

## Distribution of K, Rb, and Cs within Savannah River Site soils inferred from acid-leaching, K-Ar, and isotope-exchange studies

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Most (>80%) of the K in five samples from upland soils of the Savannah River Site in South Carolina is in unaltered remnants of primary minerals, as shown 1) by resistance of the K to strong-acid leaching at elevated temperature and 2) by K-Ar age values for the clay fractions near 300 million years, close to the mean of K-Ar age values for muscovite concentrates from the Georgia kaolin belt [1, 2]. We infer that much of the K in the soil samples is in hydroxy-interlayered vermiculite (HIV) formed by chemical weathering of detrital mica from the Appalachian Piedmont, a provenance closely similar in time and space to that of the kaolin-belt muscovite. Removal of most of the Cs and Rb from the soils by acid leaching under conditions insufficient for removal of most of the K and radiogenic Ar indicates that Cs and Rb are largely *not* in unaltered remnants of primary minerals. This and very high Cs/K and Rb/K ratios, relative to crustal abundances, in the leachates indicate that Cs and Rb were selectively held by the soils as K was removed during weathering.

Acid leaching at lower temperatures and a Rb isotope exchange study show that very little of the Cs and Rb in the soils is in ordinary cation-exchange sites. Little (<10%) of the K, Rb, and Cs in the soils was released by leaching with HNO<sub>3</sub> (0.55 mol/L) at temperatures from 23°C to 70°C. The patterns of release with increasing time and temperature were similar for the three alkali metals. Under conditions similar to those of the natural soil environment, exchange of added <sup>85</sup>Rb with a small fraction (<5%) of the soil Rb was found to have occurred in the first two hours after addition. Thereafter, the degree of exchange slowly increased until after two months the added <sup>85</sup>Rb had exchanged with a little over 10% of the soil Rb. These experiments indicate that most of the Cs and Rb cations are located in sites where both chemical exchange with hydronium ions and exchange of Rb isotopes is very slow at natural soil temperature. Such sites may be near the apices of interlayer wedges within HIV.

[1] A.A. Hassaniapak (1980) Ph.D. thesis, Georgia Institute of Technology, Atlanta [2] A.M. Elser (2004) Ph.D. thesis, Georgia State University, Atlanta

## Sedimentary facies analysis and evolution of Permian in Ziqiu Section Changyang County, Hubei Province

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The Permian of Ziqiu section at Changyang County, Hubei Province is composed of the Qixia, Maokou, Wujiaping and Changxing Formations. By use of strata study on the field outcrops and microfacies analysis, Permian in Ziqiu section of Hubei Province, lithofacies can be recognized as bioclastic grainstone, micrite calcisiltite, bealcirud, silica and calcareous shale. According to the sedimentary environment analysis, three kinds of sedimentary environments were identified, which include carbonate slope, platform and basin, the Middle Permian have mainly deposited on the carbonate slope and basin, Upper Permian have mainly deposited on the carbonate slope and basin. Sedimentary evolution of Lower-Middle Permian and Middle-Upper Permian indicates that two sedimentary cycles of transgression and regression occurred in the Permian.

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