchu Archaeological Park has requested UNESCO to correct the listed name of the site.

Methodology

The survey was conducted according a random sampling in limited sections of the *Hanan* (high) and *Hurin* (low) areas at the Urban Sector of the Llaqta of Machupicchu (Chavez Ballón 1971). The record followed a simple direct visual recognition of *quilcas*. For documentation and field notes, conventional digital photography with IFRAO Standard Scales (Bednarik 2013) was employed. Subsequently, the photos were analysed and processed with specialised software. A three-dimensional survey was conducted in Inkaterra, whose model will be applied to other sites in order to have a more comprehensive and integral view of them. The final analysis was done following archaeological/cultural parameters and chronological perspectives. Four analytical methods were employed to determine the composition of paint residues in pictograms.

Results

The survey documented an enormous volume of *quilcas* in the area of the SHM-PANM (Fig. 1), which had not been adequately recognised before 2016. At the beginning of our research we could corroborate the existence of two sites with *quilcas* that were recorded by Hiram Bingham in the Urban Sector of the Llaqta during the second expedition of Yale University in 1912 (Bingham 1913, 1922), and new evidence not previously known has been added. *Quilcas* of various types were recorded in the segment of the road from the place called Intipunku to the Main Doorway of Machupicchu. Later the study extended outside the Llaqta towards the archaeological sites of Parawachayoq and Inkaterra. Although the team of the PIAISHM had already made

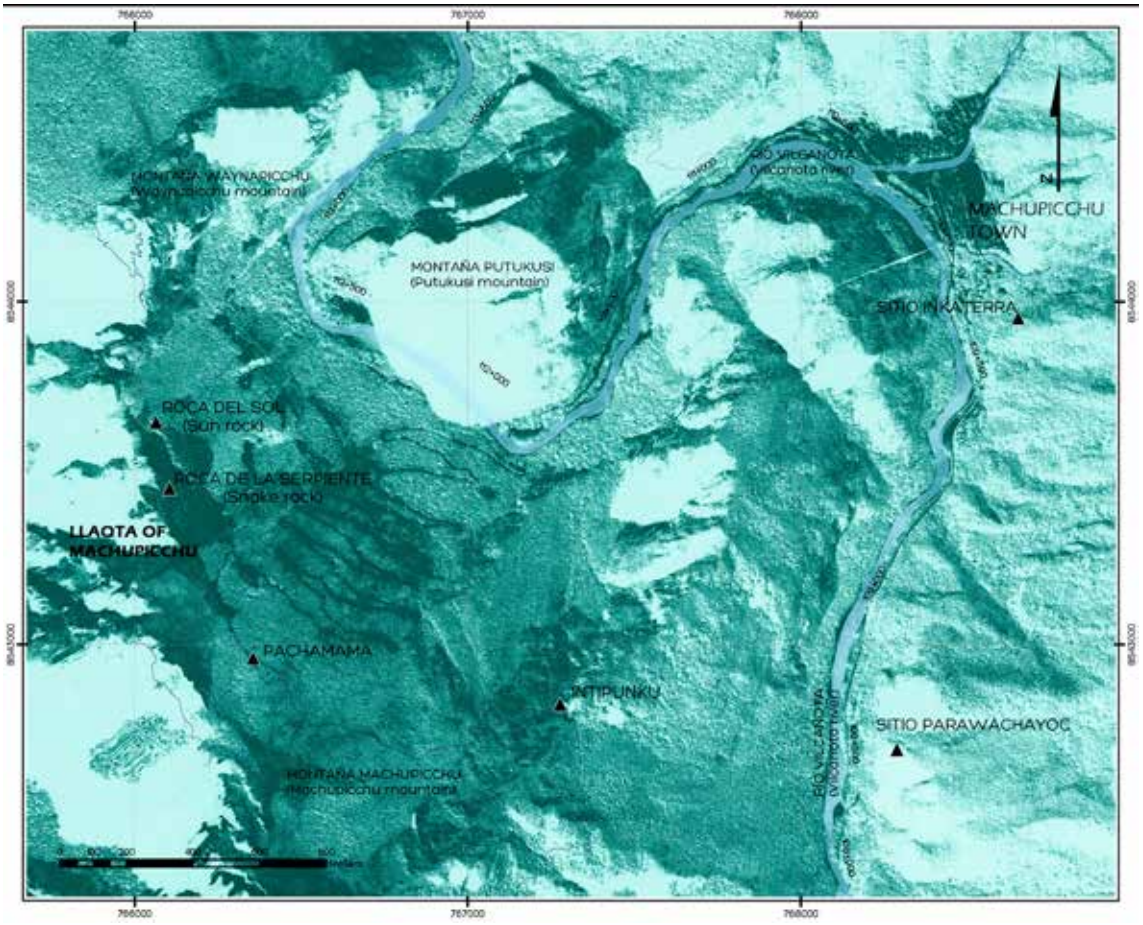


Figure 1. *Orthophoto of the Llaqta of Machupicchu and surrounding areas inside SHM-PANM, showing the location of the* quilcas *sites discussed in this article. PIAISHM 2016.*

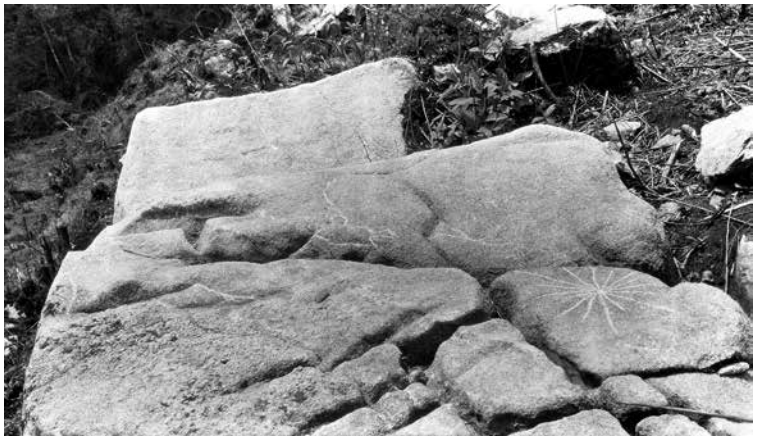


Figure 2. *'Sun rock', abstract-geometric* quilcas*, Machupicchu. Photo by H. Bingham 1912.*

records of *quilcas* in these areas, new observations revealed the existence of a wide variety of pictograms and graphic overlays, indicating a long sequence of human presence in the area. The revised record has resulted in new cultural additions to the archaeological inventory of Machupicchu.

Llaqta of Machupicchu

In the *Hurin* area, we verified the existence of a rock with several abstract geometric motifs that Bingham called 'sun rock' (1913: 472, 497) (Fig. 2), later described in detail by Valencia and Gibaja (1992: 115). The petroglyphs were produced through direct percussion on a granitic rock support located on the west side of the unfinished upper platform of the ceremonial building called *usnu* (Fig. 3). Currently its visibility is affected by the growth of various types of lichens. Associated with the 'sun' motif are others that were considered as representations of snakes by Bingham (1913: 497), but our analysis indicates that they are also abstract in nature as they were formed by simple curved lines.

In the *usnu* surroundings, other rocks with *quilcas* in enclosures and open spaces were documented, which included linear petroglyphs and cupules, or *t'oqos* as the latter cultural feature is called ethnographically (Figs 4 and 5). Generally, *quilcas* are presented on outcrops of granite without modification, with a clean and levelled immediate environment due to the permanent conservation efforts currently being made in the Llaqta.

In the *Hanan* area is a large granite block called 'snake rock', because of the curvilinear elongated petroglyphs at the top, which were interpreted as serpents by

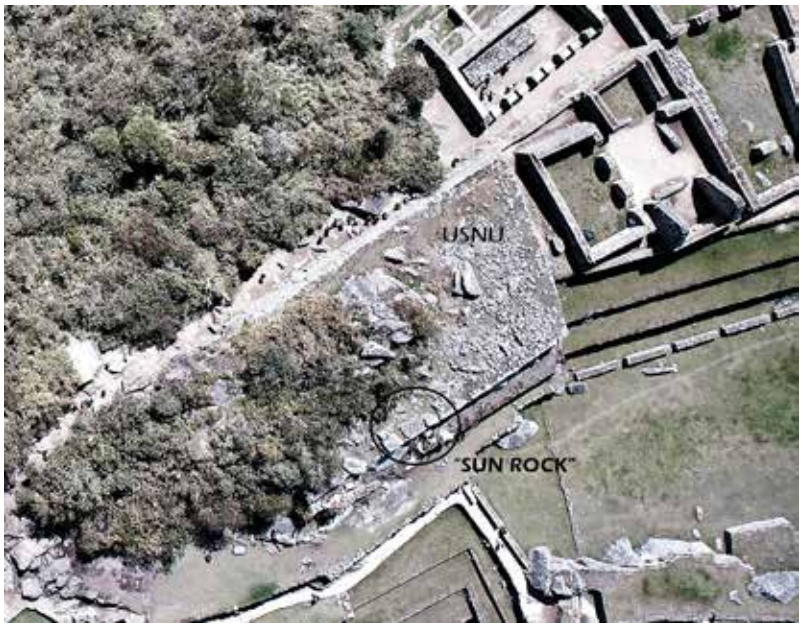


Figure 3. *Partial aerial photo of the* Hurin *sector, showing the* usnu *building with the location of the 'sun rock'. PIAISHM 2016.*

Figure 4. Quilca *with linear motifs, Machupicchu. Photo GTEL 2016.*

Figure 5. T'oqos *produced on rocks in the surroundings of the* usnu*, Machupicchu. Photo GTEL 2016.*

Figure 6. *'Snake rock', abstract-geometric* quilcas*, Machupicchu. Photo by H. Bingham 1912.*

Bingham (1913: 472, 497) (Fig. 6). In this case, we determined that the alleged zoomorphic representations are actually curved lines associated with a larger set of *t'oqos* and other lines, all in an abstract-geometric grouping. Among all these marks, *t'oqos* cover most of the rock's upper surface and its three other sides (Figs 7 and 8), concentrating most of the Llaqta's *quilcas* on a single boulder.

The immediate surroundings of the 'snake rock' consist of clean and level floor to the south, north and east, and an uneven irregular area covered with grass to the west. The rock is on a small platform in the urban

Figure 7. *Top view of the 'snake rock', support of numerous linear* quilcas *and* t'oqos*. Machupicchu. PIAISHM 2016.*

Figure 8. *Lateral view of the 'snake rock' completely covered with* t'oqos*, Machupicchu. Photo GTEL 2016.*

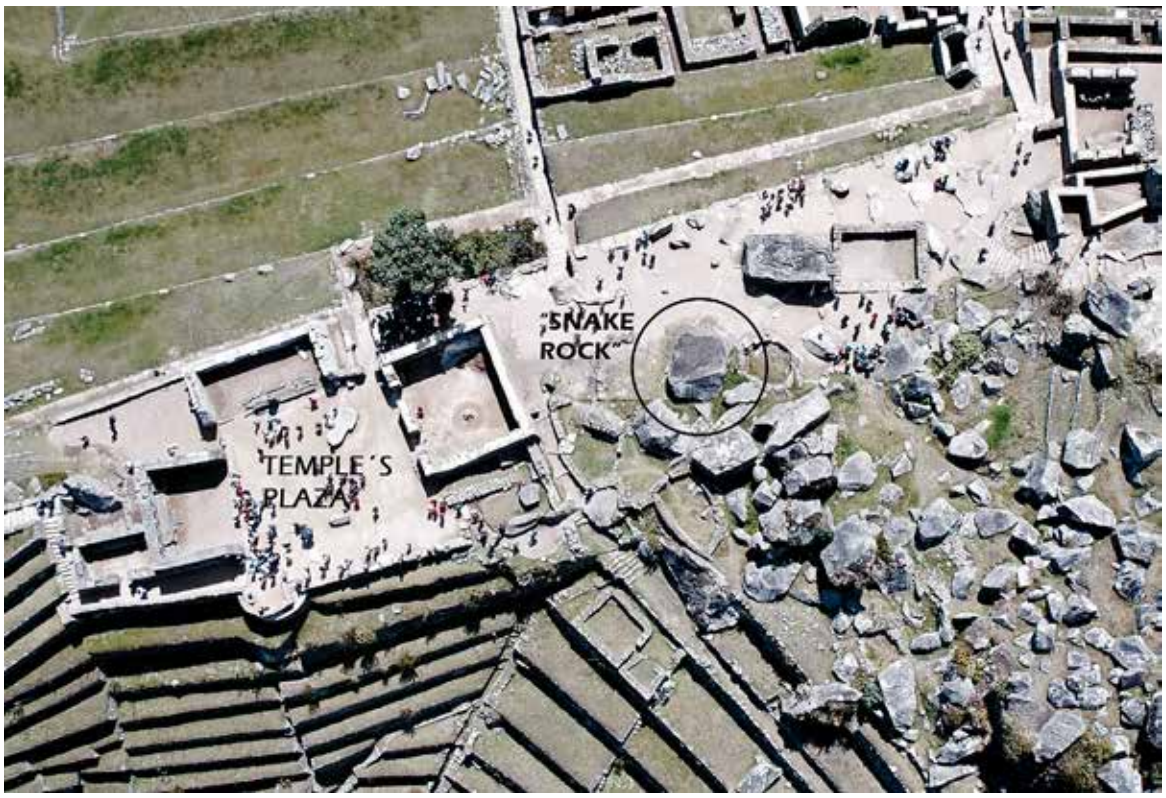


Figure 9. *Partial aerial photo of the* Hanan *sector, showing the 'Temple's Plaza' with the location of the 'snake rock'. PIAISHM 2016.*

zone of the *Hanan* area (Fig. 9). All the recognised evidence — hundreds of *t'oqos* and various strait and curved lines — were produced by direct percussion in all areas of the exposed rock panels (Fig 10). The 'snake rock' is in a clear spatial association with the most important buildings of the *Llaqta*, which suggests a hierarchical status for this evidence; Bingham could probably have used this rock as a benchmark for this sector. This relationship gives us an initial reference to infer its function and sacred character.

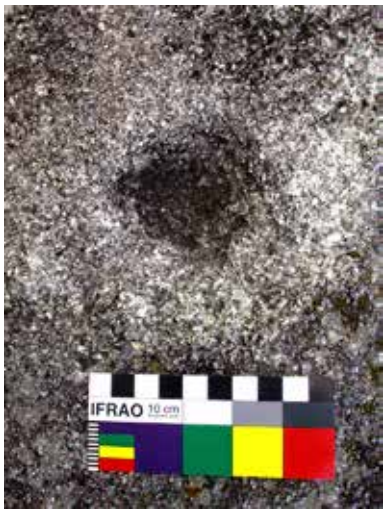


Figure 10. T'oqo *from the 'snake rock'. Photo GTEL 2016.*

Figure 11 (top right). *Outcrop 1 with sculpted sections, attached to a building, presenting* t'oqos. *Intipunku-Main Doorway road segment. Photo GTEL 2016.*

Figure 12 (right). *Outcrop 2, partly in natural state, attached to a platform and an access ladder. It has few* t'oqos, *a channel and sculpted sections. Intipunku-Main Doorway road segment. Photo GTEL 2016.*

Road Intipunku-Main Doorway

On the access road to the Llaqta of Machupicchu, from Intipunku to the Main Doorway, we examined several outcrops of granite, highlighting four large rocks (Figs 11, 12, 13 and 14). These had a considerable number of *t'oqos* and to a lesser extent other graphic elements, such as lines, grooves, channels and even carved sections for pedestrian passage (see Fig. 13).

All outcrops, some of which have been left in a natural state

Figure 13. *Outcrop 3, partially in its natural state, a staircase is attached and with an opening carved in the rock to lead to the crosswalk. It presents numerous* t'oqos. *Intipunku-Main Doorway road segment. Photo GTEL 2016.*

Figure 14. *Outcrop 4 in natural state with the adjacent road. It presents numerous* t'oqos. *Intipunku-Main Doorway road segment. Photo GTEL 2016.*

Figure 15. T'oqos *from the outcrop of Figure 13. Photo GTEL 2016.*

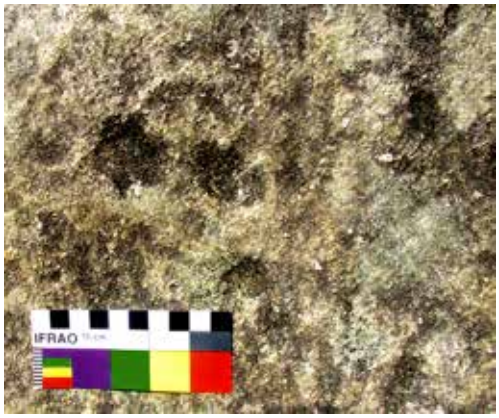


Figure 16. T'oqos *from the outcrop of Figure 14. Photo GTEL 2016.*

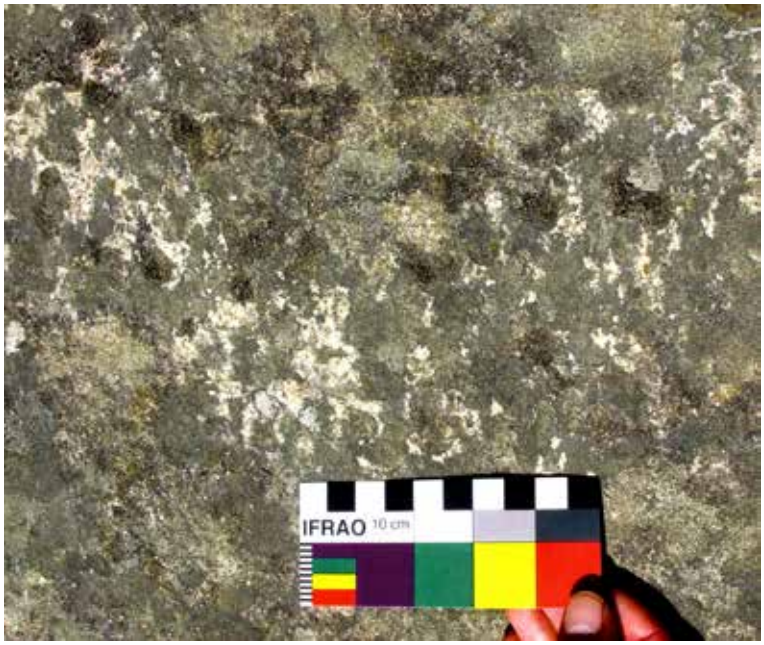


Figure 17. T'oqos *from the small outcrop near to Pachamama. Photo GTEL 2016.*

while others have been sculpted to form geometric shapes, are located near the large rocky outcrop called Pachamama, which, as will be discussed below, also provides a support for *quilcas.* Additionally, small protruding rocks with *t'oqos* and other rocks with linear petroglyphs on the top of the retaining and containment walls of this section of the road were also registered.

According to the analysis carried out *in situ*, the *t'oqos* (cupules) were produced by direct percussion, which generated semicircular depressions (Figs 15 and 16). The *t'oqos* are not completely similar and we can assume that they were produced by different circumstances for as long as the Llaqta was in use. In one of the cases examined, the making of *t'oqos* has facilitated granite exfoliation. In this case, the imprints of semicircular sections form the edge of the detachment (Fig. 17). The overall number of *t'oqos* has not been determined with precision but it is estimated to be more than a hundred units.

From the 'guard house' to the intersection with the Intipunku-Main Doorway road segment, other rocks with small numbers of *t'oqos* have been recorded and it is likely that further recording will increase the number of cases of this kind. The documentation made only in the linear section of the road at the south-southeast of Machu Picchu has confirmed the existence of *quilcas* in the form of petroglyphs (*t'oqos* and linear motifs), linked to what is considered the main entry or exit of the Llaqta.

Another group of *quilcas* along this section of the road is located at Pachamama, where there is a vertical granite cliff (Fig. 18). This outcrop is about 20 m high by 15 m wide, and its base is on top of three artificial

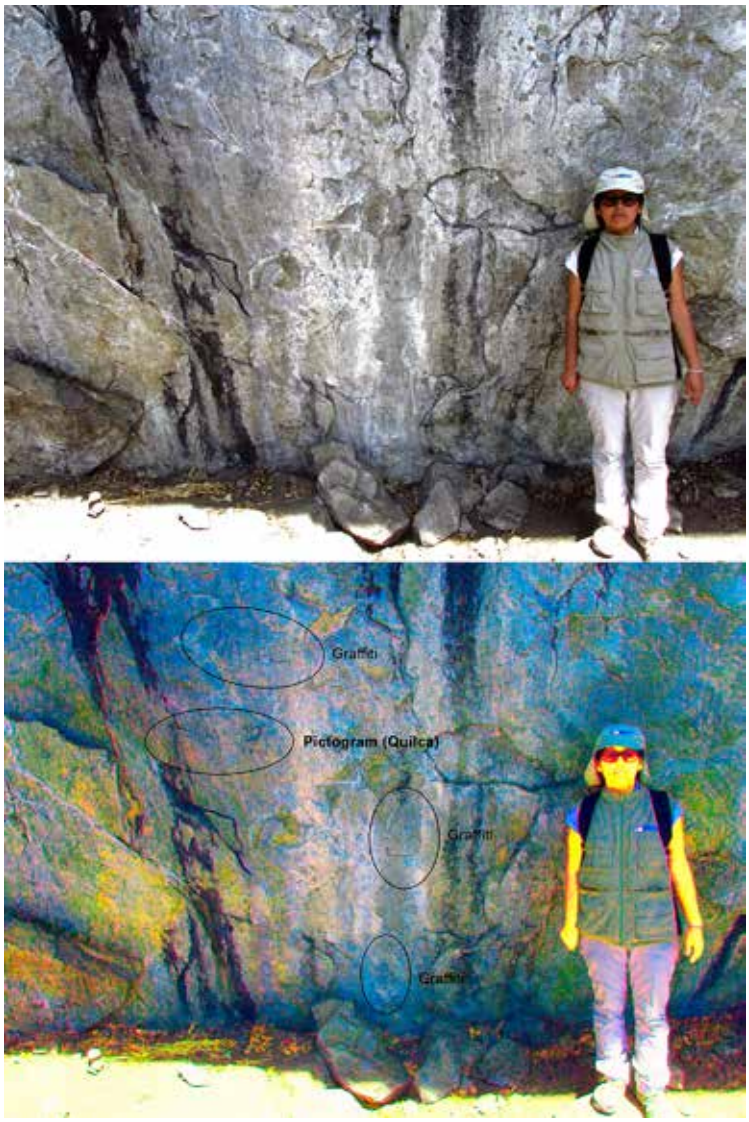
Figure 18. *Large isolated granite outcrop or* wanka*, which is the major feature of the Pachamama site. Photo GTEL 2016.*

Figure 20. *A linear petroglyph made by percussion on a small outcrop in Pachamama. Photo GTEL 2016.*

terraces that unfold in steps to the east. The outcrop and edifices clearly form a whole unit, used in ancient times as a burial site. Eaton discovered four human interments in the upper terrace adjacent to the outcrop and recognised the importance of the site, considering it to be '[b]y far the most magnificent place of burial discovered …', besides describing it as ceremonial, artistic, remarkable, unique, great and grand (Eaton 1916: 23–29).

A careful study of the outcrop's lower wall revealed more than six graphic sets of pictograms and graffiti that were located along its exposed side to a height of 1.80 m (Fig. 19). Due to the height of the rock-face, the recording work focused only in the lower part, which was the most modified because it was the most accessible. All the evidence found was scattered, since rainwater, dirt, bacteria and mineral concretions affected the whole exposed side of the outcrop, partially covering the

Figure 19. *Lower section of the Pachamama rock, support of* quilcas *and graffiti. Photo GTEL 2016.*



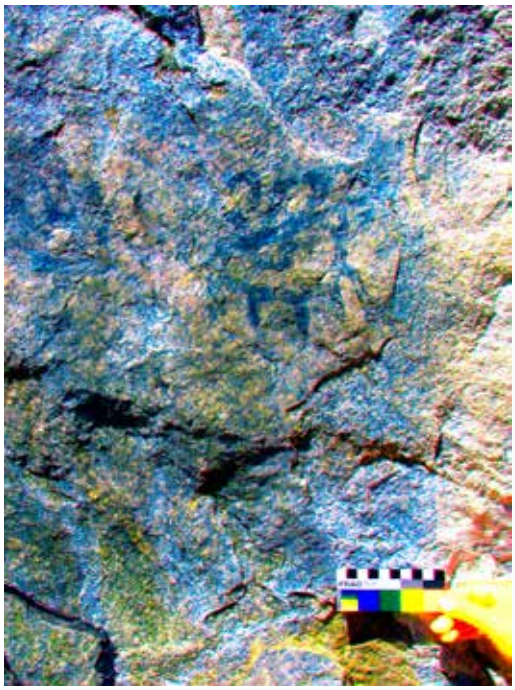


Figure 22. *Photo of* quilca *or pictogram, Pachamama. Photo by GTEL, processed with DStretch, 2016.*

Figure 21 (left). *Upper image: small section of the panel with* quilcas *and graffiti, Pachamama. Lower image: the same photo processed with DStretch indicating part of the* quilcas *and graffiti discovered at Pachamama. Photo GTEL 2016.*

graphic testimony.

Besides pictograms, we also found one petroglyph on a small rock next to the north side of the outcrop. This *quilca* consisted of a short isolated groove made by percussion (Fig. 20), and constituted the only evidence of this type in Pachamama. As we already saw, most petroglyphs were found elsewhere in the area.

Pictograms and graffiti at the site consist of clusters of various motifs, the latter comprising modern geometric figures and writings (Fig. 21). The only archaeological set of pictograms consists of thick, black painted lines forming curvilinear designs of geometric character (Figs 22 and 23), part of which were covered by a film of probable carbonates visible as granules (Fig. 24). This coverage indicates that quilcas are relatively old, but the precise age is difficult to define directly from this feature.

At comparative level, the designs of the *quilcas* (see Fig. 23) are unrelated to known Inka graphic expressions (Chavez Ballón 1961, 1965; Fernández 1989; Kauffmann Doig 2011), which could indicate that these *quilcas* are not associated with the Cusco imperial occupation of the area during the 15th and 16th centuries. Given the particular, formal and geometric line trend, these expressions probably show local graphic behaviours related to pre-Inka inhabitants, presumably of Amazonian origin. However, this assertion needs more corroboration.

Beyond *quilcas*, the graffiti and modern graphics on the rock face show significant variation of figures in different techniques, developed through simple lines or drawings with greater extent, with different colour inks from pens or markers, and by scratching or hitting the rock surface with solid tools such as stones or other objects. In this panel the visual record exposed some sections affected by abrasion by the use of blunt objects with the evident intention of erasing some modern graffiti. The formal and technical variation in the graffiti indicates that these were done at different times through the years, at least since 1902 when Agustín Lizárraga made the first recorded graffiti in Machupicchu, and they have also been affected by the same environmental processes evident in archaeological pictograms.

Inkaterra

This site of *quilcas* is on the left bank of the Alqamayo stream (see Fig. 1), within the grounds of the Inkaterra Hotel in Machupicchu town (Aguas Calientes). All

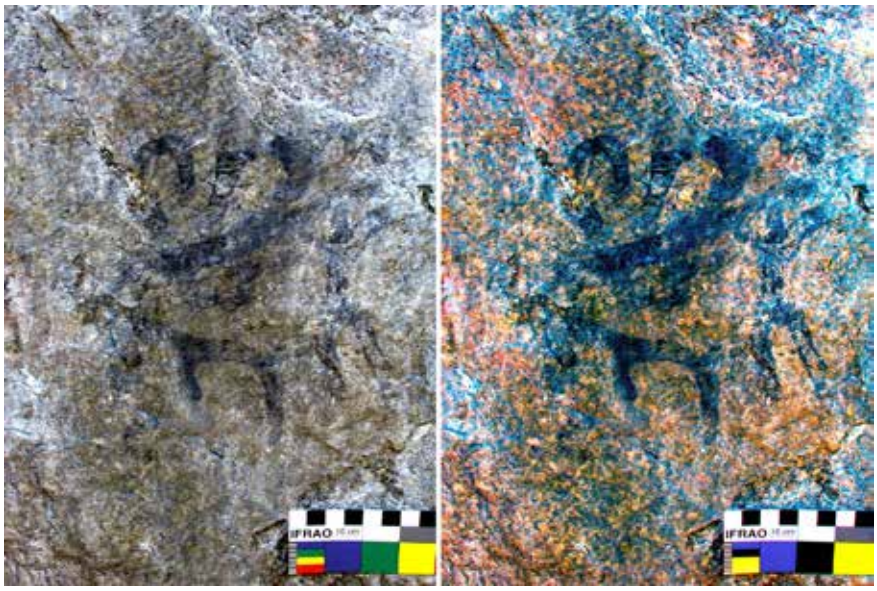


Figure 23. *Left image: main group of motifs of the* quilcas *or pictograms of Pachamama. Right image: previous photo processed with DStretch. Photo GTEL 2016.*

Figure 24. *Detail of one of the motifs at Pachamama, covered with lumps of probable carbonate concretions; image emphasised by DStretch. Photo GTEL 2016.*

Figure 25. *Granite outcrop with* quilcas*, Inkaterra. Photo JBA 2016.*

the evidence consists of pictograms whose support is a vertical granite cliff, about 15 m high and 10 to 15 m wide. The facade of the cliff is flat but with irregularities due to joints and natural fractures in the rock (Fig. 25). On this rock face, the *quilcas* form several groups of motifs produced by painting techniques. Archaeologist Julio Córdova reported the site, emphasising the interpretative aspects of the *quilcas* without formal, technical or contextual references (Córdova 1999).

All isolated groups of *quilcas* consist of abstract-geometric pictograms. These are located in the middle part of the outcrop, at an approximate height of 6 m,

Figure 26. *Abstract and geometric motifs on the top of the panel in Inkaterra. Image emphasised by DStretch, photo by GTEL 2016.*

Figure 27. *Left image: abstract and geometric rectangular motif, processed with DStretch. Right image: previous photo showing various painted motifs overlapped by the rectangular figure. Processed with DStretch, photo GTEL 2016.*

and from the base of the rock to an average height of 2 m. The main motif in the middle part consists of black concentric circles with projecting lines (Fig. 26), while the most visible set of figures in the lower section consists of a black rectangle in a horizontal position with inner triangular painted sections, which is superimposed on other quadrangular and linear motifs (Fig. 27). A third group consists of designs that

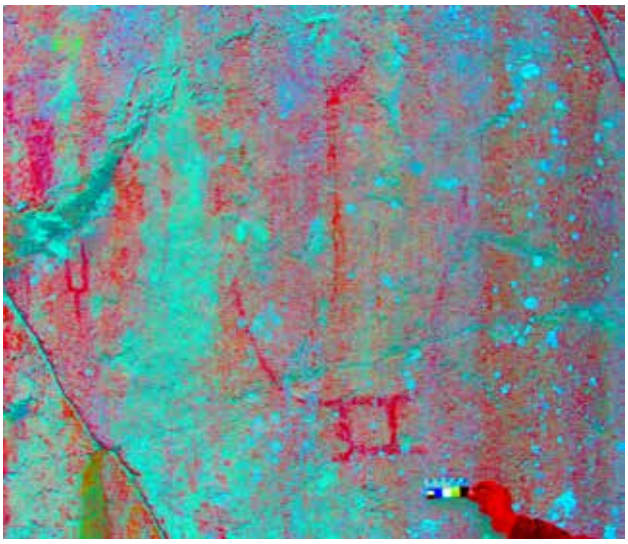


Figure 28. *Abstract-geometric linear motifs, Inkaterra. Image processed with DStretch, photo GTEL 2016.*

combine large curved lines, straight lines and circles with interior details in red pigments (Fig. 28). Fuzzy geometric figures at the base of the outcrop near the ground can also be seen.

The *quilcas* of this site show a marked geometric pattern and evidence of graphic overlay, which implies a tradition of making pictograms in this area. As we will see below, this has strong implications for the chronology of the archaeological occupation in the region. It is also important to mention that the motifs show no direct formal relationship with Inka designs, suggesting a distinct cultural association.

In view of the complexity of the site, compositional studies of the support and the constitutive pigments of the pictograms were carried out using four techniques: x-ray diffraction (XRD), Raman spectrometry, scanning electron microscope coupled to energy dispersive x-ray spectroscopy (SEM-EDXS) and x-ray fluorescence (pXRF). The XRD and Raman spectrometry allowed two materials to be identified: vegetal carbon and haematite as the major compositional elements of the black and red pigments respectively. In addition, the presence of carbon in the black pigments was confirmed by SEM-EDXS while the occurrence of Fe in the red pigments was confirmed by pXRF.

During the recording of the site, two areas were observed where rainwater was actively flowing over and

Figure 29. *Granite outcrop with* quilcas*, Parawachayoq. Photo GTEL 2016.*

Figure 30. *Left image: normal photograph of the panel with* quilcas *(pictograms) at Parawachayoq. Right image: previous photo, processed with DStretch, emphasising the details and extent of the* quilcas*. Photo GTEL 2016.*

affecting the rock, along with numerous spots where the rock surface had been altered by mineral accretions and biological growths generated by former streams. Many of these accumulations cover groups of *quilcas*, so it is possible that more images will be found in the future.

Parawachayoq

This site is located approximately one kilometre to the south-southwest of Inkaterra (see Fig. 1) in a granite outcrop, which stands on the slope that frames the right bank of the Vilcanota river in this sector of the basin. The evidence consists of a set of pictograms arranged on three irregular flat panels within a section of the rock, which projects to form a rockshelter (Fig. 29).

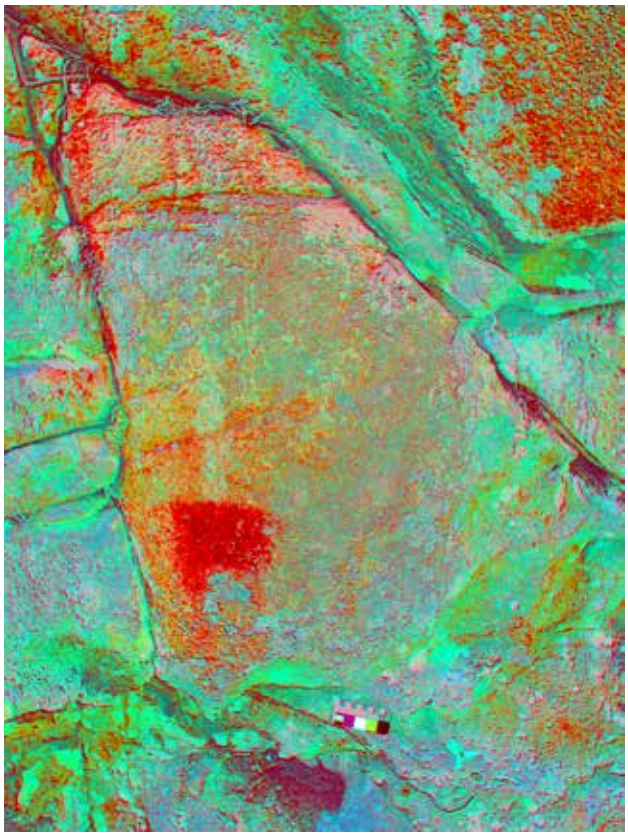


Figure 31. *Photo processed with DStretch showing remnants of a pictogram, Parawachayoq. Photo GTEL 2016.*

All the documented motifs on the three panels display the same technique and formal features, which follow similar figurative parameters based on zoomorphic designs. These *quilcas* have been executed using red pigments, highlighting the contours of schematised natural models with thickened rectangular bodies. The central panel presents the best-preserved figures that include what appear to be schematised camelids (Fig. 30), which only retain the rectangular body in the other panels (Fig. 31). According to the formal and figurative consistency of the images, we consider that all of them were produced during a single cultural stage.

At present, Parawachayoq is in poor condition due to weathering and erosion. As in Inkaterra, one of the main causes of its poor preservation are the drips and leaks created by rain and water accumulation, which have already damaged many of site's *quilcas*. It is important to mention that the site has been also heavily altered by illegal excavations affecting the entire surroundings.

Analysis

The presence of *t'oqos* or cupules is quite consistent for the whole Llaqta of Machupicchu and especially for the Intipunku-Main Gate road segment, where they were recorded on four large rock outcrops and other small promontories that also have line motifs produced by percussion. The 'snake rock' (see Figs 7, 8 and 10), which is in the Urban Sector, had more *t'oqos* than any other support in the Llaqta, and is followed by rocks in other sectors which are smaller and have cupules. The sample shows that the 'snake rock' is the centre of a great production of *t'oqos* for the whole Llaqta, which could have ideological connotations.

The distribution of *quilcas* on some rocks between Intipunku and the Urban Sector of Machupicchu, including Pachamama, suggests that the production of these motifs is related to ritual behaviour in relation to *wakas* or sacred places and/or was aimed at complementing passage ceremonies to the Llaqta. The 'snake rock', which is almost completely covered by *t'oqos* and is located immediately before the 'Temple's Plaza' entrance (see Fig. 9), provides another example of this relationship since it seems to serve the same function as the production of *quilcas*, which are related to the passage and access to other sectors. Although there is still the need to improve the record, the spatial association of this evidence cannot be understood as casual, indicating instead complex and standardised ritual behaviour.

The rocky outcrop of Pachamama (see Fig. 18) constitutes a *waka* due to its independence and location, its similarities to the surrounding mountains, and because it is the location of four burials placed at the foot of the outcrop (Eaton 1916: 23–29), a support for *quilcas.* It is also a *wanka*, a sacred monolith, prominent and of vertical disposition. From an architectural perspective, the whole ensemble has been designed as a three-level amphitheatre, which was accessed both by a set of double, parallel stairs, and a monolithic staircase on the first level (Fig. 32). This context, integrating the outcrop, burials, pictograms, petroglyphs and architecture has a functional sense that suggests a ceremonial behaviour.

The chronology of the *quilcas* can be defined, first, from the constructional and architectural aspects of the Llaqta (Astete 2008), corresponding to the 15th and 16th centuries of our era (Bastante 2016). The association between *t'oqos* and the settlement indicates a direct relationship in the production of this graphic phenomenon, which seems to depend on the built infrastructure. This case has also been documented in other Andean regions, as in the Llaqta of Choquequirao located in the Apurimac river basin (Echevarría López and Valencia 2009) and in other smaller settlements in the Amaybamba river basin. The evidence in the Llaqta of Machupicchu confirms the regularity of the behavioural pattern involving *t'oqos* and other *quilcas* produced by reductive procedures, which accordingly should be associated primarily with Cusco culture, during its imperial stage.

In the case of pictograms at Pachamama, it is possible to infer that, given the state of preservation, the probable presence of carbonate concretions (see Fig. 24) and above all the figurative nature of the designs

(see above), the motifs do not correspond to the Cusco culture of the 15th–16th centuries. They should be associated with an earlier human presence in the area. It is possible that these pictograms (see Figs 22 and 23) correspond to the Amazonian groups that populated the area before the arrival and settlement of the Cusco people during the 15th century, or to the presence of the Tampu society that surrendered to the Inka Pachakuteq (Sarmiento de Gamboa 1942 [1572]: 179–180; Valcárcel 1964; Bueno 2011). Evidence of pre-Inka pictograms in the Llaqta of Machupicchu completely changes the previously established temporal schemes for the initial occupation of the site.

Meanwhile, the Inkaterra graphics indicate a rather complex story. This site displays the superposition of two formally separate sets of motifs (see Fig. 27), indicating *a priori* a sequence for the production of *quilcas* in the site. To the right of the overlapping motifs (black on red), there are other pictograms forming linear and abstract-geometric images that stand out because of their colour and formal characteristics (see Fig. 28), which further complicates the graphic panorama.

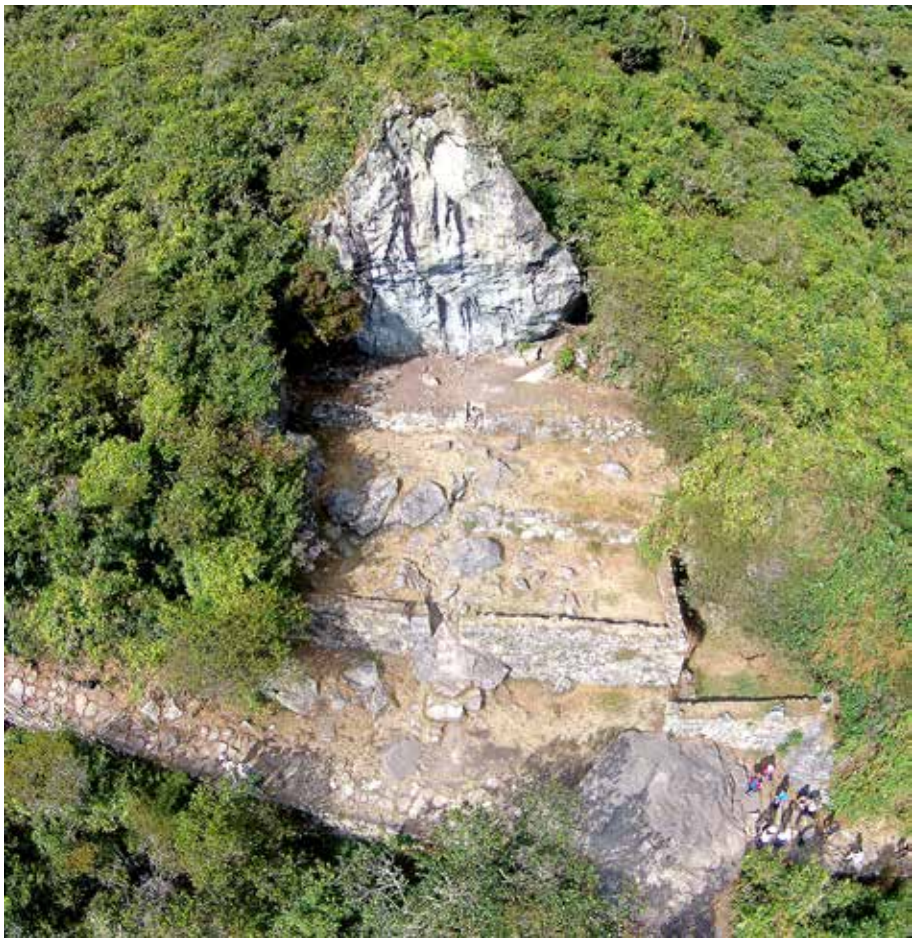


Figure 32. *Pachamama site, composed of terraces and a granite outcrop or* wanka. *PIAISHM 2016.*

If we consider the location of the motifs as the result of the progression of pictogram production, the motifs located in the middle of the outcrop at Inkaterra appear to have been produced after the painting activity in the lower part of the rock was completed, indicating, again, a late position in the chronological sequence. The general appreciation of the evidence suggests that *quilcas* at the bottom of the panel occurred in pre-Inka times, while the ones executed on the upper part (black motifs) could be from the last archaeological times before Spanish conquest, contemporary to the Cusco imperial occupation of the area, but this does not mean a direct cultural association in any sense.

Inkaterra displays at least four moments of *quilcas* production that keep an abstract-geometric graphic trend. As mentioned, three out of the four graphic corpora that had been identified must correspond to pre-Inka times, although neither the older ones nor the more recent ones have been associated with specific cultures yet. The presence of a graphic sequence suggests that there was an important cultural history in the area which preceded the Cusco imperial occupation and lasted until the early 16th century without imitating conventions of the Cusco people during that time.

The *quilcas* at Parawachayoq, which are zoomorphic motifs, were probably produced following comparable formal standards. Although this figurative parameter is unique in the surveyed area, it is consistent with other evidence of *quilcas* in the Machupicchu Archaeological Park and different zones of the Cusco region (Barreda Murillo 1994). Due to the graphic isolation of this evidence it is difficult to establish a cultural or chronological relationship between it and other corpora, but its severely weathered condition suggests that the *quilcas* date from pre-Inka times. The presence of many zoomorphic motifs in just one site implies that other behavioural parameter were a factor in the area, enriching and making even more complex the processes of social interaction in the region.

Discussion

Although the examined area was considerable and the sample of *quilcas* representative, it has not been possible to establish a definite historical and cultural correlation for most of the *quilcas*, except for the *t'oqos* of the Llaqta of Machupicchu. This is because of the lack of studies and parameters for correlations in the

region, especially with regards to *quilca* sites. Most of the evidence examined outside the Llaqta consisted of pictograms with strong variations in form, showing a sequence of *quilcas* production in one case, indicating apparently different graphic traditions.

To approach the chronology and the cultural association for the *quilcas* of Machupicchu we need to expand our survey area, in order to cover several river basins in Vilcabamba and Cusco territory. The finds in Machupicchu may confirm that *quilcas* or rock art in Peru refer to very complex traditional cultural activities that lasted thousands of years, sometimes following social patterns of territorial occupations, as in the central coast of Peru (Echevarría López 2015).

The case of the *t'oqos* in Machupicchu is very interesting as it can be part of a long cultural tradition in the *quilcas* production for the Cusco area. Although we learned that the *t'oqos* or cupules associated with Machupicchu are a cultural feature from 15th and 16th centuries, new archaeological research in the site of Marcavalle, Cusco (Huatanay river basin), has produced several small rocks with *t'oqos* dating to 1000 BCE (Luz Marina Monrroy, pers. comm. 2016). The production of *t'oqos* in the Cusco core area, two thousand years before the development of the Cusco culture in the 15th century, suggests a strong and localised pattern of conduct related to *quilcas*, which was not known before.

Although we recognise the need to extend our survey, we also realise that the three sites with pictograms, Pachamama, Parawachayoq and Inkaterra, along with the independent corpus of *quilcas*, should be more deeply examined for further archaeological integration, and to provide a more secure basis for correlation. Their study will focus on the verification and definition of the particular cultural sequences, which will allow the cultural and chronological association between sites to be defined, facilitating the verification that there is evidence of graphic traditions that precede the Cusco imperial occupation in the Llaqta of Machupicchu and the Machupicchu Archaeological Park.

So far, the examined evidence proves that the area was not an isolated territory at the time of Cusco imperial settlement, but was occupied over a longer period by people whose cultural nature and interaction sphere is still unknown. In this sense, the *quilcas* are probably one of the few lines of evidence that we have to examine the ancient local populations, whose role in the history of the region has yet to be unravelled by science.

Epilogue

Our observations show that most of the registered *quilcas* are in a condition that one would expect from their environment, although some sites require conservation measures. In the section of the Inka road from Intipunku to the Main Gate, numerous rocks and outcrops with *t'oqos* are being affected incidentally by the passage of visitors. These also affect Pachamama, where six separate episodes of modern graffiti have already been registered, showing how vulnerable the archaeological pictograms there are to serious damage. Until further studies, the Machupicchu National Archaeological Park Direction has closed access to the outcrop and judges that it would be unwise to try to remove the graffiti for the moment. Specialists are working on designing a mechanism for preventing water percolation and leaks from the top of the cliff, and excavations will be carried out on the upper platforms in order to define geological conditions and archaeological associations.

In the Llaqta of Machupicchu, rocks with petroglyphs require no intervention except preventive monitoring. The biggest problem in these cases is the invasion of lichens. The Park biologists are conducting studies to gain control of the situation and prevent proliferation of the growths. In the case of the 'snake rock', because of its complexity and the profusion of *quilcas*, a more detailed analysis will be performed.

The study indicates that the condition most *quilcas* of Machupicchu is stable and they are likely to be better protected in the future; however, the work of recording and analysis will be continued. Because most of the *quilcas* examined are in equilibrium with the environmental conditions of the area, no measures are being taken other than noted above.

In the case of Parawachayoq and Inkaterra, it will be attempted to prevent leaks and water infiltration into the panels bearing *quilcas*. Since these two places are, strictly speaking, archaeological sites, all work will be carried out under technical monitoring and archaeological procedures (Echevarría López 2009), including preventive interventions at the summits and bases of the outcrops and their immediate surroundings.

Finally, we conclude on the basis of our analysis that the archaeological survey has reached two remarkable results. First, it has confirmed that a behavioural pattern existed, which included the production of *t'oqos* associated with presumed sacred places within the Llaqta of Machupicchu and Pachamama. Secondly, an extended and varied pictographic component has been shown to demonstrate that there was a long graphic tradition before the Cusco imperial occupation of the area.

At a documentation level, the knowledge about the petroglyphs of the Llaqta, reported by Bingham during the second expedition of Yale/NGS during 1912, has been increased. The results and the evidence of *quilcas* showing different formal and spatial patterns confirm what the Archaeological and Interdisciplinary Research Program in the Historical Sanctuary of Machupicchu (PIAISHM) has postulated since the beginning of the investigations: that the Llaqta of Machupicchu is primarily a ceremonial settlement where diverse and complex ritual activities were carried out. The local population kept producing various markings on rocks as votive acts and offerings to the *wakas*.

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