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RESEARCH BRIEF



## Early Holocene Occupation of the Forest-Steppe Ecotone of Southern South America: Evidence from Casa de Piedra de Roselló Cave (Chubut, Patagonia Argentina)

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### ABSTRACT

This paper presents information on the site called Casa de Piedra de Roselló, located near the town of Aldea Beleiro in southwestern Chubut Province, Argentina. It includes the latest dates obtained there, which fix human occupation of the area at ca. 9000 cal yr BP. This early chronology – currently regionally comparable only to that obtained from Baño Nuevo 1 in the Republic of Chile – make Casa de Piedra de Roselló outstanding, since archaeological studies of it will contribute in a general way to deepening our understanding of the ways of life of human societies that inhabited Patagonia during the early Holocene.

### KEYWORDS

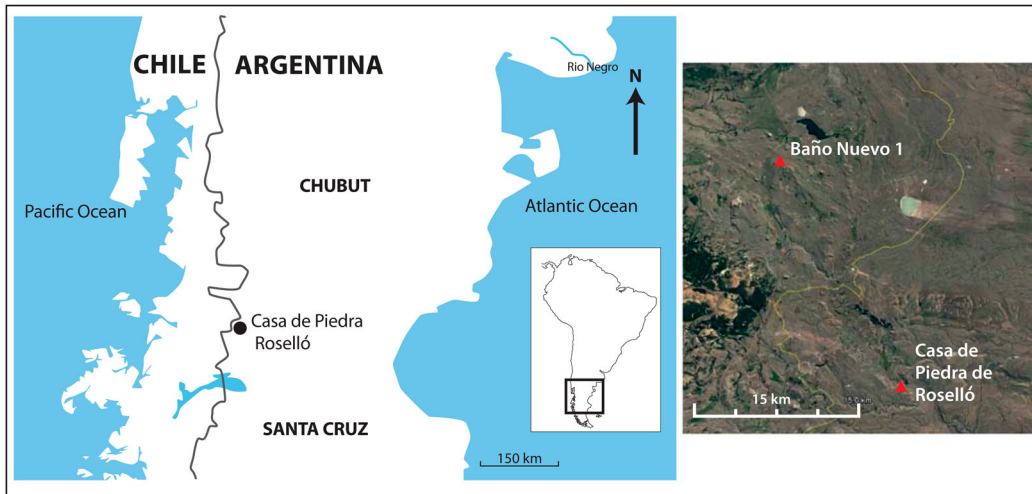
Peopling of Patagonia; early Holocene; forest/steppe ecotone; cave; central/western Patagonia Argentina

The early peopling of South America is a classic topic of discussion and debate in archaeology of the Americas, one that remains vital today (Borrero 2015, 2016). When considering it, however, information with dates from the early Holocene obtained from the study of new archaeological sites is of crucial importance for understanding the peopling process of Patagonia, the southern extreme of the South American continent. In particular, archaeological research in southwestern Chubut Province has increased in recent years (Aguerre, Arrigoni, and Andrieu 2011; Castro Esnal 2014; Castro Esnal, Sacchi, and Pérez de Micou 2011; Pérez de Micou, Burry, and Trivi 2009; Pérez de Micou et al. 2009, 2014). Despite the scarcity of antecedents, recent studies at Casa de Piedra de Roselló have provided some of the earliest dates of human occupation in the province (Castro Esnal et al. 2016; Pérez de Micou et al. 2014), joining those announced for the site Alero Dasovich (Aguerre, Arrigoni, and Andrieu 2011). To these can be added Baño Nuevo 1, located in the adjacent area of Aisén, Chile (Bate 1979; García 2007; Mena and Reyes 1998, 2001; Mena and Stafford 2006; Mena et al. 2000, 2003, 2004; Méndez et al. 2012, 2014; Reyes et al. 2012; Velásquez and Mena 2006), and although somewhat more distant from this area, in the Cisnes River basin in northern Aisén, El Chueco 1 (Méndez et al.

2011; Reyes et al. 2007). This brief paper summarizes new information from Casa de Piedra de Roselló Cave.

Casa de Piedra (CP) (45.3°S, 71.2°W) is located on the Roselló Ranch near the town of Aldea Beleiro, where the Western District of the steppe meets the Sub-Andean District of the forest (León and Fracelli 1981; León et al. 1998; Soriano 1956; Soriano, Movia, and León 1983), approximately 5 km from Argentina's border with the Republic of Chile (Pérez de Micou, Castro Esnal, and Sacchi 2013) (Figure 1). This region is a broad ecotonal band several kilometers long and with imprecise borders (León et al. 1998). The immediate surroundings of CP are currently steppe, but patches of ñire (*Nothofagus antartica*) or lenga (*Nothofagus pumilio*) can be observed within a radius of 5–7 km.

The site is found in a ravine within a rocky mass of ignimbrite that belongs to the Carrenleufú Formation (Dal Molin 1998) and is crossed by the Arroyo Ñirihua. The site consists of three caves located about 12 m above the boggy area (Spanish *mallín*) through which the Arroyo Ñirihua flows, and about 100 m to the east of this area. Like any deep rock shelter or cave, the main cave (CP1) is a sedimentary trap with little connection to the nearby exterior: the bushes and grasses that grow nearby are not present in it. The orientation of the cave mouth protects the interior from the prevailing westerly winds. It receives natural light, which decreases

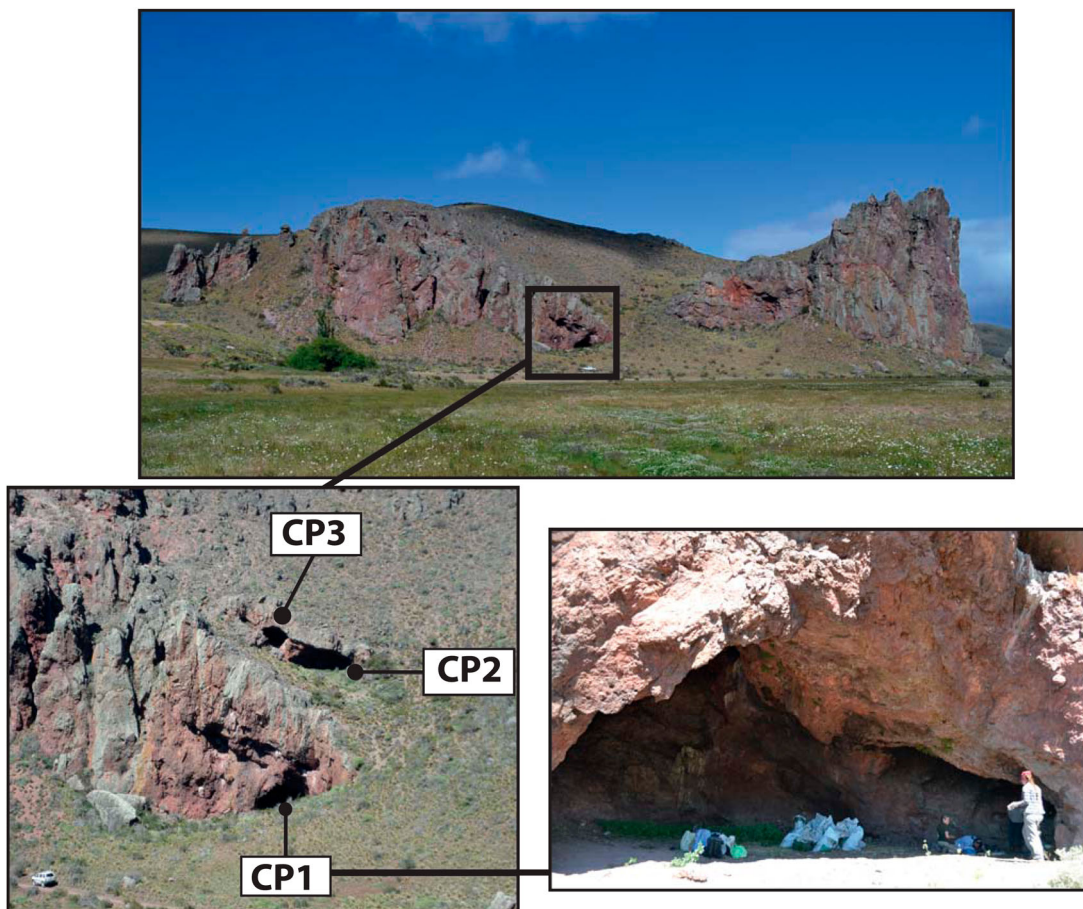


**Figure 1** Map showing the study area and, in detail, a satellite image of the vicinity of Casa de Piedra de Roselló to Baño Nuevo 1.

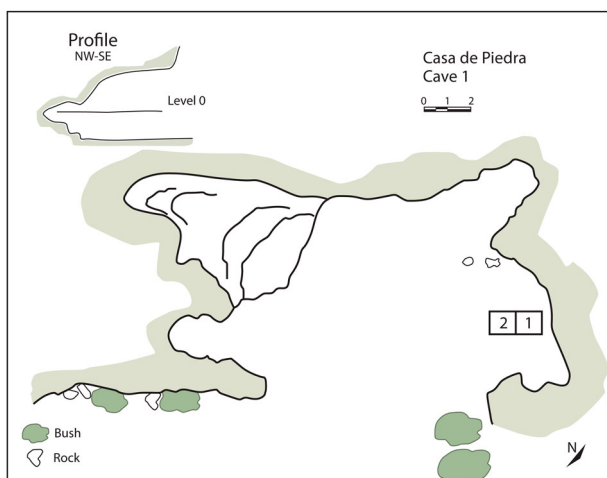
toward its interior. The drip line is a few meters outside of the cave mouth. Besides CP1, the site also contains two small caves containing rock art – CP2 and CP3 – located at a higher level (Figure 2).

To date, two square (2 m<sup>2</sup>) *décapage* excavations have been dug in CP1, reaching a maximum depth of 1.30 m

(Figure 3). Nine natural, continuous, archaeologically fertile layers have been identified (Table 1), in which five AMS dates have so far been obtained (Table 2). The first layers (Levels 0 and 1) have yielded European elements from historical periods (fragments of glass, nails, sheep remains) as well as lithic artifacts. From



**Figure 2** General views of the Casa de Piedra de Roselló site.



**Figure 3** Location of excavation area in CP1.

Level 2 downward, only indigenous material appears. Level 3 is characterized by the presence of tephra which, based on its composition, is from the eruption of the Hudson Volcano that occurred approximately 4000 cal yr BP (H2) (Stern, personal communication 2014; see also Naranjo and Stern 1998, 2004; Stern 2008; Stern et al. 2016). The uppermost part of the lowest layer (Level 8) has yielded scarce anthropic materials, while its deeper parts become completely sterile before terminating at the bedrock. Among the materials recovered to date from the entire stratigraphic column, lithic debris are the most outstanding for their frequency (Figure 4). The age of the earliest occupation is roughly 9000 cal yr BP (Table 2).

Faunal remains are in a generally bad state of preservation, probably due to the humid matrix present in some of the strata. Nevertheless, the presence of guanaco (*Lama guanicoe*) has been identified most predominantly, along with some remains of sheep (in the upper layers only), huemul (*Hippocamelus bisulcus*) in layers 4 and 6, and medium- to small-sized birds.

The raw material represented in the lithic assemblage of the entire stratigraphic column demonstrates the predominant use of a microcrystalline silicate that appears in veins in the Carrenleufú Formation (Dal Molin

1998). However, in all layers, but with greater frequency in layers 4 and 6, debris and instruments of black obsidian were found (Castro Esnal and Stern 2015; Castro Esnal, Stern, and Pérez de Micou forthcoming), largely from Pampa del Asador (located a linear distance of 270 km south of the site) (Belardi et al. 2006; Espinosa and Goñi 1999; Stern 1999, 2004). Three projectile points, one from layer 5 and two from layer 6, have convex bases.

In CP3, numerous painted motifs were registered. Among these, 10 panels were defined, on which there is a predominance of negatives of hands. Abstract motifs (circles) were also identified in the most outstanding and best preserved panel (Figure 5), as well as images of guanacos similar to those defined by Stylistic Group B, characteristic of the period 7000–3300 cal yr BP (Gradin, Aschero, and Aguerre 1976). In CP2, isolated negatives of hands were observed.

The possibility of studying a site that demonstrates occupation dating from the early Holocene allows for the formulation of hypotheses related to changes in the use of space by human groups over time. More specifically, the stratigraphic sequence of the main cave at Casa de Piedra de Roselló (CP1) has yielded an assemblage of artifacts appropriate for the diachronic study of lithic technology produced and employed by such groups. Based on the heterogeneous distribution of the archaeological materials in the sequence of CP1, we have established the hypothesis that this rocky retreat was occupied with greater intensity during the period from ~8500 to 6500 cal yr BP (layers 6 and 4). For this time period, due perhaps to the greater size of the archaeofaunal sample available, the presence of huemul has been registered. Today, the huemul is not present in the area. Its habitat is the forest, and the nearest forest is found at a distance of 15 km to the west of the site. The presence of huemul at the site therefore suggests the exploitation of forest resources during a period in which the paleoclimatic record of the region indicates higher humidity, resulting in the maximum extension of the forest toward the east (De Porrás et al. 2012, 2014; Markgraf et al. 2003; Markgraf, Whitlock, and

**Table 1** Lithic artifacts (debris, tools and cores) and faunal remains from CP1.

Level	Debris	Per cent	Tools	Per cent	Cores	Per cent	Faunal remains	Per cent	Total	Area excavated (m <sup>2</sup> )
0	33	68.75	3	6.25	2	4.17	10	20.83	48	2
1	631	81.74	11	1.42	3	0.39	127	16.45	772	2
2	942	86.18	5	0.46	4	0.37	142	12.99	1093	2
3	471	83.66	5	0.89	1	0.18	86	15.28	563	2
4	4420	75.76	109	1.87	8	0.14	1297	22.23	5834	2
5	444	82.37	4	0.74	0	0.00	91	16.88	539	1
6	1693	72.04	21	0.89	2	0.09	634	26.98	2350	1
7	191	95.50	1	0.50	0	0.00	8	4.00	200	1
8	24	96.00	1	4.00	0	0.00	0	0.00	25	1

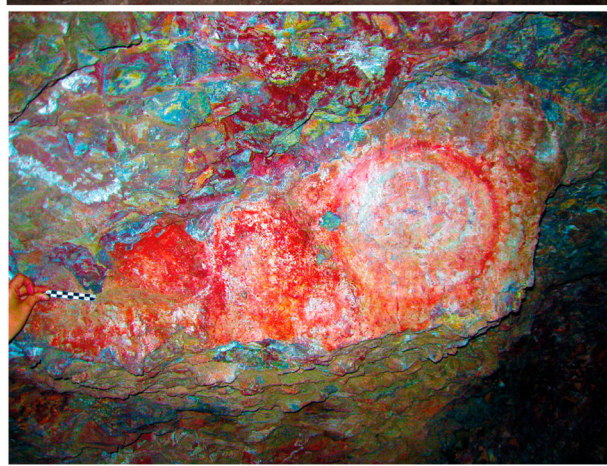
**Table 2** Dates obtained at CP1.

Sample code	Location found	Material dated	AMS date ( $^{14}\text{C}$ yr BP)	Calibrated date (cal yr BP) ( $2\sigma$ ) <sup>a</sup>
AA94274	Level 1	Wood	493 ± 34	543/461
AA94275	(Level 2)	Nailed stake	179 ± 34	Out of range
AA103810	Level 4	Charcoal	5682 ± 46	6532/6305
AA103811	Level 6	Charcoal	7719 ± 51	8579/8397
AA105881	Level 7	Charcoal	8033 ± 37	9007/8658

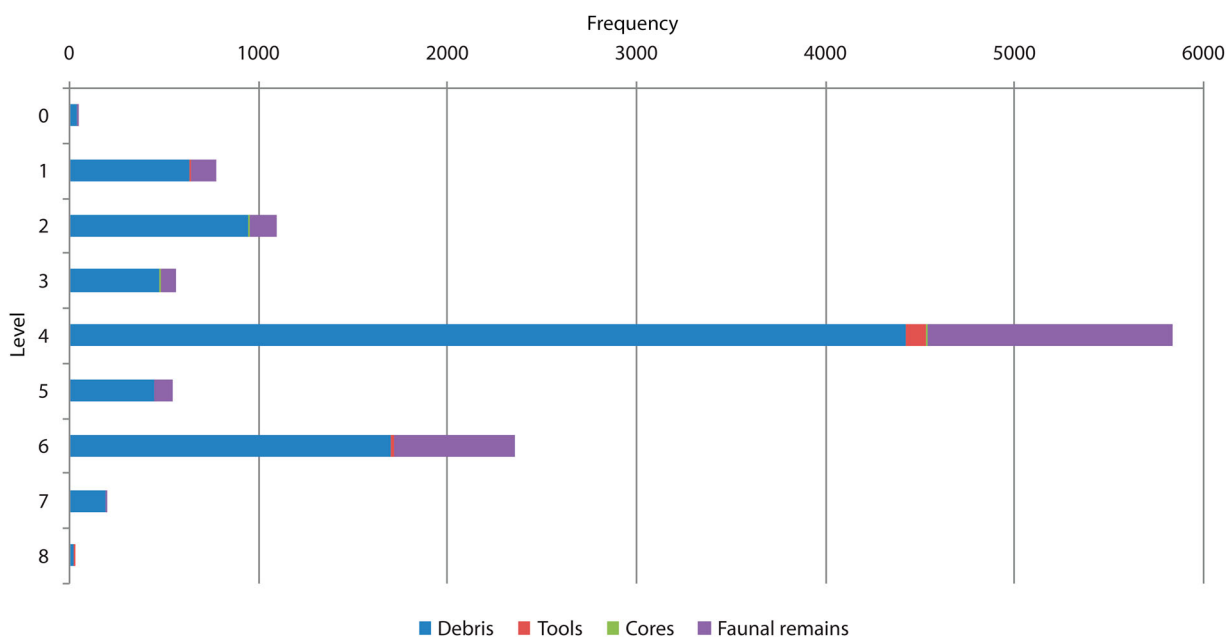
<sup>a</sup>OxCal 4.2; curve: ShCal13.

Haberle 2007; Reyes et al. 2009; Schäbitz 1991; Wille and Schäbitz 2009; Wille et al. 2007). Local-level paleoenvironmental information and zooarchaeological data will allow for an evaluation of whether the differential presence of huemul at the site might be due to changes in the animal's availability locally, to the application of different strategies of the use of space by human groups, or simply to problems with the sample.

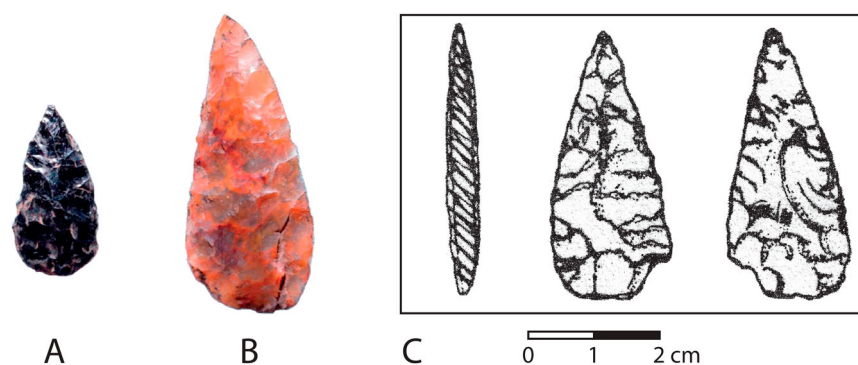
In this context, it is therefore indispensable to compare the results of our research with those from the nearby Baño Nuevo 1 site (Bate 1979; García 2007; Mena and Reyes 1998, 2001; Mena and Stafford 2006; Mena et al. 2000, 2003, 2004; Méndez et al. 2012, 2014; Reyes et al. 2012; Velásquez and Mena 2006). This site is located in the Republic of Chile, approximately 23 km to the northwest of CP, on a high plain crossed by arroyos that are the source of Arroyo Ñirihua. Baño Nuevo 1 is a cave in which human remains dating between 10,200 and 9700 cal yr BP were found (Mena and Reyes 2001; Mena et al. 2000; Méndez et al. 2014; Reyes et al. 2012) prior to first evidence of occupation



**Figure 5** Rock-art motifs from CP3's most outstanding and best preserved panel (top, original image; bottom, image modified using Image-J DStretch LAB (Harman 2015).



**Figure 4** Frequency distributions of lithic artifacts (debris, tools and cores) and faunal remains per level.



**Figure 6** (A,B) projectile points from Level 6 (CP1); (C) projectile point from Baño Nuevo 1 (taken from Mena et al. 2000).

at CP. Among the faunal assemblages at both sites, the presence of guanaco is predominant, but at Baño Nuevo 1, there is also a minimal presence of huemul remains throughout the stratigraphic column (ranging from early to later components) (Velásquez and Mena 2006). In accordance with isotopic analyses of the human skeletal remains found at Baño Nuevo 1, Méndez et al. (2014) discuss and interpret the results as evidence of the consumption of guanaco over huemul. Likewise, studies on the exploitation of huemul throughout the Holocene in Patagonia suggest the use of huemul as a complementary dietary resource in environments in which other high-yield prey such as guanaco were available (Fernández et al. 2016).

Finally, it is worth mentioning that the projectile points found at Baño Nuevo 1 (García 2007; Mena et al. 2000) are of a similar design to some of the points found at CP (Figure 6). This emphasizes the importance of integrating the data from both sites, which are very near to each other and belong to similar environments. Although the general frequency of lithic materials found at CP is much higher than at Baño Nuevo 1, local raw material predominates at both sites, with low frequencies of non-local black obsidian. This evidence allows for creating hypotheses on circuits of mobility and/or interaction among groups, since it demonstrates that the region was occupied from early times by hunter-gatherer groups who possessed broad and detailed knowledge of their environs (Castro Esnal, Stern, and Pérez de Micou forthcoming).

Further research into topics presented here will add to knowledge about the ways of life of early societies and provide a significant contribution to the discussion of the dynamics of the peopling of the extreme south of America.

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We wish to thank Charles Stern of the University of Colorado for his geochemical determination of obsidian and tephra, and Mariana De Nigris, who helped us with archaeofaunal samples.

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### Disclosure statement

No potential conflict of interest was reported by the authors.

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