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Digital virtual restoration and reconstruction of a 150-year-old Hungarian globe

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ABSTRACT

The only copy of Perczel's manuscript globe (diameter 132 cm, scale 1 : 10 000 000) is from 1862. The globe received international recognition due to its geographical accuracy, large number of geographical names and beautiful execution.

The globe is in poor condition now. Large areas faded, smaller islands, many placenames are hardly legible or only identifiable by using contemporary maps. The drawing of Western Africa and Equatorial areas disappeared during the wars. The globe was "restored" and covered by lacquer layer in 1970s. The lacquer reacted with the inks (particularly the red placenames and symbols diffused into the lacquer), and turned into yellow and darkened.

The Department of Geoinformatics and Cartography started to record the state of the globe in 2008, which led to the preparation of a virtual facsimile. More than 800 high-resolution pictures were taken, of which a 3D-model was created (available in the Virtual Globes Museum, http://vgm.elte.hu). Next, Márton processed a sample area, and with students started to process the cartographic content of the globe (lines, surface colours, names) to make it similar to the original. Hill-shading is done by Sziládi, first of the cartographers who got a degree in 1957. The state of the 100-year-old globe is known from a study made by Ambrus-Fallenbüchl in 1963. This is an important source for preparing a facsimile that shows the original state. Contemporary maps must be studied to complete the missing parts and placenames. The digital virtual restoration and virtual reconstruction will be completed this year.

Digital Virtual Restoration and Reconstruction of a 150-Year-Old Globe

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The globe of László PERCZEL

The manuscript globe was made in one copy in 1862, and is now kept in the National Széchényi Library in Budapest (Figure 1). Its diameter is 132 cm, and the scale is 1 : 10 000 000. Due to its geographically accurate, detailed, and aesthetic representation of the Earth as well as its large number of geographical names, the globe deserved the broad international appreciation. This excellent globe had a major role in that the Hungarian exhibition received the Gold Award at the Third International Geographical Congress, Venice, 1881 (Márton 2008).

Fig. 1 Perczel's globe in the National Széchényi Library

The state of the globe

The present globe cannot be shown neither to the public, nor to the Hungarian or foreign professionals due to its poor condition (Márton and Gercsák 2011). The names and symbols of

settlements are in badly faded red. The settlement names are very much damaged: about two thirds can only be identified with difficulty. The relief is enhanced by hill shading in brown, which now looks as dark patches. The names of mountains in brown are fairly clearly visible. The waters and their names (almost clearly visible too) appear in blue. Bands in the inner parts of parallel lines and arrows show the ocean currents. The light blue colours of sea surfaces almost disappear under the yellow lacquer layer. In a few places, they come out in light green shades. The banks are occasionally depicted by dotted lines, the shoals by small crosses. The prime meridian is that of Ferro. The use of administrative names reflects the time of making the globe (Alaska: Russian America, Canada: English America). Dashed lines with band show the borders. Large areas have been faded by now (Aleutian Islands), and Google Earth can only identify the names of smaller islands. Large areas have been lost in the past 150 years (West Africa, areas along the equator mainly due to the blast of explosions caused by bombing in World War II).

Physical "restoration" in the 1970s

Lacquer layer was painted on the whole globe to prevent it from further fading. However, the lacquer reacted with the original inks (particularly with the red colour of settlements and their names), and therefore, the globe started to become dark yellow. Only the grid was added on the repaired parts of the globe. The meridian ring was deformed when the workers lifted the globe from its support. For some strange reason, the ring was replaced upside down after restoration.

Virtual restoration and reconstruction after 2008 and the Virtual Globes Museum

The Department of Cartography and Geoinformatics began to register the state of the globe by taking more than 800 high-resolution photos (Figure 2).

Fig. 2 Taking photographs of the globe (Z. Nemes and M. Márton in work)

A 3D model was built from these pictures. The digital facsimile of the present state of the globe (Gercsák and Márton 2010) is the result of digital processing of the images, which can be freely seen on the homepage of the Virtual Globes Museum (http://vgm.elte.hu) operated by the Department (Figure 3).

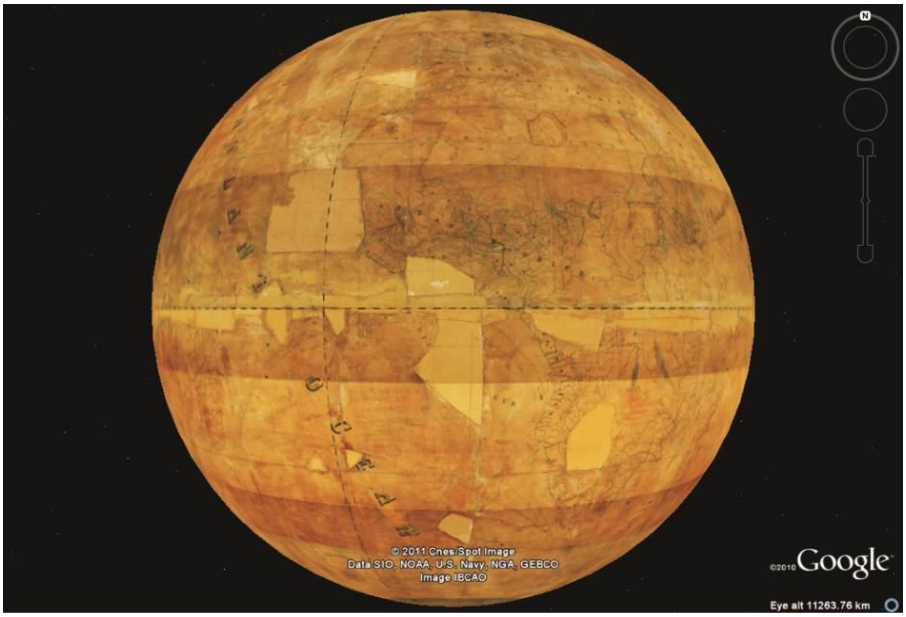

Fig. 3 The present state of the globe in the VGM

In the next phase, Márton processed a sample area (Figure 4). Then, with students, the Department digitally restored the graphics and colours in original style by re-drawing and re-colouring the whole map content (including the hill shading) and re-writing the names with letters similar to the original manuscript type. József Sziládi, a retired map editor of Cartographia Enterprise, completed hill shading. He was among the very first students who received a degree in cartography from the Department. Luckily, a description of the state of the globe, 100 years after making (Ambrus-Fallenbüchl Z 1963), was available. This was an important source for the reconstruction just like contemporary maps to complete the missing or badly damaged parts and the place names and to clarify the run of faded lines. Intensive background colours show the areas that were originally damaged but corrected by digital restoration and reconstruction.

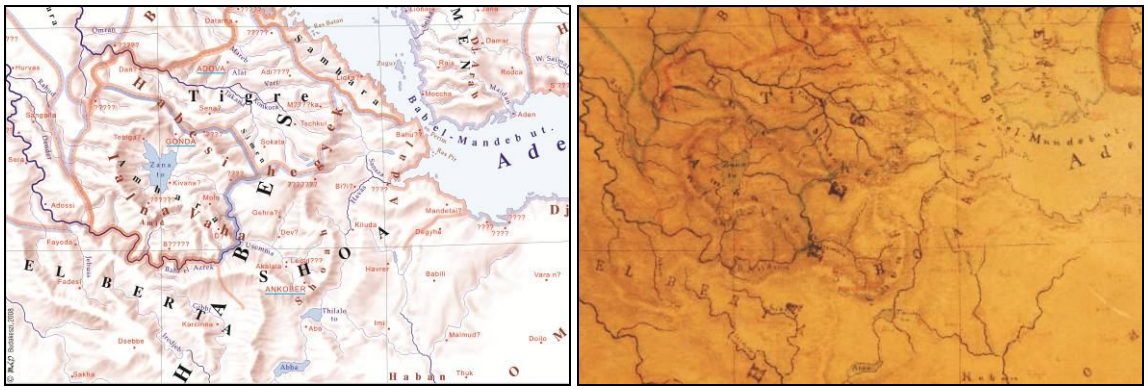

Fig. 4 Márton's sample area with the original one

Results and plans

The linear elements, the hill shading and the identification of geographical names have been completed on 10° spherical segments (Figure 5). Large damaged areas have also been recovered. The 3D virtual contemporary facsimile (Gede et al 2011) has been created by using the segments (Figure 6).

The brunt of the work is now over, but there are improvements to be done. Source maps have to be found to process some damaged parts and to recover the missing place names according to contemporary spelling. A names index with location references based on geographical coordinates

is also planned. Finally, a sponsor is very much needed to prepare the real contemporary copy of the globe. This work would include making the supporting ball and the copper meridian ring as well as mounting the segments, lacquering, and fabricating the wooden base.

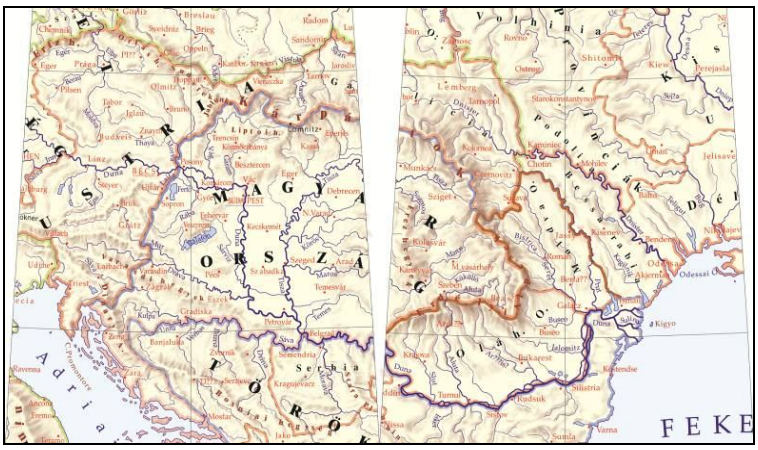

Fig. 5 Contemporary facsimile of the segment parts showing Hungary

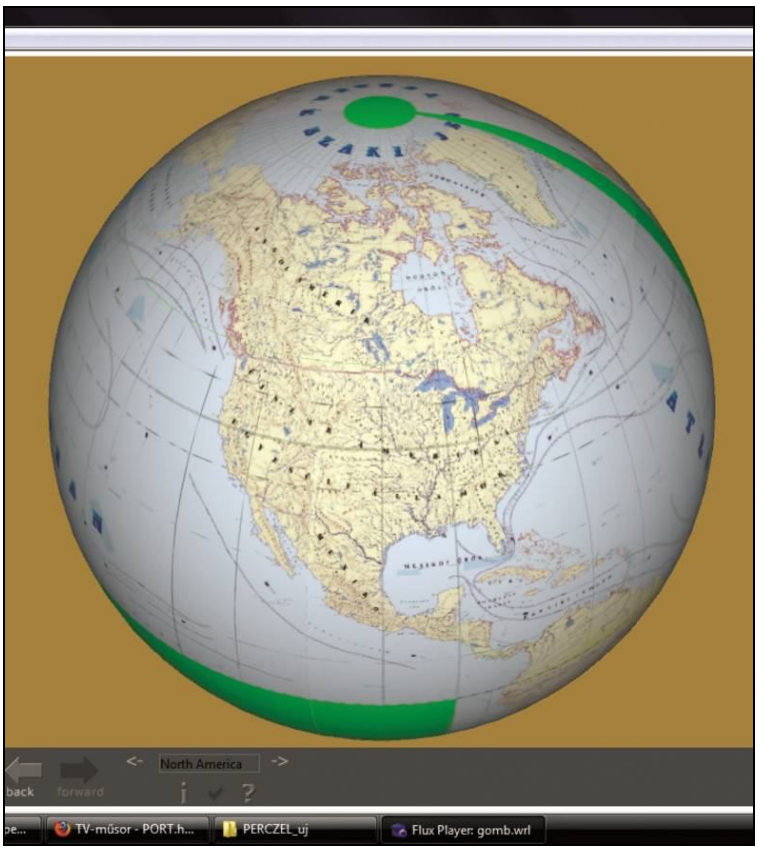

Fig. 6 Contemporary facsimile of Perczel's globe

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