ORIGINAL PAPER

AN OBSERVATION OF GEOLOGICAL ARHEOLOGICAL SAMPLES BY AAS METHOD

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Abstract. *In a feasibility study, AAS analysis was performed in an attempt to classify samples obtained at Sinca Veche, an archaeological site in Romania.*

Keywords: *AAS, geological, concentrations.*

1. INTRODUCTION

One of the most important factors is the scientific examination of antiquities including the application of Atomic Absorption Spectrometry (AAS) analysis of the composition of an object with ancient symbolic representations [1]. It is in the speed of analysis that AAS [2-5] has a clear advantage. By example, it is common for NAA [6, 7] to require one or two reactor irradiations followed by cooling periods and then at least 100 min of counting time whereas AAS analysis of a given sample can be performed in about 10-15 min. The multielemental analysis for biogeochemical characterization of an ecosystem can be used, also, the ICP-AES spectrometry technique [8]. This paper present the results achieved by AAS to the study of Pre-Roman inscriptions from the ancient site of Sinca Veche.

2. EXPERIMENTAL PART

The samples were collected from five different places (Fig. 1) and analyzed by AAS technique [9, 10]. Samples were digested with concentrated nitric acid (8 mL) at high temperature using *Digesdahl L 1284* device.

After mineralization the samples were cooled and then the clear solution volume is made up to 50 mL. The analysis of samples was performed with Schimadzu AA-6200 spectrometer from Ovidius University of Constanta laboratory. After the proper selection of lamp which corresponds with the analyzed element, it's an initialization of the specific software. For emitted radiation was used the next wavelengths: Zn (λ=213.9nm), Pb (λ=283.3nm), Mn (λ=279.5nm), Cu (λ=324.8nm), Co (λ=240.7nm), and Cd (λ=228.8nm).

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The background correction is done through this method. The software makes 3 or 5 readings and records the mean value.

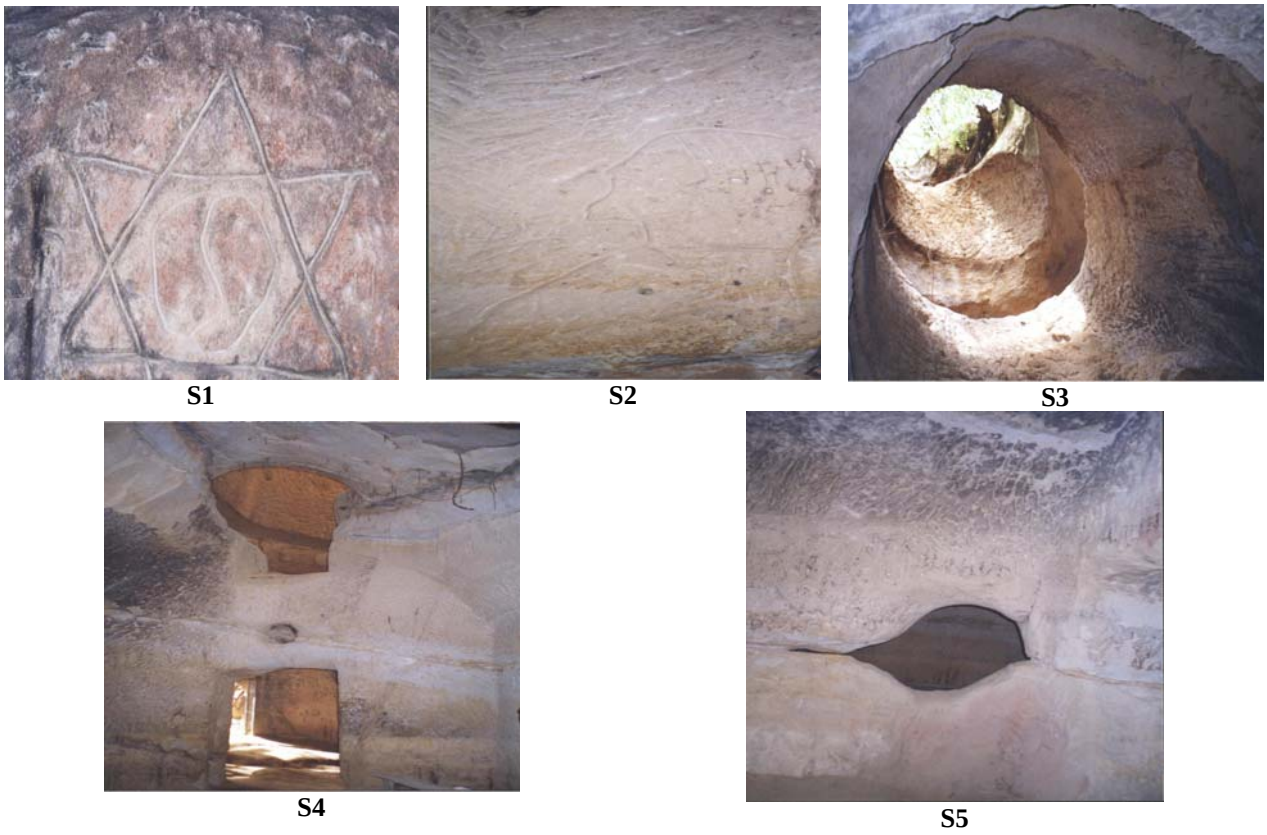

Fig. 1. Collected points: S1 – Sanctuary; S2 – Human profile; S3 – Archaeological pit; S4 – Inscription on the opened wall; S5 – Cavern.

3. RESULTS AND DISCUSSION

According with the value of the analyzed results can be concluded: the main representations of recess (Table 1) the sample was taken from the central domain, and there observe (in the hypothetical presence of a convergence centre of the ritual place) because there exists a lot of raised concentrations of Zn (20.23), Cu (29.55), Mn (78.36); Cu and Zn can results from the tools traces with whom the cavern was realized, if those are manufactured by brass; the collected points S1 and S4 are also possible to present almost exclusively structural the characteristic features which are independent by the human activity, but this fact could make them attractive and having given special destination points.

Table 1. Mean concentration of Zn, Pb, Mn, Cu, Co and Cd in archeological samples.

Sample	Mass	Mean concentration of elements [ppm]					
		Zn	Pb	Mn	Cu	Co	Cd
S1	1.3806	20.23±0.0009	5.863±0.0012	78.36±0.0020	29.56±0.0070	9.930±0.0006	nd
S2	0.8522	11.59±0.0032	20.97±0.0013	38.85±0.0014	3.479±0.0021	2.299±0.0006	nd
S3	1.1573	10.60±0.0020	nd	35.84±0.0015	1.317±0.0005	nd	nd
S4	0.572	7.482±0.0016	45.90±0.0006	33.94±0.0015	7.014±0.0016	nd	4.895±0.0015
S5	1.4785	3.980±0.0013	nd	9.550±0.0012	1.078±0.0007	nd	nd

Regarding the sample S4 it observe a raised concentration of Pb (45.90) and comparatively with the other samples this contains Cd traces; in this respect it consider that the metals which were used here are different by those used in the collected point S1.

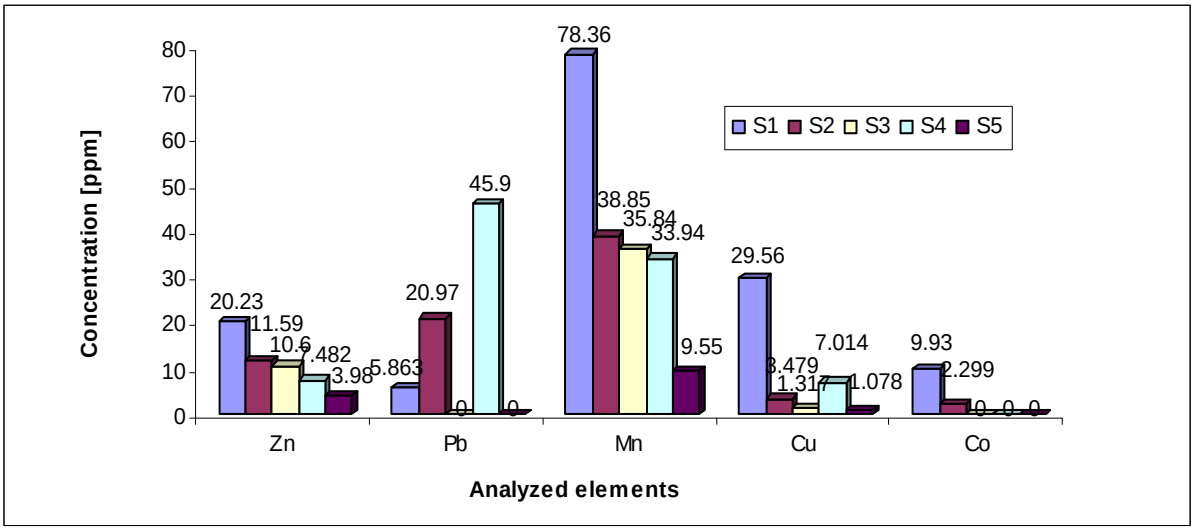

Fig. 2. Concentration of analyzed elements presented comparatively in collected samples.

The high concentration of Co and Mn (Fig. 2) in S1 and S2 can be explained by using the rituals which involve repeated firings of natural products (wood and raisins).

The archaeological pit (S3) can be the result of natural erosion or of the human hand. The studies proved that not exist real signs of hand tools, observing some concentrations of Cu (1.317) and Pb (nd). The research shows that the site of Sinca Veche is composed by sandstone with a good texture which can retain metal fragments from tools.

The sanctuary (S1), which is a convergence zone of the site, and human profile (S2) (Fig. 1) attest the human intervention through the high concentration of all analyzed metals, comparative with S3, S4 and S5.

4. CONCLUSIONS

It observes that, indeed, there exists some concentration of characteristic elements from which the antique tools were manufactured in the chiseled representation of sanctuary walls, the tools having the base of alloys by Cu-Zn (brass). It could make a contrastive study of different fields from location in order to observe the AAS determined concentration for Zn and Cu for the analogies to establish the importance of the different fields of location.

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