

Elemental mobilization through regoliths under four landuse types at the Red Soil Critical Zone Observatory

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Weathering was controlled by both natural and anthropogenic processes. With the increase of anthropogenic effects in frequency and magnitude, how such effects will modify elemental cycling during regolith formation remains unclear. To investigate the effects of landuses on major element behaviour, we studied four deep regolith profiles under landuses of upland, woodland, young and old paddy fields at the Red Soil Critical Zone Observatory in subtropical China. These profiles developed from Quaternary red clay underlain by sandstone bedrock. We found that there were no notable effects of landuses on depletion profiles of base cations characterized by geochemical mass-balance equations. In contrast, landuses showed prominent effects on depletion profiles of Si, P and Mn, due to bioaccumulation, addition of fertilizers and atmospheric deposition and / or water regime. Landuses presented obvious effects on depletion-enrichment profile of Fe mainly due to water regime. The conversion of upland to young paddy field changed depletion-enrichment profile of Al to depletion profile. The results indicated that landuses greatly modified elemental regolith profiles formed under long time natural processes over short time scales.