Lead isotopic geochemistry and its bearing on genesis of the Huize Pb-Zn deposit, Yunnan, South China

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Introduction

The Huize lead-zinc deposit, located at the southwestern margin of the Yangtze block, is hosted by a medium-grained dolomite sequence of the Lower Carboniferous Baizuo Formation. The ore bodies occur chiefly as stratiform sphalerite-galena layers that strike roughly parallel to their host sedimentary rocks.

Lead isotopes of different sulfides including galena, sphalerite, and pyrite from the Huize deposit are determined here in order to evaluate the timing of mineralization and the source of ore-forming materials.

Results and discussion

The analytical data show that the lead isotopes of the sulfide ores are highly homogeneous, with the $^{206}Pb/^{204}Pb$, $^{207}Pb/^{204}Pb$, and $^{208}Pb/^{204}Pb$ ratios varying from 18.423-18.510, 15.651-15.770, and 38.700-39.072, respectively. Model ages of the total 19 samples are from 217 to 302 Ma, mostly concentrating around 240-260 Ma. It suggests that the ore lead was derived from a single reservoir and may have experienced only one-stage evolution history.

The consistence of ore model ages with the timing of the host rock sedimentation suggests that the mineralization was contemporaneous with host sediments on the sea floor, analogous to many ancient and modern sedimentary exhalative (sedex) sulfide deposits. The hydrothermal fluids may have extracted ore-forming materials from the sediment pile, erupted at sea floor, and precipitated sulfides by mixing with the sea water.

Conclusions

The Huize Pb-Zn deposit was formed by exhalative sedimentary processes that were closely related to tectonic evolution of the Yangtze block. During the early Carboniferous a rift basin was developed at the sourhwestern margin of the Yangtze block. With the deposition of carbonate rocks, hydrothermal activities precipitated sulfide ores as interlayers.

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DOM formation from POM in streams

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Method

Leaching experiments of riverine POM fractions were used to investigate the qualitative and quantitative formation of dissolved organic matter (DOM). Amphipods (*Gammarus* sp.) were fed in the laboratory with preconditioned leaves of *Fraxinus excelsior*, *Alnus incana*, and *Quercus robur*, twigs of *Populus nigra*, and epilithic algae (periphyton). Amphipods produced two FPOM fractions (L-FPOM: 250-500μm; M-FPOM: 100-250μm). L-FPOM consisted primarily of fecal pellets while M-FPOM was mainly composed of CPOM fragments created by the feeding activity. FPOM fractions and CPOM were exposed in 100ml Erlenmeyer bottles and stirred at 100rpm at 12°C under dark conditions. DOC concentration, UV absorption (E285) and microbial respiration (biological oxygen demand in 3 days) were repeatedly measured over a 14-day period.

Result and Discussion

FPOM exhibited significantly lower DOC release rate than CPOM (Figure). Release rates decreased with time, except for L-FPOMs of oak, twig, and periphyton.

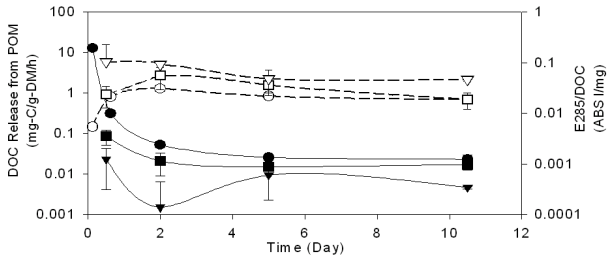

Figure. DOC release from POM (black) and aromatic content of DOM (white) derived from CPOM (circle), L-FPOM (square) and M-FPOM (triangle).

The E285/DOC ratio [1] showed that M-FPOM, refractory POM, released DOM having higher aromatic content than other POM fractions. However, this ratio was not significantly correlated with microbial respiration with DOM.

Reference

[1] Kalbitz K., Geyer W. & Geyer S., 1999, *Biogeochemistry* 47, 219-238.