

GREEN VILLAGE
LEONARDO DA VINCI LIFELONG LEARNING PROGRAMME
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Our Sustainable Ancestors

Geophysical Survey and Training Action

Na Vrsku, Sahy, Slovakia
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Summary

This fieldwork took place between 16th and 22nd June 2011 as part of the Leonardo da Vinci 'Green Village' project. The survey was led by Mark Graham and Joanne Wilkinson of Grampus Heritage and Training Ltd. The aim was to test the geophysical survey technique of magnetometry in southern Slovakia and investigate the potential of the method to increase our understanding of known historic sites in the region. We also hoped to demonstrate the potential to discover new, previously unknown archaeological sites.

The survey area was concentrated on a small hill overlooking the town of Sahy, to the south of an ongoing bronze age 'Hatvan' culture excavation site. The aim was to see if the Hatvan finds and features discovered during the excavation were part of a much larger area of settlement extending to the summit of the hill.

Working with a group of vocational trainees and with local archaeologists, the survey revealed the clear layout of a sub-circular double ditched enclosure measuring around 70m east/west axis and 50m north/south axis (internal measurements). This newly discovered enclosure occupies the summit of the hill, and has a clearly defined entrance to the East. The enclosure is bounded to the south by a very steep escarpment and may have been positioned to benefit from this natural strategically defensible position. This enclosure is not visible at all above-ground and has not been identified or photographed from the air.

The success and clarity of the survey data demonstrates the potential for archaeological geophysics in this region to greatly increase understanding of the formation of the historic landscape. The survey was conducted prior to the main Green Village action in Slovakia in order to ensure that data was available before the excavation began. This report serves as an annex to the main Slovakian 'Our Sustainable Ancestors' action report.

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1.0 Project Background and Research Aims

As part of the ‘our sustainable ancestors’ action in Slovakia, archaeological geophysics was used in an attempt to increase understanding of the nature of early settlement in the Sahy region of Slovakia. The Green Village project provided, not only the opportunity to try this survey technique in the Sahy region, but also to provide training for students and local archaeologists in magnetometry.

The site chosen for this trial survey is a small hill to the north of the town of Sahy known locally as Na Vrsku. Recent excavations have revealed evidence of bronze-age occupation on the hill and it was hoped that geophysical survey could place this activity with a broader context. In particular, it was hoped that the bronze-age excavation may be investigating a small part of a much larger settlement which utilised the summit of the hill.



Above Left: ‘Recycled’ ceramic spindle whorl from Na Vrsku excavations

Above Right: One of several broken animal figurines from the Na Vrsku Hatvan Culture excavations.

The site of Na Vrsku, Sahy is a settlement that was part of the Hatvan Culture. This culture belonged to the Early Bronze Age covering the area of modern Slovakia and Western Hungary. The culture name derived from the large habitation site of Hatvan in northern Hungary and dates from around 1800BC.

The Hatvan sites are usually situated on hilltops, with extra fortification provided by surrounding ditches. Hatvan cemeteries usually consist of cremations buried in urns, though some cremations have been found buried in a pits without the urn. Barrow cemeteries are usually situated away from the settlement, often physically separated by a geographical feature, such as a river or valley. The artefactual record for the Hatvan culture is strongly represented by ceramics. At the Hatvan site in Hungary, broom-brushed and textile-pressed pottery were found along with ceramic animals. There are also clay models of spoked wheels and vehicles as well as thick walled pottery.

The excavation site at Na Vrsku was discovered in 2005 during construction works for a factory by a German company. Archaeological investigation was carried out by means of test trenching. A trench that was excavated for a gas pipeline revealed a charcoal rich spread. As a result of this, the area was stripped of topsoil and an open area excavation started.



Above: Blade from bronze dagger discovered during excavations at Na Vrsku

This geophysical Research was funded within the ‘Sustainable Ancestors’ theme of the European Leonardo da Vinci funded ‘Green Village’ centralized measure project. The aim of the fieldwork was to test the viability of the technique of magnetometry in the region and to place the excavations at Na Vrsku in a broader landscape context.

It was of particular interest to cover the summit of the hill in the survey, to see if the Na Vrsku excavations had revealed part of a much larger area of occupation. As this was a trial survey, a successful result could lead to future research using geophysical techniques on similar sites in the region.

2.0 Fieldwork Methodology

Magnetometry survey uses sensitive gradiometer instruments to measure the slight changes in the earth’s magnetic field, detectable at the surface, which arise from human occupation on archaeological sites. Typical archaeological features which may be detected through magnetometry include building foundations, pits, postholes, hearths, ditches and trackways.

To conduct the survey a grid must be established on the site and physically marked on the ground. The gradiometers must then be carried systematically across the grid in set traverses, automatically logging the magnetic field every 0.25m as they are carried. In this way, a magnetic map of a site can be built up and displayed in greyscale plan to show the changing magnetic field. If the background magnetism of a site is stable enough, and metal contamination is not a problem, then archaeological anomalies may be detected and interpreted in the collected data.

A magnetometer survey was carried out on the high point of the field to the south of the established excavation site. The survey was conducted using a geoscan FM256 dual fluxgate gradiometer system, with data processed using Geoscan’s Geoplot 3 software. All of the fieldwork was carried out by Grampus staff and by IVT trainees. Data was downloaded on-site using a laptop computer, which enabled trainees to see the results of the squares they had surveyed. This enabled all participants to engage in continuous discussion and interpretation of the anomalies being discovered.



IVT students Faith Fairbairn and Marc Major conduct geophysical survey in Slovakia

A 20 X 20m grid was established across the site using handtapes. The survey was conducted at the following resolution: 0.1nT readings, traverse interval 0.5m, readings taken every 0.25m in the traverse direction. The final results will be georeferenced within local map data using hand measurements to plot the grid position in association with field boundaries. This will be completed when we receive map data from our partners.

3.0 Results

The results of the survey are shown in figures 1, 2 and 3 at the end of this report. The survey reveals a clearly defined sub-circular enclosure on the summit of the hill. The plots shown in figures one and two are only geophysical data and do not contain interpretation. The anomalies are interpreted in figure 3. The enclosure is defined as 2 concentric broad rings which are interpreted as an inner and outer ditch, with a third ditch in the west, possibly forming part of a defended entrance into the enclosure. The fill of the broad outer ditch has a stronger magnetic signal than the surrounding natural undisturbed soil and is shown in the plots as a darker (positive) feature. This is shown in brown in figure 3. The third outer ditch is shown in light purple in figure 3.

The inner ditch (green in figure 3) also has a stronger positive signal than the surrounding natural soil into which it has been cut. The inner ditch is narrower and more defined than the broad outer ditch. The inner ditch also has a clear entrance to the east which is flanked by 2 large pits or postholes in the ditch termini (red in figure 3). This could represent a gate structure at the entrance of the enclosure and could also suggest that the narrower inner 'ditch' is a palisade trench rather than defensive ditch. Carefully targeted excavation will be required to determine the exact nature of these defences.

The only visible entrance in the inner ditch is clearly shown in the east of the site, however the triple ditch arrangement in the west of the enclosure strongly suggests a defended entrance on this side of the feature. Why else construct a triple ditch defensive system only on this side? It is possible therefore that the enclosure was entered through the triple ditch arrangement in the west, before walking around the north of the enclosure between the outer and inner double-ditch, and finally entering the enclosure through the gated entrance in the east. This argument is strengthened by the lack of a break in the outer ditch in the east, immediately opposite the inner entrance.

Figure 1 shows the data in raw form. This means that some dark and light striping is still present running left to right across the image. This traverse striping can be 'processed-out' using the zero mean traverse software in the Geoplot 3 programme. Although it is always good practice to present raw unprocessed data with any geophysical survey report, in this case the raw data plot is extremely significant.

Figure 2 shows the processed data plot, where the traverse striping has been processed out following usual procedure. The processing of data aims to create a uniform image and make archaeological anomalies clear from the general background disturbance. When comparing plots 1(raw) and 2(processed), the reader will notice that the signal of the outer ditch almost disappears in figure 2 in the lower part (north) but is clearly continuous in the raw data (Fig 1). This serves as a good lesson to always consider raw data before interpreting survey data. In trying to create a smooth image and remove the traverse striping, the software zero function has actually erased a significant part of the archaeological anomaly.

Several pits are visible inside of the enclosure highlighted in green in figure 3. There are also several bipolar anomalies and one dipolar anomaly which are shown in yellow in figure 3 and give a strong positive/negative (black/white) signal in the survey data. These are likely to be metal objects giving iron spikes, but may also be thermoremnant anomalies. Iron spikes should be treated with caution during any excavation on the site, due to the high potential for munitions following the fighting in the region during the 2nd World War. Thermoremnant anomalies arise from areas of burning such as hearths or kilns. The pits show only as black (positive) anomalies and appear to form a structure and alignment in the centre of the enclosure (blue and purple lines in Fig 3).

A gas main to the north of the survey area crosses the survey plot and shows as a strong black and white stripe. Plough striping can also be seen in the general background of the plot running from north east to south west. The excavation site at Na Vrsku lies just outside of the survey area in the lower right of the plot.

4.0 Conclusion

The survey data reveals an incredibly clear enclosure with internal features. Nevertheless, dating of this enclosure and interpretation of function is extremely difficult without excavation. Perhaps the most striking result of the survey is that the newly discovered enclosure has no obvious connection with the ongoing Bronze Age excavation site. There are no trackways or features between the two sites and the land between the excavation and the enclosure ditch appears to be uniform and undisturbed apart from plough striping.

Local archaeologist Mr Tibor Palinkas has carried out fieldwalking on the site and has recovered both Bronze Age and Medieval ceramics from the area. It is not possible to offer a definitive date for this enclosure without excavation and recovery of artefacts from sealed contexts within the internal features and/or ditches.

It is beyond the scope of the Green Village project to undertake detailed comparative analysis of this site with other enclosures in southern Slovakia and Northern Hungary. This survey report and geophysical data is given to our partners in Sahy in the hope that they may carry out such comparative research in the future.

The clarity of these survey results and the identification of a previously unknown hilltop enclosure during this trial project create a strong argument for the development of a more comprehensive programme of geophysical survey in the region. This period of fieldwork has demonstrated the suitability and potential for the techniques to greatly increase our understanding of the historic landscape. There are many other sites in the region to which geophysical survey methods could be applied and which could yield equally spectacular results if a structured research project were to be developed.

5.0 Recommendations and Future Work

1. Excavation at Na Vrsku to understand date and function of the enclosure. Three excavation trenches are recommended to investigate the double-ditches to the south, the 'entrance' in the east and the internal pits/postholes.
2. Protection of the site. The hilltop enclosure clearly represents a near-intact archaeological feature of great significance within the landscape. Although likely to be damaged already through ploughing of the site, it is strongly recommended that further agricultural or development activity on the site be carefully monitored. Archaeological work should be carried out at the site prior to any potentially damaging groundwork.
3. Structured research Programme. Grampus would gladly work with regional archaeologists to develop a structured research programme in the region. The broader application of geophysical survey techniques, within a predefined landscape research area, has the potential to dramatically increase our understanding of the patterns and frequency of settlement sites. Such a project would transform our understanding of the historic landscape.





