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Cartographic heritage of the Habsburg Empire on the web: the MAPIRE initiative

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Summary: After years of successful publication of the cartographic database of the First, Second and Third Military Surveys of the Hungarian part of the Habsburg Empire on off-line DVDs, a consortium of data hosts, a SME and a university department started an initiative. In the frame of the MAPIRE (MAPs of the emPIRE) project, geo-referred version of high-scale (1:28800 in case of First and Second survey, 1:75000 at the Third one, to be improved later) survey sheets of the whole territory of the Habsburg Empire are published online, throughout of the portal www.mapire.eu. The horizontal control of the geo-referred maps is aimed better than 150 meters; sheets can be viewed in synchronized mode with each other or with the Google Maps cartographic database (base topographic map or satellite images). The whole database can be viewed also in 3D via a Google Earth application, as the space shuttle-based SRTM elevation dataset is combined to the historic cartographic dataset throughout the unified coordinate systems. The software background is ready to publish other maps, too: our future plans concern the cadastral datasets of the Empire as well as 'foreign' databases.

Introduction

The Hungarian SME Arcanum Database Ltd., cooperating with several data hosts and scientific partners published a lot of DVD issues in the last decade (Timár et al., 2011). These publications cover the whole spectrum of the Habsburg military surveys of the Hungarian part of the Habsburg Empire (historical Hungary, Transylvania, Croatia). Map sheets from the Austrian State Archives and the Map Archive of the Hungarian Institute and Museum of Military History were scanned and georeferred (Timár et al., 2006; 2007; 2008; Biszak et al., 2007a; 2007b). The users are able to roam and zoom the mosaic of the original sheets as well as to export the selected map content to files for offline GIS use. Part of this data (namely the Hungarian part of the Second Military Survey) was published online via the website of the Arcanum, and it quickly became popular in the public, having several feedbacks even in the mainstream media.

In the last year, the Arcanum, the existing and the possible data owners and the cooperating

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university department decided to make an initiative. We started to build a website to publish all of the available sheets of the Habsburg military surveys, covering the whole Empire. The georeferenced mosaics are shown on OpenStreetMaps and Google Earth backgrounds and can be also coupled to each other to bring a kind of 'time machine' to the users. This initiative is called 'MAPIRE', after the "historic MAPs of Habsburg EpilRE". The present account shows the scientific, technical and also the legal background of the initiative.

Scientific background

An important issue 'below the engine cover' is the georeference. All scanned image data is provided map grid coordinates in coordinate systems well defined in GIS environment. The basic procedure used is the 'four point method', where the four corner points of the scanned sheets are used for ground control points, with grid definitions and their exact theoretical location in the sheet mosaic with respect to the projection center. It was used for the Second Military Survey, where the coordinate systems were modelled by Cassini grids (Timár et al., 2006) and also for the Third Military Survey, where the original polyhedric projection was substituted by sinusoid ones for each sheet column (Molnár & Timár, 2009). For the First Survey, a quadratic fit was used for each provinces by cca. 50 local control points, e.g. churches, road crossings and bridges. Now, as a part of the MAPIRE, the First Survey georeference is improved by the GSB technology (Molnár & Timár, 2011), which procedure is described in the present volume by Molnár et al. (this volume).

As the abovementioned four corner method resulted less reliable horizontal control in the SE part of the historical Hungary (the Banat region) it was corrected by the GSB grid also in case of the Second Military Survey. Thus, the accuracy of the georeference of all presented product is better than 200 meters, however in most part of the mapper area it is below 50 meters.

Technical background

The map sheets were scanned at the location of the data providers/owners, as the transportation of the scanner provided more security for the unreplaceable original map material. The scanning resolution was 300 dpi originally, however the pixel resolution of the published maps are 150 dpi (cca. 5 meters per pixel for the 1:28,800 scale of the First and the Second Surveys). In the DVDs, compression ration of 1:20 was used for the ECW datasets, in case of the online MAPIRE, it is also improved.

The map files are no longer at the Arcanum site. Technically they are uploaded to the Amazon Cloud servers, which is available for moderate fee, thus the costs of the continuous technical guard can be decreased.

The current version of MAPIRE enables the user to roam and zoom of the different time layers (at the moment, the three military surveys, from the late 18th, early 19th and late 19th centuries, Fig 1, 2). Viewing the data can be done in 2D with OpenStreetMap (Fig 3, 4) background and also in 3D, using the Google Earth applet (Fig. 5). The possibility of direct data download is not planned at the moment, as the offline publication of the Austrian empire part is still in the agenda. However, the mosaic layers are capable for mobile applications, and we are planning to provide mobile GPS availability of the data.

The georeference of the map mosaics offers the possibility of synchronized appearance of the old maps; two parts in one window, both connected to a historic (or even a modern) dataset to see the improvement of the build and natural environment.

Legal background

Publication of such a large amount of cartographic data can be organized only based on agreement of all data owners and providers. The so far published Hungarian-related data was based on the 1926 Baden Treaty between Austria and Hungary, where the two countries agreed to keep the common databases in undivided in Vienna, providing the Hungarian party the same access rights as the Austrian party has. Common publishing of the whole empire, however, needed the cooperation with the Austrian State Archives.

The initiative is open to other data providers, as the Hungarian Institute and Museum of Military History and the Budapest City Archives (as providers of local maps) are also cooperating partners.

Future plans

The improved version of the First Military Survey have been started to be published: the mosaics of Lower Austria (with the city of Vienna) and Upper Austria are available online, processing of four more provinces (Croatia, Bohemia, Galicia and Hungary) is under way.

Besides the topographic maps, we plan to publish also the historic cadastral sheets. According to our experiences with the Hungarian, Romanian and Croatian cadastral sheets, the main problem is the large number of the sheets and the relatively high ratio of the missing sheets. We also plan to provide the available high scale city maps (e.g. Biszak & Timár, 2007), Habsburg survey sheets outside of the Empire (part of Italy and Romania, the Balkan surveys), and also the available foreign cartographic products.

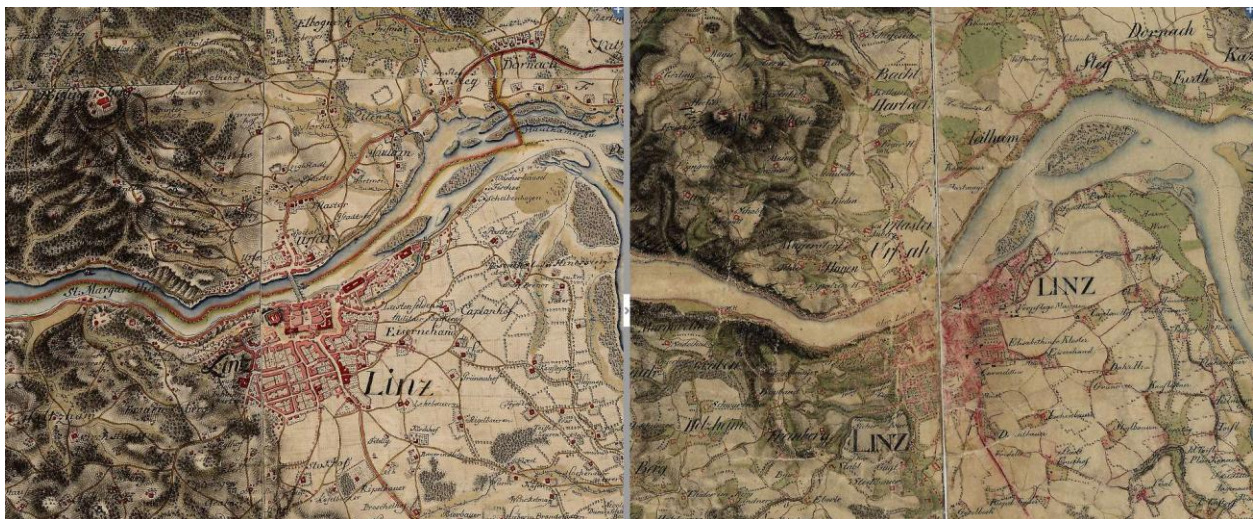


Figure 1. Synchronized view of Linz, Austria on the first (left) and second (right) military surveys.



Figure 2. Territories of the second military survey on Google Maps.



Figure 3. Synchronized view of Venice, Italy on the second military survey(left) and Open Street Map (right).



Figure 4. Second military survey and Open Street Map of Venice, Italy with 50% opacity.

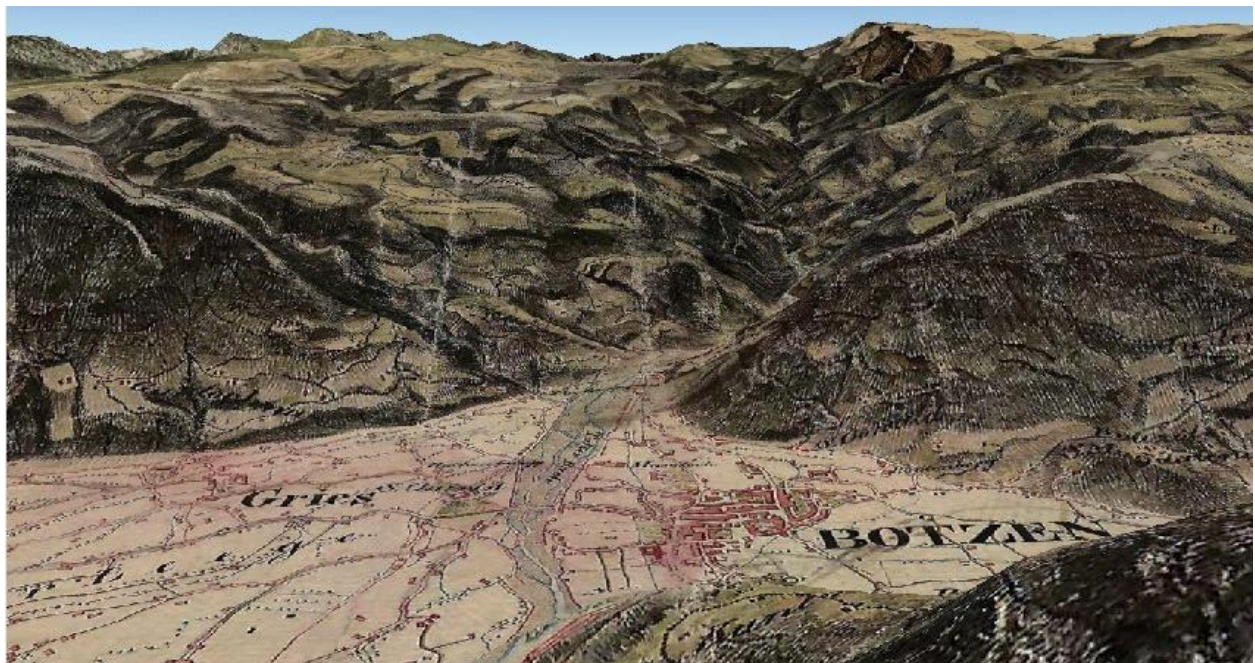


Figure 5. 3D visualization of Bolzano, Italy on the second military.

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