HORIZON 2020

Early Upper Palaeolithic mobility and technological decision-making under changing environmental constraints: case studies from Belgium and Romania

Reporting

Project Information

PALMOBI

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Periodic Reporting for period 1 - PALMOBI (Early Upper Palaeolithic mobility and technological decision-making under changing environmental constraints: case studies from Belgium and Romania)

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Summary of the context and overall objectives of the project

In Europe, the period between 36,000 and 30,000 years ago witnessed a series of profound behavioural changes in human evolutionary history, roughly coinciding with the socio-economic change from the Aurignacian to Gravettian periods, two major periods of the Early Upper Palaeolithic (EUP). The timing and nature of this change, during a period characterised by pronounced climatic variability, are still hotly debated due mainly to the scarcity of Aurignacian and Gravettian assemblages with secure chronostratigraphic and environmental context. PALMOBI investigates EUP hunter-gatherer interactions with their environment under variable ecological conditions through the integrative use of cutting-edge interdisciplinary methodologies and their application to the archaeological record of the Aurignacian and the Gravettian across two contrasting regions (temperate Belgium & continental Romania). A comparison of these two regions by applying state-of-the-art stone tool technology and raw material economy analyses, non-destructive geochemical sourcing and GIS geospatial techniques in tandem with anthropological methods and theories has never previously been attempted.

A marked increase in use of high-quality, non-local raw materials in lithic assemblages is unknown until the Gravettian. This has been interpreted as the result of climatic fluctuations and deterioration leading toward the Last Glacial Maximum, which may have triggered greater mobility and more extended social networks than among previous hominin populations. PALMOBI aims to investigate the change in the organisation of stone tool technology and related mobility strategies between the Aurignacian and Gravettian periods. Belgium and Romania with their rich EUP records of human occupation have been chosen as case study areas.

PALMOBI's main research objectives can be described as follows:
- Develop a renewed understanding of techno-economic variability in the EUP by taking into account parameters such as raw material provenience, secondary depositional context, and transport costs;
- Provide a new framework to assess the costs of different EUP technological systems and associated mobility/land-use strategies under variable environments in both case study regions;
- Assess the degree to which the Aurignacian and Gravettian technological systems correspond to different risk-minimising strategies under changing climatic-environmental constraints;
- The role of shifts in mobility strategies in promoting social change, particularly social inequality.

Work performed from the beginning of the project to the end of the period covered by the report and main results achieved so far

"FLINT SOURCING

Using Laser Ablation - Inductively Coupled Plasma - Mass Spectrometer (LA-ICP-MS) and multivariate statistical analyses on a substantial number of geological and archaeological flint samples, the geochemical signature and variability of Romanian Prut flint and Lower Danube ""Balkan"" flint has revealed the existence of long-distance transfer of Balkan flint into the Eastern

Carpathians region over 400 km by EUP foragers. The likely presence of Dniestr flint from the Ukraine in East Carpathian assemblages opens unforeseen research perspectives.

Geochemical sourcing of lithic artefacts from EUP archaeological sites located in Western Belgium (i.e. Grotte Walou, Goyet-upper rockshelter, Huccorgne) away from the primary raw material sources of the Mons Basin, have revealed long-term raw material transfers over 100 km. In Belgium, the identification of lithic raw materials is traditionally limited to macroscopic classification based on visual criteria. This is the first time that prehistoric raw material provenance in Belgium has been underpinned based on measurable geochemical signatures of the raw materials used in the Palaeolithic past.

The importance of chert or flint from secondary deposits (e.g. river gravels) in prehistoric forager raw material economies is generally taken for granted. Yet, most studies trace the origin of the lithic raw materials used in the Palaeolithic past by comparison with rocks from discrete geological formations and geographical localities sampled in primary context. In PALMOBI, the analysis of flint artifact surfaces complemented the geochemical approach in order to address the following question: How to best characterise the primary and secondary environments from which stones used by prehistoric foragers derive? Petrographical and geochemical analyses of geological flint samples of Campanian ""Obourg"" flint derived from ""clays with flint"" from the Mons Basin indicate that cortical, endocortical and internal zones result in distinct geochemical signatures based on LA-ICP-MS measurements. Most of all, our results indicate that that pre-depositional processes seem to have a negligible effect on the reliability of the geochemical fingerprint of the genetic flint type, as long as the internal zone of the sample (i.e. lithic artefact) is being measured.

MOBILITY COSTS

PALMOBI examined the predictive ability of the ""attractiveness of raw material sources"" with respect to terrain difficulty, energy expenditure and other independent variables to understand why some sources were used more than others using a resource selection model. Assuming that (a) present day raw material occurrences can serve as proxies for the prehistoric landscape, and (b) that the number of lithic artefacts found in a lithic assemblage positively correlates with the attractiveness of a source area, changing strategies for procuring and managing supplies of siliceous raw materials from different source locations can be addressed. Based on a Geographical information system (GIS)-driven multivariate modelling approach, first results indicate that terrain difficulty and mobility costs matter and have a better predictive ability than Euclidean distance alone to explain EUP assemblage variability."

Progress beyond the state of the art and expected potential impact (including the socio-economic impact and the wider societal implications of the project so far)

"While continental European Palaeolithic research is mainly concerned with origins, technological lineages, and culture history, PALMOBI assesses EUP hunter-gatherer mobility strategies and technological resilience in the face of variable raw material availability and accessibility. The methodological advances resulting from PALMOBI ultimately concern the resilience of technological behaviour in the face of climate change and the role of mobility in promoting social change.

Particularly, the evolutionary roots of non-egalitarian relationships and the various pathways that human societies have moved toward hierarchical structure and organisation are among the most interesting topics to be addressed through archaeological research. In January 2018, the fellow organised an international 'flagship' conference/workshop titled `Social Inequality before Farming?', held at the McDonald Institute for Archaeological Research. The conference brought together prehistoric archaeologists, cultural anthropologists and computational modellers to explore the processes that produce or lead a society away from egalitarianism and the way small-scale forager societies shape inequality.

The conference proceeding will be published in the brand new ""McDonald Monographs Conversations"" series, according to an Open-Access Gold policy. The conference volume will contribute to move research on social inequality and the variable socio-political organisation of pre-farming societies back to the centre of the archaeological agenda in European Palaeolithic research.
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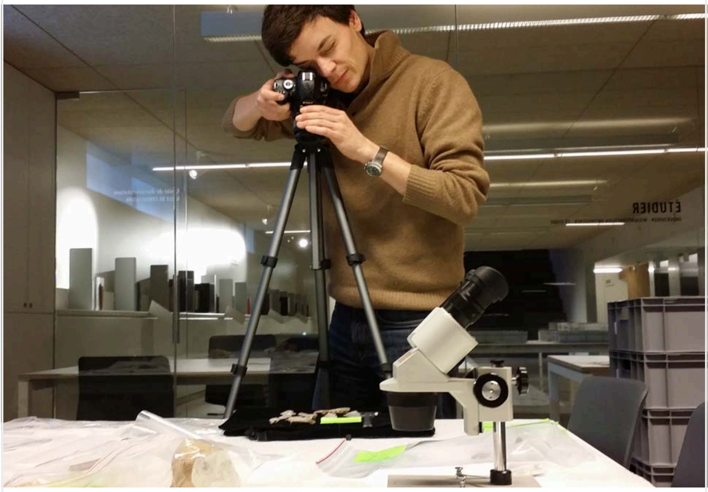

STUDY OF GROTTE WALOU COLLECTIONS AT PRÉHISTOMUSEUM (RAMIOUL, BELGIUM)

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