

When a historical map comes back to life: The Janovice Estate (1759) in a digital environment

Jakub Miřijovský^a, Karel Macků^a, Stanislav Popelka^{a*}

^a Department of Geoinformatics, Palacký University Olomouc, Czechia – jakub.mirijovsky@upol.cz

* Corresponding author

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Abstract:

The map of the Janovice estate represents an exceptionally valuable cartographic source documenting the landscape of northern Moravia during the peak of mining activity. The area includes, among others, the Horní Město ore district, an important historical center for the extraction and processing of gold, polymetallic, and iron ores. This region has long been of interest to mining archaeology, which focuses on identifying relics of historical mining, vanished technical structures, and transformations of the cultural landscape.

The map itself was created in 1759 in response to the reorganization of land ownership within the Janovice estate. It consists of a set of 32 map sheets measuring approximately 146 × 104 cm, mounted on paper and attached to a wooden frame. For a long time, it was stored in the Central Depository of the National Heritage Institute in Kutná Hora, which significantly limited its accessibility for research.

The aim of this paper is to present the process of comprehensive digitization of this unique cartographic work and its publication as a georeferenced web-based map layer usable for historical-geographical and archaeological research. The workflow involved several successive stages: photographic capture of individual map panels, post-processing and compositing, georeferencing, and final web publication.

Due to the high demands on output resolution, each panel was captured as a set of three overlapping photographs using a full-frame Sony Alpha 7M4 camera with a Sigma 85 mm lens, which minimizes optical distortion. Emphasis was placed on eliminating perspective deformation and ensuring uniform lighting conditions using an external flash system. Images were captured in RAW format to preserve maximum data quality.

Post-processing was carried out in Adobe Photoshop and included color correction, exposure balancing, and the assembly of image triplets into final panels. Both automated and manual stitching techniques were used, including local transformations and retouching of transition zones. The result was a set of lossless raster files in TIFF format.

Georeferencing was performed in ArcGIS Pro using identical control points between the historical map and the Imperial Imprints of the Stable Cadastre. Despite the temporal gap between these map sources, a sufficient number of stable features, such as settlements, roads, and prominent terrain elements, were identified. A polynomial transformation was applied to account for the geometric distortions of the historical original.

The final georeferenced raster was optimized for web use using MapTiler's tile-based system and published with the OpenLayers library. The web application allows overlay visualization with additional thematic layers, particularly the Imperial Imprints of the Stable Cadastre, the Third Military Survey, the current cadastral map, and a terrain model (Figure 1). Adjustable transparency enables detailed comparative analysis of historical and contemporary landscapes. The map is publicly available at <https://zamkyvkrajine.cz/mapa-janovickeho-panstvi/>.

The digitized map provides archaeologists and historians with a unique tool for identifying previously unknown toponyms, locating vanished structures and technical facilities such as mills, forges, and smelters, and refining the interpretation of mining-related relics in the field (Figure 2). From a cartographic perspective, the contribution also lies in the methodological process of digitizing a large and physically challenging map that could not be scanned conventionally and required contactless photographic documentation, subsequent compositing, and georeferencing.

A significant challenge was also the placement of a historical map lacking precise mathematical foundations into a geographic coordinate system. The resulting web map is therefore not only a presentation output but, above all, a valuable analytical tool that makes this unique source accessible to the scholarly community online. Through integration

with other historical map layers, especially the Stable Cadastre and the Third Military Survey, it enables a comprehensive study of landscape evolution and significantly expands possibilities for further research on the historical landscape of the Horní Město region.



Figure 1. The example of the publicly available nap of the Janovice Estate.



Figure 2. Details of the nap of the Janovice Estate.

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