Ancient Obsidian Exploitation in the Mediterranean: Giali Reexamined

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(1) Introduction

Giali is one of the major Aegean obsidian sources, along with Melos and Antiparos **(Fig. 1)**. Located in the Dodecanese, this tiny island – 5   1.5 km – is now uninhabited and a major pumice mine.

While the prehistoric use of this obsidian is well established, and the island already surveyed, the source has never been published in detail (Cherry *et al* n.d.; Sampson & Liritzis 1999).

Moreover, its chemical signature was until now based on the analysis of only eight geological samples (De Francesco *et al* 2008; Renfrew *et al*. 1965; Liritzis 2008).

In 2010, as part of a larger study into the consumption of obsidian by Eastern Mediterranean prehistoric communities, we revisited Giali to address these issues.

(2) Giali Obsidian in Prehistory

While Giali was not settled until the Final Neolithic / 4th millennium BC (Sampson 1988), small quantities of its obsidian were found at a Mesolithic / 9th mill. BC site on nearby Ikaria (Georgiadis 2008: 106).

Tools were rarely made from Giali obsidian due to its high density of spherulites (**Fig. 2**), only occasionally used by neighbouring islanders during the Neolithic (7th-4th mill. BC), who otherwise relied on Melian obsidian and local cherts (Carter 2010: 201)

In the later Bronze Age (2nd mill. BC) Giali obsidian took on a major new significance, used by Cretan ('Minoan') palace-based lapidaries to make elaborate vessels for elite consumption (**Fig. 3**), emulating their Anatolian and Egyptian peers (Carter 2010: 202).

(3) Revisiting the Source

In 2010 we systematically sampled the Giali obsidian to a) investigate the availability and diversity of obsidian, and b) establish an elemental database for artefact provenance studies.

We attempted to distinguish between several distinct outcrops on the northern half of the island, investigating whether they had variant geochemical compositions

Pedestrian survey began in the middle of the island and proceeded northward following a cliff-like outcrop of obsidian, perlite, and banded rhyolite that runs at the base of the slope along the western flank of the island (**Fig. 4**).

Obsidian is readily available but is uniformly so highly spherulitic as to prevent conchoidal fracture .

We then covered the western slope of the Giali's northern peak, with the lower slopes formally surveyed with 15m spacing between fieldwalkers, but the steep and densely vegetated slopes soon rendered this impractical, and survey on the upper slopes was opportunistic. The lower slopes on the east side were also sampled

Fig. 1*. Map of major Aegean obsidian sources*

Fig. 2*. Nodule of Giali obsidian with spherulites*

Fig. 3*. Giali vase from 2nd millennium BC Crete*

Fig. 4*. Outcrop of spherulitic obsidian in boulder form*

(4) Sampling

Obsidian was collected with distinct sample reference ID #s from six spatially distinct localities (Giali I - Giali VI), with 5 - 10 samples taken from each, a total of 50 pieces (**Fig. 5**).

Good quality obsidian is also reported from the SW and NE tip of Giali (Sampson & Liritzis 1999: 104-105) but was inaccessible due to mining operations.

(5) Elemental Characterization of Giali Source Samples

Twenty source samples were analysed at the McMaster Archeological XRF Laboratory [MAX Lab] on a Thermo Scientific *Quant'X* energy-dispersive x-ray fluorescence spectrometer [EDXRF].

Each sample was analysed non-destructively under two different conditions (each for a duration of 200 seconds), recording Ti, Mn, Fe, Ni, Cu, Zn, Ga, Rb, Sr, Y, Zr, Nb, Ba, Pb and Th.

Trace element intensities were converted to concentration estimates through reference to various international standards, including those certified by NIST and USGS.

(6) Results

Figures 6-7 comprise bivariate Sr *vs.* Rb and Y vs. Zr contents plots that demonstrate clearly that the elemental values of the samples from the six collection points intermix.

These specific trace elements were chosen on the basis of instrumental accuracy and their utility in discriminating the products of Mediterranean obsidian sources (De Francesco *et al* 2008).

The data thus suggests strongly that our samples represent the products of different outcrops from the *same* flow, and by extent the same geo-chemical source.

(7) Conclusions and Future Directions

Our analysis of 20 geological samples - from six collection points targeting the well-known spherulitic obsidian - suggest that these products all come from the same flow.

This claim should be bolstered through the characterization of the remaining 30 source samples.

The next task is to return to Giali to collect samples of the alleged artifact-quality sources from the SW and NE tip of the island (Sampson & Liritzis 1999: 105).

Resultant data will then allow archaeologists in the Dodecanese and Western Anatolia to re-examine the assumption that all non-spherultic obsidian in the region is necessarily Melian and potentially raise the significance of the Giali source.

Fig. 5*. Map of Giali showing sampling collection points and other source locations*

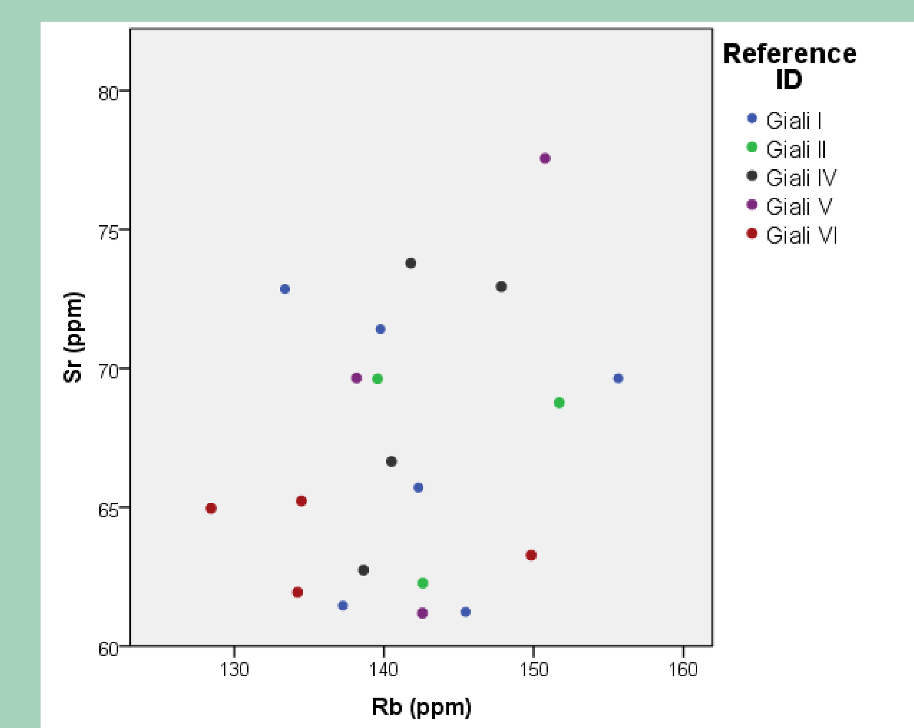

Fig. 6 *Bivariate contents plot of Sr vs Rb for 20 source samples*

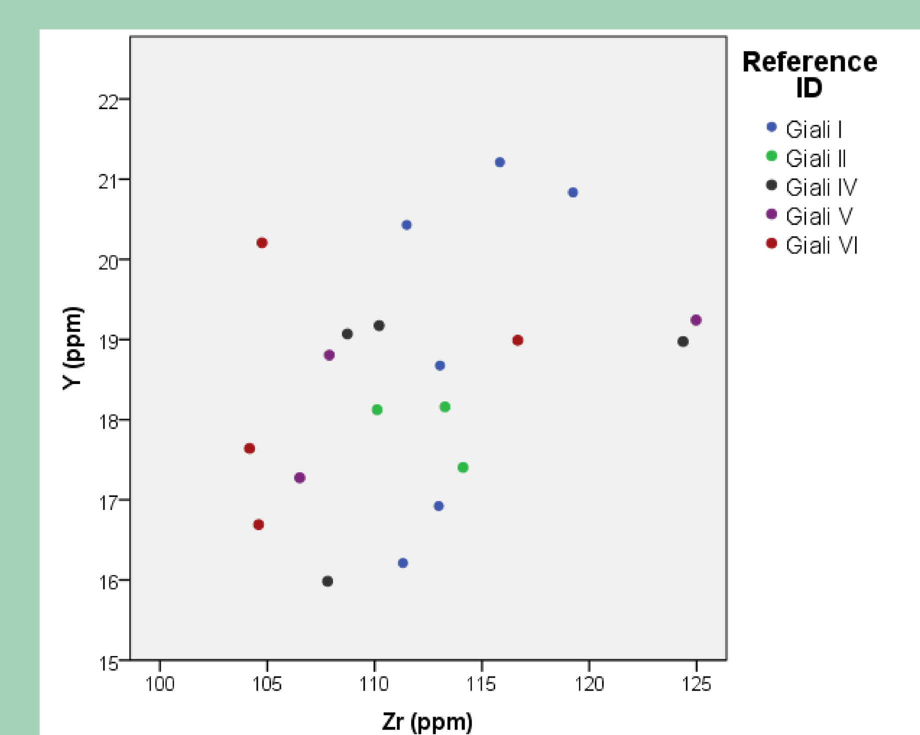

Fig. 7*. Bivariate contents plot of Y vs Zr for 20 source samples*

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