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APPLYING DIGITAL MAPS IN ATTENDANCE VARIATION HYDROGRAPHIC MORPHOLOGY IN SERBIA

Abstract. We describe digital maps whose tracking variation hydrographic morphology in Serbia. Those digital maps were done in ratio 1:100.000. Also, we describe precision and reliability of those maps to illustrate physically-geographic elements of maps, then their cultural and educational value and importance.

Keywords: digital maps, hydrography, morphology, importance.

Historical review

Cartography, or mapmaking, is one of the oldest human knowledge. Technology of mapmaking has continually changed in order to meet the demands of new generations of mapmakers and map users. Some data indicated that men transformed their first geography knowledge in drawing before they used letters. From cave paintings to ancient maps of Babylon, Greece and Asia, through the Age of Exploration, and on into the 21st century, people have created and used maps as the essential tools to help them define, explain and navigate their way through the world.

The first maps were manually constructed with brushes and parchment and therefore varied in quality and were limited in distribution. The earliest known map to date is a wall painting of the ancient Turkish city of Çatal Hüyük which has been dated to the late 7th millennium BCE. Also, the first map which represents the Earth on a flat surface is discovered in Mesopotamia and is 4500 years old. In written sources, the first maps which represent the Balkan Peninsula were Ptolemaeus' handbook from 2nd century and Pointinger map from the 4th century.

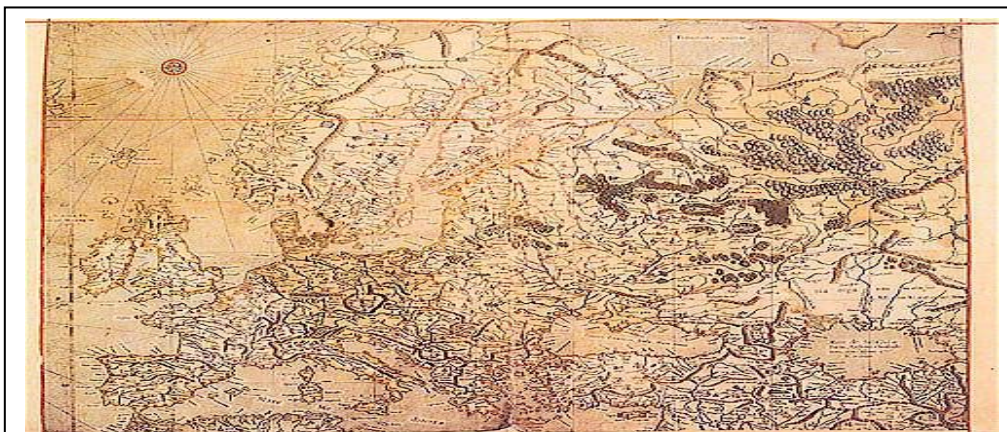


Figure 1. Mercator map of Europe

In the Age of Exploration from the 15th century to the 17th century, cartographers both copied earlier maps and drew their own based on explorers observations and new surveying techniques. In this period “big atlas” was created from the famous netherlandish cartographic school. The most deserving people for development cartography in this period are: Abraham Ortelius and Gerardus Mercator. Abraham Ortelius, antwerp cartographer, published the *Theatrum Orbis Terrarum*(1570), the first modern atlas.



Picture 2. Map of Walachia, Serbia, Bulgaria and Romania (1579).

Gerardus Mercator produced maps of Walachia, Serbia, Bulgaria and Romania (1579). Also, he took the world atlas to describe a collection of maps. He produced his own atlas in a number of parts, the first of which was published in 1578. Netherlandish cartographers technique of mapmaking related to perfection. In that time maps were created only in engraving. Also, other European countries did not get behind in this skillfulness. In France, in the 17th century Nikola Sanson acquired the appellation royal mapmaker, and the Royal Geographic Society, constituted in the nineteenth century, was the most important society in Great Britain.

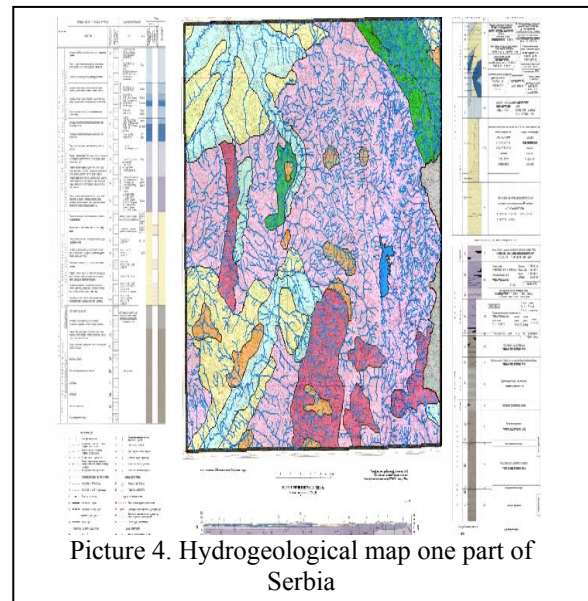
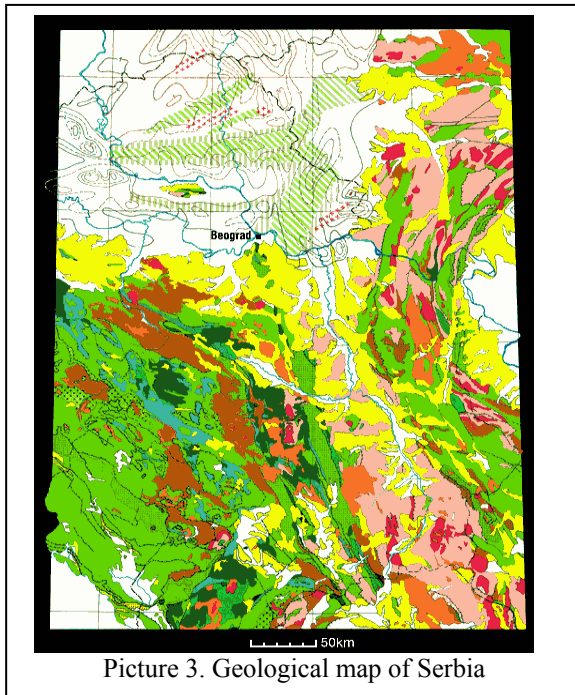
In the late 20th century and early 21st century the advance in electronic technology led to a new revolution in cartography. The development of informational technology was able to create different formats of digital maps. The data are election and labour to make use GPS technology, georadar and browser for underground fixtures. One of the most important method to create maps is digital ortophoto plans. Those plans processing satellites and aerophotogrametric shot.

Digital hydrology map

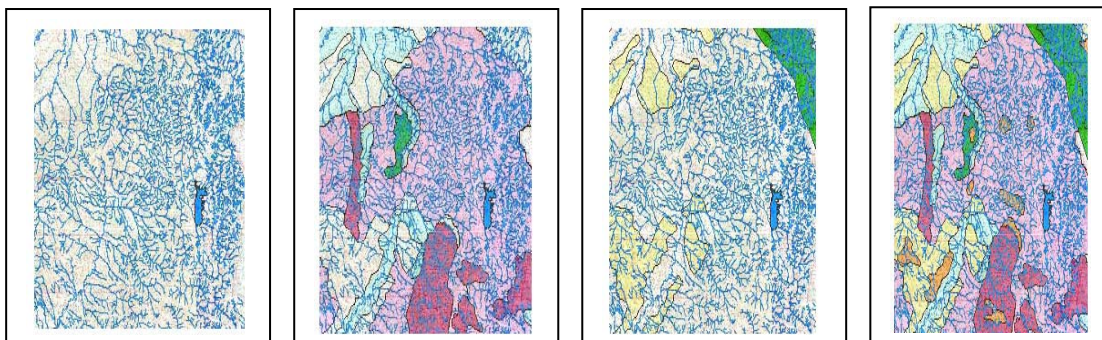
Digital maps which attendance variation hydrographic morphology in Serbia was doing for space of southeastern part of the Republic of Serbia. The primary aim to create digital map of hydrographic morphology is attendance variation of hydrographic on territory of the Republic of Serbia.

For creating practical illustrations those maps we used a topographic map, part Bosilegrad and Vranje, in ratio 1:100.000. Also, those maps including the use of contour lines

which elevation is forty meters. As a template were used Geological map from Geological atlas of Serbia. This map is located at internet address http://www.asak.org.yu/index_yu.html Maps were scanned in software “Micro station” and their resolution was 300 dpi. Then classification and linking scanned papers were done.. Because these maps are raster image we dereferences them. Further this graphical application for creating maps we need numerical and textual data. Numerical and textual data were used for creating specific database and dereferences some hydrological objects. Also, as the framework was used letter-pres hidrogeological maps.

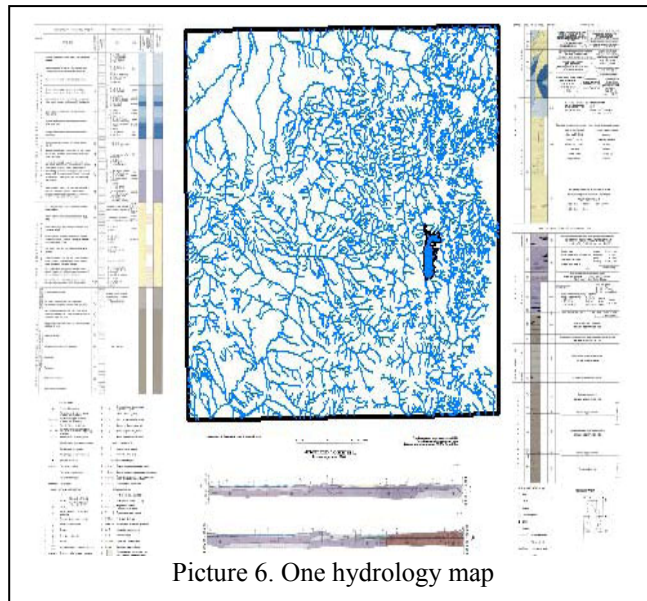


Hidrogeological maps have their own legend and parts which identify geological period. Also, they have the following profiles which represent species of ground. Numerical data were used for cadastre and interpreter on some elements on maps. On the digital map of hydrographic morphology you can see lakes, rivers and rivers sources.



Vectorization technique means that every define vector object which may be present like point, line or polygon endues position data standardization with dereferences points of maps. Vectorization structure, or drawing thematic layers were done on letter-press topographical maps. On every map were produced layers: rivers, lakes and canals for water.

Vectorization structure, at first, means to define lines which consider rivers, lakes and canals for water. The second step were defined cartography symbols and signs, and then were defined colours and shadows. In this way layers of digital map were created. All these layers were presented in software ForestryGIS(fGIS).



Picture 6. One hydrology map

This software gives a satisfactory precision in creating vectors layers using geo-data. Also, this software is compatible with other commercial software and working in the most part of GIS application.

Comment. Sphere which used vectorization is in the main industry, where are plans and schemes in vector format. We use many methods for process vectorization, and primary are hand-made, auto-manual and automatic. In hand-made digitization we hoard map template and stand over them in digital format. In this way raster picture is created. This format vectorization is simplest. The trueness data is also very important. Two other method digitizations are auto-manual and automatic. This format digitization used special software for processing raster images. Technology which we use to create maps is change and create any digital map requires uptime and make possible to create others, general and special maps and concrete them, especially about patterns and completion some part of contents.

Conclusions

Our maps highlight the need to attend variation and record appears of hydrographic morphology that have provided better seeing on physical-geographic characteristic of some territory. Our work suggests that we can use these maps for looking the most auspicious places for water to drink, irrigation and construction.

The overall aim is preservation, cultivation and description of cultural heritage. Here, at first we conceive on project digitization – to create information systems with reference document photographic, audio and screen data records.

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