



Geophysical Survey Of KATARINKA ABBEY (Part 1)

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Fig.1 Visible wall structures of the monastery

Introduction

During the International Course on ArchaeoGeophysics INCA 2009 in Mojmirovce Slovakia, ruins of Abbey of Saint Catherine (founded in 1618) near village Dechtice have been investigated (Fig.2). In the vicinity of the excavated and visible ruins, several methods were used to investigate the surroundings of church in order to find the buried ruins of buildings and remnants of caverns. The Abbey is located on the hills of Male Karpaty Mountains, GPS coordinates: 48°33'19.67" N 17°32'9.49" E. Nowadays only the church and the southern part of monastery walls are visible (Fig.1) but from the written sources the monastery was supposed to have surrounding chapels and a cavern under the presbytery (Herceg and Kvetanova, 2009, oral communication).



4-Sensor Fluxgate-Array and GPR 500 MHz antenna



Single-Fluxgate and GPR 400 MHz antenna



Gravity- and Resistivity-Measuring

Abstract

To find ruins of buildings on an archaeological site in Katarinka, measurements were done on designed areas. All methods proved useful in some locations. Best results were achieved using the radar in comparison with the magnetic method. Also the combination of gravimeter and radionuclide investigation was successful.



Fig.2 Location of Katarinka in Slovakia (red dot)

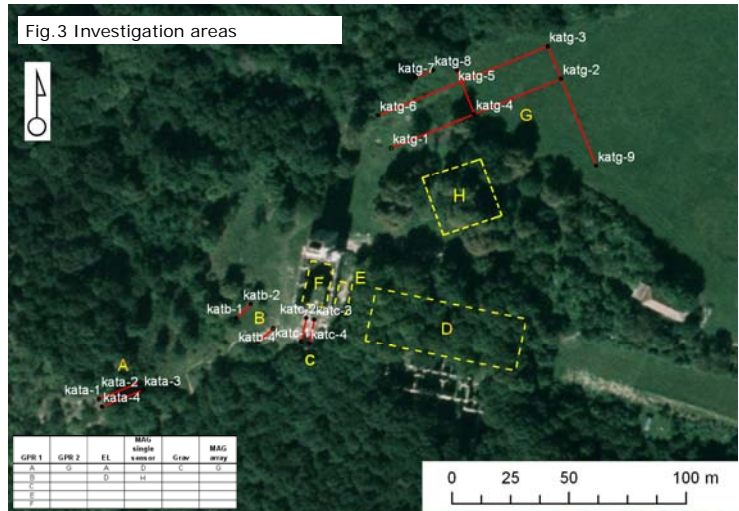


Fig.3 Investigation areas

Measurement areas, Methods and instruments

The place around the church was divided into several areas A–H as seen in Fig.3. Each place was measured with different method according to expected type of structures (table in Fig.3).

To find the ruins of walls, several methods were used:

Ground penetrating radar (GPR) with the electromagnetic waves using frequencies of 200 MHz, 400 MHz and 500 MHz was used because the reflections from the top of the ruins were expected. Instrument: Geophysical Survey System, Inc. GSSI SIR20.

Magnetic (MAG) method was used because the remnants of walls create a magnetic anomaly in the surrounding low-magnetic hill sediments. Instruments: Gradiometer Bartington Grad 601 and Array of 4 sensors Sensys CON650.

Geoelectric Resistivity (EL) method was used because of the expected differences of sediment and ruins resistivities. Instrument: Geo Server Resecs RES6P.

In order to find the caverns, empty or filled with unconsolidated sediments, the Gravimetric method (GRAV) was used, because of the difference in gravity that is caused by lower mass of the filling in the cavern. Instrument: Scintrex CG5.

Radionuclide measurements - Gamma-Ray Scintillation (GAMMA) were done in the presbytery, because of lower radioactivity of free air or unconsolidated sediments. Instrument: Rom-Elektronik MedCont with 3x3 inch NaI(Tl) crystal.

Geophysical Survey Of KATARINKA ABBEY (Part 2)

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Results

Gravimetric and radionuclide measurement in the church showed some anomalies of unknown origin. Cavern was not found, area C (Fig.4).

Geoelectric resistivity together with the magnetic method showed the position of monastery's walls, area D (Fig.5).

Magnetic method in area H did not reveal anything new, only confirmed results from previous measurements as it covered some parts of it. The sediments are homogenous with 2 anomalies that are not related to buildings, (Fig.7).

GPR in area E and F detected according to assumptions the base of the walls of monastery. Old ruins were confirmed in the central part of presbytery (Fig.7,8). Results from the areas A and B were inconclusive. Area C correlated with GRAV and GAMMA (Fig.4).

GPR and MAG in area G correlated very well together and showed the position of the walls together with the rubble around them (Fig 6). In this case, these two methods did not confirm the expectations about chapel's location.

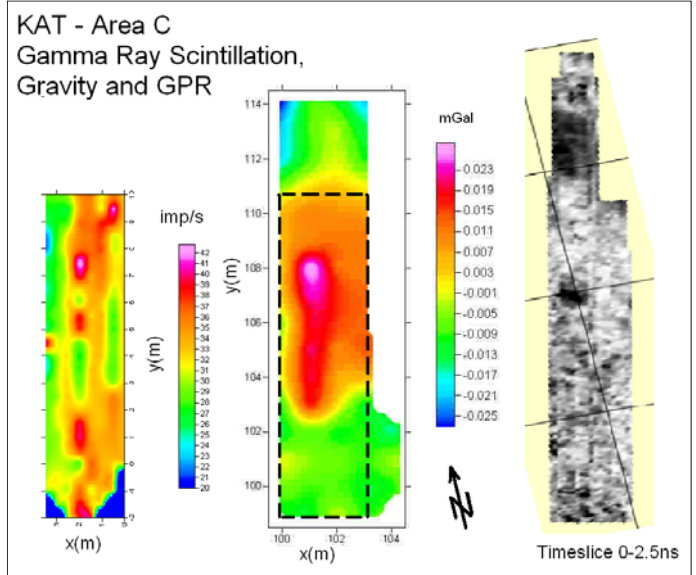


Fig.4 Comparison of GAMMA, GRAV and GPR in the church

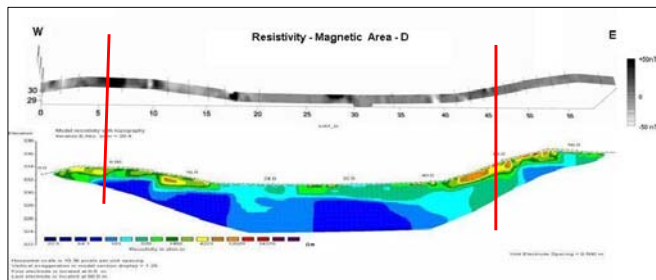


Fig.5 Comparison of MAG and EL east of the church

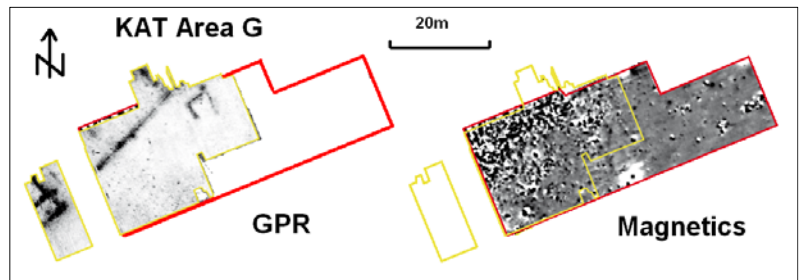


Fig.6 Comparison of GPR and MAG northeast of the church

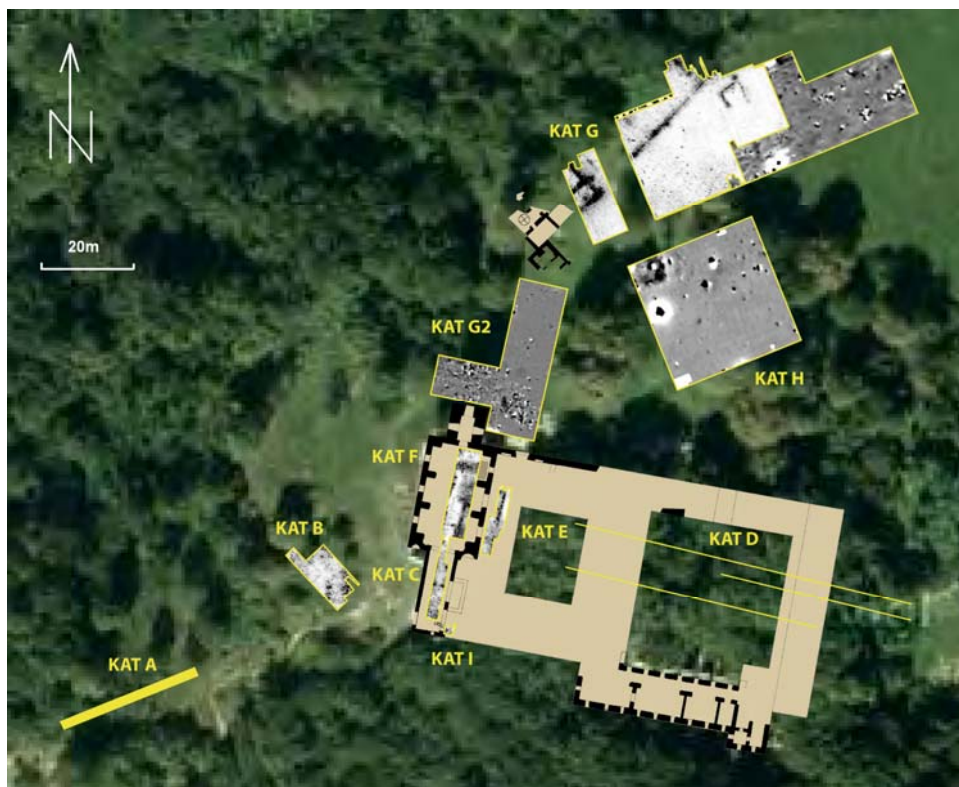


Fig.7 Final results combined with reconstructed footprint of the monastery

Conclusion

The best method for locating stone-foundations of buildings is the GPR. For finding cavities and filled caverns the GRAV method is very useful. Good results for finding the walls in areas with difficult terrain achieved EL together with MAG. On its own, only the GPR method can be used,

but only for the walls outside any structure.

Radionuclide methods should be used with other methods, especially for the archaeological measurements. MAG methods are good for finding separate anomalies, but only excavations could confirm the interpretation.

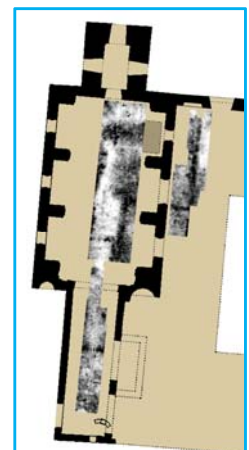


Fig.8 Detail of Fig.7: Timeslice 20 ns