Geochemistry and geochronology of Cu-bearing adakitic rocks in the Edong-Jiurui area, eastern China

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The middle-lower Yangtze River belt in eastern China is characterized by metallization with numerous copper, gold and iron deposits related to the Mesozoic magmatism distributed along this belt. The host magmatic rocks are commonly granodiorites, quartz-diorites and partly granites. However, genesis of the magmatic rocks and the related mineralization is still fully debated. Here we present geochronological and geochemical data of Cu-bearing magmatic rocks exposed in the eastern Hubei and northern Jiangxi area (the Edong-Jiurui area) to understand the origin of the Mesozoic magmatism in the middle-lower Yangtze River belt.

Zircon U-Pb dating using the LA-ICP-MS technique on the copper mineralization-related magmatic rocks yields variable ages ranging from about 152 Ma to 139 Ma, suggesting the earliest magmatic activity in Mesozoic related to metallic mineralization in this belt. These magmatic rocks are characterized by high Sr/Y and La/Yb ratios with high SiO_2, Al_2O_3 contents and are enriched in Sr- and Na_2O contents, light REEs and LILEs, depleted in Nb-, Ta-, Ti-contents. These features are comparable with those of the high-SiO_2 adakitic rocks. Pb isotopic composition of the whole-rocks exhibits feature of the mixture of mid ocean ridge basalts and sediments. Their $^{206}Pb/^{204}Pb$ ratios range 17.75 to 18.17, $^{207}Pb/^{204}Pb$ ratios from 15.51 to 15.63, and $^{208}Pb/^{204}Pb$ ratios from 38.03 to 38.44. Initial ε_{Nd} values of these magmatic rocks vary from -3.4 to -8.5. They have high Th/Yb and low Pb/Ce ratios. These adakitic rocks are further characterized specially by Mg# of 32-60, low Cr- and Ni-contents (<50 ppm and <35 ppm), implying that the magmas underwent quick reaction with peridotites in mantle during the magma ascending. They are enriched in Ba-content, coupled with high Sr/Nd and Ba/La ratios and low K/Rb ratio, indicating existence of slab-derived fluid during the magma formation. From the view of geochemical characteristics of the adakitic rocks in the Edong-Jiurui area, it can be proposed that the origin of the Mesozoic magmatic rocks, including granodiorites, diorites and partly granites, most likely originated from the slab melting with a significant addition of sediments. This study is supported by the NSFC grant (No. 41090372).

Ecological Risk Assessment of Soil Heavy Metals in Fruit Producing Area

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Introduction

With the global agricultural products polluted by heavy metals more seriously, people put more emphasis on the monitoring and evaluation of green food and non-polluted fruit producing soil environment quality.

Material, Method, Results and Discussion

In this paper, the concentrations of 8 heavy metals (As, Hg, Cr, Cu, Ni, Pb, Zn and Cd), collected from 120 surface soil samples of apple-pear main production areas in Longjing-Yanji (LJ-YJ), Sanhe (SH), Tumen (TM), Hunchun (HC)—Yanbian area (in eastern Jilin Province, NE China) are analyzed by means of statistical analysis, the single factor indices, Nemerow soil pollution indices and Hakanson potential ecological risk assessment indices. The results indicate that the accumulations of 8 heavy metals in study area are regionally different and heavy metals are mainly accumulated in SH and TM. The most metal concentrations in SH, in different degrees, do appear higher than soil background values and drastically elevated concentration of As is found in TM contrast with background levels (the ratio of As content and Jilin soil background value is up to 2.64). The metal concentrations in LJ-YJ and HC are not significantly increased compared with background values. The spatial variability of 8 heavy metals is quiet different and the order of metals variability is As > Hg > Cd > Ni > Cr > Cu > Zn > Pb. According to the National Environmental Quality Standard for Soils in China (GB 15618-1995), single factor indexes of 8 heavy metals in Yanbian area are all less than 1, respectively, indicating that soil environment quality is judged as clean and free from pollution and heavy metal concentrations are completely in accordance with the soil quality requirements of nuisanceless agro-food production. Additionally, soil potential ecological risk is mild while it reaches the most serious in SH. The order of average ecological risk indices of 8 heavy metals is Cd>Hg>As>Ni>Cr>Cu>Pb>Zn.

Conclusion

Taken together, we conclude that ecological risk assessment of soil heavy metals could provide the scientific basis data of soil quality in land utilization to get high quality agricultural products and safeguard human health.

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