



## **LIDAR, geophysical and field surveys at Ancient Epomanduodurum site and its surrounding country (Doubs, Eastern France)**

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Integrated geophysical studies were carried out over several years, at Mandeure-Mathay (Franche-Comté Region, Eastern France) for the archaeological evaluation of ancient Epomanduodurum. The site is of major scientific interest to understand the territorial structure of earlier agglomerations in Eastern Gaul at the end of the Iron Age and during the Roman period. As regards its size, urban equipment, monuments and function, the ancient town is considered rating second behind the civitas capital of Sequani, Besançon-Vesontio. It is located in the Doubs valley, where the plain of Alsace opens into the marches of Burgundy, in a traffic zone between the Vosges and the Jura. This location allows transit between the Rhône valley and the Rhein plain, through the Saône and Doubs valleys. This geographical situation was a significant factor in the creation of the late Iron Age settlement, later to turn into a major Gallo-roman town. The whole site of the Ancient town includes urban centre and two artisan suburbs. The buried ruins stretch on more than 500 hectares outside and inside a meander of the Doubs River.

From the beginning of the survey, in 2001, high resolution and non invasive geophysical methods (magnetic mapping and Automatic Restivity Profiling (ARP) were performed on large scale, both on the terrace and in the floodplain). Excavations associated to geophysical prospection allow to produce a general plan of the Gallo roman structures and to reconstruct the settlement evolution.

While human occupation on open land is certified by a lot of indications, on the contrary, the forest-covered zones on table-land appear as less documented areas. The explanation is that some of the classic methods (such as aerial reconnaissance and field walking) are less efficient in the archaeological prospection of table-lands and hills, naturally marked by omnipresent forest.

In our new research program (LIEPPEC and PCR Mandeure, 2008-2010), it appears necessary to better understand the connections, both in time and in space, between human occupation and the surrounding region, not only at the Roman period and the late Iron Age, but also during prehistoric, medieval and modern periods. In that way, we have defined a square window of 80 km<sup>2</sup>, surrounding the Ancient site of Epomanduodurum

This study is based on the LIDAR (Light Detection And Ranging) technology, particularly adapted for the detection and location of cultural resources (ancient fields, buried structures, graves) in forested environment and a multi-data crossing, including:

- Geophysical prospecting (principally magnetic, electromagnetic and electric)
- Studies of ancient maps, plans (18th and 19th) and archaeological inventories in order to spot the location of vestiges and the utilisation of former soils
- Aerial and satellite picture analysis
- Field walking and metal detector prospection in order to precise micro topographic anomalies obtained by LiDAR survey.

We received first LiDAR results during August 2009 and the use of part of this data allows us to find new sites from different periods. We will present some results, mainly in an Ancient artisanal district built on a Latenian necropolis, on hilltop sites and also on mine plant.