Geoarchaeology of agriculture – unravelling prehistoric anthropogenic environmental change in the loess zone in Silesia

The first communities of farmers migrated into Silesia (SW Poland) over 7 thousand years ago. As in neighbouring regions of Central Europe, these groups settled in areas with a loess substrate, introducing new ways of managing the landscape. The scale of prehistoric human impact on the environment in Silesia is largely unknown. Our project aims to investigate this subject using new paleoenvironmental data.

We suggest that the presence of fertile, chernozemic soils in the Silesian loess zone, was a key factor influencing the decision of Early Neolithic groups to settle in the region. Moreover, prehistoric agriculture governed both the persistence of chernozems in the warm Atlantic climatic period, as well as their subsequent degradation. To check these claims we plan to reconstruct the paleoenvironment, highlighting the scale and dynamics of human impact on the landscape (soils, forests, wetlands) from the Neolithic (late 6^{th} millennium BC) to the Early Medieval period (10^{th} century AD).

We will address questions related to human-environment interactions, in subsequent periods of prehistory: **1)** had fertile chernozemic soils formed in the Silesian loess zone naturally, in a forest-steppe environment before the 6^{th} mill. BC, influencing the extent of Early Neolithic settlement in the region, or **2)** did the first farmers influence the formation of these soils, by large-scale vegetation burning? **3)** did Neolithic people fertilize soils by adding animal manure? **4)** did mobile, pastoral lifestyles indeed gain dominance in certain periods of prehistory? **5)** do episodes of settlement intensification and decline, visible archaeologically between the Neolithic and Early Medieval times, correspond with increases and decreases of human impact on the environment? and **6)** when did beech-dominant forests spread in Silesia, and has this happened during episodes of settlement decline?

Similar problems are usually tackled in archaeology by studying sediment cores from lakes or wetlands, which preserve a record of past vegetation changes. Since the loess zone in SW Poland is devoid of such features, we will focus on organic (biogenic) and mineral (colluvial) layers deposited in closed depressions, numerous examples of which are located throughout the region. Initial research has shown that these organo-mineral sequences may be up to 4 metres thick, and contain vegetation and soil history spanning thousands of years.

Our research procedure is designed to detect changes in vegetation (also human-influenced) and climate, fire events, crop and animal husbandry, and episodes of soil erosion. We plan to investigate 4 selected closed depressions by extracting cores and sampling the peat/gytia and overlying colluvium for pollen, plant macroremains, physico-chemical, biomarker and micromorphological analyses, as well as ^{14}C and OSL dating. Soils in the immediate vicinity (on slopes) will also be characterized. To visualize the dynamics of past human activity, prehistoric settlements will be mapped in microregions surrounding the studied closed depressions.

Agriculture was a fundamental feature of prehistoric every-day life, however it remains understudied in archaeology. By delivering new paleoenvironmental data (currently critically lacking in Silesia), the project will result in a pioneering, in-depth model of human-environment relations, relevant for understanding the archaeological record in SW Poland and in neighboring European areas with a similar history of intensive settlement. This will exemplify the importance of archaeology (as a broad scientific approach) for showing how our ancestors shaped the landscape, and what consequences of these actions are visible today.