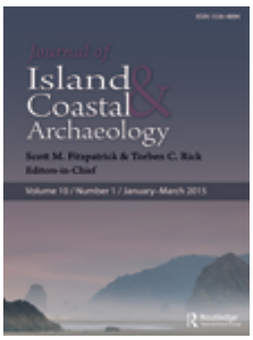

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New Results Concerning Expanded Networks of Obsidian Procurement in San Matías Gulf, Río Negro, Patagonia, Argentina

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ABSTRACT

In this article we characterize the obsidian types present along the San Matías Gulf coast through geochemical analyses and we perform a techo-morphological analyses of the recovered artifacts. Also, we present a new obsidian type that has been found for the first time in the Atlantic coast of Patagonia. By this means we hope to better evaluate trends in the circulation and use of this raw material in the San Matías Gulf during the Middle and Late Holocene. As a result, we propose that there is a differential distribution between northern and southern Patagonia and among coastal sites (black and gray obsidians). This disparity could be mainly related to spatial distance, or to different mobility patterns of the human groups or to differential availability of the sources during the year. Growing evidence also suggests different raw material circulation.

Keywords lithics, Northern Patagonian coast, obsidian, South America

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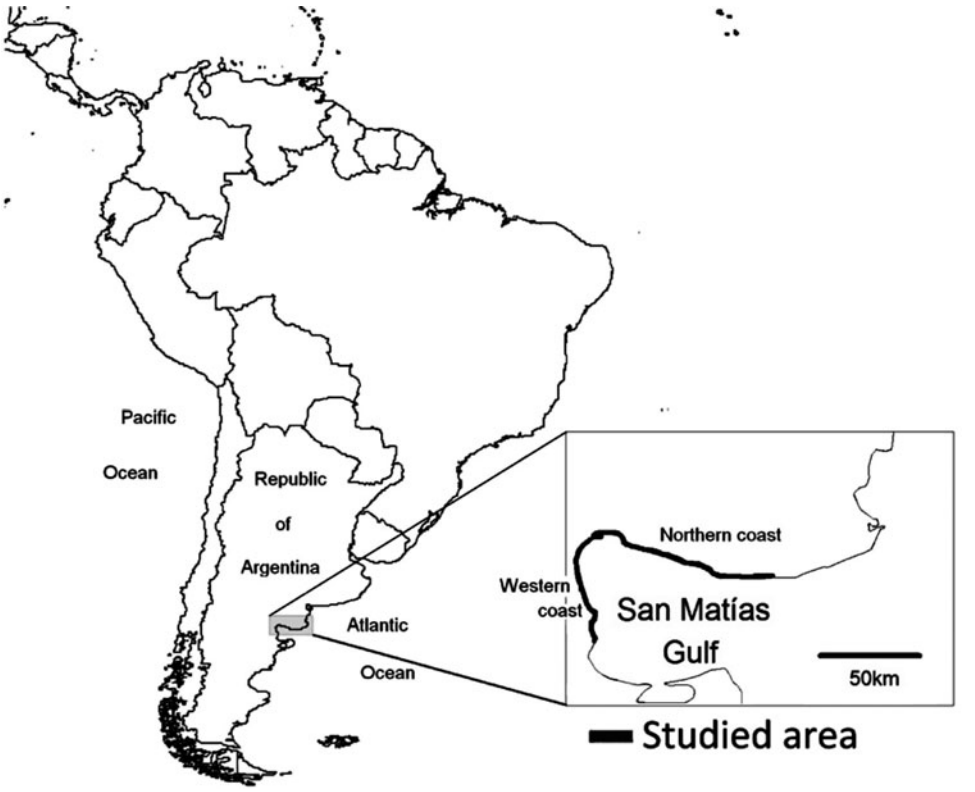

Figure 1. *San Matías Gulf, Patagonia, Argentina.*

The study of the presence of obsidian in different archaeological sites along the coast of the San Matías Gulf (northern Patagonia, Argentina) has begun to be systematized only recently (Favier Dubois et al. 2009). Obsidian is not naturally available in this area, but has been transported from sources located great distances away, so that its presence is an important line of evidence about hunter-gatherer provisioning strategies (among others, Barberena et al. 2011; Bellelli and Pereyra 2002; Charlin 2009; Civalero 1999; Favier Dubois et al. 2009; López et al. 2009; Molinari and Espinosa 1999; Stern 2004; Stern et al. 1995a, 1995b, 2000).

San Matías Gulf is located along the Atlantic coast of Patagonia (Figure 1) and runs for about 380 km in length. The coastal archaeological sites consist mainly in concentrations of superficial lithic assemblages located on terraces and shell middens among dune fields. The studied sites have different grades of preservation. The wind is the main taphonomic agent, which both covers and reveals materials during different times of the year.

Because of geomorphological and geological differences, this coast has been divided into two sectors for study (Figure 1). The northern coast of the Gulf, between the city of San Antonio Oeste and El Cóndor beach, is more heterogeneous, with sea entrances, active beaches, and cliffs, offering a greater variety of resources. In addition, there are abundant lithic raw materials of good quality for flaking (Alberti 2015) and fresh water that accumulates among dunes, characteristics that have led to a greater intensity and continuity of occupation from 6000 years BP up to 450 years BP.

The west coast of San Matías Gulf runs between the city of Las Grutas and Puerto Lobos (Figure 1). This coast is more homogeneous, with a lower diversity of resources. Raw materials are less abundant than in the northern part (Alberti 2015) and freshwater is restricted to watercourses that are also fewer in number. Here human occupations have been dated beginning only around 3000 years BP and extending up to 750 years BP.

Along the coast of the San Matías Gulf, obsidian only occurs in low proportions relative to other locally available lithic materials, and in previous analyses we showed that there has been a general pattern of declining abundance from South to North. That is, on the northern coast of the study area, the representation of this lithic material is significantly lower (Cardillo and Scartascini 2007). In this article we present data on 161 obsidian pieces: 75 from sites located on the northern coast and 86 from sites along the western part (Table 1). The samples have a wide range of typological variation, including flakes ($n = 137$, 85% of the sample), tools ($n = 16$, 10% of the sample), cores ($n = 8$, 5% of the sample) and two small nodules, recovered from both superficial as well as stratigraphic contexts.

In order to identify different sources of the obsidian, we performed an ICP-MS (ion-coupled-plasma mass-spectrometry) analysis of 25 artifacts, through which we could recognize four different types with known sources: T/CS1 and T/CS2 (mainly gray and gray-greenish obsidians) and CPLL1 and S1 (black obsidians) (Figure 3). T/CS1 and T/CS2 come from Telsen and S1 comes from Sacanana in Chubut province (225 and 380 linear km distant, respectively), while CPLL1 comes from Cantera Lolog (Neuquén province) (Lopez et al. 2009), located 560 km from the study area (Favier Dubois et al. 2009) (Figure 2). We have also recognized two types from unknown sources (DesZ and MS1). An important new finding is a broken angular flake, which is made of a visually distinctive red and black banded obsidian (Figure 4H). This flake comes from a source previously unknown in our study area: Portada Covunco (PC) in Neuquén province, 500 km away (Stern et al. 2012). This finding is of particular importance since it is the first time that this type of obsidian, which is also found as far west as Isla Mocha along the Pacific Coast of Chile, has been reported on the Atlantic coast of Patagonia. Taking all of this evidence into account, we have determined a total of seven different sources of origin for the obsidians found in sites along the Gulf's coast. Is important to clarify that even though we have not analyzed trace elements of all

Table 1. **Number of obsidian artifacts recovered in each archaeological site.**

Coast	*n*	Period
Nothern coast		
Bahía Creek	1	Middle Holocene
Bajo de la Quinta	10	Middle and Late Holocene
Bahía Final 110	2	Middle Holocene
Laguna de las Máquinas	1	Unknown
Faro San Matías	6	Middle Holocene
Saco Viejo	27	Middle and Late Holocene
San Antonio Oeste	28	Middle Holocene
Western coast		
Las Grutas	4	Late Holocene
Piedras Coloradas	11	Unknown
Buque Sur	8	Middle Holocene
El Fuerte	2	Unknown
GPS 15	1	Unknown
Arroyo Ortiz	1	Unknown
Punta Colorada	1	Unknown
Playas Doradas	1	Unknown
Islote Lobos	20	Middle Holocene
Punta Pórfido	12	Late Holocene
Punta Odriozola	12	Middle Holocene
Bahía Pozos	7	Unknown
Arroyo Verde	4	Middle Holocene
Bahía Lobos	2	Unknown

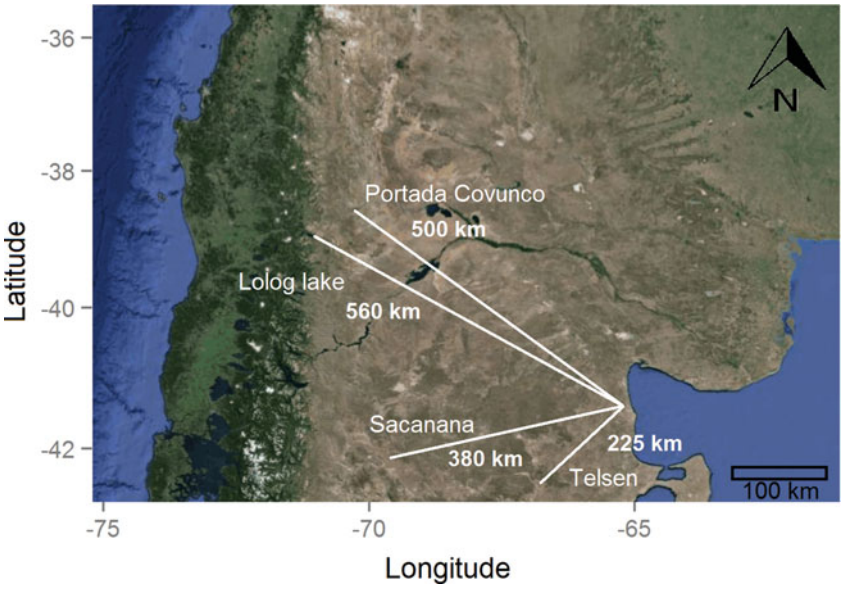

Figure 2. *Provenance sources of the different types of obsidian recovered along the coast in San Matías Gulf. Obsidians from Telsen, Sacanana, and Lolog Lake have been recovered in both portions of the coast. Obsidian from Portada Covunco has been recovered only along the west coast.*

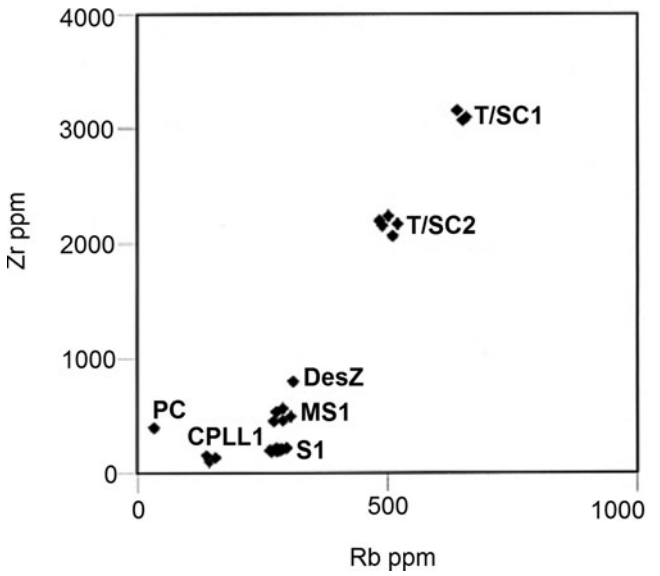

Figure 3. *Values of trace elements Zr (Zirconium) and Rb (Rubidium) for the five types and subtypes of obsidian identified in study area. The new obsidian type (PC) is included.*

Figure 4. *Artifacts recovered in the coast of San Matías Gulf. A, B and D: projectile points; C: core; E: projectile point that has been flaked using the bipolar technique; F: end scraper; G: flake; H: angular flake.*

161 artifacts, we use color as a characteristic feature for the identification of the different types of obsidian.

As previously mentioned, different stages of the manufacture of artifacts were present: nodules without modification, flakes, and even finished instruments, such as projectile points and end scrapers (Figure 4). This allows us to propose that it is likely that in some cases the raw material was transported in the form of nodules and/or cores, although the transport of preforms and finished tools may have also been possible. It is important to notice also the negative co-variation of black and gray obsidian. Where black obsidian is predominant, the gray type is not and vice versa. Only in rare instances are both types in similar frequencies in the same loci (Figure 5). Because these varieties have dif-

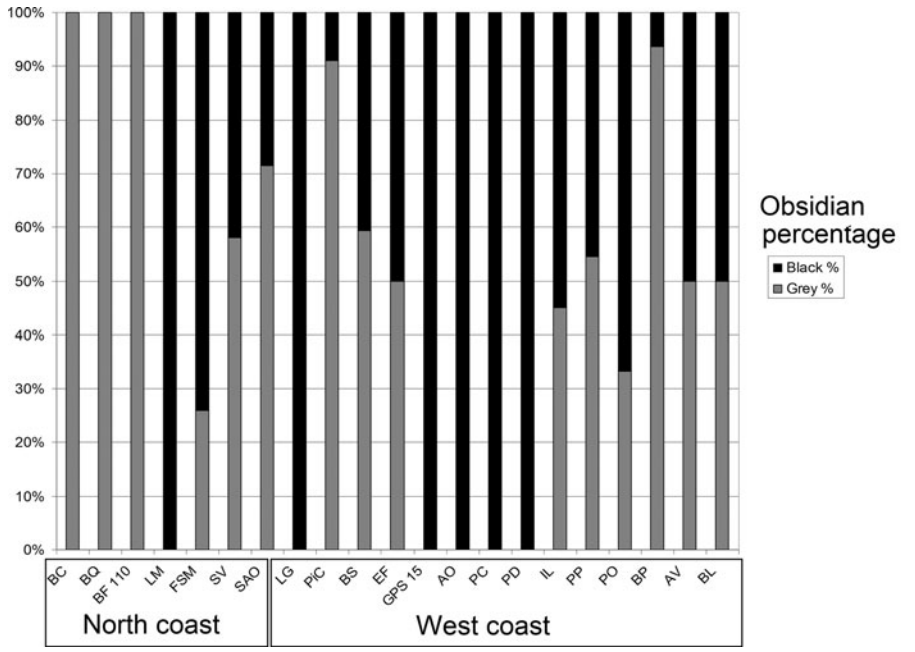

Figure 5. *Percentage of black and gray obsidian in each archaeological site. All types of obsidian are most commonly found on the west coast. BC: Bahía Creek; BQ: Bajo de la Quinta; BF110: Bahía Final 110; LM: Laguna de las Máquinas; FSM: Faro San Matías; SV: Saco Viejo; SAO: San Antonio Oeste; LG: Las Grutas; PiC: Piedras Coloradas; BS: Buque Sur; EF: El Fuerte; AO: Arroyo Ortiz; PC: Punta Colorada; PD: Playas Doradas; IL: Islote Lobos; PP: Punta Pórfido; PO: Punta Odriozola; BP: Bahía Pozos; AV: Arroyo Verde. BL: Bahía Lobos.*

ferent sources, this could be related to different mobility and provisioning patterns, including indirect acquisition, which would also reduce costs of production and transportation, as discussed below.

DISCUSSION AND CONCLUSIONS

The low proportion of obsidian in the studied sites, along with the presence of locally available raw materials of high quality for flaking, suggests that this has not been a very important resource. This may be related to the abundance of lithic raw material sources of good quality that are located along the coast. These sources are scarcer along the west coast where obsidian is more common. The discard pattern of cores (with flaking potential) and the presence of nodules without modification also suggest that there was not a strategy of conservation of this raw material. Nevertheless, some projectile points have been discarded with no remaining potential use.

In Patagonia, obsidian is a widely distributed and used raw material and appears in different contexts and with different purposes. According to our research, there is differential distribution between our study area and the southern coastal fringe of Patagonia. For example, obsidian from Pampa del Asador, which is a source located ca. 800 km south of our study area, appears along the coast of Chubut province but not in Río Negro province, and Lolog Lake obsidian is only present along the coast of San Matías Gulf, but not south of this point. This disparity could primarily be related to spatial distance, different mobility patterns of

various human groups, or differential availability of these sources during certain times of the year. Growing evidence also suggests long distance circulation of other different raw materials. In our coastal area there is evidence of the presence of rocks (quartzite) that come from the Pampean region, 300 km north of our study area (Alberti 2015).

To further investigate lithic resource acquisition and use in this region, we are in the process of doing a more intensive sampling of obsidian in some newly discovered archaeological sites in our study area to increase sample size, and better reconstruct the reduction sequences of different obsidian types. Also, new geochemical analyses are being done in order to determine if other types of obsidian could be present in the coast of San Matías Gulf. Finally, dating of buried contexts, which contain obsidian artifacts, will allow us to improve our knowledge about the temporal distribution of different obsidians.

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