NEW OBSIDIAN SOURCING RESULTS FOR INTERIOR VENTURENO CHUMASH SITES: THE OAKBROOK PARK/LANG RANCH EARLY SITES

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As new radiocarbon dating reveals the antiquity of interior sites abutting the Santa Monica Mountains, this updated record of obsidian sourcing contributes to a re-evaluation of the antiquity of purported trade routes and sources utilized by the Early Period Ventureno Chumash.

With the recent publication of new Accelerator Mass Spectrometry dates for numerous interior sites abutting the Santa Monica Mountains, our scope of research at the Lang Ranch Project has expanded to review new X-ray fluorescence (XRF), portable X-ray fluorescence (pXRF) and Neutron Activation Analysis (NAA) sourcing of obsidian that has been recovered from these sites (Roman 2017). Our case study of three sites examines the relationship between the evidence for the sources of this material and considers its correlation with the early dates from these sites, as well as summarizes past hypotheses about the specific routes that were utilized to procure the material. In addition, we examine the evidence for hypothetical trade routes based upon early reports of Native American trails from Farmer (1935) and Van Valkenburg (n.d). Alternatively, we acknowledge cautions issued by various scholars regarding the over-utilization of various proxies that have been extrapolated as evidence for long-distance trade.

In 2017, Roman reported on a new series of AMS radiocarbon dates that were recovered for the interior sites of CA-VEN-1029, -852, and -853 (Roman 2017). For a complete review of the methodology of the study and discussion of these curated collections, please see that publication. The largest site, VEN-1029, covered over 54,000 square meters and contained more than 35 excavation units. The two sites adjoining it, VEN-852 and VEN-853 were also investigated during the late 1980s. These sites were later assigned the label of an interior region “site complex” by Kelly et al. in the 1990s (Kelley et al. 1990). As noted on the “Site map”, they abut the Santa Monica Mountains region and are part of what has been called the “Conejo Corridor” which was ostensibly utilized by Ventureno Chumash groups as early as the Early Period (Walsh 2013; C. King 2011).

Site VEN-1029 was originally excavated by Ancient Enterprises under the direction of C. William Clewlow, registered under Site Records by B. Gothar (1990). The earliest date reported from that site was from a unit containing a matrix of hearth, charcoal and shell/plant remains. The date of 9757 cal BC was from Unit 7, which contained a matrix of hearth, charcoal and shellfish remains. Five separate units were dated consecutively from level 30–40 centimeters down to the lowest level which generally was 100–110 centimeters. Table 1 lists the new AMS radiocarbon results for this site.

Sites located proximal to the large open plain of VEN-1029 were VEN-852 and VEN-853; these include dates from the Early Period, the earliest being 8766 ± 45 rcybp. VEN 852 was dated to as early as 5211 ± 32 rcybp. Roberta Greenwood considered VEN-852 and VEN-853 to be closely related (Greenwood 1987). For the VEN 853 site, new AMS dates clearly demonstrate chronology of the Early- Middle Periods. Site VEN-852 is dated to the Middle Period.

Figure 1 illustrates the sites located strictly within the Lang Ranch area. These sites which comprised a proposed lithic camp and the habitation sites for that camp were also located close to an ephemeral to perennial stream (Greenwood 1987). Roman recently reported that numerous cores dug at the site of the stream in the late 1990s, the Lang Creek, indicated that at these early dates, the stream appeared to have been a source of perennial water, depending upon the timing within the Early Holocene period (Roman 2017).
Table 1. Selected New AMS Radiocarbon Dates Lang Ranch Sites.

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Dates calibrated according to OxCal 4.2 program (Bronk Ramsay 2009); shell samples calibrated using Marine 13 Calibration curve. Local Marine reservoir offset (delta R) was 283 ± 172 years (Holmquist et al. 2015).
Additionally, at all three sites there was a notable presence of *debitage*, which included obsidian, indicating to Greenwood that the camp site of VEN-852 was a final production area for lithics (Greenwood 1987). Thus, the research focus expanded to include sourcing of the obsidian via not only pXRF but also with laboratory based XRF as well as NAA, when appropriate. A collaboration was established with the University of Missouri Research Reactor Archaeometry (MURR) Laboratory and Dr. Jeffrey Ferguson to confirm the sourcing of these materials (Ferguson 2016, personal communications).

The results of this testing are discussed below as well as a proposed re-evaluation of the antiquity of the exchange routes involving obsidian for this interior region. New hypothetical trade routes based upon the reports of ‘site caches’ in the central and southern California region are also presented along with a discussion of the potential of geographic information systems (GIS) least-cost-path analyses to support these hypotheses.

In all three case study sites, the predominant form of artifacts was heavy core tools, metates, and ground stone tools, generally synonymous with the “Millingstone Horizon.” Dating for these three case studies clearly supports the presence of Early to Middle Period occupation (Table 1).

**Obsidian Sourcing for CA-VEN-1029, -852, and -853**

A testing protocol was created for the obsidian sampling program for all items recovered from these interior sites. The protocol consisted of initial testing via pXRF, followed by submission of these items to the MURR personnel (Ferguson 2016, personal communication). The decision on which testing method to
use at the lab was determined by MURR Lab (2016, personal communication). The MURR lab reviewed all issues of contamination and evaluated the samples for these issues.

In all only four of the 44 items submitted were excluded from full analysis. Figure 2 demonstrates the Sourcing Plot. The results of the sourcing evaluations are listed in Table 2. Of the samples tested, 77% of the samples were found to originate in the West Sugarloaf branch of the Coso ranges (Ferguson personal communication 2016). Of the remaining unassigned samples, one was closely aligned to the chemical assay of West Sugarloaf, and the other two were assigned to Casa Diablo, ostensibly Lookout Mountain.

Theoretical Perspectives

As Hughes and Milliken have aptly stated, trade and exchange studies generally include point of origin, deposition context and dating.

“Accounting for the actual behavioral mechanisms responsible for the observed archaeological distributions involves invoking inferential arguments that must take in to account a variety of contextual factors” (Hughes and Milliken 2007:259).

In terms of our analyses, we review the current state of knowledge on the topic of conveyance of Coso obsidian stressing the point of origin, depositional context of our samples and the dating performed on the levels associated with those samples. We refrain from broader statements regarding the mechanism of conveyance, the tribal groups involved, or the exchange nodes utilized.

Procurement Preference and Exchange Patterns

Extensive literature has reported on the West Sugarloaf branch of the Coso range as a prominent source of the obsidian artifacts found in Southern California archaeological sites (Draucker 2007; Eerkins et al. 2007; Glascock et al. 1997; Hughes 1998). The high percentage of obsidian from that source found in the Lang Ranch sites should therefore not be surprising given the extensive reporting of its’ exploitation throughout both California and the Southwest region (Shackley 1995).

Maps from Northwest Obsidian Research group clearly emphasize the major sources of the Coso Range. They indicate that Sugarloaf Mountain, West Sugarloaf, Joshua Ridge and West Cactus Peak were frequently utilized in Southern California, depending upon the time frame and the location of the archaeological site.

The rationale for lithic choices made on the long-distance versus local levels has been thoroughly investigated recently by Eerkins et al. 2008 and others. Their hypothesis is that the high-quality obsidian from the Sugarloaf region supported the development of a local Coso trading specialist groups within that region and controlled the procurement and distribution down the line to a broader region.

Jackson (1989:260) also concluded that in northwest California exchange occurred across various ethnic boundaries; the raw materials were imported despite the presence of reliable lithic materials available in local regions, and that obsidian was used “by all classes.”

As early as 1982, Ericson developed a hypothetical model of the “southern Coso exchange network” (Ericson 1982). This model originally only applied to Central California and the northern area of the San Joaquin valley, as no data was available at that time to extend the network to the south.

In another landmark study of hydration rim dating in the Coso quarries, Gilreath and Hildebrandt concluded that results indicated that

prior to 2800 BP, use of the area was largely restricted to generalized, short-term exploitation of lag quarries by groups using an expansive, highly mobile subsistence-settlement system. Beginning around 2800 BP, but reaching peak proportions between 2300 and 1275 BP, a major reorganization in production strategy took place...Increases in production volume were at least partially related to long distance exchange.
Figure 2. Sourcing Plot.

Table 2. Sourcing Results for the Three Case Study Sites.

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Notes: WS – West Sugarloaf; UA – Unassigned; CD – Casa Diablo; Joshua – Joshua Ridge.
Contemporaneous parallel increases in Coso obsidian use among consumer populations in the Owens-Rose Valley area, southern Sierra Nevada and, more importantly, several locations in coastal southern California provide evidence of this exchange [1997:Abstract].

Obsidian trading routes have also been analyzed for the general southwest regions utilizing GIS least-cost path analysis, (i.e., Taliaferro et al. 2010). The GIS models certainly advance our understanding of procurement patterns in many regions, but the distance from the Lang Ranch sites to the Coso Range is large and “trading exchanges” were originally considered as an alternative to direct procurement.

The ‘walking distance’ from the Lang Ranch sites, abutting the Santa Monica Mountains to the Coso sources, is calculated to be roughly 295 kilometers. This distance would require a conservative estimate of at least 62 hours- time frame for direct procurement. Specific time frames can be calculated based upon the Tobler hiking function (Tobler 1993). Thus, the most parsimonious explanation for the evidence found at these sites would imply exchange (Kantner 2004).

However, Hughes cautions against utilizing distance as a proxy for exchange evidence:

“In retrospect, adoption of distance-driven assumptions was ironic, because ethnographers throughout North America provided many examples of both long-distance trading expeditions and long-distance direct procurement forays” [1998:111].

Hughes also cautions:

“In many instances this conflation of distance with processes has made it difficult to disentangle interpretation from distributional data because one so often is simply used as a proxy for the other.” [Hughes 2011:1].

Conversely, in discussing early California band organization and trade exchange, Frederickson asserts that there were “relatively wide-ranging extended families moving over the landscape to harvest resources as they became seasonally available…Territorial boundaries were also likely to have been permeable” (1986:25).

Rather than making a priori assumptions, we present distances, evidence of caches in our region and discuss previous evidence of Coso obsidian recovered as far south as the San Diego region.

Lithic local sourcing has been documented for the case study sites in the Lang Ranch. As two separate investigations were performed on the sites VEN-852 and VEN-853, both totals are reviewed in our report. According to Greenwood et al. (1987), the highest percentage of local utilization of lithics at VEN-852 was from quartzite (36.1%), siltstone (29.4%), fused shale at 10.9% and chert (16.4%) of 1677 pieces of debitage. At VEN-853, again quartzite totals were (154), chert at (68), and fused shale at (53) from of a total of 302 debitage flakes.

The results of the later Kelley et al. investigation (1990:60), also demonstrated a reliance at VEN-852 on primarily quartzite, chalcedony, fused shale and chert as shown in Table 3. At VEN-853, local lithics sourcing was also highest with quartzite (260), fused shale (156), and chert (84) out of 653 pieces of waste flakes (1990:65).

Finally, at VEN-1029, local sourcing of lithics again relied on the utilization of quartzite, fused shale, chalcedony and chert. Those relative percentages of sourcing of 672 waste flakes are: quartzite 31%, fused shale 28%, chert 23%, and chalcedony 11%.

Obsidian was a small sample from all three case study sites (fewer than 1% in VEN-853), but slightly more obsidian was recovered from this inland case study than others in the region. Our totals of n=44 represent more relative percentages of obsidian in association with early AMS radiocarbon dates.

The fact that obsidian from this highly sought and rather ‘rare’ source was found in early strata from the Lang Ranch sites, as well as in other sites abutting the Santa Monica Mountains, suggest that inland people found these sources to be both preferred and available.
Table 3. Sources Catalogs from Kelley et al. (1990) and Ancient Enterprises.

<table>
<thead>
<tr>
<th>SITE (CA-)</th>
<th>QUARTZITE</th>
<th>CHERT</th>
<th>CHALCEDONY</th>
<th>FUSED SHALE</th>
<th>TOTAL FLAKES</th>
</tr>
</thead>
<tbody>
<tr>
<td>VEN-852</td>
<td>1,488 (64%)</td>
<td>111 (5%)</td>
<td>159 (7%)</td>
<td>97 (4%)</td>
<td>2,332</td>
</tr>
<tr>
<td>VEN-853</td>
<td>260 (40%)</td>
<td>84 (13%)</td>
<td>62 (9.5%)</td>
<td>156 (24%)</td>
<td>653</td>
</tr>
<tr>
<td>VEN-1029</td>
<td>208 (31%)</td>
<td>156 (23%)</td>
<td>76 (11%)</td>
<td>187 (28%)</td>
<td>672</td>
</tr>
</tbody>
</table>

As the lithics present at other inland region sites has generally been well aligned with our results- of predominant utilization of local sources- we interpret this as a primary pattern of procurement of local resources which extended throughout the time periods reflected by the AMS radiocarbon results (Whitley and Clewlow 1980).

Sourcing is on-going within the Santa Monica Mountains and adjoining regions and results to date are comparable to the Lang Ranch sites (Gary Brown, NPS, personal communication 2017). At LAN-229, near Malibu Canyon, 100% of obsidian sourcing was found to be Coso (Hughes 2013). Brown reports that most of the obsidian recovered in the SMM is from LAN-229, and that site has obsidian debitage all of which was sourced to the West Sugarloaf branch of the Coso region (n=30); this was also found in Early Period contexts (Gary Brown personal communication 2018).

Reports from the Northern Channel Islands do not note the presence of large quantities of obsidian, but those sourced have notably been identified as 97% debitage from the West Sugarloaf branch of the Coso Range (Rick et al. 2001). Bouey reported that on San Clemente Island, 93% of the obsidian that was sourced was also from Coso (Bouey 2000). With n=38 as sample size for the debitage out of a total of 109 obsidian artifacts, there also is not a large sample in that report (Rick et al. 2001). However, the percentages of sourced obsidian from Coso from all the northern Channel Islands indicate that “93% are from Coso” (2001:35).and strongly supporting the idea of a preference for this type of obsidian even though it was from an extended distance (2001:36).

Erlandson found that on San Miguel Island, at site SMI-172, dated to around 6440–6270 cal years BP, obsidian was sourced to Coso (Rick et al. 2001:35). Thus, this dating corresponds to our dated site contexts for Lang Ranch obsidian sourcing.

An obsidian cache has been found near Lake Castaic at LAN-324 (Ericson et al. 1971). This site is 86 kilometers from the Lang Ranch sites. The potential routes to this location involve less climbing of steep gradients and exposure to upper desert conditions. The Lake Castaic region is en route to the interior Antelope Valley, which was another proposed connection between the northern Coso trading centers and the southern exchange systems.

According to GIS “least-cost path models”, this location would have been within the range of hunter-gatherer rounds; and seasonal rounds to locations within this distance may have been a regular occurrence (Winterhalder 2001). Of interest, modern recommended routes for hikers suggest paths toward the Coso range that go through the Castaic Mountain Pass (Google Map 2018).

Lebow et al. report that at Sudden Flats, on the Vandenburg coast, a single component midden was recovered which was dated to approximately 10,725 calibrated years before present; and the presence of “much higher proportions of obsidian than found during subsequent time periods, suggesting that exchange networks were active and extensive during these very early times” (Lebow et al. 2015:266). They reported that ratio of obsidian to locally procured chert was 1/182 and was “significantly higher than at other sites” located in the region (2015:285).

In the Southern San Joaquin Valley, Sutton and DesLauriers (2002) performed a regional review of the obsidian sourcing from that area and found evidence of predominant usage of Coso obsidian for the region. Further, they postulated that one transport mechanism involved an East-West route to the Buena Vista Lake area. The proximity of these southern San Joaquin sites to the Mojave Desert and Rose Valley
areas was also noted by Faull (2006) as he investigated possible correlations between the rise of Coso exchange and local village functions as exchange nodes. Faull reviews specific links between the Rose Valley, Antelope Valley and the Mojave regions. He documents many sites in those areas that contain Coso obsidian in abundance (Faull 2006).

The distance from the Santa Clarita valley to Antelope Valley is 61 kilometers, not outside the range of hunter gatherer rounds. And the distance from the Antelope Valley to the Western Mojave region is 38 kilometers, calculated to be only about 8 hours walking time. The expected hunter-gatherer range for rounds is satisfied between the Castaic area and Antelope valley.

Scharlotta recently stated

Provenance analysis of obsidian and rhyolite artifacts from four Late Prehistoric sites located on the northern and southern edges of the Western Mojave Desert suggest direct procurement practices and the presence of a trade network through the Antelope Valley [2014:Abstract].

He further noted the presence of a “natural corridor linking the western Mojave Desert to the coastal areas of Southern California” (2014:231). At KER-7055, one source was identified: West Sugarloaf.

While many recent articles have stressed the evidence for the antiquity of long-distance exchange routes, the southern California interior has received attention primarily in two main regions: the Santa Ynez Valley and the interior regions near Diablo Canyon (Jones et al. 1997; Glassow et al. 2005). However, in 2005, Macko reported the presence of northeast California obsidian in Orange County; in 1985, Hughes and True reported on this preference over more local obsidian sources also in San Diego County (Hughes and True 1985). Jones and Waugh (1997:124–126), in discussing Coso obsidian sourcing from Central California, indicated that there was “an increase in obsidian exchange ca. 3500 cal BC.” The Peak was in the middle period with a reduction of evidence of usage by the Late Period. Basgall (1989) indicated that in central eastern California, there was greater diversity of sources in the Early to Middle Period, with much more utilization of local sources in the Late Period (Basgall 1989).

The preference for West Sugarloaf obsidian was also reported in a review study by Eerkins et al. from the Owens Valley; our results from Southern California support the assertion that this was a preferred obsidian source, and that it was available at least as early as the ‘heyday’ of West Sugarloaf production, from 3200 to 2200 rcybp (Eerkins et al. 2008). However, our sourced samples do include many found within even earlier periods based upon the AMS radiocarbon dates from corresponding Unit levels.

Jackson (1988) and Sutton and Everson (1992) also suggested that obsidian transported from Coso for trade was often in ‘pre-formed blanks’ - our analysis supports this assertion. Almost all the remains from the Lang Ranch sites are in the form of small debitage, indicating possible minimal reduction strategies versus re-use of tools from a pre-form material. Further, Clewlow in a review of the inland VEN-272 site not far from Lang Ranch indicated that there was extensive evidence of production of blades and revision of pre-formed blanks (1978).

Thus, this suggests at least three potential scenarios: first that the tribal groups occupying the region abutting and in the Santa Monica Mountains may have had regional trade relationships that optimized access to the Coso sources earlier than previously reported; secondly, that the trade exchange routes may have relied on trails as described in ethnographic reports and that those trails eventually arrived at the Antelope Valley; and third, that the lack of sourcing data on these sites at Lang Ranch and in the Santa Monica Mountains requires further investigation.

Costs associated with direct procurement versus trade/exchange must also be considered. Among the least-cost path studies variables are distance to the exchange site; social relationships with those tribal groups adjoining the trade locations; time required to reach the trade nexus; and labor invested to carry the product back to the Lang Ranch region (Winterhalder 2001).

Regional trade interactions, by definition, require some maintenance of social relationships to facilitate a trade agenda (Taliaferro et al. 2010). New theoretical trail maps are currently being created for
our project that re-evaluate routes that were reported ethnographically across the Simi Valley, which may have ultimately reached the Antelope Valley as a stopover destination (Roman SCA 2018).

Pending publications will also report on the Ethnographic research on the Ventureno Chumash tribes and their neighboring communities and the inter-relationships between villages in the Conejo and Simi Valleys; certainly, Harrington utilized the Ventureno Chumash sources such as Fernando Librado more than any other informants in his reports (Mills and Brickfield 2007). Sources such as Van Valkenburg’s notebooks from the 1930s trace “Indian trails” from the Simi Hills traversing toward Castaic and northward through the Piru region toward Antelope Valley (Figure 3; Van Valkenburg n.d.). Farmer’s 1935 maps retracing old ‘Indian trails’ also provide clues to the utilization of ancient trade routes in the early 1800s (1935).

Temporal Context

Hughes and Milliken (2007) suggested that a secure temporal context must be combined with an understanding of how that material is distributed at the site level.

As the presence of Coso material in the southern inland region of California demonstrates, this hypothetical direct procurement versus trade exchange regimes was extensive and allowed groups located almost 200 miles away from the Coso range to exploit this material. Our results support the contentions that there was predominant usage of exotic lithic materials in the Early and Middle Periods in these three Lang Ranch sites in the interior of the Ventureno Chumash region. However, it should be noted that our early dates produced for these interior sites of the Ventureno Chumash are not based on obsidian hydration rates. At this time, we are reporting primarily on the stratigraphic context of dated materials associated with the obsidian.

Our results are also compatible with other research suggesting greater antiquity of these exchange systems, such as the interior of the Diablo Canyon region in Central California (Jones 1995), the interior Santa Ynez region of Central California (Glassow et al. 2005), and other interior sites from the Ynzeno, Ventureno and Central California regions (Fitzgerald et al. 2005). Table 1 presents the newly published AMS radiocarbon dates from three case study sites within this interior region abutting the Santa Monica Mountain ranges. In association with these AMS radiocarbon dates, the oldest dated level for our obsidian sourcing is from VEN-853, dating to 8163 ± 38 rcybp.

Certain units from VEN-853 and VEN-1029 demonstrate a wide range of occupations based upon the scope of the dating range- Units 7 and N from VEN-1029 were dated throughout the levels as they contained charcoal, shell and bone in matrix for many levels of the strata. Other units were dated throughout the levels in order to achieve some clarification on statistical probability factors. It should be noted that Unit 5 of VEN-1029 displays a good reflection of validity with probability equations.

Obsidian Sourcing Analysis

A complete analysis of the samples tested by Missouri Research Reactor performed by Dr. Jeff Ferguson is listed in Figure 2. Generally, previous investigations have emphasized correlation among obsidian hydration readings on samples to assess relative dating (Eerkins et al. 2008; Ambrose and Stevenson 2004). However, in this study we have chosen to highlight the relationship between the newly obtained AMS radiocarbon dates from similar Unit levels as those of the obsidian samples. The issues about the absolute dating capability of hydration readings on obsidian formed a basis for this decision. As Hughes and Milliken have noted, there have been numerous concerns about the reliability of these formulae (2007).

Future testing for obsidian hydration readings is planned for these samples; however, the concerns and caveats regarding its usage were considered. Out of samples submitted, only 4 out of 46 were non-debitage. In the Lang Ranch study area, the presence of non-obsidian functional tools such as projectile points and bifaces were overwhelmingly fabricated out of either local cherts, fused shale or other non-exotic sources (King 1989; Greenwood 1987). The XRF analysis of small debitage can present some difficulties (Ferguson 2012), but the specimens in this study were large enough to generally allow confident source assignments.
Courtesy of Ventura County Archaeological Society Archives.

Figure 3. A Copy of Farmer’s rough-drawn map from 1935.
Other issues concern the proposition from Jackson that Coso obsidian “was being traded to the southern San Joaquin valley in more finished form, such as preforms or bifaces (Jackson 1988; Sutton and DesLauriers 2002:6). As stated, the predominant form in our case studies was debitage. There were no points or examples of crescents in the study group. Our region, even farther to the south, also contained primarily debitage, suggesting that this system, often labelled the “Coso regional exchange” system may have extended farther south than previously proposed.

Caveats for Interpretation

Roman (2017) noted that this area adjacent to the Santa Monica Mountains is subject to multiple types of geomorphic instability. The caveats published with the new AMS radiocarbon dates clearly state that there are at least three sources of geomorphic instability in the area: land subluxation, liquefaction and earthquake faulting. Additionally, bioturbation is often an issue with inland sites. Thus, the presence of obsidian debitage within a given level at these sites does not conclusively prove that they were of the same age. In providing a sample size with at least 40 confidently assigned specimens, we offer a beginning level of confidence about the general dating association of the obsidian found within these sites. The fact that the lowest levels of the sites are from a very Early Period is an important consideration but cannot provide evidence of direct correlation with the age of deposition of the debitage itself.

Other researchers have also chosen to correlate obsidian sourcing with AMS radiocarbon dating assays (Scharlotta 2014; Schneider et al. 2014). The practice is appropriate in this study due to the predominance of debitage forms, which are not easily tested for hydration rim dating. Future testing will include hydration rim dating for the samples; in the interim, the AMS dating presented in Table 1 that corresponds to the Unit levels of the obsidian provide beginning contextual information.

Examining Evidence for Interior Exchange Routes

The form of obsidian associated with our samples primarily as debitage prompted us to examine reports of obsidian debitage caches within the southern California region as previously stated. In this regional perspective, the Santa Ynez valleys and the Santa Clarita valleys are within the optimal GIS least-cost path walking distance for trade in foraging communities. Santa Clarita is reached via the Tapo Canyon route in to the Somis plains; then on to the Ventura basin up to the Santa Ynez valleys.

Farmer’s maps created for Van Valkenburg’s Field notes from the 1930s directly illustrate an “Indian trail” route towards the Antelope Valley. These routes were based on the informants cited by Van Valkenburg (n.d.). The 280 kilometers between the Coso Ranges and our study region at Lang Ranch/Oakbrook Park was substantial. However, evidence from various reports of caches have been published which suggest locations of regional trading centers or journey ‘stop overs’ that are in association with the obsidian. The possibility that there was a long distance north south connection was originally discounted by Sutton and DesLauriers (Sutton and DesLauriers 2002). Their analysis suggested that the most likely routes of conveyance to more southern areas, specifically the San Joaquin valley, was from east to west via the Mojave Desert (2002). However, given the discoveries of the cache locations more proximal to our sites, it is possible to envision new, alternative trade routes that led to central nodes of exchange.

Garces, in his diary recounting the expedition of 1776, noted that their route followed up the Santa Clara River, through the Piru area toward ‘Castaic’ and from that point they proceeded to Lake Hughes (Coues 1900:267). They encountered Kitanemuk guides at that point, and Lopez, in his study of the Piru region, infers that they proceeded north through Fort Tejon and on to the southern San Joaquin Valley (Lopez: n.d.).

Our results also do suggest an expanded range for the ‘Coso sphere’ originally suggested by Ericson in 1982. At that time, based upon recovered samples, Ericson proposed that the sphere would extend perhaps in to the San Joaquin valley at the farthest southern point. Our results would suggest that the ‘sphere’ may have extended farther down in to the more southern areas of the Ventureno region, which is also supported by reports from the Santa Monica Mountains obsidian sourcing (Gary Brown personal communication 2017). The lowest levels of obsidian samples at our sites were dated to 7678 ± 38 reybp (Roman, SCA Online
Proceedings 2018). These samples were collected from site VEN-853, adjacent to the large VEN-1029. The ‘lithics processing station’ suggested by R. Greenwood (1987) is also adjacent to both VEN-853 and VEN-1029. There were two “unknowns” discovered in the sample selection: these are not from sources in California or Arizona per J. Ferguson (Jeffrey Ferguson: personal communication 2017).

Eerkins (2004) suggested that it might not have meaning to consider the subsources of obsidian flows unless a large sample size is considered and regional perspectives are adopted (Abstract:2004). Our sample size is not yet large as sourcing from adjacent sites is still ongoing, but the Study Plan provides for sourcing of the obsidian from all 17 sites adjacent to the larger VEN-1029 complex.

West Sugarloaf was excavated in seams and/or benches. Investigators propose that it required more effort to excavate the benches from the domes of flow. Eerkins also suggested that “the farther one travels from Naval Air (NAWSCL) to the north and south, the more West Sugarloaf dominates the subsourse profile” (2004:27). Our results appear to confirm this hypothesis.

Various authors have stated that the preference for this subsourse of Coso obsidian was differentially procured for trade outside of the immediate Coso region (Gilreath and Hildebrandt 1987). Possible explanations include that certain groups controlled access to the source and that material was then utilized for trade exchanges across various tribelet boundaries. The scope of this paper does not allow for full exploration of this topic. Interested readers are referred to the excellent reports on this topic from the Mono and Coso areas (Davis 2011; Eerkins et al. 2007).

CONCLUSION

Based upon the new AMS radiocarbon dates associated with the Unit levels of the obsidian tested from sites VEN-852, -853, and -1029, we have tentatively identified early evidence of procurement of this raw material by the interior Venturaño Chumash living adjacent to the Santa Monica Mountain region. The dating does not rely on hydration readings at this time; samples will be submitted for clarification of such dating in the next stage of our study. However, preliminary statements can be made regarding the recovery of this obsidian debitage in the lower levels of this interior region. First, there appears to be confirmation of Basgall and others’ proposition that more exotic materials were imported in some fashion to the central and southern California region at earlier periods than were originally proposed. The pattern that is found in other regions of California, particularly those regions more proximal to the Coso range does seem to be different than that found in this evidence.

Secondly, minimal percentages of obsidian have been reported on sites at Santa Monica Mountains (Tale’ pop), on the Channel Islands (Rick et al. 2001) and at the Lang Ranch, but all show a high degree of preference for West Sugarloaf/Coso obsidian Early period sites from our case samples have slightly higher relative percentages of obsidian in debitage form than some other local sites.

Once the sourcing is completed at all the related Lang Ranch sites, we may have a clearer picture of the similarities or differences in the intensity of procurement or access to exotic lithics for these regions. As the Islands are more remote from the mainland region, the minor difference in relative percentages of obsidian noted is not surprising. Although we have evidence of utilization of West Sugarloaf obsidian during its’ purported ‘heyday’, there are dates associated with this sample set that are much older (Eerkins et al. 2008). We are cautious regarding any claims due to the caveats of interpretation associated with these levels, but our report is suggestive of the need for more associated dating for the entire interior region.

The form of debitage also appears to confirm the ‘pre-formed blank’ hypothesis as our predominant form is secondary reduction flakes. Clewlow also noted in his discussion of MGM Ranch site near Lang Ranch that

this suggests that the prepared platform technique and blade production was present in the region and indications from other inland sites in the Thousand Oaks area indicate that it may have been widespread…. [Clewlow 1978]
Finally, all efforts to evaluate evidence of obsidian caches and debitage are subject to the universal rule that they are simply ‘selected evidence’ based upon the Investigator’s study rationale. As Frederickson reminds us “models describe only data from archeological collections available to analysis, and... models cannot incorporate data of which the analysts are unaware” (1986:69).

Further he reminds us that “technological models seldom are purely descriptive of technological systems within a specific cultural framework. Rather, they are composite representations of what the lithic technologist has learned about lithic artifact production, incorporating what the analyst has been taught to observe and interpret as meaningful and appropriate” (1986:69). His thoughts on revising the concepts of ‘Trans-Sierran exchange’ merit continued consideration. As more reports of obsidian caches of debitage-and possible evidence of trade ‘nodes’ or travel ‘stopovers’- are forthcoming we hopefully will have an increasingly refined picture of the types of procurement practiced, both direct and via trade exchanges.

ACKNOWLEDGEMENTS

I am grateful to the staff of the Ventura County Archaeological Society for access to portions of these collections, particularly to Curator Robert Lopez. Gratitude is also extended to the many scholars, Docents and volunteers who worked with the Project at Stagecoach Inn Museum collections from 2012 to 2017. The former Curator at that Institution, Don Morris, is acknowledged for his support during the early investigations. All calibrations, GIS mapping and GIS trail images are created by Gary Boyd, MA, RPA, to whom we express our continued gratitude. The faunal analyses are ongoing by Dr. Judith Porcasi.

All calibrations were performed utilizing the OxCal 4.2 program Bronk Ramsay (2009) and shell samples were calibrated using the Marine 13 calibration curve. All other samples utilized the IntCal 13 curve, (Reimer et al. 2013). Local Marine reservoir offset (Delta R) was 283 ± 172 years calculated from the work of Holmquist et al. (2015). Obsidian sourcing was conducted by Dr. Jeffrey R. Ferguson at the University of Missouri Research Reactor Lab under the auspices of National Science Foundation grant #141503.

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