

Non-invasive documentation of buried archaeological landscapes

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Abstract

The future demands on professional archaeological prospection will be its ability to cover large areas in a time and cost efficient manner with very high spatial resolution and accuracy. The objective of the 2010 in Vienna established Ludwig Boltzmann Institute for Archaeological Prospection and Virtual Archaeology, in collaboration with its eight European partner organisations, is the advancement of the state-of-the-art. This goal will be achieved by focusing on the development of remote sensing, geophysical prospection and virtual reality applications. Main focus will be placed on novel integrated interpretation approaches combining cutting-edge near-surface prospection methods with advanced computer science.

Over the past decades landscape archaeology has increasingly gained importance. Despite a vast variety of approaches, a tacit agreement consists in the fact that landscape archaeologists are investigating beyond the individual site, dealing with space at different scales. This has led many archaeologists, but also preservationists, to enlarge their field of endeavour from individual sites towards entire archaeological landscapes.

In order to be able to protect archaeological landscapes, these have to be identified and documented, which for various reasons presents an archaeological challenge: The massive threat of destruction and deterioration of buried cultural heritage demands for fast, efficient and reliable methods for its identification, documentation and interpretation. At the same time, the European Convention on the Protection of the Archaeological Heritage (Valletta-Convention) states that non-destructive investigation methods should be applied wherever possible (ETS N143, article 3).

Therefore, large-scale applications of non-invasive archaeological prospection methods (e.g. aerial archaeology, airborne laser scanning (ALS) and all kinds of near-surface geophysical prospection) comprise a great potential. These methods offer the most appropriate solution in order to provide both landscape archaeologists and planning authorities with the necessary spatial information at multiple scales, ranging from the archaeological site to a complete archaeological landscape. However, scientific archaeological prospection requires the implementation and adherence to the highest technical standards in regard to instrumentation, spatial sampling intervals, positioning accuracy, data processing and visualization, as well as appropriate novel methodological concepts for the archaeological interpretation of individual

sites and archaeological landscapes. This requirement demands coordinated fundamental research aimed at the development and improvement of new ways to acquire the basic data sets, and to extract their archaeologically relevant information by means of well-thought, integrative interpretation tools.

The Ludwig Boltzmann Institute for Archaeological Prospection and Virtual Archaeology (LBIArchPro), founded in April 2010, is focusing on the necessary fundamental and applied research to develop remote sensing, geophysical prospection, Virtual Reality applications and novel integrated interpretation approaches dedicated to landscape archaeology. The LBI ArchPro is based in Vienna, but integrates a Europe-wide partner consortium, representing academic and research institutions, archaeological service providers, and governmental authorities from Austria, Germany, Great Britain, Norway, and Sweden. Its major objectives are

- 1) The development of novel methods, algorithms and software tools for the processing, digital GIS-based description and three-dimensional visualization of the huge amount of data collected.
- 2) Sophisticated processing of the airborne and geophysical data for subsequent integrated archaeological interpretation.
- 3) The development of an integrative GIS-based platform for researchers to manage and to collaborate on the huge and complex datasets covering archaeological landscapes.
- 4) Among these implementations, Virtual Reality will function as an important interface technology, making data and results graphically accessible to the scientific community and the public.

The research programme is focusing on the following programme lines: Archaeological Remote Sensing, Archaeological Geophysical Prospection and Archaeological Interpretation, Spatial Analysis & Virtual Archaeology.

Within the research programme, various geographical areas have been selected in order to provide different archaeological landscapes for distinct case studies. This includes Stonehenge (UK), Roman Carnuntum (A), Birka (S), Uppåkra (S), Gokstad (N) and Kaupang and its Hinterland (N). Here, all non-invasive, methods and techniques mentioned above will be combined, including remote sensing, geophysical prospection, Virtual Reality and dynamic GIS-based integrated archaeological interpretation. The proposed presentation will focus on these case-study areas and present the latest developments and results of the integrated prospection approach.

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