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Development of a special approach of the mineralization localization zones prediction based on the combination and the geoinformation analysis of heterogeneous geodata

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The complexity of any task solving, including tasks in the Earth Sciences, depends on the completeness of the information that is available. The prediction of the mineralization zone localization is a task with incomplete information. The tasks of prediction are complicated because of search data difficult formalize, and the absent of single information structures of the representation of the search data. These facts complicate the process of structuring, processing and analysis of information. Geodata that need to process are presented in various formats: raster two-dimensional and three-dimensional fields, vector layers of polygons and lines, point markable layers, the spectral and discrete, quantized and continuous, analog and digital forms, as well as chemical formalization. In this form representative data cannot be combining into superclasses. At the same time the information content of geodata that are applied individually is very small. While a number of low informative features, which can be obtained in the process of research of mineralization zones are usually redundant. As a result the quality of knowledge that can be obtained from the search data decreases, as well as the technological cycle of information processing increases. Additionally, that leads to exploitation of datasets, and production of large shared datasets [1]. To solve efficiently the tasks of predicting, it is necessary to use union heterogeneous search features, accumulated factual data and modern science-based mathematical apparatus of processing and analysis of the information. As well young branches of human knowledge help to solve this task: remote sensing, geoinformatics, Earth and Space Science Informatics [2], apparatus of catastrophe theory and nonlinear dynamics, game theory. The purpose of the suggested approach is to increase informational content, and to reduce of geodata redundancy to improve the accuracy of the prediction of mineralization zones. The developed algorithm of prediction of the localization of mineralization zone consists of the some steps: 1. The collection of information about the studying territory of upcoming work from various sources, i.e. building of database (DB). The DB includes variety geodata. 2. The formalization, the concatenation and the union of geodata. Study of features correlation characteristics. Generation of new formal and functional search features. 3. The formation of a number of hypotheses based on initial data. The refinement of search features. 4. Preliminary mathematical modeling of prospective mineralized zones. The study of obtained results, the formation of additional features list. 5. The collection of additional features by field methods for verifying of hypotheses. 6. Processing and analyzing of obtaining data, the specification of preliminary mathematical model. 7. The examination of hypotheses using the obtained results. The study of prediction errors. 8. Building of multidimensional risk matrices of detection and bifurcation diagrams of mineralization [3]. 9. The final mathematical modeling of perspective mineralized zones. Thus, the proposed approach allows to increase the information content of geodata significantly, to reduce redundancy of geodate, and to increase the accuracy of predicting zones of gold mineralization. Currently the approach, suggested by the author, applies for prediction of the localization of gold mineralization at the territory of the Polar Urals. References: 1.W. J. Som de Cerff, M. Petitdidier, A. Gemünd, L. Horstink, H. Schwichtenberg, Earth Science Test Suites to Evaluate Grid Tools and Middleware—Examples for Grid Data Access Tools, Earth Science Informatics, Vol. 2, 117–131, 2009. DOI 10.1007/s12145-009-0022-y. 2. P. Mazzetti , S. Nativi, J. Caron, RESTfulI implementation of Geospatial, Services for Earth and Space Science Applications, International Journal of Digital Earth, Vol. 2, Supplement 1, 40-61, 2009. DOI: 10.1080/17538940902866153 2. 3. Arnold V.I., Catastrophe Theory, 4th ed. Moscow, Editorial-URSS (2004), ISBN 5-354-00674-0 (in Russian).