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Obsidian Hydration Analysis of Artifacts from Six Sites Between Walters Ferry and King Hill, Idaho.

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SHORT CONTRIBUTIONS

OBSIDIAN HYDRATION ANALYSIS OF ARTIFACTS FROM SIX SITES BETWEEN WALTERS FERRY AND KING HILL, IDAHO

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INTRODUCTION

During the past ten years excavations have been conducted at a number of archaeological sites along the Snake River between Melba and King Hill, Idaho. Though the majority of point types from these sites are typologically of Late Archaic age (2000-150 BP) few have produced little datable organic material, though all have produced obsidian artifacts and debitage. In some instances projectile points of what are typologically Early and Middle Archaic age have been recovered. This report discusses the results of obsidian hydration analysis of 32 specimens from six sites between Walters Ferry and King Hill, Idaho. The purpose of the study was to establish chronometric ages for undated sites and determine if contexts that have produced temporally mixed types actually reflect distinct temporal occupations.

BACKGROUND

Introduced in 1960 (Friedman and Smith 1960) as a method of dating obsidian from archaeological contexts, its use in the Great Basin has a lengthy history where the method has been widely applied to the assessment of surface collections (e.g. Bettinger 1980; Jones and Beck 1990, 2003; Meighan 1983; Tuohy 1984; Zeier and Elston 1984). The use of obsidian hydration in Idaho has typically focused on contexts where no datable remains were recovered (e.g. Plew and Gould 1990) or the dating of individual artifacts (Yohe 1996). The recognition that hydration rims may vary by chemical composition, moisture and temperature, among other factors, has seen considerable critique of the use of the method (Anovitz et al. 1999; Lynch 1990; Morganstein et al. 1999; Ridings 1996; Stevenson et al. 1993). Others, however, continue to promote the utility of the technique (Hull 2001; Eerkens et al. 2008; Rodgers 2007). In this regard, Eerkens et al. (2008) recent study suggests a high correlation between radiometric dates and hydration dates on the south coast of Peru.

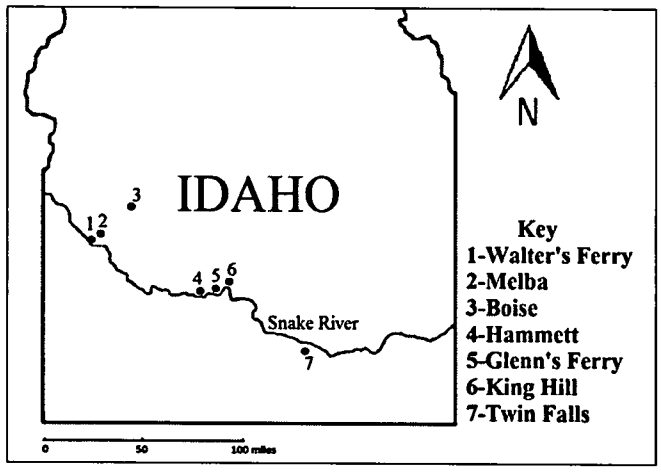

Figure 1. Map Showing Location of Sites.

THE OBSIDIAN SAMPLE

Obsidian artifacts were selected from the assemblages of sites 10-CN-5, 10-EL-110, 10-EL-215, 10-EL-1367, 10-EL-1417, and 10-EL-1577—all sites located along the Snake River. Each site is characterized by Late Archaic point types (Desert Side-Notched, Rose Spring, Eastgate and Cottonwood Triangular types) and pottery at sites 10-CN-5 (Huter et al. 2000), 10-EL-1417 (Plew and Willson 2007) and 10-EL-215 (Plew and Willson 2013) while producing some Early to Middle Archaic items. With the exception of rock-lined hearths noted at site 10-EL-1577 none of the sites have produced formal features (Plew, Huter and Benedict 2002). Site 10-CN-5 is located south of Melba, Idaho (Huter et al 2000), while site 10-EL-1367 (Plew and Willson 2007), the Medbury site, is located at Hammett, Idaho (Plew and Willson 2005). The remaining sites are located within a two mile radius of King Hill, Idaho. Each site provides evidence of food processing and lithic reduction/retooling activities.

Submitter: M. Plew								May 2013
	Lab#	Sample#	Description	Unit	Depth	Remarks	Measurements	Mean	Source
10-CN-5	1	NROL# 6	A#5			none	3.9 4.1 4.2 4.2 4.3 4.4	4.2	
10-CN-5	2	NROL# 8	A#34			none	2.5 2.5 2.5 2.6 2.6 2.6	2.6	
10-CN-5	3	NROL# 10	A#59			none	6.6 6.7 6.7 6.8 6.9 6.9	6.8	
10-EL-110	4	NROL# 3	A#9			none	6 0 6.0 6.1 6.1 6.1 6.3	6.1	SC(x)
10-EL-110	5	NROL# 4	A#67			none	2.3 2.4 2.4 2.4 2.4 2.4	2.4	CM(x)
10-EL-110	6	NROL# 5	A#208			none	4.3 4.3 4.3 4.3 4.4 4.5	4.4	OW(x)
10-EL-110	7	NROL# 8	A#52			none	5.1 5.3 5.3 5.3 5.3 5.4	5.3	BB(x)
10-EL-110	8	NROL# 9	A#118			none	2.1 2.1 2.3 2.3 2.3 2.4	2.3	OW(x)
10-EL-110	9	NROL# 10	A#42			none	2.4 2.4 2.4 2.5 2.6 2.7	2.5	BSB(x)
10-EL-215	10	NROL# 3	A#3			none	3.1 3.2 3.3 3.3 3.3 3.5	3.3	CM(x)
10-EL-215	11	NROL# 4	A#4			none	8.1 8.2 8.4 8.4 8.5 8.6	8.4	BB(x)
10-EL-215	12	NROL# 5	A#5			none	7.0 7.0 7.2 7.2 7.3 7.4	7.2	BB(x)
10-EL-215	13	NROL# 12	A#12			none	8.1 8.1 8.1 8.2 8.4 8.4	8.2	BB(x)
10-EL-1367	14	NROL# 1	A#1			none	6.0 6.2 6.3 6.3 6.3 6.4	6.3	OW(x)
10-EL-1367	15	NROL# 2	A#2			none	8.8 8.8 8.8 8.9 9.1 9.1	8.9	BB(x)
10-EL-1367	16	NROL# 3	A#3			none	5.7 5.8 5.8 6.0 6.0 6.0	5.9	CM?(x)
10-EL-1367	17	NROL# 4	A#4			none	6.1 6.1 6.2 6.2 6.3 6.3	6.2	BB(x)
10-EL-1367	18.1	NROL# 5	A#5			band 1; surfaces	4.3 4.4 4.4 4.4 4.4 4.5	4.4	OW(x)
10-EL-1367	18.2	NROL# 5	A#5			band 2; edge	6.4 6.6 6.6 6.6 6.6 6.7	6.6	OW(x)
10-EL-1367	19	NROL# 43	A#10			none		NVB	
10-EL-1367	20	NROL# 44	A#29			weathered		DH	
10-EL-1367	21	NROL# 45	A#30			none	5.7 5.7 5.8 5.8 5.8 6.0	5.8	
10-EL-1367	22	NROL# 46	A#34			none		DH	
10-EL-1417	23	NROL# 52	A#11			none	2.0 2.0 2.1 2.1 2.1 2.1	2.1	
10-EL-1417	24	NROL# 53	A#30			none	approx. 12.0	VW	
10-EL-1417	25	NROL# 54	A#31			none	3.0 3.0 3.0 3.0 3.0 3.1	3.0	
10-EL-1417	26	NROL# 55	A#69			none	4.4 4.5 4.5 4.5 4.7 4.7	4.6	
10-EL-1417	27	NROL# 57	A#79			none	3.0 3.1 3.1 3.1 3.1 3.3	3.1	
10-EL-1577	28	NROL# 47	A#16			none	3.2 3.3 3.3 3.5 3.5 3.5	3.4	
10-EL-1577	29	NROL# 48	A#92			none	2.4 2.4 2.5 2.5 2.5 2.5	2.5	
10-EL-1577	30	NROL# 49	A#393			none	2.1 2.1 2.1 2.3 2.3 2.4	2.2	
10-EL-1577	31	NROL# 50	A#522			weathered		DH	
10-EL-1577	32	NROL# 51	A#537			none	4.4 4.4 4.4 4.5 4.5 4.7	4.5	
Lab Accession No: OOL-753								Technician: Thomas M. Origer	

TABLE 1. Hydration Measurements for Specimens from Sites 10-CN-5, 10-EL-110, 10-EL-215, 10-EL-1367, 10-EL-1417, and 10-EL-1577 (from Origer 2013)

Items selected for hydration analysis include Late, Middle and Early Archaic point types, though biface and flake fragments are included.

LABORATORY METHODS

Specimens were submitted to Origer's Obsidian Laboratory for analysis. Thin section thickness was assessed using "touch" and "transparency" tests (Origer 2013: 1) with hydration bands measured using a strain-free 60-power objective and a Bausch and Lomb 12.5 power filar micrometer eye piece mounted on a Nikon Labophot-Pol polarizing microscope. A total of six measurements were taken at multiple locations along the edge of each section (see Table 1). Where possible, dates were calculated using known rates of hydration—calculating EHT (Effective Hydration Temperature) for site locations following steps outlined by Rodgers (2007). This provided the means by which dates could be calculated for Brown's Bench, Big Southern Butte, and Owyhee obsidian specimens (Origer 2013: 2). Induced hydration data indicates that Big Southern Butte, Owyhee, and Brown's Bench obsidians have hydration rates (1.05-1.5) greater than Michaels (1982, 1985) control source (Napa Glass Mountain, Napa, California). Given that the EHT of the Napa control source is 16.8 in comparison with Glenns Ferry, Idaho at 17.4, the hydration band of each specimen was adjusted downward by 6% based on previous studies (Basgall 1990; Origer 1989, 2013).

Table 1 shows hydration measurements for all 32 specimens. Dates were calculated for specimens where induced hydration data exits. These include, as noted, Big Southern Butte, Brown's Bench and Owyhee sources. Table 2 provides calculated dates for specimens from 10-EL-110, 10-EL-215, and 10-EL-1367.

Site Number	OOL Lab Number	Obsidian Source	Hydration Band (in microns)	Rate Adjusted Hydration Band	EHT Adjusted Hydration Band	Date (in years before present)
10-EL-110	6	OW	4.4	3.5	3.4	1,775
	7	BB	5.3	3.5	3.4	1,775
	8	OW	2.3	1.8	1.7	445
	9	BSB	2.5	2.4	2.3	810
10-EL-215	11	BB	8.4	5.6	5.4	4,475
	12	BB	7.2	4.8	4.7	3,390
	13	BB	8.2	5.5	5.3	4,310
10-EL-1367	14	OW	6.3	5.0	4.9	3,685
	15	BB	8.9	5.9	5.7	4,985
	17	BB	6.2	4.1	4.0	2,455
	18.1/18.2	OW	4.6/6.6	3.7/5.3	3.6/5.1	1,990/3,990

TABLE 2. Obsidian Hydration Band Adjustments and Dates (from Origer 2013)

DISCUSSION

The items from site 10-EL-110 generally reflect a Late Archaic time frame. The notable exception is item number six, which is typologically described as Northern Side-Notched. In this analysis the item is of Late Archaic age. Of greatest interest are the hydration dates from sites 10-EL-215 and 10-EL-1367. Both Middle and Early Archaic artifacts which were typologically classified have hydration dates confirming those relative ages. Notably, the Middle Archaic artifacts recovered at 10-EL-215 date between 4475 and 3390 BP. Likewise, Middle Archaic materials from 10-EL-1367 date between 4985 and 2455 BP. In general, hydration bands for the remaining items in the collection tend to support Late Archaic time frames for sites 10-EL-1417 (3.1-2.1) and 10-EL-1577 (3.4-4.5). Band width comparisons suggest that artifacts from 10-CN-5 (2.6-6.8) and 10-EL-1367 (4.4-8.9) do contain both Middle Archaic items, even though Late Archaic items are most common. Though based on a very small sample, it is of interest that Brown's Bench source materials appear as a source more common in the Middle Archaic, while Sinker Canyon, Cannonball Mountain, and Owyhee sources have hydration bands suggesting their use during Middle and Late Archaic times.

Given the tendency to assume that items of Early or Later Archaic ages found in what appear typologically dating to a particular time frame are often presumed to be only a replication of form or to have been curated to the location, this study suggests that hydration analysis may be useful in determining whether or not a site is characterized by multiple occupations/uses.

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