Modern sedimentation rate and heavy metal accumulation in Jiaozhou Bay sediments

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Introduction

The sediments that accumulate in Jiaozhou Bay of the Shandong Peninsula recorded the information about the history of changes in the source of the material, the rate of deposition and the influence of human activies [1, 2]. Six cores were collected from the Jiaozhou Bay by the Cruise work on Gold Star boat on Sep. 6th, 2003. The ^{210}Pb radioactivities of the sediments were determined by ^{210}Pb geochronology method and ICP-MS was employed for the determination of Zn, Cu, Cr, Ni, Pb, Cd and Co concentrations.

Discussion of Results

The sedimentation rates were found to be higher in margin areas of the bay, especially in the dumping areas, where the rates were about 0.77cm/a ~ 3.96cm/a. While in the central region of the bay, there was a patch of fine-grained mud, with the sedimentation rates being lower. The profiles ^{210}Pb radioactivity at sample cores mostly appeared in two-segment model, which indicate that the modern sedimentary environment of this region was very stable. Differences in the profiles reflect spatial and temporal variations in hydrodynamic conditions and the grain size of sediments in the Jiaozhou Bay.

The main heavy metals in the sediments of Jiaozhou Bay were Zn, Cu, Cr, Ni and Pb, while the concentrations of the elements Cd and Co were much lower. The concentrations of the main heavy metals of the sediments in Jiaozhou Bay were higher than that in the China Shelf Sea, which showed that the area had been contaminated to a certain extent. But these concentrations were low in comparison with the highest background level in former global modern industrialization times and that in other industrialized areas. The heavy metal profiles Zn, Cr, Ni, Co and Pb from the six cores showed a high variability, but also a decreasing trend since 1980s, while the element Cu presented an increasing trend and the element Cd presented a more chaotic profile than the other elements.

[1] Stanley *et al*. (2000) *Geology* **28**, 259–298. [2] Ruiz-Fermandez *et al*. (2004) *J Environ Radioactiv* **76**, 161–175.

The bioavailability of selenium and risk assessment for human selenium poisoning in Se-high areas, China

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Enshi, China, is one of the selenosis areas in the world, where sporadic cases of selenium (Se) poisoning in livestock and human were still being found at present. However, selenium bioavailibility in soils and current situation on intake of Se by human have not been reported in detail. In this study, selenium levels and its speciation in water and cropland soils, Se content in crops from Enshi were investigated, as well as estimating the daily intake of Se by local residents. Results showed that the geometric mean of Se concentration was 54.2 μg/L (2.0-519.3 μg/L, *n*=62) and 6.2 mg/kg (2.67-87.3 mg/kg, *n*=37) in water and soils, respectively. Selenium content ranged from 0.18 mg/kg to 37.1 mg/kg in crops, which was dependent on crop species and Se bioavailability in soils. On the basis of consumption and Se contents of foods, cereal consumption is the major pathway of Se intake by local residents, followed by vegetables, meats, and drinking water. The total daily intake of Se was approximately 3000 μg/day for human in Se-high areas in Enshi, which was considerably higher than the upper tolerable nutrient levels (UL, 400 μg/day) referred by WHO and US EPA, suggesting that a high risk for human chronic Se poisoning still exists in this areas. Furthermore, the daily Se intake through drinking water (108.4 μg/day) was up to 27.1% of referred Se UL. Thus, unlike previous studies, it is should not ignore the contribution of Se in drinking water when assessing the health risk for human daily intake of Se in Se-high areas. Local residents should be advised to avoid planting crops in areas with Se-high soils or irrigated by Se-high water, and to consume foods mixed with the exotic.

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