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The Formation Age of Tibet Rutog-Duolong Magmatic Arc and Its Associated Mineralization System

ZHANG Zhang^{1,*}, GENG Quanru¹, PENG Zhimin¹ and GUAN Junlei^{1,2}

¹ Chengdu Center, China Geological Survey, Chengdu, Sichuan Province 610081, China

² Chengdu University of Technology, Chengdu, Sichuan Province 610081, China

The Bangong-Nujiang suture zone is one of the most important suture zones in the center of the Qinghai-Tibetan Plateau (Allégre C J et al., 1984; Yin A et al., 2000). This suture zone and neighboring regions, on both north and south sides, together constitute the Bangong-Nujiang metallogenic belt. This belt contains several magmatic arcs related to the evolution of Bangong-Nujiang Tethys Ocean, the back-arc basin and the mafic-ultramafic rocks of the oceanic crust. There is a magmatic arc in the north of the belt, formed in Middle Jurassic to Early Cretaceous periods. This magmatic arc discontinuously outcropped along the north part of the Bangong-Nujiang suture zone, from Rutog in the west to Duobuza in the east. It is a magmatic response to the northward subduction during the closing of the Bangong-Nujiang Tethys Ocean (Zhang Z et al., 2011; Geng Q R et al., 2011, 2012 a, b). Up until 2012, several large representative ore deposits have been found associated with this arc, including: Duobuza copper, Caima iron, Qingcaoshan copper and Fuye copper polymetallic deposits of silver and iron. In addition, many small to medium sized copper, iron, titanium and other metal ores have been reported. All of these discoveries indicate a bright future of prospecting. Based on different geological features, this arc has been divided into two prospecting areas: Rutog-Fuye prospecting area on the west and Duobuza prospecting area on the east. According to our studies on the geochronology and mineral types, we conclude the following:

1, The magmatic activities of the mineralization can be divided into two stages. The first stage was the Middle-Late Jurassic period, 173Ma-149Ma, when the magmatic arc was first formed. Larelaxin, Caima and east of Duobuza ore concentrated area are the representatives. Caima and Larelaxin's rocks are close to each other in location and also were formed in similar periods: 164Ma-168Ma vs. 159Ma. The rocks to the east of the Duobuza

ore concentrated area, in the region of Chaerkangcuo to Bulacuo, are 149Ma-150Ma. Amongst the three areas, only Caima has been discovered with large iron ore, while the others only show iron mineralization. These first-stage ore concentrated areas were formed at different times. The Rutog-Fuye prospecting area was formed earlier than the Duobuza prospecting area. The second stage was Early Cretaceous, 108Ma-122Ma, which represents the peak period of this magmatic arc formation. This stage's magmatic rocks are widespread over the study area. The Fuye and Duobuza ore concentrated areas are the representatives. Fuye's age is 118Ma-120Ma. Iron ore deposits have been found in the past and recently, copper-silver polymetallic mines have been discovered. The Duobuza ore concentrated area contains several hidden ore bodies that formed in 108Ma-120Ma (Zhu X P et al., 2011). It is also possible that other Early Cretaceous hidden ore bodies exist in the arc. The magmatic activities of two stages overlapped each other in some areas. For example, in the center zone of the arc, Larelaxin and Caima represent Middle Jurassic magma activity, while Jipusandui and Fuye, which are on the edges of Larelaxin and Caima, show Early Cretaceous magma activity. Meanwhile, Duobuza has both two stages' magma activities.

2, Two types of mineral resources have been identified: copper (polymetallic) ore and iron ore deposits. In the Duobuza prospecting area, large amounts of copper (polymetallic) ore bodies have been reported, such as Bolong, Duobuz and Naruo ore bodies. Qingcaoshan and Xianqianxiang copper ore on the west are also considerable in size. In the Rutog-Fuye prospecting area, the representative copper (polymetallic) ore is Fuye body. In addition, several mineralization areas in this prospecting area have also been recognized, such as Zapu and Mushirebuka. The aforesaid prospecting areas both have large-scale copper (polymetallic) ore deposits,

* Corresponding author. E-mail: hzxzjlg@gmail.com

indicating that this magmatic arc has a substantial mineralization condition. These copper (polymetallic) ores are mainly contained in hidden bodies and they are mostly porphyry associated with gold and silver, while others are skarns. For iron ores, they could be found all over the study area. They are mostly skarns while a few are ore bodies. Caima is the only large ore deposit in this type. These two types of mineral resources are both concentrated in certain areas, which can be used as a clue for future prospecting.

3. Key zones in prospecting areas are identified in this study. The Rutog-Fuye prospecting area is an east-west extension. Fuye copper polymetallic deposits of silver and iron are in the east. Many mineralization areas are found in surrounding locations, such as Pugeyaerda, Yerong, Mushirebuka, Zalu copper mineralization and Gaerda ilmenite mineralization. This suggests that the east part of this prospect area has a good mineralization condition. More attention can be placed on it in the future. Also, the area between Larelaxin to Caima shows iron mineralization, which can be viewed as target areas for iron ore prospecting. The Duobuz-Qingcaoshan prospecting area is a north-south extension. Copper mineralization areas are found in its south part, which could be another key zone of prospecting. In addition, Qingcaoshan has similar features to the Duobuz ore

concentrated area, in aspects such as formation age, country rock age and lithology. Qingcaoshan could therefore be another interest area for prospecting. In the north part, there are Anmuakan, Qiguwowa and Laeza iron ores, displaying zonation with copper ores. Because very little research has been done in this area and it is far on the north, it is not clear that whether it belongs to the same magmatic arc metallogenetic evolution system. Fuye and Duobuz are polymetallic copper ores with the same magma age but different in country rock eras and lithologies. It is unsure whether the same magmatic arc activity in the Early Cretaceous period having provided all these ore-forming elements. To verify it, further research needs to be done on the Jipusandui magma rock that formed during the same period.

In summary, the Rutog-Duolong magmatic arc is formed first in the Middle Jurassic period and the magmatic activity reached the peak in Early Cretaceous. The main mineralization period for copper (multi-metal) is 110Ma-120Ma, and this mineralization can be seen in the whole region. Iron mineralization spent a longer period, where mainly around 160Ma-170Ma.

Keyword: Bangong-Nujiang, Metallogenetic belt, Geochronology, Mineral, Magmatic arc.

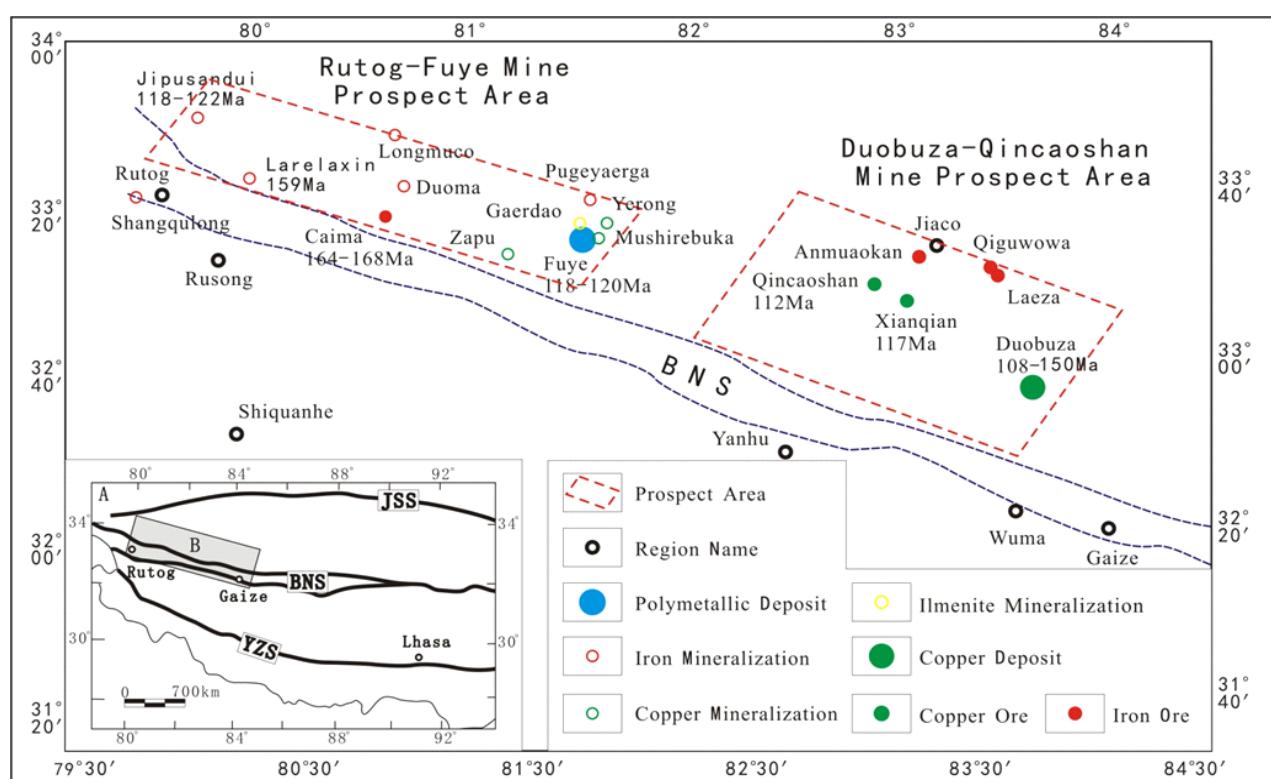


Figure 1 Locations of ore deposits and mineralization areas in this study
BNS=Bangong-Nujiang suture; YZS=Yarlung Zangbo suture; JSS=Jinsha suture

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