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From the use of space to territorialisation during the Early Holocene in Taltal, coastal Atacama Desert, Chile

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ABSTRACT

In this paper, we present recent data on Early Holocene human occupations from Taltal, in the coast of the Atacama Desert. We focus on evidences of mobility and subsistence economy, discussing the data in terms of a concept of territoriality adapted from cultural geographers working with hunting-gathering societies. We attempt to show that the Huentelauquén Cultural Complex, usually considered the earliest evidence of human occupation in the coast of northern Chile, exhibits an already consolidated territorialisation process. We question whether it represents the earliest phases of the peopling process or if such evidence are still lacking at a regional level. We try to go beyond the characterization of Huentelauquén Cultural Complex as an early maritime adaptation, understanding it as the earliest socio-territorial identity known to date for the Arid Coast of northern Chile.

1. Introduction

Unlike physical space, a territory is a "lived" as well as a "social" and "cultural" landscape (Bonnemaison, 2005; Collignon, 2006), a world where human communities build and reproduce their identity and historical knowledge. The transformation of a pre-existing physical space into a territory is thus a historical process we here call "territorialisation". From this perspective, territoriality is distinct from tenure or "ownership" over the land (Ingold, 1987) and is more related to human "affiliation" or "connection" to the landscape (Collignon, 2006, pp. 44). This "affiliation" is the dynamic outcome of the recurrent material engagement with a given physical landscape through the mediation of social practices and symbolic representations. As such, territoriality is not only determined by cultural norms or a judicial system, but constructed through experience and reproduced in social practices (Pauketat, 2001).

In hunter-gatherer societies, the use of space and the appropriation of the "environment" make up an important part of the everyday experiences and practices through which territoriality is constructed, materialized and reproduced. Therefore, mobility and the exploitation of resources are not only an adaptive response which satisfies subsistence needs at specific environmental and technological settings (Binford, 1980), but they also constitute important ingredients in the process of territorialisation itself. Together with geographic knowledge of resources and environments, and cultural affiliation with "places" through narratives and

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memory, mobility and resource exploitation are some of the main social practices through which hunter-gatherers build, reproduce and change their socio-territorial identities through time.

From this perspective, human colonization of the Americas occurred through the knowledge of, and effective adaptation to, new environments (Borrero, 1999, 2015). But it was also a process of ascribing cultural meaning to these environments (Gillespie, 2007). Moreover, it was a process of territorialisation through which socio-territorial identities were built and reproduced, changing a new land into a historical network of significant "places" for certain communities of hunter-gatherers. How these processes transpired is a difficult question to answer from the archaeological record alone. However, we may attempt to see the "colonization" phase of the human peopling of the Americas (*sensu* Borrero, 1999, 2015) as an advanced process of enculturation and territorialisation.

In this paper, we use this approach to understand the earliest human evidences known to date for the Taltal area, in the hyperarid southern Atacama coastal desert, in an attempt to identify the first human territories constructed and reproduced in this area. We will begin by presenting the environmental context where this early territorialisation process occurred and will then move on to discuss the archaeological evidence of mobility and subsistence during the Early Holocene. From there we will attempt to interpret the use of space and the construction of early socio-territorial identities in the Arid Coast.

2. Environmental setting: past and present

Taltal (ca. 25° S) is located at the southern edge of the hyperarid coast of the Atacama Desert (Fig. 1), which is considered the most arid environment worldwide. Topographically, the area presents a narrow strip of coastal shelf (~500 m wide), flanked on the west by the Pacific Ocean and on the East by the western margin of the Coastal Cordillera, which shows a marked climb up from the coast to 2000 m above sea level. To the east of this Coastal Cordillera, the hyperarid Atacama Desert dominates until the foothill of the Andes, some 100 km eastward.

Mean total annual rainfall in coastal Taltal area reaches 15–20 mm, diminishing to almost zero northward, with 4 mm/year at 23.5°S and 1 mm/year at 20.2°S. Precipitation can be absent during several years or even decades along this coast, being interrupted by the sporadic occurrence of torrential rainfall events during strong El Niño Southern Oscillation (ENSO) episodes (Vargas et al., 2000). Vegetation is limited due to the lack of perennial rivers (Rundel et al., 1991; Houston, 2006), while small springs mainly fed by coastal rains linked to ancient ENSO episodes are today the main source of fresh water (Herrera and Custodio, 2014).

Year-round sources of moisture also include the "*Camanchaca*" or coastal fogs trapped to the coastal mountains and locked at 900–1000 m above sea level (masl) by an atmospheric inversion layer associated to the interaction between the South Eastern Pacific Subtropical Anticyclone, cold sea surface waters of the Humboldt Current System and coastal upwelling (Cereceda et al., 2008). Coastal fogs and episodic rainfall provide enough humidity to sustain fog-oases or "*Lomas*" vegetation between 200 and 900 m.a.s.l. (Rundel et al., 1991; Marquet et al., 1998). Endemic species of cacti (*Copiapoa, Eulychnia)* and shrubs *(Gypothamniumn, Euphorbia, Nolana, Heliotropium, Sisymbrium*) are found in this unique type of ecosystem, while some vegetation can also be found in spring oases and low elevation rocky outcrops (Rundel et al., 1991). Communities of vertebrate and invertebrate fauna are associated with the spatial distribution of "*Lomas*" vegetation and groundwater-spring areas. These include terrestrial mammals (*Lama guanicoe, Lycalopex griseus, Lycalopex culpaeus, Pyllotis darwin*), reptiles (*Liolemus nigromaculatus*), birds (e.g. *Geranoaetus melanolecus, Agriornis montana, Diuca diuca,* Troglodytesaedon) and land snails (e.g. *Plectostylus broderipii, Plectostylus puctulifer, Chiliborus rosaceus*) (Marquet et al., 1998; Araya and Catalán, 2014).

In contrast with the hyper-aridity of the terrestrial environment, marine and coastal ecosystems along the Atacama Desert are one of the most productive in the world (Montecino et al., 2005; Thiel et al., 2007). This high productivity is associated to nutrient-rich waters of the Humboldt Current System together with strong coastal upwelling cells, and modulated by interannual, interdecadal and centennial oceanographic changes related to ENSO and ENSO-like ocean-atmosphere variability (Barber and Chavez, 1983; Montecino et al., 2005; Vargas et al., 2006). A complex trophic chain is associated with these environments, including diverse species of sea-weed (e.g. *Lessonia, Durvillaea* and *Macrocystis*), molluscs (e.g. *Concholepas concholepas, Fissurellas, Tegula atra*), fish (e.g. *Trachurus murphyi, Merluccius gayi, Genypterus* sp.) and cetaceans (e.g. *Eubalaena australis, Megaptera novaeangliae, Delphinus delphis*). In addition, rockeries along the coast are home of abundant pinnipeds (e.g. *Otaria flavescens, Arctocephalus australis, Lontra felina*) and marine birds (e.g. *Stictocarbo gaimardi, Larus modestus, Pelecanus Thagus*) (Medina et al., 2007; Thiel et al., 2007). The hyperarid coastal climate setting of the Atacama Desert also contrasts with the semiarid to arid environment that characterize the Precordillera and Altiplano, located at higher altitudes in the same region, which are seasonally affected by summer precipitations associated to easterly weather systems (Garreaud et al., 2003), resulting in a strong zonal (east-west) precipitation gradient (De Porras et al., 2017).

Present characteristics of terrestrial, coastal, and marine ecosystems of the study area cannot be assumed to have been similar during the Late Pleistocene and Early Holocene. On the contrary, past changes in environmental conditions and the productivity of these ecosystems have to be considered in order to better understand the physical landscape with which early hunting-gatherer populations interacted. During the Pleistocene/Holocene transition, between 13,500 and 11,700 calibrated years before presente (Cal BP), the southern Atacama Desert seems to have been subjected to a zonal gradient even stronger than today. Several paleoclimate records suggest wetter conditions than during the present time at high altitudes, due to the Central Andean Pluvial Event (CAPE II) dated between 13,800 and 9800 cal BP (Latorre et al., 2006; Quade et al., 2008; Gayo et al., 2012; Sáez et al., 2016; De Porras et al., 2017). Increased rainfall during this period at high elevations favoured higher phreatic levels due to increased recharge of groundwater systems (Sáez et al., 2016), and active ravines flowing towards lower altitudes, where local springs, wetlands and a more vegetated landscape would have developed (Latorre et al., 2002; Nester et al., 2007; Quade et al., 2008; Gayo et al., 2012; Díaz et al., 2012).

On the contrary, coastal records suggest for this period near-absent torrential rainfall episodes which would have implied depleted recharge of coastal groundwater systems, concomitantly with enhanced southerly winds (Vargas et al., 2006; Herrera and Custodio, 2014). However, isotopic ($\delta^{18}O$) results from mollusc shells from La Chimba-13 site, located ca. 23.5°S, suggest coastal sea surface temperatures (SST) several degrees lower than present during the period comprised between 10,550 and 9120 cal BP (Vargas et al., 2006). Ongoing analyses from modern and fossil mollusc shells from archaeological sites around Taltal-Paposo (ca. 25°S) have provided similar results, supporting the interpretation of prevailing regional cooler SST and intensified coastal upwelling during the Early Holocene (Flores et al., 2017). These conditions would have implied high productivity for marine and littoral ecosystems, since in upwelling habitats invertebrate and algae grow faster and therefore their size and abundance is higher than in

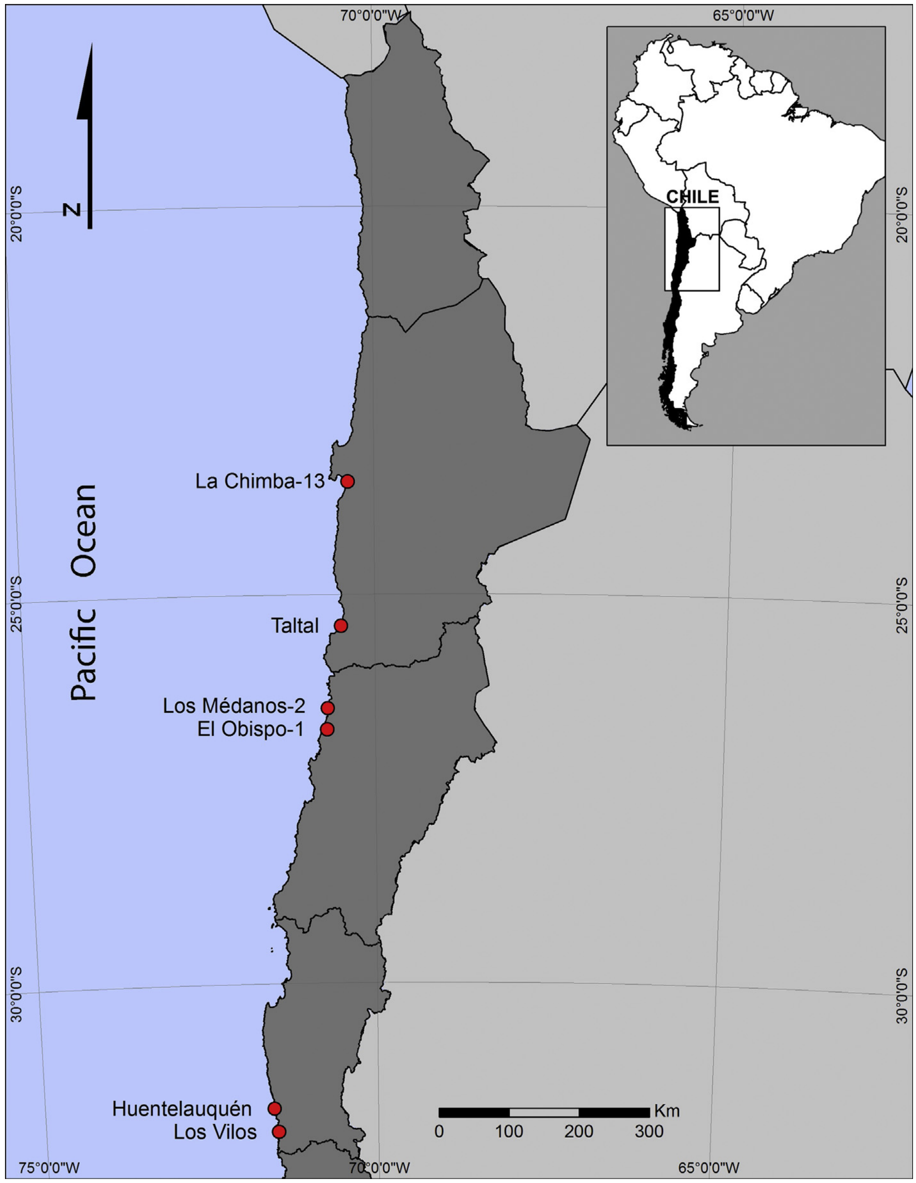

Fig. 1. The coast of Arid and Semi-Arid northern Chile, showing the location of the Taltal area and the main Huentelauquén Cultural Complex sites mentioned in the text.

other coastal areas (Menge et al., 2004; Pulgar et al., 2013), favouring kelp beds, herbivore fishes as well as mollusc species (Menge et al., 2004; Wieters, 2005; Reddin et al., 2015; Flores et al., 2017). On the other hand, terrestrial environment near the coast would have been also favoured by local humidity due to higher intensity of coastal fogs created by the lower SST and increased upwelling systems. Increased "Lomas" vegetation would have developed in the mountain belt directly affected by these intensified coastal fogs, favouring vertebrate and invertebrate animal communities (Carré et al., 2009).

3. Materials and methods

The archaeological evidence discussed in this paper comes from surface record and/or excavation of a total of 9 sites from the Taltal area assigned to the Late Pleistocene/Early Holocene according to radiocarbon ages and projectile point typology (Fig. 2). We complement these data with early sites previously published for the Arid Coast in northern Chile (La Chimba 13, Obispito 1 and Los Médanos 2) (Llagostera, 1979, 1989, 1992, 2005; Llagostera et al., 2000; Cervellino, 1998; Cervellino et al., 2000), as well as around 25 sites known for the locality of Los Vilos, located 900 km south of Taltal, in the Semi-Arid north of Chile (Jackson et al., 1997–1998, 1999, 2011; Jackson and Méndez, 2005) (Fig. 1).

In the Taltal area, the nine sites studied so far include an open-air iron oxide mine (San Ramón 15), five rockshelters (Alero 224A, Alero 225, Alero 226-5 or Alero Cascabeles, Alero 227 and Paposo Norte 9) as well as three lithic surface scatters (Alto Paposo, Quebrada Portezuelo 5 and PET-7) (Fig. 2). San Ramón 15 is a mining site used for the exploitation of iron oxides (hematite and goethite) and probably manganese oxides (pyrolusite) from the Early Holocene until ca 4000 cal BP (Fig. 3). It is located some 3.5 km to the Northeast of the city of Taltal, and less than 1.5 km from the current coastline (Fig. 2). Since it has no evidence of *in situ* residential activities, it is considered a task-specific site (Salazar et al., 2011, 2013b), even though the extraction activities were time-consuming since the host rock is extremely hard. Four of the five rockshelter sites known until now (Fig. 4) are located at the western

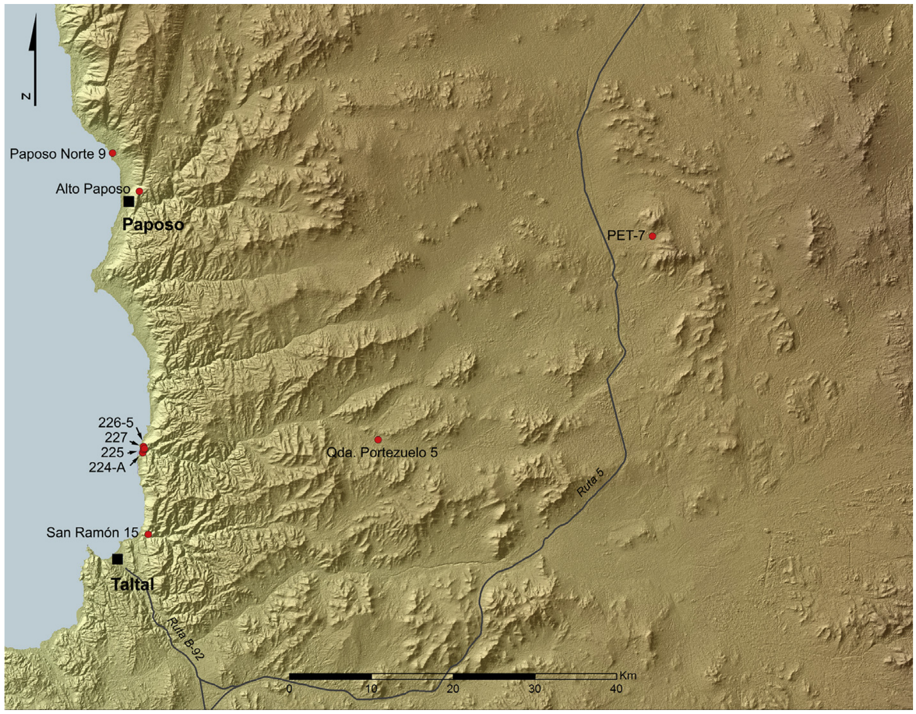

Fig. 2. Huentelauquén sites from the Taltal area.

Fig. 3. The San Ramón 15 mine during excavation.

foothills of the Coastal Cordillera near the current mouth of the Cascabeles ravine, 12 km north of the city of Taltal and less than 300 m from today's coastline (Castelleti, 2007; Castelleti et al., 2010; Galarce and Santander, 2013; Salazar et al., 2013a, 2015). The Paposo Norte 9 site is a rockshelter located nearly 60 km north of Taltal and at around 200 m from the current coastline (Salazar et al., 2015) (Fig. 2). Finally, three surface lithic scatters have been included in this study according to projectile point typology (Fig. 2; Fig. 5). These include Alto Paposo, located on the summit of the first hills of the Coastal Cordillera at 682 masl, and 50 km north of Taltal (Castelleti, 2007); Quebrada Portezuelo 05, located at the western end of the Coastal Cordillera, 30 km to the NE of Taltal and at an altitude of 1426 m.a.s.l. (Power et al., 2017); and PET-07, a lithic knapping site located 66 km away from the coast and at an altitude of 2263 masl. The lithic assemblage of this site includes finished tools such as a Huentelauquén projectile point, bifaces and a discoidal scraper, as well as abundant silex and calcedony debitage dispersed in an area of 12,075 m^2.

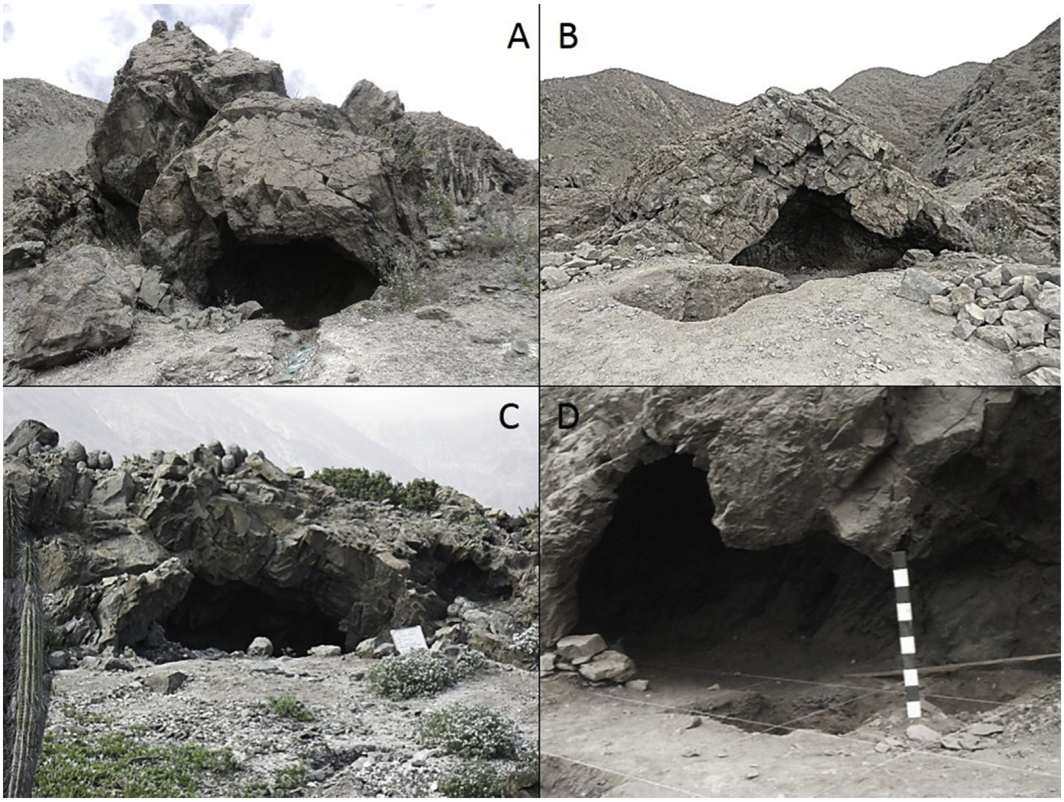

Fig. 4. Rockshelters from Taltal with Late Pleistocene/Early Holocene occupations. A. Alero 225; B. Alero 224A; C. Paposo Norte 9; D. Alero 226-5. D Courtesy of Museo Regional de Antofagasta.

Rockshelter sites show Late Plesitocene/Early Holocene deposits between 20 and 40 cm deep with evidence of shell middens and residential refuse located both within and outside the rockshelters' drip line. Hearths are interleaved with middens or ashy layers containing mollusc shells, fish, bird and mammal bones, as well as lithic debris and tools, attesting to the cultural origins of the deposits. On the contrary, Quebrada Portezuelo 5, PET-7 and, to a lesser degree, Alto Paposo, show deflated sandy deposits no more than 10–12 cm deep with very low frequency of organic remains, few ashy lenses and varied frequencies of lithic tools and debris.

Except for PET-7, systematic archaeological excavation has been undertaken in all the sites previously mentioned, even though with different degrees of intensity. The same methodology has been used at these sites, including natural/cultural stratigraphic excavation sub-divided into 5 cm artificial levels. The only exception was Alero 226-5, excavated previously by Castelleti (2007); Castelleti et al., (2010). All excavated sediments were dry-sieved in the field over 2–3 mm mesh and faunal columns of 0.5 × 0.5 m were also obtained.

Lithic analyses have been concentrated on the five rockshelter sites, three with extensive excavations (Alero 224A, Paposo Norte 9 and Alero 226-5[1]), and two with preliminary excavations (Alero 225 and Alero 227). Excavations at these sites have yielded a total of 5768 lithic artefacts, mostly dominated by debitage classes (97% of the assemblage), and in less frequencies formal and informal tools. Lithic artefacts were analysed using the same macroscopic methodology, including petrographic, technological and morphometric attributes.

Faunal remains were sorted into shells, fish and tetrapod classes during excavation. All bones and otoliths susceptible to be identified were analysed, classified into the lowest taxon identifiable -most often to species level- and later quantified using number of identified specimens (NISP), minimum number of individuals (MNI), and weight measures. Only complete molluscs recovered from excavation of 1 × 1 units were measured and quantified. Shellfish fragments from these units were not studied. However, all marine invertebrate remains from column samples of 0.5 × 0.5 m at each site were studied and quantified. Sediments from these column samples were wet-sieved, separating light and heavy fractions. Botanical remains from the light fraction were studied through anthracological and carpological analyzes and compared to reference collections for taxonomical identification. Seeds were studied under a stereomicroscope (at 10, 20 and 40X), and wood charcoal was observed using a reflected light microscope. Taxonomic identification was conducted through direct comparison with modern plant specimens (botanical reference collections prepared by our project) as well as published identifications keys and atlases (Hoffman and Jullian, 1989) (Martin and Barkley, 1973; Marticorena et al., 1998; Squeo et al., 1998; Solari, 1993).

The archaeobotanical data from Alero 226-5 comes from carpological analysis conducted in previous studies (Castelleti, 2007).

4. Results

4.1. Chronology and cultural context for the first occupations of the coast of Taltal

Setting the chronology for the first occupations of the Taltal area is crucial for understanding the territorialisation processes that

[1] Lithic remains from Alero 226-5, originally excavated by Castelleti (2007) and previously studied by Galarce and Santander (2013), was re-analysed for the present study to have a homogeneous analytic methodology.

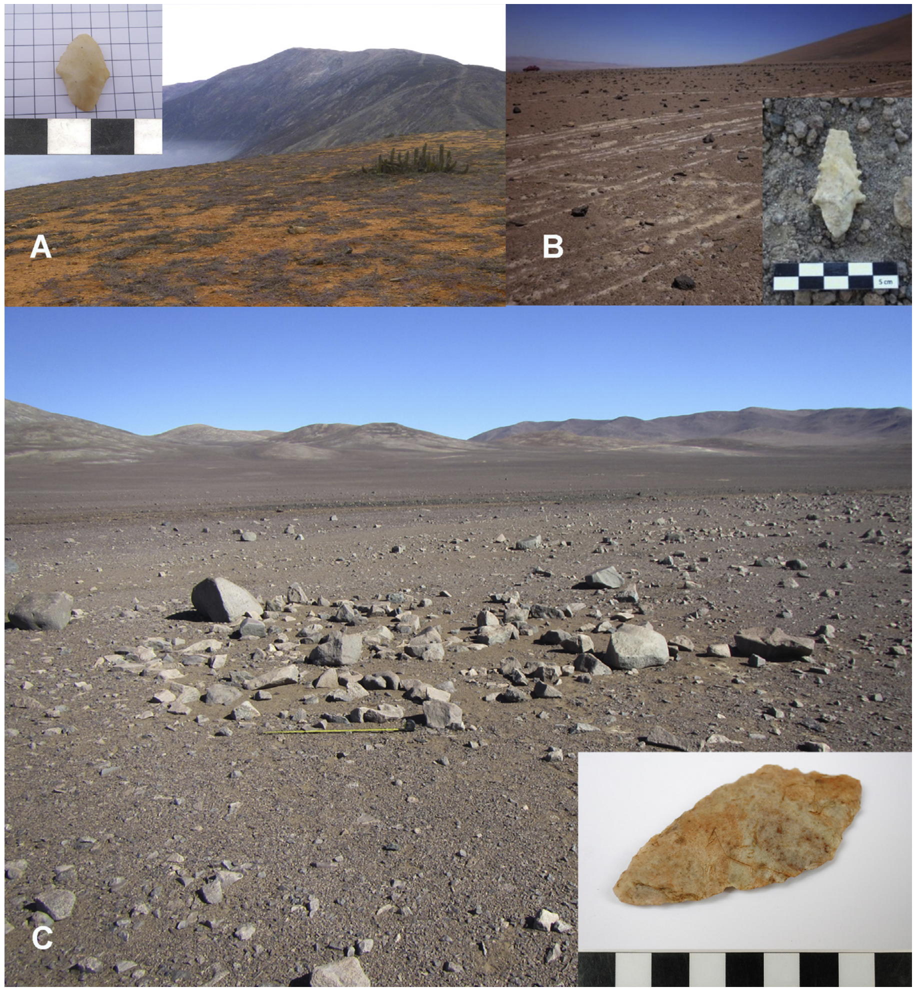

Fig. 5. Lithic scatters associated with Huentelauquén occupations in Taltal. A. Alto Paposo; B. PET-7; C. Quebrada Portezuelo 5.

transpired in this area. For this purpose, we use as a starting point a recent review by Méndez (2013), who compiled a radiocarbon dataset of 326 ^{14}C ages for what is today Chile, focusing on the period between ~16,500 and 7700 cal BP, to discuss the chronological trends and the main geographic distribution of the peopling process. Even though this study concludes “that ~13,000 cal BP should be considered an appropriate marker for the onset of hunter-gatherer populations in most areas in Chile” (Méndez, 2013, pp. 64), it also shows that the Arid and Semi-Arid Coast of Chile (Fig. 1) presents a different situation since early ages not subject to reservoir effect position the unambiguous earliest evidences only between ~11,800 and 8500 cal BP (Méndez, 2013).

The latter ages mentioned by Méndez (2013) correspond to human occupations linked to the “Huentelauquén Cultural Complex” which has been previously considered as “the first groups of hunters, gatherers and fishers who occupied a significant part of the vast coastline of the Arid and Semi-Arid regions of northern Chile, representing a consistent adaptation to the coast, whose origins could be linked to the first peopling of the Pacific Coast in the southern cone of America” (Jackson et al., 2011, pp. 222). The “Huentelauquén cultural complex” was first defined during the 1960's for the Semi-Arid coast of Chile (Iribarren, 1961) and identified by its lithic technology, characterized by geometric stones and lanceolate stemmed projectile points (Jackson et al., 1997–1998, 2011; Weisner et al., 2000). Llagostera (1979) was the first to identify the presence of the Huentelauquén Cultural Complex in what is today the Arid Coast of the Southern Atacama, and to situate it in the Early Holocene according to radiocarbon ages obtained from the La Chimba 13 site near Antofagasta (Llagostera, 1979, 1989, 1992; Llagostera et al., 2000).

In the Taltal area, Castelleti (2007); see also Castelleti et al., 2010), found and excavated the Alero 226-5 site, dated to 11,000 cal BP and the Paposo Alto site, undated until now, but with surface evidence of characteristic Huentelauquén projectile points.

For the 9 sites currently known in the Taltal area, we have 18 ^{14}C ages available (Table 1, Fig. 6), 8 of which were obtained after the abovementioned publication by Méndez (2013). Considering the ^{14}C ages known also for other Huentelauquén Cultural Complex sites from the Arid and Semi-Arid coast of Chile (Llagostera et al., 2000; Jackson et al., 2011, 2012; Ballester et al., 2012), our chronological framing of the cultural complex is based on a total of 62 ^{14}C ages, 24 in charcoal and 38 in marine shell (Fig. 7).

Jackson and Méndez (2005) proposed two distinct phases for the Huentelauquén Cultural Complex in the Semi-Arid north of Chile, the first between 13,000 and 11,000 cal BP and the second between 11,000 and 9000 cal BP. However, most of the ages used to build this chronology were obtained from shell samples and were not corrected for local reservoir effect. The corrected data for all Huentelauquén sites show that, just as Méndez proposed (Méndez, 2013), the earliest dates for this cultural complex tend to occur after 12,000 cal BP (Fig. 7). The only exceptions are a single shell age from Punta Ñagué in Los Vilos, and a single charcoal age from Alero 224A

Table 1
Radiocarbon ages for the Huentelauquén Cultural Complex in the Taltal area.

ID Sample	Site	Material	^{14}C yr. BP	Cal. yr BP (Med Prob)	Reference
D-AMS 018343	Alero 224A	Charcoal	10441 ± 44	12043-12426 (12325)	This paper
UGAMS 13090	Alero 225	Shell	10770 ± 30	10602-12313 (11393)	Salazar et al., 2013a
D-AMS 018344	Alero 224A	Charcoal	9955 ± 33	11223-11406 (11303)	This paper
D-AMS 008355	Paposo Norte 9	Charcoal	9813 ± 37	11135-11250 (11206)	Salazar et al., 2015
Beta - 280992	San Ramon 15	Shell	10620 ± 40	10384-12056 (11144)	Salazar et al., 2013b
D-AMS 008358	Alero 227	Charcoal	9720 ± 40	11066-11212 (11112)	Salazar et al., 2015
UGAMS 13089	Alero 224A	Shell	10530 ± 30	10263-11887 (11010)	Salazar et al., 2013a
Beta-190672	Alero 226-5	Shell	10290 ± 60	9894-11445 (10795)	Castelleti, 2007
D-AMS 011300	Paposo Norte 9	Charcoal	9489 ± 37	10566-10787 (10680)	This paper
UGAMS5442	San Ramon 15	Charcoal	9390 ± 30	10488-10682 (10565)	Salazar et al., 2013b
POZ-41243	San Ramon 15	Charcoal	9380 ± 50	10387-10705 (10549)	Salazar et al., 2013b
UGAMS 5441	San Ramon 15	Charcoal	9360 ± 30	10407-10604 (10528)	Salazar et al., 2013b
POZ-32943	San Ramon 15	Charcoal	9310 ± 50	10268-10579 (10445)	Salazar et al., 2013b
Beta-190671	Alero 226-5	Shell	10040 ± 60	9642-11100 (10389)	Castelleti, 2007
UGAMS5440	San Ramon 15	Charcoal	9250 ± 30	10252-10442 (10361)	Salazar et al., 2013b
Beta-255687	San Ramon 15	Charcoal	9160 ± 80	10155-10522 (10301)	Salazar et al., 2013b
UGAMS 13094	Morro Colorado	Charcoal	7470 ± 30	8181-8340 (8261)	Salazar et al., 2015
Beta-305494	Morro Colorado	Charcoal	7070 ± 40	7753-7955 (7868)	Andrade and Salazar, 2011

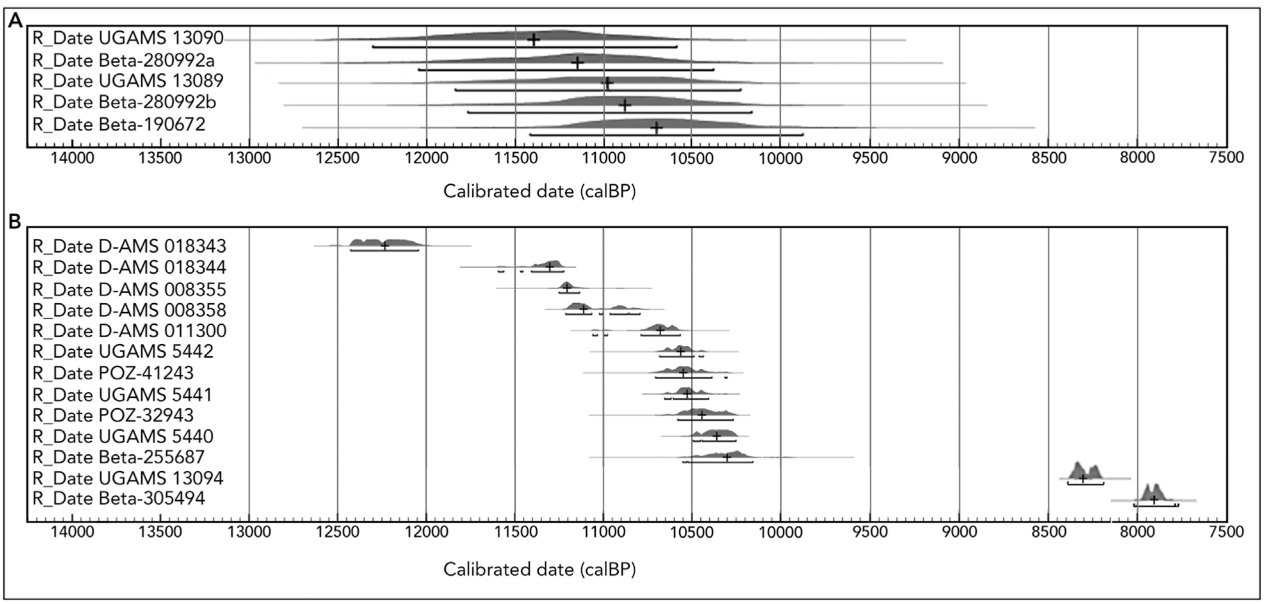

Fig. 6. Calibrated ranges for radiocarbon ages from Huentelauquén sites in Taltal. A. Shell samples; B. Charcoal samples. All ages have been calibrated using Calib 7.1 and the SHCal 13 curve. Shell samples were corrected for reservoir effect following Ortlieb et al. (2011).

in Taltal, both of which fall between ~13,000 and 12,000 cal BP (Table 1; Fig. 6).

The Huentelaqén Cultural Complex sites tend to disappear after 10,000 cal BP, and all rockshelter sites from the Taltal area are abandoned after this period. However, diagnostic material culture from this cultural complex (e.g. projectile points) has been reported in the Los Vilos area around 8500 cal BP (Ballester et al., 2012), in contemporaneity with the earliest dates from the Middle Holocene "Complejo Papudo" (Jackson et al., 1999), and in the open-air residential site of Morro Colorado in Taltal. This latter site has been radiocarbon dated to around 8000 cal BP, and presents stratigraphic association of Huentelauquén lithic tools with shell fishhooks characteristic of the local Middle Holocene (Salazar et al., 2015). Given their association with Huentelauquén projectile points we have included these later radiocarbon ages in the present study (Table 1; Figs. 6 and 7), but will not include these sites in the following segments of the paper, since their historical connection to pre-10,000 cal BP Huentelauquén occupations remains unclear. Therefore, we will now discuss archaeological evidence for Huentelauquén Cultural Complex sites of the Taltal area, concentrating on the period between ~12,500/12,000 and 10,000 cal BP.

4.2. Mobility and the lithic landscape

Mobility and resource exploitation stand among the most important social practices through which space is used/experienced, and territoriality is built and reproduced. In this segment, we begin our archaeological approach to these dimensions of the Huentelauquén Cultural Complex of Taltal by discussing the provisioning of lithic raw materials. There is abundant literature linking lithic raw material procurement and mobility strategies among hunter-gatherers, so we need not review it here (Gould and Saggers, 1985; Shott, 1986; Kelly, 1988; Bamforth, 1990; Andrefsky, 1994; Roth, 1998; Blades, 2003).

Lithic materials analysed in this paper come exclusively from the five rockshelter sites, since these show the highest frequency of artefacts and ecofacts for all Huentelauquén sites in the Taltal area. According to our analysis of 5768 lithic artefacts from these sites,

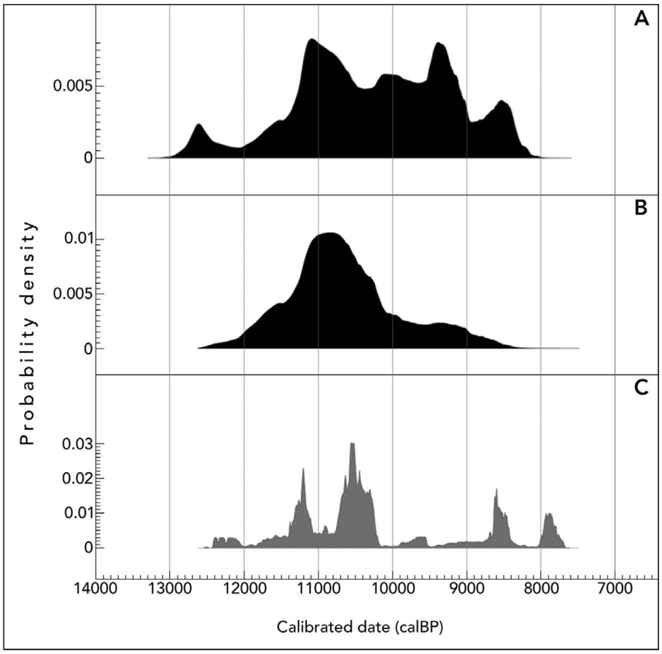

Fig. 7. Summed probability calculation for all Huentelauquén ages in the Arid and Semi-Arid coast of Chile. A. Shell; B. Charcoal. Shell samples were corrected for reservoir effect following Ortlieb et al. (2011); C. Charcoal samples for all Huentelauquén sites.

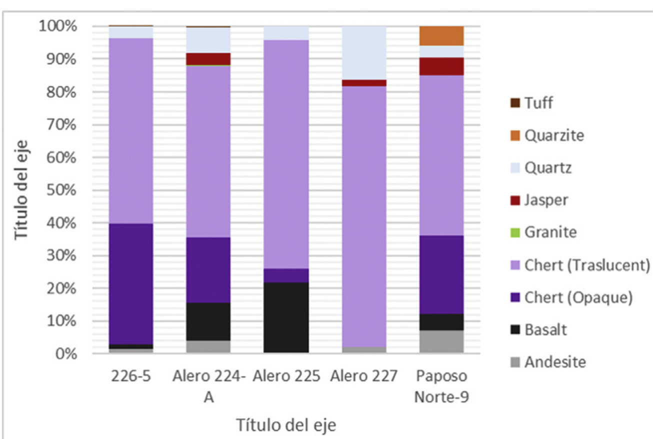

Fig. 8. Main raw materials for debitage lithic artefacts from the early rockshelter occupations in Taltal.

rocks procured and used by Huentelauquén groups in the coast of Taltal include a vast predominance of siliceous materials, which make up between 80% and 99% of both debitage and tools in each of the rockshelter sites studied (Table 2). Different siliceous raw materials have been recognized, including various types of chert, quartz, chalcedony and jasper. These are all high-quality raw materials not available locally in the coastal platform. On the contrary, these raw materials are abundant in the interior desert of Taltal (Blanco et al., 2010; Castelleti et al., 2010; Galarce and Santander, 2013; Salazar et al., 2013a, 2015). They come from source areas to the East of the Coastal Cordillera that include outcrops located between 45 and 90 km from the current coastline, and secondary deposits (alluvial or colluvial) that form strewn areas containing cobbles from those outcrops, extending sometimes more than 10 km away from the primary source (Borie et al., 2017a, 2017b; Power et al., 2017).

Table 2
Raw materials for lithic artefacts from Huentelauquén rockshelters in Taltal.

	Debitage		Tools	
Site	Silliceous	Non-Silliceous	Silliceous	Non-Silliceous
226-5	2271	73	67	5
Alero 224-A	2061	390	53	26
Alero 225	18	5	1	4
Alero 227	48	1	7	0
Paposo Norte-9	585	130	19	4
Total	**4983**	**599**	**147**	**39**

Following Méndez (2015), we can characterize this siliceous "lithic landscape" (Gould and Saggers, 1985) as non-local, dispersed, abundant and with low diversity (considering that the different siliceous raw materials identified can come from a single or few single sources) (see Borie et al., 2017a, 2017b for details). On the contrary, non-siliceous materials used and discarded at the coastal sites are locally available, either on the coastal platform or the immediate surroundings of the sites (Silva and Bahamondes, 1969; Núñez, 1984; Castelleti et al., 2010; Galarce and Santander, 2013; Salazar et al., 2013a). These include basalt, andesite and granite, whose sources are dispersed and abundant on the coastal platform.

Unlike the homogeneous representation of siliceous rocks in the coastal sites, the frequency of local raw materials at the rockshelters show interesting differences between the sites (Fig. 8). The most significant difference comes from the Paposo Norte 9 site, located some 50 km to the north from the rest of the rockshelters studied in this paper and which shows less frequency of basalt when compared with some of the sites of the Quebrada Cascabeles (noticeably Alero 224A), and in varieties of less quality. At the same time, in Paposo Norte 9 andesites and quartzite occur in more than 10%, whereas they are virtually absent from the sites from the Quebrada Cascabeles. Good-quality basalt has been identified less than 1 km from the Quebrada Cascabeles sites (Silva and Bahamondes, 1969), while quartzite and probably andesite are locally available near Paposo Norte 9. This data suggests a bimodal provisioning of raw materials for all the sites, with a predominance of non-local siliceous rocks presumably from the same or similar distant source areas, complemented with less frequent provisioning of local/immediate rocks of good or medium quality, a trend that can be traced throughout the whole Archaic Period in the study-area (Borie et al., 2017a, 2017b; Castelleti, 2007; Galarce and Santander, 2013; Núñez, 1984; Power et al., 2017; Salazar et al., 2015).

The technological features shown by lithic debitage in both groups of raw materials (siliceous and non-siliceous) is also coherent with this bimodal provisioning system and it is important in terms of mobility strategies. The technological categories most represented at these sites are small-sized flakes (more than 75% of the debitage assemblage shows length measures of 5–25 mm), without cortex (~85%) and with plane or facetted platforms. These attributes may be linked to the final stages of the lithic operational chain (blank thinning and the production or retouching of active edges on tools). However, when considering the locally available raw materials alone, we see evidence of basalt cores, and primary and secondary core by-products. Therefore, for non-local raw materials, operational chains are incomplete in these sites, showing preferentially the last stages of the productive process as well as formal and informal tools (see below), whereas for local/immediate raw materials all stages of the operational chain may occur at the sites, including tools. This implies that for non-local sources, rocks arrived to the Huentelauquén rockshelters at an advanced stage of processing (Castelleti, 2007; Blanco et al., 2010; Galarce and

Santander, 2013). Even though the sites located in the source areas have not been dated, they exhibit high frequency of cores, initial flaking from cores and coastal hammerstones (Power et al., 2017; Ballester and Crisóstomo, 2017), which is consistent with the record found at the coastal sites which show the opposite pattern.

The evidence of Huentelauquén projectile points in Quebrada Portezuelo 5 and PET-7, along with other finished tools such as bifaces and a discoidal scraper in the latter site, could indicate a complex and dynamic use of the inland landscape (Borie et al., 2017b). Considering the conditions inferred for the central valley during the Pleistocene/Holocene transition (Díaz et al., 2012; Gayó et al., 2012; Quade et al., 2008; Nester et al., 2007; Sáez et al., 2016), other activities complementary to lithic procurement could have occurred, including direct or indirect access to more distant resources (see below evidence of botanical remains from interior oases) and even social interaction with highland groups (see Borie et al., 2017b). However, since all sites in the interior desert near the lithic sources areas are small and show extremely ephemeral occupations, as well as very limited architectural investment, these trips were always short and by a limited number of individuals (Castelleti, 2007; Galarce and Santander, 2013; Salazar et al., 2015).

4.3. Foraging and Huentelauquén subsistence base in Taltal

Together with lithic raw material provisioning, mobility and the use of space in hunting-gathering societies are closely linked to procurement of subsistence resources including food, water and fuel (Binford, 1980; Kelly, 1995; Collignon, 2006), and thus it is important to consider these dimensions of early occupations of the Taltal area to understand territorialisation processes.

The economy of the Huentelauquén Cultural Complex has been previously characterized as "broad-spectrum" (Llagostera et al., 2000; Jackson et al., 2011), including a variety of littoral resources, especially marine invertebrates from the intertidal and subtidal zones, fish harvested from the shore, sea birds and marine mammals hunted in the coast, and terrestrial mammals hunted in the Coastal Cordillera (Llagostera et al., 2000; Llagostera, 2005; Castelleti et al., 2010; Salazar et al., 2015). These data indicate dietary practices based on the exploitation of an array of high-return resources with varying biomass and predominantly low procuring costs, which would have required different foraging radius and mobility patterns.

The Taltal data presented here support this claim and demonstrate a generalized subsistence base which combined diverse resources which had to be procured in littoral, coastal and even inland ecosystems (Tables 3 and 4), thus showing simultaneously diverse foraging strategies and use of space.

As it has been identified in previous studies (Llagostera et al., 2000), marine invertebrates are the most common faunal remain found in Huentelauquén sites in terms of MNI. Considering only the three rockshelters most extensively excavated to date in Taltal, predominant mollusc taxa include rocky shore species such as *Concholepas concholepas* (abalone), *Fissurella maxima* (limpet), *Fissurella crassa* (limpet), *Acanthopleura echinata* (sea cradle), *Enoplochiton niger* (sea cradle) and *T. atra* (sea snail) (Table 3). Average shell size of abalone and limpets from sites Alero 224A and Alero 226-5 indicates a non-selective collecting strategy in rocky shores, with the presence of diverse size-ranges, but preferentially individuals of medium-size in their reproductive stage (Olguín et al., 2015). These molluscs could have been collected easily in the intertidal or upper subtidal zones (Manríquez et al., 2008; Bretos, 1988; Oliva and Castilla, 1992). The ubiquitous presence of these resources at the rockshelter sites located at the foothills of the Coastal Cordillera would have required a minimum foraging radius of 1–2 km from the sites, considering lower sea-level during the Early Holocene and our yet-unpublished bathymetric results for the bay of Taltal.

The ichtyo faunal record from the Huentelauquén rockshelters analysed in this paper shows a predominance of coastal fish from sandy and kelp bed rocky bottoms (Table 3). This pattern is also observed in La Chimba 13, on the northern geographic extreme of the Huentelauquén Cultural Complex (Llagostera et al., 1997, 2000), as well as in the Semi-Arid sites of Punta Ñagué (Béarez et al., 2015) and Obispito 1 (Cervellino et al., 2000). However, the Taltal sites show differences between them. In Paposo Norte 9, for example, *Sciaena deliciosa* (canque) and *Cilus gilberti* (corvina) predominate in the Early Holocene layers, whereas in Alero 224A different fish taxa are more evenly represented, even though *Semicossyphus darwini* (pejeperro) and *Scartichthys viridis* (borrachilla) show comparatively higher frequencies (Table 3). *T. murphyi* (jack mackerel) and *Cilus gilberti* (corvina) were the only species represented in all three rockshelters most extensively excavated.

Regardless of these differences, which may indicate differences in local abundance of the taxa at the fishing locations, all species identified in the ichthyological assemblages correspond to cold-water fishes abundant in northern Chile under normal La Niña conditions (Mann, 1954; Berríos and Vargas, 2000). No warm-water or "tropical-ecuatorial" species were detected (Llagostera, 1979; Sielfeld et al., 2010).

Fishes present in the assemblage of the three rockshelters include carnivores, omnivores and hervibores, most of them found individually or in small schools near shore. Based on the habitat and behaviour of these species, they could all be harvested from the shore using an array of fishing techniques and within foraging radiuses like those required to collect molluscs. Jack mackerel is an exception since it is also abundant farther offshore (Medina et al., 2007; Thiel et al., 2007), so we cannot completely rule out the possibility that this species was collected using some sort of sea vessel, even though it is unlikely since it can also be captured from the shore, especially during its seasonal approaches to the coast. Unfortunately like in other early coastal contexts (see Reitz et al., 2016), there is no evidence for fishing artefacts in the Huentelauquén contexts of Taltal, except for a possible bone fishhook barb or gorge found in Paposo Norte 9. It is therefore difficult to reconstruct precise fishing techniques. These could have included individual-captures using fishhooks or gorges, harpooning on the intertidal zone or even hand-strategies, as well as mass capture using nets (Llagostera, 1989, 1992). The use of nets is more likely for species inhabiting soft and sandy bottoms, especially in the case of the canque, as it has been proposed for the south of Peru (Béarez, 2012; Reitz et al., 2015), for the Semiarid Coast of Chile (Béarez et al., 2015), and for the La Chimba 13 site in northern Chile, where fishing weights have also been found (Llagostera, 1979).

Despite the fact that nearly 90% of mammal bones were unidentified taxonomically due to the high fragmentation of the sample, tetrapod fauna in the excavated rockshelters includes remains of pinnipeds (*Otariidae*) and camelids (*Lama guanicoe*) (Table 3). The predominance of appendicular skeleton in both pinnipeds and camelids implies that the animals did not arrive complete to the sites. Despite this similarity, these species would have arrived from distinct ecosystems and hunting *loci*, including the rocky coast in the case of pinnipeds and the Coastal Cordillera in the case of the camelids. Canids, mustelids and rodents are also present, though in very low frequencies, and they would have also come from these same two ecosystems (Table 3). Regarding rodent remains, however, it is not clear whether they entered the sites as food items or attracted by food refuse left by human occupants of the sites. Finally, sea birds are only represented by genus *Phalacrocorax* spp. (cormorán) and a pelican species (*Pelecanus tagus*) in Alero 224A and Alero 226-5 (Peña-Villalobos, 2016).

Table 3
NISP and MNI for archaeofaunal remains from the early rockshelter occupations in Taltal.

Taxa			PN9				224-A				226–5				Total			
			NISP	%NISP	MNI	%MNI	NISP	%NISP	MNI	%MNI	NISP	%NISP	MNI	%MNI	NISP	%NISP	MNI	%MNI
MARINE INVERTEBRATE	**GASTROPODA**																	
	Muricidae	*Concholepas concholepas*	118	5.9	15	5.9	452	22.2	4	4.8	185	13.5	152	23.1	755	14.0	171	17.2
	Fissurellidae	*Fissurella maxima*	114	5.7	15	5.9	387	19.0	11	13.1	217	15.9	187	28.4	718	13.3	213	21.4
		Fissurella limbata	57	2.9	10	3.9	333	16.4	6	7.1	61	4.5	38	5.8	451	8.4	54	5.4
		Fissurella crassa	47	2.4	11	4.3	134	6.6	18	21.4	99	7.2	53	8.1	280	5.2	82	8.2
		Fissurella latimarginata	0	0.0	0	0.0	0	0.0	0	0.0	1	0.1	1	0.2	1	0.0	1	0.1
		Fissurella spp.	255	12.8	8	3.1	34	1.7	8	9.5	184	13.5	9	1.4	473	8.8	25	2.5
	Chitonidae	*Acanthopleura echinata*	75	3.8	9	3.5	91	4.5	9	10.7	243	17.8	48	7.3	409	7.6	66	6.6
		Enoplochiton niger	474	23.8	62	24.4	12	0.6	2	2.4	172	12.6	25	3.8	658	12.2	89	8.9
		Chiton granosus	7	0.4	1	0.4	0	0.0	0	0.0	5	0.4	2	0.3	12	0.2	3	0.3
		Chiton latus	7	0.4	2	0.8	9	0.4	2	2.4	2	0.1	1	0.2	18	0.3	5	0.5
		Tonicia spp.	0	0.0	0	0.0	2	0.1	1	1.2	0	0.0	0	0.0	2	0.0	1	0.1
		Chiton spp.	90	4.5	7	2.8	32	1.6	3	3.6	19	1.4	4	0.6	141	2.6	14	1.4
	Trochidae	*Tegula atra*	97	4.9	7	2.8	492	24.2	4	4.8	9	0.7	4	0.6	598	11.1	15	1.5
		Tegula spp.	440	22.1	16	6.3	20	1.0	3	3.6	14	1.0	4	0.6	474	8.8	23	2.3
		Diloma nigerrima	113	5.7	8	3.1	0	0.0	0	0.0	5	0.4	5	0.8	118	2.2	13	1.3
	Turbinidae	*Prisogaster niger*	1	0.1	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	0.0	0	0.0
	Calyptraeidae	*Caliptraea trochiformis*	0	0.0	0	0.0	1	0.0	1	1.2	0	0.0	0	0.0	1	0.0	1	0.1
	Littorinidae	*Littorina peruviana*	2	0.1	2	0.8	0	0.0	0	0.0	3	0.2	3	0.5	5	0.1	5	0.5
	Ellobiidae	*Marinula pepita*	2	0.1	2	0.8	0	0.0	0	0.0	0	0.0	0	0.0	2	0.0	2	0.2
	Turritellidae	*Turritela cingulata*	1	0.1	1	0.4	0	0.0	0	0.0	0	0.0	0	0.0	1	0.0	1	0.1
	Rissoidae	*Rissoina inca*	1	0.1	1	0.4	0	0.0	0	0.0	1	0.1	1	0.2	2	0.0	2	0.2
	Lottiidae	*Scurria parasitica*	68	3.4	67	26.4	5	0.2	5	6.0	107	7.8	103	15.7	180	3.3	175	17.6
	BIVALVIA																	
	Mytilidae	*Perumytilus purputatus*	0	0	0	0	2	0.1	2	2.4	16	1.2	13	1.98	18	0.3	15	1.5
		Choromytilus chorus	0	0	0	0	1	0.0	1	1.2	5	0.4	1	0.15	6	0.1	2	0.2
	CRUSTACEA																	
	Balanidae	*Balanus* spp.	1	0.1	1	0.4	0	0.0	0.0	0.0	3.0	0.2	1.0	0.2	4.0	0.1	2.0	0.2
		Balanus psittacus		0.0		0.0	2	0.1	1.0	1.2	4.0	0.3	1.0	0.2	6.0	0.1	2.0	0.2
	Decapoda		13	0.7	5	2.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.0	0.2	5.0	0.5
	ECHINOIDEA																	
	Echinidae	urchins	7	0.4	4.0	1.6	25.0	1.2	3.0	3.6	12.0	0.9	2.0	0.3	44.0	0.8	9	0.9
		Subtotal	1990	100	254	100	2034	100	84	100	1367	100	658	100	5391	100	996	100
FISH	**INTERTIDAL AND SUBTIDAL ROCKY**																	
	Labrisomidae	*Auchenionchus* sp.	1	0.7	1	1.3	47	9.6	9	7.0	0	0.0	0	0.0	48	6.2	10	3.7
		Labrisomus philiphi	0	0.0	0	0.0	0	0.0	0	0.0	1	0.7	1	1.6	1	0.1	1	0.4
	Aplodactylidae	*Aplodactylus punctatus*	1	0.7	1	1.3	17	3.5	3	2.3	0	0.0	0	0.0	18	2.3	4	1.5
	Haemulidae	*Anisotremus scapularis*	1	0.7	1	1.3	0	0.0		0.0	0	0.0	0	0.0	1	0.1	1	0.4
		Isacia conceptionis	1	0.7	1	1.3	10	2.0	3	2.3	0	0.0	0	0.0	11	1.4	4	1.5
	Kiphosidae	*Girella laevifrons*	6	4.4	5	6.5	22	4.5	3	2.3	0	0.0	0	0.0	28	3.6	8	3.0
		Graus nigra	0	0.0	0	0.0	9	1.8	6	4.7	18	12.1	3	4.8	27	3.5	9	3.3
	Sebastide	*Sebastes capensis*	0	0.0	0	0.0	10	2.0	4	3.1	0	0.0	0	0.0	10	1.3	4	1.5
	Gobiesocidae	*Sicyases sanguineus*	0	0.0	0	0.0	16	3.3	2	1.6	0	0.0	0	0.0	16	2.1	2	0.7
	Cheilodactylidae	*Cheilodactylus variegatus*	2	1.5	1	1.3	17	3.5	6	4.7	0	0.0	0	0.0	19	2.5	7	2.6
	Pinguipedidae	*Pinguipes chilensis*	0	0.0	0	0.0	19	3.9	10	7.8	0	0.0	0	0.0	19	2.5	10	3.7
	Blenniidae	*Scartichthys viridis*	8	5.9	5	6.5	84	17.1	20	15.5	0	0.0	0	0.0	92	11.9	25	9.3
	Serranidae	*Paralabrax humeralis*	0	0.0	0	0.0	6	1.2	2	1.6	0	0.0	0	0.0	6	0.8	2	0.7
	Ophidiidae	*Genypterus* sp.	0	0.0	0	0.0	7	1.4	2	1.6	0	0.0	0	0.0	7	0.9	2	0.7
	Labridae	*Semicossiphus darwini*	0	0.0	0	0.0	113	23.0	21	16.3	59	39.6	20	31.7	172	22.2	41	15.2
	INTERTIDAL AND SUBTIDAL SANDY BOTTOM																	
	Sciaenidae	*Cilus gilberti*	20	14.8	11	14.3	7	1.4	5	3.9	57	38.3	29	46.0	84	10.8	45	16.7
		Cheilotrema fasciatum	0	0.0	0	0.0	2	0.4	2	1.6	0	0.0	0	0.0	2	0.3	2	0.7
		Sciaena deliciosa	69	51.1	39	50.6	8	1.6	4	3.1	0	0.0	0	0.0	77	9.9	43	16.0
	Paralichthyidae	*Paralichthys* sp.	2	1.5	2	2.6	9	1.8	5	3.9	0	0.0	0	0.0	11	1.4	7	2.6
	NERITIC-PELAGIC AND EPIPELAGIC-OCEANIC																	
	Xiphiidae/ Istiophoridae	bill fish	2	1.5	1	1.3	0	0.0	0	0.0	0	0.0	0	0.0	2	0.3	1	0.4
	Scombridae	*Sarda chilensis*	0	0.0	0	0.0	5	1.0	2	1.6	0	0.0	0	0.0	5	0.6	2	0.7
	Gempylidae	*Thyrsites atun*	0	0.0	0	0.0	6	1.2	2	1.6	0	0.0	0	0.0	6	0.8	2	0.7
	Carangidae	*Thrachurus murphyi*	22	16.3	9	11.7	77	15.7	18	14.0	14	9.4	10	15.9	113	14.6	37	13.8
		Subtotal	135	100.0	77	100	491	100	129	100	149	100	63	100	775	100.0	269	100

Table 3 (*continued*)

Taxa			PN9				224-A				226–5				Total			
			NISP	%NISP	MNI	%MNI	NISP	%NISP	MNI	%MNI	NISP	%NISP	MNI	%MNI	NISP	%NISP	MNI	%MNI
TETHRAPODS	**MARINE MAMMALS**																	
	Otariidae	pinnipeds	6	46.2	2	33.3	1	50	1	50	67	73.6	1	25	74	69.8	4	33.3
	Mustelidae	*Lontra felina*	1	7.7	1	16.7	0	0	0	0	0	0.0	0	0	1	0.9	1	8.3
	TERRESTRIAL MAMMALS																	
	Camalidae	*Lama guanicoe*	3	23.1	1	16.7	0	0	0	0	20	22.0	1	25.0	23	21.7	2	16.7
	Rodentia	rodents	3	23.1	2	33.3	0	0	0	0	0	0.0	0	0	3	2.8	2	16.7
	SEABIRDS																	
	Phalacrocoracidae	*Phalacrocorax* spp.	0	0	0	0	1	50	1	50	3	3.3	1	25	4	3.8	2	16.7
	Pelecanidae	*Pelecanus thagus*	0	0	0	0	0	0	0	0	1	1.1	1	25	1	0.9	1	8.3
		Subtotal	13	100	6	100	2	100	2	100	91	100	4	100	106	100	12	100
	Total		2138	100	337	100	2527	100	215	100	1607	100	725	100	6272	100	1277	100
	%Total		34.1		26.4		40.3		16.8		25.6		56.8		100		100	

Table 4
Archaeobotanical remains from the Early Holocene rockshelter occupations in Taltal.

TAXA	TRADITIONAL USE	Alero 224-A		Alero 226-5	Paposo Norte 9	TOTAL (N)
		Identified Macroremains (N)	Identified Charcoal (N)	Identified Macroremains (N)	Identified Charcoal (N)	
Atriplex taltalensis	Fuel		5			5
*Berberis*sp.	Food		1			1
Bromeliaceae	Fuel/Food/Medicinal		1			1
Cactaceae	Psicoactive/Fuel/Food		6		1	10
Chenopodiaceae	Food			1		1
Convolvulus chilensis	Medicinal	1				1
Euphorbia lactiflua	Fuel/Medicinal/Repelent		2			2
Grabowskia boerhaviifolia	–		1			1
*Lycium*sp.	–		3		9	12
Malvaceae	Medicinal			3		3
Nicotiana sp.	Psicoactive/Medicinal		1			1
Nolana aplocaryoides	Ornamental	4				4
Nolana elegans		4				4
Nolana sp.		1	2		19	22
Oxalis sp.	–		4			4
Oxyphyllum ulicinum	–		3			3
Poaceae	Food			3		3
Prosopis sp.	Fuel/Food/Craftsmanship		1			1
Senecio sp.	Medicinal		6			6
Senna sp.	Medicinal		1			1
Verbenaceae	Medicinal	1				1
	TOTAL (N)	**14**	**37**	**7**	**29**	**87**

The whole of the faunal data shows short foraging radiuses from the rockshelters to the coast and to the Coastal Cordillera, since all animal resources found at the sites could have been obtained from distances of less than a few kilometres away. These foraging radiuses did not only target animal resources, however, but also plants. Regarding archaeobotanical remains and anthracological analyses, the Paposo Norte 9 and Alero 224A assemblages yielded plant remains of species from the coastal platform, the Coastal Cordillera and the interior oases (Table 4). Based on modern analogues of usage (Gutiérrez and Lazo, 1996), these resources could have been used either for food (*Berberis* spp., *Bromeliaceae, Cactaceae, Chenopodiaceae*, *Poaceae*, *Prosopis* spp), fuel (*Nolana* spp., *Cactaceae, Bromeliaceae, Atriplex taltalensis Oxyphyllum ulicinum*), and/or medicinal purposes (*Senna* spp., *Senecio* spp., *Verbenaceae, Convolvulus chilensis, Euphorbia lactiflua, Malvaceae, Prosopis* spp, *Nicotiana* spp).

Almost all these species are accessible today in the western flanks of the Coastal Cordillera fed by the camanchaca. They were probably more abundant during the Late Pleistocene and Early Holocene due to increased coastal fogs which would have favoured the development of *lomas* vegetation (see above). However, the presence of *Prosopis* spp. (which could correspond to tree-species such as tamarugo (*P. tamarugo*) or algarrobo (*P. alba, P. chilensis, P. flexuosa y P. nigra*)), indicates direct access to interior oases, located more than 200 km from Taltal and/or exchange practices with other hunter-gatherer groups, either from the highlands, or with other coastal groups which obtained this resource directly or indirectly.[2]

In any case, Huentelauquén Cultural Complex sites in Taltal show access to an array of faunal and botanical resources located in different ecosystems including marine/littoral, coastal, cordilleran and interior desert habitats. This diversified subsistence base implied a thorough knowledge of the properties of different resources and their location, the routes and trails required to access them, the technology for their extraction and processing and,

[2] There are two main Sections of Prosopis spp: Section Algarobia (Algarrobo), suitable for human consumption and present in archaeological contexts of the Atacama Desert since 4200 cal BP (McRostie et al., 2017), and Section Strombocarpa (Tamarugo), not edible but good as raw material and fuel. This last one is dated around 14,000 cal BP and is endemic to the Atacama Desert (Gayo et al., 2012). Remains of Prosopis spp found at Early Holocene sites of the area of Taltal precede in several thousand years the initial presence of Algarrobo and therefore it is possible to suggest that correspond to Tamarugo. Both Sections, Algarrobo and Tamarugo are trees that grow in interior oases.

eventually, the social strategies to engage with other hunter-gatherer groups.

5. Discussion

Nearly ten years ago, Sandweiss (2008: 153) proposed that the “Terminal Pleistocene dates from the northern Huentelauquén Complex sites overlap with the early occupations at Quebradas Jaguay and Tacahuay and extend the geographic extremes of known early maritime adaptations from far northern Peru to northern Chile”. Our chronological re-examination does not completely support this claim since with the exception of a single radiocarbon age from Taltal (Fig. 6) and one from Los Vilos, the “Huentelauquén Cultural Complex” is securely dated between ~12,000 and 10,000 cal BP (with a few outlier ages), whereas “twelve published conventional dates from Quebrada Jaguay span ~13,200 - 11,400 cal BP” while “Quebrada Tacahuay has four conventional and six accelerator mass spectrometry (AMS) ages spanning ~12,850 to 11,350 cal BP” (Rademaker et al., 2013: 37). A recent paper by Jones et al. (2017) has shown that the earliest dates for Sector I in Quebrada Jaguay span between ~12,500 and ~13,400 cal BP, and in sector II from ~12,600 to ~13,700 cal BP. Therefore, even though the later dates from the southern Peru coastal sites do indeed overlap with the first ages known for the Huentelauquén Cultural Complex, it seems that the first occupations in the southern Peruvian coast predate this cultural complex in at least 1000 cal yrs. Late Pleistocene occupations from the northern Peruvian coast predate the Huentelauquén by up to 3000 cal yrs (Dillehay et al., 2012, 2017).

This situation could imply two different scenarios: either the peopling of the Arid Coast of what is today northern Chile is indeed later than in the Peruvian coast, or they are both contemporary but we still lack archaeological evidence for the earliest occupations of the Chilean coast. Considering the evidence we have reviewed for the Taltal Area, La Chimba 13 in Antofagasta (Llagostera, 1979, 1992, 1989, 2005), Obispito 1 and Los Médanos 2 in Chañaral (Cervellino et al., 2000), and several sites from Los Vilos (Jackson et al., 1999, 2011; Jackson and Méndez, 2005) (see Fig. 1), it seems evident that what Jackson et al. (2011) referred to as a “consolidated settlement system” of these groups required an advanced knowledge of local environment. The technological organization of lithic material is a case in point. In Taltal, raw materials used by Huentelauquén groups remained virtually unchanged for the remainder of the prehispanic period, even though the strategies deployed and the mobility systems used to acquire them probably experienced some changes in response to socioeconomic and environmental transformations, showing some degree of flexibility and versatility (Borie et al., 2017b). Therefore, Huentelauquén groups occupying Taltal during the Early Holocene already had a thorough knowledge of the lithic landscape they inhabited, including the location of the best quality rocks (which could come from distances inland of up to 90 km) and the most efficient ways to procure this raw material including the best routes to traverse the desert and the optimal technological strategies to facilitate their transport to the coast and their use in different tasks. Furthermore, the systematic exploitation of the San Ramón 15 iron oxide mine between ~11,000 and 10,000 cal BP again shows a thorough knowledge of the location of high-grade mineral resources most likely used in ritual and social life (Salazar et al., 2011, 2013b).

The spatial and (presumably) temporal structure of local habitats was also well known for Huentelauquén groups from the Taltal area. Faunal assemblages show evidence of virtually all the main resources available locally for human consumption, including plants used as food, fuel and medicine coming from local and non-local source areas. Later periods in the area will again exhibit a similar pattern of exploited resources, even though the tendencies will change when local economies became increasingly dependent on marine and littoral resources (Salazar et al., 2015; Rebolledo et al., 2015).

However, this does not necessarily mean that initial stages of peopling (exploration phase or initial colonization processes sensu Borrero, 1999) occurred before the Huentelauquén Cultural Complex. Even though it is difficult to estimate how long a thorough knowledge of the biotic, lithic and mineral landscape may take to consolidate for a hunting-gathering group first approaching new biogeographical space, some authors claim this process may occur in a relatively short time (Nami, 2007; Civalero and Franco, 2003), or that this knowledge may even organize the first explorations into a new territory (Méndez, 2015).

Moreover, Dillehay et al. (2017) have recently argued that Late Pleistocene occupations from the Huaca Prieta area in coastal northern Perú may correspond to early exploratory migration into this resource-rich area by groups with a unifacial technology nearly 3000 years before Huentelauquén occupations of northern Chilean coast. A thorough knowledge of the coastal and near-coastal habitats of the Atacama Desert environments would have been acquired through this process of several millennia of ephemeral and discontinuous occupations of the Huaca Prieta sites. From this perspective, when early groups occupied coastal areas further south, they may have been already carrying a knowledge that favoured a rapid pace of incorporation of new geographical settings into habitual economic organization patterns. Under this scenario, Huentelauquén groups could indeed correspond to the first human settlements of the area showing a rapid adaptation to local conditions given their previous knowledge of coastal environments previously colonized further north. This conclusion is further supported by the similarities in some of the botanical remains, as well as the fish and mollusc assemblages, from coastal Quebrada Jaguay and Ring site in southern Perú (Reitz et al., 2015) with the Huentelauquén data from Taltal reported here.

However, local conditions at Taltal and northern Chilean coast in general are not exactly similar to those of the southern coast of Perú and must have therefore required a period of learning and understanding, even if it occurred at a temporal scale currently impossible to discern archaeologically. For example, no permanent streams are to be found in this part of northern Chile, and the lithic landscape presents a particular spatial structure when compared to the sites from Southern Perú: While most of the lithic assemblage from Quebrada Jaguay comes from sources located a few kilometres away from the site, in Taltal most of the assemblage comes from sources between 40 and 90 km away, with no permanent river or stream in between them.

Furthermore, we have tried to argue in this paper that territorialisation does not only imply an established geographical knowledge that had to be somewhat adapted to particular local environmental conditions. Territoriality means also an intimate cultural relationship with a network of significant places. This network is built and reproduced through repetitive practices, knowledge, narratives and memory and may therefore take more time to consolidate. We contend the data from Taltal shows that a territorialisation process was already consolidated for Huentelauquén cultural groups and therefore we cannot rule out the possibility that we still do not know the earliest phases of the peopling process in this area. Even though territorialisation and socio-territorial identities are difficult to study archaeologically, in the following paragraphs we will support our argument with the scant data available.

One important fact in relation to territorialisation processes is that the same rockshelters were used throughout the Early Holocene in Taltal despite the availability of other similar natural ones in the area. This is also true of the La Chimba 13 and probably Obispito

1 sites, which again show several millennia of repeated occupations, apparently with the same functionality linked to social aggregation practices (Llagostera, 1989). The repetitive use of these same sites and the absence of Huentelauquén occupations from other similar natural settings available in the area suggest they were not only loci of human activities, but also known “places” to which Huentelauquén groups periodically returned. Using a generalized ethnographic analogy, we may presume these “places” had specific names and were associated with group memories and historical knowledge transmitted through generations (Collignon, 2006; Sharp, 2002), and therefore together formed the network of significant places that define territorialisation.

Furthermore, at least in the rockshelters of Taltal, “site structure” (*sensu* Binford, 1982) is stable throughout the centuries. This is especially significant in the case of Alero 224A, since this was the biggest and most used of all the rockshelters we have excavated. Despite the millennial sequence of continued use of the site, its stratigraphy shows a very clear structural continuity from the very first to the last occupations. The spatial structure seen at Alero 224A seems to represent a social pattern characteristic of other Huentelauquén rockshelters, and different from the one seen in rockshelters from later periods in Taltal (Castelleti et al., 2010). Castelleti (2007) was the first to identify the early spatial pattern of Alero 226-5: the interior area would have been used mainly for sleeping activities, while immediately outside the drip line other activities would have taken place, with the presence of hearths and discarded refuse. Finally, farther away towards the exterior of these rockshelters secondary refuse would have accumulated, especially in the form of shell middens. This pattern was observed by Castelleti (2007); Castelleti et al. (2010) during excavations in 226-5, and later by us in Alero 225 and, with minor variations, in Alero 224A. Site Paposo Norte 9, on the other hand, does show limited domestic activities inside the rockshelter and hearths outside the dripline, but we have not yet found the secondary shell midden accumulated further away from the dripline, though its presence cannot be ruled out considering the yet unexcavated portions of the site.

In any case, we believe the complete knowledge of the local landscape, the systematic exploitation of its critical resources on a regional scale (Borrero, 2010), the repetitive return to the same “places”, the very similar spatial organization of social practices in the rockshelters, and the recurrent use of distinctive social aggregation sites, all clearly indicate the reproduction of a consolidated historical and geographical knowledge, and the continuity though time of social practices occurring at these significant “places” for the Huentelauquén occupations of the Arid North coast. Knowledge, repeated practices, meaningful places and “memoryscapes” are precisely the elements that define socio-territorial identities in ethnographically known hunter-gatherers (e.g. Collignon, 2006; Sharp, 2002; Bonnemaison, 2005). Therefore, we propose that what Jackson et al. (2011) called a “consolidated settlement system” for the Huentelauquén Cultural Complex in the north coast should be equivalent to an advanced colonization phase (*sensu* Borrero, 1999, 2015), which in turn indicates an already established socio-territorial identity which was reproduced in the north coast during at least 1 or 2 millennia through reiterative social practices occurring in the landscape, the creation of a network of “places” to where Huentelauquén groups constantly returned, and the transmission of knowledge and memories about the territory and its “places”. We cannot know precisely how long this territorialisation process took in the northern coast of Chile. We can only ascertain that the archaeological data available to date only shows us a consolidation of this socio-territorial identity, and not much of the historical process of its construction.

Unfortunately, we don't have yet a thorough understanding of the specific activities and practices that were reiterated at these “places”, nor of the length of its occupation or the amount of people who participated in these interactions. We do know that the sites studied so far show a diversity of complementary social practices of appropriation/processing/consumption of resources and social aggregation occurring at different “places” within the territory. These “places” include extraction *loci* with no evidence of domestic occupation and targeted mainly -though not exclusively-towards the extraction and processing of specific resources such as siliceous rocks in the interior desert (Quebrada Portezuelo 5 and PET-7) and the exploitation of iron oxides in the Coastal Cordillera (San Ramón 15); hunting stands, short-stay hunting camps and social aggregation *loci* in the western flanks of the Coastal Cordillera (Alto Paposo, La Chimba 13, Obispito 1); and multitask and more permanent occupations in rockshelters located in the coastal platform. Functionally diverse as these sites may seem, the “settlement system” for Huentelauquén groups from the north coast is certainly incomplete. The rockshelters we have studied would have been located around 1.5/2 km away from the Early Holocene coastline according to our unpublished bathymetric studies in the bay of Taltal. Given the fact that the most frequent subsistence resources found at the rockshelter sites are precisely molluscs and fish, it is obvious that some sort of occupation occurred at the Late Pleistocene/Early Holocene seashore as well. Unfortunately, we cannot say if these occupations were just extraction *loci*, more stable task camps or residential bases. Early to Middle Holocene marine transgressions inundated almost 1,5 km of coastal plain in the bay of Taltal, thereby reducing in around 75% the quotidian spaces used by Huentelauquén groups in this part of their territory. Therefore, many “places” within Huentelauquén territory should be now underwater.

The specific practices occurring at the rockshelters (its' “site function”), are not entirely clear either (Castelleti, 2007; Castelleti et al., 2010; Jackson et al., 2011; Salazar et al., 2013a, 2015). As we have seen, all rockshelter sites studied to date indicate that activities occurring there included the use of resources obtained directly from different extraction *loci* which included littoral and coastal habitats as well as others on the coastal Cordillera, the interior desert and even distant interior oases (e.g. *Prosopis*), even though in the latter case indirect access to these resources though exchange with other groups cannot be ruled out. All these resources were processed and/or consumed at the rockshelter sites. Diverse types of instruments were used in these activities, especially lithic instruments which show an array of functions and most of the tool types known for Huentelauquén occupations in La Chimba 13 and in Los Vilos (Jackson et al., 1999, 2011; Llagostera et al., 2000). A total of 186 formal and informal tools have been identified and studied in the 5 Huentelauquén rockshelters located on the coastal platform of Taltal. Following the existent typology for the Cultural Complex (Jackson et al., 1999), these tools can be grouped into 12 preliminary morpho-functional classes including expedient flakes, knives, scrapers, projectile points, multifunctional instruments and cores, among the most frequent (Table 5). Grinding stones on marine cobbles have also been reported and they include active as well as passive tools, showing either mineral residues or no macroscopic evidence of residues at all, indicating their use as iron/manganese oxide and/or probable botanical grinders.

The use of a bimodal provisioning system for lithic artefacts including local raw materials seems also significant in terms of site function, since it could indicate needs to replace stone tools during site use, considering the significant distance to the best quality rocks available.

Taken together, these data suggest the rockshelters were closer to the residential/base camp end of the site-function continuum than to the logistic task end (Binford, 1980), as suggested originally

Table 5
Lithic tool types for the Huentelauquén rockshelters in Taltal.

Tool Type	Alero 226-5	Alero 224-A	Alero 225	Alero 227	Paposo Norte-9	Total
Utilized/Retouched Flake	28	19	–	1	5	**53**
Knife	10	14	1	–	3	**28**
Scraper	11	7	–	2	5	**25**
Proyectile point	12	8	1	2	1	**24**
Multifunctional	2	6	–	–	3	**11**
Core	–	9	–	–	–	**9**
Side-Scraper	3	3	–	1	2	**9**
Grinding stone	2	4	1	–	1	**8**
Denticulate tool	1	4	–	–	1	**6**
Chopper	1	1	1	–	1	**4**
Other	–	3	–	1	–	**4**
Biface	2	–	–	–	1	**3**
End-Scraper	–	–	1	–	–	**1**
Notch	–	1	–	–	–	**1**
Total	**72**	**79**	**5**	**7**	**23**	**186**

by Castelleti (2007). However, artefacts and ecofacts from these sites form a palimpsest of more than 1000 years of occupations, and hence it is not possible to rule out the possibility that the sites were used as reiterative task camps oriented to different activities through time and articulated with now submerged residential bases. Future research is still needed to adequately solve this problem. But it is their stable site structure, regardless of specific "site-function" and activities, which we find relevant in terms of territoriality and use of space.

Coming back to mobility systems on a regional scale and the reproduction of this wider-scale territoriality, it is worth noting that even though Huentelauquén Cultural Complex sites have been found along more than 1000 km of coastline in north and central-north Chile, it seems that annual mobility cycles were more restricted, at least for most individuals. Differences between raw materials used at the Taltal sites when compared to the Huentelauquén sites from the Los Vilos area (Galarce, 2003; Jackson et al., 1999; Ballester et al., 2012), suggest that these two areas functioned rather independently from each other, each one of them separately articulating coastal and interior environments. In the case of the northern part of the Huentelauquén geographic extension, access to interior landscapes would have been limited to raw material provisioning and direct or indirect access to distant Andean resources, through a resource-specific logistic mobility.

Considering the size, infrastructure, material content and environmental context of the sites located in the lithic source areas and in the natural routes leading towards them, it is evident that these logistic inland forays were organized to last short periods of time and involved only a reduced number of individuals. This fact opens interesting questions regarding the different construction of territoriality among Huentelauquén hunter-gatherers, since those traversing the desert to access lithic source areas would have developed a more complete and complex geographical knowledge and territoriality than those who did not. This difference could have been reproduced at an individual level, or it could relate to gender and/or age condition as well, but it is difficult to be sure from the archaeological record alone.

In any case, throughout Huentelauquén territory social groups seem to have been low-demographic bands with high residential mobility and a predominantly logistic access to critical resources to the east (Castelleti, 2007; Jackson et al., 2011; Salazar et al., 2015). For such low demographic bands, social aggregation would have been crucial for biological reproduction (Wobst, 1974) and information exchange (Whallon, 2006, 2011). The extensive sites of La Chimba 13, Obispito 1 and Huentelauquén seem to have functioned precisely as *loci* for social aggregation, with probably diverse bands meeting for specific periods of time. Llagostera (1979, 1989) was the first to propose these sites may have functioned for ritual and social aggregation practices, given their extension, high frequency of geometric ("cogged") stones, and the presence of hallucinogenic substances and burials. La Chimba 13 is located 360 masl, has evidence of more than 200 geometric stones and presents an extension of over 20,000 m^2; Obispito-1 is located 100 masl, has evidence of over 300 geometric stones and presents an extension of more than 40,000 m^2. It is furthermore interesting to consider that the location of the La Chimba 13 site closely resembles that of the Obispito 1 site, more than 500 km to the south (Cervellino et al., 2000). Both these sites are located on Early Holocene dune formations on the western flanks of the Coastal Cordillera and close to small ravines. These dunes are highly visible from diverse areas of the coastal platform and thus constituted very easy-to-see landscape features that could have oriented group mobility.

6. Conclusions

This paper shows that the earliest phases of the peopling of the Arid and Semi-Arid north coasts of Chile are not clearly seen in the archaeological record, and that it is possible to think that the Huentelauquén Cultural Complex may not have been part of exploration or initial colonization process of these areas. This cultural complex seems to have been chronologically later than the earliest occupations in coastal Perú and interior northern Chile and, above all, shows an already fully consolidated territoriality.

On the other hand, the data discussed in this paper supports earlier claims considering this cultural complex as an early maritime adaptation (Jackson et al., 1999, 2011, 2012; Llagostera, 1979, 1992; Llagostera et al., 2000; Sandweiss, 2008). In Taltal, rockshelter sites from the Early Holocene demonstrate that subsistence base relied mostly on littoral and marine resources, including molluscs, fish, marine mammals and sea birds, complemented with terrestrial resources including mammals and diverse plant species used for food, medicine and fuel. Furthermore, stable isotopes from the earliest Huentelauquén individual studied to date (Los Rieles site in Los Vilos) confirms the relevance of marine proteins in his diet (Jackson et al., 2012).

Of course, maritime adaptations are more than subsistence, technology and mobility (e.g. Acheson, 1981; Sharp, 2002; McNiven, 2003). In this paper, we have tried to move beyond the economic dimension of these early groups to approach their social identity through the concept of territorialisation. We have argued that the transmission of geographic and historical knowledge across generations, social practices associated with the regular appropriation of biotic and abiotic resources, and permanently traversing diverse routes connecting the array of "places" were these resources were procured and where social life occurred, constitute material expressions of an early socio-territorial identity built by Huentelauquén Cultural Complex groups, and which was reproduced during nearly two thousand years in the Arid and Semi-Arid coast of northern Chile.

This socio-territorial identity could have operated at different spatial scales, from the sites and its' surrounding foraging radiuses, to the complete geographical extension of the cultural Complex for over 1000 km of coastline and interior territory. This identity could have also been enacted differently according to individual experiences, gender and/or age distinctions within Huentelauquén social organization. But the recurrent use of "places", the spatial organization of social activities in them, the effective use of local and regional environments and resources, the production and use of a similar lithic technology, and the presence of extensive social aggregation sites, demonstrate a shared historical knowledge for this cultural complex being reproduced throughout the Early Holocene.

Economy, subsistence and the use of space cannot be considered as phenomena independent from this shared historical/geographical knowledge and its symbolic representations. On the contrary, environment, resources, mobility, subsistence, technology, memory, knowledge and beliefs, together enacted social practices in and through which territorialisation processes occurred and were continuously reproduced.

After 10,000 cal BP Huentelauquén territoriality seems to experience a dramatic shift. In the north coast, all rockshelter sites are abandoned and not reused for the following millennia. By 8500 cal BP, open-air residential sites appear for the first time in the archaeological record of the Taltal area. More research is needed to understand this transformation. The reorientation of subsistence economy towards an increased dependence on marine resources, a characteristic of later periods in Taltal (Salazar et al., 2015; Rebolledo et al., 2015), could explain the changes in the use of space after 10,000 cal BP. This reorientation could even be related to environmental changes due to higher SST which would have affected terrestrial ecosystems near the coast. But regardless of the causes, the new economic activities would have necessarily implied a transformation in socio-territorial identities through new territorialisation processes enacted by hunter-gatherer-fishers of what is today the north coast of Chile.

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