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NEWS AND INFORMATION

IAOS ANNUAL MEETING ANNOUNCEMENT

This year the IAOS annual meeting will be held in conjunction with the SAA Annual Meetings, on Wednesday, April 20, at the Disneyland Hotel in Anaheim, California. The business meeting will run between 1:00 pm and 2:30 pm. Afterwards the IAOS will be sponsoring a workshop and discussion on field and lab standards in obsidian geochemistry described below.

FIELD AND LABORATORY STANDARDS IN OBSIDIAN GEOCHEMISTRY: SAA WORKSHOP SPONSORED BY IAOS

Geochemical analyses of obsidian and volcanic glass in archaeology has become very much a part of archaeological theory and method in many parts of the world. While the technology of chemical analysis has improved markedly (INAA, XRF, PIXE-PIGME), and the data generated has proliferated, there has been virtually no attempt to coordinate reporting standards. In this workshop, a number of researchers active in the field of obsidian geochemistry and interested parties from SAA and IAOS will discuss these problems and prospects for the decades to come, formulating provisional reporting standards for the collection and analysis of obsidian source standards and artifacts. The basic list of topics to be discussed will include: the petrology of silicic glasses; field methods in the collection of source standards; instrumental techniques; elements of interest; data presentation; and inter-laboratory cooperation and data sharing. Interested parties are invited to participate. Results will be published in the IAOS Bulletin and possibly other venues.

ESTABLISHMENT OF ADVISORY BOARD

The IAOS is pleased to report on the establishment of an Advisory Board, composed of Drs. Clement Meighan, Irving Friedman, and Roger Green, senior members of the obsidian studies "community". Recognizing their substantial and important contributions to the international study of obsidian, the IAOS sought to formalize their participation in the association. These honored members have agreed to serve in an advisory capacity on various aspects of the association, and will receive executive board status at annual meetings as well as lifetime membership.

IAOS ON-DISK OBSIDIAN BIBLIOGRAPHY INTERNET AVAILABILITY

The on-disk version of the IAOS Obsidian Bibliography (currently 1.55) has been posted in a number of Internet-accessible locations. If you have access to the Internet system and are located at a site with FTP (file transfer protocol) capabilities, you can download a copy of the latest bibliography (OBSIDIAN.ZIP) from several Internet Anonymous FTP sites. These sites include: oak.oakland.edu (SimTel Software Repository, primary mirror site (/pub/msdos /hypertext)); and grv.dsir.govt.nz (Society for Archaeological Sciences File Depot (/SAS)).

The bibliography is also available at SimTel secondary mirror sites wuarchive.wustl.edu, archive.orst.edu, ftp.uu.net, ftp.funet.fi, src.doc.ic.ac.uk, ftp.switch.ch, archie.au, NCTUCCCA.edu.tw, ftp.technion.ac.il, by Gopher from Gopher.Oakland.Edu, or by e-mail through the BITNET/EARN file servers. Other Anonymous FTP sites holding the bibliography can be located using the Archie database of Anonymous FTP files developed at McGill University. To interactively access Archie, telnet to an Archie server and enter **Archie** at the login prompt to log on to the system. Type **help** for additional information and **quit** to leave. Archie servers include: archie.ans.net, archie.rutgers.edu, archie.sura.net, archie.uni.edu, archie.mcgill.ca, archie.funet.fi, archie.au, and archie.doc.ic.ac.uk.

OBSIDIAN EXHIBIT: PHOEBE HEARST MUSEUM UNIVERSITY OF CALIFORNIA, BERKELEY

Entitled *Little Black Rocks in the Desert: Prehistoric Obsidian in the American Southwest...* this exhibit summarizes nearly a decade of research by Steven Shackley, the museum archaeologist. It explores the geological origin, techniques of chemical analysis, as well as prehistoric uses of obsidian through an examination of archaeological sources in Arizona, New Mexico, Chihuahua, Sonora, and Baja California. Exhibited case studies include (1) the newly discovered large Valle del Azufre obsidian source in central Baja California that appears to be the most intensively utilized source in the Southwest, (2) the Classic Period Hohokam obsidian project that is changing our concept of Hohokam exchange; and (3) the reconstruction of territories and ranges in the very earliest periods in the Southwest. Technological aspects of obsidian in the Southwest are also explored. One portion of the exhibit is devoted to unique obsidian objects from the Hearst Museum collection, many that have never been on display. The exhibit will be on view in the lobby from March 14 through the first of September 1994.

SHORT REPORTS & REVIEWS

Compiled by Mike Rondeau, Caltrans, Environmental Division, 650 Howe Avenue, Suite 400, Sacramento, California 95825 USA; (916) 263-3375; FAX (916) 263-3384

Short Reports provides an archaeological context in which to report obsidian research and related information. Reviews of recent studies, research in progress, older findings, regional, site, and artifact specific summaries, as well as other reports, announcements, etc. of pertinent interest are encouraged. To submit contributions to Short Reports or for an outline of recommended archaeological/obsidian information for the Short Reports format contact Mike Rondeau.

SIBERIAN OBSIDIAN IN ALASKA: SOURCING STUDIES IN PROGRESS

The presence of obsidian sourced to Siberia has been found on St. Lawrence Island and the Seward Peninsula of Alaska. These findings are the result of a state wide obsidian study undertaken by the Bureau of Land Management. This study has identified at least 20 different sources for obsidian used prehistorically in Alaska. The sources of this glass include Siberia and the Yukon. Approximately 800 samples from across the state have been subjected to neutron activation analysis during this study. XRF and microprobe chemical characterizations have also been undertaken to compare the utility and accuracy of the three methods. The use of different elements as diagnostic criteria was found to be one of many difficulties in comparing methods.

Included in this study is Batza Tena, the major obsidian source of Alaska, which has been found to include at least six or seven different known locations and involves subgroups with minor chemical variations. Another substantial obsidian source is located in the Okmok Caldera on Umnak Island in the Aleutians.

Hydration studies have thus far been limited. The findings indicate that the cool environment has retarded hydration band development in Alaska. The mean band width is in the two micron range with the largest reliable widths being in the five micron range.

The neutron activation studies were undertaken by Jimmy Griffin and Larry Haskins. Tom Jackson did the XRF work. Obsidian hydration studies were conducted by Chris Stevenson. Thanks are expressed to John Cook of the BLM, Fairbanks for his willingness to run the risks of a telephone interview.

REVIEW OF SPECIAL JCGBA ISSUE: OBSIDIAN DATA CONSPICUOUSLY ABSENT

An excellent volume of the *Journal of California and Great Basin Anthropology* has been produced (1991 JCGBA 13:3) entitled Case Studies in Lithic Technology of Western North America. There is much to recommend this issue. However, the correlation and use of technological lithic data as with data generated by obsidian studies, is not always well correlated with other archaeological information. In this volume there are some fine examples to the contrary. Even so, the linkage of technological and obsidian data sets can offer a range of potential research opportunities that are seldom tapped.

The articles noted below are used only to show ways in which technological and obsidian data might be usefully linked. It is recognized that project limitations and the focus of these articles may have limited the reporting of obsidian studies.

EARLY HOLOCENE ARROW POINTS IN OREGON?

Boulders to Bifaces: Initial Reduction of Obsidian at Newberry Crater, Oregon by Terry Ozbun (JCGBA 1991:147-159). Ozbun reports on a very interesting set of studies on three archaeological sites in the Newberry Crater locality. Two of these sites are mentioned below. The first is an obsidian quarry and workshop site from the Big Obsidian Flow dating to ca. 1350 B.P. Large biface cores of this glass are attributed to manufacture late in prehistory. It would have been of interest to know, with this reference to dating and technology, the range of obsidian hydration band widths. Correlations with such obsidian data might prove useful elsewhere in the region of Newberry Crater obsidian use. [Inside comment from Craig Skinner... INFOTEC Research is currently conducting the geochemical & hydration studies.]

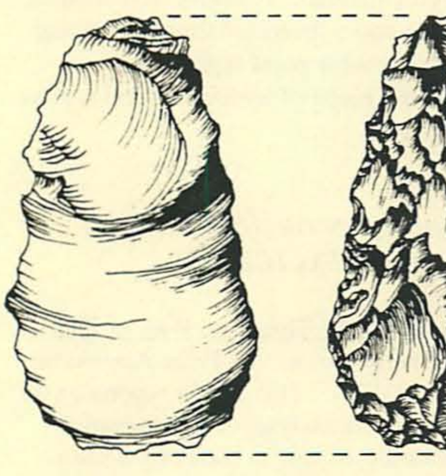
Likewise, such data from a second site in the caldera, located on the southern shore of Paulina Lake, could also have regional implications. Radiocarbon dates placed two components at ca. 7000 and 8000 B.P. The claim for the manufacture of arrow points at these early dates may be questioned. Dart point manufacture at this site was mentioned later in the article. No projectile point illustrations were provided. It would have been of value, given the known source of the obsidian and the dating, to know what point types were recovered and what range of hydration band widths these types displayed.

VARIABILITY IN OBSIDIAN BIFACE MANUFACTURING

Unifacial Bifaces: More Than One Way to Thin a Biface by Elizabeth Skinner and Peter Ainsworth (JCGBA 1991:160-171). This article reports on an excellent technological analysis of an alternative biface manufacturing technique used in the Casa Diablo obsidian source area. This manufacturing technique proceeded through early biface thinning stages producing only a unifacial artifact. A cache of seven of these artifacts were reported to have hydration widths ranging from 3.1 to 3.8 microns.

The authors observe that this was a common flaking technique at the four sites studied. However, the dating of these sites is reported as Middle and Late Archaic. No clear temporal definitions were provided. Knowing the temporal placement of this flaking technique, and how it correlated with the more than 800 hydration band readings and half a dozen radiocarbon assays accumulated by the original study (Goldberg et al. 1990) would have been of additional value. A review of those interesting obsidian studies (Goldberg et al. 1990) will be in a future Short Reports.

In this otherwise outstanding analysis, the use of the term "transverse" to describe parallel pressure flakes seems out of place. As flakes, many of these cannot be shown to have transversed the artifact. If a strict use of this term for geometric description is accepted, not only would the flakes have had to run from one edge to the other, but they would have had to cross the artifact perpendicular to the long axis. In the region where these were found, such flakes crossed the long axis of the bifaces at a diagonal. However, the author of this column is also not without terminological guilt, having referred in print to parallel pressure flakes as California flakes because of their outlines!



(not to scale)

Unifacial reduction of dorsal surface
(early through middle biface thinning stage)

Reproduced from Goldberg et. al. 1990:236

OBSIDIAN FLUTED POINTS IN ALASKA?

Obsidian fluted points have been reported from Alaska (Clark and Clark 1975). They were made from a minor subgroup in the Batza Tena source locality. All of these points were made of obsidian with a single exception of basalt. The specimens were not recovered from one site, but from a number of localities ranging in elevation from 300 to 500 feet. These localities were mainly found on a short ridge over looking the flat bottomed Koyukuk River Valley (elevation 250 feet). To the southwest of this main locality were uplands that provided the obsidian. At least three other fluted point locations were reported in the vicinity (Clark and Clark 1975:31).

The typical fluting technique for these specimens appeared to be somewhat divergent from those common in the southern part of North America. The Alaskan technique appears to have consisted of three thinning flutes. Two lateral thinning flutes preceded the main medial flute. One specimen showed fluting on only a single face. Evidence of non-fluted points of the same morphology were also reported. Given the date of this publication, the lack of hydration band width data was to be expected. For more details on these finds see the Report of Donald W. Clark and A. McFadyen Clark: Fluted Points from The Batza Tena Obsidian Source of the Koyukuk River Region, Alaska, Anthropological Papers of the University of Alaska 17(2):31-38, University of Alaska Press, Fairbanks. Illustrations and photographs of the points are provided.

References Cited During Review:

Goldberg, S.K., E.J. Skinner, and J. F. Burton
1990 Archaeological Excavations at Sites CA-Mno-574, -577, -578, and -833: Stoneworking in Mono County, California. California Department of Transportation, Sacramento.

ABSTRACTS AND ANNOTATIONS ON REPORTS AND PUBLICATIONS

Compiled by Kim Tremaine of BioSystems Analysis, Inc., 1017 Front Street, Sacramento, California 95814 USA; (916) 557-4500; FAX (916) 557-4511.

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. In addition, the proliferation and number of journals, and the interdisciplinary nature of obsidian and glass studies make it difficult to keep abreast of all relevant, current literature. The IAOS Bulletin will alert readers to some of this information by reproducing abstracts and summarizing literature that may be of particular interest to IAOS members.

Basgall, Mark E.
1993 Chronological Sequences in the Southern North Coast Ranges, California. In, There Grows a Green Tree: Papers in honor of David A. Fredrickson. Center for Archaeological Research at Davis, Publication No. 11:167-195.

Annotation

Prefaced by the fact that chronological sequences in many parts of California are still understood in broad outline only and that archaeologists should not feel complacent with antiquated frameworks, the author evaluates early spatio-temporal assumptions founded for the North Coast Ranges of California. Chronometric data from the Warm Springs locality in north-central Sonoma County, comprised of nearly 50 radiocarbon determinations, 1200 obsidian hydration measurements, and 900 time sensitive artifact forms for 64 sites, provide an unprecedented opportunity for conducting a thorough assessment.

Mount Konocti and Napa Valley obsidians are found to represent the two most prominent glass types in the project area, with Borax Lake and Annadel playing minor roles. Three major occupational phases are identified at the Warm Springs locality: the Skaggs Phase (ca.5000-2500 B.P.) characterized by Mendocino and Willits series projectile points and hydration measurements of at least 3.4 (Mount Konocti obsidian), 3.6 (Napa Valley), and 4.1 (Borax Lake) microns; the Dry Creek Phase (ca. 2500-900 B.P.) marked by Excelsior series points, some holdover of Willits forms, and obsidian hydration values of 2.5-3.3/3.5 (Mount Konocti and Napa Valley) and 3.0-4.0 (Borax Lake) microns; and finally, the Smith Phase (ca. 900-100 B.P.) represented by Rattlesnake series projectile points, perhaps a smattering of small Excelsior types, and hydration measurements below 2.5 (Mount Konocti and Napa Valley) or 2.9 (Borax Lake) microns in magnitude.

Basgall concludes that these data are in essential agreement with the temporal estimates offered by Fredrickson (1973, 1974, 1984), not withstanding the limited, widely scattered information available to him at the time.

Gratuze, B., J.N. Barrandon, and K. Al Isa
1993 Non-Destructive Analysis of Obsidian Artefacts Using Nuclear Techniques: Investigation of Provenance of Near Eastern Artefacts. Archaeometry 35(1):11-21.

Annotation

A non-destructive analytical method using both instrumental neutron activation and proton-induced gamma ray emission techniques was developed to study the provenance of obsidian artefacts from Turkey, Syria, and Iraq. Twenty-one geologic sources from 12 compositional groups in four regions (Taurus, Lake Van, Armenia, and Cappadocia) were examined.

One-hundred thirty four samples from twenty-nine sites dating from 8300 to 1300 B.C. were analyzed. The most ancient site represents the transition between hunting/gathering and agriculture at the beginning of the Neolithic. Material from the latest site was recovered in an urban context of the Bronze Age. Obsidian objects at all sites involved were relatively unique in relation to the rest of the artefacts recovered, having been imported long distances. The authors conclude that obsidian came exclusively from Cappadocia until about 7800 B.C. With new contacts between the middle Euphrates and eastern Anatolia, obsidian found in contexts post 7800 B.C. were determined to originate from the regions of Bingöl and Nemrut Dag as well as Cappadocia.

Hoard, R.J., J.R. Bozell, S.R. Hoen, M.D. Glascock, H. Neff, and J.M. Elam

1993 Source Determination of White River Group Silicates from Two Archaeological Sites in the Great Plains. American Antiquity 58(4):698-710.

Abstract

High-quality cryptocrystalline silicates from the Oligocene-age White River Group of the central Great Plains (WRGS) were widely used prehistorically for chipped-stone tools. There are three known source areas for WRGS: Flattop Butte in northeastern Colorado, Table Mountain in east-central Wyoming, and the White River Badlands of South Dakota. Specimens from these sources are often visually indistinguishable, making it difficult to specify the source of WRGS from nonquarry archaeological sites. Using a quantitative method-neutron-activation analysis- these sources were differentiated. The sources of WRGS in two Central Plains archaeological sites also were determined using this technique. The results show that the technique has important implications for studies of prehistoric mobility and for the refinement of cultural-historical affiliation.

Hughes, Richard E., and William B. Lees

1991 Provenance Analysis of Obsidian from Two Late Prehistoric Sites in Kansas. Transactions of the Kansas Academy of Science 94(1-2):38-45.

Abstract

Six obsidian artifacts from two protohistoric archaeological sites in Kansas were subjected to non-destructive energy dispersive x-ray fluorescence analysis to determine the parent obsidian source used in their manufacture. Results indicate that all six specimens were derived from two obsidian sources located in the Jemez volcanic field of northern New Mexico.

Jones, Terry L., and John F. Hayes

1993 Problems and Prospects in Sonoma County Archaeology. In, There Grows a Green Tree: Papers in honor of David A. Fredrickson. Center for Archaeological Research at Davis, Publication No. 11:197-216.

Annotation

Alternatives to California's North Coast Ranges cultural classification system, first developed by Fredrickson (1973), are explored in this paper. In so doing, a cultural history for the Santa Rosa locality is summarized by temporal phase. Diagnostic time markers and hydration ranges for both Napa and Annadel obsidians are tied to these phases.

Analyses suggest that over the last 1000 years increased territoriality and hostile intrusions occurred in an area known to be populated by speakers of many languages at the time of European contact. The authors assert that ethnic identities were being maintained at site SON-120 during the Late Period via differential exchange networks and access to territory. Pomoan-speaking peoples are said to have used the site for task-specific purposes represented by a component dominated by Annadel obsidian. In contrast, Wappo-speaking peoples are said to have used the site for residential purposes represented by a component showing a high proportion of Napa obsidian.

Parker, John

1993 Ethnographic and Prehistoric Settlement Systems in the Clear Lake Basin. In, There Grows a Green Tree: Papers in honor of David A. Fredrickson. California Archaeological Research at Davis, Publication No. 11:303-322.

Annotation

The primary period of habitation or use is identified for 100 sites in the Clear Lake Basin of northern California. A relative chronology is established on the basis of hydration analyses on 1,119 samples, representing a minimum of 5 samples per site (composed of 75% debitage and 25% various tools). Fluctuations of settlement during different "micron time periods" are highlighted and hypotheses developed which might account for these observed differences.

Micron readings (Borax Lake obsidian) indicate that the earliest habitation occurred in the southeast portion of the Basin between 8 and 10 microns, with sites being sparsely distributed. By 7-8 microns, the entire shoreline appears to have been in use, with sites regularly spaced, suggestive of the existence of culturally defined boundaries. During the 6-7 micron period, regional use appears to have expanded into the upland areas, perhaps signalling the beginning of a seasonal habitation and resource collection strategy. Use of the lakeshore and highlands is observed to continue into the historic period.

Randle, K., L.H. Barfield, and B. Bagolini
1993 Recent Italian Obsidian Analyses. Journal of Archaeological Science 20(5):503-509.

Abstract

The analyses of several obsidian flakes from three northern Italian Sites are described, using the technique of Instrumental Neutron Activation Analyses. Nineteen trace elements were determined in all. The obsidians were allocated to known source groups in the Mediterranean and Central Europe using a simple dispersion plot based on La/Sc and Cs/Sc ratios. The attribution of one sample to a Carpathian source is discussed, and the implications for contacts with Central Europe in the Early Neolithic. Evidence is presented that obsidian was being traded as early as the Early Neolithic and as late as the Chalcolithic.

Roper Wickstrom, C. Kristina
1993 Spatial and Temporal Characteristics of High Altitude Site Patterning in the Southern Sierra Nevada. In, There Grows a Green Tree: Papers in honor of David A. Fredrickson. California Archaeological Research at Davis, Publication No. 11:285-301.

Annotation

Thirty-nine sites ranging from 10,000 to 12,000 feet in elevation were identified during three seasons of survey in Sequoia and Kings Canyon National Parks in 1986-1988. In subalpine and alpine settings characterized by glacial tarns, broken granite ridges and benches, talus slopes, and wet sedge meadows, these Sierran crest sites provided an opportunity to examine high altitude land use. The author distinguishes two settlement modes paralleling those of the White Mountains (western California) and Alta Toquima (central Nevada); an earlier extensive logistical use of high altitude localities for hunting of bighorn sheep, followed by a markedly later, intensive residential use of selected environments of the region.

Geochemical studies on 230 samples from 24 of the 39 sites, reveal obsidians from a variety of sources in order of dominance: Fish Springs, Casa Diablo, Coso, Queens, Mono Glass Mountain, and Fletcher. Hydration rim values derived from some of these samples point to early beginnings for aboriginal exploitation, arguably corresponding with or soon following the inception of occupation in adjacent regions such as the Owens Valley.

The Kern River drainage (in the southern area of the Parks) joined by the Triple and Great Western Divides (in Kings Canyon National Park), appears as a boundary separating the regular use of alpine environments by east-side populations using Fish Springs obsidian from the sporadic exploitation by populations coming from the lower foothills of the west Sierra Nevada. Large amounts of Fish Springs obsidian are observed west of the Kern River at ca. 3.7 microns. This westward expansion in distribution is tentatively suggested to mark the intrusion of Numic (Western Mono) peoples onto western slopes of the Sierra Nevada.

Stevenson, C.M., I. Friedman, and J. Miles

1993 The Importance of Soil Temperature and Relative Humidity in Obsidian Dating, with Case Examples from Easter Island. In, Easter Island Studies: Contributions to the History of Rapanui in Memory of William T. Mulloy, ed. by S.R. Fischer. Oxbow Monograph 32.

Annotation

The importance of accounting for temperature and rH in obsidian dating was examined using newly acquired environmental data from Easter Island. Monitoring cells exposed for a year-long period were employed to distinguish four different ambient conditions on the island (caves, open-site areas, subsurface areas, and surface contexts). Hydration rates for obsidian specimens from the Mt. Orito source were calculated, based on an experimentally derived constant. Temperature and rH adjustments were then made relying on (1) a generally accepted understanding of temperature dependence (Arrhenius equation), and (2) preliminary findings regarding the relationship between rH and rates of hydration (founded on high-temperature vapor experiments). Adjustments for site and depth-specific temperatures and rH values yielded rates from 6.24 to 8.63 $\mu m^2/1000$ years- which the authors point out can result in substantial differences in age determination.

To asses the effectiveness of their adjustments in rate, two age determinations (accounting for temperature and rH) were compared to radiocarbon assays and found to closely correspond (impress-ively so). The authors conclude not only that temperature and rH significantly affect rates of hydration, but that it is possible to account for these parameters. They suggest that whenever obsidian dating is employed to determine the occupational history of a site, differences in temperature and rH should be measured for specific surface features and depths of deposit. For regional studies, larger-scale strategies should be devised in order to provide useful contextual data. They recognize that either level of investigation requires the researcher to commit a significant amount of time and resources if the obsidian hydration dating method is to be used advantageously.

Stevenson, C.M., E. Knaus, J.J. Mazer, and J.K. Bates

1993 Homogeneity of Water Content in Obsidian from the Coso Volcanic Field: Implications for Obsidian Hydration Dating. Geoarchaeology: An International Journal 8(5):371-384.

Abstract'

Users of the obsidian hydration dating method have routinely assumed that artifacts which originate from the same geological flow will be of the same chemical composition and thus hydrate at the same rate under equivalent conditions of temperature and relative humidity. Recent laboratory experimentation into the hydration process has shown that the intrinsic water content of the glass is the dominant factor in establishing the rate of hydration. Water content determinations on a large suite of samples from numerous prehistoric quarries within the Coso volcanic field, California, indicated that water content values, and thus hydration rate, varied significantly on a within flow basis. It is recommended that water determinations be made on individual artifacts prior to obsidian hydration dating.

Tremaine, Kim J.

1993 Temporal Ordering of Artifact Obsidians: Relative Dating Enhanced Through the Use of Accelerated Hydration Experiments. In, There Grows a Green Tree: Papers in honor of David A. Fredrickson. Center for Archaeological Research at Davis, Publication No. 11:265-275.

Annotation

Advances by archaeometrists and glass scientists are reviewed in assessing the state-of-the-art for dating obsidian artifacts. Despite claims that obsidian chronometry has "come of age", it is evident that the complexity of the hydration process is still unfolding. The author cautions against premature application of rate constants to derive absolute age determinations. An alternative relative dating approach is offered in the interim to achieve temporal ordering. This approach permits comparisons between chemically distinct obsidians exhibiting differentially developed hydration rim depths. Cross-source temporal calibrations are sought, based on constants derived from accelerated hydration experiments.

Waechter, Sharon A., and Thomas M. Origer
1993 A Discussion of Multiple Hydration Bands and Obsidian Scavenging at CA-COL-160, Mendocino National Forest. In, There Grows a Green Tree: Papers in honor of David A. Fredrickson. California Archaeological Research at Davis, Publication No. 11:277-284.

Annotation

The authors present some provocative hydration results from site CA-COL-160. Thirty percent of the measurement from 95 specimens revealed multiple band widths (exhibiting differences in thickness of greater than 0.4 microns) interpreted as resulting from scavenging or reuse. The high representation of this type of activity is questioned. Three explanations are considered: (1) that a sampling error occurred; (2) that recycling of older obsidian was a common activity throughout California, just not yet well documented; and (3) that the high frequency of recycling at CA-COL-160 is unique, reflecting divergent behavior of site occupants. Although all three explanations are viewed as plausible, the authors aren't satisfied with any of them in totality and offer suggestions for resolving the enigma.

TECHNOTE

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

BREMSSTRAHLUNG RATIO TECHNIQUE APPLIED TO THE NON-DESTRUCTIVE ENERGY-DISPERSIVE X-RAY FLUORESCENCE ANALYSIS OF OBSIDIAN

M. Kathleen Davis
BioSystems Analysis, Inc.
Santa Cruz, California

Archaeologists often use analyte/scatter ratios in non-destructive x-ray fluorescence to minimize errors in element concentration associated with small, thin, and irregular samples (Bouey 1991; Jackson and Hampel 1992; Shackley and Hampel 1992). Element concentrations for such artifacts can deviate widely from those obtained on larger specimens with relatively flat surfaces. While reference to the Compton scatter peak is preferred, selected areas of the high energy bremsstrahlung region may be used when the Compton peak is absent. This procedure is often required in analysis for barium. Since infinite thickness for barium in an obsidian matrix is close to 3 cm at 50 kV, some form of correction is required for all but the thickest artifacts. The following experiment is designed to quantify the limits of the bremsstrahlung ratio technique as it is applied to samples that are less than infinitely thick.

Two different barium/bremsstrahlung ratios were employed to calculate barium concentration in samples of obsidian from the Glass Mountain source in northeastern California. Barium/R1 is a ratio of the barium k-alpha peak to the bremsstrahlung region between 25.0 and 30.98 keV and Barium/R2 is a ratio to the bremsstrahlung region between 38.56 and 40.92 keV (Figure 1). Samples are 25 mm in diameter, polished on both sides, and range from 30 microns to 5 mm thick. All samples were prepared from a single core of Glass Mountain obsidian. Two or more of the 1 to 5 mm samples were stacked on top of one another to approximate samples thicker than 5 mm.

Trace-element analysis was conducted at BioSystems Analysis on a Spectrace 5000 energy-dispersive x-ray fluorescence system equipped with a 50 kV power supply and a rhodium x-ray tube. The x-ray tube was operated at 50 kV and .25mA with a .63 mm copper filter in the x-ray path. Samples were scanned for 300 seconds livetime in an air path. Ppm values are calculated as ratios to the bremsstrahlung regions using linear least squares calibrations derived from the analysis of eight USGS and GSJ rock standards (Figures 2 & 3). The Glass Mountain source is near the location of rhyolite used in USGS rock standard RGM-1, and this standard is included in the analysis for comparison. The reported concentration of barium in RGM-1 is 807 ppm (Govindaraju 1989).

Results indicate that the barium/R1 ratio generates accurate barium values for specimens as thin as 1 mm (Table 1). Excluding values for specimens thinner than 1 mm, the mean barium value calculated using barium/R1 is 808.6 ppm with a sigma of 15 ppm (RSD = 1.8 %). Barium/R2 is less effective as a thickness correction, though it does generate the better calibration line; sigma of the barium/R2 line is 9.6 ppm versus 20.9 ppm for the barium/R1 line (Figures 2 & 3). The mean barium value calculated using barium/R2 (samples thinner than 1 mm excluded) is 736.8 ppm with a sigma of 37 ppm (RSD = 5%). This experiment does not consider effects related to small sample diameter or irregular surface configuration, and results for such specimens may vary from those presented here. It should be noted that the intensity of the bremsstrahlung region reflects sample mass only and does not correct for matrix effects.

Table 1. Barium concentrations (in ppm) calculated for Glass Mountain obsidian

SAMPLE	BARIUM/R1	BARIUM/R2
30 µm	716.2 ± 33.3	753.8 ± 27.7
200 µm	746.7 ± 25.3	837.9 ± 18.1
0.5 mm	756.3 ± 22.6	821.3 ± 13.2
1 mm	793.8 ± 22.0	830.3 ± 11.8
2 mm	796.4 ± 21.6	814.9 ± 11.1
3 mm	809.9 ± 21.5	795.2 ± 10.7
4 mm	800.9 ± 21.4	772.7 ± 10.6
5 mm	815.2 ± 21.4	770.6 ± 10.5
6 mm	840.7 ± 21.4	758.7 ± 10.4
7 mm	824.4 ± 21.4	753.9 ± 10.4
8 mm	786.9 ± 21.4	718.0 ± 10.4
9 mm	807.8 ± 21.4	727.4 ± 10.4
10 mm	806.1 ± 21.3	728.9 ± 10.4
11 mm	813.2 ± 21.3	731.8 ± 10.4
RGM-1	776.3 ± 21.6	811.0 ± 11.2

Errors represent counting and fitting error uncertainty and do not reflect the true precision of the measurement.

Figure 1. Spectrum of Glass Mtn. obsidian acquired at 50 kV.

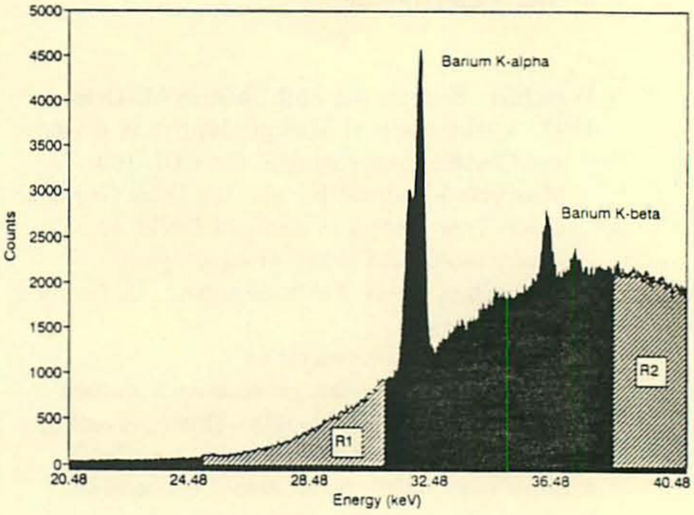


Figure 2. Intensity vs. Concentration: Barium/R1

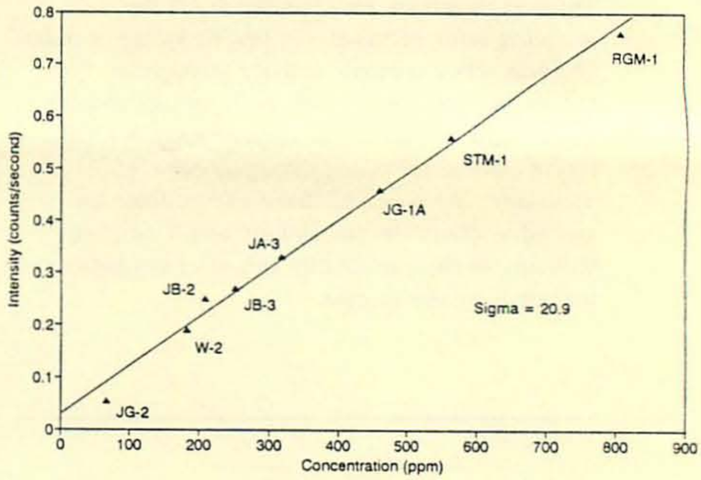
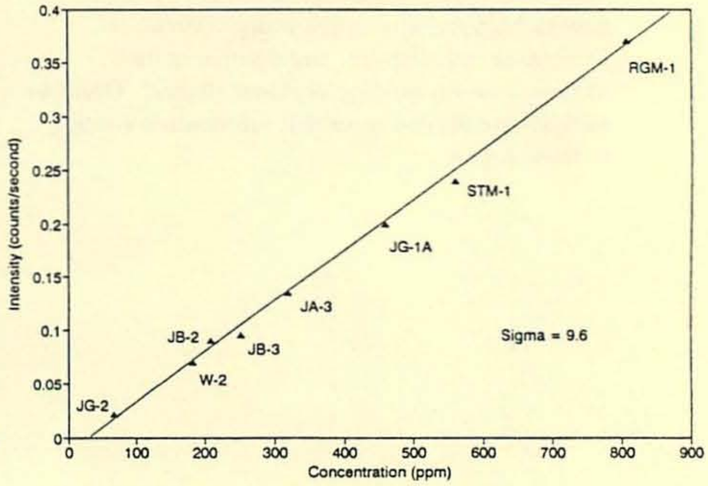


Figure 3. Intensity vs. Concentration: Barium/R2



MEETINGS AND EVENTS

1994

February 2-4. Fifth Australian Archaeometry Conference. Armidale, New South Wales. Nick Cook, Department of Archaeology and Palaeoanthropology, The University of New England, Armidale, NSW 2351, Australia; tel 067-73-2860; fax 067-73-2526; e-mail ncook@metz.une.edu.au.

February 18-23. American Association for the Advancement of Science, Annual Meeting. San Francisco, California, USA. AAAS, 1333 H Street NW, Washington, DC 20005, USA; tel 202-326-6400.

February 27-March 4. The Pittsburgh Conference & Exposition on Analytical Chemistry and Applied Spectroscopy. Chicago. Alma Johnson, Program Secretary, 300 Penn Center Boulevard, Suite 332, Pittsburgh, PA 15235-5503, USA; tel 412-825-3220. Symposium topics include: elemental mass spectrometry; advances in fluorescence; surface mass spectrometry.

April 11-15. Materials Research Society, Spring Meeting. San Francisco, CA, USA. Materials Research Society, 9800 McKnight Road, Pittsburgh, PA, USA; tel 412-367-3012.

April 20-24. 59th Annual Meeting, Society for American Archaeology. Disneyland Hotel, Anaheim, California USA. SAA, 1511 K Street NW, Washington, DC, USA; tel 202-223-9774.

May 4-6. The 27th Annual Meeting of the Canadian Archaeological Association. Hilton International, Edmonton, Alberta. Contact Jack Ives, Provincial Museum of Alberta, 12845 - 102 Avenue, Edmonton, Alberta, Canada T5NOM6. Tel 403-453-9149; fax 403-454-6629.

May 9-14. Archaeometry 94: 29th International Symposium on Archaeometry. Dr. Ay Melek Ozer, Middle East Technical University, Department of Physics, 06531, Ankara, Turkey; fax 90-4-210-12-81.

May 16-20. Materials Issues in Art and Archaeology IV, Cancun. James R. Druzik, The Getty Conservation Institute, 4503 Glencoe Avenue, Marina del Rey, CA 90292, USA; tel 310-822-2299; fax 310-821-9409.

June 5-11. Geochronology, Cosmochronology and Isotope Geology (ICOG-8). Berkeley, CA, USA. Garniss Curtis, Institute of Human Origins-Geochronology Center, 2453 Ridge Road, Berkeley, CA 94709 USA; tel 510-845-4003; fax 510-845-9453.

October 14-16. Science and Archaeology: A Multi-Disciplinary Approach to Studying the Past; sponsored by the SAS. Cambridge. Robert H. Tykot, Archaeometry Laboratories, Harvard University, Cambridge, MA 02138, USA; tel 617-496-8991; fax 617-495-8925; e-mail Tykot@HUSC4.Harvard.Edu.

November. International Symposium "The Pleistocene/Holocene Boundary and Human Occupations in South America, Mendoza, Argentina.. Organized by the Facultad de Filosofia y Letras, Universidad Nacional de Cuyo. Contact: Marcelo Zarate, Centro de Geologia de Costas y del Cuarternario - UNMP, Casilla de Correo 722 - Correo Central, 7600 Mar del Plata, Argentina.

December 4-11. Third World Archaeology Congress. New Delhi, Shri M.C. Joshi, Director General, Archaeological Survey of India, Janpath, New Delhi 110011, India; tel 991-11-3014821; fax 91-11-3109821.

1995

April 2-7. Archaeological Chemistry. Symposium to be held at the American Chemical Society National Meeting, Anaheim, California. Major Areas of Interest: Bone Dating, Artifact Dating, Archaeology of Genetic Material, and Peopling of the New World. Contact: Mary Virginia Orna, College of New Rochelle, New Rochelle, NY 10805 USA; tel 914-654-5302; fax 914-654-5387.

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
- Life-Time Member $200.00

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; bulletins; 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.

*Membership fee may be reduced or waived in cases of financial hardship or difficulty in paying in foreign currency. Please complete the form and return to the Secretary with a short explanation regarding lack of payment.

**Because membership fees are very low, the IAOS asks that all payment be made in US dollars in international money orders or checks payable on a bank with a US branch. If you do not do so, much of your dues is spent in currency exchange.

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

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Tadoshi Midoshima, Archaeological Center of Kanagawa Prefecture, Japan

CALL FOR ARTICLES AND INFORMATION

Submissions for articles, short reports, abstracts, or announcements for inclusion in the next newsletter should be received by May 20, 1994. We accept electronic media on IBM compatible 3.5" or 5.25" diskettes, in a variety of word processing formats including Wordperfect (5.n), Wordstar, and Microsoft Word or ASCII text formats. A hard copy should accompany diskettes. Send to Kim Tremaine, c/o BioSystems Analysis, 1017 Front Street, Sacramento, California, 95814; (916) 557-4506.

Short Reports: If you are interested in briefly reporting on research findings (e.g., one column in length), contact Mike Rondeau at Caltrans, Office of Environmental Analysis, 650 Howe Avenue, Suite 400, Sacramento, California 95825; (916) 263-3375; FAX (916) 263-3384.

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