



Contents lists available at ScienceDirect

Quaternary International

journal homepage: www.elsevier.com/locate/quaint

Geochemical analysis of obsidian from archaeological sites in northwestern Santa Cruz Province, Argentine Patagonia



María Victoria Fernández ^{a,*}, Charles R. Stern ^b, Pablo Rodrigo Leal ^c

^a CONICET – Instituto de Arqueología, Facultad de Filosofía y Letras, Universidad de Buenos Aires, 25 de Mayo 217, 3° piso, 1002 Buenos Aires, Argentina

^b Department of Geological Sciences, University of Colorado, Boulder, CO 80309-0399, USA

^c CONICET-Departamento de Geología, Facultad de Ciencias Exactas y Naturales, Universidad de Buenos Aires, Pabellón 2, Ciudad Universitaria, C1428EHA Buenos Aires, Argentina

ARTICLE INFO

Article history:

Available online 1 December 2014

Keywords:

Obsidian
Geochemical analysis
NW Santa Cruz
Argentina
Patagonia

ABSTRACT

Obsidian raw material has been widely used in central and southern Patagonia from the beginning of the occupation of this region. In NW Santa Cruz province, Argentina, the geochemical analyses published to date suggest that Pampa del Asador was the main obsidian source. However, both the spatial and temporal limits of the distribution of obsidians from this and other sources in the region remain undefined. The principal goal of this article is to characterize obsidian artifacts from archaeological sites, located in a portion of NW Santa Cruz, from which there is no available geochemical information. ICP-MS analyses were obtained for 49 obsidian artifacts recovered from 24 excavated rockshelters and open-air surface scatters. The results indicate that all the samples of black obsidian came from the Pampa del Asador source, located ~90–160 km to the south. Two samples of grey obsidian discovered on the top of Meseta del Lago Buenos Aires are chemically different from any other archeological obsidian yet analyzed in southern Patagonia. Their origin is still unknown, but they are most likely derived from a local Meseta del Lago Buenos Aires obsidian source. These results contribute to the knowledge about the use of obsidian in NW Santa Cruz, and provide constraints on the communication and material exchange between different environments and basins in this region.

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1. Introduction

Obsidian is an excellent material for tool-making as its conchoidal fracture results in extremely sharp edges. For this reason, in the past, it has been transported long distances from sources in different regions of the world. Different obsidians can be identified and their provenience distinguished through geochemical analysis. With this technique, the identification of the presence of obsidians from specific sources in archaeological sites makes it possible to explore variations, over different time intervals, in the indigenous use of it and the role it played in social exchange networks, among other relevant topics.

In central and southern Patagonia (Fig. 1A) obsidian raw material has been widely used from the beginning of the occupation – at >10,000 BP – of many sites studied in this region (e.g. Gradín et al.,

1979; Aschero, 1981–1982; Mena and Jackson, 1991; Stern, 1999, 2004a; Civalero, 2009; Méndez et al., 2012). In Santa Cruz province, Argentine Patagonia, geochemical analyses carried out to date for obsidian samples from archaeological sites indicate that multiple sources were used to procure this raw material. The identified provenience sites include: Volcán Chaitén (X Región, Chile), Pampa del Asador (Santa Cruz), Cordillera Bagueles (Santa Cruz) and Seno de Otway (XII Región, Chile) (Fig. 1A; Stern, 1999, 2004a; Fernández and Leal, 2014).

In NW Santa Cruz province, the few geochemical analyses published to date from archaeological sites suggest that Pampa del Asador (PDA) is their main source (e.g., Stern, 1999, 2004a). However, the spatial and temporal limits and extent of the distribution and circulation of this obsidian remain undefined. This is because analysis of the obsidian used in all the archaeological sites in the region have not yet been carried out and also because in some cases chronologies associated with the use of this raw material are not available. Therefore, the principal goal of this article is to characterize the obsidian from archaeological sites located in a portion of NW Santa Cruz, Argentina, from which there is no previously

* Corresponding author.

E-mail addresses: vickyenero@yahoo.com.ar (M.V. Fernández), Charles.Stern@colorado.edu (C.R. Stern).

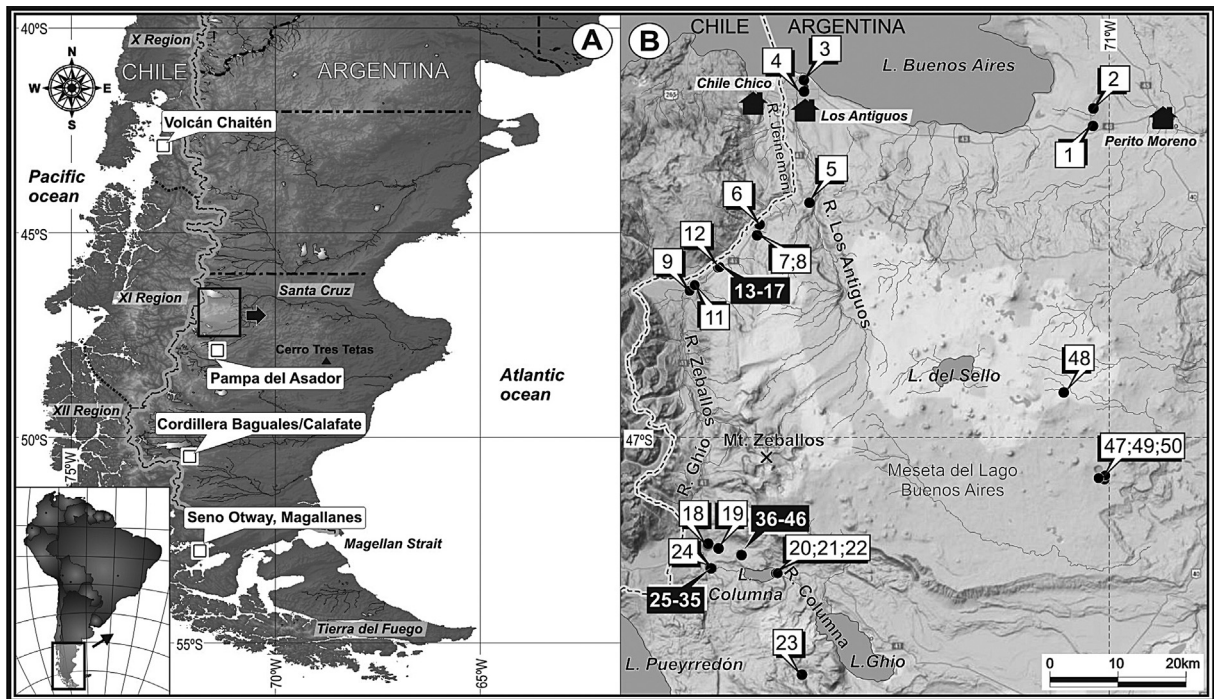


Fig. 1. A) Location of Patagonia obsidian sources, B) Samples per archaeological site in the study area. White squares indicate open air sites. Black squares indicate samples from rockshelter stratigraphic sites. The number inside each square refers to the sample code (Tables 1 and 2).

available geochemical information. With this information we analyze what sources have been used at different time periods, in different portions of the study area, and on this basis discuss possible circulation patterns of this raw material.

The study area in NW Santa Cruz (Fig. 1B) has been proposed as a natural corridor limited by the Andean Range (Chile) on the west and the western edge of the Meseta del Lago Buenos Aires and Mt. Zeballos (Argentina) on the east (Figuerero Torres and Mengoni Goñalons, 2010). This corridor links two major lake basins: lake Buenos Aires in the north and lakes Pueyrredón-Posadas in the south (Fig. 1B). Also, this circulation zone connects the steppe, forest and forest-steppe ecotones, which change according to the gradient of precipitation that increases significantly to the west and decreases eastward over a relatively short distance of only 20 km on average. Finally, throughout this area, the territories extending west to the Pacific are relatively easy to access (Figuerero Torres and Mengoni Goñalons, 2010). Recent publications have provided background information concerning the history and occupation dynamics of this portion of Patagonia (e.g., Figuerero Torres and Mengoni Goñalons, 2010; Mengoni Goñalons et al., 2013). The chronology so far places the earliest occupation detected at 6120 BP and the presence of indigenous people has continued into historic times to the present (Fernández, 2013; Mengoni Goñalons et al., 2013; San Martín, 2013).

Until now, it has been assumed that the obsidian used in the study area came from PDA because it is the closest and most accessible source (e.g., Fernández, 2013) and was the main source in other archaeological areas around the study area (e.g., Stern, 2004a). However, obsidian geochemical analyses have not yet been carried out in this specific portion of NW Santa Cruz. Not knowing the source or sources of this raw material leaves it unexplained if native people used more than one source, from when the different possible sources were used, and whether the presence of a particular type of obsidian is ubiquitous or if distribution is directed towards any particular portion of the space, especially in view of the potential communication that this study area has with different environments and basins.

This paper presents geochemical data which characterizes 49 obsidian samples from 24 sites in NW Santa Cruz in order to determine their probable origin (Fig. 1B; Tables 1 and 2). The sites include both excavated rock shelters with chronologies and open-air surface scatters, and are located in the valleys of Los Antiguos, Jeinemeni, Zeballos and Ghío-Columna rivers, along the southern coast of Buenos Aires lake, and on the Meseta del Lago Buenos Aires plateau (Fig. 1B). The geochemical results are compared with published obsidian analysis from other areas of central and southern Patagonia to determine their provenience (Stern, 1999, 2004a). With these results, we have a better understanding of how past populations used the obsidian resources, and are in a better position to contrast this new information with the previous lithic artifact technological analyses, and thereby identify possible circulation pathways and/or exchange circuits.

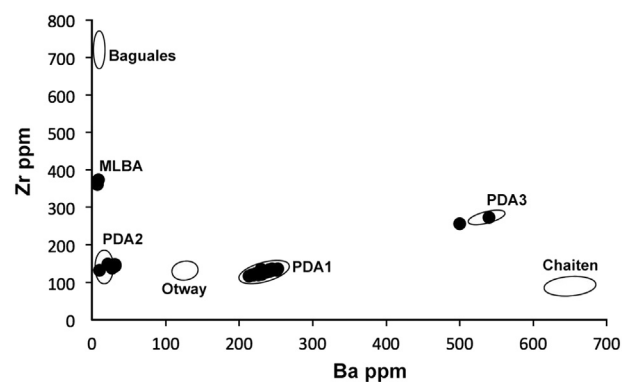


Fig. 2. Graph of parts-per-million (ppm) Ba vs. Zr contents of the different types of obsidians from NW Santa Cruz (solid circles; Table 3; PDA-Pampa del Asador; MLBA = Meseta del Lago Buenos Aires). Fields for PDA1, 2 and 3, Baguales, Otway and Chaiten are the 2-sigma ranges from previously published data (Table 4; Stern, 1999, 2004a,b; Stern et al., 2012).

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