IGGCAS SEG Student Chapter
Shuangjianzishan Super-large Ag-Pb-Zn-Sn-Cu Epithermal deposit Field Trip 2019
Field Trip Report

22 August - 28 August 2019
Introduction

In August 2019, we spent a week visiting Shuangjianzishan Super-large Ag-Pb-Zn-Sn-Cu Epithermal deposit, with a group of 4 students from three universities. The Shuangjianzishan Ag-Pb-Zn-Sn-Cu Epithermal deposit is located in Chifeng, Inner Mongolia, China. The SEG student chapter was awarded $1000 USD through the Stewart-Wallace fund, further financial support was supported by the National Key R&D Program of China (2017YFC0601306).

Participants

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Field trip group in the Shuangjianzishan underground mine. Photo by Zhiyuan Li.
Shuangjianzishan Super-large Ag-Pb-Zn-Sn-Cu Epithermal deposit, Inner Mongolia, China

1. Introduction

The southern segment of the Great Hinggan Range Metallogenic Belt in Inner Mongolia, NE China lies in the easternmost segment of the Central Asian Orogenic Belt (Fig.1). Many newly discovered large and super-large Ag-Pb-Zn±Sn±Mo±Cu deposits have made this region become the most important Ag-Pb-Zn polymetallic metallogenic belt in northern China, such as Shuangjianzishan Ag-Pb-Zn deposit (Liu et al., 2016), Weilasituo Ag-Pb-Zn-Sn deposit (Liu et al., 2016), Baiyinchagan Sn-Cu-Pb-Zn-Ag deposit (Yao et al., 2017), Fuxingtun Ag-Pb-Zn deposit (Chang, 2018) and so on.
The super-large Shuangjianzishan Ag-Pb-Zn epithermal deposit (12900t@129g/t Ag, 4Mt@1.2% Pb-Zn) is the largest silver deposit in China (Wang et al., 2019). Drilling have revealed multi-phase granitic intrusions with Mo mineralization adjacent to Ag-Sn-Cu and Ag-Pb-Zn veins in the Shuangjianzishan ore district. What’s more, one of the dominant Ag-bearing minerals is canfieldite (Ag₈SnS₆) (Zhai et al. 2018). Canfieldite is a rare silver-bearing sulfosalt mineral and always occurs in the Sn-Ag deposit, like Cerro Rico de Potosí, the world’s largest silver orefield. This system offers an excellent opportunity to discuss about the temporal and genetic relationship between magmatic hydrothermal Sn ± Cu ±Mo and Ag-Pb-Zn system.

2. Porphyry Mo Mineralization

Porphyry Mo Mineralization is commonly centered over, around, and on the top of the granitic porphyry, granitic dykes (Fig.5). Hydrothermal alteration is characterized by an assemblage
comprising quartz, sericite, K-feldspar, calcite. The ore minerals are molybdenite, pyrite, as well as minor sphalerite. The Mo mineralization occur as veins, stock works, and veinlets in altered granitic porphyry, granite and shale (Fig.6).

Figure 5. Granitic porphyry and dyke

Figure 6. The Mo mineralization occur as veins, stock works in altered shale and granite

3. Vein-type Ag-Sn-Cu Mineralization

Drilling revealed several Ag-Sn-Cu vein orebodies between the porphyry Mo mineralization and Ag-Pb-Zn Veins. They are hosted by Permian shale, slate and Jurassic volcanic rocks. They are mainly controlled by NW-striking faults. The ore minerals are chalcopyrite, sphalerite, galena, pyrite and arsenopyrite (Fig.7). Hydrothermal alteration minerals include quartz, calcite, sericite and chlorite (Fig.8).

Figure 7. The ore of vein-type Ag-Sn-Cu mineralization
4. Vein-type Ag-Pb-Zn Mineralization

These veins are also hosted by Permian shale, slate and Jurassic volcanic rocks. The vein commonly strike NW and NE, the NE veins cut across the NW veins. The main ore minerals are sphalerite, galena and widespread visible silver minerals, like native silver (Fig.9), argentite (Fig.10) and pyrargyrite. Hydrothermal alteration is dominantly characterized by an assemblage of quartz, calcite, illite, dickite, chlorite, and sericite. The bladed quartz is well developed (Fig.11).

Figure 8. The typical alteration of vein-type Ag-Sn-Cu mineralization

Figure 9. Native silver

Figure 10. Argentite

Figure 11 Typical Ag-Pb-Zn vein, bladed quartz.

References

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