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Large-scale zinc and lead mineralization in the western margin of the Yangtze Block from late Triassic to early Jurassic

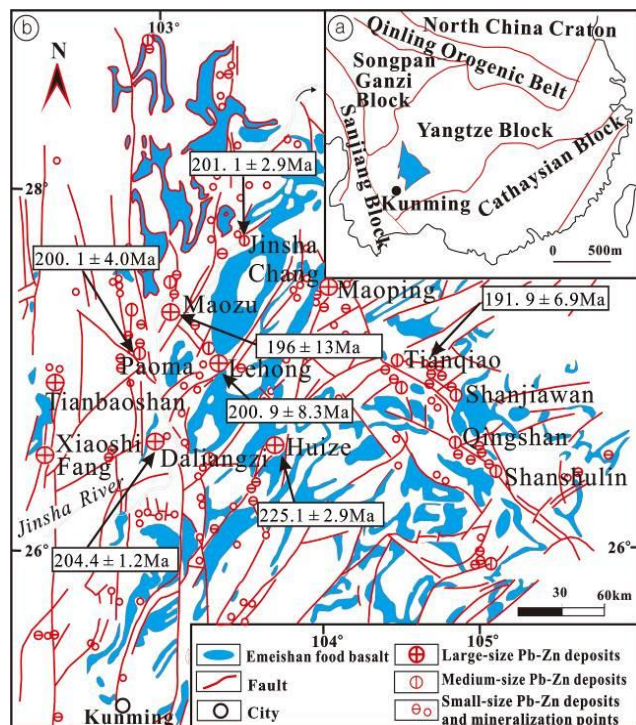
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There are more than 400 carbonate-hosted Zn-Pb (-Ag) deposits concentrated in about 170 km² in the western margin of Yangtze Block, southwest China (Figure 1a). This is known as the Sichuan-Yunnan-Guizhou Zn-Pb metallogenic province (SYG). These deposits have many common features as follows: (1) hosted in carbonate rocks from Sinian to Permian, with high ore grade (Zn+Pb generally >15 wt.%); (2) enrichment in Ag and a range of other trace elements (Ge, In, Ga, Cd, and Tl); (3) ore distribution mainly controlled by thrust fault-fold structures and lithological features, with epigenetic - hydrothermal features; (4) simple and limited wall-rock alteration; and (5) similar geological and geochemical characteristics to Mississippi Valley-type (MVT) deposits [1-3].

Although the formation age of Zn-Pb deposits has been problematic for a significant period of time, some ore-forming ages have been obtained for Zn-Pb deposits in the SYG over the past decade (Figure 1b). The obtained age data are in the range of 225 Ma – 165 Ma [1], with the peak around 200 Ma. These ages are derived mainly from Rb-Sr dating of sphalerites, Sm-Nd dating of calcites or fluorites, and Re-Os dating of bitumen, pyrites and sphalerites. Similar age data have been obtained for individual Zn-Pb deposit using different geochronological methods (e.g., Rb-Sr dating of sphalerites and Sm-Nd dating of calcites reveal that the giant Huize Zn-Pb deposit formed during the Late Triassic at 226 – 220 Ma).



The age data reveal that large-scale mineralization of zinc and lead in the SYG most probably occurred from Late Triassic to early Jurassic, at least 30 Ma younger than eruption of the Permian Emeishan basalts [3]. This time interval indicates that there is no direct relation between the Zn-Pb mineralization and Emeishan flood basalt eruption in the SYG.

Combined with the age data, geological and geochemical characteristics of the Zn-Pb deposits, and the tectonic evolution in the SYG, these deposits are probably the result of the migration of regional-scale mineralizing fluids, driven by the ore-controlling thrust-fold systems, which formed by regional tectonic compression in response to the closure of the Paleo-Tethys Ocean.

*Fig. 1: (a) Simplified tectonic map of South China (after [1]);
(b) Simplified geological map of the SYG (Modified from[2])*

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References:

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