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Changing scenarios in Bajo de la Quinta (San Matías Gulf, Northern Patagonia, Argentina): Impact of geomorphologic processes in subsistence and human use of coastal habitats

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ABSTRACT

As in other parts of the world, the northern coast of the San Matías Gulf (Northern Patagonia, Argentina) has undergone remarkable changes after the Middle Holocene sea level maximum. By means of an interdisciplinary work, the geomorphologic evolution of Bajo de la Quinta coastal hollow was reconstructed since ca. 6000 ^{14}C BP, when the oldest human occupation of the area was detected. Main recorded changes in coastal configuration seem to have had a noticeable influence in both the use of marine resources along time by native hunter-gatherer groups, and the preservation of the archaeological evidence. With respect to the first issue, changes in human paleodiets and fishing practices could be related with the sedimentary filling and rectification of this littoral after the high marine level scenario. This study highlights the importance of reconstructing past scenarios of human activities for archaeological interpretation, in particular when studying high dynamic environments such as the coastal landscape.

1. Introduction

Bajo de la Quinta ("La Quinta Hollow") is located in the northern coast of the San Matías Gulf, Province of Rio Negro, Argentina (Fig. 1). This hollow ("Bajo") is fluvial in origin and is presently covered by a field of active dunes which have buried Pleistocene-Holocene fluvial and marine deposits, indicating an active geomorphic evolution. The area shows as well a remarkable density and variety of archaeological and bioarchaeological material, corresponding to human occupations dated between ca. 6000 and ca. 450 ^{14}C BP (Favier Dubois et al., 2006, 2009).

The present work comprises an interdisciplinary study, bringing together archaeological research and geological survey of the North Patagonian Atlantic coast. The consequent development of joint activities with common objectives allowed the articulation of geological and archaeological information at consistent scales (Dincauze, 2000). In this way, the different coastal scenarios with which native groups interacted since the Middle Holocene sea level maximum (ca. 6000 ^{14}C BP) were evaluated. Environmental setting reconstruction is a key pivot on which the discussion on past human populations' use of coastal space hinges, and may contribute to explain either its continuity or changes through time.

In Northern Patagonia, the use of marine resources by prehistoric hunter-gatherers was traditionally considered as marginal and sporadic, based mainly in historical chronicles (Viedma, 1780/83; Casamiquela, 1985). Bormida (1964) was the first in recognize their outstanding contribution. However, the relative importance and temporal depth of the exploitation of these resources in the whole Atlantic Patagonian coast was recognized only in recent decades (for a synthesis see Orquera and Gómez Otero, 2007). In the case of the central and southern Patagonian coast, the existing archaeological and isotopic evidence demonstrates a moderate to low intensity of human use of marine resources and littoral areas (Gómez Otero et al., 1999; Borrero and Barberena, 2006; Gómez Otero, 2007), with the sole exception of the Northern seashore of Santa Cruz province (Castro et al., 2006). Working with F. Borella at the Northern coast of San Matías Gulf, the authors found plentiful evidence of coastal resources exploitation since Middle Holocene times, demonstrating that such exploitation has been much more intensive than what was previously supposed (Favier Dubois et al., 2006). In relation to this, at least two differentiated stages were defined with respect to North Patagonian hunter-gatherers use of

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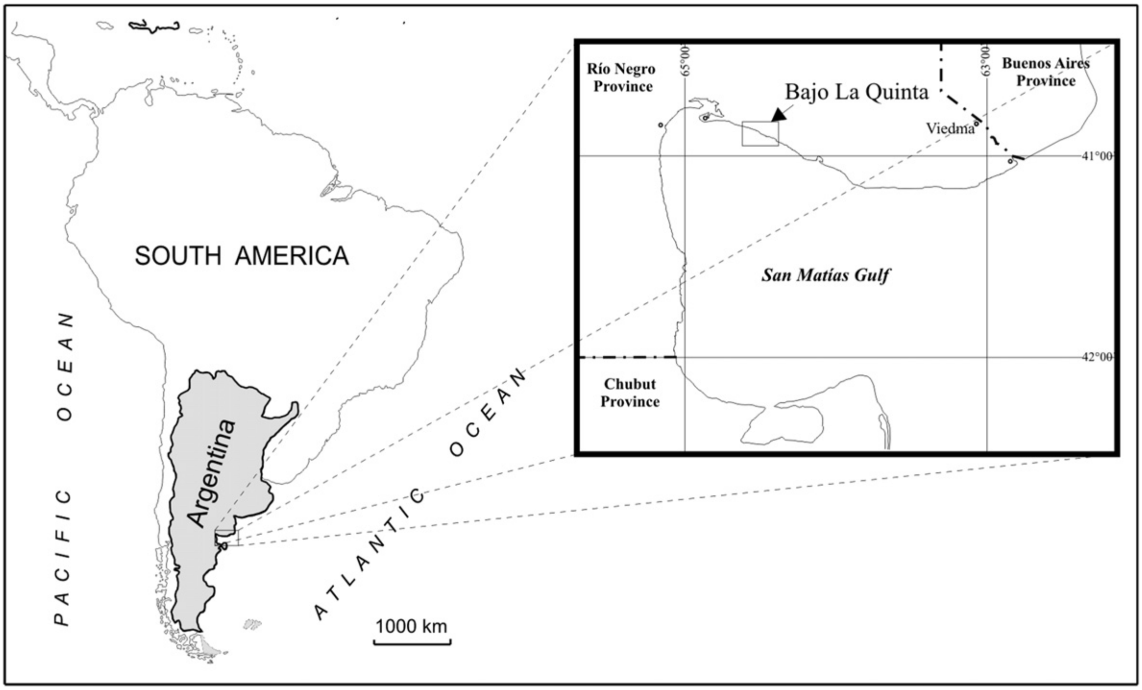

Fig. 1. Location of Bajo de la Quinta in the North Patagonian Atlantic coast.

coastal resources in this area (Favier Dubois et al., 2009). The first or early stage – Middle Holocene and Initial Late Holocene (ca. 6000 to ca. 2200 ^{14}C BP) – is characterized by the intensive exploitation of marine fauna, particularly fish (e.g. white croaker, sea bass and white bream, among others) and seals (South American sea lion and fur seal). The second or late stage – part of the Initial and Final Late Holocene (ca. 1700 to ca. 450 ^{14}C BP) – is marked by a noticeable diminution in human dependence on marine species, and an increased consumption of terrestrial fauna (guanaco, armadillo and two species of rhea birds). These results are supported by archaeofaunistic and paleodietary information (stable isotopes δ^{13}C and δ^{15}N, Fig. 2) from human remains, as well as technological data (Favier Dubois et al., 2009). However, the perspective of the past is far from being complete without approaching the scenarios which frame these dietary changes, that is, exploring natural factors that could affect decision-making on the use of the coast and its resources over time. It is in this sense that the geomorphologic reconstruction of these changing scenarios in relation to human occupation was important to contextualize the observed dietary shift, the main objective of this contribution.

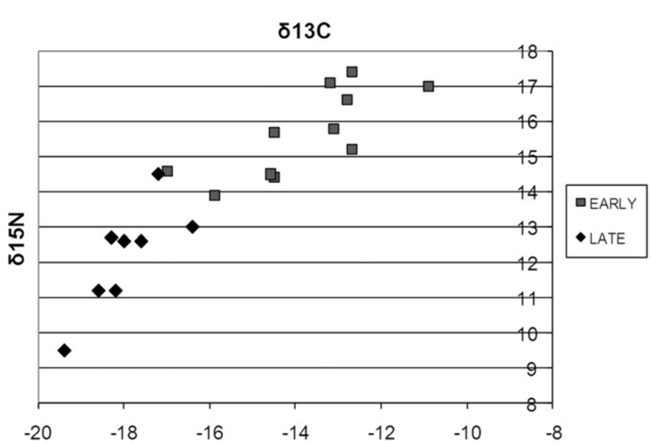

Fig. 2. Paleodietary tendencies in the northern coast of San Matías Gulf revealed by C and N isotopes for the early (ca. 6000 to ca. 2200 ^{14}C BP) and late (ca. 1700 and ca. 450 ^{14}C BP) stages of occupation. Three of the early human samples and four of the late correspond to Bajo de la Quinta (modified from Favier Dubois et al., 2009).

2. Study area

Bajo de la Quinta is a coastal hollow located in the north Atlantic Patagonian coast, San Matías Gulf, covering an approximate area of 7 km^2. The region is characterized by a semiarid climate with an average temperature of 15°, an annual rainfall of less than 300 mm, and shrub vegetation corresponding to the North Patagonian Monte (Cabrera and Willink, 1980). The macrotidal semidiurnal regime has a medium-range of 6.38 m and maximum range of 9.22 m during spring tides at the neighboring port of San Antonio Este (Servicio de Hidrografía Naval, 2009).

The San Matías Gulf presents a maximum depth of 200 m with an external 40 m deep threshold. This configuration does not allow free water exchange with the ocean, so the main influence it receives depends on atmospheric forcing (Rivas, 1990). According to Scasso and Piola (1988), circulation in the San Matías Gulf follows a closed clockwise water flow pattern. At least two external sources or energy forcings keep the circulation pattern; namely, local winds and tides. As seen from the study of the marine landforms of the area, the littoral current runs west in this sector (Kokot, 1999).

Bajo de la Quinta corresponds to a fluvial and deflation basin eroded on Neogene (Miocene) rocks belonging to the Barranca Final Formation (Kaasschieter, 1965), which is constituted by claystones and grey clayey sandstones interbedded with tuffs. This unit also forms active sea cliffs – up to 15 m high – and shore platforms. On the coast and bordering Bajo de la Quinta, Holocene and Pleistocene sandy gravel beach ridges are present (Kokot et al., 2004; Favier Dubois and Kokot, 2009). The Holocene beach ridges have an altitude of 5 m over the modern sea level and are constituted by small and medium discoid gravels of volcanic and plutonic origin. The Pleistocene beach ridges reach 20 m asl and have a similar shape and composition. These psephitic materials are derived from the

Table 1
Archaeofaunal remains with evidence of exploitation present in shell-middens by stage (modified from Favier Dubois et al., 2009). See the context and ^{14}C dating of each site in Table 2.

Early stage	Site*	Fishes (11 taxa[a])	Seals *Arctocephalus australis & Otaria flavescens*	Penguin *Spheniscus magellanicus*	Rheidae *Rhea americana* & *Pterocnemia pennata*	Armadillo *Chaetophractus villosus*	Guanaco *Lama guanicoe*
	BQ S1	X	–	–	–		–
	BCH 4	X	–	X	–	–	–
	BCH 10	–	–	X	–	–	–
	BCH BP	X	X	X	–	–	–
Late stage	BQ 126	X	X	X	X	X	X
	BQ 80	X	X	–	X	X	X
	BQ 125	X	X	–	X	X	X
	BQ 142	X	X	–	X	X	X
	BQ 235	X	–	–	–	X	X
	BQ 144	–	–	–	–	X	X

* BQ: Bajo de la Quinta – BCH: Barranca de los Concheros, in the same area.
[a] *Micropogonias furnieri*, *Diplodus argenteus*, *Eleginops maclovinus*, *Odontesthes* sp., *Paralichthys* sp., *Bovichthys argentinus*, *Acanthistius brasilianus*, *Congiopodus peruvianus*, *Pinguipes brasilianis*, *Pogonias cromis*, *Porichthys porosissimus* (Scartascini, 2010).

Tehuelche Formation, composed of fluvial and glaciofluvial rounded gravels, which cover the top of the cliff (Gelós et al., 1990). Ephemeral streams drain the Bajo de la Quinta basin, but this drainage towards the coast is impeded by the Holocene beach ridges and dunes. Although this semiarid region presents low rainfall, unusual rain storms generate a pond in the sector of interrupted drainage providing a source of fresh water by few days.

From the archaeological point of view, Bajo de la Quinta shows numerous anthropic shell-middens located in the dunes developed over marine terraces, at variable distances from the present shoreline. These shell-middens are composed mainly by two intertidal species, *Mytilus edulis* (blue mussel) and *Aulacomya ater* (ribbed mussel) and also contain abundant lithic artifacts and other marine and terrestrial faunal remains (such as fish, seals, penguins, guanacos, rheas, armadillos, and rodents), corresponding to hunter-gatherer occupations developed since Middle Holocene times. The mollusc species represented in the shell-middens are homogeneous throughout the deposits. Fish and seal remains are also present from the Middle to Late Holocene deposits. However, the terrestrial fauna remains increase in diversity during the last two millennia. Human remains were also found in the area corresponding to primary and secondary burials (Favier Dubois et al., 2006) which were important to establish the isotope based paleodietary tendencies (Favier Dubois et al., 2009).

As outlined above, stable isotope data from 19 human remains of this littoral show a change from an “intensive” to a “moderate” use of marine resources (Fig. 2). In the first or early stage, isotopic values indicate the predominant consumption of marine species of high trophic levels. The $\delta^{13}C$ and $\delta^{15}N$ mean values are -13.8 ± 1.7 and 15.6 ± 1.2 ‰ respectively; values which are consistent with an important contribution of a fish and seal diet (Favier Dubois et al., 2009). For the later period, the isotopes indicate a diminution in marine food supply ($\delta^{13}C$ mean value of -17.9 ± 0.9 ‰) with the incorporation of lower trophic level species ($\delta^{15}N$ mean value of 12.1 ± 1.5 ‰). In concordance with this regional paleodietary tendency, the archaeological faunal assemblages at Bajo de la Quinta reveal a greater importance of terrestrial vertebrates (including small mammals as armadillos) in archaeological sites corresponding to the Final Late Holocene (Favier Dubois et al., 2009, see Tables 1 and 2).

3. Methods

Archaeological and geomorphologic data was obtained from on-site fieldwork interpretation, satellite images, and aerial photographs. Radiocarbon dating (University of Arizona AMS Laboratory, and Laboratorio de Tritio y Radiocarbono –LATYR-) was also performed on fossil molluscs found on marine terraces, sediments and archaeological material from shell-middens (Table 2). These data dated both coastal landforms and human occupation in Bajo de la Quinta.

In parallel with the geomorphologic studies, stratigraphic analyses were performed in sediments excavated on the temporary pond located in Bajo de la Quinta. These analyses provided complementary information on the environmental evolution of the hollow during the Middle-Late Holocene.

Table 2
Radiocarbon dates obtained at Bajo de la Quinta.

Archaeological site	Geological context	Sample dated	^{14}C age (yr BP)	Calib. range (yr BP)[a]	$\delta^{13}C$	Lab. Ref.
–	Middle Holocene intertidal deposits	Fossil shells (*Tellina petitiana*)	6821 ± 58	7539–7404	3.4	AA88055
–	Late Holocene marine terrace	Fossil shells (*Glycimeris longior*)	2820 ± 50	2826–2665	0[b]	LP-2170
–	Late Holocene pond sequence	Organic matter	2767 ± 93	2925–2745	–23.2	AA88052
Sector Otol.1	Pleistocene spit (surface)	White croaker otol. (*Micropogonias furnieri*)	6080 ± 80	6773–6539	–15[b]	LP-1904
Sector Terraza fondo	Pleistocene spit (surface)	White croaker otol. (*Micropogonias furnieri*)	4980 ± 90	5574–5334	–15[b]	LP-2312
Shellmidden BQ S1	Sand dunes on Late Holocene marine terrace	Ribbed mussel (*Aulacomya ater*)	3000 ± 90	3051–2788	0[b]	LP-1878
Shellmidden BCH 4	Sand dunes on Late Holocene marine terrace	Charcoal	2984 ± 50	3162–2997	–22.7	AA74746
Shellmidden BCH 10	Sand dunes on Late Holocene marine terrace	Charcoal	2482 ± 49	2611–2355	–15.4	AA74748
Shellmidden BCH BP	Sand dunes on Late Holocene marine terrace	Charcoal	2197 ± 38	2298–2046	–23.4	AA81730
Shellmidden BQ 125	Sand dunes on Late Holocene marine terrace	Blue mussel (*Mytilus edulis*)	1070 ± 60	824–668	0[b]	LP-2016
Shellmidden BQ 126	Sand dunes on Late Holocene marine terrace	Charcoal	942 ± 37	902–747	–25.6	AA81727
Shellmidden BQ 80	Sand dunes on Late Holocene marine terrace	Ribbed mussel (*Aulacomya ater*)	1040 ± 60	795–674	0[b]	LP-1923
Shellmidden BQ 142	Sand dunes on Late Holocene marine terrace	Charcoal	804 ± 37	721–670	–25	AA81728
Shellmidden BQ 235	Sand dunes on Late Holocene marine terrace	Charcoal	540 ± 80	628–474	–24[b]	LP-1958
Shellmidden BQ 144	Sand dunes on Late Holocene marine terrace	Charcoal	450 ± 80	548–330	–24[b]	LP-1926

[a] CALIB REV6.0.0 (1986–2010 M. Stuiver and P. J. Reimer), for marine samples a local reservoir effect value of 266 ± 51 yr ($\Delta R = -134 \pm 51$) was used (Favier Dubois, 2009).
[b] Estimated $\delta^{13}C$ value.

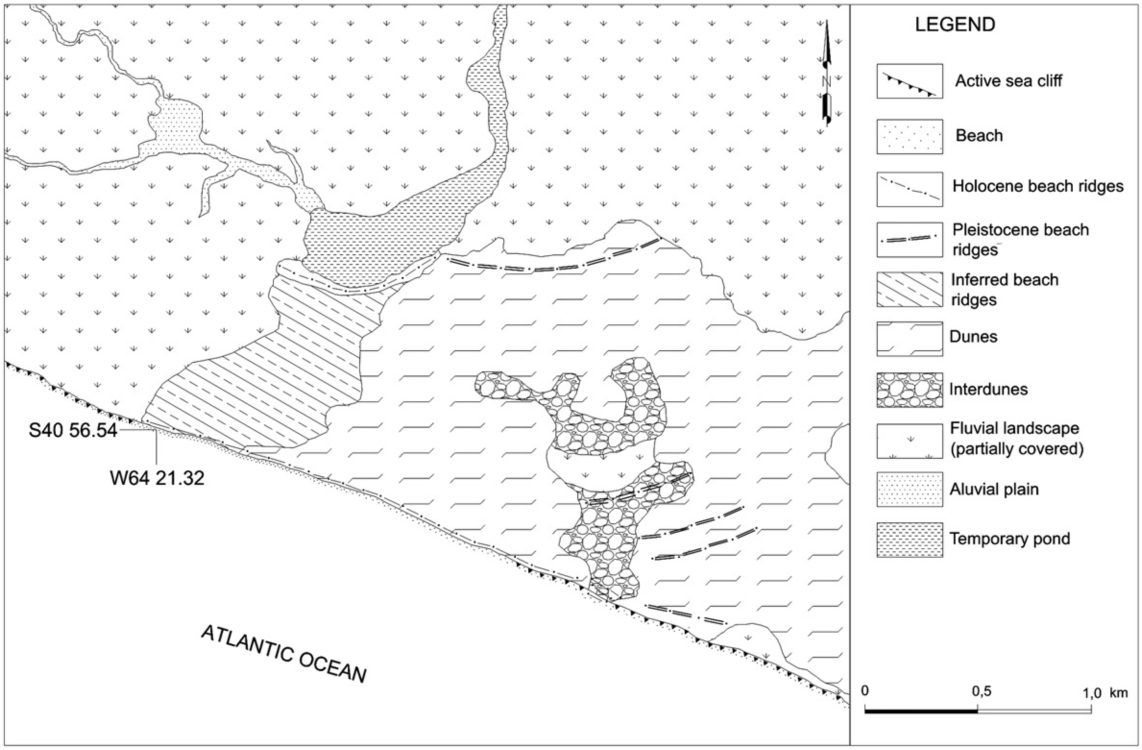

Fig. 3. Bajo de la Quinta geomorphologic map.

4. Results

4.1. Chronology

Fossilized molluscs from the Holocene marine terrace were dated by ^{14}C for establishing the chronology of main coastal scenarios of past human occupation. Archaeological fish remains (mineralized ear structures, otoliths) preserved over Pleistocene spits, and samples from ten shell-middens included in aeolian deposits developed on the Holocene marine terrace were also dated. In addition, an AMS date was obtained on sediments of the temporary pond located in the central area of Bajo de la Quinta (Table 2).

4.2. Geomorphology

The area of Bajo de la Quinta presents marine, fluvial and aeolian landforms (Fig. 3). The coastline is represented by an active sea cliff of variable altitude, reaching a maximum point in the southeast sector where the Barranca Final Formation (Kaasschieter, 1965) emerges. A sandy gravel beach can be observed throughout the entire coastline and on the foot of the cliff.

Regarding the accumulation of ancient marine landforms, there are a series of Holocene and Pleistocene beach ridges partially covered by dunes that have conformed spits. The Holocene beach ridges are arranged throughout the coast, next to the present beach and covering part of the area corresponding to the fluvial basin. The Pleistocene beach ridges comprised old spit barriers in which lagoons were present.

The eolian activity is ubiquitous. Dunes are over 20 m high and cover almost all the area making it difficult to observe the marine landforms. The main valley and a great part of the beach ridges were covered by sand, and these marine deposits and associated fauna of natural origin (mainly marine shells) can be observed only in interdune sectors. In the central area there is a temporary pond originated by the interruption of the fluvial drainage. The remainder of the area is covered by sediments of fluvial origin.

4.3. Landscape evolution and human occupation scenarios

In this section the geomorphologic evolution of past coastal scenarios is described. Eight stages (a–h) summarizes the main changes (Fig. 4):

- a- Area influenced by fluvial erosion and the coastline in Pleistocene times.
- b- During the last Pleistocene transgression (former interglacial period) the sea covered the fluvial basin.
- c- In the regressive phase, beach ridges and spits developed, bordering the east side of the fluvial basin under dominant coastal processes.
- d- Situation during the Last Glacial Maximum, sea regression (enlarged view).
- e- During the transgressive maximum in Middle Holocene times, the basin was flooded again and the sea penetrates among the Pleistocene spits. These landforms appear elevated (up to 20 m) due to relative sea level changes in which the tectonic uplift must have had an important role as in the whole Patagonian coast (Codignotto et al., 1992).

This picture represents the scenario related to the oldest archaeological record recognized in the Bajo currently found. Over the elevated Pleistocene spits surfaces, there are a great number of fish remains (white croaker otoliths) associated with large discoid stone fishnet weights. Intertidal deposits corresponding to the marine transgression sampled from the bottom of the temporary pond were dated ca. 6800 ^{14}C BP, whereas fish otholiths over Pleistocene spits provide ages between ca. 5000 and ca.

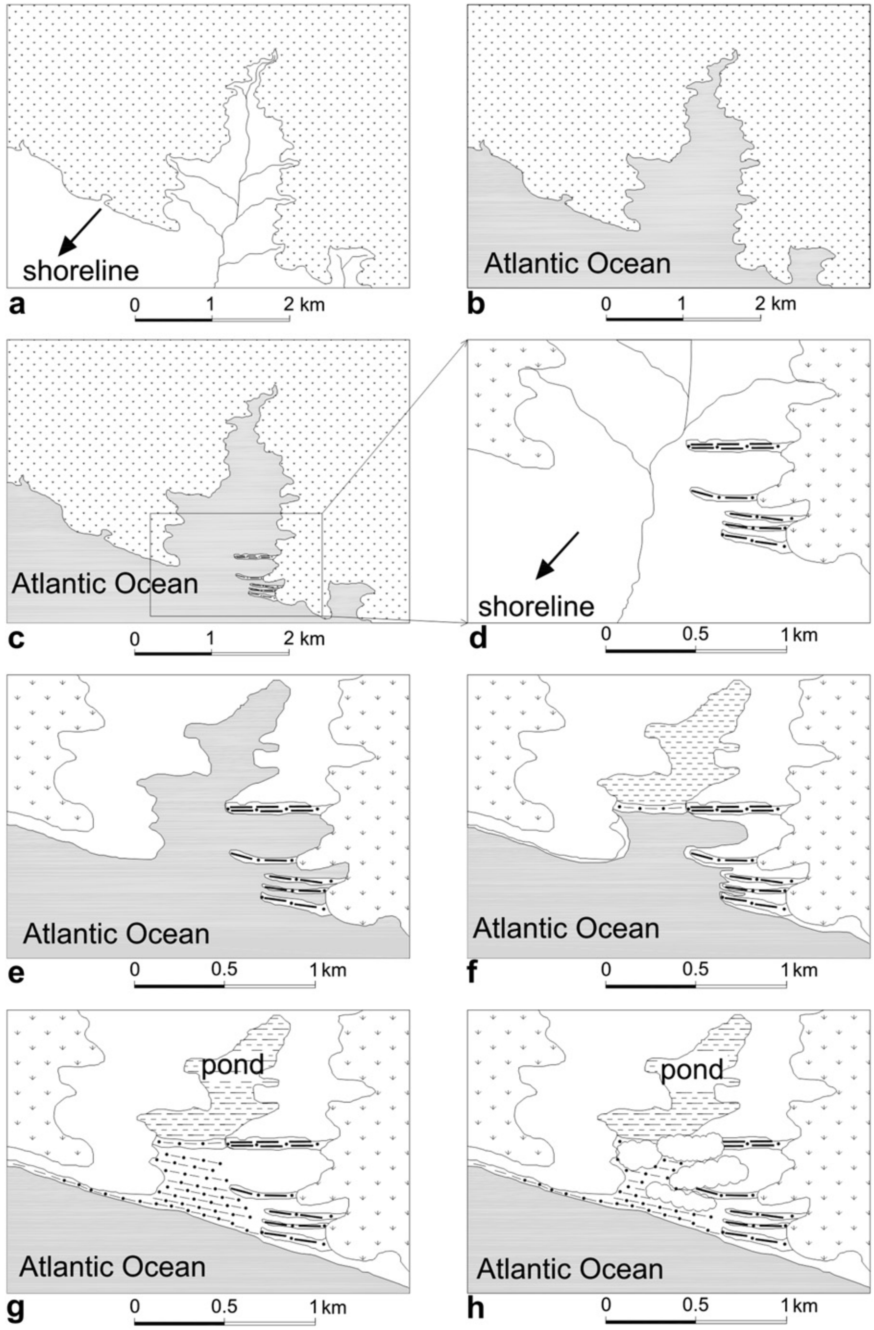

Fig. 4. Landform stages in the evolution of the coastal area of Bajo de la Quinta.

6000 ^{14}C BP (ca. 5500–6500 cal BP; Table 1). This Middle Holocene scenario shows a high marine level when the exploitation of the channels formed among the Pleistocene spits for net fishing occurred (Fig. 5). In this context, the use of a net transverse to the channel could have been very useful to retain many pieces, which then could have been placed and first processed on the surface of the adjacent spit where current otoliths were found. This practice could have been favored by the macrotidal regime that characterizes the San Matías Gulf.

f- Post-transgressive lowering of the sea level is indicated by the formation of beach ridges such as the one dated ca. 2800 ^{14}C BP (Table 1) on a Holocene terrace. An estuary formed, in which fluvial deposits generated by the basin effluents flowing into the sea are accumulated. Interruption of the fluvial drainage commences with the beach ridge barrier.

g- Holocene sea regression, formation of beach ridges and marine terrace (Fig. 6). The aeolian morphogenesis begins from rocky coastal surface erosion and deflation processes operating over the terrace.

h- Towards 1000 ^{14}C BP, aeolian dynamics become prominent, generating dune advancement that together with the beach ridges definitively interrupt the hollow drainage towards the sea. This process favored temporary fresh water accumulation, forming a pond. On the other hand, the coast is rectified, with open sea beaches (i.e. coastal inlets disappear). The periodic presence of water in the pond and interdune depressions must have been an important factor for the populations inhabiting

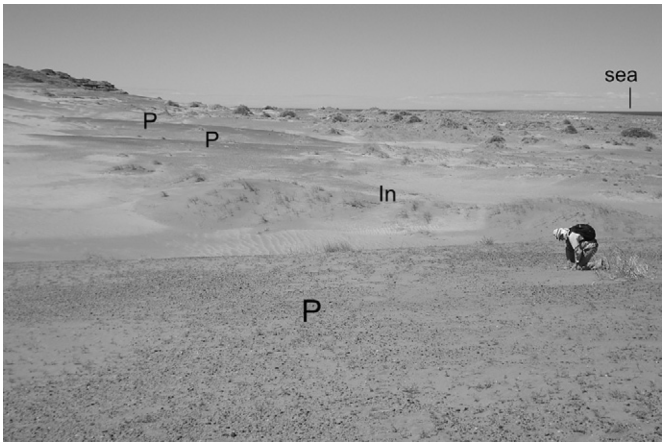

Fig. 5. Pleistocene spits (P) separated by ancient coastal inlets (In) partially covered by dunes.

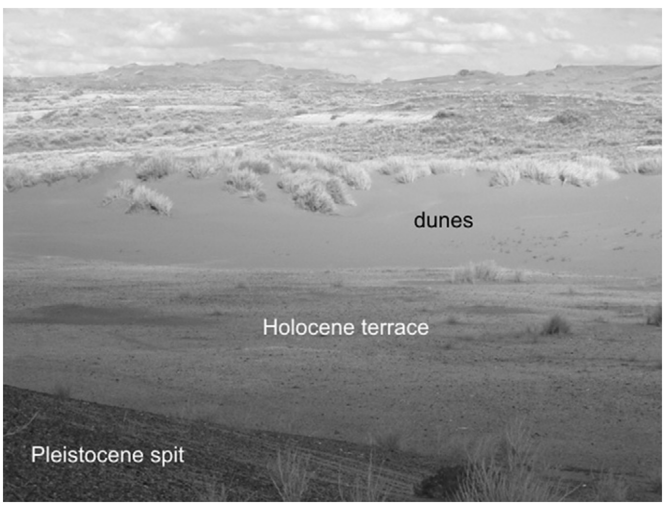

Fig. 6. Holocene terrace generated by successive beach ridges that filled the old marine inlet. The Pleistocene spit is in the foreground of the photo.

the area since superficial water resources are very scarce in the San Matías Gulf coast, with the only exception being the Negro River (Olivares and Sisul, 2005).

The importance of this Late Holocene scenario (h) is indicated by the vast amount and diversity of archaeological materials – stone

Fig. 7. View of the profile excavated in sediments of the temporary pond in the central part of Bajo de la Quinta, including the upper stratigraphic units (2–4) and the level dated by AMS (x).

artifacts, instruments made on bone and shell, archaeofaunal remains, grinding tools, pottery fragments – and human burials in the dunes developed on the Holocene terrace. This material has been preserved in the fine-grain sandy matrix and is in very good condition, unlike the early scenario (e) where the absence of such deposits resulted in the preservation of just the most resistant elements remaining on the surface of the Pleistocene spits. The Late Holocene archaeological record indicates changes in the size of the fishnet weights and in the quantity and size of the white croaker otoliths, differing from the ones found in the earlier scenario (see Table 4). The most recent human occupation in this area was dated at ca. 450 ^{14}C BP (Table 2).

The stages “e”–“h” of the geomorphologic evolution of the basin show close correspondence with the stratigraphic sequence observed in a 3 m profile excavated in sediments of the temporary pond (Table 3, Fig. 7), with marine facies at the bottom (marine transgression), then transitional and fluvial deposits (marine regression, dominance of fluvial dynamics), and finally lacustrine layers (interruption of drainage and pond dynamics) towards the top of the sequence. The AMS dating of ca. 2800 ^{14}C BP at 110 cm depth indicates the fluvial processes operating in Late Holocene times and the formation of the water pond towards the conclusion of this interval. Pollen studies are presently being performed on this profile in order to precisely evaluate the environmental succession (Marcos et al., 2010).

Table 3
Stratigraphic units recognized in the profile excavated in the ephemeral pond.

Unit	Depth	Description	Environment	Chronology
4	0–36 cm	Sandy silt, laminated.	Lacustrine	Late Holocene
3	36–110 cm	Silty sand, massive, presence of weak buried A horizons.	Fluvial	
2	110–235 cm	Silty sand, massive, abundant gypsum concretions.	Transitional	
1	235–290+	Fine sand, massive, marine shells.	Marine	Middle Holocene

Table 4
Main characteristics of white croaker otolithes and stone weights in each stage (Scartascini, 2010).

Stage	Otoliths			Stone weights				
	N	Mean size	Stand dev.	*N*	Mean weight	Stand dev.	Form	Raw material
Early	189	25.21 mm	5.01 mm	33	125 g	60.02 g	Discoidal	Volcanic & plutonic rocks
Late	57	29.81 mm	3.89 mm	8	45 g	23.3 g	Spherical	Carbonate rocks

5. Discussion and conclusions

The interdisciplinary approach performed at Bajo de la Quinta allowed exploration of the geomorphic scenarios corresponding to the main periods of human settlements, and the evaluation of the modifications in the coastal configuration and their associated environments that could have had an impact on human use of these spaces over time. The study of white croaker otoliths and fishing artifacts recovered in the locality suggests that the capture technique of this resource was different during the Middle Holocene and the end of the Late Holocene. For the former stage there is evidence of intensive netting in the marine channels developed among the Pleistocene spits. The particular coastal configuration of the above mentioned times reconstructed through geomorphologic studies (scenario e) would have facilitated mass capture netting. As these are surface sites, the preservation of this evidence has been partly biased by the taphonomic history of the assemblage, consisting mainly of hundreds of white croaker otoliths of varied sizes and stone fishnet weights over the high Pleistocene spits, which is the expectable evidence in surface contexts after millennia of exposure. The otoliths and some crab chelae fragments are the only faunal remains preserved on those terraces, thanks to their hardness and mineralization. No other faunal remains have resisted the surface conditions of mechanical and chemical weathering under the prevailing winds and semiarid climate. With respect to the stone artifacts near the stone weights, various flakes (lithic debitage), rock nodules of diverse lithology (some of them used as cores) and denticulate tools which may be associated with the first stages in fish processing were found. Many of those artifacts show signs of polish by wind action.

Towards the end of the Late Holocene, a predominance of spherical smaller fishnet weights is observed, accompanied by a reduced number of white croaker otoliths, which are bigger (indicating larger individuals) and more uniform in size (Scartascini et al., 2009; Scartascini, 2010) (Table 4). This is coherent with a technique which allows fishing fewer pieces, but selecting them by size, like the use of fishing lines. Fishing lines must have been more effective than nets for capturing white croakers (the main exploited species) and other fishes such as sea bass, white bream or Patagonian blenny on the more open coast existing in Late Holocene times (scenario g).

In short, evidence suggests there were changes in fishing practices correlated to changes in the coastal configuration and associated capture environments represented through time. Geomorphologic changes tending to rectification of the coast such as the ones that occurred in Bajo de la Quinta have also taken place in other coastal entrances of the northern coast of the San Matías Gulf, such as Caleta de los Loros, Bahía Creek and Bahía Rosas (Kokot et al., 2004). Such important changes in the coastline usually have an impact on the distribution and/or availability of marine resources. Consequently, the coastal modification at this large scale could have had a role in the decreasing use of marine resources (particularly fish) registered by paleodiets in the northern coast of the San Matias Gulf. In this sense, the recorded change in fishing practices at Bajo de la Quinta; that is, from intensive net fishing (massive capture) to predominant line fishing (selected pieces), must have had a negative impact in the energetic return generated by this activity (Favier Dubois et al., 2009). Then, the increasing incorporation of terrestrial fauna in diets could have been favored by these circumstances. Nevertheless, other factors operating in a broader scale during Late Holocene times in Patagonia may have played a role in the observed changes in subsistence strategies, including demographic increase and saturation of selected favorable places (see Barrientos and Pérez, 2004),

Another consequence of the geomorphologic evolution at Bajo de la Quinta in Late Holocene times was the fluvial drainage interruption that favored the presence of fresh water in the area. This could have been particularly important towards 1000 ^{14}C BP in view of the regional environmental deterioration during the Medieval Warm Period (ca. 900–1200 AD). This climatic fluctuation is associated with dryer conditions in Northern Patagonia according to dendroclimatic studies (Villalba, 1990, 1994). Such circumstances would have generated greater human concentration in the coastal springs (i.e. water ponds), fact that is consistent with the remarkable increment in archaeological evidence in Bajo de la Quinta at the time and the abundance of grinding tools and pottery indicating low residential mobility, hence, a greater permanence of people in those places (Favier Dubois et al., 2009). On the other hand, the development of aeolian deposits as sand sheet and dunes during Late Holocene times favored a rapid burial and a good preservation of the archaeological evidence corresponding to this interval, allowing the conservation of delicate materials like fish scales.

Summing up, the geomorphologic evolution in Bajo de la Quinta generated changing scenarios that were attractive for different reasons at different moments of the Holocene, and have contributed to shape both the use of the space by the native groups and the properties of the archaeological record preserved through time. The evaluation of these changing scenarios has been possible thanks to an interdisciplinary study which illustrates the importance of this type of approach for archaeological interpretation, and in particular, when studying high dynamic environments such as the coastal landscape. In those contexts, a geoarchaeological perspective may be very useful for facing some important questions still unclear in Patagonian coastal archaeology such as the timing of the first occupations in each region (see Orquera and Gómez Otero, 2007), and the geological biases which distort the comprehension of the human use of littoral environments through time.

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