Contribution ID: **476** Type: **Oral report**

TOWARDS A MULTI-PROXY BIOAVAILABLE STRONTIUM ISOTOPE BASELINE FOR THE ORENBURG REGION, RUSSIA

Saturday, October 17, 2020 3:00 PM (25 minutes)

Strontium isotopes are used in archaeology, ecology, forensics, and other disciplines to study the origin of artefacts, humans, animals and food items. Strontium in animal and human tissues such as bone and teeth originates from food and drink consumed during life, leaving an isotopic signal corresponding to their geographical origin (i.e. where the plants grew, the animals grazed and the drinking water passed through) [1].
To assess the mobility and provenance of ancient populations, it is necessary to compare their $^{87}Sr/^{86}Sr$ isotope ratios with the local bio-available strontium baseline (background), characteristic of each specific location or potential provenance region of an individual or artefact. Its definition requires a comprehensive approach to the analysis of different samples ("proxies") characterizing the ecosystem of the archaeological site under study, the identification of the most suitable proxies, as well as the unification and standardization of the sampling and analytic protocols [2]. Common proxies when producing strontium isotope baselines are surface/ground water, plants, soil leachates, and faunal remains, and the choice largely depends on the nature of material under investigation, and of the availability of sampling material [3].
In order to construct multi-proxy strontium isotope baselines for the Orenburg region, where unique and significant archeological monuments of the Mesolithic era to the Middle Ages are situated, a one-month long fieldwork was implemented. Samples characterizing bioavailable strontium (vegetation, soil, rocks, surface and ground water, as well as bone and dental remains of modern fauna, the shells of bivalve and gastropod mollusks) were collected on the territory of about 124 thousand km^2. Due to its location, the territory of the Orenburg region has a complex geological structure, which is reflected in highly variable environmental Sr isotopic signatures.
A methodology of $^{87}Sr/^{86}Sr$ isotope analysis of collected proxies of different types by Neptune Plus MC-ICP mass-spectrometer after Sr chromatographic separation will be applied in the Zavaritsky Institute of Geology and Geochemistry, UB RAS, and strontium isoscapes (iso - isotope, scape - landscape), representing lines/areas with certain $^{87}Sr/^{86}Sr$ isotopic ratios of bioavailable strontium will be constructed. Obtained strontium isoscapes will be used for unveiling the regions potentially connected with the provenance (birth) of human and animal individuals and their mobility as well as to discuss the origins of archaeological textiles. These data will greatly expand the possibilities of historical interpretations and will allow the traditional archaeological cultural and geographical models to be verified.
The work was carried out at the "Geoanalitik" Center for Collective Use and supported by RFBR grant No. 20-09-00194.

References:

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Primary authors: KISILEVA, D. (Zavaritsky Institute of Geology and Geochemistry, Ekaterinburg, Russia); SHAGALOV, E. (Ural State Mining University, Ekaterinburg, Russia); SOLOSHENKO, N. (Zavaritsky Institute of Geology and Geochemistry, Ekaterinburg, Russia); OKUNEVA, T. (Zavaritsky Institute of Geology and Geochemistry, Ekaterinburg, Russia); URAZOVA, K. (Zavaritsky Institute of Geology and Geochemistry, Ekaterinburg, Russia; Ural Federal University named after B.N. Yeltsin, Ekaterinburg, Russia); KARPOVA, S. (Zavaritsky Institute of Geology and Geochemistry, Ekaterinburg, Russia; Ural Federal University named after B.N. Yeltsin, Ekaterinburg, Russia); RYANSKAYA, A. (Zavaritsky Institute of Geology and Geochemistry, Ekaterinburg, Russia); PANKRUSHINA, E. (Zavaritsky Institute of Geology and Geochemistry, Ekaterinburg, Russia)

Presenter: KISILEVA, D. (Zavaritsky Institute of Geology and Geochemistry, Ekaterinburg, Russia)

Session Classification: Section 9. Nuclear-physical methods in the study of cultural heritage objects

Track Classification: Section 9. Nuclear-physical methods in the study of cultural heritage objects.