



## Zircon U-Pb Chronology and Geological Significance of Mesozoic Volcanic Rocks from Naozhi Copper-Gold Mining Area

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**Abstract:** The Naozhi copper-gold mining area is located in the northern part of Yanbian area and the eastern part of the continental margin of northeastern China. It is just in the superposition and transformation of the Paleo-Asian and Circum-Pacific tectonic domains. This area is a compounding tectonic-magmatic-metallogenic area which has experienced many tectonic activities such as the closure of the Paleo-Asian Ocean, the matching of the North China plate with the Jiamusi-Xingkai plate, and the activity of the Paleo-Pacific plate (Peng YJ, 2002), where the gold-copper mineralization is closely related to Mesozoic volcanic belt. In order to reveal the genetic relationship between the deposit and the volcanic rocks in the mining area, we have carried out volcanic geology, petrography and zircon U-Pb chronology studies related to the volcanic rocks. The results reveal that:

The Mesozoic volcanic rocks exposed in the mining area are mainly andesite, trachyandesite and overlying tuff that has an

unconformity contact with the andesite (Fig. 1-a). There are about 20m basal conglomerate beds between them. A large number of prismatic grey-green andesite breccias have been found in the tuff (Fig. 1-b). Therefore, we conclude that the two sets of volcanic rocks were formed in different ages. The obvious sedimentary discontinuity indicates that the formation of tuff is obviously later than the crystallization of andesite lava.

Typical rocks of the two formations mentioned above (Fig. 1-c, d), including crystal debris tuff (NZ18-1), breccia tuff (NZ18-4, Fig. 1-c) and andesite (NZ18-6, Fig. 1-d), have been studied for zircon U-Pb chronology. The age of the crystal debris tuff is  $(107.5 \pm 1.5)$  Ma ( $N=10$ ). The age of the breccia tuff is  $(107.6 \pm 2)$  Ma ( $N=7$ ). Both correspond to the magmatic events in late Early Cretaceous (Fig. 2-A, B, D). The age of the andesite can be divided into two groups. The weighted average age of the effective sites of the first group is  $(125.8 \pm 2.5)$  Ma ( $N=3$ ), which corresponds to the magmatic events in early Early Cretaceous

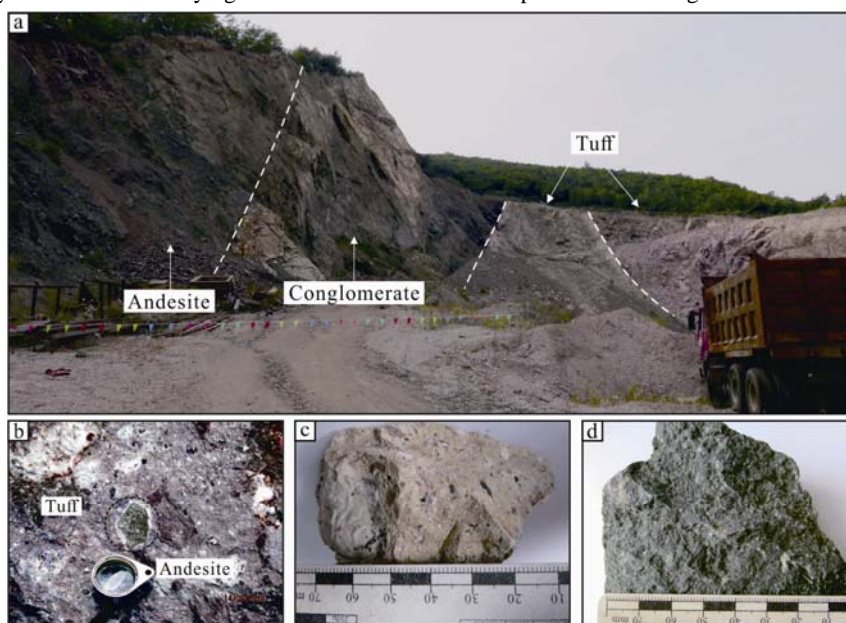


Fig. 1. Field geological relationship and hand specimen photos of the Mesozoic volcanic rocks in Naozhi copper-gold mining area. (a) Field contact relationship between andesite and tuff; (b) Breccia tuff contains andesite breccia; (c) Breccia tuff specimen; (d) Andesite specimen.

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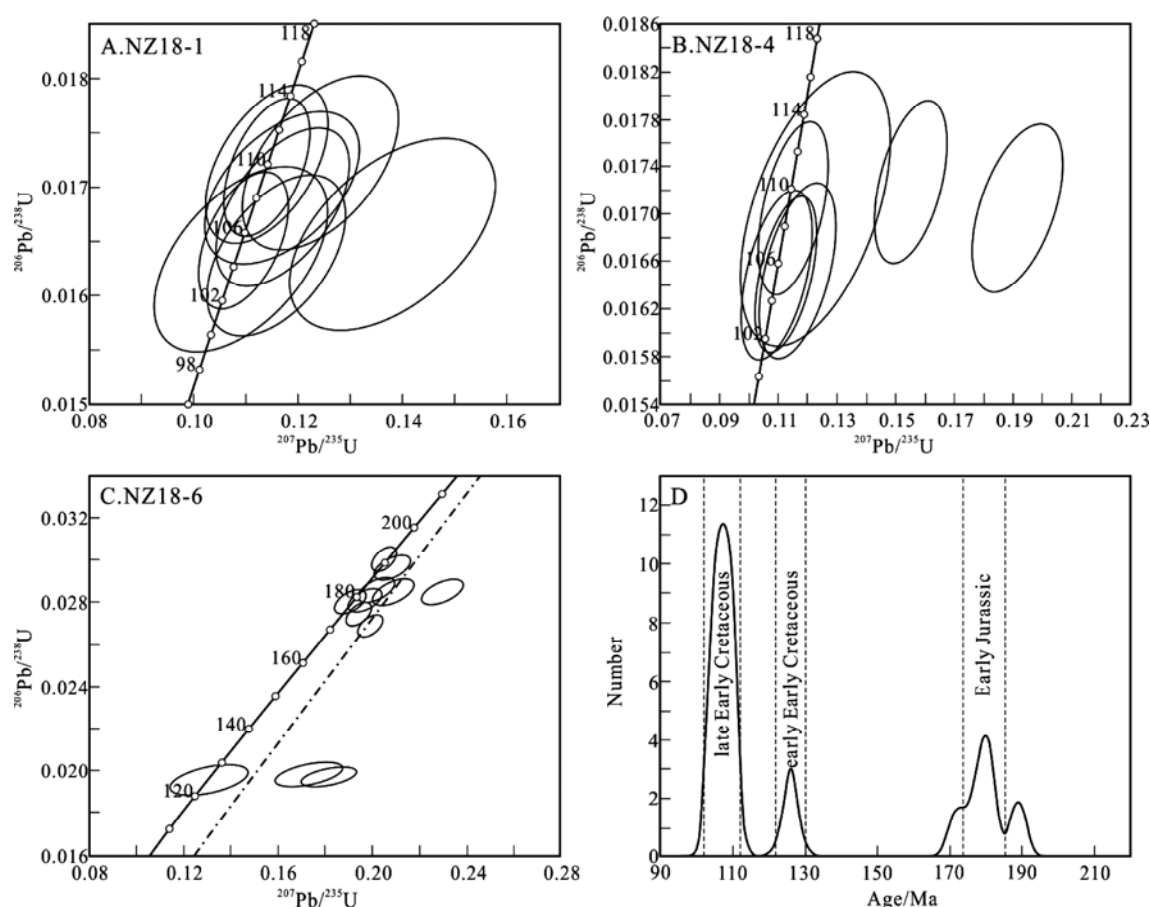


Fig. 2. Zircon U-Pb age concordia diagram (A, B, C) and age diagram (D) of the tuffs and andesite.

(Fig. 2-C, D). The weighted average age of the second group is  $(179.9 \pm 4.6)$  Ma ( $N=9$ ), which is the magmatic zircon captured from the wall rock (granodiorite of Early Jurassic).

The previous zircon U-Pb dating of the trachyandesite is  $(130 \pm 2)$  Ma (Liu JL, 2015), and the previous dating result of the mineralization is  $(127.8 \pm 0.2)$  Ma (Zhou YC, 1992). The authors believe that the stratas of Mesozoic volcanic rocks in Naozhi copper-gold mining area are in turn andesite, trachyandesite of Ciweigou formation in early Early Cretaceous and tuff of Jingouling formation in late Early Cretaceous. There are three stages of magmatism during the Mesozoic: the Early-Middle Jurassic (190–173 Ma), the Early Cretaceous (133–106 Ma) and the Late Cretaceous (97–88 Ma) (Peng YJ, 2002). The Mesozoic volcanic rocks in the Naozhi copper-gold mining area are the products of the second stage. It reflects that the eastern Yanbian area experienced at least two plate subductions in the Early Cretaceous and formed the continental extensional condition corresponding it. Metallogenesis is closely related to the early stage volcanism.

**Key words:** Mesozoic volcanic rocks, Zircon U-Pb chronology, Naozhi copper-gold deposit

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## References

- Liu, J.L., Sun, F.Y., Lin, B.L., Wang, G., Xu, Q.L., and Ao, Z., 2015. Geochronology and geochemistry of Naozhi gold deposit in Yanbian region, southern Jilin Province and its geological significance. *Journal of Jilin University: Earth Science Edition*, 45 (5): 1394–1404.
- Meng, Q.L., Zhou, Y.C., and Chai, S.L., 2001. *Porphyry-hydrothermal copper-gold deposits in eastern Yanbian, China*: 1–163.
- Peng, Y.J., Ji, C.H., and Xin, Y.L., 2002. Petrology and geochronology of the Paleo-Jilin-Heilongjiang orogenic belt in the adjacent areas of China, Russia and Korea. *Geology and Resources*, 11 (2): 65–75.

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