

## News and Highlights

## Super-Large Pb-Zn Deposits Discovered in Danaopo, Huayuan County, Hunan Province

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Geological Brigade 405 of Hunan Provincial Geology and Mineral Exploration and Development Bureau discovered the Danaopo and Yangjiazhai super-large Pb-Zn deposits through 5 years (2009–2014) of exploration in Huayuan County, Hunan Province. These deposits contain 208.4942 million tons of (332+333) class Pb+Zn ores and 4.8746 million tons of metal amounts, of which metal amounts of 333 class zinc are 4.1198 million tons and metal amounts of lead are 0.7548 million tons, associated with useful components of Cd, Ag and Se. In addition, the Limei, Qingshuitang and Yutang Pb-Zn deposits were proven before and this region has thus been ranked as a Pb-Zn ore resource base with a hundred-ton scale (Fig. 1).

This ore district is located in the Bamianshan fold belt

southeast of the Yangtze block and west of the Jiangnan uplift, and its strata, sedimentary formations and regional mineral deposits show significant control by the Baojing-Tongren and Yongshun-Cili deep faults. Since the Sinian, this area has developed fully platform-type cover, and tens of hundreds of meters of marine sediments were deposited, with no regional metamorphism. The lower Paleozoic sediments reach up to 4000 m, of which carbonate rocks are as thick as 1800 m, serving as the main ore-hosting rocks in the region (Fig. 2).

The Pb-Zn ores mainly occur in the Lower Cambrian Qingxudong Formation with a thickness of 300–600 m, and the orebodies are mainly hosted in thick limestone of the middle Qingxudong Formation. The rock sequence is

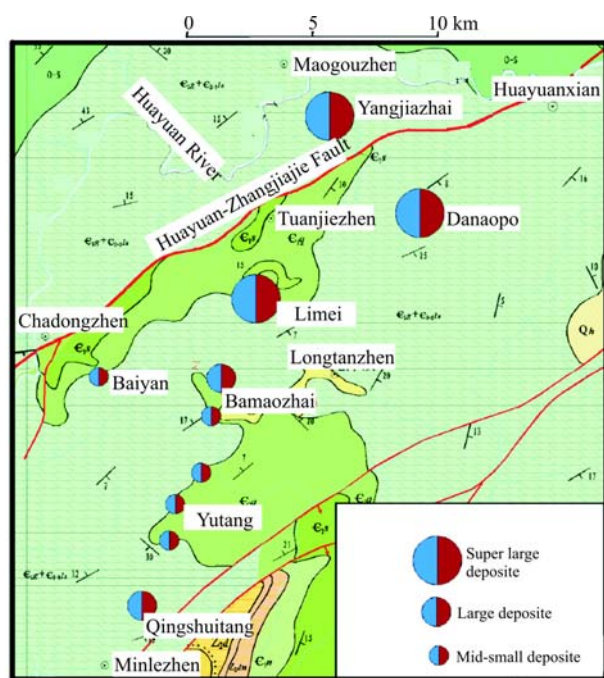


Fig. 1. Map showing distribution of Pb-Zn deposits in the Huayuan area of Hunan Province (modified from Geological Brigade 405 of Hunan Provincial Geology and Mineral Exploration and Development Bureau, 2014).

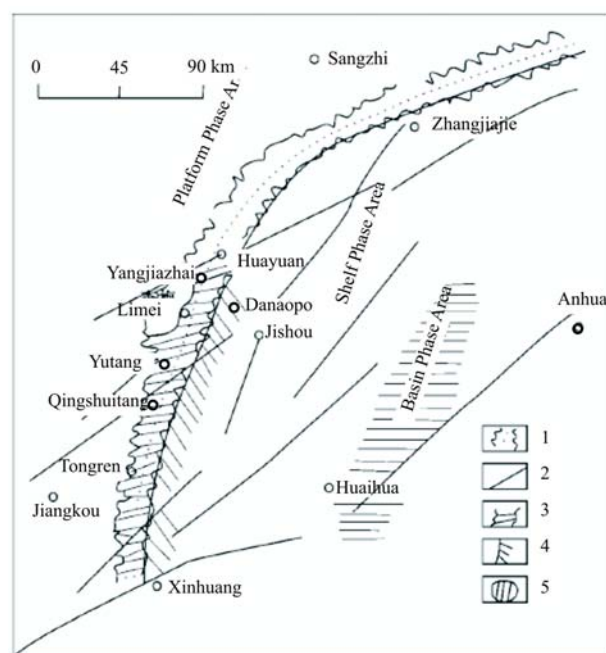


Fig. 2. Distribution sketch map of Pb-Zn deposit belt and lithofacies (modified from Luo Wei et al., 2009).

1, algal reef shoal facies of platform margin; 2, regional faults; 3, regional Pb-Zn mineralization belt; 4, regional mercury mineralization belt; 5, Yutang lead zinc mine.

from bottom to top micritic limestone, algae-rich limestone, sandy calcirudite, clastic algal-oid limestone, dolomitic limestone and dolomite, showing a gradual transition from limestone to dolomite. Small amounts of terrigenous silty sandstone and gypsum lenses can be observed locally.

The mineralization type of the Pb-Zn deposits is single-lead or single-zinc, with occasional symbiosis of lead and zinc. The mineralization displays a certain zonation. Clastic limestone near the algal shells mainly hosts the lead, followed by zinc, and algal limestone mainly hosts zinc, followed by lead. From algal reef of the reef-back saline basin to shoal facies, the zinc content decreases away from the reef facies, but lead content increases, and the shallow-water basin is dominated by lead; in a vertical direction, the lead and zinc content decreases from top to bottom. This corresponds well with the mineral formation sequence of pyrite, sphalerite and galena, indicating that the mineral precipitation process is very monotonous and narrow in scope, limited to a sulfide-carbonate stage.

Luo et al. (2009) suggested that the homogenization temperatures of the fluid inclusions from the Limei ore district were 85–60° for the early sphalerite, 140–115° for the late sphalerite, 130–85° for the early coarse-grained calcite and 260–215° for the late calcite, and the common temperature was 230–75°. The decrepitation temperature ranges from 380 to 250° for sphalerite and 305–290° for galena. This leads to the inference that this deposit is a

stratabound low-temperature hydrothermal one.

Isotopic composition of the Limei Pb-Zn deposit varies greatly. The  $^{206}\text{Pb}/^{204}\text{Pb}$  values lie between 17.067 and 19.315, averaging 17.96; the  $^{207}\text{Pb}/^{204}\text{Pb}$  values range from 14.240 to 16.512; the  $^{208}\text{Pb}/^{204}\text{Pb}$  values range from 34.360 to 41.913, averaging 38.29, indicative of a predominantly radioactive origin. During the Pb-Zn mineralization processes, the early crustal Pb and Zn materials entered into reduced water, and algae present made them accumulate, resulting in the increasing Pb and Zn background values in the ore-hosting Qingxudong Formation. In the late Caledonian period, with the resurrection of contemporaneous faults, the rising crustal Pb and Zn materials, and extracted crustal materials encouraged the enrichment of lead and zinc, forming veined and irregular orebodies.

## Acknowledgement

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## Reference

- Luo Wei, Yin Zhan, Kong Ling, Dai Ta-gen. 2009. Discussion on the geological features and genesis of the Limei Pb-Zn ore concentration belt in north-western Hunan Province. *Geological Survey and Research*, 33(3): 194–202(in Chinese with English abstract).

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