Evaluation of Deep Prospecting Methods in Hadamengou Large Gold Concentration Area, Inner Mongolia

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Abstract: The Hadamengou gold field is located in the western section of northern margin of North China Craton. Since it was discovered in 1986, more than 100 tons of gold resources have been proved. The outcropping strata in this area are mainly high-grade metamorphic rocks of Wulashan Group, which are host rocks of this gold field. The whole gold deposit is mainly controlled by two deep faults, Wulatqianqi-Huhhot and Linhe-Jining. The distribution of magma and metal deposits in the area is also affected by them. Their secondary structures are EW-trending, NE-trending and NNE-trending faults, which are the important ore-hosting structures of this deposit. A large number of Hercynian, Indosinian and Yanshanian intermediate-acid intrusive rocks and intermediate-basic-acid dikes can be seen in the area. The larger ones are the Dahuabei granite body in the west of the mining area and the Shadegai rock body in the north. The main dikes are granite pegmatite dikes, granite porphyry dikes and diabase dikes. Hadamengou gold deposit can be divided into nine vein swarms according to its spatial occurrence location (No.1, No.13, No.24, No.25, No.55, No.100, No.113, No.304 and No.313) (Fig. 1). Each vein swarm contains several gold veins with the lengths varying from 50 to 2760m and the thicknesses varying from 0.50 to 19.58 m. The vein strikes nearly east-west, inclines southward and dips from 60° to 70°, a few veins strike northwest. The mineralization types are divided into quartz-potassium feldspar vein type, quartz vein type, potassium feldspar altered rock type and pyritized phyllite rock type. In recent years, many methods and means have been used in deep exploration in mining areas, and good prospecting results have been achieved. The technical combination of deep prospecting methods for Hadamengou gold deposit including: (1) Geology, Geophysics and Geochemistry Comprehensive Prediction Technology for Deep prospecting. Gold veins are controlled by structures, and the veins themselves are gold-bearing sulphide quartz veins and gold-bearing sulphide altered rocks. According to these characteristics, on the one hand, using geophysical methods of CSAMT, MT, SIP and other integrated geological profiles, inversion of ore-controlling structures by CSAMT and MT. Deep extension of vein is determined by SIP. On the other hand, the technique of structural geochemical superimposed halo is used to collect samples of typical veins in stages and promote deep prediction. The method of prospecting mineralogy is also used to carry out metallogenic prediction, and good prediction results have been achieved, also. Therefore, in order to carry out metallogenic prediction and prospecting in Hadamengou gold field, it is suggested to adopt comprehensive geophysical and geochemical methods and techniques. The main assemblages are geology + CSAMT, MT, SIP + structural superimposed halo + drilling verification; (2) Three-dimensional geological modeling and Three-dimensional prospecting prediction. Three-dimensional geological modeling is the premise and foundation of deep prospecting and prediction. Establishing three-dimensional regional geological model and typical deposit geological model is a technology of integrated modeling using multivariate data, including known geological, prospecting engineering, geophysical, geochemical and remote sensing data. Three-dimensional prospecting prediction is supported by three-dimensional visualization technology, guided by prospecting model, based on three-dimensional geological structure model, extracting favorable metallogenic information for systematic analysis, delineating favorable areas for deep prospecting with the best combination of favorable metallogenic information, and realizing the positioning and quantitative three-dimensional visualization prediction of mineral resources.

Through the above, the deep prospecting methods of Hadamengou large gold concentration area in recent years are summarized as follows: (1) Comprehensive study of existing data is the basis and prerequisite for deep prospecting. Before carrying out the investigation, collect all kinds of geological, geophysical, geochemical and remote sensing data in the study area as far as possible, conduct comprehensive research, establish the focus of work and the methods used for mineralization prediction, and draw up feasible work plans; (2) Targeted and effective methods of prospecting and prediction are the key to improve prospecting effect. Using new methods and technologies boldly, such as three-dimensional visualization technology, remote sensing technology and advanced geophysical and geochemical exploration technology, can multiply the prospecting hit rate. The accuracy and prospecting efficiency of deep exploration can be greatly improved by utilizing the advantageous geological information in the past and utilizing the new technologies of deep exploration, such as geology, geophysical prospecting, geochemical prospecting and remote sensing; (3) The development of computer science and GIS technology provides convenient conditions for the integration, analysis and processing of various data, the development of three-dimensional geological modeling and metallogenic prediction by using the three-dimensional visualization prediction of mineral resources.
visualization technology platform. It makes the expression of the process and results of the comprehensive geological analysis more intuitive and vivid, and all kinds of data processing more efficient, but it really realizes the omni-directional expression and prediction of three-dimensional geological factors. Comprehensive metallogenic prediction still needs to be improved; (4) Drilling is the best means to verify deep target area. Through drilling verification we can check the effectiveness of the prospecting and prediction methods, judge the correctness of the three-dimensional visualized geological model and the delineation of ore-forming target area, and use the drilling results to modify the three-dimensional geological model; (5) Deep prospecting in mineral concentration area is a systematic project, involving the comprehensive application of geophysical, chemical, remote sensing and other methods and technologies. All working methods must be carried out in an orderly manner and closely coordinated in order to achieve actual results. The basic idea of field work is to synthesize the past data, to deploy the comprehensive methods and technical means of prospecting and prediction, to integrate data modeling, to synthesize model, to synthesize three-dimensional prediction, to verify and evaluate deep prospecting. The work flow is divided into five stages: pre-research, basic investigation, special investigation, three-dimensional modeling and prediction, verification and comprehensive evaluation. The purpose is to find all kinds of prospecting information in an all-round way to delineate deep prospecting targets.

Key words: Hadamengou gold field, deep prospecting methods, three-dimensional geological modeling, metallogenic prediction

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References

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