

Unearthing the opportunity costs of Palaeolithic mobility and resilience strategies

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Credit: AI-generated image ([disclaimer](#))

The Aurignacian and Gravettian are significant periods of the Early Upper Palaeolithic (EUP) which reflect changes in stone tool technology and mobility. The PALMOBI project combined for the first time a unique range of methodologies to better understand these changes.

Traditionally, European palaeolithic research has focused broadly on cultural history and technological trajectories. The EU-funded PALMOBI project set out to contribute an assessment of hunter-gatherer mobility strategies and technological resilience in response to the variable availability and accessibility of raw materials. For the first time, investigators incorporated measurable geochemical signatures of the siliceous raw materials from Belgium and Romania.

PALMOBI brought together geochemistry, petrography, lithic technology, GIS geospatial techniques and environmental modelling to reconstruct mobility and land-use strategies during the Early Upper Palaeolithic (EUP), between 36,000 and 30,000 years ago. The project found evidence of effective provisioning and management of lithic resources characterised by an increased mobility during the Gravettian period.

First-time combination of cutting-edge methodologies

While a better understanding of prehistoric mobility should be based on the reliable sourcing of stone (lithic) raw materials to start with, its misinterpretation can lead to problematic behavioural reconstructions. Identification is usually based on visual classification which lends itself to errors, such as those which can occur between visually similar raw materials such as chert or flint.

Explaining the inception of the PALMOBI project, coordinator Dr. Luc Moreau says, "Any attempt to trace long distance transport of [materials](#)—with important implications for mobility strategies, time-budgeting and social networks—should be reinforced by microscopic/petrographic and geochemical comparisons."

PALMOBI conducted raw material surveys in Romania and Belgium – both rich in well-understood EUP records of human occupation and

environmental change. The geological samples collected during these surveys served as proxies for the prehistoric landscape, against which changing adaptive strategies could be modelled. As Dr. Moreau enthuses, "A comparison of these two regions using a combination of cutting-edge methodologies in tandem with evolutionary anthropology methods and theories has never previously been attempted."

The team used Laser Ablation—Inductively Coupled Plasma—Mass Spectrometer (LA-ICP-MS) for non-destructive geochemical analysis of archaeological and geological samples, which quickly and accurately provided information about lithic raw material variability and provenance, from multiple trace elements. Petrographic characterisation of flint surfaces was also undertaken using a binocular microscope to assess in more detail the secondary depositional context of the rocks collected by EUP foragers.

Additionally, a GIS was used to provide multivariate modelling of raw material selection behaviour, drawing a distinction between human choices and wider restraining factors. As Dr. Moreau cautions, "Before inferring social causes for variation in human behaviour, potential trade-offs should first be evaluated. In PALMOBI, terrain and raw material variables hold the key to modelling the costs and decision-making process of technological investment and mobility to cope with variable conditions towards the Last Glacial Maximum of the Last Ice Age."

The evidence mounts up

PALMOBI's results suggested that the scale of group mobility in EUP hunter-gatherer societies indeed appears indicative of adaptation to the environmental context. Long distance mobility increased in frequency under conditions of deteriorating climate and increasing cold temperatures, when the availability and predictability of subsistence resources were subject to important fluctuations.

PALMOBI also shed more light on why some raw material sources were used more than others. Results showed that besides raw material quality and abundance, terrain difficulty and calculations of mobility costs help explain and predict the variability in treatment and intensity of raw material use, found in the archaeological record.

As Dr. Moreau summarises, "Not only did Gravettian hunter-gatherers accept higher costs of obtaining lithic [raw materials](#) when local rocks proved unsatisfactory, their social networks mitigated the risk of resource failure, more than in any previous period. Contrary to common narratives, strong technological similarities between Aurignacian and Gravettian assemblages in Romania reflect changing adaptive and mobility strategies, not a new incoming population."

Alongside participation in a number of public dissemination events, the project's work on the role of mobility in promoting social change inspired the organisation of an international conference which explored the processes that can lead a society away from egalitarianism.

Provided by CORDIS

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