Behavior of major and trace elements in an extreme weathering profile on basalt in Hainan Island, South China

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Large amounts of laterite profiles have been developped on the Neogene basalts in Hainan Island, South China due to the high temperature and precipitation in this region. Major and trace elements of a lateritic profile in northern Hainan were studied to investigate the element mobility and re-distribution during extreme weathering. The profile is bascially devided into two sections: The top 2~3m comprises of homogeneous fine grain laterite, and the bottom 2~3m is composed of yellowish fine laterite, containing un-weathered core stones.

Ti, Zr, Hf, Nb, Ta and Fe are conservative in this profile, and the ratios between each other remain those in the fresh basalts. Ca, Na, Sr, K and Mg are almost entirely removed from the profile, and losses of Rb and Ba are over 50 percent, whereas Cs is significantly enriched in the top section. Cs, K, Rb, Na and Sr show an upward increasing trend in the top section, suggesting combination of extraneuos sources.

Both Mn and P are removed significantly in the top section and enriched markedly in the bottom section, which may be the result of deposition of Mn oxides/hydroxides and secondary phosphate minerals. The distribution of REEs resembles Mn and P. Marked positive Ce and Gd anomalies occur in this profile, and the Ce enrichment is closely related to Mn, and other REEs seem largely associated secondary phosphate minerals and Mn oxides/hydroxides. Among the transition metals, Sc and V exhibit as conservative, and the re-distribution of Cr, Cu and Zn are closely related to P. However, Mn oxides/hydroxides prevent the enrichment of Cr because the oxic phase Cr(IV) is soluable and easily to be removed. Co is closely associated with Mn, and Ni seems not relate to both Mn and P.

Th and U are basically conservative in this profile, but show increasing trend in the top section, which seem to combine extra materials in the top section after extreme weathering.