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# A NEW OBSIDIAN SOURCE IN THE HIGHLANDS OF GUATEMALA

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## Abstract

A new obsidian source has recently been discovered in the highlands of Guatemala, near the city of Sansare, El Progreso. Ten samples have been subjected to neutron activation analysis, and the results are presented. While ceramic affinities tie the Sansare area with Formative and Classic period Highland Maya sites, linguistic evidence suggests that Postclassic inhabitants of this region were Xinca speakers.

From the Pleistocene period on, obsidian, or volcanic glass, was manufactured into stone tools by aboriginal populations throughout the Americas (Burger and Asaro 1979; Irwin-Williams 1979; Stross et al. 1977). Obsidian was also the most widely traded durable good in ancient Mesoamerica. Artifacts made of highland Guatemalan obsidian from the extensive source areas of El Chayal, Ixtepeque, and San Martín Jilotepeque have been recovered from ancient archaeological sites throughout the highlands of southern Mesoamerica, the Peten, Yucatan, and even from the Gulf coast of Mexico (Andrews et al. 1989; Hester et al. 1971; Nelson 1985). Determining the ultimate geological source of a particular artifact is possible because obsidian from each source is characterized by a distinct trace-element composition (Nelson 1985). Thus, by comparing the chemical compositions of tools with those of naturally occurring samples of known provenance, the ultimate origins of obsidian artifacts can be known. The "fingerprints" of both natural flows and man-made artifacts are usually determined by either X-ray fluorescence or neutron activation analysis (NAA). While the vast majority of Mesoamerican obsidian subjected to trace-element analysis has been assigned to known sources of volcanic glass, it is clear that several sources have yet to be identified (Cobean et al. 1991; Jackson and Love 1991; Nelson 1985).

A recent archaeological survey conducted by the University of San Carlos under the direction of Marco Antonio Leal Rodas has discovered a previously unknown obsidian source in the highlands of Guatemala (Leal Rodas 1988; Leal Rodas et al. 1988). Located 2 km to the southeast of Sansare, department of El Progreso, on a flat mesa top and its surrounding slopes (Figure 1), the Sansare flow was exploited by the ancient inhabitants of the region. In July 1990, members of the archaeological project Ri Rusamaj Jilotepeque visited the Sansare source and retrieved 10 obsidian nodules that were subjected to NAA

**Table 1.** Trace-element composition of Sansare obsidian ($N = 10$)

| Element | Concentration Unit | Arithmetic Mean Concentration | $\sigma$ of Sample (absolute) | $\sigma$ of Sample (%) |
|---|---|---|---|---|
| B | ppm | 25.1 | ± 1.2 | 4.9 |
| Ba | ppm | 703. | ±12. | 1.7 |
| Ce | ppm | 48.5 | ± 1.6 | 3.4 |
| Cl | ppm | 420. | ±51. | 12.2 |
| Co | ppm | 2.14 | ± 0.07 | 3.4 |
| Cs | ppm | 6.53 | ± 0.14 | 2.1 |
| Dy | ppm | 2.72 | ± 0.29 | 10.5 |
| Eu | ppm | 0.650 | ± 0.012 | 1.9 |
| Fe | pct | 1.24 | ± 0.03 | 2.2 |
| Gd | ppm | 2.63 | ± 0.23 | 8.8 |
| Hf | ppm | 3.49 | ± 0.05 | 1.4 |
| K | pct | 3.40 | ± 0.14 | 4.2 |
| La | ppm | 25.6 | ± 0.7 | 2.7 |
| Lu | ppm | 0.285 | ± 0.003 | 1.1 |
| Mn | ppm | 613. | ±18. | 2.9 |
| Na | pct | 2.95 | ± 0.09 | 3.1 |
| Nd | ppm | 19.0 | ± 1.0 | 5.1 |
| Rb | ppm | 139. | ± 3. | 2.2 |
| Sb | ppm | 0.570 | ± 0.032 | 5.7 |
| Sc | ppm | 3.30 | ± 0.06 | 1.8 |
| Sm | ppm | 3.70 | ± 0.06 | 1.7 |
| Sr | ppm | 263. | ±12. | 4.8 |
| Ta | ppm | 0.957 | ± 0.021 | 2.2 |
| Tb | ppm | 0.461 | ± 0.019 | 4.0 |
| Th | ppm | 10.6 | ± 0.2 | 2.3 |
| U | ppm | 4.41 | ± 0.19 | 4.3 |
| Yb | ppm | 1.75 | ± 0.04 | 2.1 |
| Zn | ppm | 40.9 | ± 2.9 | 7.0 |
| Zr | ppm | 137. | ± 5. | 3.7 |

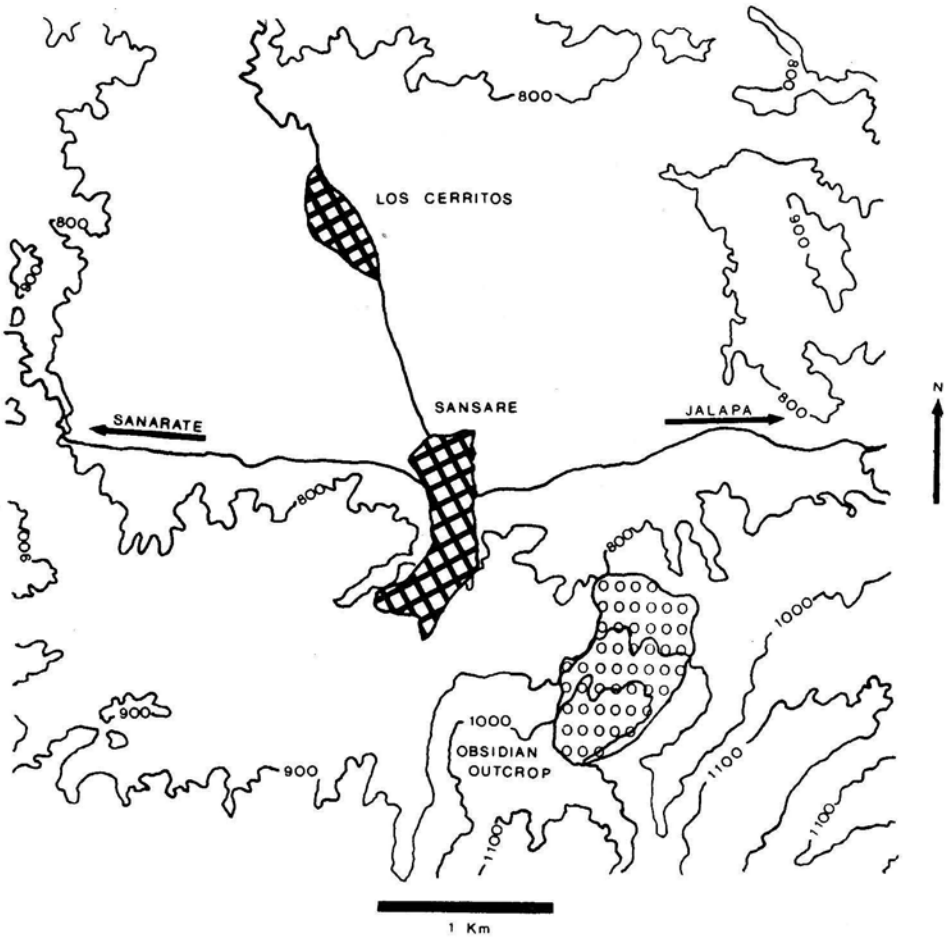


**Figure 1.** Location and approximate extent of the Sansare obsidian source. Hatching represents modern settlements.

at the Missouri University Research Reactor. The chemical composition of these samples is presented in Table 1.

The trace-element compositions of Sansare, Jalapa, and El Chayal obsidian are somewhat similar, probably reflecting the relatively small distance that separates the three sources. Glascock et al. (1990) have found that cesium and thorium are particularly useful for "fingerprinting" Guatemalan obsidian sources. Figure 2 displays the cesium and thorium compositions of several Guatemalan sources, including Sansare, Jalapa, and El Chayal. Ellipses are drawn at a 95% confidence level.

Sidrys et al. (1976:1) define an obsidian source area as "a large area containing several outcrops of obsidian, which may or may not have been utilized by ancient man, and which may or may not have similar chemical characterizations." It should also be noted that a single geological event may be associated with many outcrops, and that a source area may be formed by several geological events. Because of its proximity to both the Jalapa and El Chayal sources, the outcrop at Sansare probably should not be considered a separate source area. Indeed, the definition used here suggests that Sansare, Jalapa, and El Chayal may form one large source area.

While chemical characterization is not a criterion that Sidrys et al. (1976) use for defining a source area, trace-element analysis is the accepted tool for sourcing obsidian artifacts. Jalapa, Sansare, and El Chayal obsidian form chemically distinct clusters, and between-group variance is much larger than the within-group variance associated with each source. Sansare obsidian does not cluster well with either El Chayal or Jalapa obsidian. For this reason we believe that a new source name is appropriate.

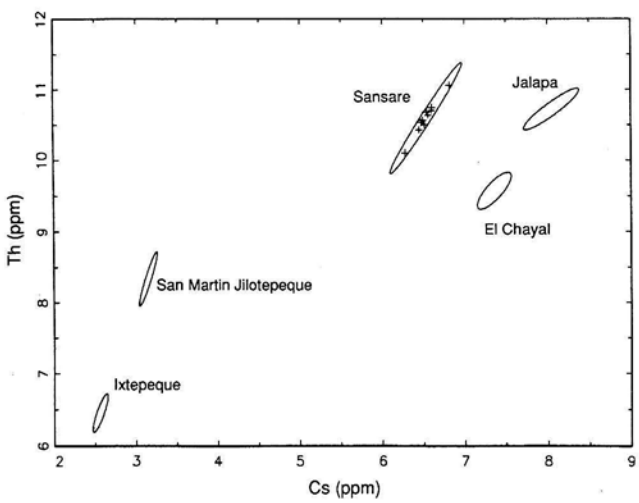


**Figure 2.** Cesium and thorium compositions of Sansare ($n = 10$) and other Guatemalan obsidians. Ellipses are drawn at the 95% confidence level.

It does not seem likely that obsidian from the Sansare source was ever distributed over a wide area. No previously unprovenanced artifacts (which have been subjected to trace-element analysis) known to us can be assigned to Sansare. Furthermore, although the source was exploited to a great degree by local inhabitants during the Middle Formative period, later it fell into disuse, except for a casual flake-core industry (Leal Rodas 1988). The quality of Sansare obsidian is quite variable, but little of it is suitable for prismatic-blade production. During the Late Formative and Classic periods, obsidian from the nearby source of El Chayal was used by the inhabitants of the Sansare region for most of their lithic needs. Jalapa obsidian was also exploited, but less commonly.

The ceramics of this archaeologically unknown region appear to resemble contemporary Formative and Classic material from Kaminaljuyu and El Portón (Leal Rodas 1988). There is some evidence, however, that later Postclassic inhabitants of the Sansare area were not Mayas. Many local place names (such as Sansare, Sanarate, Samurra, Tatasirire, and Guishoro) are Xinca in origin (Campbell 1972; Leal Rodas et al. 1988). While it would be premature to suggest that the many large Formative and Classic archaeological sites found near Sansare are Xinca, it seems likely, in view of the linguistic evidence, that this part of the eastern highlands of Guatemala was controlled by Xinca speakers at or near the time of conquest.

## RESUMEN

Un yacimiento de obsidiana ha sido descubierto en las tierras altas de Guatemala, cerca de la ciudad de Sansare, departmento de El Progreso. Se ha realizado análisis por medio de activación de neutrones (NAA) de diez muestras, y los resultados se presentan aquí. Si bien hay afinidades cerámicas con el área Sansare y sitios formativos y clásicos de las tierras altas mayas, la evidencia lingüística sugiere que los habitantes postclásicos de la región eran hablantes de la lengua xinca.

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