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# Spatial distribution of raw material types at the Paleolithic sites: a case study from the northern Mongolia

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## Résumé

The Middle Selenga River Basin, the main tributary of the lake Baikal, is an area representing the example of the definitive role of raw material outcrops in the Paleolithic sites location. Dozens of the sites are situated in the area of Permian formation, included the Tulbur thickness with stone raw material outcrops in the Ikh Tulberiin Gol and Kharganyn Gol Valleys. This raw material is distinctive in composition and quality in terms of knapping. Nine types of cherts (silica-rich rocks), three types of coarse tuff and tuffites with siliceous cement and one type of tuffaceous siltstone are divisible in the results of petrochemical analyses (Rybin et al, 2016).

Types of raw material that ancient humans utilized, producing artifacts, have been included to the comparative collection and counted as an attribute for each artifact in the course of technical typological analysis. This gives an opportunity to study spatial distribution of raw material types and raise a question about the principles of selection and use of material within a site.

Tolbor-21 (T-21) and Kharganyn-Gol-5 (KhG-5) are the stratified multilayered sites. Terminal Middle Paleolithic is presented here by archaeological horizons 7 and 6 of KhG-5, and Initial Upper Paleolithic is presented in the horizon 5 of KhG-5 and horizons 5 and 4 of T-21 (Khatsenovich, 2018; Rybin, 2020). Raw material primary outcrops were located in 200-400 m from the sites. Local raw material was predominantly used by humans during their occupation of the river valleys. The only exception is KhG-5: here the ratio of local and transported raw material significantly changed from the Middle to Upper Paleolithic (Khatsenovich, 2017). This site is located at the periphery of Tulbur formation, and geochemical modules indicated that raw material was transported from the neighboring valley. Necessity of raw material transportation and small size of the blocks at the local outcrops affected the artifact size (Rybin et al, 2016).

Spatial distribution of raw material types at these sites was studied in the horizons 7 - 6 of KhG-5 and horizon 4 of T-21 using kernel density estimation (Baxter et al., 1997). Particular types of raw material are located in the particular areas. Supposedly it reflects behavioral aspects related to raw material selection or usage of the one available nodule. Type 4 (fine cryptocrystalline chert), located in excavation Pit 2 of the T-21 site and almost

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absent in other excavation pits, is an example of such a situation.

Further, the raw material impact on morphology was studied. For this purpose the length and width parameters of the blanks (flakes and blades), made from one raw material have been compared to each other within one horizon.

Both sites indicate the highest percent of the most easily accessible and widely available type 1. On KhG-5 however the other types have relatively large percent and its spatial distribution is more homogeneous. This may be due to the greater distance of this site from raw material outcrop.

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**Mots-Clés:** spatial analysis, northern Mongolia, raw material, kernel density estimation