



## **Analyses of selected Maps of Czech Lands from the Period 1518 - 1720**

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Preliminary results of research on old maps of Czech Lands deposited at the Map Collection of Charles University (CU) in Prague are presented. The extensive cartographic collection belongs among the most important collections in the Czech Republic. Maps of Czech Lands, i.e. Bohemia, Moravia and Silesia, created by individuals in the period of 1518 - 1720 are part of our history and represent important cultural heritage of immense value. They give evidence about the period in which they originated. The goal of the research is to document the development of cartography during the period 1518 (Claudianus's map) to 1720 (Müller's map). More than 50 originals or facsimiles of different maps were found in the Map Collection of CU during inventory phase of the work.

This paper concentrates on a description of most interesting maps discovered from the point of view of their content, map symbols and cartometric characteristics. The research is conducted within the project "Cartometric and semiotic analysis and visualization of the old Czech Lands maps in the period 1518 – 1720".

The analysis of map content can provide us with answers to other relevant questions related to analysis and assessment of maps. Similarly to modern maps, old maps also include some map elements which were becoming more and more precise with the development of cartography and geodesy. The map research then centered on the analysis of the map content and on cartometric analysis using modern computation methods. The obtained results of the research will be described and compared with information presented in historical and cartographic studies of the last decades.

Cartometric analyses of the map are important. They verify cartographic parameters of the map. The following cartometric analysis will be carried out: positional accuracy of the map, calculation of the map scale, calculation of the rotation of the map.

The methodology of cartometric analysis used in this article is based on comparing a scanned old map with a current digital data set, and subsequent identification, analysis and interpretation of discovered changes. It enables to analyze inaccuracies in old maps, making use of modern mathematical-geometrical procedures, thus contributing to the speediness and reliability of the analysis.

Analyses of scale and rotation are an important factor illustrating the accuracy of the construction of a cartographic work. They are giving us interesting information about the accuracy in the construction of the map depending on the position of points. We use the program MapAnalyst which is specialized for cartometric analyses of old and historical maps. For this purpose the program contains a complex geometrical-analytical apparatus using multiquadratic interpolation of a set of identical points. The process of cartometric analysis is fully automated, with the exception of collection of identical points. This fact contributes to speediness and overall reliability of the analytic process.

The results will be influenced especially by the selection of identical points which served as a basis for determining a transformation key, and by the method of multiquadratic interpolation which will be used.

Because of the fact that cartographic work is a relatively extensive set of point, line and areal cartographic signs, it is not usually possible to perform an analysis of the map as a whole, due to time reasons. Therefore, it is necessary to choose only a subset of such elements which represent a sample set in which we can suppose a higher degree of positional accuracy. To prevent distortion of the geometrical and positional relationship between the points we used affine transformation of first order. Higher-degree transformations were not used for the analyses because they cause unnatural distortions of the map image. Because of the redundancy of identical points the transformation coefficients were adjusted according to the method of the least squares.

The results of cartometric analyses will be expressed using different cartographic techniques (vectors of displacement, isolines or distortion grid).