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Geophysical prospection on the Pâture du Couvent (Bibracte, France)

The campaign of 2014

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Abstract

This article investigates the usability of ground-penetrating radar and provides a report on the geophysical survey in the zone of the Pature du Couvent on the Mont Beuvray. In 2014 a large area was explored and this paper presents how the results could be related to the excavated archaeological structures.

Introduction

The cooperation between the Institute of Archaeological Sciences of the Eötvös Loránd University and the European Archaeological Centre started in 1988, and its aim was the research of the ancient site of Bibracte on the Mont Beuvray (France). The excavations were carried out with the leadership of Miklós Szabó in the central zone of the oppidum, at the so-called "Pâture du Couvent". The results of this long-time research has been published in numerous publications, of which the main road of the oppidum, the Late Augustean domus, and the earliest known Provincial basilica should be mentioned. Due to the complexity of the archaeological features and the high number of masonry structures, it seemed to be reasonable to carry out a new geophysical survey.

In the framework of this cooperation, we were invited to test our geophysical survey methods on the Mont Beuvray and in 2013 we have already tested geomagnetometry and ground-penetrating radar on the site. After the evaluation of our results from the previous year,⁴ we decided to focus our research to the southern zone of the Pature du Couvent. In 2014,⁵ the sole instrument we used was ground-penetrating radar and we had the opportunity

- 1 Timár Szabó Czajlik 2005.
- 2 See Szabó Тіма́r Szabó 2007 for further references.
- 3 For the earlier geophysical surveys see Czajlik et al. 2013, 124.
- 4 Czajlik et al. 2013; Timár et al. 2013
- 5 The funding of this project was provided by the Balaton program (2014).

to repeat the survey on the surfaces already investigated in 2013 but this time we could work on a fairly larger surface because the vegetation, an obstacle for the towed instrument, was meanwhile cleared. The test areas were large enough so we could change the direction of the survey (in the angle of roughly 45 degrees compared to the direction of the known walls), which contributes to the efficiency of the survey (*Fig. 1*).

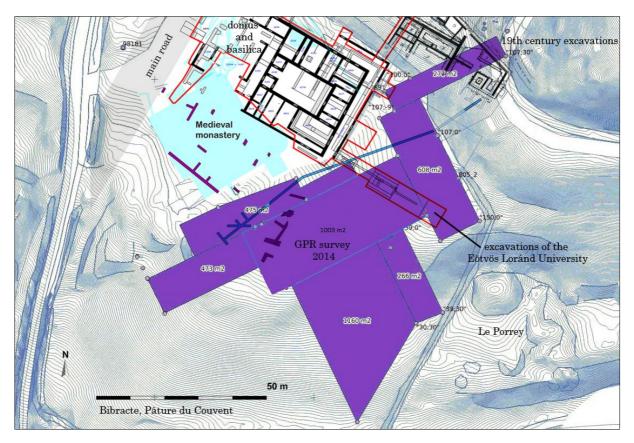


Fig. 1. Bibracte, Mont Beuvray. The surveyed area on the Pâture du Couvent, 2014.

The surveyed area of 4257 m² was divided to seven sectors, streching over the entire south-eastern part of the Ilot des Grandes Forges including the zone of the source, the modern and the ancient roads as well as the forest that limited this area. We have to remark that a part of the surface is rather steep which caused significant difficulties in carrying out the survey and in the data processing respectively.

Experimental protocol and equipment

The georadar device, type SIR-2000 made by Geophysical Survey Systems, was equipped with antennes for 150, 300 and 900 MHz. The distance between the measuring lines was 0,5 m and the displacement of the measuring points was 0,04 m along these lines. The meteorological conditions were less favourable compared to 2013, as there was no long drought period preceding the survey and it was raining on the last day of our campaign. Despite of these factors, the results proved to be quite useful with the exception of some small areas, for example the source and its surroundings. We discarded the unusable raw data from the concerned sectors' time slices, not just along the perimeter of the source but also at the trenches where the post-excavation banking up was inhomogenous.

The data processing followed a strict protocol of gain compensation, correction of the spheric divergency and absorption/attenuation, bandwidth and direction filtering and finally, migration of the data. We have to remark here that we developed a new software in 2014 for the data treatment which made possible to process the data from larger blocks with uniform parametrics.

Results

We have chosen two layers for the general evaluation: time slices at 35 and 45 ns. There were significantly different results on these time slices in 2013, apparently due to the soil conditions. The results of 2014 seem to be less divergent (Fig. 2-3).

Both images tell us about basically the same archaeological features. The most important changes in the patterns are located to the eastern and northern boundaries of the surveyed area, where the terrain is sloping. Based on these two images it was possible to make a compiled image.

The compiled image (Fig. 4) shows multiple signals which may refer to free standing buildings in the zone of the source (C). It is not sure whether the corner of the insula (A), explored in 2013,⁶ connects to a longer linear structure (possibly a wall) but it seems to be very likely. In the northern area of the surveyed zone, near the upper boundary of the terrace (D), the signals indicate intersecting walls and thus multiple archaeological phases.

In the zone halfway between the source and "Le Porrey" the signals clearly show a rectangular structure in both time slices. There is a broad strip around the hill where the signals were intensive but it is hard to come to any conclusion as to what type of structures are visible there (F).

East of the basilical complex there is an open area identified as forum (D).⁷ Although there was no possibility to fully excavate it, there was an opportunity to study some of its parts. Substantial pieces of masonry constructions survive and the GPR surveys of 2013 and 2014 revealed not only the continuation of the known walls but also a number of other walls. From the excavation, we know that these walls belong to a post-basilical period and therefore, they are contemporary to the domus.⁸

Conclusion and perspectives

The most important result in 2014 is the exploration of new walls or masonry structures on a relatively large surface. A part of the explored walls seem to have the same orientation as the known Antique buildings of the Ilot des Grandes forges, but without control excavations there is no possibility to decide if they belonged to the basilical period or the domus period. According to the intensive and lower time slices they might rather belong to the latter architectural phase.

In the zone of the monastery we could observe signals referring to a joining room with the same orientation as the standing vestiges, but as we move away from the excavated area we can not even risk to assign the explored structures to any of the archaeological periods.

⁶ Timár et al. 2013, 116.

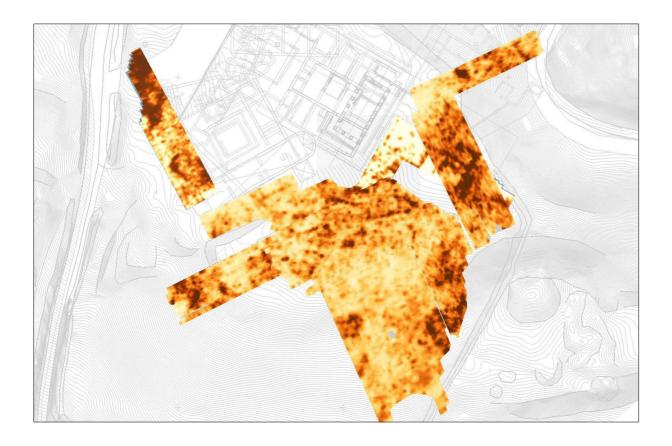
⁷ Szabó – Timár – Szabó 2007.

⁸ Szabó 2005, 123.

In the forthcoming year 2015 we plan to complete the coverage. We plan to survey the unexplored areas of the Ilot des Grandes forges and merge the new data with the results from 2013–2014 in order to carry out a complex evaluation.

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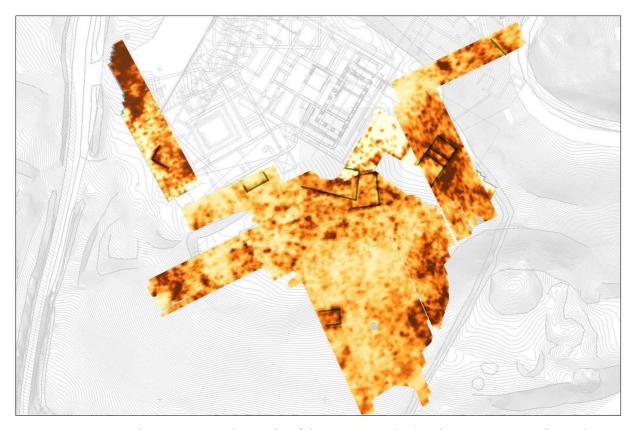
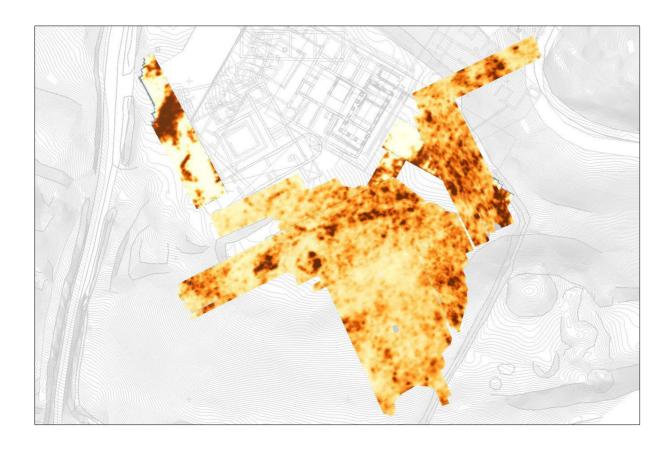


Fig. 2. La Pâture du Couvent. Graphic results of the GPR survey (top) and an interpretation (bottom), 2013-2014, constant time slice: $35~\rm ns$.



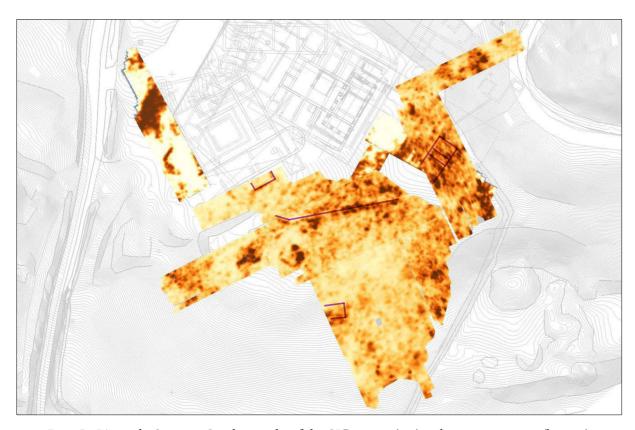


Fig. 3. La Pâture du Couvent. Graphic results of the GPR survey (top) and an interpretation (bottom), 2013-2014, constant time slice: 45 ns.

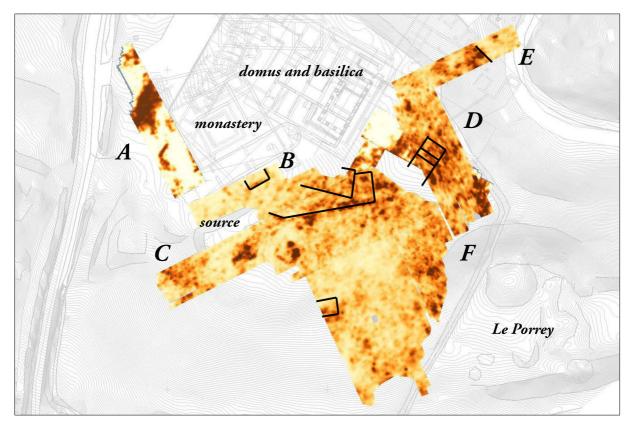


Fig. 4. La Pâture du Couvent. Graphic results of the GPR survey, 2013-2014, compiled interpretation.