Sm-Nd dating of calcites from the Huize superlarge zinc-lead deposits of Yunnan Province, Southwest China

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More than 400 Pb-Zn-Ag ore deposits and ore spots have been found in the Sichuan-Yunnan- Guizhou polymetallic mineralization area of southwest China. The Huize superlarge zinc-lead ore deposits, composed by Kuangshanchang and Qilinchang ore deposit at a distance of 2 km, are situated at the center of this area. But there is not any dating data on these deposits. REEs are incorporated in calcite by substituting for Ca^{2+} in the crystal lattice. In recent years, some Ca-bearing minerals, such as fluorite, scheelite and tourmaline, have been used for Sm-Nd isotope dating. We have dated the ages of No 1 orebody of the Kuangshanchang deposit and No 6 orebody of the Qilinchang deposit by Samarium-Neodymium method in calcite.

The data for the calcites from the No 6 ore body yield a slope corresponding to an age of (226±15)Ma and ε_{Nd}=-10.8, MSWD=0.197 . The calcites from No 1 ore body define a slope corresponding to an age of (225±38)Ma and ε_{Nd}=-10.6, MSWD=0.129. The ages of the two ore bodies are essentially similar, that is to say that the two ore deposits of the Huize superlarge zinc-lead deposits formed at the same stage. If plot all the data in one line, the slope corresponding to an age of (222±14)Ma and ε_{Nd}=-10.8, MSWD=0.695.

The outskirts of most ore deposits (including the Huize superlarge zin-lead deposits) in the Sichuan-Yunnan-Guizhou polymetallic mineralization area distribute a large amount of Emeishan basalt, erupted about 250Ma ago. At present, the understandings on the relationships between mineralization and Emeishan basalt activities have remained controversial. The ages of the Kuangshanchang and the Qilinchang deposit are close to the time of the Emeishan basalt eruption, maybe suggest that mineralization of the Huize superlarge zinc-lead deposits and the Emeishan basalt activities have some close relationships.

The abnormity of tellurium in deep sea sediments

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Tellurium is a rare and dispersed element in the Earth. The abundances of tellurium in the earth's crust and MORB are about 1 ppb and 4 ppb respectively (Wen Yi, 2000). Because of its low abundance and analytical difficulty, not many studies have been done on its geochemistry. The concentrations of tellurium in deep-sea sediments from C-C Zone of the East Pacific Basin were measured by ICP-MS in this study. It is found that the concentrations tellurium in deep-sea sediments are extremely high, ranging from 70 ppb to 380 ppb. The average value is 180 ppb, approximately 200 times of the value in the crust and 50 times of that in MORB. In order to understand the origin of abnormity of tellurium in deep-sea sediments, the isotopic compositions of helium and the concentrations of tellurium in their magnetic fractions and bulk are compared in this study. The $^3He/^4He$ ratios of deep-sea sediments are very high, varying from $1.10x10^{-5}$ to $2.69x10^{-5}$ with the average value of $1.79x10^{-5}$. The $^3He/^4He$ ratios and the concentrations of tellurium in magnetic fractions are obviously high than those in bulk. The $^3He/^4He$ ratios of magnetic fractions vary from $20.33x10^{-5}$ to $25.60x10^{-5}$, with an average of $22.56x10^{-5}$. The concentrations of tellurium in magnetic fractions vary from 210 ppb to 710 with an average of 530 ppb, which is approximately 3 times as much as that in bulk, 500 times in the crust and 100 times in the MORB. Thus high concentrations of tellurium in deep-sea sediments could not result from pelagic sediments or under lying basalts. All data points of helium isotope of sediments sit in or close to the mixing curve between the interplanetary dust particles (IDPs) and the terrigenous sediments in the chart of ^3He - $^3He/^4He$. It shows that the high $^3He/^4He$ ratios in marine sediments result from IDPs, and the $^3He_{IDP}$ amount up to 99.9% of the measured ^3He concentration. There is obviously a positive correlation between the ^3He and Te concentrations in deep ocean sediments. As we know that the abundances of tellurium in meteorite are excessively high (2100 ppb). It may be even higher in IDPs. It is suggested that the abnormity of tellurium in deep-sea sediments may be caused by IDPs. Therefore the tellurium concentration in sediments may become a new and more sensitive indicator of impact event of meteorite or comet.