Day 1 (27 May)

9:30-11:20: lectures
Session I - Obsidian sources and their characterisation

9:30-9:50
Barba, L. - Esparza, R. - Ruvalcaba, J. L.: Building a data base of the Mesoamerican obsidian outcrops

9:50-10:10
Reepmeyer, C. - O'Connor, S. - Mahirta - Irfan, A.: An update on the South Wallacean obsidian interaction sphere

10:10-10:30
Suda, Y. - Oyokawa, M. - Inata, Y.: Geochemical classification and characterization of obsidian sources in Oki-Dogo island: application to the provenance study of archaeological obsidian artifacts

10:30-10:50
Akbar Abedi - Dibazar, Mohammadi Vahideh - Steiniger, D. - Glascock, M. D.: The Provenance of Kul Tepe Obsidian Artifacts; Syunik and the Highlands of Armenia as Possible Seasonal Pastureland

10:50-11:10
Přichystal, A. - Strunga, V. - Furmanek, M. - Rapiński, A.: Provenance of the Stroked Pottery culture obsidian from Dzielnica (Opole province, Upper Silesia, Poland)

11:10-11:20
General discussion on session I

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Rácz, B.: The Carpahian 3 obsidian - the geoarchaeological review
Donato, P. - Barba, L. - De Rosa, R. - Niceforo, G. -Pastrana, A. - Crisci, G. M.: Sub-sourcing of Sierra de las Navajas obsidians (Hidalgo, Mexico)
Magyari, S. I. - Gherdán, K. - Markó, A - Topa, B. - Albert, G. - Weiszburg, T.: A 19th century pseudo-obsidian reference: the glassy andesite of Buják, Hungary as possible chipped stone raw material
Bačová, Z.-Bačo, P.: Occurrences of the volcanic glass related to Neogene volcanism in the Eastern Slovakia

Building a data base of the Mesoamerican obsidian outcrops

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Session I - Obsidian sources and their characterisation
Form of communication: oral
Day 1 (27 May) 9:30-9:50

As an important part of the projects that support the CAICPC network (Applied Sciences to the Research and Conservation of Cultural Heritage Network), in the frame of the SICOM 2015 (Symposium on Research and Characterization of Obsidian in Mexico) it was proposed the creation of a shared data base of the obsidian outcrops registered in Mexico and neighbor countries. The main goal of this project is to promote research on this important archaeological material providing free access to data base to members of the network.
In order to carry on this work, every research institute that have had performed obsidian elemental analysis in México was invited to share their results to build up a joint data base. At this stage we included three analytical techniques (XRF, NAA and ICP-MS), using the same reference material (obsidian rock No. 286 del NIST) to obtain reliable and comparable results.
Currently, our data base includes 29 outcrops in 8 Mexican states and 4 outcrops in Central America. As a result of the first round of analysis we reach 477 geological samples analyzed mainly by XRF.
To display and share the data base we published a web page that includes the basic information concerning the geological obsidian outcrops and their analytical results, in addition to the references and documents related with them.
Taking into consideration the cost of the international reference material for all the involved laboratories, we developed a strategy to establish a set of 6 cubes of internal obsidian references shared with all laboratories to analyze them in the same conditions and calibrate equipment in the same way.

Keywords: obsidian, Mesoamerica, data base, reference material

An update on the South Wallacean obsidian interaction sphere

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Session I - Obsidian sources and their characterisation
Form of communication: oral
Day 1 (27 May) 9:50-10:10

This paper will present an update on the South Indonesia obsidian interaction sphere, first discussed at the International Obsidian Conference in 2016. Preliminary results showed the utilisation of three unknown obsidian sources with additional three subsources suggested. Since then three new sites have been excavated, two new islands investigated and the location of one of the unknown obsidian sources has been identified. The previous source 3a, b, c originate all from the same lava flow, close to the village of Kulutan on Alor. We were able to detect obsidian transportation to small islands in the network, which might align chronologically with the emergence of this interaction zone. Dates for the start of the network have been pushed back to 15,000 years ago. Density distribution of the two unknown sources in excavated sites show that we might be able to triangulate the location of these unknown sources which will guide future fieldwork.

Keywords: Obsidian, Wallacea, Terminal Pleistocene, maritime transportation

Geochemical classification and characterization of obsidian sources in Oki-Dogo island: application to the provenance study of archaeological obsidian artifacts

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Session I - Obsidian sources and their characterisation
Form of communication: oral
Day 1 (27 May) 10:10-10:30

Obsidian sources and its related archaeological sites are distributed in the Oki-Dogo island on the southern margin of the Japan Sea. Archaeological studies had revealed that the obsidian in this island was widely provided as the lithic row material during the prehistoric age at the Chugoku and Shikoku regions. Therefore, detail geochemical characterization of obsidian in this island is quite significant to perform the provenance analysis of obsidian artifact in the western Japan. Suda et al. (2016) reported that the number of obsidian sources in this island reaches 17, which are geochemically divided into 9 groups. Based on these results, we established a system of provenance analysis of obsidian artifacts related to the Oki-Dogo source. In this system, we applied the semi-quantitative non-destructive analysis by ED-XRF, in which tow obsidian specimens (SE1-295, N7-403) were used as the standard materials for the calculation of semi-quantitative data by FP method. The 31 obsidians from the sources, had already been geochemically classified by quantitative data, were analyzed by this method to determine the compositional fields for the 9 groups in the variation diagrams. The measurements were repeated 10 times for each specimen. The compositional fields were defied as the ellipses of equal probability calculated from the plots in diagrams. Then, we designed a program using the Microsoft Excel to perform all calculations, in which the results can be yielded only to input the semi-quantitative data in an Excel Sheet. Using this system, we performed the analysis of several hundreds of obsidian artifacts from the Miyabi prehistoric site in Oki-Dogo. We can assign 60% of obsidian, while the remaining 40% did not have an affinity with known source. Although further investigation to make clear the 40% obsidian is necessary, we succeeded the improvement of provenance analysis of obsidian artifacts related to the Oki-Dogo source.

Keywords: obsidian, west Japan, Oki-Dogo island, WD-XRF, ED-XRF

The provenance of Kul Tepe obsidian artifacts; Syunik and the Highlands of Armenia as possible seasonal pastureland

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Session I - Obsidian sources and their characterisation
Form of communication: oral
Day 1 (27 May) 10:30-10:50

Excavations at the site of Kul Tepe in the Jolfa region in north-western Iran have unearthed various archaeological materials from Late Neolithic/Early Chalcolithic to Achaemenids periods (end of 6th millennium to 3rd century BC). During the Chalcolithic and the Bronze Age most lithic tools used in Kul Tepe were made of obsidian. From the first and second excavation seasons, 53 and 32 obsidian samples were selected and analyzed by pXRF. According to the results, the main source of obsidian for the workshops in Kul Tepe was Syunik, but other sources in the Lake Sevan Basin like Ghegam, Bazenk, Choraphor and Gutansar and the Lake Van region (Nemrut Dağ and Meydan Dağ) were utilized also

Keywords: Kul Tepe, obsidian, provenance, pXRF, Syunik, Prehistoric trade

Provenance of the Stroked Pottery culture obsidian from Dzielnica (Opole province, Upper Silesia, Poland)

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Session I - Obsidian sources and their characterisation
Form of communication: oral
Day 1 (27 May) 10:50-11:10

During archaeological excavations at Dzielnica (Opole province, southern Poland) in 2006 there were found obsidian flakes connected with the Stroked Pottery culture (Stichbandkeramik, SBK). Two pieces of well translucent obsidian with inventory numbers 45/06 and 56/06 have been analysed using neutron activation analysis in the Nuclear Physics Institute of the Czech Academy of Sciences, Husinec-Řež near Prague. Both samples were analysed for 8 major elements (Si, Ti, Al, Fe, Mg, Ca, Na, K), 18 trace elements (As, Ba, Co, Cr, Cs, Hf, Mn, Mo, Ni, Rb, Sb, Sr, Ta, Th, U, V, W, Zn and 13 elements from the group of rare earth elements.
For determination of obsidian provenance we used various diagrams based on trace element ratios and comparison of the Polish artefacts with natural obsidian sources in Slovakia or in Hungary and also with Neolithic tools from Moravian Painted Ware I (Lengyel I) settlements Těšetice-Kyjovice and Brno-Žebětín. The Lengyel obsidian tools from Těšetice-Kyjovice form a homogenous collection and O. Williams-Thorpe with her colleagues already studied them with conclusion on their provenance from the Slovakian source Carpathian 1. In our discriminating diagrams the Polish SBK obsidians from Dzielnica have the same position as the Lengyel samples from southern Moravia. We also confirmed the Th/U ratio as excellent marker to distinguish the Slovakian (Carpathian 1) and Hungarian sources (Carpathian 2). Th/U ratios of Dzielnica obsidians with values 1,75 and 1,78 (it is under 2) together with relatively lower contents of Ba, La, Th and usually also Na, Rb, Sc, Fe, Cs, Hf, Ce, Sm and Eu testify undoubtedly for the Slovakian source Carpathian 1. It seems the geochemical differences between the Slovakian source in the northern part of Zemplín Hills (Carpathians 1a, probably the principal source for prehistoric obsidian in Central Europe) and the well-known source at Viničky in the southern part of Zemplín Hills (Carpathians 1b) are very inconspicuous. Macroscopic appearance of obsidians from Dzielnica is characteristic for the source Carpathians 1a. Using of obsidian from the Slovakian source at Paleolithic (from the Epigravettian onwards) and Mesolithic sites in Poland has been described by R. E. Hughes and D. H. Werra.

Keywords: Stroked Pottery culture, Dzielnica, southern Poland, obsidian, Slovakian source

The Carpathian 3 obsidian - the geoarchaeological review

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Session I - Obsidian sources and their characterisation
Form of communication: poster
Day 1 (27 May) 15:50-17:00

The territory of the westernmost part of present-day Ukraine (Transcarpathia) has been a densely inhabited area in almost all periods of human history. In the region of Transcarpathia, currently more than 100 Palaeolithic sites are known, most of them known from surface collections. Early petroarchaeological studies commenced in Transcarpathia with the activity of V. Petrun' and by the discovery of Middle Palaeolithic settlements and workshops around Rokosovo and Maliy Rakovets and the description of the local obsidian sources. Obsidian was one of the most important raw materials for prehistoric stone tools. In the Carpathian Basin we know three separate sources of Carpathian obsidian (C1 – from Slovakia, C2 – from Hungary and C3 – from Ukraine), the aim of the present work is to introduce the Carpathian 3 obsidian from Transcarpathia.
Palaeolithic communities in the recent territory of Transcarpathia were primarily using local raw materials for the production of their tools. In the volcanic raw material regions of the Transcarpathian Palaeolithic two raw material types of volcanic origin played a dominant part in the production of stone artefacts: glassy dacite from Korolevo and Carpathian 3 type obsidian from Rokosovo.

Keywords: obsidian, Palaeolithic, Transcarpathia, raw material, Rokosovo

Sub-sourcing of Sierra de las Navajas obsidians (Hidalgo, Mexico)

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Session I - Obsidian sources and their characterisation
Form of communication: poster
Day 1 (27 May) 15:50-17:00

Sierra de Las Navajas (State of Hidalgo, Mexico) was among the most important sources for obsidian trade in Mesoamerica during the pre-colonial and early colonial times.
Chemical composition has been used to distinguish between the different volcanic sources within Sierra de las Navajas. In particular, according to previous studies very high contents of HFSE distinguish the obsidians from Las Minas complex (the most exploited sub-source) from those of other sub-sources. In this work a geochemical study by XRF and ICP-MS was carried out on the obsidian of Sierra de las Navajas. Our data demonstrate that the composition of the Las Minas green obsidians is not constant in terms of many major and trace elements: a group of samples have high Nb, Zr, Y, Rb, poorly fractionated Heavy Rare Earth Elements (HREE) patterns and low TiO_2 and Ba, but other obsidians from the same area have lower Nb, Zr, Y, Rb, higher Ba and TiO_2 and more fractionated HREE. This geochemical variation is also observed within the same stratigraphic sequence and can be explained with the empting of a zoned magma chamber in which dominated the process of fractional crystallization of K-feldspar and Ti-rich phases. The chemical variation found in the Las Minas samples encompasses those of the three subsources previously identified (Las Minas, El Horcón and Ixatla volcanic complexes). The macroscopic aspect of the samples with different composition is identical and they cannot be distinguished on the basis of their color, microvesicularity or microcrystallinity. Therefore, caution must be taken when attributing artifacts to one of the sub-sources of Sierra de las Navajas on the basis of chemical composition since compositional variations, internal to each sub-source, must be taken into account.

Keywords: Chemical composition, trace elements, obsidian sources

A 19th century pseudo-obsidian reference: the glassy andesite of Buják, Hungary as possible chipped stone raw material

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Session I - Obsidian sources and their characterisation
Form of communication: poster
Day 1 (27 May) 15:50-17:00

Ferenc Schafarzik, Hungarian geographer and geologist, in his monography on the Cserhát, part of the Northern Hungarian Range, gave a detailed description of a volcanic rock outcrop near the village of Buják. He described the rock glassy, colourless, of isotropic matrix, with some parts strongly resembling obsidian.
Our aim was to rediscover that small outcrop, to study the rock with modern petrographical and geochemical methods, and to determine whether it can be regarded as chipped stone raw material.
Our work was initiated by archaeological inquires searching for possible raw material sources of knapped stone objects made of neutral magmatic rocks in the Cserhát.
We georeferenced both the geological and the 1:10000 topographic map of the area and by that tool we started with the systematic field work. The location described by Schafarzik could then be identified on the SW slopes of Bársony Hill, Buják. The collected rock samples were described from petrological point of view (macroscopic observations, stereo- and polarized light microscopy, SEM, chemical analysis: both mineral- and whole rock chemistry) and we performed knapping experiments, too.
The rock proved to be basaltic andesite (SiO_2 56 wt%). Its main and trace element composition is fairly similar to other samples from the region's basaltic andesites.
Its texture is microholocrystalline-porphyric, sometimes pilotaxitic porphyric. The euhedral or subhedral plagioclase, pyroxene and amphibole phenocrysts either stand alone or form groups. Plagioclase is labradoritic in the matrix, while bytownitic as phenocrysts. Two pyroxenes are present: augite and orthopyroxene with some Ca-content.
Knapping experiments demonstrated that the macroscopically "most glassy" rock variant is suitable for making knapped stone.
The locality studied could be regarded potential raw material source for the knapped tools made of neutral magmatic rocks in the Cserhát region, Hungary.

Keywords: andesite, Schafarzik, Cserhát, Buják, knapping, petrography

Occurrences of the volcanic glass related to Neogene volcanism in the Eastern Slovakia

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Session I - Obsidian sources and their characterisation
Form of communication: poster
Day 1 (27 May) 15:50-17:00

Occurrences of volcanic glass in the Eastern Slovakia are mainly associated with products of acidic volcanism. It is a part of bimodal andesite-rhyolite volcanism of the Late Badenian to Early Pannonian age. Rhyolite and rhyodacite volcanism is characterized by pyroclastic rocks in the form of tuffs and pumice tuffs. Massive forms of volcanic glass – perlites, pitchstones and obsidians – are related principally with intrusive and extrusive forms of rhyolite volcanism. Perlitized volcanic glasses of marginal parts of rhyolite extrusive bodies are known from the surroundings of Byšta, Brezina, Viničky and Malá Bara localities. Small grains of obsidians are part of pyroclastic rocks from the region of Hermanovce, Skároš, Veľká Tŕňa a Veľká Bara. Glasses, sometimes referred to as pitchstones, form marginal parts of different intrusive forms (necks, dykes) of rhyolites in the area of Merník cinnabar deposit. In the northwest part of Lipová hora hill, they reach directly the surface, where they form the marginal parts of a larger body, as well as separate, pure glassy dykes. Significantly extended are rhyolite glasses - obsidians with autochthonous occurrences in the Zemplínske vrchy Mts. These occurrences are related mainly to the Borsuk extrusive body near Viničky and rhyolite body in pure glassy development covered by the Borsuk sequences. Allochthonous occurrences of obsidians in the form of marekanite are known from the area of Šibeničný vrch hill near the Streda nad Bodrogom. Marekanite is a part of redeposited rhyolite tuffs and polymict epiclastic breccias. Primary source of these obsidians is not known yet. In the area of Brehov, under eolian sands there were found, applying technical works, the interbeds with sculptured fragments – nodules of obsidians. Obsidians at the similar position are known from the surroundings of Cejkov. Glassy facies to pure volcanic glass were verified by drilling works at the base of the Velký vrch hill extrusive body north of Brehov.

Keywords: rhyolite volcanites, volcanic glass, Eastern Slovakia