Planimetric Accuracy Assessment of the *Nuova carta geografica dello Stato Ecclesiastico*

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Abstract: For a map to be a geometrically reliable source of information, it must be an accurate representation of an area. Maps were often not drawn with the intention to represent the geometric position with the highest accuracy possible, as precise geometry is not required for some cartographic applications, or space is deformed intentionally to graphically emphasize selected areas. Before using information contained in old maps, for example in historical studies, it is necessary to assess their quality.

Planimetric accuracy assessment of the *Nuova carta geografica dello Stato Ecclesiastico* by Ch. Maire and J. R. Bošković from 1755 is presented in this paper. Planimetric accuracy of an old (historical) map is the extent to which distances and bearings between identifiable objects on a map coincide with their true value or location. In the map of the Papal States, only positions of cities were measured with precise geodetic methods, while other map content was copied from already existing maps. When assessing planimetric accuracy of map contents, the above characteristics have to be analysed. The accuracy of the surveyed and mapped city positions are going to be assessed in this paper, while other map contents such as rivers, roads and the general provision of mountains are going to be the subject of another research.

Planimetric accuracy is going to be be assessed using a method of coordinate comparison in the first part of the paper. At the end of the third section of the book *De Litteraria…* by Ch. Maire and J. R. Bošković, a table is provided with a list of geographical coordinates for the 84 cities depicted on the map. If we suppose the cities were depicted according to those coordinates, then geographic coordinates of the cities on the map can be compared with their contemporary coordinates. We expect the values of longitudes will differ by some amount for two reasons. The first reason is the fact that Maire and Bošković determined geographic coordinates in relation to the prime meridian of the Canary island El Hierro (Ferro). The second reason follows from the fact that scientists began to actively deal with the problem of practical and precise determination of longitude at the beginning of the 18th century.

In the second part of the paper, planimetric accuracy is going to be assessed by the free Java application MapAnalyst. The application has been used to assess the accuracy of old maps and visualizations of different spatial deformations of old maps. The theory of map projections teaches us that the final result of any analysis is not going to be correct if the computational procedure does not take into account the effect of the map projection. MapAnalyst version 1.4 (end of 2010) was applied for this purpose. It supports various map projection types and was provided by its authors to users for evaluation.

Keywords: Nuova carta geografica dello Stato Ecclesiastico, Josip Ruđer Bošković, Christofore Maire, planimetric accuracy assessment, MapAnalyst