



KEYWORDS: *Petroglyph – Hunter-fisher-gatherer – Social interaction network – Coast*

## SYMBOLS BY THE SEA: THE FIRST RECORDING OF ATLANTIC COASTAL ROCK ART IN PATAGONIA (PUNTA ODRIOZOLA, RÍO NEGRO, ARGENTINA)

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**Abstract.** The recent detection of petroglyphs on the west coast of the San Matías Gulf is the first recording of rock art in the Atlantic littoral of Patagonia. This evidence is discussed in the context of the regional and global information about coastal rock art sites. Techno-morphological and visibility analyses show similarities with motifs located in south Patagonia. These are discussed in terms of visual communication systems in societies with high mobility and open social interaction networks. It is concluded that the singular location of the petroglyphs in a coastal environment is the result of natural and social processes, such as the lower availability of rocks in the Atlantic coastal fringe, the sand-dune dynamics and the selection of specific micro-environments for the production of certain images.

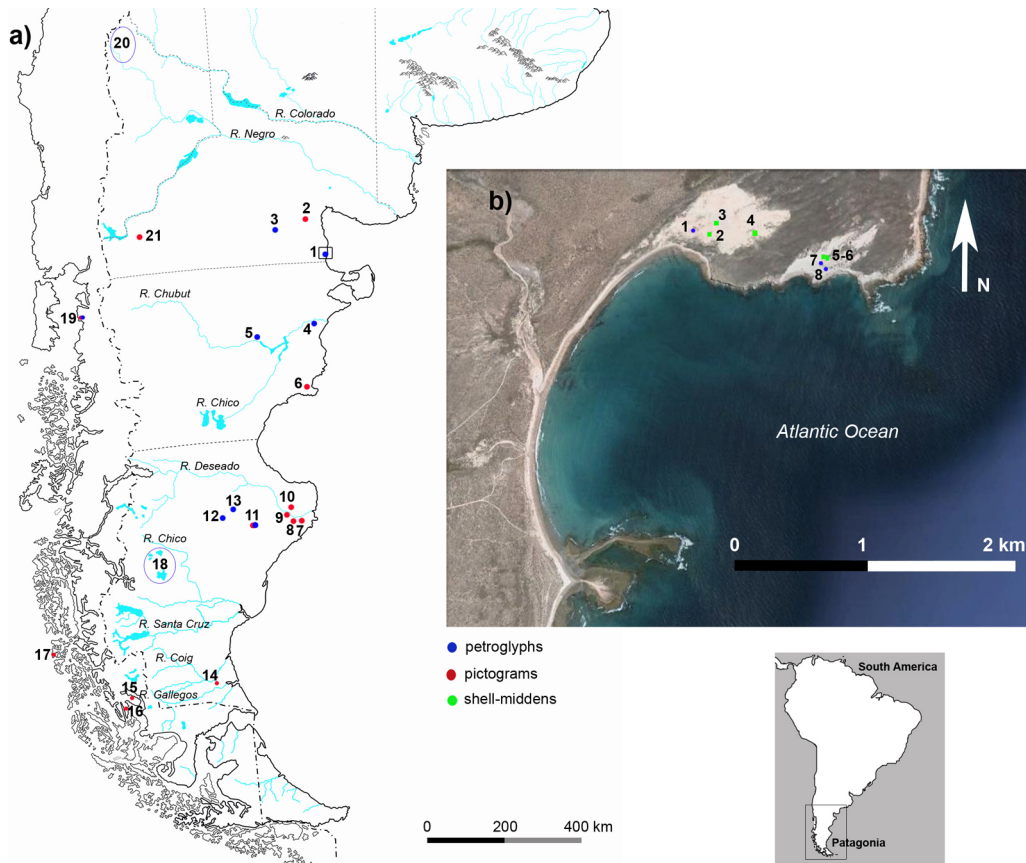
### Introduction

The localisation of rock art in close proximity to the sea is common in some regions of the world, such as Scandinavia and northern Russia (Sognnes 1998; Bradley et al. 2001; Helskog 2004; Gjerde 2010; Vogt 2014), west coast of North America (Turpin 2001; Santos Ramírez 2005), Sydney Basin (McDonald 2008; Sefton 2013), north-west coast of Tasmania (Sims 2013), Dampier Archipelago (Bednarik 2007a; McDonald 2014; Mulvaney 2013) and south coast of Brazil (Simas de Aguiar 2003; Comerlato 2005). The recent detection of two sites with petroglyphs at less than 0.2 km from the shoreline in the area of Punta Odriozola (west coast of the San Matías Gulf) constitutes, however, an exceptional finding within the Atlantic littoral of Patagonia because rock art has been mainly recorded in the interior valleys and plateaus of this vast region (Figs 1 and 2).

The goal of this work is to discuss the uneven distribution of rock art in the interior and Atlantic coastal fringe of Patagonia in the context of the social interaction networks during the late Holocene. Given that the selection of places for marking the land refers to human decisions, the study inquires into physical (e.g. availability of rocky outcrops) and social grounds (i.e. territorial and ritual behaviour) for explaining this singular location of petroglyphs in a coastal environment. The relationships between the inland and coastal motifs are evaluated through a comparative analysis of their morphological and technical attributes, together with their location, visibility and relative chronology.

A growing corpus of ethnographic and archaeological information draws attention to the active role of images in the social dynamics of hunter-gatherer groups. Provided that through their stylistic properties images may express identity, it has been proposed that their spatial distributions within certain environmental and socio-demographic conditions are relevant for inferring the nature of the past social interactions. Thus, wide spatial distributions of stylistic attributes (especially in arid environments) could be indicating contexts of open social networks and integration strategies; while circumscribed distributions (especially in fertile environments) could be pointing towards more closed social networks, possibly implying territorial behaviours as well as differentiation and regionalisation processes (Gamble 1982; Jochim 1983; David and Lourandos 1998; Ross et al. 2008; Hitchcock 2012; MacDonald and Veth 2013 for a debate of these models in the Pilbara and Western Desert regions, Australia). Territoriality among hunter-gatherers refers to social claims for immaterial and material resources which are localised in specific places and pathways, not through an overt defence or exclusion to others, but through social regulations and ritual practices which may involve the creation and recreation of images (Blundell 1980; Ingold 1986; Bradley et al. 1994; Tilley 1994; Carden 2008).

The late Holocene in Patagonia (from c. 3000 years BP) is characterised by a demographic increase, evidenced by an increment in the number of archaeological sites which also evidence more continuous and redundant human occupations (Borrero 1994–95; Salemme and Miotti 2008; Crivelli Montero 2010). The frequent



**Figure 1.** A. Distribution of the discussed sites and areas in the Patagonian region. 1: Punta Odriozola, 2: Cueva Galpón and Rinconada Catriel, 3: El Ganso, 4: Angostura de Gaiman, 5: Piedra Calada de las Plumas, 6: Cañadón Encerrado, 7: Cueva Mariscano and Alero VT, 8: Las Manos, 9: Alero Chico, 10: Gruta Molina, 11: Piedra Museo, 12: Los Navarros, 13: Laguna del Cerro Bonete, 14: Güer Aike, 15: Cueva de los Niños, 16: Cueva de los Acantilados, 17: Grotte du Pacifique, 18: Meseta del Lago Strobel, 19: Cueva Grande and Cueva Mediana, 20: Cordillera del Viento, 21: Peña 1 and Alonso 1. B. Detail of Punta Odriozola area in the southern portion of the west coast of the San Matías Gulf. 1: PO-3 (boulder 1), 2-3: PO-3 (shell-middens), 4: PO-1 (shell-midden), 5-6: PO-2 (shell-middens), 7: PO-2 (boulders 1-4), 8: PO-2 (boulder 5).



**Figure 2.** Sea view from the petroglyphs of Punta Odriozola 2 (boulders 1-4).

presence of exotic materials in sites dated to this period points to the importance of logistical mobility, extra-regional exchange and long-distance social interaction networks (Borrero and Barberena 2006; Salemme and Miotti 2008; Fernández 2009; Prates 2011; among others). The late Holocene is also represented by a proliferation of images, especially rock art (Fiore 2006; Crivelli Montero 2010). Motifs from Punta Odriozola are associated with this period and formally related to a corpus of rock art which has been originally defined as 'estilo de pisadas' ('footprint style'), mostly manifested in petroglyphs, with fewer cases of pictograms (Menghin 1957).

The repertoire of the 'footprint style' is characterised by a predominance of linear forms — straight and curved lines, circles, spirals, labyrinths etc. — usually associated with zoomorph and human figures, and especially footprints. These images are widely distributed through the whole Patagonia, especially in the interior. In south Patagonia, the formal similarities detected in petroglyphs located between the Deseado and Santa Cruz Rivers did not support the existence of social regionalisation processes (Carden 2008; Re et al. 2009; also see Charlin and Borrero 2012 for examples south from the Santa Cruz River), although some animal motifs, e.g. 'lizards', were more spatially circumscribed than others, which implied the possibility that they could have functioned as identity or territorial markers in west Santa Cruz (Carden et al. 2009). A local modality of the 'footprint style' was proposed for west Río Negro (north Patagonia); it was manifested through petroglyphs with added pigment located in the interior of caves and rockshelters. This visual repertoire was characterised by a high proportion of human footprints, combined with hands, animal footprints and different kinds of circular motifs (Llamazares 1989). Based upon this previous research, the present analysis considers a macro-regional scale for the comparison of the coastal and interior motifs in order to evaluate its implications in terms of the hunter gatherer social dynamics.

### Coastal rock art in Patagonia

Most of Patagonia's rock art, especially in Argentina, is located in the extra-Andean zone or near the Andes Cordillera. Among a corpus of more than 500 sites with rock art in this region (Renard de Coquet 1988; Fiore 2006), only ten reported sites are situated at less than 60 km from the Atlantic shoreline, most of them with pictograms (Table 1). The shortest distance after Punta Odriozola corresponds to the geometric paintings of Cañadón Encerrado, 12 km from Punta Gaviotas in Chubut (Gómez Otero and Vallejo 1996). The following nearest distances fall within a range of between 40 and 60 km from the Atlantic coast (Table 1). Petroglyphs are generally situated further inland, especially considering that the two largest concentrations with high quantities of motifs are located in the basaltic plateaus of west Santa Cruz (Belardi and Goñi 2006; Re 2010) and in the Cordillera del Viento of north Neuquén (Schobinger

1956; Vega et al. 1998; Fig. 1a). After Angostura de Gaiman, located 50 km from the shoreline, the nearest petroglyph sites to the Atlantic littoral are Laguna El Ganso (Río Negro), Piedra Calada de las Plumas (Chubut) and Piedra Museo (Santa Cruz), between 143 and 155 km from the coast (Fig. 1a; Menghin and Gradin 1972; Miotti 1991; Carden 2008; Blanco et al. 2015).

As regards to the Pacific Patagonian coast, only five sites with rock art situated near the shoreline have been reported, although their distances to the sea (between 3 and 0.1 km) are much shorter than in most of the Atlantic rock art sites (Table 1). One of them is the Grotte du Pacifique, located in the Pacific facade of the Archipelago Madre de Dios, southern Chile (Fig 1a). At least 45 pictograms (ochre paintings and charcoal drawings) were registered; the repertoire includes anthropomorphs, possible marine mammals and geometric designs. The human occupations of the site were attributed to the Kaweskar people and their ancestors. According to the geomorphology of the cave and to the surveys conducted in the archipelago, the pictograms and cultural deposits could not be older than 6000–6500 years BP (Jaillet et al. 2009).

Southeast from the Grotte du Pacifique, two sites with pictograms have been registered in the interior channels of the Magallanes region (Chile); these were also associated to canoeing hunter-fisher-gatherer groups (Fig 1a). One of them is Cueva de los Niños, by the Última Esperanza Fiord, where stains of red paint were recorded beneath the moss that covered the inner walls of the rockshelter. A human burial of two infants was uncovered in this site and dated at  $250 \pm 65$  years BP; the bone remains were associated with shell beads, fragments of tendons, feathers, hide and painted wood (Legoupil and Prieto 1991; Table 1). Not far from Cueva de los Niños, Cueva de los Acantilados was located between the Mountain Channel and the Resi stream. The red pictograms registered in this rockshelter consist of linear and punctiform geometric designs as well as traces of unidentified forms. This place was apparently on a path to the Última Esperanza Sound (Rodríguez Martínez and Oyarzún Barriá 2006; Borrero 2013; Table 1). Further north in the Patagonian littoral, two rockshelters with rock art have been found by the southern slope of Morro Vilcún, 15 km north from Chaitén, Chile (Fig. 1a and Table 1). Cueva Mediana includes red pictograms (dots and dragged finger lines), while the petroglyphs from Cueva Grande were made by percussion. No other cultural evidences were found in these sites, although a thick shell-midden, which could be pre-Historic or modern, was registered in the deepest chamber of Cueva Grande (Mena et al. 2011).

This distributional background highlights the singular location of Punta Odriozola's petroglyphs in the Atlantic coast of Patagonia, whose short distance to the sea is more similar to the Pacific coastal rock art sites than to the Atlantic ones. Furthermore, Punta Odriozola's petroglyphs share with the Pacific coastal rock art their spatial association to evidence of littoral

Subregion	Province/ region	Area	Site	Dist. to shoreline	Nearest ocean	Technique	Reference
North Patagonia	Río Negro	Pailleman Range	Rinconada Catriel	60 km*	A	PIC	Gradin 2003
			Cueva Galpón	54 km	A	PIC	Carden and Prates 2014
		San Matías Gulf: west coast	Punta Odriozola 2	0.03–0.15 km	A	PET	This paper
			Punta Odriozola 3	0.15 km	A	PET	This paper
Central Patagonia	Los Lagos	Chaitén Bay	Cueva Grande	0.2 km*	P	PET	Mena et al. 2011
			Cueva Mediana	0.2 km*	P	PIC	Mena et al. 2011
	Chubut	Lower River Chubut	Angostura de Gaiman	50 km*	A	PET	Gradin 1979
		Punta Gaviotas	Cañadón Encerrado	12 km	A	PIC	Gómez Otero and Vallejo 1996
South Patagonia	Santa Cruz	Deseado Inlet	Cueva Marsiscano	40 km*	A	PIC	Zubimendi and Ambrústulo 2014
			Alero VT	40 km*	A	PIC	Zubimendi and Ambrústulo 2014
			Las Manos	50 km*	A	PIC	Zubimendi and Ambrústulo 2014
			Gruta Molina	53 km*	A	PIC	Zubimendi and Ambrústulo 2014
			Alero Chico	55 km*	A	PIC	Zubimendi and Ambrústulo 2014
	Lower River Gallegos	Abrigo Güer Aike	55 km*	A	PIC	Manzi and Carballo Marina 2012	
	Magal- lanes	Madre de Dios archipelago	Grotte du Pacifique	0.1 km*	P	PIC	Jaillet et al. 2009
		Última Esperanza Sound	Cueva de los Niños**	< 0.5 km*	P	PIC	Legoupil and Prieto 1991
		Las Montañas Channel	Cueva de los Acantilados***	3 km*	P	PIC	Rodríguez Martínez and Oyarzún Barria 2006

**Table 1.** Nearest sites to the shoreline in Patagonia, considering the Atlantic and Pacific Oceans. \* Distances are approximate. \*\* Distance to Última Esperanza Sound. \*\*\* Distance to Las Montañas Channel. Abbreviations are A: Atlantic; P: Pacific; PIC: pictograms; PET: petroglyphs.

adaptations, such as the shell-middens. The rest of the analysed sites in the Atlantic side are clearly continental.

### Punta Odriozola: archaeological context and landscape

The Patagonian Atlantic coast is characterised by important sandy extensions which are the result of the erosion of Tertiary rocks and dominant aeolian processes (Kokot 2004). Punta Odriozola is structured by a hard substrate integrated by faulted and folded igneous and metamorphic rocks which constitute an irregular rocky landscape with cliffs, where a small sea entrance emerges. The dune field where the petroglyphs are located was formed over the sea's ancient abrasion platform, after it started to descend in consecutive pulses since the middle Holocene (Schellmann and Radtke 2010). The coastal regression generated highly dynamic new spaces (characterised by erosive and sedimentary processes) suitable for human settlement, whose distances to the sea were not very different to the current (Favier Dubois 2013). The preservation of the

archaeological materials is the result of the sand dunes' dynamics which cover and protect organic remains from weathering. However, the erosion of these dunes also uncovers the archaeological remains and generates a biased pattern in terms of visibility (Favier Dubois et al. 2008). An example is provided by the shell-middens and petroglyphs of Punta Odriozola 2 which have been exposed recently, as is suggested by the excellent preservation of the archaeo-faunal materials and rock art motifs. It is remarkable that these remains were not visible during the previous field surveys conducted in the area. Conversely, another site (Punta Odriozola 1), which was excavated four years ago, is presently not available because it has been covered by the sand (Borella et al. in press).

The aeolian mantles have yielded lithic artefacts and several traces of shell-middens which are mainly composed by bivalve molluscs (*Aulacomya atra atra*) and abundant archaeo-faunal remains. These assemblages are in close proximity to the petroglyphs: 0.06 km in Punta Odriozola 2 (PO2) and between 0.10 and 0.45 km in Punta Odriozola 3 (PO3) (Fig. 1b). The results



Figure 3. View of boulders 1–4 (indicated by numbers from the south). A, B, C and D show details of each boulder.

of the analyses of the shell-middens suggest that the subsistence in the area was based upon the consumption of otariids, guanacos (*Lama guanicoe*) and fish from the Patagonian littoral reefs. In lower proportion, Dasypodidae (armadillos) and small birds were also incorporated into the diet (Borella and L'Hereux 2013). An interesting finding corresponds to an artefact on a gastropod shell whose decoration consists of parallel straight lines and resembles the engraved rectilinear designs on the Rheididae eggshell fragments recovered from the north coast of the gulf (Fiore and Borella 2010; Borella et al. in press). This decorated artefact on shell, together with other surface findings such as shell beads and rock art, is indicating technological aspects of the past societies beyond subsistence practices and may have been imbued with symbolic meaning.

According to the archaeological evidence, the selection of this part of the coast by the hunter-fisher-gatherers was related to the intensive exploitation of marine resources, to the presence of freshwater retained in the deflation hollows and to the availability of primary and secondary lithic sources that provided rocks of good to excellent quality for knapping, from which blanks and cores are dispersed in different loci (Alberti and Cardillo 2014; Borella et al. in press). The existence in the area of a reproductive colony of sea lions (*Otaria flavescens*) in close proximity to the archaeological sites suggests the possibility of similar colonies in the

past and highlights the richness of the environment (Borella 2006). In this sense, the petroglyphs may be interpreted as a cultural transformation of the landscape which recognises its pre-existing values (Borrero 2013). Four shell-middens from different sectors in the area yielded around 3000 years BP (Borella et al. 2013); thus, in spite of its attractiveness, the human occupation of this portion of the west coast of the San Matías Gulf was apparently marginal compared to the north coast, whose chronology ranges from c. 6000 to 400 years BP (Favier Dubois et al. 2009a).

The petroglyphs are positioned horizontally over large boulders which are almost at ground-level. These are part of a Cretaceous sandstone outcrop (Arroyo Salado Formation) which emerges in the form of tabular slabs with low elevation. At PO2 motifs are distributed over five yellowish sandstone slabs. Boulders 1–4 are placed horizontally among a larger number of slabs (Fig. 3); the assemblage is 0.15 km north from the coastline, which can be observed directly from the petroglyphs (Fig. 2). Boulder 5 is placed 0.04 km south from boulders 1–4 and 0.10 km north from the coastline. It has a slightly oblique position, facing the sea (Fig. 4).

At PO3, located 1 km west from PO2 (Fig. 1b), a smaller number of motifs was recorded. These are positioned horizontally on a reddish sandstone boulder which measures approximately 4 m in a north-south

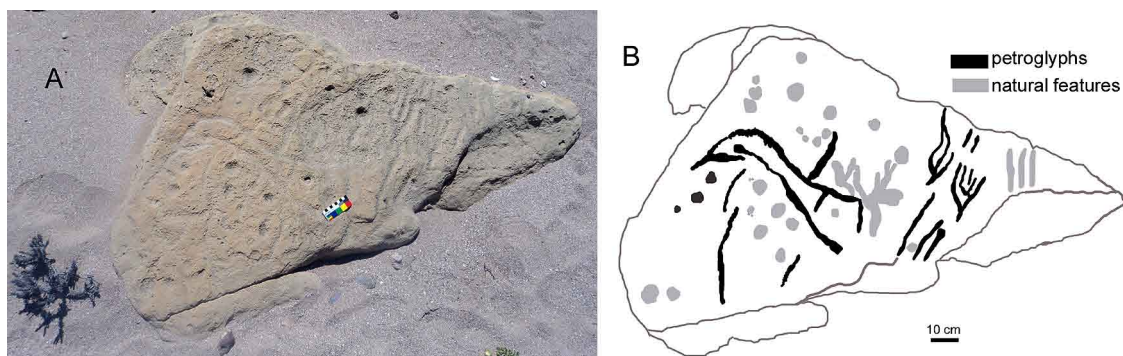


Figure 4. Boulder 5 from PO2.



Figure 5. Petroglyphs from PO3.

axis and 6 m in an east-west direction (Fig. 5). The rock is situated 0.15 km north of the coastline. At a short distance from the boulder the sea can be seen at the southwest; southward it is blocked by the presence of vegetated sand dunes.

### Methodology

Different aspects were considered in motif classification, such as location, visibility, dimensions, technique, degree of patination, weathering, superimpositions and relationships to other motifs or natural rock features. The technical analysis evaluates different extractive procedures (Whitley 2005; Bednarik 2007b; Fiore 2007; Blanco 2015) combined with motif size, groove width etc. Location considers the position of the supports and motifs (horizontal, vertical, oblique), their distance to the ground, to the sea and other relevant topographic features, as well as their distance to other kinds of archaeological evidence. Visibility is closely related to location; the visual field of a panel refers to the space of observation available around it (Aschero 1997). Visibility expresses the maximum distance from which motifs can be seen, categorised into four classes: very low (up to 1 m), low (up to 3 m), medium (up to 7 m) or high (up to 15 m or more) (Carden 2008; see Lenssen Erz 2004 for similar parameters). The degree of patination was evaluated on the basis of the grooves' colour: light (white), medium (grey) or developed (matching the colour of the support) (Re 2010; Blanco et al. 2015). Although the patination of a rock surface is a function of time, there are different micro-environmental variables that could also influence it, such as evapotranspiration, dust deposition, proximity to different types of vegetation or rock-surface organisms, the acidity of rock-surface solutions, surface roughness etc. (Keyser 2001; Bednarik 2007b). The preservation was defined as good when motifs could be easily distinguished by their sharp outline or contrast to the support; regular when motifs affected by natural or anthropic agents were still visible; and poor when the petroglyphs were very difficult to observe.

Motifs composed by single elements were classified as simple, while those composed by more than one element were classified as composite (Gradin 1978). The

formal analysis relies upon the following categories: biomorphic (zoomorphic); strokes: straight or curved linear forms whose length is less than 10 cm (isolated, grouped, aligned); lines: one-dimensional forms whose length is  $\geq 10$  cm (simple rectilinear or curvilinear, parallel, perpendicular, 'S' or 'U'-shaped, spiralled or labyrinthine); figures: two-dimensional forms which may be linear or infilled, rectilinear (squares, rectangles) or curvilinear (circles, ovals). The natural features of the rocks were also included when they seemed to be relevant in the production of motifs, which implies that rather than being neutral backgrounds, supports may have been imbued with meaning (Keyser and Poetschat 2004). The structural analysis of the composite motifs examines the way in which the elements were combined in the construction of specific images. Two possible kinds of associations are considered: (1) the clustering of elements (usually of the same kind), and (2) the attachment of elements where a core element may be distinguished (usually by size or complexity) to which other elements have been attached internally or externally (Munn 1973; Carden 2013).

The formal analysis was framed in a macro-regional scale through the comparison of the petroglyphs from Punta Odriozola with the late Holocene rock art repertoire from north Patagonia (between the Colorado and Chubut Rivers), central Patagonia (between the Chubut and Deseado Rivers), and south Patagonia (south of the Deseado River) (Fig. 1a). Attention was especially paid to specific similarities in the construction of motifs, such as the grouping or attachment of elements mentioned above; since it is considered that they are the most diagnostic for detecting formal relationships across long distances. Thus, composite motifs may be pointing, with less ambiguity than simple motifs, to a shared knowledge of certain rules (technical, stylistic) which were expressing a common ideational background (e.g. mythical, cosmological) through which the images were reproduced and decoded (Munn 1973; Aschero 1997; Curtoni 2006; Carden 2008, 2013; Troncoso and Jackson 2010).

### Results

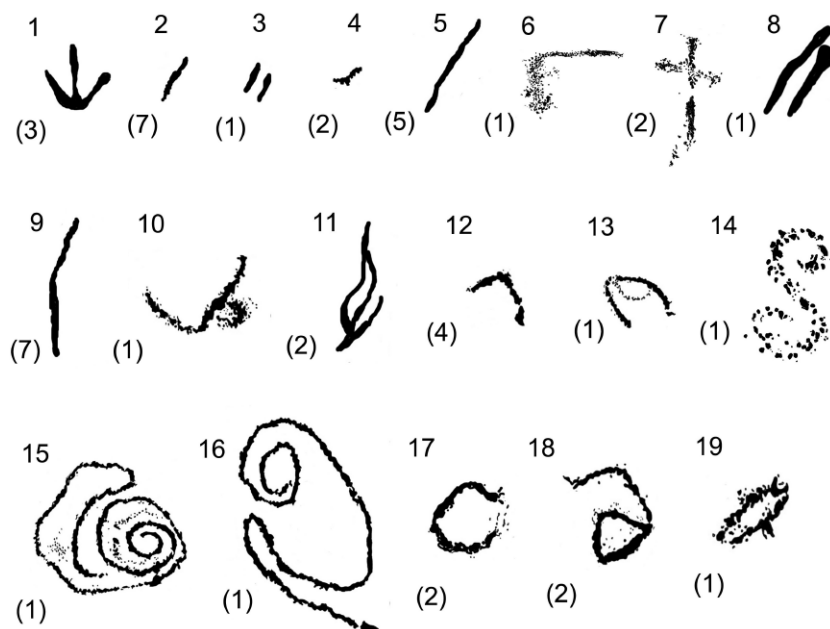
All the petroglyphs were made by percussion

Boulder/site	1-PO2	2-PO2	3-PO2	4-PO2	5-PO2	1-PO3	Total
Size (length × width in cm)	100 × 93	45 × 220	45 × 40	30 × 95	80 × 140	400 × 600	
Position	hz	hz	hz	hz	obl	hz	
Height (in cm)	g-l	< 50	< 50	g-l	g-l	< 50	
Patina	light	light	light	light	undet	undet	
Technique	P pun/con	P pun	P pun	P pun	P	P	
Relief	shallow	shallow	shallow	shallow	deep	interm	
Groove width (in cm)	0.5–3.5	0.8–4	0.6–1.25	1	1.2–3.7	0.5–3	
Preservation	good	good	good	good	poor	poor	
Number of motifs	8	1	2	1	10	3	25
Number of elements	19	1	3	1	14	7	45
Number of superimpositions	2	0	0	0	0	1	3
Elements in composite motifs	attached	-	attached	-	attached	grouped	
Use of natural features	re-marked concavity	re-marked border	attachment to hole	-	deepened cavities?	-	

**Table 2.** General information from the analysis of the petroglyphs. The position refers to both boulders and motifs. Abbreviations are hz: horizontal; obl: oblique; g-l: ground level; undet: undetermined; P: percussion; pun: punctuated; con: connected; sh: shallow; interm: intermediate

(hammering), although the kind of artefact used for the percussion was not identified. It is not clear if hammering was applied directly or indirectly (i.e. through the use of chisels); however, the experimental background suggests that direct percussion using small cobbles is the most likely technique (Bednarik

2007b; Blanco 2015). In PO2 (boulders 1–4) motifs can be clearly distinguished by their sharp colour contrast to the support and show very shallow reliefs. Although the depth of the grooves has not been measured, it can be observed that, compared to boulders 1–4 (PO2), petroglyphs from boulder 5 (PO2) exhibit the deepest



**Figure 6.** Basic elements for the construction of motifs in Punta Odriozola (n=19). Numbers in brackets show the frequency in which each element is repeated (total elements=45). 1: 'Bird footprint', 2: straight stroke, 3: straight parallel strokes, 4: curved stroke, 5: straight line, 6: line at right angle, 7: cruciform lines, 8: straight parallel lines, 9: curved line, 10: curved line + arc, 11: curved convergent lines, 12: arc, 13: arc + internal curved line, 14: 'S'-shaped line, 15: spiralled labyrinth, 16: oval labyrinth, 17: circle, 18: circle + attached line, 19: oval.

'U'-shaped grooves, and motifs from boulder 1 (PO3) are in an intermediate position (Table 2). The width of the grooves ranges from 0.5 to 4 cm, with an average of 1.6 cm in PO2 and 1.4 cm in PO3 (Table 2). Variety was detected in the kind of hammering; in boulders 1–4 (PO2) punctual percussions are clearly observable; however, in boulder 1 the percussions are more tightly connected and form continuous grooves. It is possible that the greater labour investment in boulder 1 could have been related to the complexity of the composition compared to the simpler motifs on the rest of the boulders. It is difficult to evaluate the kind of percussion in boulder 5 (PO2) and boulder 1 (PO3) because of the poor preservation of the petroglyphs. However, it can be observed that the grooves are not as punctuated as in PO2 (boulders 1–4).

Diversity is also present in weathering and patina. The light colour of the peck marks from PO2 (boulders 1–4) indicates little patination and, together with the good preservation of the assemblage, could mean that

petroglyphs are recent (Fig. 3). However, these slabs have been recently uncovered by the sand dunes, which could explain better than time elapsed their good preservation and light patina. Probably because of its close proximity to the sea, boulder 5 is highly weathered, as manifested by the presence of exfoliated and rough surfaces in the rock, which also contains small cavities. Some of these cavities may have been deepened by percussion but it is difficult to confirm this because of the intense weathering that affected the petroglyphs (Fig. 4, Table 2). Boulder 1 from PO3 also displays signs of weathering and erosion, manifested in the form of abraded and exfoliated surfaces, as well as colour changes in some portions. The grooves match the colour of the support and are difficult to observe; however, it is not clear if this situation is the result of the patination of the rock or the product of the intensive weathering conditions in this particular environment (Table 2).

The 25 motifs registered in Punta Odriozola were elaborated on the basis of 19 types of basic elements, reaching a total number of 45 elements (Fig. 6 and Table 2). Most of the motifs are simple because they are constituted by one element, while six are composite (Table 3). Lines are predominant, followed by strokes, curvilinear and zoomorphic figures in equal proportions (Table 3). In all these classes except strokes, there is a tendency towards the production of curvilinear shapes (Figs 3, 4 and 5). Peck marks not forming designs were also deliberately produced, especially on boulder 1 from PO2. Both sites differ in the way in which elements were articulated into composite motifs (Table 2). In PO2 they were combined by attachment to complex forms — i.e. the labyrinths from boulder 1 (Fig. 7a); or to simpler shapes, i.e. a natural hole and a curved line (Figs 3c and 4, respectively). In PO3, similar elements — ‘bird footprints’ — were grouped together but not attached; in one case they were also related to a curved line (Fig. 5a and b). This is the only boulder in which zoomorphs were identified.

Only three superimpositions were registered among the petroglyphs: two in PO2 (boulder 1) and one in PO3. In all cases — a straight line over a labyrinth, a curved line over the straight line (Fig. 7a) and a bird print over a curved line (Fig. 5a) — the overlapped elements integrate composite motifs, which means that the superimpositions cannot be interpreted as

Site	PO2					PO3	Total motifs	% motifs
	b1	b2	b3	b4	b5	b1		
<b>Boulder</b>								
‘bird footprint’	0	0	0	0	0	1	1	4%
<i>pair of ‘bird footprints’</i>	0	0	0	0	0	1	1	4%
<i>pair of ‘bird footprints’ + curved line</i>	0	0	0	0	0	1	1	4%
<b>Zoomorphic</b>								
straight	0	0	1	0	0	0	1	4%
straight parallel (pair)	0	0	0	0	1	0	1	4%
curved	1	0	0	0	0	0	1	4%
<b>Strokes</b>								
straight	1	0	0	0	2	0	3	12%
straight parallel (pair)	0	0	0	0	1	0	1	4%
at right angles	0	1	0	0	0	0	1	4%
<i>cruciform converging at a natural hole</i>	0	0	1	0	0	0	1	4%
curved	0	0	0	0	3	0	3	12%
converging curved	0	0	0	0	2	0	2	8%
<i>curved combined with straight</i>	0	0	0	0	1	0	1	4%
‘S’-shaped	0	0	0	1	0	0	1	4%
arc	1	0	0	0	0	0	1	4%
<i>spiralled labyrinth</i>	1	0	0	0	0	0	1	4%
<i>oval labyrinth</i>	1	0	0	0	0	0	1	4%
<b>Lines</b>								
circle	1	0	0	0	0	0	1	4%
circle + attached line	1	0	0	0	0	0	1	4%
oval	1	0	0	0	0	0	1	4%
<b>Curvilinear figures</b>								
	3	0	0	0	0	0	3	12%
<b>Total per boulder</b>	<b>8</b>	<b>1</b>	<b>2</b>	<b>1</b>	<b>10</b>	<b>3</b>	<b>25</b>	<b>100%</b>

**Table 3.** Frequency and percentage of types of motifs documented in Punta Odriozola. Motifs in *italic* are composite.

diachronic because they are part of compositional designs. This conclusion is supported by the similar patination and preservation degrees recorded between the superimposed and underlying elements (Table 2).

If each boulder is considered separately, the near absence of variation in the patina and/or preservation of the petroglyphs, together with the small number or absence of superimpositions, which were interpreted as synchronic, do not allow proposing a deep diachrony in the production of the images. If the boulders are considered comparatively, it can be observed that petroglyphs from PO3 and boulder 5 (PO2) evidence more intense weathering processes than motifs from boulders 1–4 (PO2). However, these differential conditions should not necessarily be interpreted in terms of different ages of the petroglyphs, but in the context of the particular micro-environments in which they are located. In this regard, it is possible that the exceptionally good preservation and light patina recorded on boulders 1–4 may be a consequence of their recent exposure by the movement of the sand dunes. The visibility of the petroglyphs is medium (boulder 1) and low (rest of the boulders). This is so due to the horizontal and low position of the boulders which are at ground level and because of the highly erosive conditions of the coastal environment. In PO3 and boulder 5 (PO2), low visibility is reinforced by



intense weathering.

As was mentioned, the petroglyphs are located at short distances from archaeological sites associated with the exploitation and processing of marine and terrestrial resources (Borella et al. 2013, in press). In PO2 they are located between the shoreline and the shell-middens; the distance of boulders 1–4 to these sites (0.06 km) is indicating that the images are not spatially segregated from other activity areas. The same situation is repeated in PO3; although distances are longer (0.10–0.45 km), petroglyphs are placed in the same area where the faunal resources were registered. Such proximity between rock art and shell-middens implies that the space for the production of images and subsistence activities was available (uncovered by sand dunes) and unavailable (covered by sand dunes) at the same time. This is supported by the similar preservation degrees found in the petroglyphs and faunal remains (excellent in PO2 and poor in PO3, where taxonomic identification was only possible at the Mammalia class because of the low integrity and high weathering of the bones due to their longer exposure). The evidence shows, thus, that both practices shared the same locus and, at least spatially, cannot be disconnected (Fig. 1). Given this narrow spatial relationship, until other chronological indicators are available it is inferred that rock art could be relatively contemporaneous to these subsistence activities, which only yielded dates around c. 3000 years BP (Borella et al. 2013, in press).

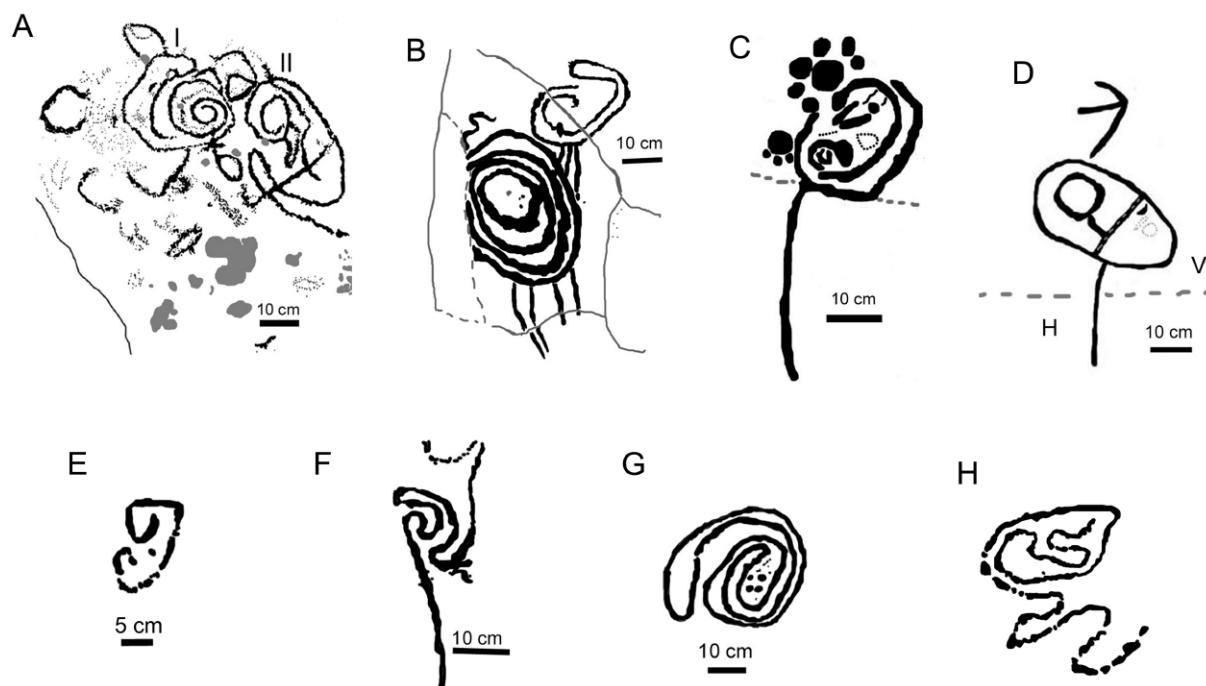
The technical variations registered in PO2 (boulders 1–4) are interpreted as degree differences and not kind differences, since all petroglyphs, whether displaying more continuous or discontinuous grooves, exhibit clear punctuated shallow peck marks and the same light patina. Motifs from PO3 are not radically different because they were also made by percussion; the grooves seem to be more continuous than on boulders 1–4 (PO2) but they are too much eroded to be conclusive. The same accounts for boulder 5 (PO2), although in this case the deeper grooves could be signalling a relevant technical difference. Formal variety was also registered in the different boulders (Table 3); however, a tendency is observed towards the production of curvilinear shapes and, bar a few exceptions (see below), the images analysed here are morphologically familiar to the repertoire of the ‘footprint style’. Furthermore, the diversity in preservation and patina found in boulders 1–4 (PO2), boulder 5 (PO2) and boulder 1 (PO3) is not possible to explain in chronological terms and, in addition, the scarce detected superimpositions are signalling synchronic compositions. The absence of superimpositions is not sufficient to reject a diachronic production of rock art; however, so far there are no strong indicators of a deep diachrony in Punta Odriozola, considering both the rock art evidence (preservation, patination, technique, superimpositions and morphology) and the radiocarbon dates. Therefore it is hypothetically proposed that these images were produced in a relatively short span of time which

coincided with the exploitation of marine animal resources and the formation of the shell-middens.

## Discussion

The chronology proposed in this paper for the petroglyphs of Punta Odriozola on the basis of the archaeological context (c. 3000 years BP) is supported by macro-regional rock art evidence. In north-western Patagonia the minimum ages inferred for similar petroglyphs which were sealed by dated sediments ranges from 2740 to 2200 years BP (Crivelli Montero 2006). Similar ages were estimated for the south Patagonian petroglyphs due to the closest dated archaeological evidences and associated material culture (Gradin 1976; Miotti et al. 2005; Belardi and Goñi 2006; Miotti and Carden 2007; Carden 2008; Re 2010; Re and Guichón 2014). Within this temporal frame, the comparative analysis revealed that most of the simple motifs from Punta Odriozola – i.e. ‘bird footprints’, straight or curved strokes and lines (simple or parallel), right angled and convergent lines, ovals, circles and circles with attached lines – circulated widely across the Patagonian region, not only as petroglyphs with diverse techniques, but also as pictograms. The only simple motif that shows a more restricted spatial distribution in Patagonia is the ‘S’-shaped line from boulder 4, PO2 (Fig. 3d), which is repeated in the form of pictograms in two sites from north-west Patagonia (Peña 1 and Alonso I), although they were dated as younger than 1000 years BP (Boschín 2009; Fig. 1a).

Among the composite motifs, some of them show widespread distributions, i.e. the grouped ‘bird footprints’ and the combined straight and curved lines; while others are only repeated in certain subregions. Among the latter, the most relevant case is represented by the two labyrinthine motifs from boulder 1 (PO2). Although the first has a predominantly spiralled shape and the second is principally oval (Fig. 6: No. 15 and 16, respectively), both can be defined as ‘atypical labyrinths’ because they consist of continuous twisting lines (Aschero 1973). Following Aschero’s classification, these figures correspond to the sub-circular atypical labyrinths (‘type d’), to which other elements were attached (Fig. 7a). The spatial distribution of the sub-circular labyrinthine figures is interesting because they are concentrated as petroglyphs south of the Deseado River (south Patagonia, Santa Cruz). An example is represented by the labyrinth of Los Navarros site, Deseado Massif, which is connected to concentric circles (Blanco 2015: 212; Fig. 7b). Although they are not strictly labyrinths because they were not produced by continuous lines, motifs closely related to the ‘d type’ have been documented in the same area at Piedra Museo and Aguada del Cuero localities (Carden 2008; Fig. 7c and d). Other sub-circular labyrinths are also present in simpler forms in the Strobel Plateau, west Santa Cruz; e.g. Puesto Las Novias, Laguna La Reja sites and Laguna del Faldeo Verde sites (Re 2010: 408, 410, 412, Fig. 7e, f and g; Re et al. 2005: 249, Fig. 7h). These



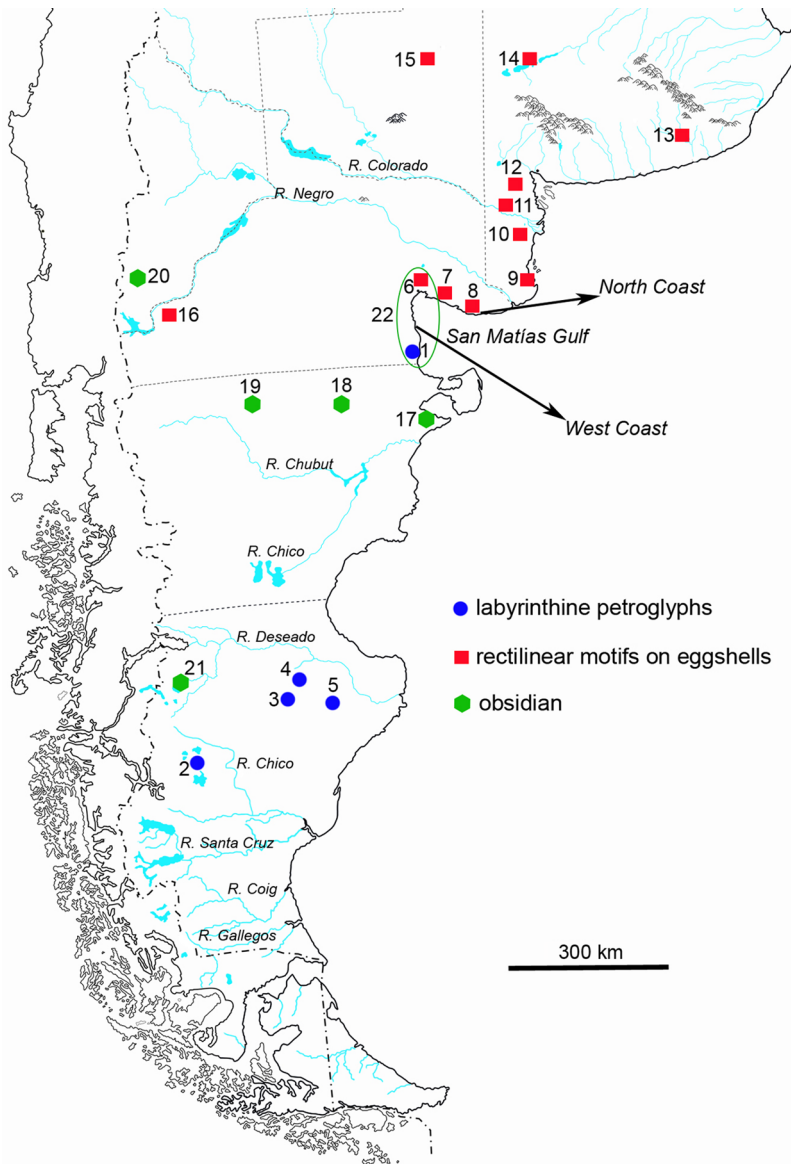
**Figure 7.** Atypical labyrinths of the sub-circular kind and related motifs. A. Boulder 1, PO2: I- spiralled, II- oval; B. Los Navarros (after Blanco 2015: 212); C. Piedra Museo (after Carden 2008: Pl. 12); D. Laguna del Cerro Bonete: V- vertical plane, H- horizontal plane (after Carden 2008: 172); E and F. Puesto Las Novias (after Re 2010: 408, 410); G. Laguna La Reja (after Re 2010: 412). H. Laguna del Faldeo Verde (after Re et al. 2005: 249). Discontinuous lines show plane changes in the rock surfaces. Grey lines and areas show natural features.

motifs were made by percussion and most of them show internal and/or external adjunct elements. Even though complex labyrinthine lines occur in north and central Patagonia (e.g. Onetto 1990; Gradin 2003; Boschín 2009), they are not similar to the labyrinths mentioned above because they are predominantly rectilinear. They have been related to a different stylistic modality, 'tendencia abstracto geométrica compleja' ('complex abstract geometric tendency'), also known as 'estilo de grecas' ('fret style'), which corresponds to chronologies younger than 1300 years BP (Menghin 1957; Gradin 1988; Podestá et al. 2008). There are only two references of curvilinear labyrinths in central Patagonia; the first one was described as a very small oval labyrinthine figure painted with thin red lines in Piedra Parada 4, north-west Chubut. It was interpreted as a local variant of the 'fret style', whose chronology in the area was estimated as c. 480 years BP according to the associated dated layers (Aschero 1983; Onetto 1986–87). The second labyrinth from central Patagonia is a petroglyph from Cerro Yanquenao, south Chubut, which was described as an irregular curvilinear labyrinthine motif, although neither images nor chronological references were provided (Gradin 1986).

The macro-regional circulation of cultural items c. 3000 years BP was not exclusive to rock art, as is observed from the lithic raw materials. Some examples from the coasts of Río Negro and Chubut correspond to artefacts made with obsidian from distant sources, such as Telsen and Sacanana in the Somuncura Plateau and Lago Lolog near the Andes Cordillera (Gómez Otero and Stern 2005; Favier Dubois et al. 2009b). A relevant

case is constituted by the lithic artefacts from Médano Grande site in coastal Chubut, approximately 100 km south from Punta Odriozola, which were made with obsidian from Pampa del Asador, located south from the Deseado River (west Santa Cruz) at a distance of 800 km (Stern et al. 2000). This example shows a very similar long-distance circulation pattern to the labyrinthine petroglyphs' (Fig. 8). Other objects from the San Matías Gulf show spatial distributions that, although widespread, do not include south Patagonia. This is the case for the *Rheidae* eggshell fragments engraved with rectilinear geometric motifs mainly registered in the north coast (Fiore and Borella 2010). During part of the middle Holocene and the initial late Holocene (c. 5600–1000 years BP), these designs circulated widely on the *Rheidae* eggs through the Pampean and north Patagonian region (Fiore and Borella 2010; Carden and Martínez 2014). This distributional panorama covering a large spatial scale in which ideas, images, objects and raw materials circulated could indicate a context of open social interaction networks. Although the differences in the spatial distributions (Fig. 8) may be interpreted in terms of different social interactions, exchanges and/or mobility patterns, sampling biases cannot be excluded and more evidence is necessary to support the idea.

Although location is different, visibility of rock art from Punta Odriozola is similar to that from the inland petroglyphs of south Patagonia. Even though variability has been registered, the latter are most commonly positioned over vertical basaltic cliffs, usually facing lagoons and near springs in the interior of depressions.



**Figure 8.** Distribution of motifs and raw materials discussed in this work.

1: Punta Odriozola, 2: Laguna La Reja, Puesto Las Novias and Laguna del Faldeo Verde, 3: Los Navarros, 4: Laguna del Cerro Bonete, 5: Piedra Museo, 6: San Antonio Oeste, 7: Bahía Final, 10, 8: Bajo de la Quinta, 9: La Serranita, 10: La Modesta and Loma de los Morteros, 11: El Puma, 12: El Caldén, 13: Paso Otero, 14: Pintado, 15: Laguna del Fondo, 16: Casa de Piedra de Ortega, 17: Médano Grande, 18: Telsen, 19: Sacanana, 20: Lago Lolog, 21: Pampa del Asador, 22: Distribution of obsidian within the San Matías Gulf area.

These humid places that concentrate faunal and floristic resources have been related to hunting activities (Miotti et al. 1999; Carden 2008), in some cases seasonally oriented towards guanaco exploitation (Gradin 1976; Cassiodoro et al. 2014). These localisation patterns are also repeated in north Patagonia at the Somuncura Plateau, Río Negro (Blanco et al. 2015; Blanco 2015). The visibility of the petroglyphs from the Deseado Massif (Santa Cruz) is generally medium or low, and even very low; i.e. people can see the petroglyphs only when they approach them. Some complex images

(including labyrinth-like ones) placed in the interior of cavities, niches and crevices in the rock facades (sometimes in very low positions) suggest that their subsequent visualisation was not as important as the experience of creating them (Carden 2013). The selection of these kinds of features of the rocks in archaeological and ethnographic contexts has been related to concerns with passages to other worlds inhabited by spirits (Lewis Williams 2002; Taçon and Ouzman 2004; Arsenault and Zawadzka 2014; among others). This does not mean that inconspicuous images are necessarily more important or sacred than highly visible ones. Such inferences should be made after case by case analyses considering form, location and visibility in a combined way. Although the sacredness of archaeological images is a very difficult topic to address, the patterned spatiality of these petroglyphs points towards repeated (traditional) and stylised (formal) behaviour that may be associated to the regularity that characterises ritual practices (Insoll 2004; Ross and Davidson 2006; Carden 2013; Whitley 2014).

The visibility of Punta Odriozola's rock art is low, not only because it is limited to those in close proximity, but also because of its short and uncertain permanency in a very dynamic and constantly transforming landscape. Due to this situation, the possibilities of detecting rock art in the field are reduced, as is suggested by the petroglyphs from PO2 and PO3, which were fortuitously discovered four years after the initial surveys in the area. It is possible that the scarcity of rock art in the Atlantic littoral of Patagonia could also be the consequence of a lower availability of rock supports in a sedimentary landscape dominated by large extensions of gravel and sand. The presence of the tabular sandstone slabs that emerge in Punta Odriozola could explain the selection of this sector for the production of images in terms of an

availability of supports.

Even though physical landscape conditions human behaviour, emphasis must also be placed on the relationships between people and their social surroundings. The archaeological information from two coastal environments that differ from the Patagonian Atlantic littoral, i.e. the submerged shorelines of Scandinavia and southernmost Patagonia (including southern Tierra del Fuego and the Chilean archipelagos) is illustrative on this point. Both regions were strongly influenced by Pleistocene glaciations, which produced

similar landscapes with abundant shallows, skerries, fjords, islands and channels. Although both have suitable rocks for the production of images, rock art is abundant in the former, including in some areas thousands of sites (Sognnes 1998; Helskog 2004; Gjerde 2010; Vogt 2014), while in the latter it is only represented by five sites with low quantities of motifs (Table 1). Similar postglacial marine adaptations deriving from seal hunting were registered in these high-latitude productive environments; however, their trajectories were different (Bjerck 2009; Bjerck and Zangrando 2013). Although changes in the material culture were documented in the occupation sequence of the Beagle Channel (Tierra del Fuego), the economic and social systems always remained strongly sea oriented with little changes in the settlement and mobility patterns (Orquera and Piana 2009; Wickham-Jones 2014). Settlement systems in Norway, instead, became more permanent towards the middle Mesolithic, pointing to an increased sedentism and intentions to return to specific places (Bjerck and Zangrando 2013). In coastal mid-Norway, one of the major rock art areas in northern Europe, the production of petroglyphs during the late Mesolithic is related with this shift in the habitation patterns among hunter-gatherers (Sognnes 1998). As the attachment to land was not so strong among the highly mobile canoeing groups from southernmost Patagonia, the absence of rock art in Tierra del Fuego could be explained by this socio-economic fact rather than by a lack of technological knowledge or rock substrate (Fiore 2003). According to these ideas, and considering that littoral adaptations from the Patagonian Atlantic coast were more land-based compared to those registered in the Beagle channel and Chilean archipelagos, it is still relevant to ask why the former, which has long-term occupations since the middle Holocene (Orquera and Gómez Otero 2007; Favier Dubois et al. 2009a), was not marked with rock art in the profuse manner as the Patagonian interior was.

### Conclusions

Rock art from Punta Odriozola is chronologically and techno-morphologically related to petroglyphs from the Patagonian interior. The similarities go beyond formal attributes and also refer to techniques (mainly percussion), visibility patterns (usually medium or low), and archaeological context (related with faunal exploitation activities around 3000 years BP). The petroglyphs manifest, thus, the reproduction of a visual repertoire which is widespread in continental Patagonia, although some specific motifs (labyrinths) are only repeated in the south Patagonian plateaus. These long-distance similarities between composite motifs imply less ambiguously than simple motifs a shared ideological context through which the images were reproduced. However, the lower frequency of these designs in the macro-regional space also suggests that the familiarity with their meanings could have been more restricted considering intra-group relationships

(e.g. groups of age and sex).

The uneven distribution of rock art in coastal and interior Patagonia may be partially related to some natural aspects of the coastal environment. Through the Punta Odriozola example it could be observed that when the petroglyphs were preserved beneath the sand-dunes they were invisible and when they became uncovered, highly erosive conditions also affected their visibility. Although the availability of rock supports along the Atlantic coast is another cause that has to be further explored, the active coastal aeolian mantles and highly active weathering processes seem to be important agents that account for low visibility and frequency of rock art and raise the necessity of a more intensive search for this kind of evidence in the Patagonian Atlantic littoral. These physical causes, however, are not sufficient to explain the compelling differential frequency of the coastal and inland rock art, which suggests that the clear human preference for producing images in the interior landscapes also must have obeyed social reasons. An inverse question may be helpful in this issue: why did people choose to make rock art in Punta Odriozola? Despite the dynamic and changing conditions of the environment, the material culture suggests intentions of permanency in this landscape, not only evidenced by rock art but also by a high frequency of exhausted mortars indicating site furniture (*sensu* Kuhn 1995) and occupational redundancy (Borella et al. in press). These motifs are evidencing the reproduction by the sea of traditional practices and images most commonly carried out in specific settings of the interior plateaus: hollows where fresh water concentrated in lagoons or springs, usually near hills. In the Deseado Massif, the recurrent association between the petroglyphs and these topographic features suggested that rock art was signifying rich micro-environments while hills (sometimes through their inter-visibility) were signalling the paths that led to these places (Miotti et al. 1999; Carden 2008). Although motifs usually had low or medium visibility, hills anticipated their presence to people who could decode the historicised and, probably, sacred landscape. The low frequency of the coastal petroglyphs does not allow proposing localisation patterns; however, some coincidences were observed between PO2 and PO3 which could guide future fieldwork in terms of what to expect when searching for rock art sites on the Atlantic coast:

- (1) They are placed within dune fields, which are the main source of groundwater recharge after low rainfall. Freshwater was a critical resource in this strip of the coastline, where no permanent or semi-permanent water courses are available.
- (2) They are in such close proximity to the sea that it can be observed from the petroglyphs or from very near them.
- (3) They are in such close proximity to material evidences of subsistence practices focused in marine resources (shell-middens) that they cannot

be spatially segregated from them. Moreover, the current presence of a breeding colony of sea lions (*Otaria flavescens*) in the area is pertinent for the interpretation of these deposits, where the exploitation of other species of otariids has been registered (Borella and L'Hereux 2013). Otariids restrict breeding and birthing to the aestival months when they generate large concentrations ashore. This means that they would have been available in dense patches on the coast, which is relevant if it is considered that people in continental Patagonia did not have access to seaworthy boats (Borella et al. 2014).

- (4) The richness of the area is also manifested by the local lithic quarries which provided raw materials with good and excellent qualities for knapping (Alberti and Cardillo 2014).

Although Punta Odriozola's rock art is situated in a productive environment, its low and medium visibility suggests that if a nexus existed between rock art and the demarcation of the land as a claim of territorial rights, it was not expressed through a conspicuous display of images as was proposed for other regions (Hartley 1992; Bradley et al. 1994; Vogt 2014). The isotopic and archaeological evidence of the San Matías Gulf shows a diet diversification (represented by marine and terrestrial animals) and the incorporation of new technologies (pottery and bows and arrows) towards the final late Holocene (1500–420 years BP). These innovations could have been related to intensification strategies in the context of a demographic saturation of the coastal springs (Favier Dubois et al. 2009a). Territorial strategies are more likely to have been developed in this period than in the earlier one (3100–2200 years BP), to which the petroglyphs are related. Furthermore, the rock art information corresponding to the initial late Holocene is not evidencing stylistic regionalisation, at least in south Patagonia (Re et al. 2009), although variability within the 'footprint style' still remains to be distinguished in the different subregions, whether in the form of a differential distribution of motifs or in the specific associations of distinct elements (e.g. Llamazares 1989 for north-west Patagonia; Franklin 2007 and McDonald and Veth 2013 for Australian examples).

The close proximity between shell-middens and petroglyphs in Punta Odriozola does not necessarily imply a semantic or functional connection between subsistence practices and image production. The rock art content does not include fish or marine mammals, but elements which could not be identified, except 'bird footprints' (although this does not mean that these images are abstract). However, the presence of animals in rock art should neither be interpreted as conclusive in favour of a necessary link, since they do not always refer to subsistence practices but may have different connotations (e.g. Lewis Williams 1980; Whitley 1994). The proximity of Punta Odriozola's images to the sea suggests its symbolic relevance, as

may also be suggested by two primary human burials from the area (Islote Lobos and Arroyo Verde) which are located at similar distances from the shoreline as the petroglyphs. Both inhumations dated c. 2700 years BP and are represented by incomplete human remains found in superficial position within the dune fields (Borella et al. in press). In other regions of the world, the localisation of rock art and human burials at the sea border has been explained by cosmology, since shorelines are liminal places where different worlds meet — i.e. land, sea and sky (Bradley 2000 and Helskog 2004 for Scandinavian cases). These kinds of sacred motivations for the production of rock art are beyond practical reasons and also guide our expectations to find more rock art in the immediacy of the sea, since a deeper inquiry on these questions can only begin to be addressed through patterned evidence in the Atlantic coast.

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