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Using of Grid Shift Binary (GSB) data to improve the geo-reference of the Third Military Survey of the Habsburg Empire

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According to our previous analyses, the geodetic datum of the Third Military Survey of the Habsburg Empire is not a really unified (adjusted) one. Basic geodetic adjustments were carried out in more than sixty blocks but the final unification was cancelled because of the urgent need of the maps. Thus, although we can define proper projections and a substituting datum for the geo-reference of the map sheets, the horizontal control remains poor. The error of the fitting to modern databases is up to 250 meters, which is hardly tolerated even at less accuracy claims.

A method, offered by the open source GIS software, (and implemented in many commercial one) have been tried to improve the horizontal control of these map sheets (1:75000 scale maps of the Empire and the 1:25000 series of the historical Hungary). This simple method uses a GSB (Grid Shift Binary) file; a correctional grid, defining the latitude and longitude elements of a simple horizontal shift between the old and the modern geodetic systems. Using the 660 main geodetic base points throughout the study area, we provide GSB data with different spatial resolution. The optimum resolution for the correctional grid occurs when the grid size is around the average distance of the base points in the triangulation net. Using this effective tool, the error of the fitting of the Third Military Survey maps can be reduced below 40-50 meters, which is appropriate for the scanned 1:75000 scale sheets. Further improvement can be achieved by processing the higher order geodetic base-point sets.

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