

Editorial

Editorial for Special Issue “Genesis and Evolution of Pb-Zn-Ag Polymetallic Deposits”

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Pb-Zn-Ag polymetallic deposits are complex and diverse. In the last dozen years or so, applications of high resolution in situ analytical techniques have contributed to a better understanding of the genesis and evolution of Pb-Zn-Ag polymetallic deposits. The contributions of this Special Issue report new data using state-of-the-art analytical techniques for Pb-Zn-Ag deposits, mainly from China, and with one from the Czech Republic.

The studied deposits from China include the main metallogenic belts from the southern Great Xing’an Range in NE China, the middle-lower reaches of Yangtze River in east China, the West Qinling orogen in central China, the Sichuan-Yunnan-Guizhou region and the Tibetan Plateau in SW China, and the East Kunlun Mountains in west China. The Shuangjianzishan Ag-Pb-Zn deposit, located in the Great Xing’an Range metallogenic belt, is the largest Ag deposit in China. New geochronologic, isotope geochemical, and fluid inclusion data from Shuangjianzishan’s Xinglongshan ore block [1] indicate that the ore-forming fluids were predominantly a mixture of Cretaceous magmatic and meteoric water, with fluid mixing as the dominant mechanism for mineral precipitation. The Huaobaote Ag-Pb-Zn deposit was also formed during the Early Cretaceous Epoch (136.3–134.3 Ma). The ore-forming fluid was dominantly a mixture of magmatic and meteoric water, with fluid mixing, cooling, and immiscibility as the primary mechanisms for mineral precipitation [2]. The Yinshan Pb-Zn-Ag deposit is located in the Middle-Lower Reaches of Yangtze River metallogenic belt. In situ sulfur isotopes imply that the mineralization was related to a granite of ~130 Ma [3].

The Fengxian-Taibai (abbr. Fengtai) ore field in the West Qinling orogen is an important Pb-Zn producer in China. Most previous studies suggested that the Pb-Zn mineralization resulted from Devonian sedimentary-exhalative processes. New geochronologic, stable and radiogenic isotopic, and trace element data indicate that the representative Qiandongshan-Dongtangzi Pb-Zn deposit is not the product of sedimentary-exhalative processes, but is rather the product of epigenetic magmatic hydrothermal fluid processes, driven by regional tectono-magmatic activities in the Late Triassic Epoch [4,5].

The Sichuan-Yunnan-Guizhou metallogenic belt, located on the western margin of the Yangtze Block, includes over 400 carbonate-hosted Pb-Zn-Ag deposits. The fluid inclusion and H-O-He-Ar isotopic data suggests that ore-forming fluids in the Maoping deposit are the result of mixing of metamorphic fluids from the Precambrian basement and basinal brines from the Youjiang Basin [6]. Similarly, the new data from the Maliping deposit suggest that the ore-forming fluids are derived from the mixing of deep sourced fluids flowing through the basement and organic-bearing basinal brines [7].

Studies of Pb-Zn deposits in the Tuotuohe region located on the northern Qiangtang Block of the Tibetan Plateau demonstrate that the ore-forming fluids are of medium-low temperature, medium-low salinity, and low density. They are the result of mixing of Cenozoic magmatic and meteoric water modified by wall-rock interactions. The ore-forming metals were transported in solution as chloride complexes and precipitated as a consequence of cooling, fluid mixing/dilution, and fluid-rock reactions [8].



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To the north of the Tibetan Plateau stand the Kunlun Mountains, and the Niukutou Pb-Zn skarn deposit is located in the East Kunlun. This deposit resulted from early hydrothermal fluids that migrated from deep plutons to the shallow marble, during which time these fluids evolved from high f_{O_2} and high temperatures to low f_{O_2} and low temperatures, as well as increasing pH and Mn contents [9].

The Příbram ore district within the Bohemian massif in the west-central Czech Republic is renowned for its uranium deposits, but Pb-Zn-Ag polymetallic deposits are also important. The study on the Bt23C Zn-Pb vein of the Bytíz deposit reveals three complex types/sources of aqueous fluids: early high temperature and high salinity fluids from an unspecified deep source, followed by low salinity and low temperature waters, likely infiltrating from overlying evaporated freshwater piedmont basins; and late high-salinity chloridic solutions that may be either externally derived marine brines, or local shield brines [10].

The genesis and evolution of Pb-Zn-Ag polymetallic deposits are unlikely to be elucidated completely in the near future, so more precise and systematic studies are needed to further advance our understanding of Pb-Zn-Ag polymetallic mineralization.

Conflicts of Interest: The authors declare no conflict of interest.

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