Geophysical Survey: Hungarian National Museum Reveals Intriguing Data from Medieval Structure Hidden Underground

Overview

- Máté Stibrányi, PhD and Zsombor Klembala in collaboration with The Hungarian National Museum, investigated an unusually large ditch that had been identified on aerial imagery.
- GPR Slice software was used to analyze data from a previous ground penetrating radar (GPR) survey.
- After analyzing the results, the team uncovered some strange findings with excellent detail.

caption

The Hungarian National Museum, the leading archaeological institute in Hungary has its own Archaeological Prospection Department for non-invasive investigations all over the country. This department employs geophysicists, archaeologists, geologists, and GIS experts together to use geophysical and remote sensing methods exclusively for archaeological research.

Challenge

One of the team's most highlighted tasks is the identification of archaeological built heritage elements below ground. Everywhere in Hungary, there are potential foundations of historical buildings from the Roman era to the late medieval age; Roman villa sites and demolished medieval churches are all around the agricultural, usually heavily ploughed landscape.

These heritage elements hold significant value both on a national and on a local level. On one hand, these sites are a great archaeological risk for future infrastructural or industrial developments, because such still unknown sites can significantly hinder or even prevent any construction project. On the other hand, these places hold significant heritage value and are considered essential for culture, plus they serve as a cohesive force for local communities.

István Eke, a colleague of the local county museum, (Museum of Göcsej) raised awareness to the southern part of Esztergályhorváti (a little village near the western part of Lake Balaton in Hungary), at the western bank of river Zala, where they had come across an aerial imagery of a round ditch.

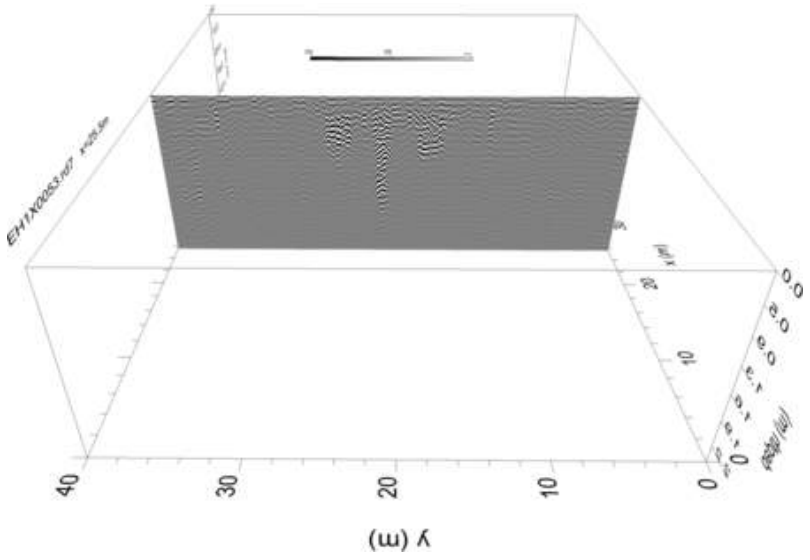
aerial imagery

Solution

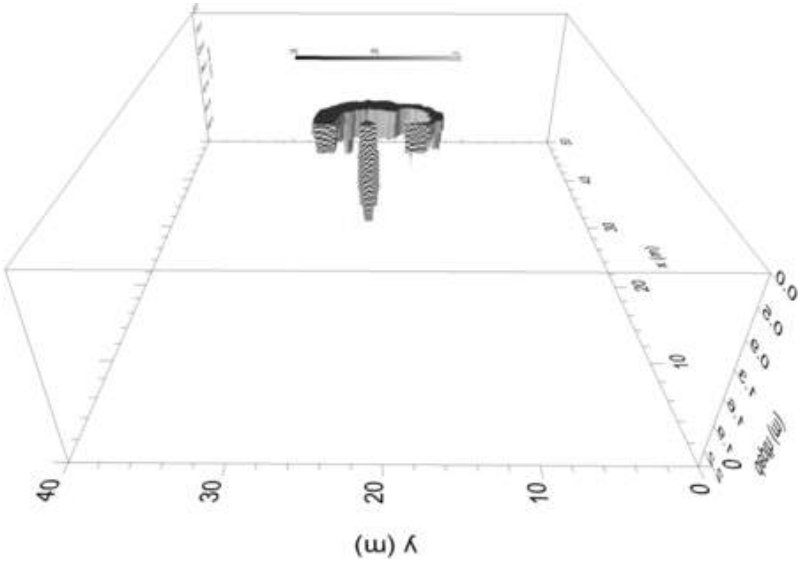
The next step was to conduct a GPR survey to gain deeper insights of the round ditch. The GPR data was then processed and visualised with GPR-Slice software. When surveying such heritage sites, even the smallest feature can have important meaning, so processing and visualising is just as important as the survey itself.

Results

Post-processing and visualizing the data with GPR Slice software revealed a peculiar round-shaped feature with an extension to the east. This is a well-known feature in medieval ecclesiastic research, it is called a rotunda church. These unusual churches were a common sight in the central part of Europe and dated from the 9th to the 13th century. However, this church has some strange features.

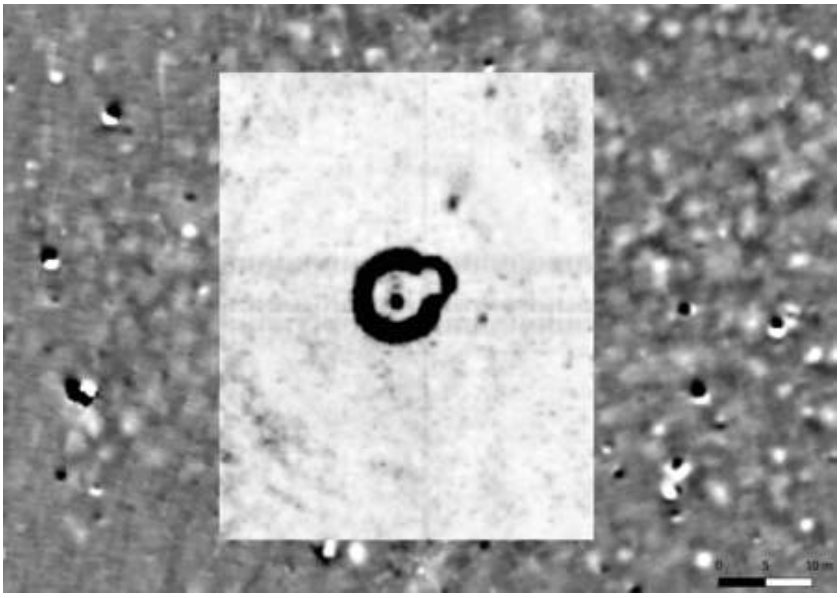


GPR Slice



GPR Slice

Apart from the large ditch around it – which is not a typical feature of these buildings – the middle of the church is also intriguing. Looking at the GPR data in detail, we can see a round feature at the middle of the church going much deeper than the foundations. As a matter of fact, it goes even deeper than the GPR's penetrating depth, at around 1.7 m.



caption

The team believes that this is a finely built stone well with brim, which is quite unusual within rotundas. Most likely it was used for baptism, but there has been no such features at other rotundas in Hungary that we know of.

A large well in the middle of a church indicates baptism, and as this was clearly a major feature in this church, it also indicates that large populations had to be baptised here during the construction of this building.

The data indicates the structure to be an early medieval church dated at the christening of the population and the surface finds around the site can also confirm this. Moreover, this site is very close (around 3 km) to Mosaburg (Zalavár), the easternmost centre of the Carolingian Empire at the 9th century, it may be even dated before the Hungarian occupation of Pannonia.

There has not been any excavation on the site, so there are still many questions unanswered, however this survey can present the possible details to guide future excavation if needed. Even without excavation, the team were able to understand much more about the site.

It must be emphasised that during this kind of survey, the team needed to identify as much detail as possible, because every detail can have a meaningful and unexpected archaeological significance. GPR Slice was the perfect way to analyze the GPR data in great detail. All in all, we can conclude that these methods open new opportunities for the exploration and presentation of Hungary's rich buried cultural heritage.

See more case studies with ground penetrating radar and GPR data post processing tips on our Tech Hub.