1 Geology of the Baogutu Deposit

The west Junggar, located in the eastern part of the Junggar—Balkash metallogenic province, is an important constituent of the central Asian metallogenic domain (CAMB, Zhu et al., 2007). Two gold deposits concentrating areas have been recognized in west Junggar: Hatu-Sartohy and Baogutu concentrating areas, locating in north and south sides of NE-trending Darbut faults, respectively. The Baogutu region locates in south side of Darbut fault. Granitic to dioritic stocks and dykes are intensively distributed in Baogutu region. Zircons separated from the porphyry were dated to be 310 to 320 Ma using SHRIMP and LA-ICP-MS methods (e.g., Wei et al., 2011; Shen et al., 2012). The diorite dykes expose in NE-trending faults in stocks or Lower Carboniferous outside of the stocks. The age of these dykes (310-314 Ma, Tang et al., 2010) overlap the late stage of the porphyry.

The Baogutu gold deposit is located ~15 km SW from the porphyry Cu deposit. It is hosted within the Lower Carboniferous Baogutu Formation. The tuff, tuff siltstone and silt-bearing mudstone are the wall-rocks of most Au-bearing veins. In Baogutu gold mine, there are lots of quartz diorite and diorite dykes crosscut the Baogutu Formation together with the gold-bearing veins. Spatial relationships between gold-bearing veins and dykes were investigated underground. 1. They are hosted in the same fault, the gold-bearing vein occurring in hanging wall, footwall of the dyke, or crosscutting the dyke; 2. They are controlled by two faults, parallelizing to each other in space, with a horizontal distance of 20 cm to more than 1 m. Most of the Au-bearing veins are lensoid or ribbon-like in morphology, dipping to 301 to 328°, at angles of 70 to 77°. Some veins reach 400 m in depth with lengths of 10 to 150 m and planar thickness of 0.5 to 3 m. Gold grade is highly variable, from ~1 g/t to more than 100 g/t. The Au-bearing veins are composed of gold-bearing quartz veins and mineralized host rocks. Three kinds of quartz veins have been recognized in Baogutu gold mine: pyrite—quartz vein, stibnite-quartz vein and native arsenic vein (An et al., 2009; 2010).

2 Classification of the Baogutu Gold Deposit

The geological and geochemical characteristics of the Baogutu gold deposit mostly consistent with the intrusion-related gold deposit as described by Lang et al. (2000) and reviewed by Baker (2002). The intrusion nearby the Baogutu gold deposit is moderately reduced (ilmenite-series, Wei et al., 2014), which is alike with that in intrusion-related system. In intrusion-related system, there exists the Au-As-Bi-Mo-W mineralization as sheeted veins and dissemination in intrusion or as large veins in contact zone, and epizonal Au-As-Sb mineralization hosted in dykes or faults as veins (Lang et al., 2000). The Au-As-Bi mineralization has been recognized in Baogutu region, hosted in intrusion-related faults, and showing very close relationship between gold mineralization and native bismuth (Zheng et al., 2009). The Baogutu gold deposit with accessories of As and Sb should be representative of the epizonal gold deposit in intrusion-related gold system. The gold-bearing veins in Baogutu gold deposit expose in 1-3 km external of the intrusions, and the gold mineralization was also coincident with the intrusions, showing their possible genetic relationship. Many dioritic dykes hosting or distributed together with gold-bearing quartz veins and veinlets, the metal suite of Au-As-Sb-Ag, the ore mineral assemblage of pyrite-arsenopyrite-stibnite-native arsenic and the dominant alteration of quartz, carbonate and sericite in Baogutu, are consistent with the geological features in typical epizonal gold deposit, such as Donlin Creek in Alaska and Brewery...
The gold mineralization depth (1-2 km), temperature (150-300°C) and occurrence of visible gold with arsenopyrite and arsenic-rich pyrite in Baogutu might warrant the classification of the Baogutu deposit as an epizonal gold deposit in intrusion-related gold system. Fluid inclusions in Baogutu are low salinity NaCl-H₂O inclusions containing small amount of CO₂ (Qi et al., 1992), very similar to later stage fluid in intrusion-related system (Baker, 2002).

Acknowledgement

This work is sponsored by National Natural Science Foundation of China (41203032) and autonomic research foundation of State Key Laboratory of Continental Dynamics.

References


