

Chemical weathering characteristics of lime soil and the main influencing factors in Guilin, Guangxi Province, China

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The chemical weathering of carbonate rocks is the main form of interaction between earth spheres in the key karst zone. The karst weathering material contains important information about the climate environment and material cycle. Through the study on the chemical composition, weathering process and strength of Guilin lime soil in Guangxi, and the comparative analysis between lime soil in Guilin and the karst weathering crusts in Yunnan, Guizhou, Hunan, and Qinghai Tibet Plateau, the results showed: (1) the chemical composition of Guilin lime soil was similar with that of carbonate weathering crust in other parts of China, and had the common characteristics of uniform distribution of chemical composition on the profile and obvious enrichment of Fe, Al and trace elements. During the formation of lime soil and carbonate weathering crust, the rapid dissolution of Ca and Mg had an important impact on the migration and enrichment of other elements. (2) The chemical index of alteration (CIA) of Guilin lime soil and carbonate weathering crust in other parts of China were much larger than that of the upper crust (UCC) (60.13), which showed the characteristics of strong chemical weathering in the humid and hot climate. (3) The weathering process of carbonate rock was different from that of silicate and loess. In the early stage of carbonate rock weathering, soluble components (calcite, dolomite, albite) had been rapidly dissolved and leached. All the carbonate weathering crust was measured to be in the stage of potassium feldspar weathering and clay mineral generation. Therefore, the weathering degree of carbonate weathering crust was mainly determined by the leaching of potassium feldspar and the increase of clay minerals. As a result, there was no correlation between CIA and Na/K (molar ratio), but was a significant negative correlation between CIA and K/Al (molar ratio) in the carbonate weathering crust. (4) The CIA values of lime soil and carbonate weathering crust in southern China were negatively correlated with latitude, reflecting the influence of climate factors. The content of insoluble matter in carbonate rock was negatively correlated with CIA.