A Big Earth Data Platform for Three Poles

**Test and analysis of H, O and s isotopes of tiegelongnan and other deposits in duolong ore concentration area**

1、Description

Tiegelongnan porphyry epithermal copper (gold) deposit is located in duolong porphyry area north of Bangong Nujiang suture zone, Tibet, China. The mineralization is mainly composed of several stages of Jurassic sedimentary sandstone and diorite and granodiorite porphyry dyke, with intrusion time ranging from 123 to 116 ma. Hydrothermal alteration is characterized by alunite kaolinite dickite superimposed quartz Muscovite pyrite and biotite alteration zones. Porphyry chalcopyrite pyrite ± molybdenite (phase 1) mineralization is related to biotite alteration. The mineralization of porphyry chalcopyrite bornite (stage 2) and glauconite (stage 3) is related to quartz Muscovite pyrite alteration formed at about 121 ma. It is composed of albite porphyry (Ma-5) and chalcopyrite (Ma-5) and hydrothermal porphyry (ma-6) and chalcopyrite (ma-6) in the stage of mineralization. Fluid composition is related to Muscovite, average δ 18O is 8.9 ‰, δ D is − 56 ‰, indicating the source of magmatic water. Fluid in equilibrium with quartz vein δ 18O composition decreased from 6.7 ‰ to 2.3 ‰, which may be the result of water rock isotope exchange. Quartz fluid inclusion δ D values ranging from − 50 to − 84 ‰ are partially lower than those obtained in Muscovite alteration fluid, which may be the result of H fractionation during fluid inclusion fracture. Fluid composition balance and alunite yield in hyperthermic stage δ 18O − 1.2 to 2.7 ‰, δ D − 71 to − 51 ‰, n = 11, and δ 18O is between − 2.5 and 2.9 ‰, δ D is between − 72 and − 51 ‰ This shows that alunite and type I kaolinite are formed by the mixing of magma and high-altitude Cretaceous atmospheric precipitation. Late type II and type II III kaolinite (filled with alunite and quartz vein) fluid δ 18O and δ The D value is plotted along the mixing line between magma and low altitude Cretaceous atmospheric precipitation, which may be after erosion and plateau subsidence. Porphyry mineralized sulfide phase 1 chalcopyrite and pyrite δ 34S value is between − 5.8 and 0.9 ‰, and the average fluid δ 34sh2s = − 2.5 ‰ (n = 10), while chalcopyrite in stage 2 ranges from − 8.7 to − 3 ‰, with an average of δ 34SH2S=−5.6‰（n=5）。 Sulfide phase 2 fluid δ 34sh2s value is lower than stage 1, indicating that chalcopyrite bornite mineralization was formed under higher oxidation conditions than chalcopyrite pyrite mineralization. Alunite δ The 34S value is between 11 and 18.3 ‰ (n = 8), and the associated sulfide is grade 4 pyrite δ 34S values range from − 32.2 to 5.4 ‰. The S isotope imbalance in alunite pyrite pairs may be due to the rapid cooling and retrograde S isotope exchange during the late sulfide emplacement. Epithermally mineralized sulfide stage 4 s equilibrium pyrite (− 14.9 to − 9.5 ‰), stage 5 chalcopyrite (− 11.6 to − 8.2 ‰) and stage 6 (− 5.4 to − 2.6 ‰) show δ The increase of 34S value indicates that the composition of epithermal fluid evolves to more reduction conditions.  
The experiment was entrusted to the Queen's isotope research center of Queen's University of Canada and the microanalysis Laboratory of Memorial University of Canada. The experimental data are of good quality. Representative core samples were collected from the East-West section and several other boreholes. Separate biotite (n = 1), white mica (n = 5), quartz (n = 13), alunite (n = 10) and kaolinite (n = 12) for O and H isotopic analysis, and separate alunite (n = 10), pyrite (n = 5) and chalcopyrite (n = 4) for S isotopic analysis of conventional minerals; Eight polished slices were prepared for in-situ sulfur isotope analysis of pyrite (n = 16) and chalcopyrite (n = 10).

2、Keywords

Theme：Alunite,Kaolinite,Meteoric water,Porphyry,SIMS S isotope,Stable isotope,Others  
Discipline：Solid earth  
Places：Bangong-Nujiang suture zone, Tibet  
Time：2018-2021

3、Data details

1.Scale：None

2.Projection：

3.Filesize：0.2MB

4.Data format：None

4、Space scope

|  |  |  |
| --- | --- | --- |
| - | north：32.89 | - |
| west：83.49 | - | east：83.54 |
| - | south：32.87 | - |

5、Time frame:2018-06-30 16:00:00+00:00--2021-08-14 16:00:00+00:00

6、Reference method

References to data:

YANG Chao , WANG Liqiang . Test and analysis of H, O and s isotopes of tiegelongnan and other deposits in duolong ore concentration area. A Big Earth Data Platform for Three Poles, doi:10.11888/SolidEar.tpdc.2720712022

References to articles:

Yang, C., Georges, B., Tang, J.X., Song, Y., & Zhang, Z. (2020). Hydrothermal fluid evolution at the Tiegelongnan porphyry-epithermal Cu(Au) deposit, Tibet, China: Constraints from H and O stable isotope and in-situ S isotope. Ore Geology Reviews, 125.

7、Supporting project information

National Key R&D Program of China

8、Data resource provider

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