Heavy metal contamination in fluvial sediments caused by Dexing Cu Mine, Jiangxi, China

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Although mining environment have attracted much concern of the scientists, the recent researches mainly focus on the environment of the mining districts and the around. This study showed that the impact of mining environment contamination extended to the drainage areas by the fluvial transportation.

330 fluvial sediment samples for the area 4800km^2 were collected in Dexing area and its vicinity watersheds, where the largest porphyry copper mine in China is located. The Heavy metal levels for As, Hg, Cd, Cr, Zn, Cu and Pb of the samples were determined using inductively couple plasma atomic emission spectrometry and X-ray fluorescence spectrometry. The results show: (1) The max of As, Hg, Cd, Cr, Zn, Cu and Pb heavy metals contents in sediments increased from 120.00, 1.16, 3.00, 150.00, 300.00, 690.00, 300.00 mg/kg in the year 1989 to 1109.00, 5.43, 13.50, 236.00, 1770.0, 4390.00, 1685.00 mg/kg in the year 2004 respectively, and the averages were from 17.39, 0.08, 0.25, 69.00, 75.00, 40.00, 31.00 mg/kg in the year 1989 to 27.91, 0.12, 0.33, 64.00, 103.00, 148.00, 47.00 mg/kg in the year 2004. (2) The average potential ecological risk coefficient (E_i^r) [1] for As, Hg, Cd, Cr, Zn, Cu and Pb changed from 13.37, 9.21, 37.77, 2.45, 0.46, 4.72, 4.53 in 1989 to 21.43, 14.00, 49.91, 2.29, 0.63, 17.42, 6.76 in 2004. The average potential ecological risk index (*RI*) rose from 73 in 1989 to 113 in 2004, and the max potential ecological risk index (*RI*) changed from 578 in 1989 to 3748 in 2004. (3) the sediments from the water drainages in Dexing mining area are contaminated by As, Hg, Cd, Cr, Zn, Cu and Pb mainly along the Dexing River drainage, Dawu River drainage and Le'an River drainage.

Above results suggest that the impact of heavy metals contamination caused by mining activities could extended from the mining area to its vicinity watersheds by the fluvial transportation.

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Stable hydrogen isotopic ratios of coal-derived and oil-associated gases: A case study in the Tarim basin, NW China

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Stable hydrogen and carbon isotopes have been used in studies of genetic characterization of natural gases, and numerous studies of the use of δD as a source indicator have been published [1-3]. The greater range of δD values and distinct chemical reactivity of hydrogen make compound-specific hydrogen isotope data a valuable complement to $\delta^{13}C$ values and the measurement of stable hydrogen isotope ratios an attractive technique for geological applications. However, due to the analytical precision, hydrogen isotopic studies on C_2-C_4 hydrocarbons were not very practical in 80's or early 90's. Here we investigate systematically the stable hydrogen isotopes of coal-derived and oil-associated gases from the Tarim basin, NW China and make a combined use of gas δD and $\delta^{13}C$ in studies of gas origin and gas-source correlations.

The Tarim basin is located in northwest China and is one of the largest basins in the world with an area of 560, 000 km^2. Recently a number of giant gas fields have been found in the basin, which have made the Tarim basin as one of the most important basins enriched in gas resources in China. There are two types of gases: coal-derived gases sourced from the Mesozoic terrestrial source rocks with humic organic matters, -121‰~-182‰ of δD_{CH4}, -94‰~-192‰ of δD_{C2H6}, -91‰~ -150‰ of δD_{C3H8}; oil-associated gases generated from Sinian to lower Paleozoic marine source rocks with sapropelic organic matters, -154‰~-191‰ of δD_{CH4}, -112‰~-137‰ of δD_{C2H6}, -75‰~-111‰ of δD_{C3H8}.Partial reversal of hydrogen isotopic distribution among CH_4, C_2H_6 and C_3H_8 are commonly presented in the oil-associated gases, due to the mixing of oil-associated gases with different thermal maturity or mixing of oil-associated and coal-derived gases. In general, oil-associated gases are more enriched in D than coal-derived gases, while no exact limit was found between them due to mixing effects. Except the depositional environments, gas δD also increases with increasing thermal maturity of source rocks.

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