International Association for Obsidian Studies Newsletter

Number 4 **Winter/Spring 1991**

Business Address: Department of Anthropology, California State University at Chico, Chico, California 95929-0400

Assembled and edited by R. J. Jackson

CONTENTS

NEWS AND INFORMATION

Obituary

IAOS member Dr. Jonathan O. Davis was killed in an automobile accident on December 15, 1990, at the age of 42. Dr. Davis was a research professor with the Quaternary Sciences Center of the Desert Research Institute of the University of Nevada system. He also served as faculty in both the Geology and Anthropology Departments at the University of Nevada, Reno. Dr. Davis was to serve as the 1992 chairman of the Archaeological Geology Division of the Geological Society of America. As a geoarchaeologist, his research interests included tephrachronology. He was one of the first scientists allowed into the Mount St. Helens area after the mountain's May 1980 eruption. His death is a tragic loss for western North American archaeology and geology. Jonathan will be sorely missed.

Meeting Announcements

The third annual business meeting of the IAOS will be held during the 25th Annual Society for California Archaeology Annual Meeting, at the Radisson Hotel, Sacramento, California. The IAOS annual meeting will be held on March 23, 1991 at 10:00 A.M.. The meeting room will be posted at the registration table. Topics to be discussed will include the creation and distribution of an obsidian hydration standard slide set, coordination of calibration between hydration laboratories, the establishment of standard source and hydration reporting standards, and IAOS publications. Officers for 1992 will be elected at the meeting, and candidates need not be present to be elected. However, the willingness of nominees to serve as officer must be identified at meeting time.

IAOS Obsidian Bibliography

The International Association for Obsidian Studies (IAOS) is pleased to announce the completion of an extensive bibliography of obsidian studies by Ms. Kim Tremaine and Mr. Craig Skinner. The bibliography is available on floppy diskette, free of charge to all members of the IAOS.

Craig and Kim pooled their extensive bibliographies and invested considerable time in developing the database. Craig developed a self-contained, archived, self-extracting file. Users simply type README to invoke step-by-step instructions on the extraction and use of the bibliography.

The IAOS would like to express its gratitude to Craig and Kim for the generous contribution of their time, expertise, and resources in developing the bibliography.

The IAOS Obsidian Bibliography should assist archaeologists, obsidian researchers, and students to identify and access the extensive obsidian literature.

The bibliography is currently available on 5.25 inch or 3.5 inch computer diskettes in DOS format. As mentioned previously, the bibliography is available to all IAOS members, free of charge. Diskettes will be available at the Annual Meeting, and members can obtain a copy by simply writing to the IAOS business office. Non-members can obtain a copy of the bibliography for a cost of $10.00. Note that the cost of membership in the IAOS is $20.00 per year for regular membership. For an extra $10, non-members can both join and obtain a bibliography diskette. Please identify the desired diskete size when requesting a copy of the bibliography.

X-Ray Fluorescence Analysis Capabilities at the California State University, Chico

Northeastern California is one of the most obsidian-rich and complex geological regions in North America. Regional archaeological investigations suggest that most of the obsidian sources located within this area were intensively used by prehistoric peoples, and furthermore, that several of the sources served as important elements in prehistoric exchange systems. In an effort to address various research questions which have arisen over the years, the Department of Anthropology, California State University, Chico (CSUC) has assembled the equipment necessary to perform x-ray fluorescence analysis (XRF) on obsidian samples.

With the assistance of Dr. John Young, Department of Physical Sciences, CSUC is in the process of refining the equipment's capability through the addition of a new multichannel analyzer and associated software. In addition, CSUC is expanding its database of known obsidian sources in order to increase its efficacy. The new laboratory will be operated under the supervision of Dr. Mark Kowta, Dr. Frank Bayham, Dr. John Young, and Mr. William Dreyer. Ms. Blossom Hamusek has played a primary role in organizing the laboratory and conducting analyses. Blossom is currently pursuing her graduate degree in the Department of Anthropology and is interested in exploring the geochemical variability of the Tuscan source by obtaining and analyzing samples from various geographically separated locations within the Tuscan Flow source area. Although CSUC plans to conduct XRF studies primarily for in-house archaeological projects initially, they are exploring the possibility of conducting XRF analyses for contracted work as well.

IAOS Standard Microscope Calibration Slides

by R. J. Jackson

One of the primary purposes of the IAOS is the development of standards for analysis to ensure inter-laboratory comparability. One of the variables affecting hydration rind thickness measurements is microscope calibration. Optical microscopes are usually calibrated with stage micrometers, which are essentially small, transparent "rulers" etched or printed on the surface of glass slides. While stage micrometers should measure in standard and identical increments, stage micrometers vary in quality as well as the sizes of the increments that they measure.

In the last newsletter, I discussed IAOS' investigation of standard microscope calibration slides and the possibility of obtaining photo-etched reference scales. The photo-etched slides proved to be expensive to produce, but a precise and inexpensive alternative is available. The first set of standard calibration slides will soon be distributed to IAOS Institutional member hydration laboratories.

These standard microscope calibration slides will consist of small circular beads (microspheres), obtained from Duke Scientific Corporation of Palo Alto, California. The beads are highly uniform polymer spheres, certified as traceable to National Bureau of Standards/Community Bureau of Reference standards. The microspheres are packaged in aqueous solutions in concentrations optimized for ease of dispersion and colloidal stability. Detailed technical description of the polymer microspheres and the methods of slide preparation are offered under "*Technotes*," later in this newsletter. A variety of microsphere sizes are available from Duke Scientific, ranging from 20 nanometers (nm) to 2000 microns. One nanometer is equivalent to 0.001 micron (1/1000 millimeter), or 10 Angstrom units. I selected the 10 micron particles (certified at 9.87 ± .057 microns) to explore the potential of these beads as calibration standards. The IAOS is in the process of purchasing one and five micron microspheres to increase the precision of calibrations for different size ranges.

Once prepared and distributed, each obsidian hydration technician should develop a calibration constant for each magnification. New calibration constants can be applied to old measurements, if the new calibrations vary significantly from the old, rendering measurements comparable for different laboratories and technicians, all other factors being equal (which is probably an incorrect assumption).

A seemingly small difference in calibration factor can yield significant variation in reported hydration rind thicknesses, and those differences vary in magnitude with the thickness of the hydration rind. Differences become greater with larger rind measurements. For example, at 500X magnification a calibration factor difference of only 0.01 (3 "ticks" of variation on the filar drum) would produce 0.1 micron of difference in reported hydration rind thickness for a relatively small rind (1.7 vs. 1.8 microns), a difference of approximately 0.25 microns for a larger rind (4.25 vs. 4.5 microns), and 0.50 microns of difference with large hydration rind thicknesses (8.5 vs. 9.0 microns).

Seemingly systematic differences between laboratories were observed by Stevenson, in his article reporting the results of an inter-laboratory comparisons of a standard hydration specimen slide set (IAOS Newsletter Number 1, Fall 1989). In brief, some technicians produced greater variation from the group mean for large hydration rind thicknesses than the measurements that these technicians produced for small rind thicknesses. Stevenson noted that this difference contradicted a pattern predicted from a consideration of the effects of optical resolution on measurement.

Differences between calibration constants that result from imprecise etched stage micrometers or inadequate calibration might account for such systematic variation. Fortunately, errors would be systematic and correctable with relative ease. Unfortunately, tens of thousands of hydration rind thicknesses have been used to date archaeological sites and materials. Given the implications for small differences calibration factors, it is important that obsidian hydration technicians use a precise calibration standard and take numerous measurements (e.g., 30-50) to obtain a mean value for calibration factor development. By doing so, the variation in individual measurements will be minimized.

The Obsidian Databank at MURR

by Dr. Michael Glascock
University of Missouri-Columbia
Research Reactor

Over the past 12 years, the Archaeometry Laboratory at the Missouri University Research Reactor (MURR) has been engaged in the trace-element characterization of obsidian sources in Mesoamerica by use of Neutron Activation Analysis (NAA). To date we have analyzed almost 800 source samples from more than thirty of the obsidian sources in Mexico, Guatemala and Honduras. A number of these sources have been characterized in great detail through the analysis of 50 to 100 sub-source samples in attempts to make these data more useful for possible micro-sourcing of obsidian artifacts. As a result, the Missouri Obsidian Databank is undoubtedly the most comprehensive trace-element databank in existence for obsidian sources in Mesoamerica.

MURR uses the NBS standard reference material SRM-278 Obsidian Rock upon which the databank is calibrated. This standard has been well characterized by MURR and other laboratories, which have determined it to be quite homogeneous. Element concentrations in SRM-278, as used by MURR, are as follows:

Al	7.489 ± 0.079	%
Lu	0.682 ± 0.007	ppm
As	4.400 ± 0.2	ppm
Mn	41.000 ± 26	ppm
B	25.000 ± 1.0	ppm
Na	3.520 ± 0.04	%
Ba	881.000 ± 19	ppm
Nd	25.400 ± 1.2	ppm
Ce	61.400 ± 0.6	ppm
Rb	126.000 ± 3	ppm
Cl	640.00 ± 90	ppm
Sb	1.60 ± 0.2	ppm
Co	1.44 ± 0.02	ppm
Sc	4.96 ± 0.05	ppm
Cr	6.0 ± 0.6	ppm
Sm	5.80 ± 0.06	ppm
Cs	5.10 ± 0.05	ppm
Sr	64.00 ± 4	ppm
Dy	6.27 ± 0.15	ppm
Ta	1.24 ± 0.012	ppm
Eu	0.766 ± 0.008	ppm
Tb	0.951 ± 0.017	ppm
Fe	1.398 ± 0.014	%
Th	11.65 ± 12	ppm
Gd	5.34 ± 0.06	ppm
U	4.46 ± 0.12	ppm
Hf	8.09 ± 0.14	ppm
Yb	4.50 ± 0.07	ppm
K	3.45 ± 0.02	%
Z	54.0 ± 2.5	ppm
La	30.1 ± 0.02	ppm
Zr	290.00 ± 10	ppm

Several archaeological studies comparing artifacts to the sources in the Missouri Obsidian Databank have been conducted and others are currently underway. Thus far, we have analyzed about 500 artifacts from various sites in Mexico including Tula, San Lorenzo Tenochtitlán, Jalieza, Azcapotzalco and La Mixtequilla; obsidian from La Entrada, Honduras and in Cihuatan, El Salvador have also been analyzed. Other obsidian projects from Belize at Cuello, Nohmul and Colha are now beginning.

More recently MURR has begun a collaboration with Dr. Jon Ericson (Univ. of California at Irvine) to characterize Californian obsidians by NAA. Anyone interested in possible collaborations with MURR for obsidian sourcing should contact Dr. Michael D. Glascock, 223 Research Reactor, University of Missouri, Columbia, MO 65211. Phone number: 314-882-5270.

Sonoma State University Obtains Olympus Video Calipers System

Sonoma State University is purchasing a Cue Micro-300 Video Calipers system that for the measurement of obsidian hydration rinds. The magnification element of the system consists or an Olympus BHT petrographic microscope with trinocular head. A high resolution color video camera is mounted to the microscope photo tube head, sending the video image to a control box that processes the image and superimposes a digital filar on the video image on a high resolution color video monitor. The Cue Micro-300 has the following capabilities:

- horizontal resolution of 1 part in 1024
- Metric, English, and arbitrary scale options with decimal point calibration that eliminates recalibration
- dual horizontal and vertical caliper lines with four different line options
- five digit screen display
- five calibrations stored in memory
- horizontal intensity graph
- printer/computer output

By digitizing the measurement device, video calipers reduce the mechanical and optical error associated with filar measurement by producing a flat image without physical distance separation between measuring device and image.

The Video Calipers approximate the image observable under the microscope eyepiece, although the sharpness of the image is slightly reduced. The horizontal intensity bar produces a graphic presentation of the light intensity along one of the horizontal caliper lines. Hydration diffusion fronts and specimen edges, characterized by lower intensity areas under polarized light, are translated graphically so that the center of a broad diffusion front can be determined without estimating the center of the front. For obsidian hydration purposes, such a feature may help to reduce the subjectivity of determining the extent of the diffusion front or edge of the specimen when sharp contrast is absent.

The video calipers will help to reduce eye fatigue, allow technicians to examine more specimens per session, and should allow measurements to be recorded as they are made. It will also be ideal for teaching new technicians as well as collaborating on the interpretation of difficult specimens.

ARTICLE

Obsidian Consumption and Obsidian Hydration at the King-Brown Site, CA-SAC-29

by John W. Dougherty

Introduction

This paper has its origins in an attempt to understand changes in the use of obsidian at CA-Sac-29 (Sac-29). This site, also known as the King-Brown site and the Roeder Site, was first test-excavated by the Sacramento Junior College in 1939. More excavation was done in the years 1954 to 1956 by Sacramento State College (later California State University, Sacramento). The site was again excavated in 1967 by the State Department of Parks and Recreation in an effort to salvage material from parts of the site to be destroyed by the construction of Interstate 5.

Despite the extensive history of excavation, there has never been a complete analysis of the site. Most studies have been specialized analyses of aspects of the site data (e.g Fenenga 1953; Gifford 1947). The only broad study of the site's archaeology is a master's thesis (Olsen 1963). Basing his analysis mainly on materials recovered during the 1954-1956 excavations, Olsen concluded that the site was occupied during the Central California Middle and Late Horizons. In 1967 and 1968, using both the 1954-1956 and 1967 excavation materials, L. D. Arnold undertook an analysis of the hydration of the obsidian projectile points recovered from the site (Arnold 1969). This study found a span of hydration rinds ranging in thickness from 1.0 to over 4.5 microns. Arnold calculated an estimated rate for the hydration of obsidian in the Sacramento-Davis region of Central California based on climatic data. Based on his estimated hydration rate, Arnold concluded that Sac-29 had been inhabited for at least 3,500 years.

During the 1980s I undertook a study of the projectile point typology from Sac-29 (Dougherty 1990). This study quickly ran into unanticipated difficulties. Foremost was the problem of correlating non-obsidian and obsidian artifacts. Since the non-obsidian materials could not be analyzed for hydration, the analytical strategy counted on comparing bead lots from interments that were also accompanied by projectile points. The obsidian and non-obsidian projectile points could thus be cross-correlated through the well seriated Central California bead typology (Bennyhoff and Hughes 1987). At the same time bead varieties could be associated with hydration ranges from a large hydration sample. This proposal foundered on the fact that only two interments from Sac-29 contained both beads and projectile points in an association that appeared deliberate. Comparisons of bead lots and projectile points could only be indirect, using stratigraphic analysis of the interments. Such a study could yield little not already known about Central California prehistory. In fact, assuming variability in the depth to which contemporaneous graves were excavated, such correlations might be little more than educated guesses.

There remained the hydration analysis of the typological variation among the obsidian specimens. Although numerous writers have expressed opinions about the internal variation of Central California projectile point types and the temporal succession of such types, little work has been done with hydration analysis despite the abundance of obsidian artifacts. Given the large sample of hydration slides already available, it would be simple to gain some information on the nature of fine grained variability within and between obsidian artifact types. It would also be possible to study changes in the use of obsidian at Sac-29.

Results of Analysis

The assemblage of obsidian from Sac-29 is typologically heterogenous. However, it is principally composed of projectile points of two different series. The earlier occupation of the site is marked by large, leaf'shaped points of Napa obsidian. Thirty-odd typeable specimens and numerous fragments that were probably from similar pieces are present in the collection. These pieces are morphologically similar to Excelsior points from thexouthern North Coast Range area of California. For the purposes of the study they were termed Roeder Leaf-Shaped points and described as members of the Excelsior Series. As a group, they are large, averaging over nine centimeters in length, and over 20 grams in weight (Dougherty 1990:59-61). Hydration rind thickness ranges from 2.8 to 4.7 microns. The total weight of obsidian in the typeable specimens is 730.34 gm.another 402.28 gm of obsidian is found in projectile point fragments consistent with broken specimens of this type based on remaining details of flaking and edge working. This amounts to a total of 1132.5 gm of obsidian assigned to the earlier occupation.

The later period of site occupation is typified by Stockton Series points. These are well known, late prehistoric forms from Central California and were mentioned in print as early as 1902 (Holmes 1902). Stockton Series points are considered to be characteristic of the Central California Late Horizon in the lower reaches of the Sacramento and San Joaquin river valleys (c.f. Elsasser 1978:37-46; Moratto 1984:176-177). They are typically corner notched or leaf-shaped points with hafting notches. The most common forms are marked by one or more deep serrations along the blade. Nearly all Stockton series points from Sac-29 are of Napa obsidian, though a few specimens were also manufactured from Borax Lake obsidian. Over 287 typeable specimens and fragments were attributed to this series, including serrated, unserrated, and large forms. A small number of other forms are also present in Late Horizon contexts at CA-Sac-29. These are not, as a rule, manufactured of Napa obsidian. They include a single Desert Side-notched specimen of Annadel obsidian, a small number of pieces made from Borax Lake obsidian, and specimens made of glass from trans-Sierran sources as well. The total weight of obsidian found in Late Horizon forms is 520 gm. Hydration ranges, for the Napa specimens, from 2.8 microns to about 1.0 micron.

In order to begin to understand the changes that took place during the culture history of Sac-29, I concluded that it would be advantageous to examine the rates of obsidian deposition at the site. This required determining how much of the site had been sampled, obtaining a figure for the amount of obsidian found in the sample, and calculating a rate that estimated the mass of obsidian that was introduced into the deposit per hydration year. This approach would produce figures that would be very rough, but might still be informative.

Excavation records and the work of Arnold (1969) and Olsen (1963) indicated that, including both the 1954 and 1967 excavations, but not the earlier work by the Sacramento Junior College, between two and three per cent of the site had been sampled. While the stratification of the site is well documented by Olsen (1963) and Dougherty (1990), there is no clear evidence that the site was horizontally differentiated. The varying results of the two excavations however, do seem to indicate that there was some horizontal zonation of the site. Unfortunately, land modifications intervening between the excavations make certainty about this impossible. This means that it is not possible to determine the degree of bias that may exist in the sample. The data may seriously over- or under-estimate the heterogeneity of the real composition of the site assemblage. Recognizing this, we can admit that the data may be only a very poor approximation of the site's make-up, cross our fingers and slog ahead regardless.

Figure 1 shows the raw counts of rind measurements per 1/10% that were found by Arnold (1969) and Dougherty (1990). On the face of it, it appeared that obsidian use had increased dramatically in the Late Horizon. However, this curve is plotting the frequency of pieces of obsidian, not mass. It is a reasonable estimator for the Late period, because there is no evidence of significant shifts in artifact size. But, the Middle Horizon is another problem entirely. The average artifact size for Middle Horizon points is much greater than that of the Late Horizon. In fact, comparing the two periods, as Figure 1 does, is completely misleading.

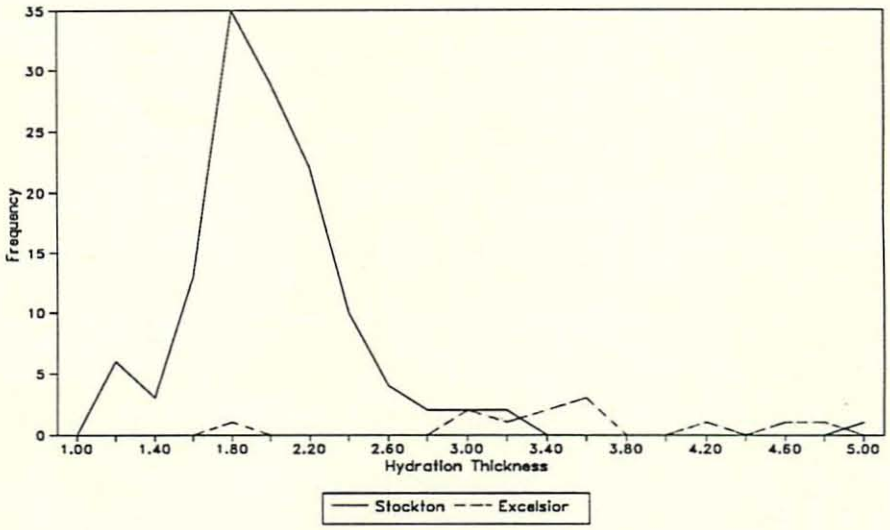

Figure 1: Unweighted Hydration Frequencies of Stockton and Excelsior Projectile Points from CA-Sac-29.

The simplest means of dealing with this is to weight the Late period frequencies with average weight of the Middle period points. To simplify the problem, the analysis can be restricted to the Stockton and Excelsior series. When the data is replotted using weighted frequencies for the Stockton Series it is clear that the apparent differences between the Late and Middle Horizon obsidian accumulation at Sac-29 can, largely be accounted for by changes in technology (Figure 2). What has been done here is to divide the OH rind measurement frequencies for the Stockton Series points by the mass of the average Roeder point. Figure 2 depicts the Stockton Series as it would appear if the entire sample had consisted of Roeder points.

It is immediately evident that, throughout the time span represented by the Sac-29 sample, obsidian consumption has varied between fairly constant limits. There is no sign of overall increase or decrease in the use of obsidian with time.

Conclusions

The lesson of these observations is clear. The best measure of the amount of obsidian being consumed prehistorically is

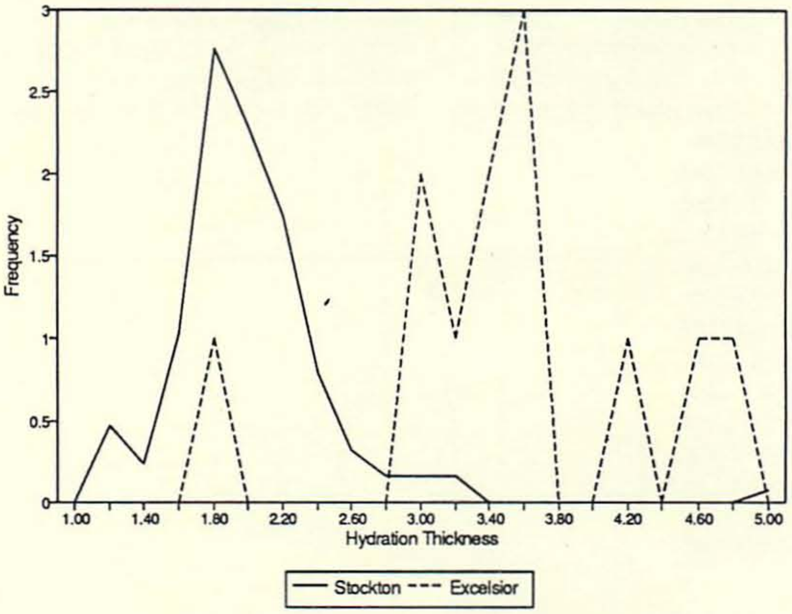

Figure 2: Stockton Series Frequencies Adjusted To Compare Artifact Mass With Excelsior Series Artifacts

which obsidian mass is being used. Thus, where hydration samples are taken across technological shifts, frequency distributions of hydration band measurements take on an equivocal significance. To use such data sets is going to require attention, not only to the methods of obsidian hydration, but to the technology being studied as well. The rewards are profound: a better understanding of site deposition processes, sounder interpretations and enhanced usefulness of hydration studies, and most importantly, a enhanced view of our subject matter -- the behavior and evolution of prehistoric societies.

References Cited

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1969 Theoretical and Applied Obsidian Hydration Dating: Determining Rates From Environmental Temperatures, and the Hydration Analysis of 4-SAC-29 Obsidian Artifacts. Unpublished Master's Thesis, Department of Anthropology, Sacramento State College, Sacramento.

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1990 The Obsidian Projectile Points of the King-Brown Site: Sacramento County, California. Unpublished Master's Thesis, Department of Anthropology, California State University, Sacramento.

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1978 Development of Regional Prehistoric Cultures. In California, edited by Robert F. Heizer, pp. 37-57. Handbook of North American Indians, Vol. 8, William C. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

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1984 California Archaeology. Academic Press, Orlando.

Olsen, William H.

1963 The Comparative Archaeology of the King Brown Site (4-Sac-29). Unpublished Master's Thesis, Department of Social Science, Sacramento State College, Sacramento.

REPORTS AND PUBLICATIONS

The volume of so-called "gray literature" in archaeology is staggering, making it difficult for researchers who are not "plugged-in" to contract or research archaeology of a certain region to hear of and gain access to reports. The IAOS Newsletter will alert its readers to some of this information by reproducing abstracts and summarizing both new and old literature that may be of particular interest to IAOS members.

Shackley, M. Steven

1990 Early Hunter-Gatherer Procurement Ranges in the Southwest: Evidence from Obsidian Geochemistry and Lithic Technology. Ph.D. dissertation, Arizona State University.

ABSTRACT

An important factor in the understanding of hunter-gatherer organization is the character of the environment and landscape inhabited over the course of a year or the subsistence cycle. This study is devoted to the reconstruction of these *procurement ranges* during the earliest hunter-gatherer periods in the American Southwest. This task is facilitated by use of source provenienced obsidian artifacts recovered from a number of early hunter-gatherer contexts that are seen to be representative of the range exploited by the group that inhabited these sites. Ethnographic examples of recent hunter- gatherer organization worldwide are rallied to suggest that early Southwestern hunter-gatherers occupied quite large procurement ranges in this arid environment that necessarily included lowland and upland environments for subsistence success. These hunter-gatherers were organized as foragers who practiced a residential strategy moving the consumers to the resources with frequent residential moves, and/or as collectors employing a logistic strategy of moving the resources to the consumers through task groups dispatched from relatively permanent residential bases. An important primary difference between these two levels of organization is the use of storage by collectors to enable decreased residential mobility and reduce the possibility of famine.

The procurement range reconstructions are facilitated by a systematic geological, geochemical, and archaeological examination of 20 obsidian sources and chemical groups in Arizona, western New Mexico, northern Sonora and Chihuahua, mostly small nodule marekanite sources dating from the middle to late Tertiary. These sources were found to be relatively well dispersed over the landscape, and were available to early hunter-gatherers in almost every environment. Additionally, a technological analysis of the obsidian artifacts from the sites, including cores, debitage, utilized flakes, bifaces, and projectile points indicates that obsidian cores formed a reliable long life raw material that through bipolar reduction could be used to produce hundreds of flakes for use as expedient tools and projectile points.

The geochemical results and flaked lithic technological analyses imply that Middle Archaic groups in Arizona were residentially mobile following the phased availability of plant and animal resources. This resource scheduling included the lowlands of the Sonoran and Chihuahuan Deserts during the cooler months to the uplands of the southern Colorado Plateau and Mogollon Highlands during the summer and fall to harvest the highly nutritious piñon seeds and hunt the aggregated deer, elk, and antelope during the fall rutting season. Sometime during the late Middle Archaic (ca 3500 B.P.), the lifeway began to change from a strategy emphasizing high residential mobility (foragers) to more logistic organization as evidenced by the appearance of storage facilities, possible pithouse structures, and the technology to harvest and process hard storable seeds. By 2000 B.P. during the Late Archaic, hunter-gatherers were regularly employing rather settled logistic strategies and possibly territoriality including lowland and upland environments as suggested by pithouse villages with elaborate storage facilities, and the technology used to harvest and process hard seed plants. As early as about 3100 B.P. Late Archaic groups began to integrate cultigens into the logistic strategy as a further buffer against resource shortages and the movement toward sedentism was emplaced.

Moore, P. R.

1988 Physical Characteristics of New Zealand Obsidians, and Their Use in Archaeological Sourcing Studies. Manuscript on file with the author (Mr. Phil Moore), State Highway 25, R.D. 2, Waihi, New Zealand. $5.50 (U.S.), $8.50 (N.Z).

Abstract

Various physical features, including colour, lustre, fracture, translucency, flow-banding, and the presence of spherulites and crystal inclusions can be used to identify the original source of obsidian artifacts. The characteristics of obsidian from the 20 known source areas and 3 source regions (new terms) in New Zealand are described.

A standard procedure for sourcing of obsidian artefacts, using a "flow diagram" and comparison with reference material, is outlined. Using this procedure a flake assemblage from North Cape is shown to have been derived from 3 main source areas/regions: Pungaere/Waiare (Northland); Mayor Island, and the Coramandel Volcanic Zone.

Dreiss, Meredith L.

1988 Obsidian at Colha, Belize. A Technological Analysis and Distributional Study Based on Trace Element Data. Papers of the Colha Project, Vol 4. Texas Archeological Research Laboratory, The University of Texas at Austin and Center for Archaeological Research, The University of Texas at San Antonio.

Abstract

The Maya site of Colha, Belize has yielded more than 3,600 obsidian artifacts during five field seasons of excavations jointly conducted by the University of Texas at San Antonio, Texas A&M University, and Centro Studie Ricerche Ligabue, Venezia. Technological analyses of 2,688 of these artifacts are presented in Part I of the monograph. Part II assesses distribution patterns revealed by x-ray fluorescence analyses of obsidian blades from Colha, and numerous other sites in the Belize periphery. Samples are analyzed within a

chronological framework which was originally established for the Maya lowlands by Nelson (1985). His model suggested that there were two major shifts in obsidian source usage: in the Late Preclassic period El Chayal obsidian supplanted the earlier Preclassic period use of Rio Pixcaya, and in the Terminal Classic, Ixtepeque replaced El Chayal as the dominant obsidian source used during the Postclassic at lowland Maya sites. New trace element data presented in this monograph, from the Belize study area, supports Nelson's basic hypothesis, but the data also suggest a regionalized distribution pattern. Obsidian acquisition patterns seem to differ temporally and spatially in different environmental zones depending upon either a site's accessibility to Tikal's sphere of influence via overland or riverine trade routes, or proximity to coastal exchange networks along the coastal littoral of Belize.

A list of publications with summaries from projects using the Missouri Obsidian Databank follows:

Glascock, M.D., J.M. Elam and R.H. Cobean

1988 Differentiation of Obsidian Sources in Mesoamerica. In Proceedings of the 26th International Archaeometry Symposium. Edited by R.M. Farquhar, R.G.V. Hancock and L.A. Pavlish. University of Toronto Archaeometry Laboratory, pp. 245-251.

Summary:

Neutron activation analysis results are reported for twelve obsidian sources in the Mexican state of Hidalgo. Statistical analyses permitted differentiating between sources and assignment of provenience to obsidian artifacts from Tula.

Garcia Chavez, R., M.D. Glascock, J.M. Elam and H.B. Iceland

1990 The INAH Salvage Archaeology Excavations at Azcapotzalco, Mexico: An Analysis of the Lithic Assemblage. Ancient Mesoamerica (in press).

Summary:

Analysis of a collection of lithic artifacts from recent INAH salvage excavations in Azcapotzalco, Mexico contributes to our understanding of lithic procurement and manufacturing processes, other economic activities and intersite relations, and the decline of Classic civilization in the Basin of Mexico. The results of NAA conducted at the Missouri University Research Reactor on a small sample of artifacts from the site support the conclusions of visual analysis and growing evidence from other central Mexican sites that at the end of the Classic Period obsidian exchange networks utilizing the Pachuca, Hidalgo sources were largely replaced by widespread dependence on the considerably more distant obsidian source of Ucareo, Michoacan. It appears that Ucareo obsidian was imported primarily in the form of large polyhedral cores used to produce prismatic blades. Obsidian from the Otumba, State of Mexico, source was also identified by NAA in biface and blade form.

Elam, J.M., M.D. Glascock and L. Finsten

1990 The implications of obsidian artifact proveniences from Jalieza, Oaxaca, Mexico. In Proceedings of the 27th International Archaeometry Symposium. Edited by E. Pernicka and G.A. Wagner. University of Heidelberg (in press).

Summary:

Fifty obsidian artifacts from the archaeological site of Jalieza in the Valley of Oaxaca, Mexico were analyzed using instrumental neutron activation analysis and provenienced to identifed sources in Mexico. The source assignments and their implications for models of obsidian production and exchange during Classic and Postclassic times in the Valley of Oaxaca are presented.

Glascock, M.D., J.M. Elam and K. Aoyama

1990 Provenience analysis of obsidian artifacts from the La Entrada Region, Honduras. In Proceedings of the 27th International Archaeometry Symposium. Edited by E. Pernicka and G.A. Wagner. University of Heidelberg (in press).

Summary:

One hundred obsidian artifacts from the La Entrada Region of Honduras were analyzed by neutron activation analysis and provenienced relative to known sources in Guatemala and Honduras. New chemical abundance data is presented for the sources and evidence is presented for existence of two undiscovered sources which provided obsidian for the early inhabitants of La Entrada.

Cobean, R.H., J.R. Vogt, M.D. Glascock and T.R. Stocker

1990 High Precision Trace Element Characterization of Major Mesoamerican Obsidian Sources and Further Analyses of Artifacts from San Lorenzo Tenochtitlán, Mexico. Recently submitted to American Antiquity.

Summary:

High precision trace element analyses for 208 geological samples representing 25 Mesoamerican obsidian sources are presented and discussed. These results were obtained using instrumental neutron activation analysis to measure a total of 28 elements per sample and represent the first detailed chemical studies ever published for many of the source areas. Especially intensive analyses were made for six sources in the states of Veracruz and Puebla in Mexico from the region of Pico de Orizaba volcano. In addition, source determinations are provided for 65 artifacts from the Olmec site of San Lorenzo Tenochtitlán, Veracruz. The investigations presented here constitute an important basis for associating obsidian artifacts with specific source areas; thereby making possible the reconstruction of prehistoric trade systems.

TECHNOTES

This section of the Newsletter is devoted to sharing new techniques, innovative ideas, sources of equipment and supplies, and discussing new technologies. Obsidian analysts are invited to submit information relating to these topics.

As announced on page 1, standard microscope calibration slides have been produced for IAOS member obsidian hydration laboratories. Recognizing that many readers may not be terribly interested in technical details of these standards. Rather than subject these folks to this technical yet important information, a description of the reference particles and slide preparation is included here.

The reference particle standards were obtained from Duke Scientific Corporation of Palo Alto, California. Duke Scientific manufactures a variety of certified particle size standards consisting of highly uniform spheres of polymer and glass. They are available in sizes ranging from 20 nanometers (nm) to 2000 microns. One nanometer is equivalent to 0.001 micron (1/1000 millimeter), or 10 Angstrom units. The "nanosphere" size standards are packaged as aqueous suspensions in concentrations optimized for ease of dispersion and colloidal stability. The spheres have a specific gravity of 1.05 g/ml and a refractive index of 1.59 @ 589 nm (25 degrees Centigrade).

Methods used by Duke Scientific to calibrate the microspheres include adaptations of photon correlation spectroscopy (PCS), transmission electron microscopy, and optical microscopy (array methods). PCS correlates the fluctuations of scattered laser light with the Brownian movement and diameter of suspended particles. PCS is also referred to as quasi-elastic light scattering or dynamic light scattering.

The standard polymer microspheres have been calibrated with the National Institute of Standards and Technology (NIST, formerly National Bureau of Standards) traceable methodology. The calibration values were transferred by optical microscope from a NIST calibrated stage micrometer. National Bureau of Standards (NBS) and Community Bureau of Reference (BCR) materials were used to validate the accuracy and traceability of the calibration methods.

For maximum measurement accuracy in the 1 to 40 micron size range, monosized polymer microspheres were selected from Duke Scientific's inventory. These particles are polystyrene divinylbenzine or polymethylstyrene, available in sizes range from 1 to 40 microns (nominal diameter). As an initial exploration of polymer microspheres as a IAOS reference standard, I chose the 10 micron particles. The certified mean diameter of these particles is 9.87±.057 microns. Their size distribution and uniformity were measured with a specifically configured, high-resolution electrical resistance analyzer, traceable to NBS and BCR.

The reference particles arrived in a 15 ml vial in aqueous solution. While placing a drop of solution and placing cover slip over the solution on a glass microscope slid proved easy, problems were encountered in producing permanent reference slides. First, the polymer microspheres tend to move around in solution. If allowed to dry, the particles cluster, making them difficult to locate and measure under the microscope. In addition, cover slips do not adhere. Fixing the cover slips in mounting medium such as Kleermount is problematic as well. Kleermount is suspended in tuolulene solution. Tuolulene degrades plastics (polymers). This effect is clear in difference between measurements obtained on polymer beads in aqueous solution, versus those obtained in Kleemount. The Kleermounted microspheres had expanded considerably, increasing their controlled diameters.

Similarly, mounting in Lakeside cement appears to affect the polymer microspheres. A mounting medium that does not affect the polymer beads is still being sought.

ABOUT THE IAOS

The IAOS was established to:

1) develop standards for analytic procedures and ensure inter-laboratory comparability;

2) develop standards for recording and reporting obsidian hydration and sourcing results;

3) provide technical support in the form of training and workshops for those wanting to develop their expertise in the field.

4) provide a central source of information regarding advances in obsidian studies and the analytic capabilities of various laboratories and institutions.

Membership

The IAOS needs membership to ensure the success of the organization. To be included as a member and receive all of the benefits thereof, you may apply for membership in one of the following categories:

- Regular Member $20.00/year
- Institutional Member $50.00/year

Regular members are individuals or institutions who are interested in obsidian studies, and wish to support the goals of the IAOS. Regular members will receive any general mailings; announcements of meetings, conferences, and symposia; newsletters; and papers distributed by the IAOS during the year. Regular members are entitled to attend and vote in Annual Meetings.

Institutional members are those individuals, facilities, and institutions who are active in obsidian studies and wish to participate in inter-laboratory comparisons and standardization. If an institution joins, all members of that institution are listed as IAOS members, although they will receive only one mailing per institution. Institutional members will receive assistance from, or be able to collaborate with, other institutional members. Institutional members are automatically on the Executive Board, and as such have greater influence on the goals and activities of the IAOS.

If you wish to join us, mail a check or money order to the IAOS:

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Call for Articles and Information

If you are interested in submitting a short article or announcement for inclusion in the next newsletter, the submission should be received by June 1, 1991. We accept electronic media on IBM compatible 3.5" or 5.25" diskettes, in a variety of word processing formats including Wordperfect (4.2 or 5.0), Wordstar, and Microsoft Word or ASCII text formats. Hard copy should accompany diskettes. Send articles, news, and information to:

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