

Analysis of 3D structures in GIS

LENKA KOCIÁNOVÁ^{1,2} and ROSTISLAV MELICHAR²

¹Czech Geological Survey, Leitnerova 22, CZ-602 00 Brno, Czech Republic;
lenka.kocianova@geology.cz

²Faculty of Science, Masaryk University, Kotlářská 2, CZ-611 37 Brno, Czech Republic;
melda@sci.muni.cz

Geographic Information System (GIS) is a very useful and proven tool in the construction of geological maps produced by geological mapping. Others specialized maps such as uncovered or tectonic map are derived from geological units in the map and from database storing data collected during this process of geological mapping.

For geologists the set of structural data measured in the field is a way how to see under the mapped surface. Structural data are stored in the GIS database. It contains coordinates of stations, type and orientation of tectonic features represented by dip and dip direction. Other information relating the lithology could be included.

Common software for orientation analysis of tectonic features works out of the GIS environment. Showing only the angle relationships and missing spatial context form limits of this method. One can not distinguish if points in the plot lie near each other forming a belt of shear zone or if there is no mutual interconnection.

Prototypes of tools, that were developed for the ArcGIS Desktop (ESRI) software, frequently used in geological mapping, are presented. These tools allow us to analyse structural data with respect to their position in the geological map. All tools are grouped into a toolbox "Orientation analysis", that can be added to the map application and allow the user to plot selected data into

diagrams, construct contour diagrams, count spatial averages and construct appropriate maps. The selection is made by spatial query (e.g. select structures that lie in the particular geological unit or near a significant fault) and/or by an attribute selection such as type of structure.

The processing result provides the data of vectorial type. It enables us to select these data in the plot and link them back to the map. All information from the attribute table are preserved which allows us to symbolize them as desired.

Combination of GIS tools and the tools of orientation analysis presented above can bring a considerable profit in tectonic and geological maps construction.

Tools are tested using data from the Strážek Moldanubicum and Svratka crystalline unit region in the Rožná surrounding.

Acknowledgement. This work is supported by the Czech Geological Survey (project 541008).

References

- FISHER, N. I., LEWIS, T., & EMBLETON, B. J. J., 1987: Statistical analysis of spherical data. *Cambridge University Press. Cambridge.*
KANG-TSUNG CHANG, 2008: Programming ArcObjects with VBA, A Task-Oriented Approach. CRS Press. London.