

the contaminant is derived from underground arsenic-rich aquifers formed under the anoxic conditions. Our study shows that the efficient speciation (changeable, carbonate, Fe-Mn oxide, and organic matter except silicate or residue in total content) 6 of the relatively heavy metals (Cu, Pb, Zn, and Cd) as well as arsenic in the water are derived mainly from the upper reaches where mining areas are distributed with higher contents of arsenic ($20.86 \mu\text{g}\cdot\text{g}^{-1}$ in rocks on average and 12.2 times the crustal abundance) in media based on the data that record traces of contaminant mobilization conserved in water, soil, and resident hair. This finding means that the treatment in the upper reaches may be an impactful and long idea for human to avoid arsenic poisoning caused by mobilization of the pollutant from higher geochemical setting area except solely reducing the content of contaminants (As etc.) in drinking water recently.

Key words groundwater arsenic pollution; evidence of occurrence; Hetao area, Inner Mongolia, China

Analysis on the sources of mercury in soils in the Chengdu Basin, China

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Mercury is a pollutant of concern due to its toxic and bioaccumulative properties. Studies on the distribution and hazard of mercury in the environment are mainly focused on its forms, toxicity and the environment standard, and progresses and results have been achieved. But these studies in the past were concentrated on the scales of laboratory or smaller districts merely, such as a small unit of mineral area, vegetable base, paddy field, lake, etc. Multi-target regional geochemical survey carried out by China Geological Survey from the 1990s to now is a fundamental and commonweal geological survey, large-scale and systematical inquisition and research were conducted in 19 provinces (or municipalities directly under the Central Government) in the eastern overlay region of China, and the purpose is to provide the basic geochemical data for national economic construction, adjustment of industrial and agricultural structures and sustainable social development. Geochemical studies aim at investigating soils in these regions and 52 elements have been tested, producing a great amount of data at the same time. Methods: based on the data from 3061 samples of surface soil and 832 samples of deep soil from the project of multi-purpose geochemical survey in the Chengdu Basin, Sichuan, China, this paper describes the correlation relationship between Hg and other 48 elements and their spatial distribution in surface and deep soils of these areas by applying the method of linear regression and factor analysis. Two equations about Hg and other elements and pH in surface and deep soils have been addressed by the method of linear regression, then all of the elements in an equation were measured by factor analysis, which can be used to explain better the sources and spatial distribution of Hg in surface and deep soils by the isoline maps of factor scores of the components of elements related and GIS techniques. Conclusions: there are two sources of mercury: one is due to natural effects, mainly with magmatite, sedimentary rock and sulfide deposits in the Longmenshan Mountain, Sichuan Province, China; the other is an anthropogenic source, including fossil fuels and sewerage from city and industry pollution. These conclusions and methods will be useful for ecological environment assessment and pollution prevention in these areas.

Key words Chengdu Basin; mercury; multivariate statistics; linear regression; factor analysis

Response of sediment characteristics to trophic state change at submerged macrophyte zones in a large shallow Lake Wuliangshuai, China

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Sediment samples at different depths were collected from a large shallow lake named Wuliangshuai in China, in order to determine the response of sediment characteristics to trophic state change. The lake changed from natural state to eutrophication in the late 1970s, creating a Transitional Sediment Layer (TSL) that can be visually used to separate sediments derived from multi-biology and macrophytes. Sediment characteristics were enumerated as a means of corroborating extant eutrophication data from sediment record. Inferences about the timing and trajectory of eutrophication were made using sediment characteristics-based reconstruction. Water content, electrical conductivity, pH, organic matter, nutrient (total nitrogen and total phosphorus) and metals (As, Cd, Co, Cr, Cu, Mn, Ni, Pb, Zn and V) were measured in about 20 different layers of 63-71 cm deep columns of the sediment. At the submerged