

Pb isotopic signature of the “Yangtze-type” Pb-Zn deposits and its implications for Caledonia Movement in South China

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Intensive Caledonian tectono-magmatic activities are widespread in South China. However, our understanding about the nature of the movement has long been largely unclear. Here we present a new Pb isotope study, using a high-precision in situ analytical method and a modified approach by means of mother element-related treatment, of a typical deposit in the Huayuan Pb-Zn metallogenic belt, western Hunan in South China, aiming to provide new insights to this tectonic movement.

It is revealed that the ore-forming sulfides are distinctively different from the host carbonites of the sedimentary strata in Pb isotopic signatures; the metallogenic metals were sourced by high-grade crystalline basements of the region, rather than their carbonatic host rocks or adjacent strata as has long been suggested; the unconformities between the crystalline basement and cover strata and the regional deep-seated fault systems provided the most favorable moving channels for ore-forming fluids; high porosity in dolomites effectively promoted fluid moving and interactions between them, caused dissolution and brecciation of the carbonates and pH increasing of the fluids, and thus finally induced the mineralization. It thus suggests that these ores are typical of the Mississippi Valley Type lead-zinc deposits, rather than that of the reworked sedimentary deposits.

This metallogenic mechanism not only explains that the deposits are hosted predominantly by the dolomitic layers bottomed the cover strata overlying the regional unconformities, and also provides an essential proof to support an intracontinental orogenic nature for the Caledonian Movement in South China among the competing models.

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