Inca sacred space, platforms and their potential Soundscapes, preliminary observations at usnu from Ayacucho

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Abstract
Inca platforms forming part of an architectural complex commonly defined by the term usnu are in ethnohistorical sources described as being associated with ritual events involving performances of speech, music and dance. This paper reviews the performance role, its relevance and function and discusses their effectiveness with respect to the use of sound, based on experimental use of the human voice, the drum and a shell trumpet at a number of these sites. It is demonstrated that sound was a factor of some importance in the planning of the site of Usccunta and indeed that a particular instrument, the shell trumpet or pututu may have been considered in the layout of the largest communal space here.

Keywords: Usnu, Usccunta, sound, pututo

Introduction
The project on which this paper is based carried out investigations of Inca platform structures which are commonly found at the principal plazas of numerous Inca settlement sites. The project focused on the Department of Ayacucho over a series of field seasons in 1999, 2003, and from 2006 to 2010 (Fig. 01).

The platforms have been recognized as representing one of the signature architectural forms used by the Incas in setting up their cultural dominance across the Andes at the time they established their imperial presence. They represent a particular form of Inca sacred space and examples are known from Vilcashuaman, Huanucopampa (Pino Matos 2004). Pumpu (Matos 1994) as well as a large number of other sites.

The current research has developed out of earlier investigations of the architectural complex identified by the term usnu and discussed in papers by Meddens, Pino Matos and Zuidema (Meddens 1997; Pino Matos 2004; Zuidema 1989a), and a pilot project looking at Inca stone faced platforms in the northern sector of the department of Ayacucho in 2003 and 2007 (Meddens et. al. 2008; 2010).

Zuidema identified the fundamental aspect of the usnu concept as an element comprising a basin or location where liquids get absorbed into the ground. As well as formulating the crucial facet of its connecting the sky and mountain...
Figure 01. Platforms investigated as part of the current study in the department of Ayacucho.
deities through the contemporary world of the Incas with the ancestors in the world below through a vertical axis mundi type link (Zuidema 1989a).

As noted in several earlier papers the term usnu in the ethnohistorical source material has been applied in a variety of complementary definitions (Meddens 1997; Meddens et. al. 2008; Meddens, McEwan and Vivanco 2010): referring to a throne of the Inka (Guamán Poma de Ayala 1980: 239, 357 [1583-1615]; Joan de Santa cruz Pachacuti Yamqui 1993: 200 [1613]), as a site of for human sacrifice (Guamán Poma de Ayala 1980: 236 [1583-1615]; Anónimo 1968: 157 [1580-1621]), as a basin or post of stone or gold in the plazas of towns, all associated with structures like towers built in beautiful stonework (such as at Vilcas, Pucara, Huánuco Viejo and Tiahuanaco); as a site where the Inka lords sat, drank to, and made sacrifices to the sun (Albornoz 1989: 176 [1570-1584]) as a ‘sitting’ stone, or a boundary marker when it is a large ‘sitting’ stone (González Holguín 1952 [1608]); as a stone on ceque lines (Cobo 1895: 27, 45 [1653]); as a site for solar observations (Anónimo 1968 [1580-1621]), and walling an usnu is mentioned in the Huarochirí manuscript (Salomon and Urioste 1991: 102; Meddens 1997; Meddens et. al. 2008).

**Sound, performance and stage**

The ushnu project, as part of the investigations carried out, included a pilot study of the soundscapes associated with the platforms investigated. The concept of soundscape was first introduced and discussed in considerable detail by Schafer (1977). In his view research of the subject seeks to find out ‘what is the relationship between man and the sounds of his environment and what happens when those sounds change’ (1977: 3-4). Soundscape can be understood as a landscape of sound, and the way this is interpreted by the individuals and social groups within it. It contributes to our understanding and interpretation of place and our connection with it. Practical applications of the notion of soundscape in archaeology and anthropology have been investigated by a range of scholars including Hamilton and her collaborators (Hamilton et al 2006).

The investigation of soundscapes here at inca platform sites was considered important as the ethnohistorical source material indicates that the platforms where employed in a form of ‘performance theatre’ which included several forms of communication. These comprised visual movement, speech, song, music and dance. Betanzos notes that Huayna Capac when visiting a community would dress in the locals’ traditional costume and have his hair arranged like theirs, he would make libation offerings to the sun, address the population, dispense gifts to the people and they all danced and sang at the site of a platform in the main squares of their towns (Betanzos 1987: 185-186 [1551]). Cobo states that the Incas had two types of ritual festivals, seasonal ones and extraordinary ones; the latter being ones celebrated on for example the occasion of a drought, war or the coronation of a new Inca (Cobo 1895: 93).

Pedro de Cieza de León mentions a shrine in Vilcas almost certainly the usnu, ‘where the lord would give his public addresses’. (Cieza de León 1947: 435 [1553]). Carabajal when describing the use the Inca makes of the ushnu at Vilcashuamán notes that the Inka is present on the platform under a large canopy called achiagua made of bird feathers of ‘a thousand colours’, held up on poles made of gold. It was carried by 12 captains of ancient lineage (Carabajal 1965: 218 [1586]). Cobo describes the use of a shell trumpet (originating from the sea) during Capac Raymi in the principal plaza of Haucaypata (and therefore in close proximity to the usnu located there) in a dance called Guari (Cobo 1895: 98). This dance was part of the yearly initiation rites in which young boys were accepted in the ranks of the adult men.

What becomes clear from the ethnographic source material is that the ritualised performances carried out at, or in the vicinity of these platforms had multiple characteristics many of which were standardised, repeated and replicated at each performance (Coben 2006: 226-228, 242).

Replication of the ritual performances carried out at these sites at its most extensive comprised that of an entire site, such as that of Cusco itself. It, as located at the centre of Tawantinsuyu, represented the nucleus of the Inca world. The person of the Inka himself also conceptualised this core (Coben 2006; Farrington 1998: 53-59). Other Cuscos comprising conceptually close replicas of the real thing were relatively few in
Figure 02. Comparative drum results in mapped in isobel contours for some of the investigated sites.
number and are represented by sites such as Huánuco Pampa, Tomebamba, Hatuncolla, Inkwasi and Incallajta. The *usnu* complex, including its basin and platform elements, in itself represents the hub at the centre, the axis mundi at the principal plaza (Coben 2006: 247) of Cusco and of all the new Cuscos constructed in the outlying provinces of the empire. Symbolically the *usnu* therefore can be seen as a shorthand metaphor for that larger concept of core, the axis mundi and by implication the person of the Inka. This explains the range of variation of the contexts in which *usnu* complexes can be found. The presence of the platform demonstrates the authority the Inca himself manifest as the axis mundi, which is represented by the structure itself, incorporating within it all aspects of the stage setting of the plaza, the larger centre and the core of the city of Cusco. At some level these elements become interchangeable.

**The sound evidence and background**

In the field a standard sound intensity measuring device was used for measuring sound levels in decibels. For each of the structures sampled sound levels were measured at incremental distances of 10 m., from the centre of all four faces of each structure, up to the point where levels dropped below 40dB, as at this level and below audibility and understanding are increasingly difficult. The limited number of data points resulted in a restricted coverage for each site. The data was plotted on same scale site plans to produce isobel maps for each site (Fig. 02). The surface area for each sampling location at the drop off point below 40 Db was calculated in square meters.

For a sound source the human voice, a drum and an Andean shell trumpet known as a *pututu* (Fig. 03) were used. The human voice was employed using Spanish, Quechua and English. An attempt was made to establish whether Quechua lends itself better to projection over distance out in the open air. The results of the latter testing were inconclusive largely because our measuring equipment is not sensitive enough to adequately measure these kinds of differences.

For the drum a large hollow instrument covered at both ends with cow hide was employed as it fits Bernabe Cobo’s description of the drum or huancar commonly used by the Incas as being large or small fashioned out of a hollow log covered at both ends with llama hide, and it being played with a single drumstick (Cobo 1895: 229).

For the shell trumpet or pututu a Strombus (Tricornis) galeatus with a modified periostracum with a hole drilled trough, and a resin tubular mouthpiece attached was used in the fieldwork. It should be noted that 39 to 44 examples of marine shell trumpets are known from archaeological contexts and collections as are a further 73 made of pottery made to copy the shell prototype (Herrera 2010: 18, 20). Surprisingly the examples from secure archaeological context date between circa 3,600 BC and AD 1050 (Herrera 2010: 18, 20). They have been associated with burials and offerings situated in temple complexes such as at Chavin de Huantar and Keushu (Herrera 2010: 8-24). The lack of later examples is particularly noteworthy as they are not infrequently mentioned in ethno-historical sources and several are depicted in Guamán Poma’s work. Firstly he shows Challco Chima Inca (a high ranking Inka allied with Atahualpa’s faction blowing a *pututu* while leading the captured rival Inka Huascar away
Inca sacred space, platforms and their potential Soundscape, preliminary observations at Usnu from Ayacucho

Figure 04. Pututu isobel contours for intihuatana 2 at Usccunata.

to his faith (Guamán Poma 1980 [1615]: 115 / 95). Then he shows it being used in a penance procession and states: ‘to the mountains and peaks they gave sound’, in ‘this procession of hail and ice, and of lightning they carried their weapons, drums, flutes, trumpets and bells, crying out as they went’ (Guamán Poma  1980 [1615]: 284 / 258-259). With his depiction of
the *chasqui* runner he notes ‘he who carries the shell’, ‘he carries his trumpet, *putoto*’, ‘wanting to be able to be ready, (the next *chasqui* runner en route) ‘calling him with his *guaylla quipa*’ (trumpet) from a distance as he approaches (Guamán Poma 1980: 350 / 323). He also states that when the Inca travelled, musical instruments including drums, flutes and the *pututu* were used in the royal procession (Guamán Poma 1980: 306 [1615]). Where the Inca went music, drums and trumpets as well as dance were essential to the pageant.

The continued use of trumpets as an appropriate offering to the *apus* in early colonial times, in this instance to the mountain deities and mines of Porco, Cuycoma, Chapotí, Suricaba and Aricaba in Bolivia, is confirmed by their discovery in such a context by Hernán González de la Casa. The date of this find is uncertain but must be prior to 1606 as the original document which carried the report was copied and certified in 1606 (Platt, Bouysse-Cassagne and Harris 2006: 184-185).

The *pututu* is specifically linked to water (Herrera 2010: 25) by the origin of the shell from the sea as well as its associations in mythology. Murua recounts the tale of Inca Yupanqui persuading a man dressed in red on a mountain pass near Cusco to refrain from playing his trumpet thus avoiding a *unu pachacuti* or cataclysm by water (Murua quoted in Zuidema 1989b: 349).

What should also be noted is that musical instruments in a current ethnographic context have been found to be season specific in their use, with specific instruments being played during different times of the yearly agricultural cycle (Stobart 2006).

**Soundscape parameters**

In our sample several sites were re-tested over a period of days. Relative humidity tends to be low in the high altitude Altiplano environment where the platform sites are located. Air temperature during the daytime tends to be relatively low because of the altitude, though in the absence of cloud cover and shade the temperatures out in the sun can be relatively high. It was found that besides distance from and nature of the sound source wind speed and the configuration of the landscape were the most noticeable factors affecting sound intensity and audibility.

Sound waves move through the atmosphere and they decrease in intensity with increasing distance, that decrease being equal to the square of the distance from the source; i.e. as the distance from the sound source doubles the intensity is quartered. Sound quality is affected by factors such as the nature and intensity of the source, temperature, humidity, wind levels, background noise, and the refractive, diffractive and reflective properties of the surrounding surfaces. Low pitched or low wavelength sounds can be heard over greater distances than high pitched high-wavelength ones and the human ear can hear sound in the range of 20 to 20,000 Hz, with the human voice usually being in the range of 500 to 2000 Hz although it can extend to 50 to 5000 Hz.

Broadly speaking there are two types of sound sources; point and string sources (Moore 2005: 17). A point source would be relatively intermittent whereas a string source would be more continuous such as the sound of a procession, a large group of chanting people or the roar of a river. The decibel level of a string source (such as a *pututu*) decreases slower with distance and the difference is significant. The former will decrease approximately 6 dB with a doubling of the distance and the latter circa 3 dB (Egan 1988: 14; Moore 2005: 17-18).

**Soundscape results**

Our soundscape work and our approach to it developed over the period of the fieldwork. As a result our most extensive and complete data sets relate to voice information whereas we have less information on the drum and *pututu*.

What became immediately obvious was that a sound source positioned at the centre of a platform would be inaudible to any audience present around the structure, with the sound effectively travelling above the heads of any listeners and therefore remaining inaudible. In order for a sound source to be successfully heard the source needed to be positioned on the top edge of the platform facing the audience. This makes sense of a statement by Cristobal de Molina, (as quoted by Morris and Thompson [1985: 59]) who notes that the Inca and three of his chief nobles would mount the platform in the main town squares to address the people and to
Inca sacred space, platforms and their potential Soundscapes, preliminary observations at usnu from Ayacucho

Figure 05. Pututu isobel contours for Usccunta and other sites south of the Rio Pampas in Ayacucho.
see and review the armies and assemblies. What remains an unanswered question here is, in those cases where there were four speakers addressing a group of listeners gathered around a platform whether these would have taken turns to speak, or whether a form of synchronised address was employed on these occasions.

A second point to make is that on the Altiplano, after noon the wind tends to come up. Wind levels soon rise to the point that any speech is drowned out. These structures would therefore only be efficiently useable in a sound context during the morning hours.

Voice data was collected from 14 platform locations. At the 40 Db level and above the space in which sound would be audible and understandable ranged from circa 5000 to circa 20,000 m². Of the 14 sites where data was collected 10 or 66.7% ranged between 5,299.6 and 6,943.0 m². There were four outliers where significantly larger areas where achievable, measuring 8470.10, 10821.90, 15599.20 and 20297.10 m² respectively. Of these two were administrative sites (Condormarca and Vilcashuamán), one a high altitude pilgrimage centre (Usccunta), one a mid valley isolated platform site (Usnupata) and the remaining ten high altitude isolated platform mountaintop locations.

The 40 Db cut off point with voice data most commonly was at circa 50 m. from the platform wall face, although greater distances were occasionally observed, usually from only 1 of the 4 faces, of between 100 and 120 m as was a single instance of 180 m. The latter was at the site of Usccunta where even more remarkable sound results were obtained using the drum and pututu.

The decibel limits for voice levels at the data points closest to the platform faces ranged from 50.6 to 65.4 Db.

Drum and pututu data were collected from seven sites. These instruments were both more effective than the use of the voice, with the pututu being more effective still than the drum. The drum

![Figure 06. Pututu isobel contours for Incapirqa Waminan.](image)
at the 40 Db cut off achieved areas measuring between 6,461.80 m² and 20,740.60 m² with one outlier at 83,166.10 m². This reflected common distances of between 90 and 120 m from the platform face to one instance of 210 again at the site of Usccunta. At the 10 m point drum sound levels ranged from 50.4 to 76.7 Db. The pututu as an instrument represents a string source and as noted above, the sound therefore decreases slower with distance from source. The measurements here mostly range from 3,904.70 m² to 12,108.40 m², although the lower measurement in this case is almost certainly due to lack of familiarity of the player with the instrument at the time the site was tested and the next area size up of 10,129.00 m² appears more realistic. There are three significant outliers again from the site of Usccunta measuring 39,163.50 m² and 126,848.30 m² (Fig. 04 - 05) respectively and 65,964.36 m² from Incapirca Waminan (Fig. 06). There are two usnu platforms at the Usccunta site and the larger of the two measurements here reflects a large level open plain around this platform whereas the smaller area reflects a more varied topography in the immediate vicinity of this platform. At 10 m distance sound levels ranged from 62.4 to 79 Db. The distances to the 40 Db cut off point most commonly varied from 50 to 90 m with outliers of 180 to 510 m the latter being again at the site of Usccunta. At distances of around 500m individual features of the person producing the sound are lost, facial features are invisible and even hand and arm signals are difficult to distinguish with the naked eye. At Incapirca Waminan it is particularly along the north-eastern horizon that the results with the pututu were striking, reaching over 300m. The sound quality at Incapirca Waminan produced a noticeable echo.

The sites of Usccunta and Incapirca Waminan clearly stand out from these results. Incapirca Waminan in this respect is unique among the other isolated mountaintop sites. This site is located on a rounded mountaintop on the Altiplano c. 27 km southeast of the city of Ayacucho, at UTM 599685 – 8522350 (WGS84), and at an altitude of 4372 m asl. This platform is situated on the summit of the mountain. It comprises three superimposed platforms (Fig. 07). The basal one is little more than a rectangular outline of rocks, or a very
**Figure 08.** Partial plan of Usccunta.
low double-faced fieldstone wall, barely a single rock in height, constructed directly on top of the ground surface. The wall width is 0.65 m. This lowest platform measures circa 32.7 m by 18.5 m. The second platform consists of a single faced wall, circa 1.07 m in height and measuring circa 24.5 m by 11.4 m. The third and final platform is contained within a double faced wall, c. 1.35 m in height and 0.65 m wide. This stage measures 22.8 m in length by 9.6 m in width. The walls of which are built out of selected and minimally modified fieldstone, comprising grey andesite. These appear to have been quarried from rock outcrops in the immediate vicinity of the monument. The rocks used measure from circa 0.3 x 0.3 m to c. 0.4 x 0.7 m. The form of the stonework and structure show that it is of Late Horizon Inca origin.

The structure’s length axis is aligned on a north-east by south-west orientation of 73°. There are no steps or stairs facilitating access to the top.

The location of the site of Inkapirqa Waminan (Fig. 01) offers a remarkable view of the major mountain peaks and ranges present. Uripe, Condoray, Qarawarasu, Apacheta and Rasuwillca can all be seen from this platform, as can many lesser peaks. Other cultural features present in the vicinity of the site include an ancient road, an apacheta, two chullpas and a huanca. The huanca is situated some 500 m. east of the platform and nearby this feature a small elongated mound was located with concentrations of worn LIP and LH pottery fragments on the surface.

The two platforms present at Usccunta are in an unmistakably different configuration to those at the isolated high mountaintop structures represented in the rest of the sample. The site is located in Lucanas on the district boundary of Aucara with Cabana Sur (Fig. 01). It has two platforms and has a range of other structures present as well. Usccunta is large, measuring up to 80 hectares and has kallanka, chullpa and colca type structures present on the surface (Cavero 2010: 36-68, 86-89, 111-113) (Fig. 08). It is spread over two mountain tops named Usccunta and Warmitalle (or Huarmitalle).

Usccunta is the larger of the two, rounded in shape and delimited at various levels by vertical cliff faces. The summit comprises a vertically rising rock face, which rises like pinnacle out of the centre of the peak. Warmitalle is immediately west of Usccunta and comprises a ragged stepped denuded peak which rises skyward. South east of Usccunta is a large plain on which the two usnu platforms present are situated. The topography rises again immediately south and southeast of the plain where a further rounded mountain feature named Canrarac is present with along its eastern slope a series of circa 40 circular structures measuring between 3.5 and 4 m. across. The principal archaeological remains present at Usccunta are spread across three sectors. The plain to the southeast, where besides the two platforms, rectangular and circular structures are present in the immediate vicinity of the ushnu nearest the mountain (Intiwatana 2) (Fig. 09).

The rectangular structures appear to comprise a very damaged patio group at least some of the buildings of which were constructed of finely cut blocks of polygonal ashlar. The circular structures, again badly preserved are built of modified field stone and measure up to circa 4 - 5 m. across. The first terrace of the mountain, which can be accessed from a 1.5m wide and 6 m high staircase built of carefully selected and modified fieldstone, immediately northeast of Intiwatana 2 has at least 3 kallankas and three patio groups with rectangular buildings as well as a group of circular structures on the south and southwest side of the terrace. The wall width of the rectangular buildings is circa 0.6 to 0.7m. Three of the smaller ones measure 6.95 x 3.93 m.; 16.35 x 5.2 m. and 20.45 x 5.42 m. The rectangular buildings here include several built of cut stone polygonal ashlar. Further west there is no evidence for structural features, and to the north the remains of a series of circular corrals are found; and to the east a series of chullpa like and other smaller buildings are present. The second terrace accessed up a staircase through an opening in an up to 2.2 m high encircling wall, possibly of defensive nature, has large numbers, more than 100, roughly built small circular structures of variable diameters, grouped in 3 to 5 units around patio like spaces. These are all constructed of modified fieldstone and suggestive of temporary perhaps seasonal occupation / use. The top of the pinnacle forming the summit of Usccunta is crowned by a number of Saywas.
Several cup marked rocks are present at the site.

The two *usnu* platforms are situated at UTM 588109 – 8418974 (WGS84) at 4495 m asl (Intiwatana 2) (Fig. 09) and at 588373 – 8418523 at an altitude of 4481 m asl (Intiwatana 3). The two structures are separated by an open space measuring approximately 520m across. Intiwatana 2, the northern platform, is built on mid grey bedrock and has two tiers with the upper level measuring 15.25m by 9.93m and the lower 19.67 m by 12.59 m. The retaining wall of the upper tier is constructed of a finely fitted cut stone polygonal ashlar in grey andesite, the lower of modified fieldstone. Abutting the northern wall face and centrally placed is a 1.59 m wide staircase with 3 steps. The platform is on a length orientation of 334°. The southern platform (Intiwatana 3) is situated 19m lower than the northern one and is built on bedrock with a mid red colour. This platform too has two tiers the upper one measuring 16.40m by 9.76m, the lower 18.09 m by 11.53 m. The upper level is likewise constructed of finely fitted cut stone polygonal ashlar in grey andesite, while the lower platform is formed of modified fieldstone. The length orientation of Intiwatana 3 is on 341°.

The architectural forms present are characteristic of the Late Intermediate Period and the Late Horizon and have Inca and Chanca/Soras/Rucanas cultural affiliations. The cultural material collected at the site was limited to surface finds as none turned up in the excavations. It comprises 73 lithics representing basalt, obsidian, quartz and andesite artefacts, mostly flakes, and blades as well as some scrapers, waste flakes and chips, hammer stones, mortars and pestles and stone ‘balls’ which may alternatively have served as projectiles or in a game. In addition there are 676 potsherds, mostly jars and bowls including a single Middle Horizon face neck jar fragment and several pieces of aryballus. There are also several fragments of plates. Although a significant part of the assemblage is of uncertain date much of it pertains to the later pre-hispanic period, LIP or LH. Of the positively identifiable group the assemblage is dominated by a LIP component (232 sherds or 34.3% of the material) which is of Chanka/Soras/Rucanas affiliation including ‘Clunck ware’ and ‘Purple slipped ware’.

A smaller but obvious group comprises Inca ceramics (13 sherds or 1.9%), largely aryballus and plate forms. There is a single badly eroded Face neck jar fragment of Middle Horizon date and Wari affiliation (probably epoch 2). There is a small copper or silver alloy spatula or spoon, with a human figure standing on top of the handle with the left hand pointing skyward and the right hand pointing to the ground. This object is probably Late Horizon in date. Similar artefacts are present in the collection of the ethnography museum in Berlin and are given a Chanca provenance here (Baessler 1906: 59, T12, Fig. 162). Finally modern activity is represented by a .22 caliber rifle cartridge case.

The positioning of the *usnu* platforms, separated by the wide open plain, with one situated slightly higher than the other, one on grey white bedrock and the other on red material expresses the dual social structure of Inca communities. Usccunta is encircled by LIP – LH roads, and is immediately southwest of a major intersection of inter valley roads, one on a northeast – southwest, the other on a north – southeast orientation. An apacheta is located north of the site and Saywas are present on rocky outcrops around the site. Sizeable lakes comprising Laguna Turpococha to the northwest, Laguna Huancacocha to the south and Laguna Lliullisja to the southeast are all located within about 5 km of the site, with several streams draining away from the mountain to these reservoirs and beyond.

A very notable aspect of the local environment is the presence of relatively large numbers of non-domesticate animal species observed during the time spent at this site, including Andean goose, condor, vicuna, foxes and puma.

Usccunta represents a major *wamani* in the current mythology of the region and as noted by Cristobal de Albornoz a rock on top of Usccunta was the principal *Huaca* of the Soras (Duvoils 1967: 28). This rock is certain to be the rock feature still standing proud of the top of this mountain making it a distinguishing feature recognisable from 30 to 40 km distant. The site constituted a seasonal pilgrimage centre used by the Soras and Rucanas and later appropriated and used by the Incas.

The site’s arrangement around the large flat plain with the two *usnu* platforms would have been used in seasonal celebrations including dance and music performances. Both would have
Inca sacred space, platforms and their potential Soundscapes, preliminary observations at usnu from Ayacucho

Frank Meddens y Millena Frouin

visually and audibly demonstrated the social duality of the communities of the region much as can still be observed at present day community festivals in July and August where dance groups and musicians representing the community moieties play off against each other.

**Conclusions**

As noted above any sound source deployed at any of the platform sites tested would need to have been positioned on top of the perimeter walls of the structures rather than in the centre of the platform in order to be audible to any audience present. In this manner only the people facing this side of the platform would have been able to hear the sounds being produced in any detail. Furthermore sound would only be usable effectively in the morning, as after about noon wind levels tend to rise to such levels that they largely drown out sounds such as can be produced by the human voice, a drum or a pututu.

More tentatively the results of our fieldwork appear to demonstrate that sound may have been a particularly significant consideration at two of the 14 sites sampled. In case of the site of Usccunta there is no doubt that the platforms were carefully positioned in the large level plain, which forms such a major feature of this site in order to exploit both the specific acoustic properties of this sector as well as the fact that this would have been the prime position for large scale gatherings. The pilgrimage function of this particular site (Cavero 2010: 111-113) requires that on occasion large scale publicly visible communal ceremonies could be accommodated. The presence of two platforms here, one positioned slightly higher than the other, one on a red bedrock material the other on a grey/white bedrock suggest aspects of duality in the ceremonies conducted here. A concern with sound as one aspect of this does not come as a surprise, what does perhaps is that the positioning of the dual platforms here appears to have been laid out at the limits of possibly
Figure 10. Comparative extent of the three sound sources plotted for Intihuatana 2 at Usccunta.
the loudest sound instrument available to the Incas, the pututu (Herrera 2010: 17), perhaps confirming by this fact that this instrument was in the mind of those who planned and laid out the site (Fig. 10).

The potential use of a pututu at a site where two platforms which are likely to have been elements of one or more usnu complexes can be best understood in the light of the fact that both usnu (Zuidema 1989a) and pututu (Herrera 2010) have a direct conceptual link with liquid and water and therefore with the rituals surrounding these.

The fact that our sound results at other occupation, religious/administrative centres such as Condormarca and Vilcashuaman were unremarkable are almost certainly related to the fact that the reflective surfaces at both these sites as represented by the original Inca architecture present here have been largely destroyed in the case of the former and substantially modified at the latter site. Additionally only voice data were recorded at both and it would therefore be useful to carry out additional testing with a pututu at a future date.

The at present anomalous results of the pututu at Incapirqa Waminan may be related to the specific topography around this site. With the use of the pututu here, unlike with the use of the human voice, a clear echo was obvious with the string source represented by the trumpet.

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