

## **Multi-source and multi-dimension geochemical analyses for deep exploration targets in Dashui Au deposit,China**

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The Au deposit generally has complex geological setting and metallogenic progress, including mineral origin/source and ore-forming liquid path and mineral reserve space of gold in world-class Qinling orogenic belt, China. The multi-source and multi-dimension geochemical analyses can be used to identify and extract key ore-controlling and ore-forming geological bodies in three dimensional (3D) space by mathematical modeling and 3D geometry modeling, i.g., ore-forming stratum, fault and intrusion in the study.

The Dashui deposit is a large Au deposit, located in western Qinling orogenic belt of China. The complicated orogenic and intrusive and metamorphic hydrothermal processes in Indo-chinese epoch make the vein-type Au deposit complicated. So far, the early exploration and mining engineering datasets are limited the shallow subsurface, the maximum depth is 400m, the geometry of Au orebody at depth is not clearly, and the metallogenic genesis/model is uncertainty by the deposit chemistry datasets. To summarize the orebody geometry and features in 3D space for deep exploration and quantitative assessment of the Au deposit, the original halo litho-geochemistry and fluid inclusions of ore were analyzed. The methodology is summarized as follow: (1) Chronology analyses were used to extract the ore-forming date and the ore-controlling geological intrusion date; litho-geochemical analyses were used to derive the halos of ore-forming and industrial orebodies; (2) 3D geological modeling using multiple mining and exploration cross-sections and borehole dataset; (3) the metallogenic model analyses combining the 3D geological model and 3D orebody model; (4) The trend modeling of the temperature using the fluid inclusions of ore assay by kriging interpolation methods, the 3D grade(Au) and Cu/Pb ratio modeling compared the geological model; (5) The 3D targeting combining multiple geochemical models and 3D geological body models.

The research results show that metallogenic process can be delineated combining 3D geological modeling and 3D geochemical modeling, and the potential exploration targets can be extracted by compared the known 3D orebody models with the multiple 3D geochemical models in study area.

**Keywords:** 3D geological modeling; 3D geochemical modeling; exploration targeting; Dashui Au deposit.