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Two mineralization events in the Wunuer Zn-Pb-Ag-Mo deposit in Inner Mongolia, NE China: Constrains from geochemical, isotopic, geochronological features

HONGYU LIU, WEI MEI AND BANXIAO RUAN

China University of Geosciences, Wuhan

Presenting Author: lhy@cug.edu.cn

The Wunuer Zn-Pb-Ag-Mo deposit is newly explored in the middle segment of the Great Xing'an Range, Inner Mongolia, NE China. Two mineralization events have been identified in this deposit, including an earlier magmatic-hydrothermal metallogenic event that was composed of the porphyry-stage Mo mineralization and the crypto-explosive breccia-stage Zn-Pb mineralization, and a later epithermal Zn-Pb-Ag mineralization event. Whole-rock geochemistry, magmatic and hydrothermal zircon U-Pb age, sphalerite Rb-Sr isochron age, S-Pb-Hf isotope, are presented for understanding of deposit genesis and mineralization process.

Magmatic zircon U-Pb dating reveals that the mineralized granite porphyry intrusion age (144.8 ± 1.2 Ma) is simultaneous to the ore-hosted volcanic-sedimentary rocks (Manketouebo Formation) depositing age (144 ~ 147 Ma). Whole-rock geochemistry reveals that they are both originated from a mantle-derived juvenile component assimilated by minor crustal material in a post-orogenic extensional setting. The magmatic-hydrothermal metallogenic epoch can be restricted to 144.8 - 139.3 Ma based on granite porphyry intrusion age and hydrothermal zircon U-Pb age. Sphalerite Rb-Sr isochron age indicates that the epithermal-stage mineralization age is 121 ± 2.3 Ma. The concentrated and positive $\delta^{34}S_{V\text{-}CDT}$ values (0.17‰ ~ 5.40‰) of sulfides, as well as uniform Pb isotope compositions of galena and granite porphyry intrusion, jointly imply a magmatic source of metallogenic materials for both the porphyry-stage mineralization and the epithermal-stage mineralization.