

# Geological features and distribution laws of lead-zinc ores in western Guizhou province

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**Abstract.** After a comprehensive analysis of previous data, it is known that lead-zinc ores are approximately distributed in the form of a triangle in western Guizhou Province, where there is potential for forming large deposits and development of lead-zinc ores is impacted a lot by their structures.

**Keywords:** Lead-zinc Ores, Distribution Laws, Western Guizhou Province.

## 1. Introduction

In western Guizhou Province, there is a considerable amount of Pb-Zn ores, which have been examined by many experts and scholars (Zhang, 2005; Jin, 2006; Nie et al., 2007, 2014; Zhang, 2005; Li et al., 2012; Wang et al., 2013), and great achievements have been made in their research. Based on previous data, provenances of lead-zinc ores in western Guizhou Province are analyzed to provide basic data for further studying metallogenic rules of these ores and prospecting and exploration.

## 2. Geological Backgrounds of Metallogenesis

Lead-zinc ores, which are mostly distributed in northwestern Guizhou Province, which composes the Sichuan-Yunnan-Guizhou metallogenic belt of lead-zinc ores together with eastern Yunnan and Southern Sichuan provinces. From the perspective of its tectonic structure, western Guizhou Province lies on the rift of Youjiang River on the southwestern margin of Yangtze Plate. Sanjiang fold zone is the boundary in the west of the rift in Youjiang River, while the south of the rift adjoins the South China Block (Nie, 2014). In northwestern Guizhou Province, the metallogenic province of lead-zinc ores is on the southwestern margin of Yangtze paraplatform and in the east of Xikang Yunnan axis as an upper Yangtze metallogenic subprovince in the metallogenic province of Yangtze paraplatform (Jin, 2006).

Listed from the old to new, exposed strata include Simian Denying Formation, Cambrian system, Silurian, Devonian system, carbonic system, Permian system, Triassic system, Jurassic system, tertiary system and quaternary system, among which Permian Emeishan basalts are extensively distributed across the whole area (Fig.1, b). Carboniferous carbonate rocks are essential ore-bearing strata and host rocks for lead-zinc ores. This zone has tectonically evolved through Chengjiang orogeny, Caledonian orogeny, Hercynian orogeny, Indosinian orogeny, Yanshanian orogeny and Himalayan orogeny.



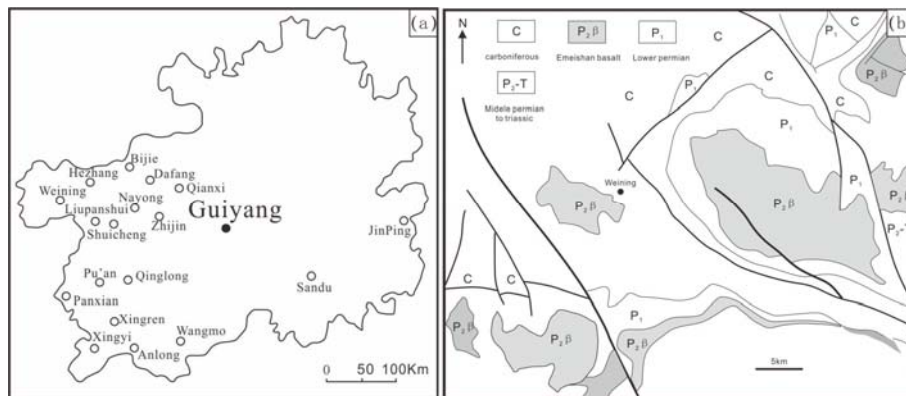


Figure 1. Location of the northwest Guizhou (a); Geology map (b) (Qi et al., 2006)

### 3. Features of Ores

The composition of minerals is simple in lead-zinc ores of northwestern Huizhou Province, where sulfides are the major type of ores. In these ores, minerals include galena, sphalerite and pyrite; there are dolomite, calcite, baryte and fluorite, which are gangue minerals. Secondary oxidized minerals such as chalybite, zinc carbonate hydroxide and creosote develop near the surface of the earth and on deep faults (Liu, 2002; Chen et al., 2008; Nia, 2014; Qin et al., 2016).

### 4. Typical Deposits

In northwestern Guizhou Province, relatively typical deposits include Pub-Zn Deposit in Shuichen Cedar Forest, Qingshan Deposit, Pub-Zn Deposit in Baoji Bay, Mangdong Pb-Zn Deposit, Maomaochang Deposit, Yadao Pb-Zn Deposit, Tianqiao Pub-Zn Deposit, Yinchangpo Deposit and Yunhuhe Deposit, among which the Pub-Zn Deposit in Shuichen Cedar Forest is relatively famous, developed and utilized earlier. All these deposits are characterized by great reserves, high tenor and irregular shapes of ore bodies.

### 5. Distribution Laws of Ore Bodies

In northwestern Guizhou Province, lead-zinc ores are divided into three metallogenic sub belts as follows: 1) Hezhang Yadu-Mangdong metallogenic subbelt, 2) Weaning Squishing metallogenic sub belt and 3) Yingchangpo-Yunhuhe metallogenic subbelt (Jin, 2006).

Squishing Qinghai Deposit is a typical deposit of Shuicheng Metallogenic Province, where the underlying stratum of the lead-zinc ores is the lower Permian Liangshan Formation and the upper stratum is the Upper Carboniferous Mapping Formation. Ore bodies exist in the form of irregular triangles, impacted by faults in terms of distribution, and deposits are mainly vein-type; there are well-defined boundaries between ore bodies and wall rocks, of which the mode of occurrence is generally the same as faults; while the distribution of lead-zinc ores is generally impacted by faults (Our, 1996; Zhang et al., 1999; Chen, 1999, 2001; Yang, 2014). The Baoji Bay Pub-Zn Deposit and the Mangdong Pb-Zn Deposit belong to Hashing Metallogenic Province, where ore-hosting rocks are mainly limestones on the lower Permian Ixia Formation and the deposits are distributed in the southeast anticline of Hangdog (Zhang, 1998; Chen et al., 2012). Concerning their mode of occurrence, ore bodies are steep or flat, so the mode of occurrence varies a lot without any transition. Yinchangpo Deposit belongs to Yunhuhe Mine, where ore bodies originated from limestones of the carbonic Huanglong Formation and mostly exist in the form of veins, with a mode of occurrence similar to wall rocks (Liao and Deng, 2002). Yunhuhe Pb-Zn Deposit is also in the Yunhuhe Mine. In this deposit, ore bodies originated from the upper Devonian Rongxian Formation, mostly appearing in forms of strata and veins.

As a whole, Pub-Zn ore bodies have following features: 1) their distribution is related to wall rocks; different types of wall rocks affect shapes, scale and distribution of ore bodies; 2) ore bodies are

generally in irregular shapes and in the form of veins; 3) Ore bodies mostly develop in folds, controlled by faults.

In northwestern Guizhou Province, Pub-Zn ores are generally distributed in triangles in 3 metallogenic provinces. Since ore bodies are larger and larger from the west to the east, there is potential for development of large-scale Pub-Zn deposits in the west. Traditionally, Pb-Zn ores are mostly explored with routine geological prospecting methods. As ore bodies went extinct on the surface of the earth, traditional methods have become inapplicable. Under this circumstance, it is necessary to enhance comprehensive exploration such as physical prospecting and remote sensing, in an attempt to achieve breakthroughs in deep areas of northwestern Guizhou Province.

## 6. Conclusion

In western Guizhou Province, Pub-Zn ores demonstrate following features and distribution laws: 1) In northwestern Guizhou Province, Pub-Zn ores are approximately distributed in triangles in three metallogenic provinces, become increasingly larger from the west to the east and have potential for developing into large deposits in the west; 2) The host rocks vary among ore bodies of different mines, because the metallogenesis of Pub-Zn ores is different even in a period; 3) Pub-Zn ores are significantly impacted by their structures, which are important indicators for prospecting these ores. However, methods such as remote sensing and physical prospecting shall be used for comprehensive prospecting as deeper and deeper prospecting is performed.

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