

About us...

In the year of 2007 a new digitizing centre was founded in the Research Institute of Geodesy, Topography and Cartography (VÚGTK). This center is a part of Branch Information Center (ODIS) which also operates the Surveying library. In this library are stored some old and valuable publications from the field of geodesy and cartography.

But in this centre we mainly focus on old and valuable maps, plans and map atlases and we deal with the whole process of accessing old maps via internet – digitizing, adjusting digital images, georeferencing and pre-processing images for online publishing on internet. In the field of old maps we cooperate with Institute of History of Academy of Sciences of the Czech Republic and with Land Survey Office in Prague.



Fig. 2 - Samples of maps digitized in our digitizing center

Large format scanner...

The only type of scanner which is by our opinion the most suitable for digitizing of old and valuable maps, damaged documents and maps taped by thick pasteboard is large format flat bed scanner. In this type the map is placed on scanner desk which presses it to a scan glass and over this glass a scan head with cameras moves. Here we can speak about non-contact digitizing where a mechanical damaging of artworks is eliminated. A large format scanner designation indicates that artworks up to format A0 can be digitized on.

The scanner can be equipped by cradle so books and large atlases (up to A1 format) can be safely and well digitized.



Fig. 4 - Important part of the digitizing center is large flat bed scanner Trias Vidar



Fig. 1 - New digitizing centre of VÚGTK

Technical equipment...

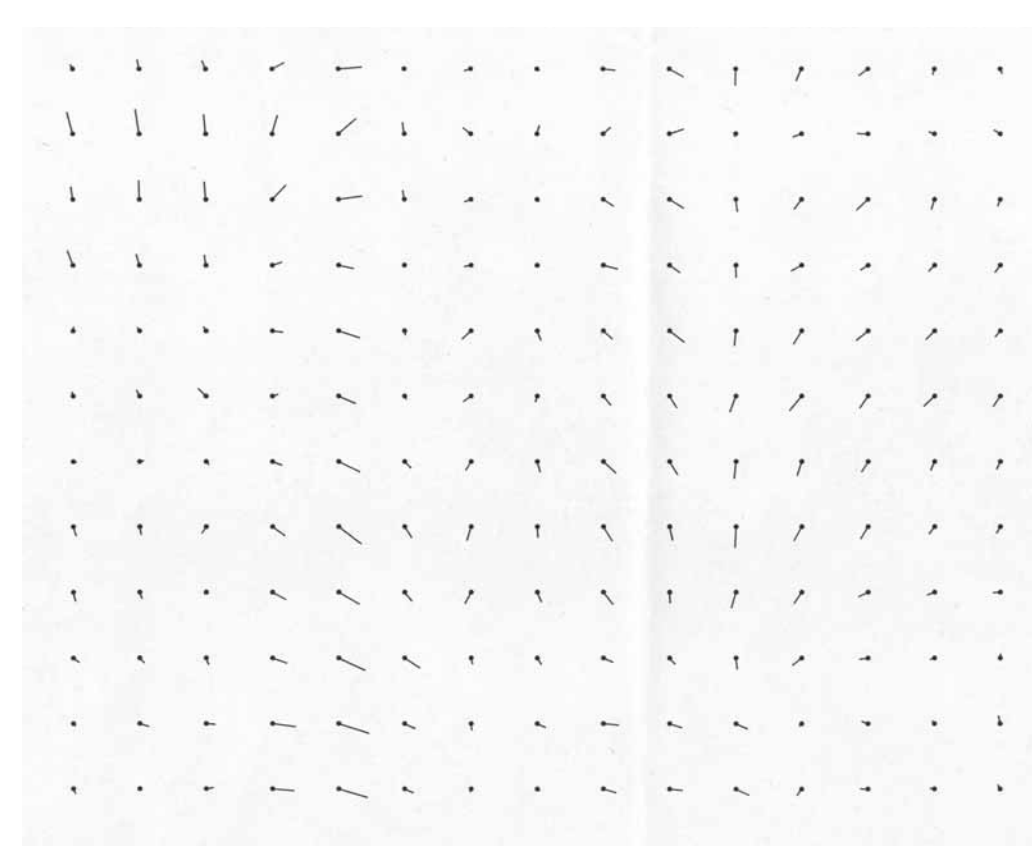
Because we wanted to digitize mainly old maps, city plans and map atlases in our centre, we looked for a suitable type of scanner which would fulfill following demands:

- cartometric accuracy of scanner
- digitize artworks up to format A0
- book digitizing possibility (map atlases)

Scanners based on static digital camera cannot be used, because final digital image is deformed due to optical system of a camera and the required accuracy can't be achieved. Common flat bed scanner is limited by maximum flat size of scanner which is normally up to format A3. Disadvantages of sheetfed scanners are high risk of artwork damage during artwork transportation through the scanner and also maximum thickness of artwork which can be up to 15 mm, so books, atlases and maps on thick pasteboard can't be digitized on this type of scanner.



Fig. 3 - Map atlas in scanner cradle and scanner accuracy evaluation



Our large format scanner Trias Vidar...

Our digitizing centre is equipped just by this type of scanner, specifically by Trias Vidar scanner from the company ProServ and scanner has following technical parameters:

- maximum optical resolution is 400 dpi
- colour depth is 24-bits
- maximum artwork formats is A0+ (914 x 1300 mm)

The scanner construction allows to safely digitize artwork larger than format A0+. The artwork is digitized part after part with enough overlaps and images are then composed to one big image file.

Scanner accuracy is tested every year and our scanner has a certification by the Czech Office for Surveying, Mapping and Cadastre for cadastre maps digitizing. The accuracy is characterized by mean error in position 0,10 mm which is approximately +/- 2 pixels in 400 dpi resolution. The certification gives us information about accuracy of conversion of paper maps to digital maps. This is important to know within the meaning of error transmission for further adjustment of digital maps, for example for map georeferencing.

http://mapy.vugtk.cz

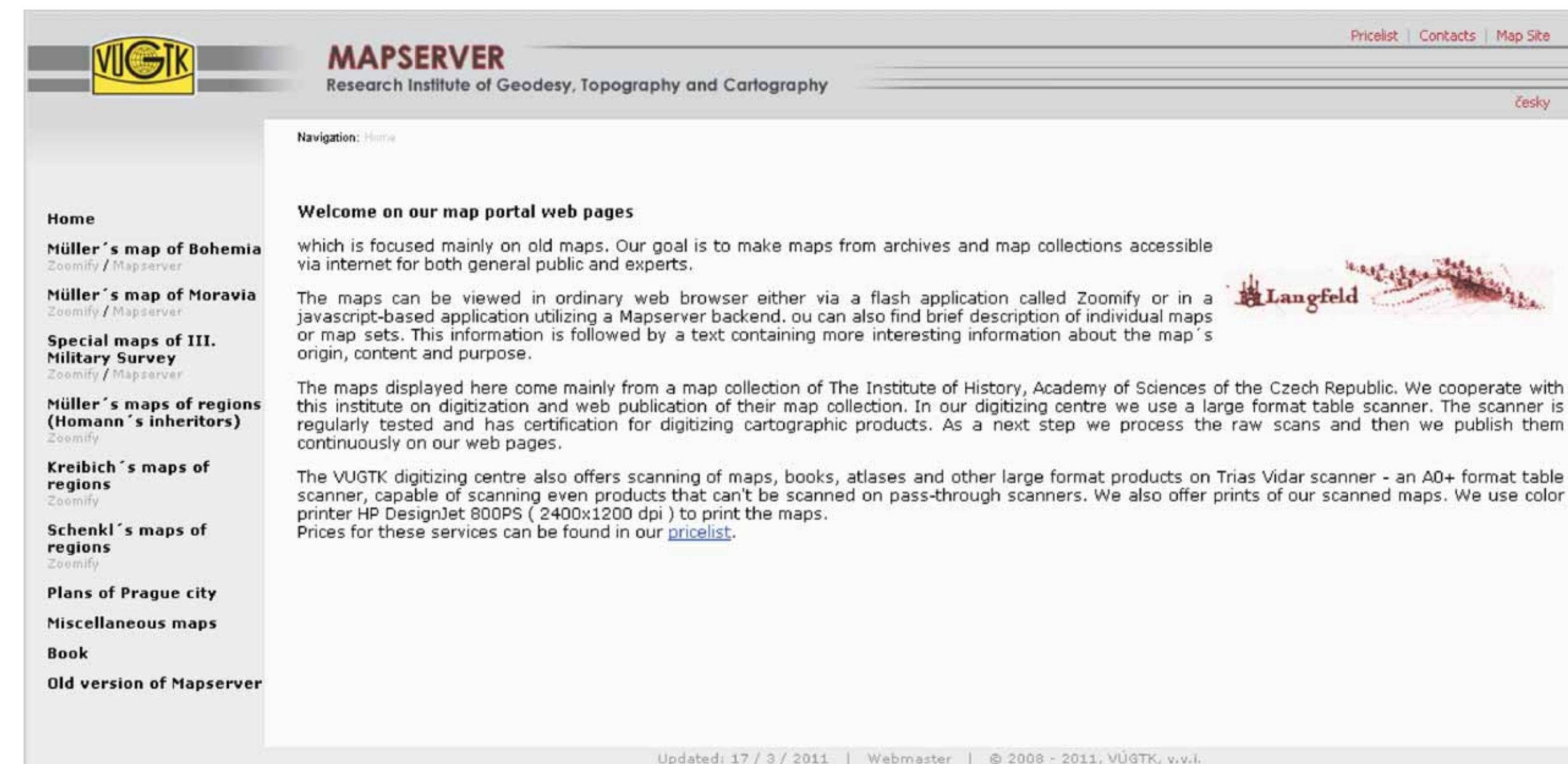


Fig. 5 - Our map portal for old maps

Zoomify...

Before publishing via Zoomify application, the acquired raw scans need to be cropped and watermarked. Zoomify is a commercial tool that is used both for image processing (to prepare large format images for online publication) and for displaying images in web pages while allowing to zoom and pan the images. We use this tool for publishing individual maps or individual map sheets with map frame information in the case of a map sets.

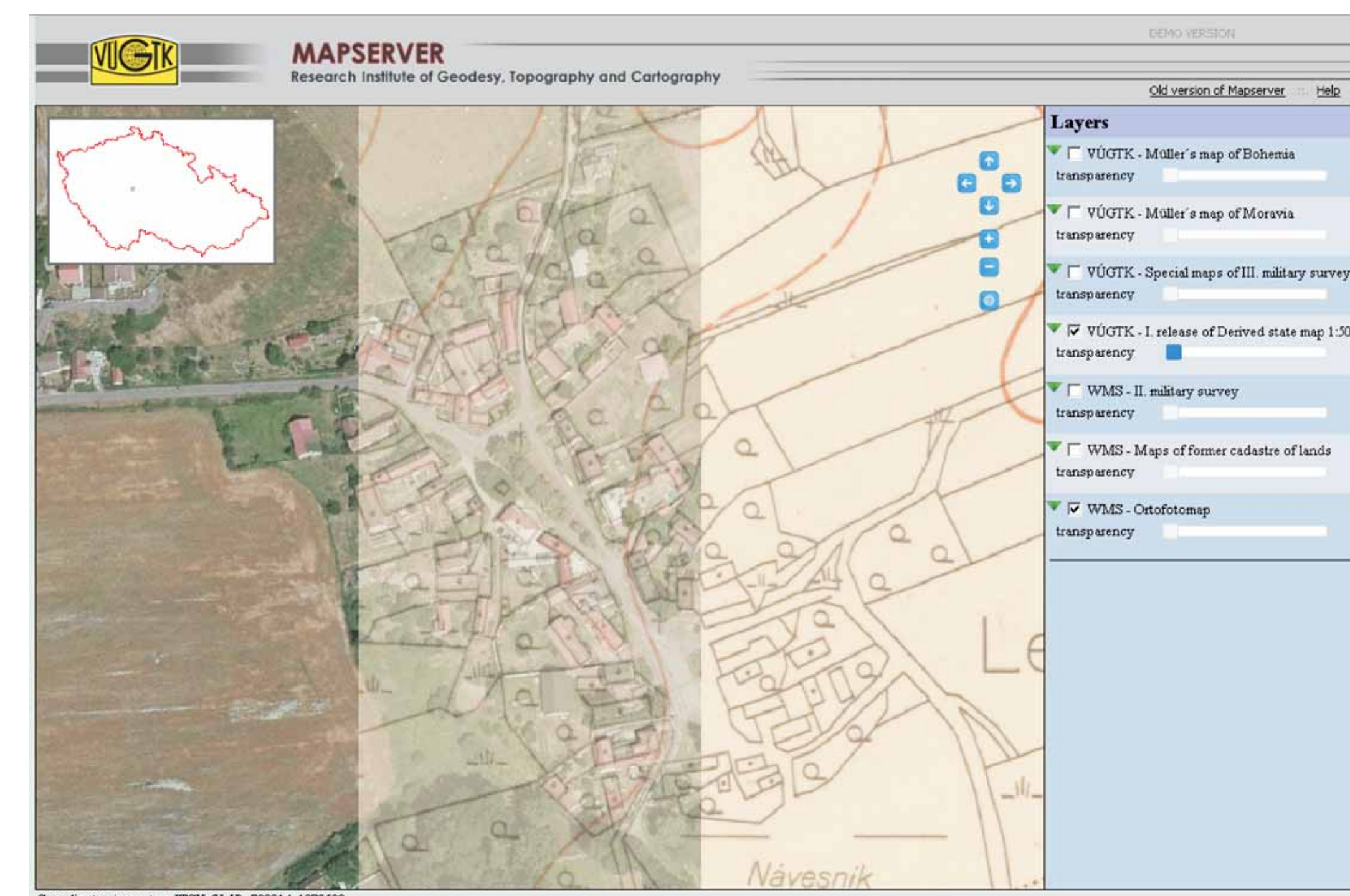


Fig. 7 - Our javascript based client for exploration of maps published by WMS and example of two maps comparison by transparency

Projects and further plans...

Projects we have done:

- Digitizing and publishing of Müller's map of Bohemia, Moravia and regions
- Digitizing and publishing of special maps of the third military survey
- Digitizing and publishing of plans of Prague city
- Digitizing and publishing of regional maps between years 1730 - 1845

Projects in process:

- Publishing of the third military survey maps 1 : 25 000
- Digitizing and publishing of the first release of Derived state maps 1 : 5 000

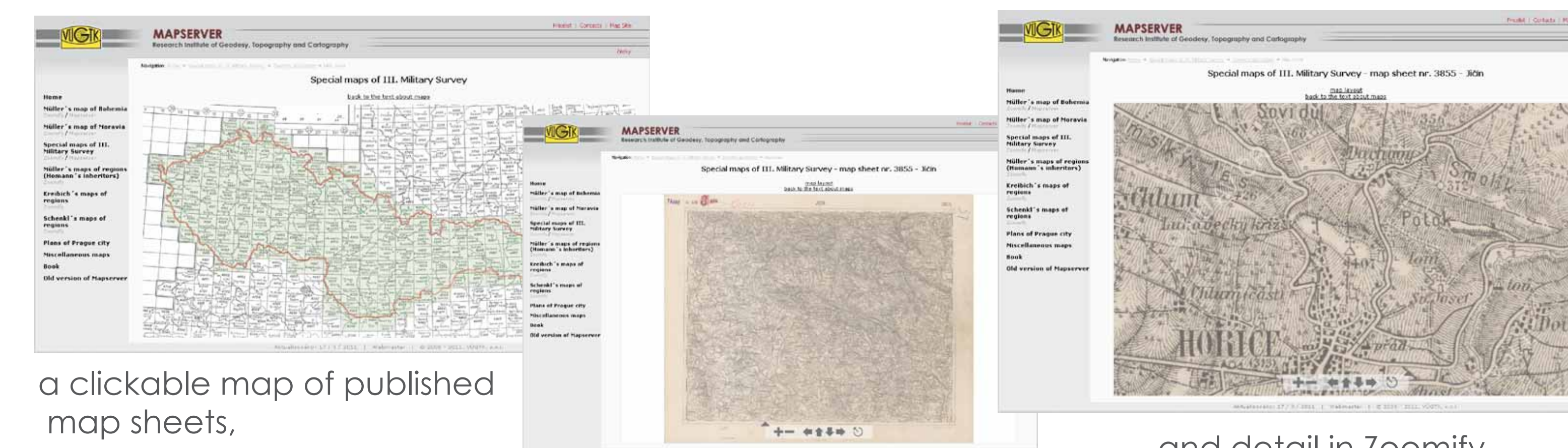
In five years long project funded by Ministry of Culture we want to improve methods for digitizing of all old cartographic products (maps, city plans, map atlases, globes) and we want to develop new software tools for adjusting digital images, georeferencing and pre-processing images for online publishing. In the end of the projects there will be tools not only for viewing but also for changes analyzing on maps of different releases and tools for 3D countryside reconstruction.

Maps publishing...

Digital copies of maps we further process and continuously publish on our web server map portal <http://mapy.vugtk.cz>. The majority of these maps are comprised of old maps of the area of today Czech Republic. All the published maps and map sets are provided with brief description. More interesting details about the maps' origins, contents and purpose are given in accompanying text. Our goal is to make maps which are stored in archives and map collections accessible via internet for both general public and experts.

The maps can be viewed in ordinary web browser either via a flash application called Zoomify or in a javascript-based application utilizing a Mapserver backend. The maps displayed here come mainly from a map collection of The Institute of History, Academy of Sciences of the Czech Republic. We cooperate with this institute on digitization and web publication of their map collection.

Fig. 6 - Special maps published via Zoomify



a clickable map of published map sheets,

a map sheet in Zoomify application

and detail in Zoomify.

Web Map Service (WMS)...

As a second method we decided on Web Map Service which is in our opinion the best method for publishing the maps on internet, especially for map sets. This has great advantage in that it keeps the cartographic properties of the maps. Therefore we can determine coordinates, azimuths, distances and areas without the need for the original paper map. On top of that we can easily compare the content of the old maps with new ones. Because of that, we think this is the most effective way of using old maps on the internet.

We use the UMN MapServer to make the maps available. We also provide a JavaScript based web application to display the maps in web browser. This application allows image data from several WMS sources to be displayed at the same time. Individual data sources' transparency can be adjusted to produce overlay views and provide visual comparison between various maps.

In our digitizing centre we processed following map sets – Müller's map of Bohemia (1720) and Moravia (1716), special maps of the 3rd Military Survey and a sample of the first release of national map series called Derived State Map 1 : 5 000 (SMO5). Orthophotomaps, cadastral maps and old military maps from different servers are connected to our client as additional map layers and together with our own map layers make our web application well suited for analyzing objects in old maps and for comparing old maps with the present state. Results of our work with old maps of the Czech Republic can be seen on our Map portal <http://mapy.vugtk.cz>

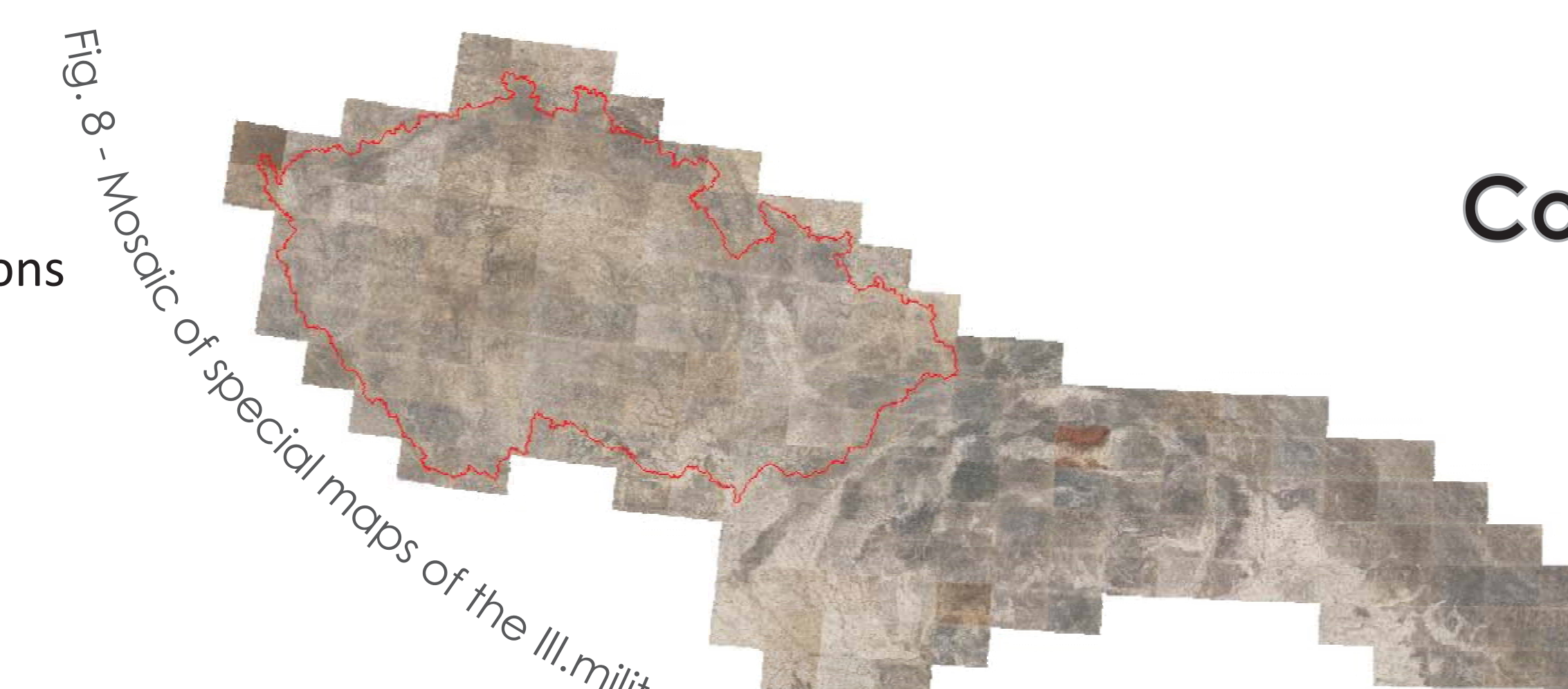


Fig. 8 - Mosaic of special maps of the III. military survey for territory of former Czechoslovakia

Cooperate with us...

We are open to any cooperation in a field of cartographic products digitizing and publishing. If you have any question, do not hesitate to contact us, we are looking forward to you!

Filip Antoš - filip.antos@vugtk.cz,
Milan Talich - milan.talich@vugtk.cz,
Ondřej Böhm - ondrej.bohm@vugtk.cz

