1 Introduction

The northeastern (NE) Yunnan, the core unit of Sichuan-Yunnan-Guizhou Pb-Zn polymetallic metallogenic province (SYGP), contains more than 300 Pb-Zn deposits and mineralized spots (Han et al., 2012) (Fig. 1). Most researchers agree on the migration of large scale Pb-Zn bearing fluids resulted in the formation of concentrated Pb-Zn deposits (Huang et al., 2004; Wu, 2013). However, the source, transport mechanism and geodynamic settings of the ore-forming fluids are controversial. This article focuses on the metallogenic mechanism of the Pb-Zn deposits in NE Yunnan by summarizing the geological features and collected age data.

2 Geological Features

There are many common features in the carbonate-hosted Pb-Zn deposits of NE Yunnan: (1) epigenetic-hydrothermal deposits with high ore grade (Zn+Pb≥15wt.%, generally); (2) usually associated with Ag and a range of other trace elements (Ge, Cd, In, Ga, and Tl) (Zhou et al., 2013); (3) hosted in carbonate rocks from Sinian to Permian, and below the Permian Emeishan flood basalts; (4) mainly controlled by thrust fault-fold structures and wall rock features, sharp contact developed between ore-bodies and surrounding rocks with clear boundary; (5) simple mineral assemblage, texture and structure in ores, mainly dense massive structure; (6) mineralization zonation from the floor of ore-bodies to the overlying rocks, with simple and limited wall-rock alteration (Han et al., 2012); (7) multiphase and multistage of mineralization, with the mixing and boiling of fluids at the main stage; (8) similar stable isotope compositions (Wu, 2013).

By comparison, the Pb-Zn deposits in NE Yunnan exhibit many same features as the typical MVT Pb-Zn deposits (Tab. 1), with some important differences, such as the Pb+Zn grades, tectonic background, etc. They can be considered as a special kind of MVT Pb-Zn deposits.

3 Ore-Forming Ages

Fig. 1 shows the reported ore-forming age data of several Pb-Zn deposits in the SYGP in recent few years. The age data are mainly Rb-Sr dating of sphalerites, Sm-Nd dating of calcites or fluorites, and Re-Os dating of...
bitumen, pyrites and sphalerites. The obtained age data of Pb-Zn deposits in the SYGP are in the range of 225 Ma ~ 165 Ma (Wu, 2013), with the peak around 200 Ma, indicate that the Pb and Zn mineralization are mainly occurred in Indosinian epoch.

4 Geodynamical Setting

Based on the evolution of regional tectonics, ore-controlling structures, and the reported age data, a possible geodynamical mechanism of the Pb-Zn mineralization in the SYGP is proposed as fellows: In the late Triassic-early Jurassic (~200 Ma), the Yangtze Block was collided with adjacent blocks, associated the closure of the Paleo-Tethys ocean. The Longmenshan orogenic belt and foreland basin were formed by the subsequent Indosinian movement. The orogeny made the deformation of SYGP by a series of thrust fault-fold structures, which caused the migration of deep fluids upward along the regional faults (Fig. 1). The mixing and circulation of fluids occurred underneath the Emeishan flood basalt, which made the isotopic compositions homogenized, with the Pb-Zn metal enriched gradually. The fluids extracted sulfur from gypsum and barite in Cambrian to Permian carbonate rocks by TSR, and led to the precipitation of Pb-Zn ores along the fracture zones and inter-formational boundaries by mixing and boiling of fluids. The basalts acted as an impermeable layer.

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References