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USE OF GEOMATIC METHODS FOR FINDING AND DOCUMENTING HISTORICAL ARTILLERY REDOUBTS

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Introduction

One of the last important battles of the finishing Thirty Years' War took place at Třebel at the end of August 1647. After the conquest of the town of Cheb, Swedish troops led by Gen. Carl Gustav Wrangel moved to the south to the area near the town of Stříbro in July 1647 and attacked Třebel. The Imperial garrison successfully defended it, thus the Swedes retreated to the eastern bank of the Michelsberský/ /Kosí Stream, where their headquarters was. The large clash finally happened three days later, on 22 August, and the Swedish troops pulled back over the Šumava mountains to the German side. The battle is thoroughly documented in a pair of engravings constituting a part of a detailed report on the Swedish campaigns in Bohemia of the end of the Thirty Years' War in 1647. The report was published in an extensive journalistic work, Theatrum Europaeum, issued by the Frankfurt engraver and publisher Matthäus Merian (1593–1650) since 1633.

Fig. 1: Engraving of the 1647 battlefield near Třebel (the scene dated of August 19th)

Research

In the area of Třebel, systematic archaeological research took place between 1988–90 and 1999–2004. The research also included criticism and confrontation of the engravings with a simple in-field comparison, where battles from several other localities were processed. The survey of the Thirty-Years-War relic of interest is closely related to the earlier published research of the Třebel battlefield, which continues on several locations around the then battlefield, introduces new geospatial methods and puts them in place. The engraving of the state to 19th August 1647 with dimensions of 357 to 240 mm depicts an area of ca 11.5 to 7 km (ca 82 square kilometres), in an oblique view from north-west to south-east. It was published in Volume VI of Theatrum Europaeum as well as the engraving of the state to 22th August 1647 which depicts a much smaller area of ca 20 square kilometres, in an oblique view from the west.

Acknowledgements

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Results

The site was gauged by the RPAS method. The output represents a detailed orthophoto and a digital surface model that give the ability to detect field signs of building relics. A magnetometer was used for additional measurements. The scanning of the RPAS eBee was performed by a camera that records in visible and also in infrared spectrum. The processing took place in the Agisoft PhotoScan Professional software where an orthophoto and a digital surface model were acquired as outputs. Consequent data processing was also performed in ArcGIS software. A digital surface model (DSM) has been computed as a shaded relief (hillshading) to show the current state and differential DSM. Processed magnetometric measurements were displayed as a hypsometric chart of magnetic anomalies and a magnetic field gradient where a simple prediction kriging was also used to render.

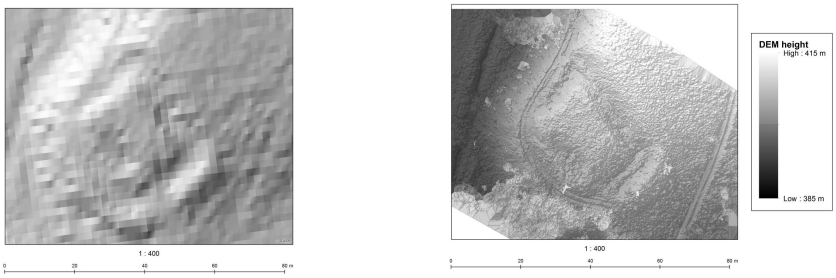

Fig. 2: Hill Shaded Terrain Model: COSMC – image service (left) and derived from RPAS

Fig. 3: Orthophoto of COSMC (left) and derived from RPAS

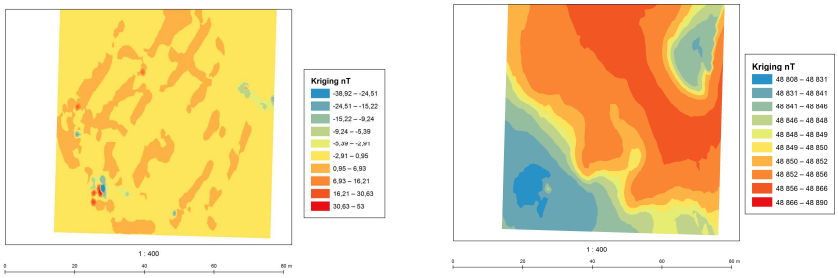

Fig. 4: Magnetometric data interpolation using kriging method for magnetic field intensity (left) and for gradient of magnetic field intensity

Conclusion

The article presents detailed documentation of a probable redoubt by means of RPAS and a magnetometer. Both technologies confirm the presence of an object. The redoubt outline is also visible in a shaded-relief terrain model (available at the Czech Office for Surveying, Mapping and Cadastre). The RPAS technology, combined with geophysical devices, enables documenting and confirming the presence of archaeological objects. By combining these technologies, we confirm the finding of the archaeological object and thus it is possible to detect their subsurface structure. The combination of mentioned methods seems to be an appropriate alternative when considering cost / work / performance ratio.