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PGAA analysis of some Neolithic obsidian samples from Romanian regions

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Thirty archaeological samples from different regions of Romania and from different prehistorical periods were analyzed at the PGAA facility of the Budapest Neutron Centre: Iclod, Tzaga, Silagiu sites in Transylvania, Neolithic period; Cuina Turcului site at Iron Gates (on Danube border, between Romania and Serbia), Early Neolithic (Neolithisation) and Neolithic period; Magura site in Teleorman County (South of Bucharest, near Danube), Early Neolithic (Neolithisation period).
The aim of the study was to identify obsidian geological sources used in each region and period. Neolithisation is the process of transition from hunting-fishing-based society to agriculture, process related to an important populations movement. The most accepted theory is "Ex Oriente Lux", the migration of "Neolithic model" (and population) from Mesopotamia, Anatolia, Greece - through Aegean Islands, Balkans, Central Europe - via Danube.
Two main geological regions are presumed to be the obsidian sources for Romanian territory: Tokaj Mountains (Carpathian I –now in Southern Slovakia and Carpathian II –now in Northern Hungary) and Greek Islands –especially Melos (Aegean Sea). PGAA proved to be the most convenient method to quantify the major components and some characteristic trace elements in the bulk material, most of all B and Cl, in a non-invasive way. In order to determine the provenance of the archaeological objects, we have investigated several elements'contents. Compositions of archaeological objects were compared with our own reference database including the major European and Mediterranean sources. B/SiO2 vs. Cl/SiO2 ratios and Principal Components Analysis (PCA) proved to be the most indicative in determination of different groups.
Our results indicate all the Transylvanian Neolithic samples fit the Carpathian I pattern. The same pattern can be attributed to Neolithic Cuina Turcului samples. A special situation is for the Neolithisation period, both for Cuina Turcului and Teleorman. These samples fit Carpathian II pattern, however, based on K2O content, these samples are very similar to those from Yali Island (Aegean Sea). Since the latters are known to show weak mechanical quality, it has been less probably used for tools production. By increasing the number of fingerprinting elements, using additional analytical methods, one can further confirm or disprove the current theories of Neolithisation.

References

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Summary

Non-destructive Prompt Gamma Activation Analysis was applied to perform provenance study of Neolithic obsidian artefacts. Elemental compositions of archaeological objects from Romanian sites have been compared with reference measurements of the most important geological sources in Central Europe and in the Mediterranean region. Based on the measured concentrations, especially on B- and Cl content, the samples proved to be either 'Carpathian I'(North of Tokaj mountains, Slovakia) or 'Carpathian II'(South of Tokaj mountains, Hungary) types. However, further methods are recommended to identify more fingerprint-like trace elements in obsidians.

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