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ABSTRACT

The main aim of this paper is to evaluate if certain processes that were documented in a specific area of Central-Southern Patagonia during the Late Holocene were also registered in a broader spatial scale. Previous investigations carried out in our study area located in Central-Western Santa Cruz province, Patagonia, have stated that climatic fluctuations during the Late Holocene (last 2500 years) were the cause of a reduction of hunter-gatherers' residential mobility. The new climatic conditions were characterized by important environmental droughts, which increased during the Mediaeval Climatic Anomaly, circa 900 years BP. This reduction in mobility resulted in concentrations of populations in low altitude basins and increased logistical and seasonal mobility, defined as a process of extensification.

In this paper we take a broad spatial perspective to evaluate to what extent the low residential mobility identified in our research area had a correlation in a larger regional scale. Also we assess if this lead to a regional differentiation among hunter-gatherer populations, previous to European contact (450 years BP). In order to achieve these aims, we undertake a coarse grain analysis, using available data published on the composition and distribution of the archaeological record for Central-Southern Patagonia, an area of about 450.000 km^2. Specifically, we consider evidence about technology, zooarchaeology, rock art, mortuary record and paleodietary studies.

The analysis indicates that a reduced residential mobility could have occurred in certain areas of the study region, linked to the aforementioned climatic changes. On the issue of regional differentiation, the archaeological record highlights the complexity of this process. There are a variety of arguments both for and against the idea of a process of regionalization in Central-Southern Patagonia in the Late Holocene. We propose a process of differentiation of populations with low residential mobility which nonetheless remained connected through the circulation of goods, information and people.

1. Introduction

Over the last decades, the peopling of Patagonia has been intensively investigated through various lines of archaeological inquiry. There is a general agreement among researchers about the low demography and high mobility that characterized Early and Middle Holocene hunter-gatherer groups, whereas, during the Late Holocene, some areas experienced an increase in population size and density as well as changes in mobility and resource acquisition strategies (Aschero et al., 2005, 2009; Borrero, 2001; Cassiodoro et al., 2013, Mena, 1991; Paunero et al., 2007; among others).

Particularly, in previous presentations, for our study area (Central-Western Santa Cruz province (COSC), Fig. 1), located in Central-Southern Patagonia (CSP) we have proposed that climatic fluctuations during the last 2500 years of the Late Holocene were the cause of a reduction of hunter-gatherers' residential mobility (Goñi, 2000,

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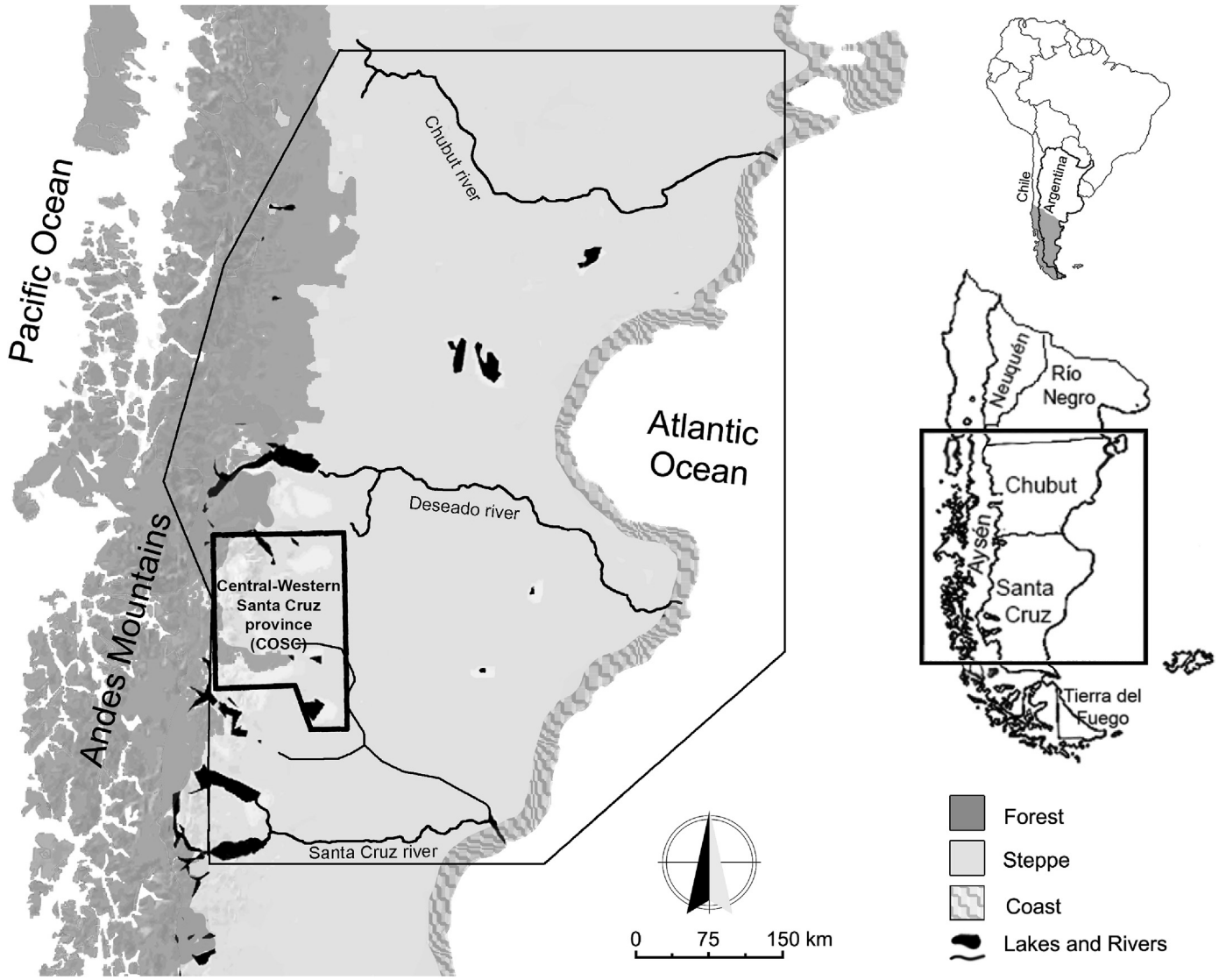

Fig. 1. Location of the region under study (Central-Southern Patagonia) and distribution of the three major environments: Forest, Steppe and Coast.

2010; Goñi et al., 2000–2002). The new climatic conditions were characterized by important environmental droughts, which increased during the so called Mediaeval Climatic Anomaly (MCA), circa 900 years BP (Stine and Stine, 1990). This reduction in mobility resulted in concentrations of populations in low altitude basins, such as Salitroso and Cardiel Lakes, which sustained water, plant and animal resources and consequently provided good conditions for human habitation during these arid times. We have also suggested that, coupled with this reduced residential mobility, a subsequent process of logistical and seasonal mobility, defined as a process of extensification, took place (Goñi, 2000; Goñi et al., 2000–2002; Goñi, 2010; among others).

Were these changes a local phenomenon or did they occur on a larger regional scale? In this paper we take a broad spatial perspective to evaluate if, as a consequence of the climatic and environmental changes that took place during the Late Holocene, these new strategies in human mobility and land use were also recorded in other areas of Patagonia. Building on that, we then assess if the low residential mobility identified in our research area in this period could have led to a diversification and differentiation among hunter-gatherer populations in a larger regional scale, previous to European contact (450 years BP).

To achieve these goals, we undertake a coarse grain analysis on the composition and distribution of the archaeological record of Central-Southern Patagonia, using published archaeological data. This macro-region (*sensu* Dincauze, 2000) comprises an extensive space with an area of about 450.000 km^2 (Fig. 1). Due to the diversity of the information generated by different colleagues through time, the archaeological data was summarized in three environmental units: Forest, Steppe and Atlantic Coast. In a chronological scale, we restricted the analysis to the evidences assigned to the Late Holocene, here understood as the last 2500 years (Goñi, 2010). We considered the available information regarding different aspects of technology, zooarchaeology, rock art, mortuary record and paleodietary studies.

2. Regional setting

As stated, the region under study in the present article is Central-Southern Patagonia (CSP). It includes a large part of the provinces of Chubut and Santa Cruz in Argentina and a portion of Aysén in Chile (Fig. 1). It stretches from the Chubut River in the

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north (44° S) to the Santa Cruz River in the south (51° S). Thus, cultural, environmental and climatic information will be provided only for these spatial scales. On the whole, this region comprises an area which has 850 km in its north-south axis and 550 km in its east-west axis. Given its size it corresponds to the macroscale (*sensu* Dincauze, 2000). The region is crossed by a few rivers running from the Andean Range in the west, to the east, which drain into the Atlantic Ocean. One of the most important of these is the Deseado River, which, roughly speaking, divides the region in its central portion (Fig. 1).

Even though it is a wide area, CSP is characterized, in general terms, by a great environmental uniformity with a semi desert climate (Paruelo et al., 1992). Hence, there is a prevalence of steppe (shrub and grass steppe) (Fig. 2). Regarding animal species, the guanaco (*Lama guanicoe*), an ungulate of up to 150 kg, has been the most important resource for hunting populations in the past. Other species that can be found in the steppe are carnivores like grey foxes (*Pseudalopex griseus*), red foxes (*Pseudalopex culpaeus)* and pumas (*Felis concolor*), toothless mammals like hairy armadillos (*Chaetophractus villosus*) and dwarf armadillos (*Zaedyus pichiy*) and numerous rodents. There is also a wide variety of birds, among which the choique (*Pterocnemia pennata*), a flightless bird, stands out given its size.

There is a rainfall gradient which decreases towards the east and consequently affects vegetation. In the western end of the region under study, along the Andes range, a forest environment can be found, characterized by *Nothofagus sp* (Fig. 2). Although this environmental unit presents similarities to the ecological structure of the steppe, there are also several differences. Two species of cervids are characteristic such as huemuls (*Hippocamelus bisulcus*) and pudus (*Pudu pudu*). Conversely, toothless mammals and fligthless birds are absent.

On the other hand, the Atlantic Coast is located in the eastern edge of the region. According to the colleagues working in the area, this environmental unit was defined as a geomorphological and spatial unit. However, the criterion to be compared with the forest and the steppe was the structure of resources that it offers. Here there is a rich variety of animal species (Fig. 2), where marine species can be found, both permanent and seasonal. These include pinnipeds (*Arctophalus australis and Otaria flavescens*), a wide variety of flying birds such as cormorants (*Phalacrocorax sp.*), flightless birds like penguins (*Spheniscus sp.*), as well as an important diversity of mollusks and bivalves.

Given its dry climate, one of the main characteristics of CSP is the heterogeneous distribution of water resources. Therefore, spaces with fresh permanent water which are available all year round are restricted to river valleys, lake basins and wetlands/vegas. The latter are mainly located towards the west. Also noteworthy is the strong seasonality exhibited by the region, -particularly in its western portion and the highlands. This is due to its high latitude and causes that during the winter many areas are covered with snow.

Research conducted by our team has focused on an area located in Central-Western Santa Cruz province (COSC) (Fig. 3). Thus, our study area is dominated by a steppe environment with low lake basins such as Salitroso and Cardiel Lakes and high plateaus like Pampa del Asador-Guitarra and Strobel. Also a transition between the steppe and the forest can be observed in Perito Moreno National Park (Aschero et al., 1992–93).

According to various paleoclimatic studies, the present landscape in CSP was established during the Late Holocene. Firstly, changes in the direction and intensity of winds, the so called Southern Westerlies, were recorded since 6000 BP and particularly after 1800 BP (Gilli et al., 2001). Consequently, fluctuations in the distribution of hydric resources in space were observed as well as decreasing humidity at a regional scale since 2500 years BP (Ariztegui et al., 2010, 2014; Stine and Stine, 1990; González, 1992; Gilli et al., 2001, 2005; Horta and Aschero, 2010, Horta et al., 2017; Markgraf et al., 2003; Moreno et al., 2016; Quade and Kaplan, 2017; among others). The presence of epic droughts *circa* 972 and 860 BP was established during the global scale episode known as Mediaeval Climatic Anomaly (MCA) (Stine and Stine, 1990; Stine, 1994). These environmental fluctuations affected the vegetation of the region (Mancini et al., 2002). Hence, it is recognized that the present limits of the Andean Patagonian forest as well as circum lacustrine steppe environments were established during the last 2500 years (Bamonte et al., 2013; Méndez et al., 2014). On the other hand, climatic variation at the Late Holocene, could be of different degree out of our area, as was referenced in Laguna Potrok Aike (Zolitschka et al., 2006) at south and Cari Laufquen (Ariztegui et al., 2001) at the north of CSP.

3. A case study: human peopling in central-western Santa Cruz province

Based on the described environmental and paleoclimatic

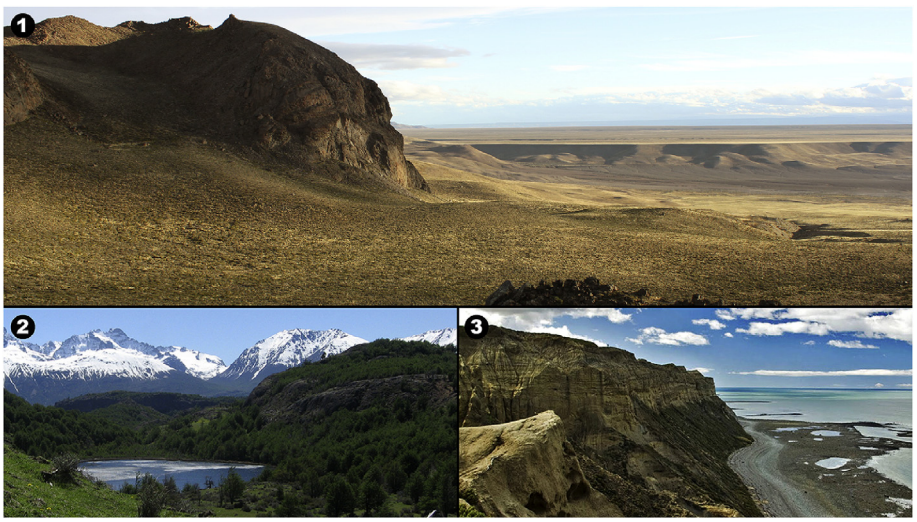

Fig. 2. Major environments discussed. References: 1: Steppe, 2: Forest, 3: Coast.

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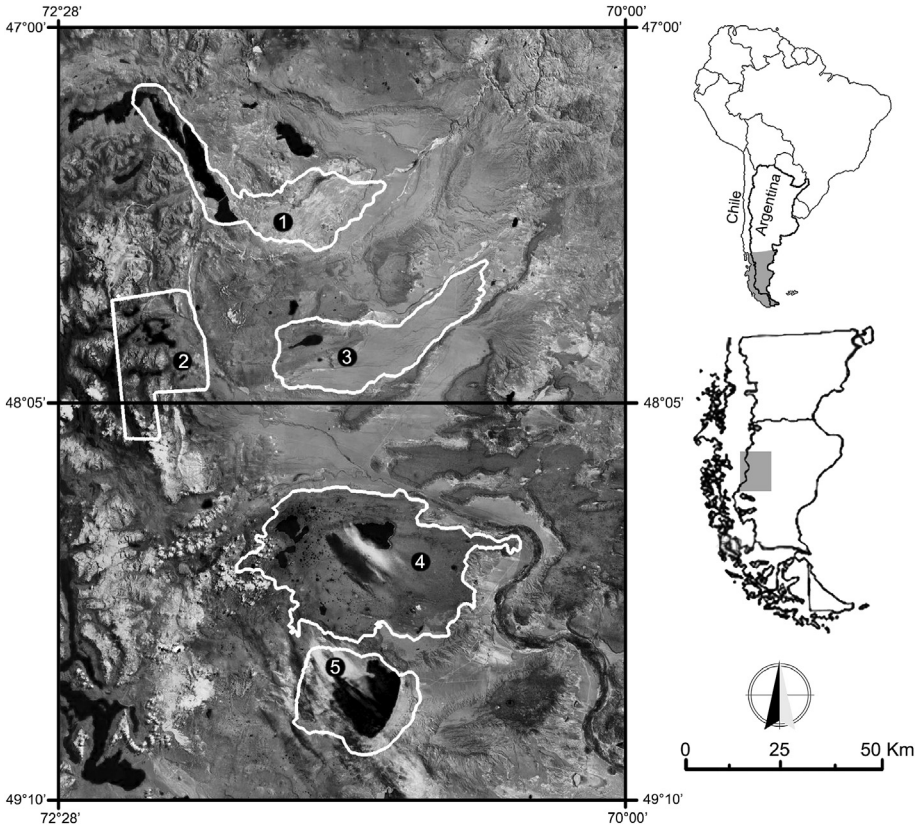

Fig. 3. Location of the study area (COSC). References: 1: Pueyrredón, Posadas and Salitroso Lakes 2: Perito Moreno National Park, 3: Pampa del Asador-Guitarra Plateaus, 4: Strobel Plateau, 5: Cardiel Lake.

conditions, in previous papers (Goñi, 2000; Goñi et al. 2000–2002; Goñi, 2010; among others) we presented a peopling model for Central-Western Santa Cruz province (COSC) in a mesoregional scale (*sensu* Dincauze, 2000) (Fig. 3). The central argument is that the significant climatic changes recorded during the Late Holocene directly affected the circum Andean and steppe environment of the low lake basins and high plateaus which are present in our research area. These changes fueled a progressive decrease in the environment humidity causing regional droughts (Stine, 1994). These new ecological conditions generated hydric retractions and as a consequence new portions of terrain became available in the lake basins. These new spaces were gradually colonized by species from the shrub steppe, principally molle (*Schinus pollygamus*), creating suitable living conditions for hunter-gatherer populations. As water is a critical resource for humans, we have posed that the increase in aridity during the Late Holocene generated dramatic changes in their mobility. Thus, a strong reduction in residential mobility took place reaching its critical point during and after the MCA (Goñi, 2010). In this scenario, low basins such as Lakes Salitroso and Cardiel, allowed for more stable camps due to their resource availability year round, i.e. water, firewood, plants and animals, becoming optimal places for residential purposes. We have also suggested that this gradual reduction in residential mobility, coupled with the potential spatial constraint originated by the new arid conditions, derived in higher concentrations of populations in specific areas, in other words, in local demographic increases (Goñi, 2010)

Additionally, due to the low residential movements, seasonal and logistical mobility became a necessity for hunter-gatherers to cope with resources which were differentially distributed or available in time and space. We have suggested an extension of action ranges that included the surrounding highlands i.e. Strobel and Pampa del Asador-Guitarra Plateaus and high basins from Perito Moreno National Park. Thus, an extensification strategy (*sensu* Binford, 2001) was established to allow for the complementary use of different environments with different effective temperatures (between 9,8 °C to 12,6 °C). In this process high plateaus were fully incorporated to hunters' mobility.

This model has been assessed in COSC through multiple lines of evidence (Bourlot, 2009; Re et al., 2009; Rindel, 2009; García Guraieb, 2010; Goñi, 2010; Re, 2010; Tessone, 2010; Cassiodoro, 2011; García Guraieb et al., 2015; among others). The observed patterns in the archaeological record of lowlands differ from those seen in the highlands and support the outlined model. Building on these findings we first aim to evaluate if similar processes took place in a larger spatial space in CSP and, second, if a case of regional differentiation can be identified in the macro-region.

4. Regional differentiation

A process of regional differentiation taking place in Patagonia has already been discussed (Carden et al., 2009; Re et al., 2009; Charlin and Borrero, 2012; Martínez et al., 2016). An important part of the discussion is based on the concept of regionalization exposed by David and Lourandos (1998) and Guilfoyle (2005). Strictly, it is associated to the presence of populations that differ from each other. In the Australian model presented by David and Lourandos (1998) the social context of this phenomenon is related to denser and more territorially bounded groups, where borders are politically and actively marked, mainly through rock art and linguistic differences. We believe that the concept of regionalization defined in these terms is not applicable to the case of Patagonia (e.g. Re

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et al., 2009). Instead, regional differentiation could have occurred without the existence of clear marked territories. For example, in Northern Patagonia this concept was used to explain a differentiation in the landscape originated in the emergence of a new social demographical order (Martínez et al., 2016).

Any assessment of this phenomenon in Patagonia should take into account both its demographic and environmental peculiarities. First, CSP presented in the past, and still does nowadays, a very low demographic density (Goñi, 2010). In biological terms, human populations need an adequate gene flow to be viable through time. In our case, under the premise of a very low demographic density, the genetic exchange between populations must have been a requirement. Hence, a continuous exchange of people, goods and information was needed to sustain biological viability. The question is how far these populations were from each other and if they related themselves with cospecifics distributed across the macroregion during the Late Holocene.

Moreover, large spatial scales imply great distances for pedestrian travelers, within a great environmental uniformity of semidesert characteristics, and in high latitudes. According to Kelly (1995), the average distance per residential move increases as effective temperature decreases; our case matches this statement. However, as stated, there are few areas in CSP that provide good conditions for permanent or annual habitation such as low basins. The large distances between these areas, which vary between 150 and 500 km would necessarily have implied a diversity of social and mobility strategies. We pose that this is one of the reasons why social differences could have appeared in the region.

Also, the predominance of the steppe and its main prey, the guanaco, point to the issue of the regional environmental uniformity as an initial condition of the processes discussed here. Nonetheless, on the one hand, the Atlantic Coast offers a rich variety of marine species which sets a clear adaptive division between coast and steppe environments. On the other hand, the Andean forest also has a specific offer of resources, like huemul and wood, which are mostly available in the summer. Thus, it is worth wondering if this differential offer of resources of each environmental unit would have led to regional differences when considered in a larger scale.

To sum up, we will discuss if it is possible to identify a trend towards a regionalization in Central-Southern Patagonia during the Late Holocene. Given the characteristics of the region under study (great distances, environmental uniformity, low demography), we do not expect a marked territoriality, though we do not discard a potential differentiation of groups in social terms as a result of the concentration of populations proposed for the Late Holocene. This issue will be approached through the analysis of the differential composition and distribution of the archaeological evidence.

5. Materials and methods

A coarse grain analysis of the composition and distribution of the archaeological record was carried out in a broad spatial and temporal scale. Spatially, the scale corresponds to the macroregion (sensu Dincauze, 2000) of Central-Southern Patagonia, circa 450,000 km^2. As mentioned, this includes the land delimited by Chubut River in the north till Santa Cruz River in the south (Fig. 1). The temporal scale corresponds to the Late Holocene, from 2500 BP until European contact (*ca.*450 BP).

The archaeological lines of evidence which were evaluated correspond to technology, zooarchaeology, rock art, mortuary records and paleodietary studies. Data sets generated by our research

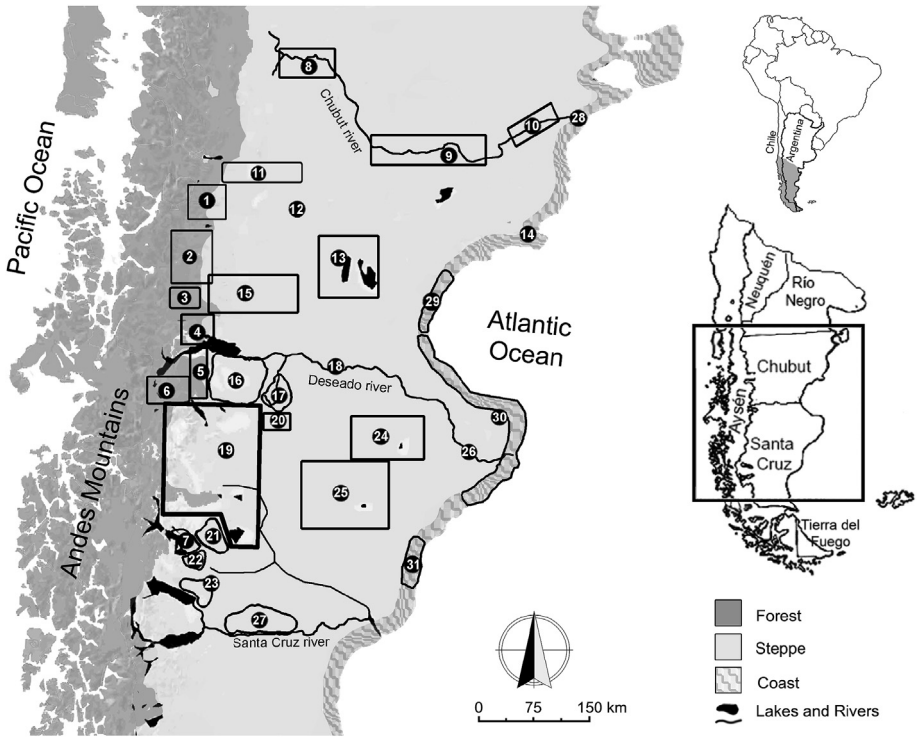

Fig. 4. Location of the areas mentioned in the text. References:1: Cisnes River Valley, 2: Coyhaique Alto-Ñirehuao, 3: Alto Simpson River Valley, 4: Ibáñez River Valley, 5: Jeinemeni-Zeballos-Roballos-Ghío River Valleys, 6: Chacabuco River Valley, 7: San Martin Lake, 8: Piedra Parada, 9: Middle Course of Chubut River, 10: Lower Course of Chubut River, 11: Genoa-Pico River Valleys, 12: Cerro Shequen, 13: Musters-Colhué Huapi Lakes, 14: Cañadón Encerrado, 15: Mayo River Valley, 16: Buenos Aires Plateau, 17: Pinturas River Valley, 18: Angostura del Río Deseado, 19: COSC, 20: Bajo Caracoles, 21: Cardiel Chico-San Adolfo Plateaus, 22: Tar Lake, 23: Viedma Lake-Tobiano Plateau, 24: Northern Deseado Massif, 25: Southern Deseado Massif, 26: Lower Course of Deseado River, 27: North Bank of Santa Cruz River, 28: Cangrejales, 29: Southern Coast of Chubut, 30: Northern Coast of Santa Cruz, 31: San Julián Peninsula.

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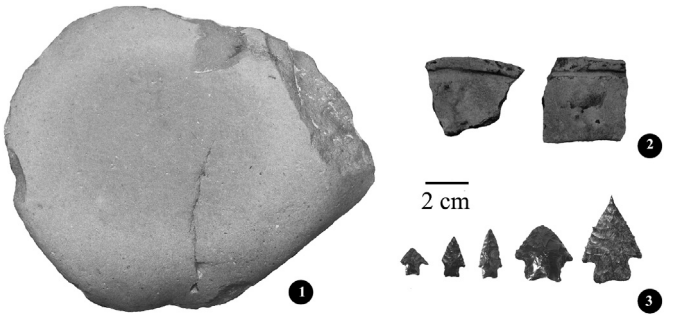

Fig. 5. Artefacts discussed in the text. References: 1: Grinding stone, 2: Potsherds, 3: Projectile points.

team in COSC were considered alongside information published by other colleagues working in the defined macro-region (Fig. 4 and Tables A, B, C and D in Supplementary Data). Depending on the various research trajectories in the different areas, the spatial coverage of the available data for each line of evidence varied in quantity and quality. Given the fact that precise quantification became very difficult, the information was segregated into environmental units independent of the research areas stipulated by the different authors. Thus, three environmental units were taken into account (Figs. 1 and 2): a) Forest (including forest-steppe ecotone): in the west of the macro-region on both sides of the Andes Mountains; (b) Steppe: the wide space between the forest to the west and the Atlantic seacoast to the east, which includes both lowlands and highlands; and (c) Coast: a strip of marine coastal environments over the Atlantic Ocean, which is typically around 1–5 km away from the current coastline according to the researchers. Because this paper is mostly generated and based on the information obtained in the steppe region of Patagonia, we are exclusively taking into account information of the eastern limit of the Andean forest and excluding data from the Pacific Coast and the western portion of the forest. Likewise, in some lines of evidence the north-south axis was evaluated, considering the distribution of the record towards the north and south of the Deseado River (Fig. 1). Chronologically, we considered the archaeological evidence assigned to the Late Holocene (last 2500 years BP) and the available radiocarbon dates published.

6. Results

6.1. Technology

The technological aspects considered to evaluate the questions posed correspond to the distribution of ceramic sherds, grinding artifacts, hunting blinds and projectile points' characteristics (Fig. 5). In addition, the distribution of artifacts manufactured in black obsidian has been considered since this raw material has a single known source of origin located in Pampa del Asador-Guitarra area (Espinosa and Goñi, 1999; Stern, 1999, 2004). It should be clarified that information regarding black obsidian artifacts whose sources correspond to sectors located north of the study area will not be considered. The archaeological assemblages considered are from sites and transects carried out in the Forest, the Coast and the Steppe. For this work only the papers presenting quantified information on the variables were considered. Detailed information on publications and areas considered are presented in Table A in the Supplementary Data.

Throughout the Holocene the artifact structure of the lithic assemblages do not show great variations since endscrapers, projectile points, side-scrapers and artifacts with low formatization are

Table 1
Frequencies of potsherd, hunting blinds and grinding artefacts in the region.

	Forest	Steppe	Coast
Ceramics	63	1200	775
Grinding artifacts	36	295	>15
Hunting blinds	12	621	0

recorded in similar proportions (Gradin et al., 1979; Aschero et al., 1992; Cassiodoro et al., 2014, among others). However, in the Late Holocene, new technologies such as pottery (Gradin et al., 1979; Mena and Jackson, 1991; Goñi et al., 2000–2002; Arrigoni et al., 2008) and hunting blinds (Goñi 2000–2002) are incorporated. Likewise, a higher frequency of grinding artifacts is observed, usually accompanying ceramics (Mena and Jackson, 1991; Aschero et al., 1983; Cassiodoro, 2008). Both ceramics and grinding artifacts are present in all environments (Table 1) although these are mostly represented in sites from the Steppe (Gradin, 1978; Gradin et al., 1979; Bellelli, 1980; Cassiodoro, 2008; Castro Esnal et al., 2011). For instance, the Salitroso Lake basin stands out because of the high frequency of both technologies (Cassiodoro, 2011). However, sites in Lakes Musters and Colhue Huapi (Reyes et al., 2013), the Río Pinturas area (Gradin et al., 1979) and the North Coast of Santa Cruz (Moreno and Videla, 2008; Arrigoni et al., 2008; Zubimendi, 2010) also present both grinding artifacts and ceramics. This association of technologies in specific places and related to late chronologies is understood as a function of the residential character these areas might have had and the incorporation of new elements for food storage and processing.

The presence of hunting blinds is identified mainly in the Steppe (Figs. 6–1). Specifically, these rock structures are associated with highlands, mainly plateaus such as Buenos Aires Plateau (Gradin, 1976, 1996), Pampa del Asador- Guitarra Lake Plateau (Aragone and Cassiodoro, 2005–2006; Goñi et al., 2010; Cassiodoro, 2011; Dellepiane, 2014, among others), Strobel Plateau (Gradin, 1959-60 a and b; Flores Coni, 2014), Cardiel Chico and Tobiano Plateau (Belardi et al., 2017) and Deseado Massif (Carden et al., 2009; Magnin, 2010). Both, the characteristics of their spatial layout

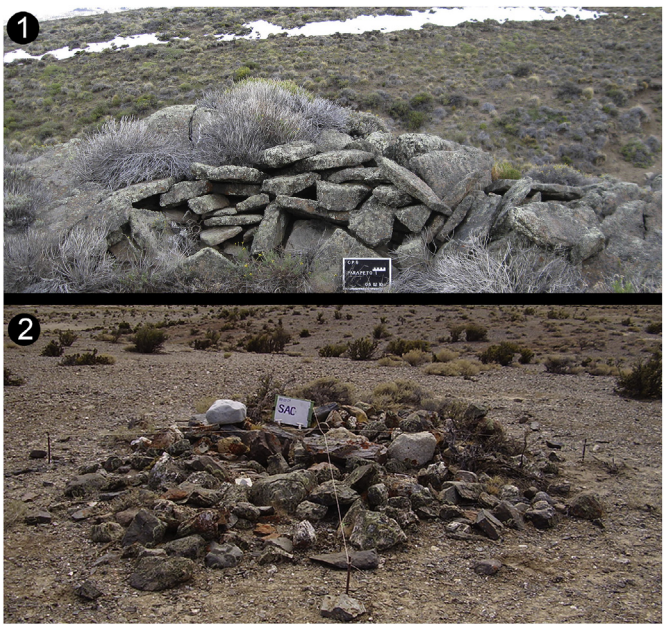

Fig. 6. Rock structures discussed in the text. References: 1: Hunting blind, 2: Chenque burial.

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(oriented according wind direction, proximity to bodies of water, etc.), and the related archaeological record, link these structures with seasonal hunting activities (stalking, interception of prey, etc.). In sum, this type of technology has been associated with particular land equipment strategies and resources acquisition. The characteristics of the associated archaeological material (e. g. ceramics) together with 20 dates available to COSC establish its temporary location in moments after 2000 years (Gradin, 1976; Re et al., 2017).

Additionally, a change in the design of projectile points is emphasized, since they tend to be triangular unstemmed in Middle Holocene and triangular stemmed in Late Holocene in all the environments (Cardich et al., 1973; Gradin et al., 1979; Durán et al., 2003; Aschero et al., 2005; Hermo, 2008; Castro Esnal et al., 2016). At the same time, variability in stem width is observed. Larger sizes, associated with the use of throwing spears, are found throughout the Late Holocene, and stem widths smaller than 10 mm, related to the use of the bow, are present after 900 years BP (Gómez Otero et al., 2011; Cassiodoro, 2011). The convergence of different types of means of propulsion post MCA would indicate variability in hunting strategies. Moreover, during Late Holocene new technologies are linked to the exploitation of aquatic resources in coastal and steppe lacustrine environments. In the North Coast of Santa Cruz Province and Lower Course of Chubut River bone harpoons (from pinnipeds and cetaceans) as well as wood and stone mazes are documented (Moreno, 2008; Beretta et al., 2013). In Lakes Musters and Colhue Huapi and the Lower Course of Chubut River stone mazes and net weights are present (Gómez Otero et al., 2013; Moreno et al., 2015).

In the Late Holocene an increase of artifacts manufactured in black obsidian of Pampa del Asador-Guitarra is noticeable in most of the lithic assemblages of the region (Gradin et al., 1979; Skarbun et al., 2007; Sacchi, 2013; Cassiodoro, 2016). Moreover, a wide distribution is evident, given the fact that obsidian artifacts were found as far as 800 km away from the original source. Geochemical analyzes determined an association between materials from Pampa del Asador-Guitarra and obsidian artifacts from Lakes Posadas and Salitroso area, Perito Moreno National Park (Stern et al., 1995), Jeinemeni-Zeballos (Fernández et al., 2015), Aysén area (Chile) (Stern, 1999; Méndez and Reyes, 2008; Méndez et al., 2008–2009), Chubut Province (Stern et al., 2000; Castro Esnal et al., 2011), North Coast of Santa Cruz (Ambrústolo, 2010) and even other areas towards the south of the region (Charlin, 2009), reaching Tierra del Fuego (Stern, 2004) (Fig. 1). Artifacts made of this raw material have been recorded in assemblages of the three environmental units. It should be noted that its representation tends to be lower as one moves away from the source (83% in Pampa del Asador-Guitarra), with a gradual decrease in the north-south axis (28% in Jeinemeni and 29% in San Martín Lake basin) and clearly abrupt eastward (only one 4% in Deseado Massif) (Molinari and Espinosa, 1999; Mengoni Goñalons et al., 2009; Hermo, 2008; Hermo and Miotti, 2011; Fernández, 2013; Cassiodoro et al., 2015; Franco et al., 2015). However, these differences cannot be considered exclusively as regional differences due to the availability of other raw materials of excellent quality in the Deseado Massif (Franco et al., 2012; Hermo et al., 2015).

In sum, there are clear attributes as regards technology that account for the development of new strategies for acquiring and processing resources during the Late Holocene. To a greater or lesser extent, this is evident in different sectors of the region. On the one hand, highlands are linked to resources acquisition. This occurs in COSC, as well as in places located further to the east, such as Deseado Massif. On the other hand, Steppe lowlands and the Coast show a more residential character. Thus, what it is evidenced in COSC regarding land use, may also be occurring at different spatial scales (local or micro-regional) in different places of the region. At the same time, the distribution of black obsidian artifacts shows a more fluid flow of goods in the north-south axis than in the west-east axis. New variables should be considered in order to evaluate this in greater detail.

6.2. Zooarchaeology

The number of sites with faunal information was considered for each of the environmental units as well as the taxonomic diversity and the species effectively exploited, namely, those with evidence of processing and consumption. Therefore, 81 sites and 133 assemblages were compared (Table B in Supplementary Data). A significant number belong to the Steppe (n: 72), followed by the Coast (n: 43), and finally the Forest (n: 20).

Considering the taxonomic diversity, the sites located in the Steppe have the lowest overall diversity (Fig. 7). These are followed by the Forest and the Coast, the latter, the environment with the highest species diversity. However, it is important to note that the species mean in the Forest sites is the most elevated of all the assemblages, approaching a mean of 10 taxa per site. The guanaco is the main taxon in the three environmental units; it is present in 72% of sites. This trend is particularly marked in the Steppe where this species dominates the taxonomic structure in all the sites considered (Gradin and Aguerre, 1994; Mengoni Goñalons, 1999; De Nigris and Mengoni Goñalons, 2000; Catá, 2003; De Nigris and Catá, 2005; Paunero et al., 2007; Bourlot, 2009; Rindel, 2009; Marchionni, 2013; Dellepiane et al., 2014; among others).

In the Forest, this trend is not so clearly defined (Fig. 7). Other species were recorded such as cervids (huemul, pudu) and canids (Mena and Jackson, 1991; Méndez et al., 2006; Rindel, 2009; among others). Finally, the Coast evidences the highest amount of species identified in this analysis, where pinnipeds (South American sea lion and South American fur seal), a variety of fish, cetaceans (whales and dolphins) and marine mollusks and bivalves show the highest frequencies (Borella, 2004; Castro et al., 2004; Moreno, 2008; Zubimendi, 2010; Zubimendi et al., 2011; Gómez Otero et al., 2013; among others). Therefore, the amount of species richness is high in the Forest, low in the Steppe and reaches a maximun in the Coast (Fig. 7). These results are in accordance with the species richness inside the different sampled environments, and indicate

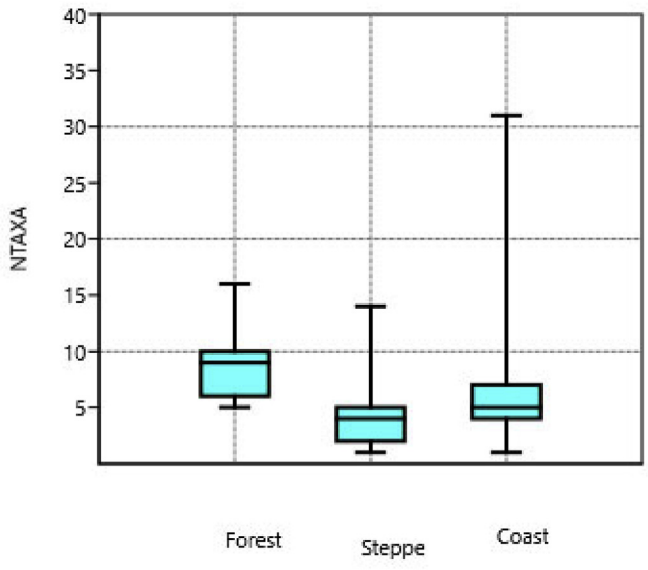

Fig. 7. NTAXA per site in the sampled areas.

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that the human population exploited resources according to the environmental availability.

Fig. 8 indicates the variability in the dominant taxa exploited by the human groups in each sampled area. In order to build this figure, we considered the taxon with the highest NISP in each assemblage. Then we standardized this value by environment. In the Forest, the most represented taxon is the guanaco. However, a few samples are composed mostly by huemuls and canids (Fig. 8). Other taxa that also were also found in the Forest samples are pudus and felines like pumas, as well as birds like cauquens and the flightless choiques and other minor species (Mena and Jackson, 1991; Méndez et al., 2006; Rindel, 2009; among others among others). Finally, it is important to highlight that there are evidences of bivalves and marine mollusks in this area (Mena and Jackson, 1991).

In the Steppe all the sampled assemblages are dominated by the guanaco (Fig. 8). In addition to these species, other taxa were found such as canids (foxes) and felines (puma), birds (choique and cauquen), rodents (chinchillon) and skunks. In a few sites the presence of freshwater fish stands out (Gradin and Aguerre, 1994; Mengoni Goñalons, 1999; De Nigris and Mengoni Goñalons, 2000; Catá, 2003; De Nigris and Catá, 2005; Paunero et al., 2007; Bourlot, 2009; Rindel, 2009; Marchionni, 2013; Dellepiane et al., 2014; among others). Moreover, marine mollusks are also present in very low frequency (Marchionni, 2013).

The Coast is the environment with the highest diversity of taxa with processing evidences. In striking difference with the two previous environments, most coastal assemblages were dominated by pinnipeds (South American sea lion, South American fur seal and elephant seal). The guanaco occupies the second place, and it is interesting to observe that in 5% of the groups the presence of pinnipeds and camelids is similar, indicating a mixed consumption of terrestrial and marine species. Mollusks and fish present the numerically highest NISP in almost a third of the assemblages: 17 species of marine mollusks and bivalves were recorded, together with a considerable quantity of sea fish remains, while a few cases illustrate the almost exclusive exploitation of cetaceans (dolphin and Southern right whale). Other recorded taxa in these coastal sites, but not numerically dominant are toothless mammals (piche, large hairy armadillo, armadillo), rodents (mara), an important amount of terrestrial bird species (choique) and, above all, marine bird species (two penguin species, albatross, cormorants, seagulls, oystercatchers, etc.) (Borella, 2004; Castro et al., 2004; Moreno, 2008; Zubimendi, 2010; Zubimendi et al., 2011; Gómez Otero et al., 2013; among others). This pattern is also supported by the aforementioned presence in the Coast of stone and bone tools specifically manufactured for the acquisition of aquatic resources.

In short, the guanaco prevails in the faunal assemblages in two of the three environmental units, and the amount of species used by human groups of the past increases closer to the Coast.

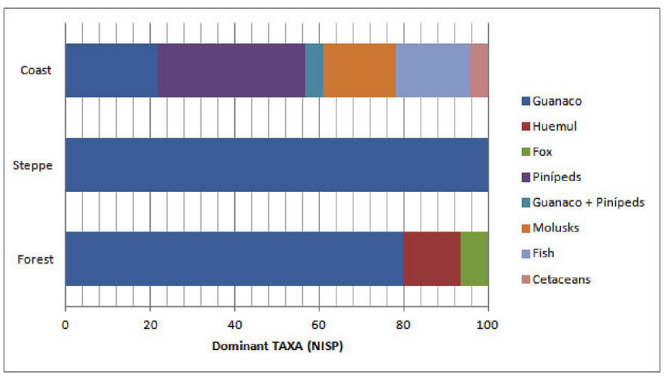

Fig. 8. Dominant species (NISP) in the sampled areas.

6.3. Rock art

In order to evaluate the characteristics of Late Holocene rock art in CSP, we analysed the number of sites, techniques and type of motifs assigned to this period. The difficulties in dating rock art have been discussed worldwide and usually several indicators are jointly used to ascertain its age (see Aubert, 2012). In the region under study different temporal trends have been observed for paintings and for engravings (see Schobinger and Gradin, 1985; Gradin, 1988; Fiore, 2006). While paintings have been executed during the Early, Middle and Late Holocene, engravings have been mostly assigned to the Late Holocene. During the Middle Holocene engraved motifs are scarce and found in certain spatially restricted areas (e.g., Strobel Plateau and Northern Deseado Massif) (Carden, 2008; Re, 2010). Hence, for the purpose of this paper, only those sites with paintings that were explicitly assigned to the Late Holocene by the different authors were included in the analysis. On the other hand, in the following discussion all sites with engravings that were registered in CSP were incorporated in the sample. The chronological indicators that have been used in various research areas have been diverse but are mostly relative (see Guichón et al., 2016). Hopefully in the future a wider application of absolute methods will be possible, so that this coarse grain study can be improved.

During the Late Holocene, an increase in rock art production was suggested by different researchers in many areas (Aschero et al., 1983; Fiore, 2006; Carden, 2008; Re, 2010; among others). Spaces that were sporadically used in previous times are now incorporated fully, such as the high basaltic plateaus in the Steppe (e.g. Strobel and Pampa del Asador-Guitarra plateaus) (Re and Guichón, 2013; Goñi et al., 2014; Re et al., 2017). Other areas register fewer motifs assigned to the Late Holocene in comparison to earlier periods (e.g. Perito Moreno National Park and Pinturas River Valley) (Gradin et al., 1976, 1979; Aschero et al., 2005). Regarding the method of production, as was previously stated, the use of paint continues to be recorded during the last 2500 years, albeit in lower frequencies, while the technique of engraving is used more intensively and introduced in many areas. Another trend that needs to be remarked is that during the last 2500 years there are types of motifs common to the entire region under consideration. Certain motifs recorded in previous times continue to be executed, such as hand stencils and dots. On the other hand, some designs appear for the first time in certain areas while in others they become more frequent. This is the case of simple and complex geometric designs and, to a lesser degree, figurative images. In the following, the similarities and differences found between the three environmental units defined in CSP will be explored in more detail.

In most research areas in the region under study information about rock art assigned to the Late Holocene can be found (Table C in Supplementary Data). A total of over 280 sites with paintings and/or engravings assigned to this period have been recorded (Table 2). It must be noted that their spatial distribution is uneven. The vast majority (97%, n: 274) of these sites are in the Steppe, in 24 different research areas (Table 2 and Table C in Supplementary Data). Some areas stand out because of the quantity of sites dated to the last 2500 years, such as the case of the Strobel plateau with 90 sites (Re et al., 2017), located in our study area.

In contrast, the Forest features a very small amount of sites (3%, n: 8) located in three areas: Coyhaique Alto-Ñirehuao (Nuevo Delaunay et al., 2013, among others), the Ibáñez River valley (Muñoz, 2013, Fuentes and Mena, 2010, among others) and Perito Moreno National Park (Aschero et al., 2005, among others). Lastly,

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Table 2
Distribution of sites with rock art assigned to the Late Holocene, detailing the different techniques of production.

	Forest	Steppe	Coast	Total
Paintings	8	61	0	69
Paintings and Engravings	0	44	0	44
Engravings	0	169	0	169
Total	8	274	0	282

no sites at all have been recorded on the Coast. The nearest sites are Cañadón Encerrado, 12 km from the present-day coast (Gómez Otero and Vallejo, 1996) and four others recorded in the Lower Course of Deseado River, at a distance of ca. 50 km (Ambrústolo et al., 2015).

As regards the technique that was selected for the production of the images, most of the sites with Late Holocene rock art only feature engravings (60%, n: 169) (Table 2). Nevertheless, there are sites only with paintings, while others display both engraved and painted motifs (Fig. 9). When the different environments are considered, it can be seen that in the Forest the sites present only painted motifs, while the sites in the Steppe display a greater variety of techniques (Table 2). This pattern in the distribution of the different techniques is probably in part related to the available rock surfaces and the type of sites in each area and environmental unit. It is worthy of note that on the high plateaus of COSC (Buenos Aires, Pampa del Asador-Guitarra, Strobel and Cardiel Chico plateaus) the engraving technique is completely dominant (Figs. 9–1 and 9-2). In these areas rock art is mostly located on vertical basaltic rock walls and is thus part of open air sites.

With respect to the types of motifs that were depicted, some are found in the two environmental units, whereas others are only present in the Steppe. In the Forest there is a greater frequency of hand stencils and simple abstract motifs (Aschero et al., 2005; Muñoz, 2013). In contrast, in the Steppe there is greater diversity. A wide variety of abstract designs – both simple and complex – can be observed and tend to dominate the assemblages. It is noteworthy that whereas in some areas there is a greater frequency of different variants of circles and lines, in others more complex designs in the Greca style (sensu Menghin, 1957) abound (Figs. 9–5

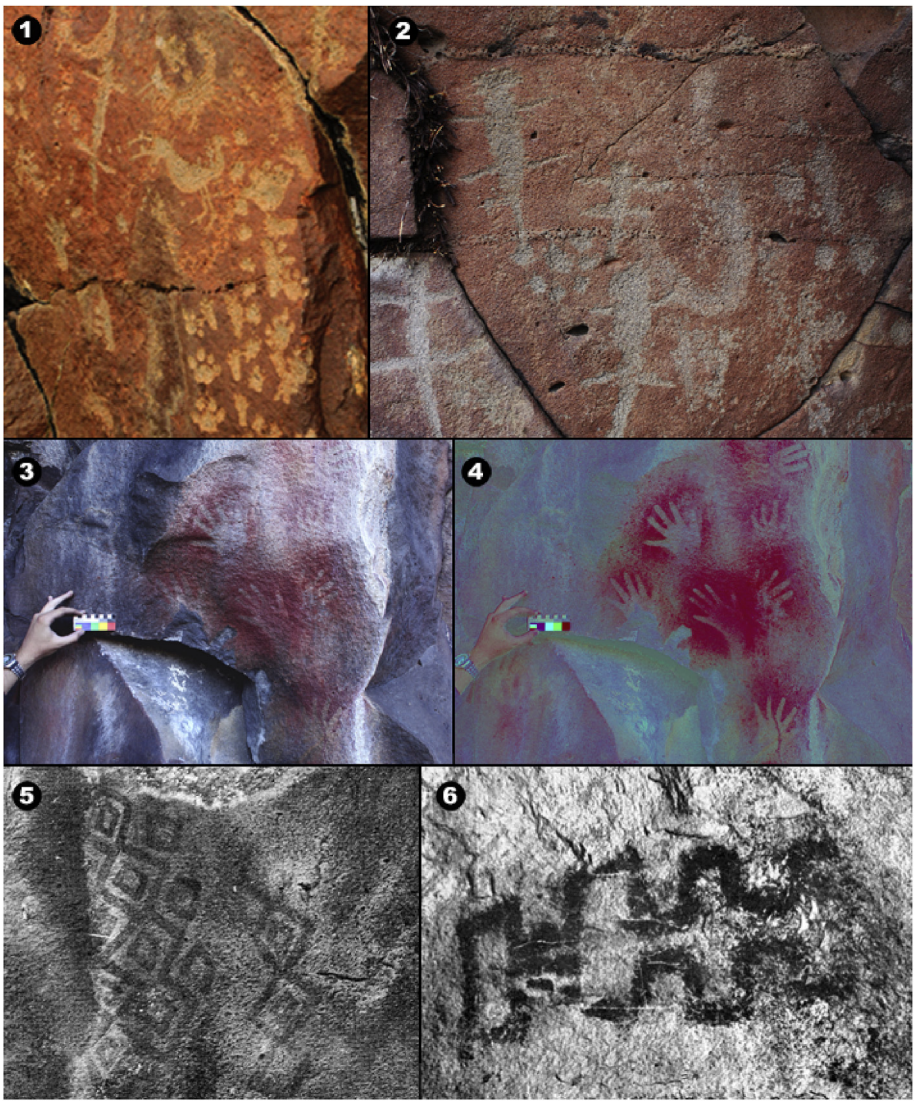

Fig. 9. Examples of rock art from the region. References: 1 and 2 - Engravings from the Strobel Plateau, 3 - Paintings from Cardiel Lake (original photo), 4 - Paintings from Cardiel Lake with DStretch filter, 5 - Greca style paintings from Cerro Shequen (Chubut) (taken from Gradin, 1978), 6 - Greca style paintings from Alero de las Manos Pintadas (Chubut) (taken from Gradin, 1973).

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Table 3
Number of identified and confirmed burial structures and chenques and of available radiocarbon dates for burials per environmental unit of Central-Southern Patagonia.

	Forest	Steppe	Coast	Total
Identified Burial Structures	24	102	446	572
Structures with positive findings (excavation or surface).	10	72	62	144
Available ^{14C} dates	6	41	22	89
Burial Structures identified as Chenques	21	84	410	515
Chenques with positive findings (excavation or surface)	8	44	35	87

and 9-6). In addition, figurative motifs are also present in the Steppe, mostly footprints (bird tracks, feline tracks, guanaco tracks and human tracks), although there are also some silhouettes (lizards and guanacos) and hand stencils (Figs. 9–3 and 9-4). The frequency of figurative motifs in each area is highly variable. It has been highlighted that the greatest diversity of motif types might be found on the Strobel Plateau (Re et al., 2009; Re, 2010, among others). Partly on this basis, it has been suggested that this area could have been a place where different populations could have converged, not necessarily simultaneously, during the last 2500 years (Belardi and Goñi, 2006; Re et al., 2009; Re, 2010, among others).

Setting aside the three environmental units defined in this paper, different characteristics in the rock art can also be observed in the north-south axis of the region under consideration. To the South of the Deseado River a greater amount of sites assigned to the Late Holocene can be found. As investigations advance, it will be necessary to ascertain if this trend is not due to a sampling bias. Furthermore, this area is also distinguished by a greater use of the engraving technique and the broader variety of figurative motifs that were represented. In contrast, to the North of the Deseado River most sites include paintings (e.g. Cerro Shequen and Río Mayo) (Gradin, 1978). There is also a greater quantity of complex abstract designs in the Greca style (sensu Menghin, 1957).

Summing up, available information on rock art suggest that during the Late Holocene a greater communication took place using the medium, especially in the Steppe, than had been the case in earlier times. This is based on the number of sites, the variety of techniques and the diversity of motifs that have been recorded. Similarities within CSP suggest a circulation of information and people on a broad spatial scale. Nevertheless, differences among the three environments and along a north-south axis are evident, as well as smaller-scale differences when the various areas are considered separately. Thus, the possibility of discussing a differential flow of information in different areas and/or a potential social regionalization is also still open.

6.4. Mortuary record

To analyze the mortuary record at the region scale, we considered the spatial distribution of burials, the burial type and their chronology. Data sets were obtained only from published archaeological papers, excluding museum catalogues, as the latter usually have imprecise spatial references and lack chronological information (Table D in Supplementary Data). Even in the published archaeological reports, it is frequent to find structures depicted as burials although their true function has not been confirmed by excavation or superficial findings of human remains. This is particularly the case with possible chenques, low stone structures which are one of the most frequent burial types in Late Holocene Patagonia but are easily confused with other stone structures (Figs. 6–2). Thus, in Table 3, for each environmental unit, we present all the burial records gathered from the literature and those specifically confirmed by archaeological findings. The available radiocarbon dates for burials in each unit are also included. On the whole, 572 human burials were identified in the region, of which only 25% (n = 144) have been confirmed as such.

The first point to be underscored is that even considering this number alone, i.e. the 144 confirmed burial structures, the Late Holocene mortuary record largely contrasts with the paucity of human burials corresponding to the Middle and Early Holocene in Patagonia (Dillehay, 2000).

Second, there is a marked unbalance between the environmental units in the number of published burials versus the confirmed cases. Out of a total 572 burials, 446 were recorded in the Coast (77%), however, only 13% of them have been confirmed as actual human burials and there are only 22 available radiocarbon dates for this environmental unit. In contrast, in the Steppe, of the 102 identified burials, 70% have been confirmed as such, and this is the environmental unit with more dates for burials: 41 in total, 30 of which are from burials in Salitroso Lake. Finally, in the Forest, 41,7% of the 24 reported burials have been confirmed and there are 6 available radiocarbon dates. Whether this situation is due to differential preservation or uneven research intensity between units, the disparity is marked enough and needs to be taken into account when assessing the spatial and temporal distribution of the funerary record in the macro-region.

Third, chenques are the most frequent burial type in the three environmental units (Table 3, Figs. 6–2). They represent 87,5% of the burials recorded in the Forest, 81,5% of the Steppe and 92% of the Coast. As mentioned before, they are stone structures 3–5 m in diameter and about 50 cm tall in average. Most of them contain primary inhumations of a varying number of individuals of both sexes and various ages. In some cases, up to 12 individuals have been recorded buried in the same chenque and some of these structures show evidence of reuse through time, spanning several centuries (e.g. chenque SAC 1-1 in Salitroso Lake basin, Goñi et al., 2000–2002).

Regarding the spatial distribution of the mortuary record, Figs. 3 and 4 depict the location of the cases presented in Table 3. The spatial distribution is not homogeneous across the region and there are particular sectors with high density of burials, opposed to isolated cases and broad vacant areas. The high density areas are concentrations of chenques which can be found in the three environmental units. In the Forest, the only place with an important concentration of chenques is in Ibáñez River valley (Aysén) (Reyes, 2002). In the Steppe, the biggest concentration of human burials is located in Salitroso Lake basin, where at least three types of burials have been recorded: niches, burials under boulders, and chenques which, as discussed in previous works, are the most numerous ones (27 of 37 excavated burials) (Goñi et al., 2000–2002; García Guraieb et al., 2015). In the neighbouring Ghio and Posadas-Pueyrredón Lakes (Fig. 3), small groups and isolated chenques have been also located (García Guraieb, 2010) although these have not yet been studied in depth. Another sector of the Steppe where several chenques have been identified is the Deseado Massif (e.g. Miotti, 2006). Finally, in the Coast, the northern coast of Santa Cruz Province, a large number of burials have been reported, with specific areas with high density of chenques (e.g. Castro and Moreno, 2000; Zubimendi et al., 2011; Zilio, 2015). However, as previously

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mentioned, in the last two cases, the Deseado Massif and the Northern Coast of Santa Cruz, the number of excavated and confirmed burial structures is still comparatively low (Table 3). The rest of the region presents areas with middle and low densities of burials (mostly chenques) and others with no human burials at all even in sectors intensively surveyed as the Perito Moreno National Park, the Strobel Plateau, the Cardiel Lake basin (Barrientos et al., 2014). Last, whereas there are high density areas with burials in the three environmental units (i.e. west-east axis), when considering the north-south axis, the mortuary record tends to cluster in the northern part of the region, i.e. north to the Deseado River.

Regarding the temporal distribution of the funerary record, while the initial Late Holocene (ca. 3000/2500-900 years BP) shows a greater diversity of burial types though comparatively a small number of cases, during the final Late Holocene (i.e. since ca. 900 years BP), chenques become the most frequent type of burial. This type of burial spans from *ca.* 1500 years BP to the first stages of European contact (450 BP). However, the majority of them date to post ca. 900 years BP, i. e. after the epic droughts of the MCA. This is particularly the case for chenques of the above mentioned concentrations in the three environmental units (García Guraieb, 2010; Zilio, 2015).

To sum up, the broad spatial distribution of chenques during the Late Holocene suggests a broad circulation of information about mortuary practices between populations across the region. At the same time, and particularly during the final Late Holocene, we observe the concentration of this type of burial in some areas of CSP, some of which, like the one in Salitroso Lake, can even be considered formal burial grounds. This, along with the fact that they contain mainly primary burials of individuals of both sexes and all ages, suggest that these burials were the result of low residential mobility groups, aggregated in certain suitable spaces apt for long term habitation, that is, suitable to face the Late Holocene climatic changes in water distribution in the landscape, especially during and after the MCA.

6.5. Paleodietary studies

Carbon and nitrogen stable isotopes in bone collagen, expressed as $\delta^{13}C$ and $\delta^{15}N$, are used as paleodietary indicators in archaeology (Ambrose, 1983). For CSP, the information available corresponds only to human remains from the Late Holocene, since there are no values for the Middle Holocene (due to the lack of human remains corresponding to that period). Likewise, the isotopic ecology of the region has allowed to differentiate diets associated with marine resources from terrestrial ones (Barberena, 2002; Gómez Otero, 2007; Moreno et al., 2011; Zilio et al., 2014). Also, in the latter environment, it allowed to differentiate between steppe and forest resources (Tessone, 2010; Barberena et al., 2011; Fernandez and Tessone, 2014; Méndez et al., 2014).

There are five sets of human remains with δ13C and δ15N to analyse the paleodiets' variability of Late Holocene hunter-gatherers. The samples corresponding to Coast are those located in the South Coast of Chubut Province (Gordon et al., 2015) and the North Coast of Santa Cruz Province (Moreno et al., 2011; Zilio et al., 2014). The ones corresponding to the Steppe are those of the Lower Valley of the Chubut River (Gómez Otero, 2007) and the Salitroso Lake (Tessone, 2010; Tessone et al., 2015). In the latter, the sample could be differentiated into two temporal periods, those corresponding to the pre-900 years BP and the post 900 years BP. Finally, for the Forest, the sample of Aysén was considered (Méndez et al., 2014).

In order to analyze the $\delta^{13}C$ and $\delta^{15}N$ variability of the skeletal series, a chart with the means and standard deviations of the different sets was drawn (Table 4 and Fig. 10). Firstly, what stands out from this figure is a differentiation of most of the sets analyzed, with the only partial overlap of the values of Lower Valley of the Chubut River and South Coast of Chubut, besides the two temporal blocks of the Salitroso Lake. Likewise, the values are aligned on the same axis. The sample corresponding to the Forest is observed at one end, while at the other end the populations associated with the marine environment are located.

Based on the information available in the bibliography and the information generated by this project on isotopic ecology, we can interpret these differences as reflecting a variety of situations in terms of the exploitation of environments and resources. First, in the human remains of the Coast we see paleodietary situations that reflect a differential emphasis on marine resources. The North Coast of Santa Cruz reflects the individuals with the highest consumption of this environment (Moreno et al., 2011; Zilio et al., 2014), while for the South Coast of Chubut, paleodiets with a strong terrestrial component are observed, although an individual with marine diet is recorded (Gordón et al., 2015).

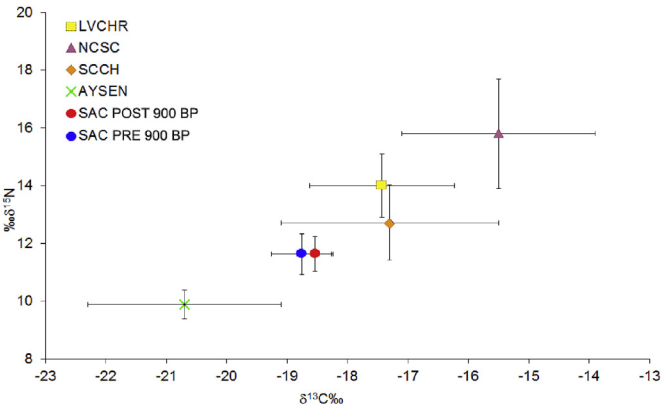

Fig. 10. $\delta^{13}C$ and $\delta^{15}N$ of the archaeological samples of CSP. References: SCCH: South Coast of Chubut, NCSC: North Coast of Santa Cruz, LVCHR: Lower Valley of the Chubut River, SAC pre 900 BP and SAC post 900 BP: Salitroso Lake.

Table 4
$\delta^{13}C$ and $\delta^{15}N$ means and standard deviations (sd) of the archaeological samples of CSP.
References: SCCH: South Coast of Chubut, NCSC: North Coast of Santa Cruz, LVCHR: Lower Valley of the Chubut River, SAC pre 900 BP and SAC post 900 BP: Salitroso Lake.

Environment	Area		$\delta^{13}C$		$\delta^{15}N$		References
		N	mean	sd	mean	sd	
Coast	SCCH	8	−17,3	1,8	12,7	1,3	Gordón et al., 2015
	NCSC	16	−15,5	1,6	15,8	1,8	Moreno et al., 2011; Zilio et al., 2014
Steppe	LVCHR	10	−17,4	1,2	14,0	1,1	Gómez Otero, 2007
	SAC post 900 BP	30	−18,7	0,5	11,6	0,7	Tessone, 2010
	SAC pre 900 BP	12	−18,5	0,3	11,6	0,6	Tessone, 2010
Forest	AYSEN	4	−20,7	1,6	9,9	0,5	Méndez et al., 2014

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Second, in the Steppe differences are also observed. Lower Valley of the Chubut River samples recorded a variable consumption of marine and steppe resources which can be explained by the variable distance of these samples to the coast −5 to 90 km- (Gómez Otero, 2007). On the other hand, Salitroso Lake is clearly related to the resources of the steppe in both temporary blocks, without being able to differentiate the paleodiets in the last 2500 years (Tessone, 2010). Finally, in the Forest, Aysén sample also differs, with values that reflect a consumption of resources from the steppe-forest transition (Méndez et al., 2014). This may be due to two reasons. Firstly, differences observed in the zooarchaeological record with a greater presence of huemul and pudu in the sites of the Forest. Secondly, the natural distribution of nitrogen and carbon is dependent on climatic-environmental variables in which the precipitational gradient is the most relevant factor. This generates spatial differences in the values of the same exploited species, with higher isotopic values in the Steppe and lower values in the Forest (ie. guanacos) (Tessone, 2010; Fernández and Tessone, 2014; Méndez et al., 2014).

In sum, what emerges from the analysis of the $\delta^{13}C$ and $\delta^{15}N$ variability is a paleodietary differentiation of hunter-gatherers. This is observed when comparing the environmental units as well as inside the areas. This allows us to think of a variety of situations in terms of exploitation of environments and resources by hunter-gatherer populations of CSP during the Late Holocene.

7. Discussion

In this paper we took a broad spatial perspective to evaluate to what extent the low residential mobility identified in our research area (COSC) had a correlation in a larger regional scale (CSP). The composition and distribution analyses of the archaeological evidence presented here suggest that a similar process could have taken place in specific sectors of the region. Thus, in addition to the low basins of Lake Cardiel, and particularly Lake Salitroso, there are other areas that show similar features of the archaeological record suggesting a reduction in residential mobility and a concentration of populations during the Late Holocene.

First, in the Northern Coast of Santa Cruz a large concentration of chenques has been identified, which points to the aggregation of populations in this sector of the Atlantic Coast. The presence of sites with pottery and grinding artifacts in this area support the same idea. Second, another area with a concentration of chenques, albeit less numerous, is the one in the lower Ibáñez River valley (Aysén, Chile), located in the forest. Third, the technology recorded in the Lakes Musters and Colhue Huapi in the steppe points to a more stable and long term land use and settlement pattern than in previous moments, reinforcing the idea that in certain sectors a more reduced residential mobility was implemented. All these sectors are low altitude basins that share similar features such as benign winters and good conditions for year round human occupation. At the same time, the analysis of faunal remains and paleodietary studies also point to a low residential mobility as they show marked differences between the three environmental units.

The model proposed for our study area (COSC) also suggests an extension in action ranges, that is, a process of extensification, which occurred complementarily to the reduction in residential mobility. A large amount of hunting blinds can be found in most of the plateaus of the Steppe such as those located in COSC (Pampa del Asador-Guitarra and Strobel) and also in Cardiel Chico, Buenos Aires and Deseado Massif. This technology can be considered both as a kind of space equipment and as a feature for the exploitation of particular resources. Thus, the archaeological record in some areas indicates that a pattern of complementary residential and logistical land use also occurred in a broad spatial scale.

As stated in the Introduction, the other issue that we wanted to address was the possibility of identifying a trend towards a process of regionalization in Central-Southern Patagonia during the Late Holocene. Given the characteristics of the region under study (great distances, environmental uniformity, low demography), we did not expect a marked territoriality, though we did not discard a potential differentiation of groups in social terms as a result of the concentration of populations in a few distant areas during the Late Holocene. An attempt to discuss micro-identity in Río Ibáñez basin was formulated by Mena (2013), but was no longer supported by the author in more recent works (Mena, 2016). The information discussed in this paper for the different lines of evidence shows the complexity of this research problem. As the summary presented in

Table 5
Arguments for regional uniformity and differentiation in CSP during the Late Holocene.

Lines of evidence		Regional Uniformity	Regional Differentiation
Technology	Artefactual structure of lithic assemblages	Similar structure in the three environments	–
	Pottery	Present in the three environments (mainly in Steppe)	–
	Grinding artifacts	Present in the three environments (mainly in Steppe)	–
	Hunting blinds	Present in many areas of the Steppe (particularly highlands)	–
	Bow arrow projectile points	Present in the three environments	–
	Technology associated to aquatic resources	–	Localized distribution in the Coast and in only one area of the Steppe
	Obsidian artefacts	Present in the three environments	More frequent in COSC
Fauna	Exploited species	Guanaco is the main taxon in the three environments	Exploitation of local resources in each environment
Rock art	Distribution	–	Present only in the Steppe and Forest. More frequent in the Steppe
	Techniques	Paintings in the Steppe and the Forest	Engravings only in the Steppe
	Motif types	Certain motifs shared by the Steppe and the Forest	Certain motifs only found in the Steppe (particularly in some areas)
Mortuary record	Chenques (rock structures)	Present in the three environments	Clusters in some areas
Paleodietary studies	Stable isotopes	–	Exploitation of local resources in each environment

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Table 5 highlights, there appears to be some aspects where a regional uniformity can be appreciate whereas, at the same time, certain differences can be identified in the record at a broad spatial scale that can be read as a process of regional differentiation between populations.

As we have seen, there are multiple processes included in the idea of regional differentiation and as archaeologists we can only observe some traits in the archaeological record that we assume are related to or illustrative of these processes. For instance, it is possible that the differences observed in rock art are related more to differences in what is being communicated than to differences in the populations that produced it, as our own case study suggests (Belardi and Goñi, 2006; Re, 2010). However, the integration and discussion of several lines of evidence at the same spatial level can bring a better understanding of this process in all its complexity.

During the Late Holocene the presence of technological innovations in all areas of CSP points toward a regional uniformity. After ca. 900 year BP the use of bows and arrows was generalized along with pottery and grinding artifacts. At the same time, a great amount of hunting blinds and new mortuary structures (chenques) can be found. In addition, the wide distribution of artifacts manufacturated in black obsidian from Pampa del Asador-Guitarra can also be interpreted as an indicator of regional uniformity. However, its frequency is much higher near its source and in areas to the west, north and south, indicating a specific area of circulation that can be taken as an argument for regional differentiation.

The zooarchaeological data reflects mostly the ecological aspects of each environment identified in the region. Even though the guanaco is the dominant taxon in most assemblages, differences can be observed between environmental units regarding the other complementary lower-ranked taxa. For instance, in the Coast, the lipids rich marine fauna from the Atlantic are usually incorporated in the assemblages, showing the local character of resource exploitation in this environmental unit. The use of specific technologies for the acquisition of these resources can be considered as another argument for regional differentiation.

Regarding rock art, during the Late Holocene we observed similarities (wide distribution of certain techniques and motif types) within the region that suggest communication on a broad spatial scale and can be considered as indicators of regional uniformity. Nevertheless, differences in the same variables among the three environmental units and along a north-south axis were also evident. Consequently, rock art also supports a differential flow of information and a potential social regionalization.

The study of the mortuary record also shows a complex scenario where on the one hand, a similar burial type, the stone structures called chenques, become the general way for burying the dead in all of CSP, especially after ca. 1500 BP. However, on the other hand, chenques are found highly concentrated in certain areas where the presence of formal burial grounds for different social groups can be posed.

A differentiation of populations is visible in the paleodietary analyses of δ13C and δ15N variations which reflect the different exploitation of environments and resources. In the Coast, the North Coast of Santa Cruz samples show the individuals with the largest consumption of marine resources, whereas in the South Coast of Chubut the presence of an individual with a marine diet signal in a context of individuals with a strong continental component in the diet can be interpreted as the presence of population cores from the interior that yet admitted the presence of individuals coming from coastal groups. In the Steppe, the farthest from the coast we are, the more continental the paleodietary signal becomes. At distances of less than 100 km from the Atlantic Coast diets still show a variable amount of marine and continental steppe resources, as it is the case of Lower Valley of the Chubut. But in the samples coming from areas closer to the Andes, the paleodietary signal becomes clearly continental and firmly based on Steppe resources. This is the case of Salitroso Lake samples, located in COSC. In the Forest, the Forest-Steppe transition is shown in the lower Ibáñez River valley (Aysén, Chile) sample. Thus, even though the differences in hunter gatherers' dietary signal can be explained by the specific exploitation of the different environments and resources where each population lived, it also reflects the spatial segregation of populations with different diets in the long term.

Lastly, it is worth mentioning that cranial studies using geometrical morphometrics techniques on samples from regions across South America have shown morphological similarities between Late Holocene populations from continental Central and Southern Patagonia, particularly when compared to populations from the north (i.e. Chaco/Pampa Region, Delta, Southern Andes) and to a lesser degree, from the south (i.e. some of the Fuegian populations) (Perez et al., 2004). At the same time, these studies, along with others based on long bone metrics (Béguelin, 2009) and dental morphometrics (Bernal, 2008) on Late Holocene samples from different areas of Patagonia underscore the low internal variation of Lake Salitroso sample when compared to others derived from the other areas, suggesting certain degree of separation of the former from the latter (Pérez et al., 2004).

Summing up, all lines of evidence provide data that can be construed as arguments both for and against the development of a regional differentiation in CSP during the Late Holocene. Regional differentiation of populations, or what many scholars call "regionalization" is a complex process that can imply many factors. It is a dynamic and non-linear process. It can be gradual or not and increase or reduce its spatial impact through time. In addition, during the same period, the process of regionalization can occur in some areas of a region and not in others causing some segments of a population to become more isolated form the chore whereas other segments come become more open and expansive.

In CSP, in the context of a regional process of environmental aridification during the Late Holocene, we pose the coexistence of both a greater social differentiation and an increased circulation of goods, people and information. Thus, we underscore that these processes can be complementary and not necessarily opposite. The question remains if these processes would have led to a deeper social differentiation and a more actively demarcation of territories in the region, had they not been interrupted by the arrival of Europeans to the Patagonian coasts in 1520.

8. Conclusions

The initial goal of this paper was to assess if the Late Holocene climatic changes that caused hunter-gatherer populations to reduce their residential mobility in Central Western Santa Cruz had similar effects at a regional scale. Second, we evaluated if, as a consequence, a process of regionalization took place during this period in continental Central Southern Patagonia.

On the basis of the evidence presented here, we believe the first question can be positively answered. The second issue needs to be further evaluated. Nevertheless, the archaeological record highlights the complexity of this process. Based on what has been presented so far, there are a variety of arguments, both for and against the idea of a process of regionalization in Central-Southern Patagonia during the Late Holocene. Thus, it is possible to suggest social dynamics where there were differences between groups that, at the same time, kept strong connections with each other. In other words, we pose the interplay between uniformity and differentiation at the time of the European arrival to the region. Finally, it is worth underscoring that to address these issues, a very broad spatial scale was needed and that, in the future, the inclusion of

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new datasets and lines of evidence for the different areas of CSP can shed new light to these questions in all their dimensions and complexities.

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Appendix A. Supplementary data

Supplementary data related to this article can be found at https://doi.org/10.1016/j.quaint.2018.03.007.

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