Geophysical Research Abstracts
Vol. 20, EGU2018-12032, 2018
EGU General Assembly 2018

High Oxygen Fugacity and Slab Melting Linked to Cu Mineralization: Evidence from Dexing Porphyry Copper Deposits, Southeastern China

Hong Zhang
Northwest University, Department of Geology, China (zhanghong820426@163.com)

The Dexing porphyry Cu deposit is the largest Cu deposit in eastern China, with total reserves of 8.4 Mt Cu, the source of the ore-forming materials has been obscure and hotly debated. Based on the previous work, this study focus on the open pit and drilling hole fine sampling, using zircon and apatite as well as the micro-region in situ trace elements, isotopes and other geochemical characteristics, to compare the differences between ore-bearing porphyry and wall rocks, aimed to explore the mineralization source of Dexing porphyry copper deposit. The intergrowth of hematite and magnetite (sepcularite) is widely developed in Dexing Porphyry copper deposit, which represents the high oxygen fugacity conditions for the formation reached the ΔFMQ+2 buffer. The porphyry and wall rocks from Dexing porphyry copper deposit are obviously different, the samples FJW-13 and FJW1702-16 from Fujiawu drill hole represent the epimetamorphic phyllite of the Shuagqiaoshan Group, get the U-Pb age about 830Ma and 899Ma respectively, it is also represent the Hengyong Group and the Jilin group age that invade the Dexing copper deposit area. The age of Porphyry is mainly concentrated in 168∼173Ma. The distribution of εHf(t) andδ18O in Porphyry and wall rocks is obviously different, among which the distribution of porphyry is more concentrated, theεHf(t) andδ18O range are 4.58∼5.51, 5.3∼5.6‰ theεHf(t) andδ18O distribution are different from surrounding rocks, respectively, -7∼16,7.4∼ 7.9. Combining model ages, εHf(t) andδ18O with adakitic porphyries such as high oxygen and island arc properties, this difference shows that the Shuangqiaoshan group cannot be the main mineral source of porphyry copper deposit, the porphyry may have the mantle material joining, In the process of upwelling, it was mixed by the Shuangqiaoshan Group.
Some of apatite grains in Dexing porphyry present high Cl content. Based on the extreme incompatibility characteristics of Cl, these "high Cl" grains indicate that the ore-forming fluids may origin from the mantle or subduction zone. The porphyry apatite has higher Th, U and lower Sr and REE contents, which differs from the Shuangqiaoshan wall apatite characteristics. Meanwhile, the range of the 87Sr/86Sr of apatite in Porphyry samples is 0.7042∼0.7088, and this 87Sr/86Sr isotope scale represent the arc-type environment. The 87Sr/86Sr of apatite in wall rocks is 0.7065∼0.7183, it is obviously different from those porphyry apatites, which has the characteristics of continental crust.
The same stage pyrite and chalcopyrite have been pick out for sulphur isotope, and the results showed that the δ34S fractionation of pyrite and chalcopyrite in both Porphyry and wall rocks are similar. The results show that the hydrothermal fluids invading into porphyry and wall rocks are the same source during Porphyry copper mineralization, and the wall rocks are only disturbed by hydrothermal fluids, which may come from the upper mantle or deep crust, then mixed by the continental crust.