



# Human occupations during the Middle Holocene and beginning of the Late Holocene in the Pocitos basin, Puna of Salta, Argentina: New research and regional comparison



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## ABSTRACT

This article analyzes the human occupations of the Middle Holocene and beginnings of the Late Holocene at Pocitos as compared with other areas of the Salta Puna (Highlands region) such as Pastos Grandes and more generally in a macroregional framework (south-central Andes). Pocitos is a basin presenting an arid environment of salt flat, and with very scant primary productivity. Its location in the Salta Puna, midway between the Puna of Jujuy and that of Catamarca, is suitable for social interaction and cultural communication. From information on surface and stratified contexts from the Middle Holocene and beginnings of the Late Holocene the technological and faunal variability in the area is analyzed. The site serving as a chronological referential base is Abrigo Pozo Cavado.

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## 1. Introduction

This article analyzes human occupations in the Middle Holocene and beginnings of the Late Holocene in the Pocitos basin, Puna of Salta, Argentina. The archaeological information from Pocitos is discussed on the basis of a regional comparison with a nearby basin named Pastos Grandes, also in the Salta Puna (López, 2009a). More generally, archaeological evidence in the mesoscale of the Pocitos basin (approximately 1000 km<sup>2</sup>) is looked at on a macroregional level (*sensu* Dincauze, 2000: p. 19). The analysis and discussion topics in this article are the use of space, the consumption of faunal resources, and lithic technology.

Recent archaeological research in Pocitos provides new information related to Middle Holocene human occupations in the Argentine Puna. In this context, the chronological base for the area comes from the Abrigo Pozo Cavado site, a rockshelter at the edge of the Pocitos salt flat. Thus the analyses at this site are considered a starting-point for the discussion of regional problems.

## 2. Study area

The study area corresponds to the Puna of Salta (Argentina), intermediate between the Jujuy Puna, to the north, and that of Catamarca, to the south (Fig. 1). The Puna is a high plateau placed between the Western Andean Chain and the Eastern Chain (Turner,

1964). Although conditions of aridity are common to the whole of the Puna, in the north there is more relative humidity (Puna Seca) and towards the south drier conditions dominate (Puna Salada). In this context, the Salta Puna is placed in an intermediate zone between the Puna Seca and the Puna Salada, for which reason significant processes of social interaction are to be expected.

The Pocitos basin, also known as Pocitos-Quirón, is characterized by extreme aridity, though it is crossed by *vegas* (spatially restricted fertile zones). Its most characteristic feature is the Pocitos salt flat, which occupies a significant part of the basin's area. This zone is 120 km southwest of the most important township in the Department of Andes in Salta, called San Antonio de los Cobres. At the bottom of the basin where the salt flat is located, the altitude is around 3800 masl. However, 60 km eastwards the altitude is greater, at around 4000 masl in the neighbouring basin of Pastos Grandes. In contrast to Pocitos, in Pastos Grandes the availability of zones suitable for human occupation is higher. The presence of gorges and fertile zones with permanent water, wild camelids, and a diversity of pastures is notable. In fact, at the Alero Cuevas site, occupied throughout the Holocene, there exists a sheltered gorge with a high availability of resources (López, 2008).

## 3. Theoretical aspects

The Middle Holocene encompasses a chronology between *ca.* 8000 and *ca.* 4000/3500 BP. In the Puna, it is characterized by being a dry, hot period, although interspersed with moments of greater humidity and a high variability in local conditions (Yacobaccio and

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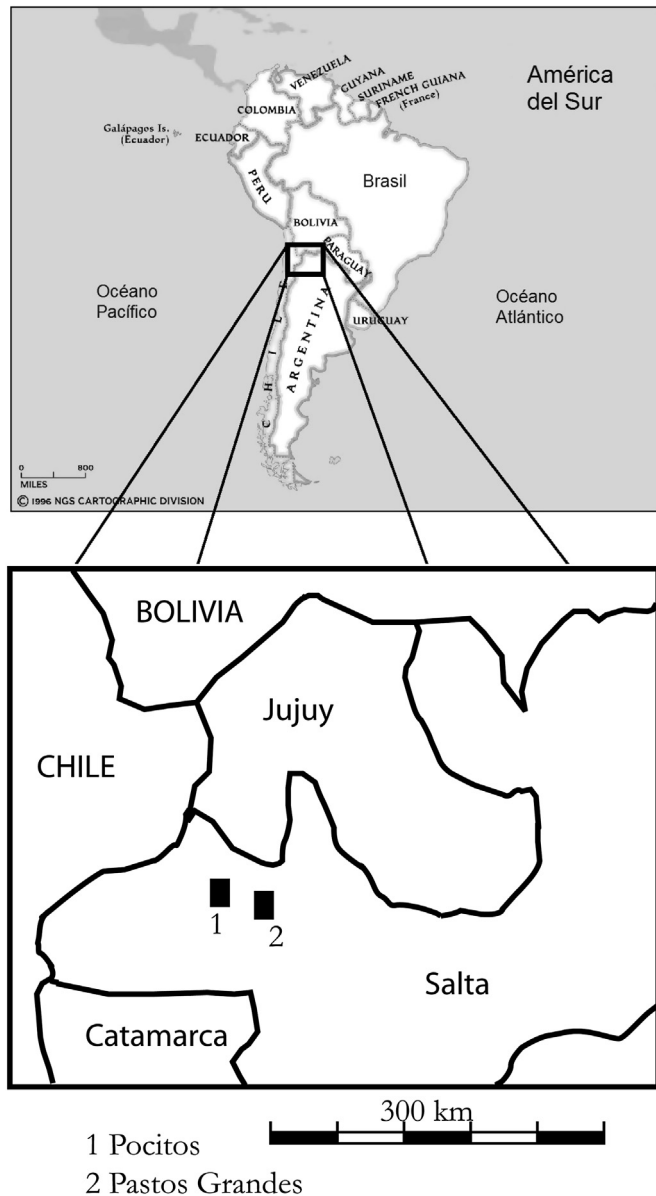


Fig. 1. Areas of study in regional context.

Morales, 2005). Throughout the Middle Holocene, in the south-central Andean highlands, a clear segmentation of the landscape would have occurred. Human groups would have concentrated in those sectors where water was available, as well as other resources necessary to adaptation to the environment (Núñez et al., 2005). Consequently, a heterogeneous and concentrated distribution of the regional archaeological record is expected.

The theoretical framework of this research is provided by evolutionary ecology (Smith and Winterhalder, 1992). From this perspective, and specially resting on the optimal group-size model (Boone, 1992), Middle Holocene climatic conditions are expected to enhance generated processes of sustained and continual aggregation in time at the sparse productive sectors for human occupation. In the long term, this would have triggered population density pressures and an increase in competition for resources. In this regard it has been suggested these processes would have been more notable in the Puna from the end of the Middle Holocene and the beginning of the Late Holocene (Aschero, 1994; Yacobaccio, 2001; Muscio, 2004; López, 2008).

These processes would have included the human occupation of those environments that, in evolutionary ecology terms, might be considered “suboptimal”. This is the case of Pocitos, an area on the edge of a salt flat, extremely desert-like nowadays. Although there are no palaeoenvironmental studies available, on a general level Pocitos may be considered a suboptimal environment with respect to others such as Pastos Grandes. The characteristics of the landscape at Pocitos accentuate the possibilities of a heterogeneous and concentrated distribution of the Middle Holocene human occupations.

#### 4. Methodological aspects: prospection, excavations, and chronology

Over recent years systematic archaeological research has been carried out at Pastos Grandes and Pocitos (López, 2008, 2009a; López et al., 2009). The methodological outline was inscribed within a strategy of regional research requiring a survey of high and low density archaeological material. For this reason it was necessary to complement the surface information with that from stratigraphic layers. In the first case systematic transects and directed prospecting were carried out, while in the second  $1 \times 1$  m or  $0.5 \times 0.5$  m grid-squares and test-pits were effected in order to obtain stratigraphic information and radiocarbon dates. The combination of archaeological information from layer and surface was adequate to carry out an approximation to the processes that took place throughout the Holocene.

Available chronology comes from two excavated rock-shelters, including Middle Holocene human occupations. At Pastos Grandes, the Alero Cuevas archaeological site was recorded, and at Pocitos, the Abrigo Pozo Cavado site.

The Alero Cuevas site is located in the Pastos Grandes gorges at 4400 masl and has a width of almost 20 m by more than 8 m in the deepest part (Fig. 2). The chronology is the following (see López, 2008):

- Early Holocene:  $9650 \pm 100$  BP,  $8838 \pm 52$  BP and  $8504 \pm 52$  BP
- Middle Holocene:  $6510 \pm 80$  BP,  $6506 \pm 58$  BP,  $5106 \pm 68$  BP,  $4210 \pm 70$  BP
- Late Holocene:  $2277 \pm 54$  BP,  $2020 \pm 60$  BP,  $643 \pm 35$  BP.

The excavation has so far included eight  $1 \times 1$  m grid-squares. This excavation was inscribed within a distributional area



Fig. 2. Alero Cuevas site seen from bottom of ravine.

methodology that laid stress on vertical stratigraphic control and chronological determination, although the horizontal extension will be continued in the future.

The Abrigo Pozo Cavado site lies northwest of the Pocitos salt flat, at Pozo Cavado, an ample valley with surrounding hills in a West-East direction (Fig. 3). This site is in an elevated sector of a mud-and-clay terrain at the edge of the Pocitos salt flat or, more clearly, an extension of land surrounded by the salt flat. The archaeological site lies in a rock formation with other rockshelters along this outcrop and over an extension of approximately 30 m. The altitude is lower than at Pastos Grandes, at around 3700 masl.

The Abrigo Pozo Cavado site was first recognized in 2010 and it is still being excavated. Two 1 × 1 m grid-squares have been excavated, which allowed a stratigraphic sequence to be observed, and three radiocarbon dates to be obtained from the Middle Holocene and beginning of the Late Holocene (Table 1).

The excavation confirmed the presence of a long archaeological sequence (see Fig. 4). The first layers, undated, correspond to Late Holocene contexts with evidence of ceramics. Layer 2 seems to be the limit between late and early contexts, made up of mud and crystallized rock fragments, probably related to the action of the salt flat. Underneath are the layers corresponding to the Middle Holocene and beginnings of the Late Holocene. Layer 3, composed of damp silt, presents abundant lithic and zooarchaeological material, and was dated at 2970 ± 80 BP. Layer 4 is darker due to the high presence of carbonaceous soil and organic material, giving a date of 3884 ± 59 BP. Layer 5 is less thick than the foregoing and, at the moment, has no dates, but differs from layer 4 in its light brown silt matrix. Finally, layer 6 is around 40 cm thick in some sectors of grid-square 1, and shows a dark matrix owing to carbonaceous and organic matter. This layer produced a date of 6280 ± 90 BP, which places it in the Middle Holocene. The analyzed archaeological material comes from grid-square 1, as new dates from grid-square 2 are awaited in order to determine the continuity of the different layers, without dismissing the possibility that in some sectors there may have been Early Holocene occupations. For the moment, beneath layer 6 of grid-square 1, the stratigraphy comes to an end with the bedrock.

Similarly, southwards from Abrigo Pozo Cavado (approximately 1.5 km distant), there is another rocky formation with archaeological evidence on the surface, Abrigo Bella Vista. As Abrigo Pozo Cavado, this is a formation with different rockshelters placed continuously along the edge of the Pocitos salt flat.



Fig. 3. Abrigo Pozo Cavado site seen from salt flat of Pocitos.

**Table 1**

Radiocarbon dates from the Abrigo Pozo Cavado site in Pocitos, Puna of Salta, Argentina, during the Middle Holocene and beginning of the Late Holocene.

Site	Laboratory	BP date (non-calibrated)	Calibration 1 sigma BC - AD	Material
Abrigo Pozo Cavado APC/C1 C6	LP- 2631	6280 ± 90 BP	5303 BC –5060 BC	Bones
Abrigo Pozo Cavado APC/C1 C4	AA 90384	3884 ± 59 BP	2470 BC –2290 BC	Bone
Abrigo Pozo Cavado APC/C1 C3	LP- 2636	2970 ± 80 BP	1259 BC –1003 BC	Bones

The initial surface prospection along the slope of this rockshelter showed archaeological characteristics shared with Abrigo Pozo Cavado. Time-sensitive artifacts from the Middle Holocene were especially evident.

In other sectors of Pocitos, different open air archaeological sites were detected with artifacts comparable to those obtained in Middle Holocene layers at Abrigo Pozo Cavado and Alero Cuevas. Among the open air Pocitos sites, Zelallos 1 and 2 are concentrations of non-ceramic artifacts located in sectors surrounding an existing fertile plain in front of the village of Pocitos and a palaeopeat vega. Pozo Cavado Estructuras is a series of stone structures or “parapets” that might have functioned as a way of visualizing hunting prey. Rodríguez 1 and 2, on the northeast margin of the Pocitos salt flat, have concentrations of artifacts that, as at Zelallos, have no ceramics and that at other sites were dated as Middle

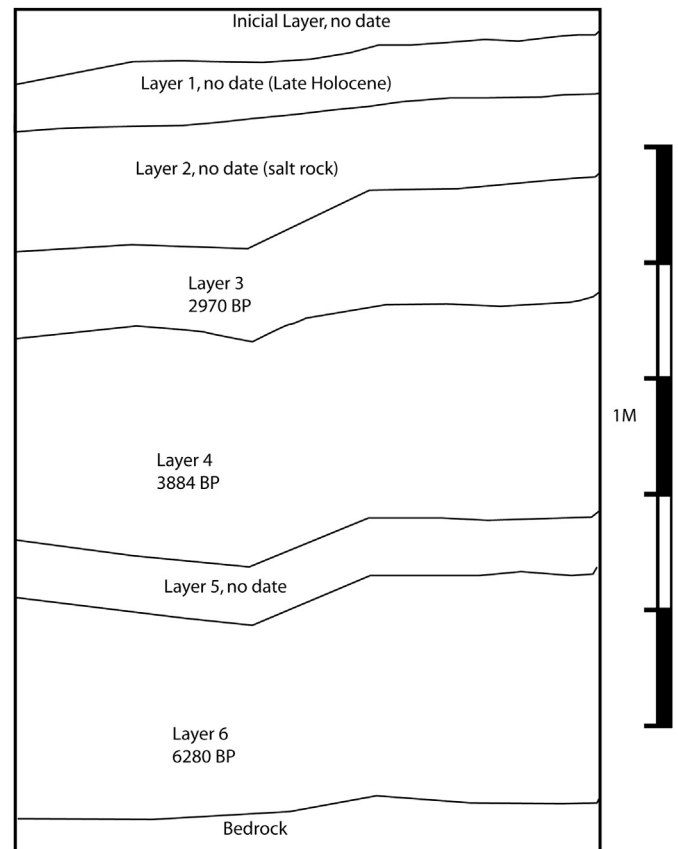


Fig. 4. Stratigraphy of the Abrigo Pozo Cavado site, grid 1.

Holocene. Therefore, the use of these sites during the Middle Holocene is probable, although their use in other chronological contexts cannot be discarded. The test-pits that were carried out provided scant archaeological information, as these spaces are intensely exposed to erosion, leaving the record uncovered on the surface.

In the next section the results of recent research on lithic material and fauna at the Abrigo Pozo Cavado site and surface contexts at Pocitos will be presented, as a starting point for the discussion of the problems in the region. This will be done by means of comparison with the archaeological information from the Alero Cuevas site and other contexts at Pastos Grandes, whose research results were presented in previous articles (López, 2008, 2009a). In turn, macroregional processes will be emphasized on the basis of comparison with other contexts in the Puna.

## 5. Results

### 5.1. Analysis of time-sensitive artifacts in Pocitos

The Pocitos area presents different places where time-sensitive artifacts belonging to the Middle Holocene and beginnings of the Late Holocene were recovered. The association of this kind of artifacts in dated layers allows a relative chronology to be given to some surface distributions. The artifacts most sensitive to time are projectile points, though unifacial lanceolate artifacts made using blade technology are also sensitive, and have been directly dated at Pastos Grandes (López, 2009a).

What is most noticeable at Pocitos, in contrast with Pastos Grandes, is the high variability of tool classes discarded in the Middle Holocene and beginning of the Late Holocene. Different surface contexts were prospected such as Zelallos, and the Rodríguez and Pozo Cavado sites. For the purposes of this work only time-sensitive artifacts that can be assigned to the Middle Holocene and beginning of the Late Holocene were analyzed, especially projectile points.

The analyzed sample consisted of 40 tools, of which 38 were projectile points. The archaeological variety allowed different classes of time-sensitive artifacts to be recorded, which can be grouped together in the following manner (see Fig. 5):

- 1) Projectile point with notched base and parallel rectilinear edges. Fragmented. Present on surface. Its characteristics are very similar to those detected in Quebrada Seca, in the Catamarca Puna and dated at around the Middle Holocene (Martínez, 2003). None were found at Pastos Grandes.
- 2) Lanceolate projectile point with parallel or subparallel edges. There are two different designs: one of average size, around 6 cm in length, and another with straight or parallel rectilinear edges for which, though it is fragmented, a fairly greater length can be estimated by projection. The first was found in stratigraphic layers both at Abrigo Pozo Cavado and Alero Cuevas. The second, however, has not been found in the stratigraphy in the region, although there are surface fragments at Pocitos. This kind of point could be likened to those defined by Martínez (2003) at Peñas de la Cruz A, in the Puna of Catamarca. At Pocitos, the base of the points is convexilinear, though the presence of double-pointed specimens should not be ignored.
- 3) Elongated triangular point. Present on the surface at Pocitos, largely fragmented with straight or rectilinear bases. A specimen of this class was recorded in layer 6 at the Abrigo Pozo Cavado site dated at 6280 BP. Its regional variability must be studied in depth.
- 4) Point with prominent stem and barbs, also fragmented, but similar to the ones recorded in Middle Holocene contexts at the

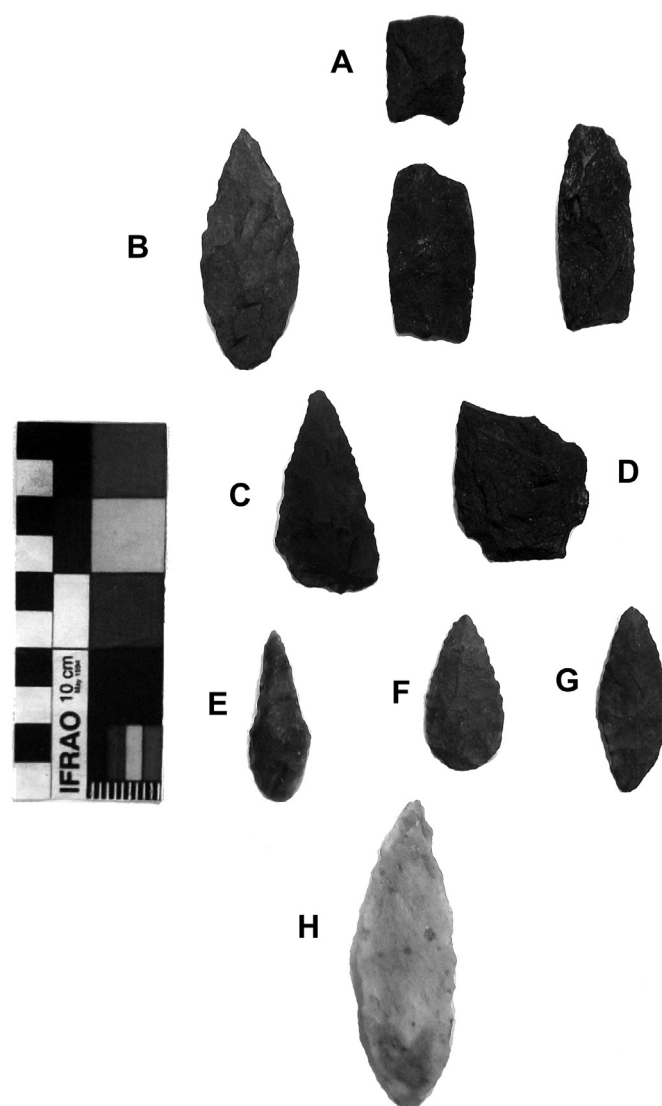


Fig. 5. Middle Holocene time-sensitive artifacts from Pocitos. A: Projectile point with notched base and parallel rectilinear edges (fragmented). B: Three lanceolate projectile point with parallel or subparallel edges. C: Elongated triangular point. D: Point with prominent stem and barbs. E: Point with outlined stem, convex base, and resharpening. F: Small lanceolate point with convex base. G: Bipoints. H: Unifacial lanceolate artifact made on blade.

Catamarca Puna and named Quebrada Seca B (Martínez, 2003; Hocsmán, 2006). These points are absent at Pastos Grandes.

- 5) Point with outlined stem, convex base, and resharpening. The best specimen of this kind of point comes from a layer at Abrigo Pozo Cavado and was dated at 3884 BP. Similar types of points were found at Quebrada Seca 3 and Chaschuil in Catamarca Puna (Ratto, 2003).
- 6) Small lanceolate point with convex base. Found on the surface and in stratigraphy at Pocitos, and in different contexts of the Puna, with high frequencies towards the end of the Middle Holocene. For example, these points were recovered in Inca Cueva 7 and Huachichocana III in Jujuy, and in the Tulán gorge, in North of Chile (Núñez, 1992; Yacobaccio, 2001). It was also recorded at Alero Cuevas between 5000 and 4000 BP. In general they do not exceed 4 cm in length.
- 7) Bipoints (Double point). In general similar to the small lanceolate in morphology and size, but instead of having a convex base, they have a double apex. Found on the surface and buried at Pocitos, and dated towards the end of the Middle Holocene.

8) Unifacial lanceolate artifacts made on blades. They are tools with parallel or subparallel edges and long lateral and unifacial edges. They usually present a small retouch of the bulb, possibly to reduce the piece for hafting. The main technological feature is their manufacture from blades. At Pocitos, only two specimens were found on the surface and, so far, none in stratigraphic layers. Nevertheless at Pastos Grandes their frequency and distribution in layers and on the surface is very high (>100). At the Alero Cuevas site they are dated between ca. 5100 and 4200 BP in association with a blade core. This same association is repeated in different surface sectors at Pastos Grandes. They have also been found at San Antonio de los Cobres, Puna of Salta (Muscio, 2004), at 120 km distance from Pocitos, and at Salinas Grandes, in the Jujuy Puna, where they were defined as “industria saladillense” (Saladillo Industry) (Fernández Distel, 1978). Although no functional analyses exist, in other works it was proposed that the long cutting edges would have been suitable in processing resources (López, 2008).

## 5.2. Lithics in Abrigo Pozo Cavado

The information on the use of lithic material during the Middle Holocene and beginning of the Late Holocene is from the Abrigo Pozo Cavado site. The lithic material from the three dated layers was analyzed in order to account for changes and continuities in three main aspects: diversity of artifact classes, artifact sizes, and use of raw materials.

In the three layers analyzed, the debitage remains quite constant, as the highest represented class above tools (Table 2). Among the debitage, a few fragments possibly related to blade technology were recovered. The representation of blank flakes is totally predominant, and no blade cores were found. This differs from the record at Pastos Grandes, where the presence of unifacial lanceolate artifacts with blade cores is exceedingly frequent throughout the area. At the Alero Cuevas site, this association is dated in layer F2 towards the end of the Middle Holocene. Unifacial lanceolate artifacts manufactured with blades are the instrument class most highly represented in this layer (39.2%), and their absence is notable in the other layers dated as Early and Late Holocene (López, 2008). In the layers studied at Pozo Cavado the most highly-represented tool classes are projectile-points and retouched flakes, which make up the two ends of a continuum of energy investment in lithic technology. In both cases, the tasks these classes of tools aim at would be, on the one hand, the use of extractive tools (camelid hunting), and on the other, for processing purposes, with more expeditive artifacts and a few sidescrapers and endscrapers. Layer 4, dated at 3884 BP, presents the highest percentage of projectile-points, most of them small lanceolate,

convex-based ones, made on obsidian. In layer 6, dated at 6280 BP, though the percentage of points is smaller, class variability is high. Among them are a lanceolate point over 6 cm in length made of andesite, a convex-based lanceolate point shorter than 4 cm in obsidian, and a straight-based elongated triangular point in obsidian.

Artifact sizes can help to understand the sort of tasks carried out in the site with the lithic material. The recurrence of small sizes in debitage and tools, shorter and narrower than 4 cm (Fig. 6), suggests the possibility that the Abrigo Pozo Cavado site may have been used intensely for lithic reduction processes. This small size of debitage would be related to the final stages of shaping and resharpening tools, fundamentally projectile points.

The use of raw materials shows a high representation of obsidian, more than half in all layers (Fig. 7). The obsidian from Quirón is the most represented, which is consistent with its geographical location, 20 km from the Pozo Cavado site. This obsidian is regarded as local because its source is located inside of the basin of Pocitos. No information is available on the other sources of raw materials in the area. Among the “other obsidians”, two varieties of grey obsidian prevail: a lighter and a darker. The first has undergone a chemical analysis that suggested similarities with the obsidian present at Tulán, in the north of Chile, but unfortunately the source is unknown (Cecilia Mercuri, personal communication).

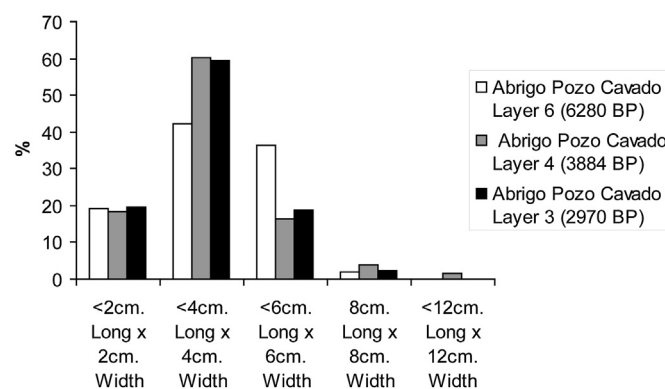
The most relevant variation in the use of raw materials at Abrigo Pozo Cavado site is related to the high frequency of quartz in layer 4 and the drop in the use of andesite (possibly coming from Pastos Grandes because there is a source at Picadero). The obsidian remains constant. This marks a clear difference with the record in the Alero Cuevas site in Pastos Grandes, where the end of mid-Holocene layer tends to increase the use of the local andesite (Picadero) and decreased non-local obsidian, including that of Quirón (local: 50.67% and non-local: 49.39%). In Pastos Grandes, all obsidians recovered are non-local because the sources are outside of this basin. In this layer of Alero Cuevas, many changes become evident in the whole, due to the proliferation of blade technology and the rise in the use of local raw materials. In Pocitos, there are no abrupt changes in lithic technology.

## 5.3. Archaeofaunal analysis

Archaeofaunal information for the Middle Holocene in the Salta Puna comes from Abrigo Pozo Cavado and Alero Cuevas. The results from the Abrigo Pozo Cavado site are presented as a starting-point to advance in the analysis of changes at a regional level during the Middle Holocene. The detailed archaeofaunal information from the

**Table 2**  
Artefactual classes in Abrigo Pozo Cavado. Between parentheses is the absolute frequency.

Artefact class	Abrigo Pozo Cavado layer 6 (6280 BP) %	Abrigo Pozo Cavado layer 4 (3884 BP) %	Abrigo Pozo Cavado layer 3 (2970 BP) %
Projectile points	1.9 (4)	5.4 (7)	3.8 (2)
Retouched flakes	1.4 (3)	2.3 (3)	7.6 (4)
Preform	0.4 (1)	2.3 (3)	1.9 (1)
Side scrapper	2.4 (5)	0.7 (1)	0
Burins	0.4 (1)	0	0
Tool fragments	1.4 (3)	2.3 (3)	0
Endscraper	1.4 (3)	0.7 (1)	0
Core	0.9 (2)	0.7 (1)	0
Debitage	89.4 (186)	85.1 (109)	86.5 (45)



**Fig. 6.** Size of the debitage and tools in Abrigo Pozo Cavado.

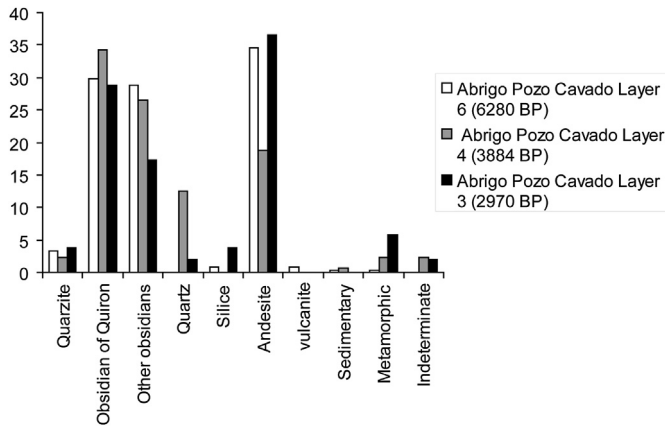


Fig. 7. Raw material diversity in Abrigo Pozo Cavado.

Alero Cuevas site has already been presented in other works (López, 2008, 2009b).

It is important to highlight some indicators on the preservation of bone material at Abrigo Pozo Cavado. Behrensmeyer's (1978) weathering stages were considered, and the three analyzed layers show very good preservation. Although stages 0 and 1 are more strongly represented in layers 4 and 3 than in 6, it also shows a predominance of these stages (Fig. 8). At the same time the variability is not high, with a small representation of the more extreme weathering stages. This would indicate a fairly rapid burial of the bones and probably a certain recurrence in the use of this site that prevented prolonged exposure of most of the faunal material on the surface. Nevertheless, currently there are no indicators available to measure the degree of stability of the occupations on a fine level of detail.

The diversity of taxa is very low at this site as in the Puna as a whole. Yacobaccio (2001) proposed a process of intensification in the use of camelids that involved their domestication. The importance of camelids as high-yield faunal resources and concentration in their consumption throughout the Holocene has already been pointed out on different occasions (e.g. Olivera, 1997). In this way, at a family level, camelids are the totally predominant resources in the Middle Holocene and beginning of the Late Holocene in the layers under analysis. In the three layers camelids exceed 98% of the assemblages in NISP (Fig. 9).

Among the camelids, interspecific variability is starting to be controlled through osteometric analyses. Osteometry has permitted certain specimens to be assigned to either of two size-groups. If the present-day Andean guanaco (*Lama guanicoe*) is taken as a standard, which is intermediate between (smaller) vicuñas (*Vicugna vicugna*) and (larger) llamas (*Lama glama*), there

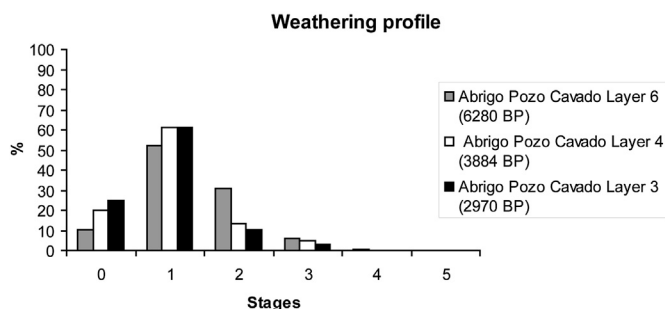


Fig. 8. Weathering profile in Abrigo Pozo Cavado.

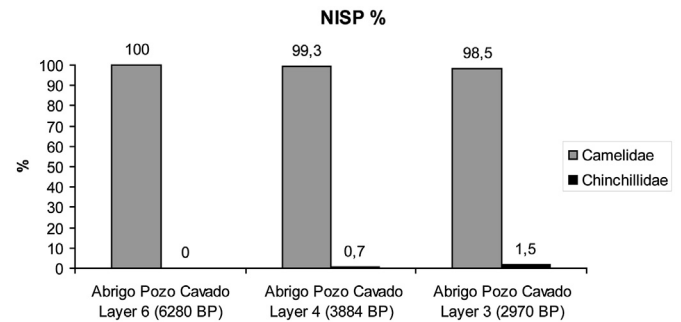


Fig. 9. NISP % of archaeofaunal assemblages identified to the level of family in Abrigo Pozo Cavado.  $N = 576$ .

are values that move away towards both extremes. Therefore, especially in layers 3 and 4, the measurement of first phalanges indicates the possible presence of wild and domesticated camelids, although the sample must be increased as the measurements were carried out on 10 specimens. In layer 6 there are two fused distal metapods available for measurement, and one corresponds to the smaller size, the other to the larger. Vicuña hunting would have been fundamental for the human groups that occupied Pocitos, although the presence of domesticated camelids towards the end of the Middle Holocene cannot be ruled out.

Comparison with the layers of the Middle Holocene and beginning of the Late Holocene at the Alero Cuevas site allows a tendency to be noted similar to the representation of larger (possibly llamas) and smaller sizes (possibly vicuñas). On a more general level, the presence of wild and domesticated camelids has been shown at different sites in the Argentine Puna (Yacobaccio, 2001). Even so, although there are solid indicators, the evidence is still fragmentary on the domestication processes in the region.

With regard to anthropic and non-anthropoc marks at the Abrigo Pozo Cavado site, the former show variations according to the layer, whereas the latter present low representation in all cases. These include rodent, carnivore, and root marks. Anthropoc marks mainly include cut marks on different bones of the axial and appendicular skeleton, being more frequent in layer 4. Fig. 10 shows the increase in the representation of specimens with cut-marks from layer 6 (6280 BP) to layer 4 (3884 BP). More interesting is the presence of different newborn specimens with diverse cut marks in layer 4. This suggests that changes might exist in the representation of fused and non-fused specimens, and in the age profile of the animals consumed at the site.

Results of studies on fusion profiles reveal a very high variation between layers 6 and 4. In layer 6 (6280 BP) fused specimens

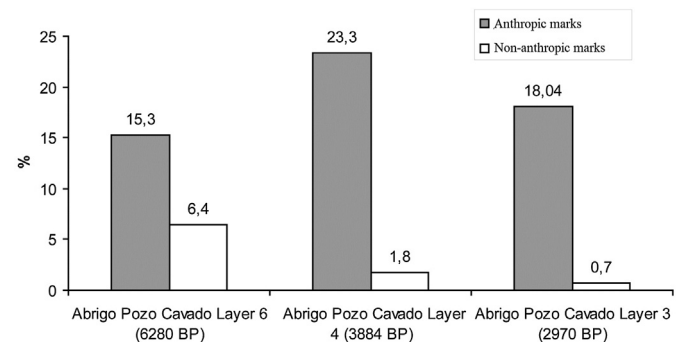


Fig. 10. Anthropoc and non-anthropoc marks on the NISP (only camelids) in Abrigo Pozo Cavado ( $N = 576$ ).

predominate, whereas in layer 4 (3884 BP) non-fused specimens show an increase to 70.4% (Fig. 11). Each of the layers contains newborn specimens, which would at least indicate the presence of the human groups during summer. In layer 4, the newborn have an elevated representation of approximately 28% in unfused specimens and several specimens with anthropic marks. Thus the analyses on a site level at Pocitos allow a high representation of sub-adult camelids to be noted towards the end of the Middle Holocene. This was also detected at Alero Cuevas in the 5100–4200 BP layer. At this site, as at Pocitos, an increase of the non-fused specimens occurs towards the end of the Middle Holocene (58.3%). Instead, in the 6500 BP layer, fused specimens predominate (61.72%). At Pocitos as well as Pastos Grandes, there is a change in the age profile between the layers dated beyond 6000 BP, and the layers dated 5000–3500 BP. Although throughout the Puna there is a high variation in the Middle Holocene age profiles, the presence of shared tendencies on a regional level in the Salta Puna is apparent. The increase of samples will be decisive in considering whether these tendencies hold throughout.

**6. Discussion**

The drier and more arid conditions of the Middle Holocene and beginning of the Late Holocene would have led to processes of human aggregation due to spatial circumscription. From the optimal group size model (Boone, 1992), it is expected that the aggregation may continue down to suboptimal levels, but adaptive ones in relation to act solitarily. In contexts such as those described, by the end of the Middle Holocene pressures dependent on population density may have broken out, generating competition for spaces and resources. As high-ranking spaces decrease, it is to be expected that human groups will also occupy lower-ranking or even suboptimal spaces, but those still available for occupation. This may explain the intense human occupations existing at Pocitos during the Middle Holocene on the edge of the salt flat.

Abrigo Pozo Cavado site shows an intense use of the excavated sector which does not necessarily indicate a continuous or stable use but recurrent over time. In Schlanger's (1992) terms, it is a place of persistent use during the Middle Holocene and the start of the Late Holocene. From lithic and archaeofaunal analyses it can be posited that this site constituted a favourable place for hunting wild camelids and the final shaping of tools, especially projectile points.

At Pocitos, in contrast to Pastos Grandes, a great variability in classes of projectile points and different Middle Holocene time-sensitive artifacts were detected, with patterns shared in other

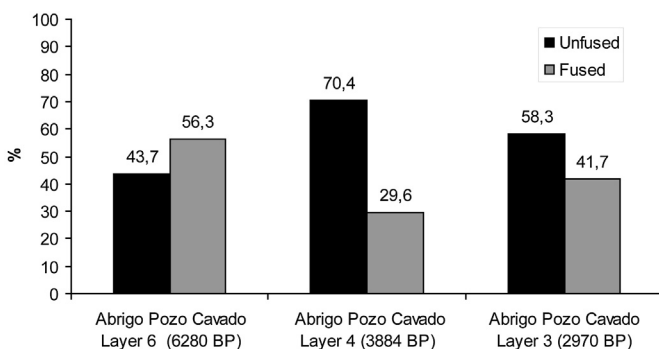
sectors of the Puna, both in Catamarca and Jujuy. High percentages of grey obsidian in Abrigo Pozo Cavado (source unknown) were also evident in archaeological contexts in Tulán, north of Chile. These characteristics might indicate the use of Pocitos as an area of cultural information circulation from different sectors of the Argentine Puna and possibly that of northern Chile. This might relate to Pocitos' situation as a suboptimal or marginal environment in contrast with Pastos Grandes, where the stability of the occupations would have been greater, generating competition for these spaces. In this regard, in Pastos Grandes, both in layers and on the surface, a class of artifacts dated towards the end of the Middle Holocene predominates. These are the unifacial lanceolate artifacts made using blade technology. In turn, the drop in non-local obsidians at the end of the Middle Holocene and the greater use of local raw materials such as andesites at the Alero Cuevas site (López, 2008), could be interpreted as a sign of spatial circumscription and competition. However, further information is needed to reinforce this hypothesis.

On the other hand, an increase in specimens of non-fused camelids with a high presence of subadults in general and

**Table 3**

Comparison of processes and archaeological indicators during the Middle Holocene and beginning of the Late Holocene between the Pocitos mesoscale and the Argentine Puna macroscale.

Archaeological processes and indicators during the Middle Holocene and beginning of the Late Holocene	Mesoscale: Pocitos	Macroscale: Argentine Puna
Use of space	Recurrent occupations on the microscale as Abrigo Pozo Cavado. Suboptimal environment little suited to permanent residential use, though this is not dismissed for certain sectors. Territory open to the circulation of people, resources, and cultural information	Heterogeneous use of space on macro and meso scale ( <i>sensu</i> Dincauze, 2000). Environments of greater or lesser quality for residential occupation. Places of residential use and places for circulation. Places of persistent use on a meso and microscale, and sectors with low or no occupation.
Consumption of faunal resources	Predominant use of camelids, intensification (increase of subadults, a feature shared with Alero Cuevas in Pastos Grandes), and domestication?	Predominant use of camelids, intensification processes on the macroscale due to the increase in camelid consumption during the Middle Holocene (Yacobaccio, 2001). Solid but fragmentary evidences of domestication.
Lithic technology	Artifact variability from different classes of points and instruments. Use of local and non-local raw materials. Source of local obsidian.	High variability in the mesoscale between different areas of the Puna. Flake and blade technology. Bifacial and unifacial technology. Particular classes and widely disseminated classes. Circulation of obsidians on the macroscale (Yacobaccio et al., 2004).



**Fig. 11.** Fused and unfused specimens of camelids in Abrigo Pozo Cavado. Percentage corresponds to 100% of specimens in which we could see the state of fusion (N = 111).

newborn in particular was detected in layer 4 (3884 BP) at the Abrigo Pozo Cavado site. There was also an increase in anthropic marks, including on the newborn specimens. According to Broughton (1999) one of the causes of the increase in subadults in archaeological contexts can be population pressure on resources. This same pattern is repeated at the Alero Cuevas site in the same chronological context. Other hypotheses that are not contradictory with greater pressures depending on the density cannot be discarded. For instance, at some archaeological sites in the Central Andes such as Telarmachay, it has been proposed that the increase of subadults and newborn is related to domestication processes (Wheeler, 1998).

Bioarchaeological evidence will be needed to go into the analysis of these processes more deeply. For the moment, the edge of the Pastos Grandes salt flat has the only human remains found in the region, in an open air context, dated at  $3738 \pm 46$  BP. This date places this find between the end of the Middle Holocene and beginning of the Late Holocene, for which reason it is interesting for an advance in the studies on the processes of change in this context. Briefly, it is important to mention the recurrence of anthropic marks on the skeleton and even a small obsidian artifact embedded in the right radius, hypothetically interpreted as a sign of interpersonal violence (López and Miranda, 2008). However, it is necessary to obtain bioarchaeological information for this chronological context that will allow the analysis of whether a pattern of conflict or health problems derived from human aggregation and poor general socioecological conditions existed (see Brothwell, 1987). Competition processes will not necessarily lead to violent conflicts.

## 7. Conclusion

It is suggested as a hypothesis for in-depth studies in future research that Pocitos was an area open to the circulation of people, resources, and cultural information. It remains to delve more deeply into the interaction networks with low sectors like the mesothermal valleys during the Middle Holocene. However, it is probable that Pocitos was also a transit area for cultural information between this sector of the Puna and the mesothermal valleys. For instance, in the later layers of the Abrigo Pozo Cavado site the presence of corncobs was found, probably brought from the valleys.

The Abrigo Pozo Cavado site shows continuities throughout the Middle Holocene and beginning of the Late Holocene in several faunal and lithic aspects. Changes also exist between layers 6 (6280 BP) and 4 (3884 BP) that might be due to the process of intensification in the use of camelids in a context of greater pressures dependent on population density towards the end of the Middle Holocene. Even with local variations, most contexts of the Argentine Puna and the north of Chile evince changes towards the end of the Middle Holocene that might be connected with processes of human aggregation, spatial circumscription, larger group size, intensification in the use of camelids, and probably their domestication (Aschero, 1994; Yacobaccio, 2001; Núñez et al., 2005). Table 3 comparatively summarizes the archaeological patterns of Pocitos on a regional level.

Lastly, the archaeological information from Pocitos should not be regarded as conclusive. Continuity in the analyses will allow the suggested hypotheses to be assessed more thoroughly. In this respect it is seen as fundamental to expand the samplings and to obtain bioarchaeological information that will enable the analysis of biological and cultural variability of the human populations that peopled this sector of the Argentine Puna.

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