IAOS

International Association for Obsidian Studies

Bulletin

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CONTENTS

NEWS AND INFORMATION

CALL FOR PAPERS

Please consider joining an IAOS sponsored session on long distance exchange at the 2007 Society for American Archaeology meetings in Austin, TX. If interested, please contact Carolyn Dillian at cdillian@hotmail.com

IAOS ELECTIONS

We have two candidates for the position of Secretary/Treasurer of the IAOS for inauguration during our annual meeting at the SAAs in 2006, please review the election materials enclosed with this *Bulletin* and complete and send the ballot on the last page. You can also vote electronically by sending an email with your vote to Janine Loyd at iaos@origer.com

PAYPAL ON THE IAOS WEBSITE

The IAOS website will now offer PayPal to those joining the organization or for renewing your IAOS membership with a credit card. It is a great way to facilitate the payment of non-U.S. membership dues with minimal cost to the IAOS. Thanks to Phil LeTourneau and Craig Skinner for making these arrangements!

2006 IAOS ANNUAL MEETING

The IAOS Annual Meeting will be held during the Society for American Archaeology meetings in San Juan, Puerto Rico. The IAOS meeting is tentatively scheduled for Friday, April 28, 2006. Time and location to be announced.

NOTES FROM THE PRESIDENT

Greetings from your new president. I am looking forward to my involvement with IAOS as we grow as an organization over the next two years. Thanks to outgoing President Carolyn Dillian for all of her work leading IAOS. Luckily for us, although she leaves her post as president, she continues on as *Bulletin* editor.

As I said in my candidate statement, IAOS is fortunate to have three key strengths. Our dedicated membership is the backbone of IAOS. Our first goal should be to get the many inactive members back and then expand from there. Our excellent Bulletin keeps us up to date on a broad range of current obsidian research. This is the third edition edited by Carolyn Dillian; she has a number of ideas for continued improvements. The IAOS website run by Craig Skinner serves as a central resource for obsidian researchers. I think we can easily build on these to become a stronger, more relevant organization.

The April annual meeting in Salt Lake City was well attended. Most of our discussion concerned ways to increase membership: entice more students to join, make paying dues more convenient, encourage lapsed members to begin paying again, and add features to the Bulletin.

IAOS currently has a student rate of $10 (half the regular membership) and offers free membership to students with submission of a paper to the Bulletin. To introduce more students to IAOS, Steve Shackley has sent the IAOS Bulletin to anthropology departments. Steve, as Director of the Archaeological XRF Laboratory at the University of California, Berkeley, has also very generously offered an annual student research award. Each year, Shackley will award free XRF analysis of up to 100 samples for one project. The deadline for proposals is December 31.

To make paying membership dues easier, especially for foreign members, we are setting up a PayPal system. At a very small cost to IAOS, citizens of many foreign countries will be able to use this feature to pay in their own currency. Unfortunately, PayPal does not currently work in a number of countries, including Russia, and the nations of Eastern Europe, Africa, and the Middle East. PayPal plans to expand its services to other countries, but has no timetable for this yet.

One idea discussed at the annual meeting was to add a section on current research notes where members can publish brief and informal information about ongoing research. This section will be a great place to see the breadth of ongoing obsidian research. I encourage everyone to submit something.

Finally, thanks to Janine Loyd for her dedicated service as Secretary/Treasurer since 2002. She will be retiring this year and we have two candidates for her replacement: S. Colby Phillips and Teddi Setzer.

Sincerely,
Philippe LeTourneau

AWARDS

The IAOS has instituted a new award for obsidian-related papers presented during conferences or meetings. The award consists of a two-year membership in the IAOS and publication of the paper in the IAOS *Bulletin*. If you have a paper you wish to nominate, please send the following information to Carolyn Dillian at cdillian@hotmail.com

- Name and affiliation of nominee
- Title of paper
- Conference where presented

ELECTIONS

We have two nominees for the position of Secretary/Treasurer of the International Association for Obsidian Studies. Please read the candidates' statements below and cast your vote using the ballot enclosed at the end of this *Bulletin* or by email to iaos@origer.com

S. Colby Phillips
University of Washington
colbyp@u.washington.edu

I am currently a first-year archaeology graduate student in the Department of Anthropology at the University of Washington, interested in late-Pleistocene hunter-gatherers, technological organization strategies, and lithic analysis. While I currently do not have any experience with obsidian sourcing or analysis research, I am working on several proposals and hope to begin working on obsidian-related projects within the next year.

Prior to returning to graduate school, I was a technology marketing professional for ten years, and managed a non-profit technology-industry standards consortium. A key part of my role was to oversee the membership, budget, and communications activities of the organization. I believe this experience is directly relevant to the Secretary-Treasurer position, and I look forward to contributing to the ongoing growth and activity of the IAOS.

Teddi Setzer
University of South Florida
tsetzer@mail.usf.edu

I'm a Ph.D. student at the University of South Florida, and I have been working with obsidian sourcing and use-wear in the central Mediterranean for five years with Rob Tykot. My MA thesis, Use-Wear Experiments with Sardinian Obsidian: Determining its Function in the Neolithic, was completed last year.

I have had three years of experience as an officer (including vice-president and secretary) in multiple organizations at USF, as well as a substantial amount of fund raising experience. I am very enthused to have the opportunity to work with the IAOS and others who share an interest in obsidian studies.

Bull Creek (Formerly AZ Unknown B), Yavapai County, Western Arizona, USA

M. Steven Shackley, Archaeological XRF Laboratory, Department of Anthropology, 232 Kroeber Hall, University of California, Berkeley, CA 94720-3710, USA

During the 1990s when a number of archaeological projects from central and northwest Arizona submitted samples for analysis, another, as yet, unlocated source was revealed, in generally small quantities. This source then called AZ Unknown B had only been recovered in sites from about New River in a swath through Mayer to the Prescott area. In three sites (AZ N: 8:27, 12:14, and 12:22 ASM) discovered and tested along Arizona State Route 69 near Mayer, Arizona, four obsidian artifacts yielded a elemental composition that had not been reported before (Shackley 1996). The composition, did not match any known source in the greater Southwest. It had not been recovered from any other contexts analyzed by this lab, including extensive analyses of sites in the Tonto Basin and along the Mogollon Rim.

Recently, an older resident of Prescott loaned the lab eight artifacts collected from a site along Walnut Creek, Yavapai County, three of which exhibited the elemental chemistry matching AZ Unknown B. The artifacts included two bipolar cores with substantial cortex suggesting that the source was relatively nearby.

It was tempting to assume that this is the source mentioned by Northeastern Yavapai informants to Gifford (1936:279, 285), but this source was supposed to be in two places that have been investigated and no obsidian or rhyolite is present. One of the sources was supposed to be in an "obsidian cave" near "Walnut Grove" in the Bradshaw Mountains. My investigation of the area indicated that only metamorphic rocks are in that part of the Bradshaw Mountains. The other "source" is a "black stone" near Strawberry, which is probably the black dacite that is frequently used in the region for tool production, but is not obsidian.

Over the years, all volcanic fields in the area have been investigated. On 11 and 12 July 1999 the sediments east between I-17 and the Agua Fria River along Bloody Basin Road southeast of Codes Junction, and the Agua Fria upstream from this area north of Mayer were surveyed for obsidian in the alluvium. None was found. While no rhyolite is mapped in this area on the Yavapai County geological sheet (Arizona Bureau of Mines 1958), this is not unusual at that scale. Both andesite and basalt are mapped in the area indicating the possibility of bimodal volcanism, which is common in the Basin and Range complex and frequently includes Tertiary silicic volcanism as an early phase in the eruptive history (Shackley 2005).

Discovered only in 2003 by John Rose (U.S. Bureau of Land Management, Kingman) and a crew from Pima Community College, this source called Bull Creek is located just south of the Burro Complex as detailed by Moyer (1982, 1986; see also Shackley 1988, 1995, 2005), and has the same elemental composition of AZ Unknown B, and so can be considered "discovered" (Figure 1). The exact location is not given here since it is an archaeological site on federal property.

Gifford and his Yavapai consultant could very likely have confused "Walnut Grove" and "Walnut Creek", but the mention of a "cave" where obsidian was procured is interesting given the presence of a rockshelter with groundstone and ceramics at Bull Creek that has marekanites in the perlitic lava walls. We'll probably never know if this is the source that Gifford's Yavapai informant was talking about.

The site was mapped and sampled by me and archaeologists from Pima Community College in October 2003. Interestingly, while the secondary distribution down Bull Creek and north to Burro Creek is not as extensive as Burro Creek, it appears to be more commonly used in prehistory, although there has been so little archaeological work in this part of western Arizona that this could be sampling error. Two small marekanites of Bull Creek were found in a site recorded by SWCA in 2003 in the Juniper Mountains north of Prescott only about 32 linear km east of Bull Creek.

Bull Creek's geology seems quite similar to the rhyolite of the Burro Complex and may very well be contemporaneous (Tertiary), or actually part of the complex, although the elemental composition is quite different from the Burro

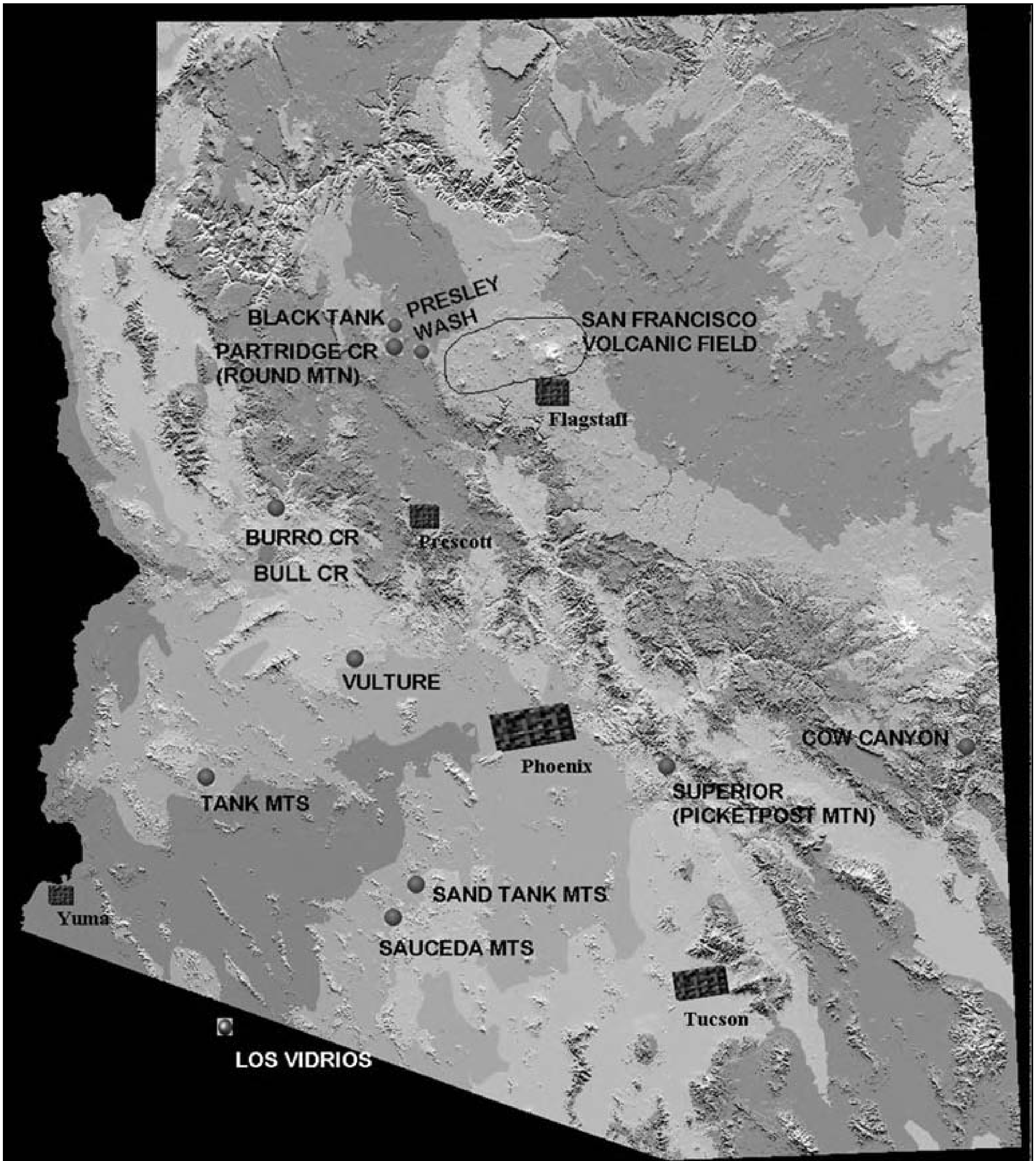

Figure 1. Sources of archaeological obsidian in Arizona. Bull Creek is located in western Arizona just south of the Burro Creek source.

Creek obsidian (Shackley 1995, 2005; Figures 2 and 3 here). The source outcrops at a number of rhyolite domes at the head of Bull Creek in western Yavapai County, north of Bagdad and just below Bozarth Mesa. The elemental analysis was performed on samples derived from two separate domes (Table 1). It's location near high prehistoric site density on the piñon-juniper grasslands of Bozarth Mesa may be responsible for it's more common use in prehistory as opposed to Burro Creek in a slightly more arid region. Based on the presence of AZ Unknown B, this source is present at least as far east as Mayer over 95 km southeast in central Arizona and is common in sites in the Prescott area.

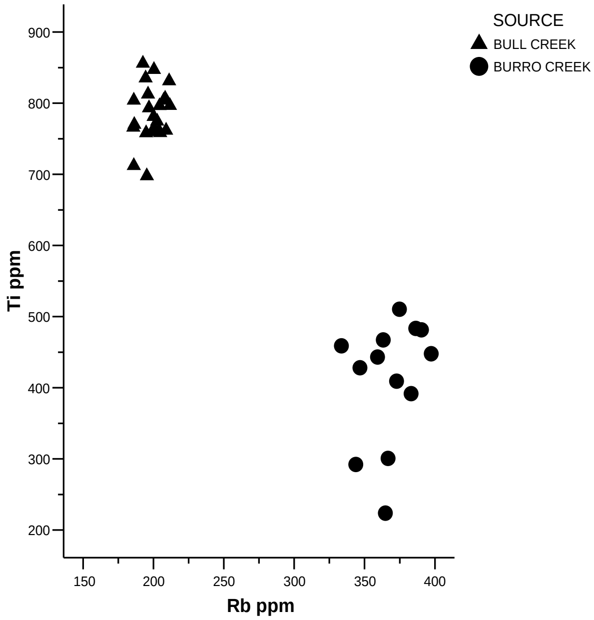

Figure 2. Biplot of Bull Creek and Burro Creek elemental concentrations for Ti and Rb.

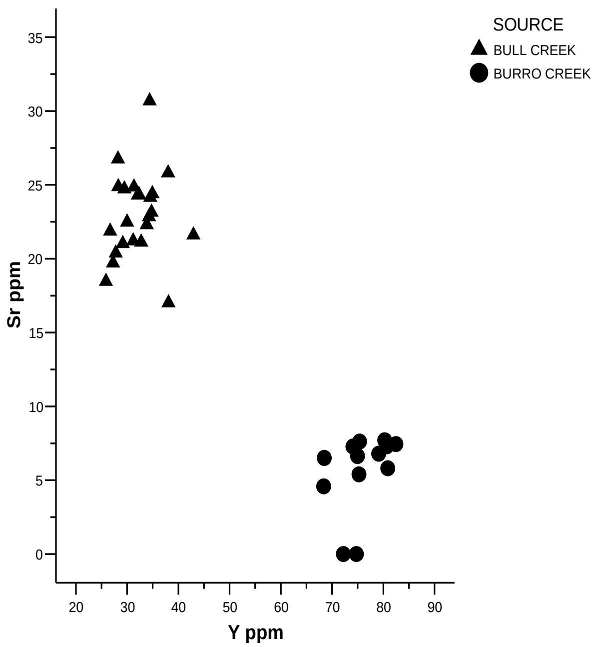

Figure 3. Biplot of Bull Creek and Burro Creek elemental concentrations for Sr and Y.

Marekanites up to 10 cm in diameter are present in both perlitic and ashy lava on a number of domes at the head of Bull Creek in a geologic environment quite similar to Sand Tanks to the south in west Maricopa County (Shackley and Tucker 2001). Most marekanites are less than 2 cm, and bipolar cores and flakes are common on the surface of the perlitic lava up to a density of 10/100m^2. Chalcedony flakes derived from precipitation through the rhyolite also occurs.

While the marekanites have been eroding down Bull Creek and ultimately into Burro Creek, the analysis of nodules collected from Burro Creek over the years has not detected this source, suggesting that few actually reach this far west. Although the Burro Creek has been known to rockhounds and collectors for many years, it is practically absent in archaeological contexts in Arizona, while Bull Creek is commonly found in the region, despite the similar quality for tool production. The discovery of this source solves a long term “unknown source” in the North American Southwest.

	N	Minimum	Maximum	Mean	Std. Deviation
Ti	23	698	856	698	39
Mn	23	397	573	482	41
Fe	23	6306	7571	7003	354
Rb	23	186	212	199	8
Sr	23	17	31	23	3
Y	23	25	43	32	4
Zr	23	67	88	77	4
Nb	23	17	37	29	4

Table 1. Selected elemental concentrations for Bull Creek, Arizona source standards.

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RESEARCH NEWS AND NOTES

This new section of the IAOS *Bulletin* is devoted to research news and notes from our membership. Please consider submitting an abstract or brief description of your current research, and include your contact information if you would like to receive comments, questions, or suggestions from our readers. Contributions for the research news and notes can be emailed to the *Bulletin* editor at cdillian@hotmail.com .

Alan Gold
San Joaquin Environmental Management Branch, California Department of Transportation
alan_gold@dot.ca.gov

I am working with Sandy Rogers, Curator of Prehistoric Archaeology at the Maturango Museum, Ridgecrest, California on the study of several early Holocene age obsidian artifacts from the collections of Emma Lou Davis from her work at China Lake, California. They consist of Clovis-like, Concave Base (Black Rock or Great Basin Concave Base) points and crescents. These artifacts are manufactured of Coso obsidian and have hydration measurements from 10 to 18 microns.

Philippe D. LeTourneau
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As part of long-term research on Folsom toolstone procurement in New Mexico, I have thus far had 40 obsidian Folsom artifacts from 20 sites analyzed by XRF. Almost all of the artifacts (n=37) are from 17 sites in central New Mexico south of the Jemez Mountains, west of the Rio Grande, and north of Socorro. Of the remaining three artifacts, one is from near Taos, another from near Clovis, and the final one is from the Estancia Basin.

Four obsidian sources are represented: Cerro Toledo Rhyolite (CTR), El Rechuelos Rhyolite (ERR), and Valle Grande Member (VGM) of the Valles Rhyolite in the Jemez Mountains; and Grants Ridge/Horace Mesa (GR/HM) near Mount Taylor. Santa Fe Group alluvial gravels containing obsidian from all but the VGM source are local (within an average of 10 km) to all of the central New Mexico sites. Non-artifactual VGM obsidian has not been documented in these gravels or anywhere else outside of the Valles Caldera. The other three sites are not near any of the four sources.

Given the locations of the sites relative to the locations of the obsidian sources, the proportions of the different obsidians among the artifacts are very interesting. Rather than a preponderance of locally available obsidian, 80 percent (n=32) of the artifacts are VGM, 10 percent (n=4) are CTR, 2.5 percent (n=1) are ERR, and 7.5 percent (n=3) are GR/HM.

The 40 artifacts analyzed by XRF account for 22 percent of the 179 documented obsidian Folsom artifacts from 36 sites in New Mexico. Results of visual analysis of the other 139 artifacts (from sites in the same general regions) compare well with the XRF results: 0.7 percent (n=1) are CTR, 0 percent are ERR (n=0), 2.2% (n=3) are GR/HM, and 97 percent (n=135) are VGM. Each of the four obsidian sources has visually unique varieties, although VGM and CTR both have translucent gray varieties that, as seen in visual – XRF comparisons, are impossible to distinguish visually. Fortunately the majority of the artifacts are not translucent, so the numbers of misidentified CTR and VGM artifacts are likely relatively small.

XRF and visual analyses of obsidian Folsom artifacts from central New Mexico document a strong preference during the Folsom period for non-local VGM obsidian from the Valles Caldera rather than obsidian from local gravel sources.

INDO-PACIFIC PREHISTORY ASSOCIATION

18TH CONGRESS, UNIVERSITY OF THE PHILIPPINES, MANILA 20-26 MARCH 2006

The 18th Congress of IPPA will be held from March 20-26, 2006, on the campus of the University of the Philippines, Diliman, Quezon City in MetroManila. The meeting will be hosted by the Archaeological Studies Program at the University of the Philippines, and by the Archaeology Division, National Museum of the Philippines.

A session on all aspects of obsidian studies in East Asia, Southeast Asia and the Pacific region has been accepted, but there is room for additional papers. Please contact Robin Torrence (robint@austmus.gov.au) with an abstract if you are interested in participating.

Technology, Exchange, and Ideology: New Approaches to the Study of Volcanic Glass

The purpose of the session is to review new developments in the study of volcanic glass (obsidian and basaltic glass) across the whole region comprising East Asia, SE Asia and the Pacific region.

Proposed papers:

Robin Torrence (Australian Museum): *Why was volcanic glass so special?*

Nina Kononenko (Australian National University): *Spatial patterning in obsidian use on Garua Island, Papua New Guinea*

Pip Rath (University of Sydney): *New ways to use old methods: obsidian characterization in Papua New Guinea*

Glenn Summerhayes (Otago University): *Modeling interaction and mobility using obsidian – a view from Melanesia.*

Marshall Weisler (University of Queensland*): Basaltic glass: an important component for prehistoric interaction studies in Hawai'i.*

Hubert Forestier (IRD, Jakarta): *Stone tool production on Sumatra, Nias and Mentawai Islands*

Trudy Doelman (University of Sydney): *Studying trade at the source: basaltic glass workshops in Primoye, Far East Russia*

Nikolai Klujev and Igor Sleptsov (Russian Academy of Sciences, Vladivostok): *New sites near the obsidian sources in Primorye, Far East Russia*

Irina Pantyukhina (Russian Academy of Sciences, Vladivostok): *Paleolithic obsidian microblade technology in Primorye, Far East Russia*

Mi-Young Hongmi (Seoul): Obsidian tool production at the Paleolithic site of Hopyeong-dong, Korea

Jong Chan Kim (Seoul National University): *A provenance study of obsidian artifacts from Paleolithic sites in Korea using PIXE.*

Keita Watanabe (Rikkyo University) et al. *SIMS(+) profiling of Japanese obsidians*

Masao Suzuki (Rikkyo University) et al. *Comparison of EDXRF, INAA, and LA/ICP-MS for sourcing archaeological obsidians*

Toru Tateishi et al. (Tokyo University of Fine Arts and Music) *Reconstruction of obsidian exchange systems in Jomon Japan: A combination of GIS and resource analysis*

Tetsuo Warashina (Kyoto University): *Sourcing of archaeological obsidian implements by X-ray Fluorescence Analysis*

Hiroyuki Sato (Tokyo University) and Masami Izuho: *Archaeological obsidian study in Hokkaido, Japan*

Hiroyuki Suzuki (Hokkaido Archaeological and Cultural Remains Investigation Center): *Obsidian manufacture and behavioral implication: a case of the Upper Paleolithic Shirataki site group in Hokkaido, North Japan*

Obsidian Abstracts from the 2005 Annual Meeting of the Society for American Archaeology, Salt Lake City, USA

Prepared by Yaroslav Kuzmin, Pacific Institute of Geography

Synchronic and diachronic changes in obsidian procurement in Formative Oaxaca, Mexico
J. Blomster (George Washington University), M. Glascock (University of Missouri-Columbia)

During the Formative period, villagers in Oaxaca – a region without a local source of obsidian – participated in various exchange networks to obtain this critical resource. Focused primarily on obsidian samples from the site of Etlatongo, in the Mixteca Alta of Oaxaca, this paper examines the nature of the sources utilized by the first occupants of this large village. Instrumental Neutron Activation Analysis reveals sources utilized by all villagers as well as obsidian exploited by individual households. Changes in these sources are traced during the Late Formative. These data are compared with those from other contemporaneous Oaxaca villages.

Going through changes: identifying transitions in obsidian blade trade during the Formative Period in Western Mesoamerica
J. De Leon and K. G. Hirth (Pennsylvania State University)

During the Formative Period in Western Mesoamerica, finished prismatic blades were extensively traded before blade cores were traded. This paper examines the shift from trading blades to trading cores using data from Central Mexico. For comparative purposes, data from the Valley of Oaxaca, where all obsidian was imported, is used. We offer a hypothesis regarding how to identify this significant shift in obsidian exchange and discuss some of the important socioeconomic and sociopolitical implications that underlie this change.

Crossing the Delaware: Documenting Super-Long Distance Obsidian Exchange in New Jersey
Carolyn D. Dillian (Rutgers University and CRCG), Charles A. Bello (Museum of the Aleutians and CRCG), and M. Steven Shackley (University of California, Berkeley)

Super-long distance exchange has been documented through the occurrence of materials such as shell, copper, or obsidian from archaeological contexts. However, X-ray fluorescence analyses of five obsidian samples from archaeological sites in New Jersey have revealed connections with the western United States that are truly unprecedented. A discussion of archaeological provenience and geologic provenance is provided to situate these objects within a scientifically rigorous context. Finally, in this paper, we explore the role of the exotic as a symbol of places both known and unknown.

The complimentary aspects of basalts and obsidian in examining Great Basin Paleoarchaic mobility
D. G. Duke and D. C. Young (Far Western University)

Early Great Basin people were hooked on black volcanic rocks. But the rocks they chose so interchangeably basalt and obsidian-possess distinct qualitative differences. Obsidian is amendable to the highly-curated mobile toolkits usually envisioned by archaeologists, while basalt technology is generally crudish and expedient. Obsidian is emphasized in Paleoarchaic mobility studies, but basalt has unrealized potential to inform us about the local, logistical priorities of people that pertain to the duration of their stays in individual basins. Basalt is uniquely suited to represent immediate technological needs, and together with obsidian, provides a balanced means of examining early residential priorities.

INAA examination of flake size bias in XRF studies

J. Ferguson (University of Colorado, Boulder), J. Eerkenes (University of California-Davis), M. Glascock (University of Missouri-Columbia), C. Skinner (Northwestern Research Obsidian Studies Laboratory)

Most obsidian sourcing studies using only XRF systematically ignore smaller artifacts that often reveal different source profiles than the artifacts meeting the minimum size requirements for accurate XRF. We show that biface assemblages often reveal different source distributions than large debitage from the same context, and the sources of small debitage most closely resemble the distribution for the bifaces. Using data from three regions in eastern California and central Oregon we have demonstrated the need to supplement XRF studies with INAA studies of the smallest recovered obsidian artifacts in order to gain an accurate understanding of obsidian procurement patterns.

An obsidian source in the prehistory of the Amur River basin (Russian Far East)

A. Frashuer (University of South Florida), M. D. Glascock (University of Missouri-Columbia), V. Popov (Far Eastern Geological Institute), N. N. Zaitsev (Archaeological Operation Center, Blagoveshchensk)

Obsidian tools are known from some sites in the Amur River basin, but the source of basaltic-type archaeological obsidian remained unknown until recently. Sites with evidence of obsidian use from the same source are located in the middle and lower streams of the Amur River, with distances between them up to ca. 1400 km. In summer 2004, in the course of fieldwork under CRDF grant RG1-2538-VL-03, high quality basaltic volcanic glass, possibly representing an archaeological obsidian source in the Amur River basin, was found on the Obluchie Plateau, Lesser Khingan Mountains. Results of INAA will be discussed at Symposium.

Obsidian exploitation and exchange in Western Mexico

M. D. Glascock (University of Missouri-Columbia), P. C. Weigand (E. Colegio de Michoacan)

Obsidian was an indispensable material for the prehistoric peoples of Mesoamerica in the manufacture of objects used for war, hunting, ornaments, figurines to represent their gods, and knives for human sacrifices. The state of Jalisco, located in Western Mexico, has one of the highest densities for obsidian sources in the world. Instrumental neutron activation analysis and x-ray fluorescence spectroscopy have been employed to establish compositional profiles for the obsidian sources in Jalisco, Nayarit, and Zacatecas. Using these compositional profiles, the patterns of obsidian exploitation and exchange in Western Mesoamerica will be discussed.

Flutes and glyphs, a Paleo/Archaic Clovis site and obsidian source in Kane Spring Wash, southern Nevada

E. Jensen (Lost City Museum), F. Lytle

Identification of a fluted Clovis point from the Kane Spring Wash obsidian source and XRF age estimate of site petroglyphs yield important information on material procurement in southern Nevada. Kane Spring Wash in southern Nevada is a transitional area between the Great Basin and the Mojave Desert. Three obsidian source signatures have been identified in the geology of the Kane Spring caldera. This point was found within 5 km of one obsidian source and provides an opportunity to examine the paleo-environmental setting and landscape use in a material source and tool production area.

Chronological patterns of obsidian exploitation in Northeast Asian prehistory

A. J. T. Jull (University of Arizona), Y. V. Kuzmin (Pacific Institute of Geography), G. S. Burr (University of Arizona)

In Northeast Asia (Japan, Korea, and the Russian Far East), the earliest use of obsidian as a raw material is detected in the Upper Paleolithic of Japan at ca. 30,000 BP in the

Kanto Plain (Kozu-jima source). Exploitation of the Paektusan source began in Korea at ca. 24,000 BP and in the Primorye (Maritime) Province of Russia at ca. 10,000 BP. Two Hokkaido Island main sources, Shirataki and Oketo, were widely used since ca. 20,000 BP. From ca. 10,000 BP to ca. 2000 BP, obsidian was a common raw material in the Neolithic and Paleometal complexes of the region.

The archaeological obsidian studies in Hokkaido, Japan
M. Izuho (Sapporo Buried Cultural Property Center)

This paper reviews the archaeological obsidian study in Hokkaido, Japan. It will be provided from geological, geochemical and archaeological points of view: 1) Tertiary-Quaternary tectonics as Arc-Trench system and geological formation process of Obsidian, 2) distribution of primary sources of obsidian and its geochemical characterization, 3) secondary distributed area and archaeological inference of lithic raw material procurement point, and 4) the reconstructed models of hunter-gatherer mobility pattern, lithic raw material trade, and long-distance exchange networks of the Upper Paleolithic in and around Hokkaido.

Obsidian exchange networks in Northeast Asia: recent progress in the study of archaeological volcanic glass sources
Y. V. Kuzmin (Pacific Institute of Geography)

Several sources of archaeological obsidian were identified in the Russian Far East, using INAA data on geological and archaeological specimens. In Primorye (Maritime) Province and the adjacent Korean Peninsula, two main networks centered on the Basaltic Plateau in southern Primorye and the Paektusan (Changbaishang) volcano on the Chinese/North Korean border, existed since ca. 24,000 BP, with exchange distances up to 200-700 km. In Hokkaido and Sakhalin Islands, the two main sources since ca. 20,000 BP were Oketo and Shirataki, with exchange distances up to 1000 km. Several sources of archaeological obsidian remain unknown. Research was supported by CRDF grant RG1-2538-VL-03.

Results of chemical analysis on obsidian samples from two Virgin Anasazi sites near Mt. Trumbull, Arizona Strip, Northwestern Arizona
C. Martin (University of Nevada-Las Vegas)

The Virgin Anasazi lived in the Mt. Trumbull area from around AD 300 or earlier to AD 1230. The results of LA-ICP-MS analysis on obsidian flakes collected from sites of different time periods will be presented, with a discussion on what may be learned about changes in directions of mobility or exchange through time. If the exact obsidian sources are identified, the discussion will include a comparison of the movement of obsidian with the movement of olivine-tempered pottery, which is known to come from the Mt. Trumbull region and has been found in southern Utah and southeastern Nevada.

Prehistoric obsidian sources and utilization in the Kyushu Island, Japan
H. Obata (The Kumamoto University)

About 30 obsidian sources are known in Kyushu Island that were exploited and utilized in prehistoric time. The source with the most abundant and best quality of obsidian as material of stone tools is the Koshidake Mountain in Imari City, Northwestern Kyushu. The Koshidakean obsidian began to be utilized 30,000 BP, and spread widely around Kyushu Island about 9,000 BP. Later beyond the inland region Koshidakean obsidian were transported by the ship to the Ryukyu Islands and the southern coast area of the Korean Peninsula in the later half of Jomon Period. The geochemical analysis done recently have proved and emphasized this story more clearly and strongly.

Sources of volcanic glass at Kamchatka Peninsula, Russian Far East: recent geochemical study

V. K. Popov (Far Eastern Geological Institute); M. D. Glascock, R. J. Speakman (University of Missouri-Columbia); A. V. Grebenikov (Far Eastern Geological Institute); A. V. Ptashinsky (Kamchatka State Pedagogical University)

Within the framework of CRDF Project RG1-2538-VL-03, in order to reveal major sources in volcanic glass-rich area of the Kamchatka 40 samples of rhyolite-type obsidian and perlite from 3 prehistoric sites and 14 outcrops for the first time were analyzed in 2003-4 by INAA. At least 7 different geochemical groups were identified, 6 from Eastern Kamchatka and at least 1 from Central Kamchatka. Some of them (Karymsky volcano and Nachiki, Eastern Kamchatka range) were used in prehistory as sources of obsidian raw material. Another possible source is located at the Ichinksy volcano area, in the Central Kamchatka range.

Development and application of a relative obsidian hydration chronology for the southeastern Great Basin

M. Seddon

Obsidian hydration analysis has tremendous potential to provide chronological information to otherwise non-diagnostic archaeological sites and components. The Kern River 2003 Expansion Project includes refining a previous relative hydration chronology from the region as a mitigation effort. This paper presents the relative hydration chronology revised using a database of sourcing and hydration data from more than 350 obsidian projectile points from the Wild Horse canyon, Black Rock area, and Panaca Summit/Modena sources in the southeastern Great Basin. The chronology is then applied to several sites in the region to demonstrate the utility of the approach.

Obsidian use during the Bronze Age: an experimental study of obsidian artifacts from Duos Nuraghes, Sardinia (Italy)

T. Setzer and R. Tykot (University of South Florida); G. Webster

Experimental archaeology is a key way to learn about the life and culture of prehistoric people. This study uses experimental archaeology to investigate the function of obsidian at the site of Duos Nuraghes, Sardinia, which was occupied during the Bronze Age Nuragic culture. In addition to ceramic jars, vessels, and metal tools, hundreds of pieces of obsidian were recovered from this site. This research provides not only information about topics such as subsistence, trade, technology, and craft specialization, but it also demonstrates the purpose of this lithic material during the transition to metal tools.

Chronometry and geochemistry at McEuen Cave: the radiocarbon and obsidian geochemical data

M. S. Shackley (University of California-Berkeley)

Forty-eight AMS radiocarbon dates were derived from McEuen Cave during the two field seasons including the largest single suite of AMS dates on cultigens from the Southwest. This presentation of the sampling strategy and provenience of the suite of AMS radiocarbon dates from all contexts at McEuen Cave will also include the results of the large source provenance study (>300) of obsidian artifacts recovered from the rockshelter. The data presentation will be followed by an interpretive discussion of the obsidian source provenance study in relation to Archaic and Early Agricultural periods in the Southwest.

An examination of the potential of portable-XRF in archaeology

R. Speakman, M. Glascock, C. Descantes, R. Popelka, D. Robertson (University of Missouri-Columbia)

X-ray fluorescence spectrometry (XRF) is one of the most widely used and versatile of all instrumental analytical techniques. Archaeologists routinely use XRF to characterize pottery, obsidian, metal, and other inorganic materials. Technological advances in XRF instrumentation during the last several years, such as the development of high-precision thermoelectrically-cooled detectors and miniature X-ray tubes have facilitated the development of portable-XRF instruments that provide rapid, low-cost, multi-elemental characterization of archaeological materials. A major advantage of PXRF is that the instrument easily can be transported into the field or to museums, permitting multi-element chemical characterization of archaeological materials in nontraditional laboratory environments.

Trade or transport? The occurrence of obsidian from the Malad, Idaho source in the Great Plains
R. Thompson (Caribou-Targhee National Forest)

This research traced the obsidian from the Malad, Idaho source throughout the Rocky Mountains and on to the Southern Plains. The pattern evident from this analysis indicates a long-term transport of material from the Great Basin into the Southern Plains. Although long distance trade is the most plausible explanation for the discovery of obsidian from this source across the landscape, this research does not rule out the possibility of direct transport by the users of this material.

Focusing on sub-sources improves the big picture of obsidian exchange in Melanesia
R. Torrence (Australian Museum)

The concentrated efforts on a small group of researchers using PIXE-PIGME to characterize a substantial sample, of obsidian artifacts from sites in Melanesia, has moved the study of exchange beyond the identification of “earliest” (c. 40,000 bp) and “most distant” (c. 4,700 km) contact to a new concern with the specific identification of exchange mechanism. A recent focus on small, localized, sub-sources has greatly improves regional histories of long distance and intra-regional interactions. The have shown that control over resources played an important role in exchange, even in the apparent absence of hierarchical societies.

Source analysis of obsidian artifacts from Pantelleria (Italy) and Tunisia
B. A. Vargo (AMEC Earth & Environmental); R. Tykot (University of South Florida); M. Glascock and R. J. Speakman (University of Missouri-Columbia)

Throughout the Neolithic period, obsidian served as an important commodity in the central Mediterranean as the intensification of trade relationship expanded. We report the current results of an extensive physical and visual analysis and chemical characterization of obsidian artifacts from sites on the Italian island of Pantelleria, and the Tunisian sites of Zembra and Hergla. In particular, the results of geochemical analysis of over 100 artifacts are used to trace obsidian from multiple sites to specific geological subsources, not only documenting long-distance routes of exchange but suggesting certain kinds of socioeconomic interactions between Pantelleria, Sicily, Malta, and North Africa.

Highlights from the 2003 International Specialized Workshop: Recent Advances in Obsidian Dating and Characterization, Melos, Greece

Organized by the Laboratory of Archaeometry, University of the Aegean and the International Association for Obsidian Studies

In this and previous *Bulletin* issues, we are pleased to present highlights and abstracts from the 2003 *International Specialized Workshop: Recent Advances in Obsidian Dating and Characterization* held in Melos, Greece. The conference was organized by Professor Ioannis Liritzis of the Laboratory of Archaeometry at the University of the Aegean, with the assistance of Dr. Carolyn Dillian of the IAOS. IAOS served as a co-sponsor of the event. The conference was designed to address the current status and research potential of obsidian hydration dating and chemical characterization. Since the 1960's, when hydration dating first appeared, the method has proven useful to archaeologists, although unsatisfactory results have frequently occurred. The reason for this uncertainty relies on several factors: a) a limited understanding of the water diffusion in obsidian, b) the unknown temperature and humidity history of the hydration environment, and c) interpretation of site depositional context and sampling. During the last five years, the dating of obsidian has focused on modeling the concentration-dependent diffusion process. The development of this approach as well as experimental evidence on water diffusion in obsidian and glass in general, may establish appropriate mathematical expressions, which will make the method essentially intrinsic and independent of environment factors, since they are embedded within the diffusion equations. These and other new developments were explored. As dating is closely related to the distribution and transportation of obsidian, particular presentations addressed questions regarding characterization (and thus provenance) focusing on the Aegean, Mediterranean, Pacific, United States, and other parts of the world. Therefore, up to date reviews and current results of recent archaeological excavations, chemical analyses with physical methods, and usewear analyses were presented. Papers will be published as special issues in the Journal of Mediterranean Archaeology and Archaeometry (www.rhodes.aegean.gr/maa.journal).

-Editor's note: Conference description paraphrased from conference notes previously published by Prof. Ioannis Liritzis as part of workshop abstracts.

ABSTRACTS

Stevenson, C. (Virginia DOT), I. Liritzis (University of the Aegean), M. Diakostamatiou (University of the Aegean), S. W. Novak (Evans East, Inc.), and I. Abdelrehim (Evans Northeast)
The Dating of Hydrated Obsidian Surfaces by SIMS-SS: An Evaluation with data from Aegean and Easter Islands, Mexico, and USA.

The diffusion of environmental water into obsidians depends on random molecular motion but with the tendency for water to move in the direction of decreasing water concentration. The rate of this movement also depends on temperature, relative humidity, and the location and arrangement of ions within the obsidian structure. When characterized by secondary ion mass spectrometry (SIMS), the result is a sigmoid shape water (hydrogen ions) concentration profile that incorporates all variations of the external parameters into the final profile shape. Using this end product of diffusion, we have developed an empirical model, based on certain boundary conditions and physicochemical mechanisms that express the H^+ concentration versus depth profile as a diffusion/time equation. This allows chronometric ages to be calculated. We have termed this approach SIMS-SS since the primary input variable is the degree of saturation achieved in the surface layer (SS).

To demonstrate the accuracy of this method, we have selected five case examples from around the world that incorporate a wide variety of different obsidians, environmental regimes and ages. These examples have been developed by the authors. The archaeological context of each example is discussed with particular attention placed on establishing the integrity of the context and the relationship between the radiocarbon event and the deposition of the obsidian artifact.

There are three advantages to our new procedure: 1) the final shape of the hydrogen profile incorporates two of the principal external, and highly variable, environmental parameters, those of temperature and humidity; 2) the use of SIMS instrumentation to measure surface hydration layers results in high precision thickness values with an error of 0.02-0.05 µ depending on the degree of surface roughness; and 3) absolute age estimates may be calculated.

Behrens, H. (University of Hannover), M. Leschik (TU Clausthal), G. Heide (GFZ Potsdam), G. H. Frischat (TU Clausthal), and M. Wiedenbeck (GFZ Potsdam)

Experimental Studies on Water Diffusion, Oxygen Isotope Exchange and Corrosion of Rhyolitic Glasses and Melts

Previous studies on water diffusion in rhyolitic glasses and melts were performed nearby the glass transition or at higher temperatures in the stable melt. Bulk water diffusivity (Dwater) depends strongly on water content of the melt. For instance, when increasing the water content from 1 to 5 wt%, Dwater increases by one order of magnitude at 600ºC. The effect of anhydrous composition on water diffusivity is less pronounced. At 1 wt% of dissolved H2O and at temperatures above 400ºC, Dwater is identical in peraluminous and metaluminous melts but it is faster by a factor of 3 in peralkaline melts (NBO/T = 0.04). Oxygen exchange between melt and fluid is much slower than water diffusion. At 600ºC and 4 wt% H2O, the diffusion of 18O (D18O) is one order of magnitude slower than the bulk water diffusion.

However, it is still an open question whether these high temperature data can be applied to model hydration of obsidians at ambient conditions. To elucidate this question, we have performed hydration experiments covering a wide range of temperatures from 100 to 1000ºC. In the experiments natural or synthetic rhyolitic glass wafers were contacted to a D218O-fluid. Thus, bulk water diffusion (using profiles of D and H) and oxygen diffusion (using profiles of 18O) can be measured in a single experiment. Runs were performed at elevated pressures (300 and 1000 MPa) in the T-range 200 - 1000ºC using a rapid-quench cold seal pressure vessel. Glass plates (5x5x1 mm) were sealed with the fluid in gold capsules. Additional experiments were carried out in fused silica capsules at 0.1-2 MPa in the T-range 100-200ºC. In these runs one sample was hung in the vapor and another one was surrounded completely by the aqueous liquid. After the experiments, concentration profiles were recorded perpendicular to the surface using SIMS, SNMS (Secondary Neutral particle Mass Spectrometry), electron microprobe and/or IR spectroscopy.

Our results show that high temperature data for bulk water diffusion and the 18O-diffusion in the melt can not be simply extrapolated to glasses. Nearby the glass transition, both D18O and Dwater decrease strongly with decreasing temperature. Diffusion in the glass appears to be dependent on the history of glass. Significant differences were observed between natural obsidians and obsidians re-melted at high temperature and pressure (1200ºC, 500 MPa). With decreasing temperature, both bulk water diffusion and 18O-diffusion became relatively faster in the natural obsidian compared to the re-melted obsidian. For instance at 200ºC, D18O and Dwater are two orders of magnitude slower in the re-melted obsidian. The activation energies are similar for bulk water diffusion and 18O-diffusion in the melt and in the natural obsidian at low temperature (50-65 kJ/mol) but significantly higher in the re-melted obsidian (120 kJ/mol). When extrapolating the high temperature data, Dwater and D18O may be overestimated by four orders of magnitude at 200ºC. It is noteworthy, that in the whole T-range of 100-1000ºC the ratio Dwater/D18O is approximately constant at about 15.

After experiments at low temperature (100-400ºC) glasses were depleted in NA and K nearby the surface but enriched in CA, indicating corrosion of the glass. The thickness of the corrosion layer depends on experimental condition and starting materials. Corrosion was observed not only when glasses are in direct contact to the liquid but also when glasses hung in the vapor. Our results indicate that the hydration layers in obsidians are not only determined by water diffusion into the glass but also by corrosion processes.

Pantano, C. G., N. P Mellott, and J. P. Hamilton (Pennsylvania State University)
Leaching, Dissolution and Surface Layer Formation in Na, Ca-Aluminosilicate Glasses

The in-diffusion of water, hydrolysis and leaching of the silicate network, and dissolution (recession) of the surface are competitive (sometimes coupled) reactions during the weathering of glass. The glass composition and many external variables (temperature, time, humidity, pH, etc.) determine their net effect on long0term weathering. We have focused on glass structure effects, the degree of network crosslinking/polymerization in particular, as a way to understand and perhaps simplify the dependence on glass composition. In this presentation, the behavior of a systematic series of NA, CA-aluminosilicate glasses in aqueous solutions will be described. The degree of network polymerization is the primary variable; it is controlled here by the alumina content, and is quantified in terms of the relative number of non-bridging oxygens. Methods including solution analysis, SIMS depth profiling, FTIR, NMR, and AFM have been employed to characterize and understand dissolution and surface layer formation at ambient temperatures.

Gottesman, M.
Obsidian Hydration Dating – How Good is it?

Over the past five years, the Stevenson/Ambrose "intrinsic water" dating method has been in use. There is now a library of over 1000 valid dates from over 80 sites. I believe that these dates (derived from nearly 1300 samples) are correct within 15%, based on discussions with the various archaeologists involved and a comparison with c14 dates.

The number of sites studied is dominated by Southern California sites, particularly Orange County. Most of the obsidian has been sourced to the Coso flows with another substantial portion from Obsidian Butte and a few from undetermined or other sources. The rest of this presentation is based on lessons learned from the California data. Discussion will focus on the following topics:

- Diffusion vs. Other Rates
- Water Content of Coso Flows
- EHT Commentary
- Southern California Dates
- Orange County vs. c14 dates

Glascock, M. D. and R. J. Speakman (Research Reactor Center, University of Missouri)
Obsidian Characterization Basics: Analytical Techniques, Elements, and Sources

Archaeologists often rely on provenance data from obsidian to reconstruct long-distance exchange/trade relationships and the movement of prehistoric peoples through time. Obsidian provenance research in South America has lagged behind most other regions (i.e., Mediterranean, Mesoamerica, and North America) for several reasons; however, since 1990, efforts to locate and chemically characterize obsidian sources throughout South America have accelerated such that more than 40 sources have now been located and characterized. This presentation will describe the current status of obsidian research in South America, the variety of the analytical techniques available for characterizing obsidian sources and artifacts, and the methods currently being employed to accurately determine the provenance of artifacts most efficiently and at minimal cost.

Dillian, C. (Rutgers University)
Sourcing Belief: Using Obsidian Sourcing to Understand Prehistoric Ideology in Northeastern California

Large obsidian bifaces from Northern California have long been known as non-utilitarian ceremonial and wealth objects. Despite their stylized form, bifaces were manufactured from several different obsidian sources. Glass Mountain in Siskiyou County, California was one source for black obsidian bifaces. The lithic assemblage at Glass Mountain and x-ray fluorescence data from the surrounding region indicate that Glass Mountain obsidian was used almost entirely for biface production, and was neglected as a source for utilitarian objects. Just as obsidian objects fulfilled utilitarian or non-utilitarian functions, obsidian sources retained special roles within the context of prehistoric culture and belief systems.

Bassiakos, Y. (NCSR Demokritos), V. Kilikoglou (NCSR Demokritos), and A. Sampson (University of the Aegean)

Yali Island: Geological and Analytical Evidence for a New Source of Workable Obsidian

The volcanic islet of Yali, along with the islands of Kos, Nisyros and a number of other smaller Dodecanese islands mark the southeastern fringe of the so-called Hellenic arc, whose explosive volcanism propagates across the Aegean (from S to SE) during the Upper Pleistocene and Holocene. Obsidian is outcropping on those three mentioned islands, however only obsidian from Yali, bearing characteristic gas vesicles and microcrystalline aggregates, has been reported as provider of raw material used in prehistoric times for construction of stoutly objects (e.g. vases, thick blades, etc.), which do not require fine processing.

In April 2002, we announced the discovery of a new occurrence of obsidian on Yali. Our first geochemical data indicated that we are dealing with a new Aegean source of workable obsidian, used for fine implement construction. Results of further geological and analytical studies presented here strengthen these indications.

Physiographically, Yali is composed of two trigonal parts roughly equal amongst them (approx. 2.2 km² each), aligned in a NE-SW direction and connected by a marrow and low neck. Upper Quaternary felsic vulcanites in the form of pyroclastics, rhyolites, and perlitic lava flows build almost entirely both parts of the islet.

The geologically older formation (approx. 150 ka) is a rhyolitic pumice lapilli, termed as lower pumice, occupying the SW part to heights of 160 meters. The hereupon-new obsidian occurrence appears in the upper layers of that formation, where pieces of rounded or ellipsoid cobbles, 2 to 15 cm in diameter are apparent in quantity, hosted in the loose pumice. The cobbles are free of inclusions, dark-gray to black in color and somewhat more brittle and translucent in comparison with the Melian obsidian. A Tyrrenian stratum 0.5 to 1.5 m thick, bearing abundant fossil mollusk shells (whose ESR-dating studies are in progress) overlies the pumice, whilst post-Tyrrenian pyroclastics comprise the subsequent overlying formations, two of them hosting some fragments of the already known obsidian with the characteristic gas vesicles and microcrystalline aggregates. A double fault system E-W and NW-SE trending, creates a tectonic horst in the SW part of the islet, always enabling accessibility to all mentioned successively deposited formations, including the obsidian bearing pumice layers.

Much simpler, and geologically younger (less than 55 ka, without Tyrrenian deposits) is the construction of the NE part, where the leucocratic rhyolites and the perlitic lava flows predominate, and the rhyolitic pyroclastics are limited in a probably Holocene hill/dome, situated in the easternmost tip of the islet. The main occurrences of the known Yali obsidian are located there, exposed in large bodies, often alternating with perlitic lava flows, apparent also in some of the numerous volcanic domes.

Several hundreds of obsidian objects, integral or fragmented, were collected and studied after a multi-period surface survey and extensive excavations in the Yali Late Neolithic settlement. Most of them are, as a matter of course, made of the macroscopically recognizable known Yali obsidian. However, diagnostic trace elements determined by means of the NAA technique and subsequent statistical treatment of the data, resulted at definite discrimination among the limited fine implements, of two sources of premium obsidian. One source is Melos/Adamas and the second is the newly discovered obsidian occurrence on SW Yali.

Gratuze, B. (UMR 5060 CNRS, IRAMAT), S. Boucetta (UMR 5060 CNRS, IRAMAT), D. Binder (UMR 6130 CNRS – UNSA et Mission de Prehistoire Anatolienne), N. Balkan-Atli (Universite d’Istanbul), L. Bellot-Gurlet (UMR 7075 CNRS, LADIR), and D. Mouralis (UMR 8591 CNRS)

New Investigations of the Gollu-Dag Obsidian Lava Flows System: Comparison between Chemical, Mineralogical, and Fission Track Data

The Gollu-Dag obsidian lava flow system is relatively complex. Ten different obsidian outcrops have been identified around this volcano. They are located in the south (Sirca deresi and Buyuk gollu tepesi), on the west (Bozkoy Ilbiz, Bozkoy Muneninyeri, Bozkoy Kucuk (dam131)m Kayirli village-Gosterli) on the north (Birtlikeler and Ekinlik) and on the east (Eriklidere, Kaletepe deresi 2, Kaletepe deresi 3 zone A and B, Komurcu) of the Gollu-Dag.

Different knapping workshops have been identified surrounding the volcano; they are located on the obsidian outcrops of Kaletepe, Birtlikeler, Bozkoy Ilbiz and Bozkoy Kucuk. Some of these workshops date from the Paleolithic periods while the majority of them date from the Neolithic period. The great importance of these knapping workshops for long and short distances obsidian supply has already been demonstrated. Obsidian from these workshops is found in Aceramic Neolithic sites of Cyprus and in different PPNA and PPNB sites of the Levant and Mesopotamia.

One of the main problems encountered when studying the Gollu-Dag obsidian flows is the great chemical similarity of some of them. For example:

- If it is easy to distinguish the obsidian from Bozkoy Ilbiz and Muneninyeri on the one hand and the obsidian from Bozkoy Kucuk on the other hand; it becomes very hard to differentiate chemically the obsidian from Bozkok Kucuk and the obsidian from Sirca deresi or Birtlikeler.
- Obsidian from Eriklidere, Kaletepe and some obsidian from Ekinlik have also very closed composition.
- One of the obsidian outcrops of the Kaletepe deresi 3 has the same composition as the obsidian found at Birtlikeler.

The use of the geochemical approach to solve the problems of obsidian trade around the Gollu-Dag is therefore insufficient. A multi-disciplinary program joining archaeology, geochemistry, dating, mineralogy, and geomorphology was thus started to understand the relationships between the different obsidian flows and to draw the pattern of the Gollu-Dag obsidian trade.

The archaeological and geomorphological approach will help to understand which obsidian outcrops were available during the Paleolithic and Neolithic periods. Lithic technology will also give information about the different knapping methods used on these workshops.

Glass structure characterization by micro-Raman spectroscopy is used to check if it is possible to get different “structural signatures” between obsidian of very closed chemical composition. Even if our obsidians are highly vitreous, some micro-crystals are present in the glassy matrix. Micro-Raman allows identification of various phases distributions, which surprisingly did not affect the macro-homogeneity of chemical composition, and may characterize some outcrops.

Tykot, R. (University of South Florida)

High-Precision Sourcing of Obsidian Assemblages from the Central Mediterranean: Feasibility and Utility for Archaeological Interpretation of the Exploitation of the Italian Island Sources

In the central Mediterranean, obsidian artifacts are found at archaeological sites up to hundreds of kilometers from their geological sources on Lipari, Palmarola, Pantelleria, and Sardinia. Intensive field surveys of these sources in 2000-2002 have resulted in the precise location and documentation of each obsidian flow or outcrop. Analyses of large numbers of geological specimens from each island demonstrate that subsources often have different physical and chemical characteristics, which may be determined using non-destructive, inexpensive techniques such as detailed visual description, high precision density measurement, X-ray fluorescence spectroscopy, and laser ablation ICP mass spectrometry.

For Lipari, three types of obsidian are found along the coast and in the interior of the island. On Palmarola, three chemically distinct sources are available, and on Pantelleria at least five are known. Obsidian from Monte Arci in Sardinia may be classified into at least nine chemical groups, some separable by differences in color, transparency, and crystalline inclusions.

Already, analyses of statistically significant numbers of artifacts from sites in the central Mediterranean demonstrate the differential use of these subsources, and suggest that factors including accessibility, size and frequency of obsidian nodules, and their mechanical and visual properties were important variables in source exploitation. The discovery of obsidian artifacts at archaeological sites represents the final stage in a long chaine operatoire, which also includes the initial acquisition of the raw material; the processes of reduction and manufacture; transportation and trade; and artifact usage. The high precision sourcing of obsidian assemblages, in conjunction with technological and use-wear studies, is necessary for a complete understanding of obsidian use, and the sociocultural circumstances in which it was embedded.

Carter, T. (Stanford University)
Problematizing the Analysis of Obsidian in the Aegean and Surrounding Worlds.

The chemical characterization of obsidian has been a major success story. In 20 years a range of analytical techniques was employed to discriminate each of the Aegean and surrounding sources. Yet, for some reason, here the work virtually ceased for 15 years, it being generally accepted that Melos was the major supplier of obsidian in Aegean prehistory, an assumption based on a handful of samples. This may indeed be the case; however, no one has really sought to clarify the relationship between the two Melian quarries. Is it to be assumed that they were used contemporaneously, exploited by the same peoples, their raw materials traveling in the same directions and consumed in the same manner? Recent analyses have suggested an early use of Dhemenegaki, with procurement shifting to Sta Nychia in the Bronze Age (V. Kilikoglou pers. comm.).

Drawing on new techniques and data from Greece and Turkey, this paper re-examines what is known about obsidian's consumption during Aegean prehistory. It will examine the significance of non-Melian obsidian in Palatial Crete, examining their means of displacement and their relationship to the more readily available volcanic glass. It will be suggested that one can only comprehend these low-level imports by invoking 'concepts of appropriateness' that transcend obsidian's mechanical and functional properties (e.g., why was Giali, not Melian, obsidian chosen to make vessels?). Arguably it is more profitable to consider more esoteric concerns, with Bronze Age Mesopotamia, the Near East and Egypt providing numerous references to obsidian's medico-magical properties and cosmological associations.

Torrence R.(Australian Museum), G. Summerhayes (Australian National University), I. Orlic (Physics Division Australian Nuclear Science & Technology Organization), P. Rath (University of Sydney), and J. P. White (University of Sydney)
Networks and Disasters: Changing Patterns of Obsidian Procurement in West New Britain, Papua New Guinea

A number of significant archaeological discoveries in the Pacific region have been made as a result of PIXE-PIGME characterization studies of obsidian artifacts and source outcrops. For example, these studies have revealed the existence of Pleistocene age marine transport and widespread exchange networks that linked sources with both Southeast Asia and the Remote Pacific during the Holocene. More recently, PIXE-PIGME analysis of c.1400 artifacts from 30 sites located on the Willaumez Peninsula of New Britain, Papua New Guinea and dating from the late Pleistocene up to the recent period has revealed a number of punctuated changes in source selection. New sources appear in the record at various times. In addition, obsidian artifacts derived from popular outcrops vanish suddenly and then reappear hundreds of years later or disappear altogether. In a highly active volcanic region it is not surprising that the timing and scale of eruptions is a major factor in explaining changes in the existence of and access to obsidian outcrops, but environment is not always the key element in source selection. Preference for particular obsidians (or for social links with owners) was also important. This paper considers the interlinked roles of social networks and volcanic disasters in shaping 35,000 years of obsidian use in Melanesia.

Pawlikowsk M. (University of Mining and Metallurgy, Poland), I. Liritzis (University of the Aegean), I. Tsamafyrou (University of the Aegean), and V. Perdikatsis (Technical School of Crete)
Surface microscopic investigation of obsidians

In the effort to refine the new obsidian hydration dating method SIMS-SS, a detailed examination of the obsidian surfaces is made for obsidians under various natural conditions. The SIMS-SS requires a flat surface and lack of patination of any kind.

Thin sectioned samples viewed under a polarized light microscope as well as under a scanning microscope were examined. Weathering, formation of secondary minerals, erosional phenomena, properties of glass structure, lamination, microcrystals, various alterations, and hydration rim zones of various thickness were observed.

Most of the samples are secondary chopping products of tool making, found in the ground of the two Melian sources- at Adamas and Demenegaki-, and the microscopic investigation refers to an extreme state of these surfaces.

A 2D and 3D presentation of the different crystalline phases (ordered phase) within the amorphous obsidian is made, which may offer a means of differentiation of obsidian sources, as well as aid SIMS measurements.

Indeed, these microscopic investigations may, a) guide selection of appropriate rastered area (e.g. 150x 150 μm2) for SIMS ion beam measurements, and b) qualify crater depths, measured by a profilemeter, of craters sputtered on these surfaces. Both points are most significant factors for the error evaluation and obsidian diffusion dating.

Perles, C. (Prehistoire et Technologie M.A.E.)

Why the Obsidian Trade?

With the onset of the ceramic Neolithic, the "economy of raw materials" changes drastically all over Greece. Exotic raw materials such as obsidian and honey flints circulate widely and often predominate over the mediocre local raw materials. I had previously suggested that this shift reflected the new importance taken by functional constraints over time constraints, more important in earlier periods amongst hunter-gatherer groups. However, I further reflection upon Neolithic chipped stone assemblages leads me to nuance this position. I shall now argue that interaction through trade and the production of symbolically valued artifacts were equally fundamental factors underlying these complex strategies.

Astruc L. (Centre d'Etudes Prehistoire Antiquite Moyen-Age), H. Ben-Abdelouris, R. Vargiolu (Ecole Centrale de Lyon) and H. Zahouani (Ecole Centrale de Lyon)

Mechanical Properties of Obsidians and Mechanisms of Wear

We will present our first results on two topics: 1. the characterization of the mechanical properties of different kind of obsidians; 2. the understanding of their mechanisms of wear. The data are mainly used, here, as a complement to the analysis of use-wear on obsidian tools to better approach the utilitarian aspects embedded in the phenomena of obsidian diffusion.

The starting point of this research was thus use-wear on lithic tools, a discipline in which interpretation is based on an analogical and qualitative approach: comparisons between archaeological and experimental use-wear traces are observed with stereoscopic and metallographic microscopes. Unlike the studies of flint tools, methods and interpretations of obsidian implements are still limited. Taking these facts into consideration, two ways of research were chosen: 1. to establish new experimental corpus and to determine new rules of interface; this is the aim of a research group called "obsidian, technology, and function"; 2. to work on the mechanical properties of obsidians and on the mechanisms of wear.

To analyze raw materials and wear, new apparatus and methods of characterization have been developed at the LTDS of the Ecole Centrale de Lyon and already used for chert implements. The 3D characterization of surfaces conducted brings both qualitative and quantitative data on: the rugosimetry and porosity of the knapped surfaces and their evolution of these surfaces under specific conditions of wear (3D imaging, 3D statistical parameters).

Considering the first points of our research, variations in the mechanical responses of different obsidians were observed, described and quantified (fragile properties of the raw material and response to dynamic abrasion.) The methodology, already used on flint, is based on scratch test, a simulation of abrasion. The first results were obtained on obsidians from Kayirli and Nenezi dag, and Bingol.

Considering the second point, research on mechanisms of wear is needed to get better diagnostic on the archaeological material; it is as well a way to test the relevance of our rules of inference. These mechanisms have been documented through friction tests. Experiments were conducted within specific conditions to analyze contacts between obsidian and divers material – bone, stone, cereals. Our purpose in this paper will be to document the role of abrasion in the wear of obsidian tools as "abrasion" is often considered by archaeologists as a key factor in the development of wear facies on obsidians – its role being, for instance, more important than for flint. We will discuss this statement taking the case study of a comparison of wear developed on obsidian and chert surfaces after a controlled friction with two kinds of stones.

The results presented during this workshop in Melos correspond to the first step of our program on obsidians. Our wish is to propose a discussion to the specialists of this raw material – in chemistry, physics and archaeology – in order to construct more accurate protocols of experiment and methods of characterization in the perspective of a better understanding of the phenomena of diffusion in various parts of the world.

Iovino, M. R. (Viale Tunisi 8 – 96100 Siracusa)
Tribology and Micro Wear Trace Analysis on Obsidian (Sicily and Turkey)

The micro wear trace analysis on archaeological obsidian tools attempts, through a comprehensive approach, which makes use of mechanical concepts and experimental methodologies, to understand the rich and complex behavior of ancient humankind when performing their subsistence and handicraft activities. To reach this goal, the primary purpose of functional analysis is to understand how obsidian surfaces interacted with the worked materials and its related modifications.

Undertaken in conjunction with field, ethnographic and laboratory-based experimental work, this analysis needs to be enhanced by microscopic observation. Considerable progress has been made by many researchers in establishing reliable probes for wear trace analysis of obsidian. Diagnostic use-wear traces can be identified macroscopically and microscopically. Focusing on edge removals, striation patterns, rounding, abrasion, polishes, organic and non-organic residues, it can be possible to assign more realistic functional names to obsidian stone tools, correlating the lithic surface modifications with the executed motion(s) and with worked material(s). The identification of worked materials on the archaeological tools, however, remain still in many cases debatable, as polish, on obsidian, is not always a clear source of information. A deeper understanding of striation as well as of abrasive and adhesive wear on obsidian surfaces poses a major challenge and elucidates what can be their role in the identification of worked materials. Results of the experimental investigation and of the analogies observed on obsidian tools from the Neolithic sites in Turkey and Sicily will be presented.

NOTE: Assistance in transcribing these abstracts was provided by Laura Mott, Field and Laboratory Assistant, Cultural Resource Consulting Group, Highland Park, New Jersey, USA

MEMBERSHIP

The IAOS needs membership to ensure 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/year*
Institutional Member: $50/year
Student Member: $10/year or FREE with submission of a paper to the *Bulletin* for publication. Please provide copy of current student identification.
Lifetime Member: $200

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

Institutional Members are those individuals, facilities, and institutions who are active in obsidian studies and wish to participate in interlaboratory 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 fees may be reduced and/or waived in cases of financial hardship or difficulty in paying in foreign currency. Please complete the form and return it to the Secretary-Treasurer with a short explanation regarding lack of payment.

NOTE: Because membership fees are very low, the IAOS asks that all payments be made in U.S. Dollars, in international money orders, or checks payable on a bank with a U.S. branch. Otherwise, please use PayPal on our website to pay with a credit card. http://www.peak.org/obsidian/

For more information about the IAOS, contact our Secretary-Treasurer:

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iaos@origer.com

Membership inquiries, address changes, or payment questions can also be emailed to iaos@origer.com

ABOUT THE IAOS

The International Association for Obsidian Studies (IAOS) was formed in 1989 to provide a forum for obsidian researchers throughout the world. Major interest areas include: obsidian hydration dating, obsidian and materials characterization ("sourcing"), geoarchaeological obsidian studies, obsidian and lithic technology, and the prehistoric procurement and utilization of obsidian. In addition to disseminating information about advances in obsidian research to archaeologists and other interested parties, the IAOS was also established to:

1. Develop standards for analytic procedures and ensure inter-laboratory comparability.
2. Develop standards for recording and reporting obsidian hydration and characterization 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 the advances in obsidian studies and the analytic capabilities of various laboratories and institutions.

ABOUT OUR WEB SITE

The IAOS maintains a website at http://www.peak.org/obsidian/
The site has some great resources available to the public, and our webmaster, Craig Skinner, has recently included a members' only section.

NEW: You can now become a member online or renew your current IAOS membership using PayPal. Please take advantage of this opportunity to continue your support of the IAOS.

The members' lounge has a message board for posting questions, keeping in touch, or updating fellow IAOS members about research. There is also a link for the IAOS listserv. Other items on our website include:

- World obsidian source catalog
- Back issues of the *Bulletin.*
- An obsidian bibliography
- An obsidian laboratory directory
- Photos and maps of some source locations
- Links

Thanks to Craig Skinner for maintaining the website. Please check it out!

CALL FOR ARTICLES

Submissions of articles, short reports, abstracts, or announcements for inclusion in the *Bulletin* are always welcome. We accept electronic media on IBM compatible disks and CD in a variety of word processing formats, but MS Word or WordPerfect are preferred. Files can also be emailed to the *Bulletin* at cdillian@hotmail.com Please include the phrase "IAOS Bulletin" in the subject line. An acknowledgement email will be sent in reply, so if you do not hear from us, please email again and inquire.

Deadline for Issue #34 is October 1, 2005.

Send submissions to:

Carolyn Dillian
IAOS *Bulletin* Editor
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Inquiries, suggestions, and comments about the *Bulletin* can be sent to cdillian@hotmail.com Please send updated address information to Janine Loyd at iaos@origer.com

CAST YOUR VOTE FOR IAOS SECRETARY/TREASURER

All IAOS members are encouraged to vote for officers. We have two candidates for IAOS secretary/treasurer. You may cast your vote via snail mail, by detaching and mailing this form, or via email.

Secretary/Treasurer:

_______ S. Colby Phillips
University of Washington

________ Teddi Setzer
University of South Florida

Please mail to:

IAOS
c/o Janine Loyd, Secretary-Treasurer
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MEMBERSHIP RENEWAL FORM

We hope you will continue your membership. Please complete the renewal form below.

NOTE: You can now renew your IAOS membership online! Please go to the IAOS website at http://www.peak.org/obsidian/ and check it out!

___ Yes, I'd like to renew my membership. A check or money order for the annual membership fee is enclosed (see below).

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___ Yes, I'd like to become a student member of the IAOS. I have enclosed either an obsidian-related article for publication in the IAOS *Bulletin* or an abstract of such an article published elsewhere. I have also enclosed a copy of my current student ID. Please send my first issue of the IAOS *Bulletin.*

Not convinced, but want to know more?

___ Please send me a complementary issue of the latest IAOS *Bulletin.*

NAME: ____

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___ $20 Regular
___ $10 Student (include copy of student ID)
___ FREE Student (include copy of article for *Bulletin* and student ID)
___ $50 Institutional
___ $200 Lifetime

Please return this form with payment to:
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