

Analysis of the evolution of a Roman urban space by GPR survey

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Abstract

We identify the previous phases of a building by means of GPR of a Roman quarter. We analyze the data from excavations and geophysics in a complementary way to understand the evolution of an urban space.

Keywords

domestic space; gallo-roman site; GPR; urban space evolution; urbanism

Introduction

The site of Saint-Romain-en-Gal is located on the right bank of the river Rhône and is one of the districts of the ancient city of Vienne, located in the in the department Isère in France. The sinking of the river around the second century BC allowed for the development of a peri-urban sector relatively sheltered from the fluctuations of the Rhône. The first traces of occupation, in the form of rural occupation, date back to around 40 BC. A vast residential district then developed, but also commercial and artisanal sectors, as well as a vast monumental complex covering more than 8 ha. In just over two centuries, the plain of Saint-Romain-en-Gal therefore became a flourishing and dynamic peri-urban district. This exceptional dynamic was accompanied by ambitious development programs with a profound and sometimes rapid evolution of the urban space (Brissaud et al. 1995).

This evolution has been known at certain places on the site, where more or less extensive excavations have made it possible to propose partial restitutions of the previous states (Brissaud and Prisset 1995). These surveys made it possible to show the profound changes experienced in certain plots, whether in the spatial organization of private space or even in the change in function of some of these spaces.

The objective of the here presented geophysical archaeological prospecting was therefore to investigate areas already excavated in order to assess what information could contribute a GPR survey to understand the evolution of the urban space of Saint-Romain-en-Gal. For this, two sectors whose previous states are partially known by archaeological excavations (Prisset 2006), were tested in order to validate the results obtained with the radar and to assess the complementarity of the two approaches (Guarino 2018).

The first case study is focused on the last state of occupation of a house and a warehouse dated to the 2nd century AD. The first one, the *Maison de Sucellus*, is a domus of 1500 m² area, comprising a peristyle with three branches as well as a series of rooms whose function remains difficult to define because the remains have been leveled below the ground surface. However, we can identify the presence of a reception room overlooking a portico, which opened onto the garden with a rectangular basin with an apse. The second building, called the *Pillar Building*, is made up of a large courtyard framed by two rows of rooms. It is separated to the west from the *Maison de Sucellus* by a wide dividing wall. Excavations have shown that in the 1st century this same space was occupied by a single residence, the *Maison au Vivier*, located in the east-



Fig. 1: GPR survey in the rooms of the *Maison de Sucellus* at Saint-Romain-en-Gal (France). © C. Benech.

ern part with rooms organized around a large rectangular basin. The western part is occupied by the garden located 2 m below the house. This lower lying area was filled during the construction of the *Maison de Sucellus*.

The second case study concerns a space occupied in the last state of occupation by a market dated to the 2nd century AD. In the previous state, this space was occupied by a private house. Unlike the previous case, we therefore have a complete change of function between the two phases of occupations.

Materials and methods

Ground-penetrating radar prospecting was carried out using a Stream X multi-antenna radar array (IDS GeoRadar). It consists of 8 antennas spaced 12 cm apart, which allows for high-resolution recordings over a width of 72 cm in a single pass.

The nominal frequency of the antennas used is 200 MHz and the precise positioning of the measurements along a measurement profile is ensured by an RTK GNSS, which delivers an NMEA position string during the data acquisition. The data processing was carried out with the

GPR-SLICE software and the resulting data images were then repositioned in the overall plan of the site using the QGIS software.

The radar prospecting was carried out in each room of the two houses selected along parallel profiles with spacings following the size of the rooms in order to cover the maximum available surface which is already relatively small.

Results

In the first case study, GPR mapping made it possible to detect the major structural elements of the *Maison au Vivier*: the rectangular basin in particular, as well as the dividing wall between the dwelling and the garden appear clearly. The internal divisions of the rooms also appear, but some walls observed during excavation do not show up on the radar amplitude map. Some rooms are filled with soils that respond particularly well and make it possible to have a precise measurement of the levels of functioning, that corroborate those observed during excavation. Finally, certain linear elements appear in the zone occupied by the garden: they could be constructions or developments linked to the latter.



Fig. 2: GPR survey of the *Maison de Sucellus*: the main characteristics of the *Maison au Vivier* are visible.

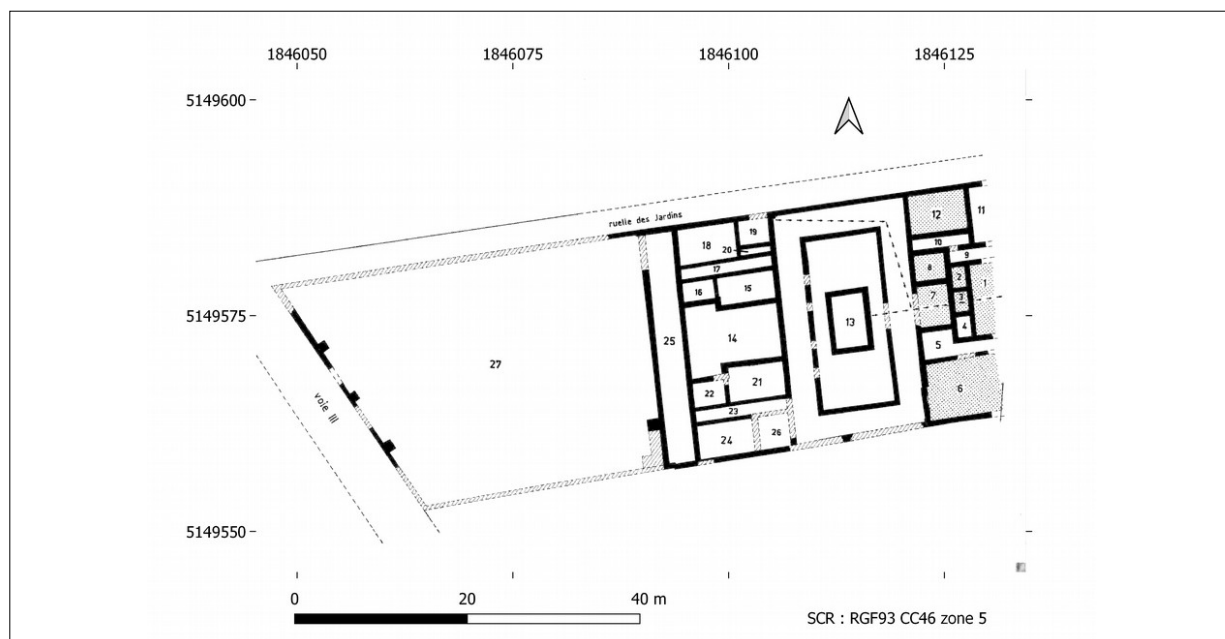


Fig. 3: Ground plan of the *Maison au Vivier*. DAO L. Brissaud.

In the second case, the results obtained are clearer for the southern and western parts of the house, where room divisions appear and complete those observed during the excavation. In the northern part, the division of rooms does not show up, perhaps because the walls were de-

stroyed during the construction of the market. If these have disappeared, it is possible that certain highly reflective zones indicate the presence of floor levels of rooms, whose shape would nevertheless provide information on the internal organization in this part of the house.

Discussion and conclusion

These first two GPR tests on already excavated areas of Gallo-Roman buildings have shown the potential of this type of approach. In the two cases studied, the systematic exploration of all the open areas of the last state of occupation made it possible to identify the major divisions of the internal space of the buildings. However, some divisions are not visible, probably due to their destruction during reconstructions or after the abandonment of the site. The foundations of the last occupation also sometimes rest on the walls of the previous building state. Finally, the identification of ground levels provides valuable information on the operating levels of previous phases. Certain characteristic elements of the Roman house, such as a peristyle or a reception room, can make it quite easy to identify whether it is a public space or a private dwelling. If these latter elements are not clearly apparent, as in the case of the market, this discrimination may be more difficult to make.

The perception of the previous building phases of an urban space is often relatively restricted by the reluctance to destroy the most recent levels, and therefore the best preserved, in order to understand the evolution of this space. This type of research is therefore often the subject of very specific archaeological surveys when it comes to protected sites. The contribution of geophysics therefore makes it possible to obtain a broader and complementary vision, which allows the researcher to orient the excavation according to the study objectives. Our study shows once again all the potential of a joint and reasoned use of excavation and geophysical prospecting. ■■■■

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