
Characterization of Hydroxy-Interlayered Vermiculite and Illite/Smectite Interstratified Minerals from the Weathering of Chlorite in a Cryorthod

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Abstract: X-ray diffraction, FTIR, and chemical analyses were performed on clay fractions (1– 2 μm , <0.1 μm), separated by means of size fractionations and high-gradient magnetic separation techniques, from a Cryorthod developed in a chlorite-mica schist saprolite. Weathering of large phyllosilicates pre-existing in the saprolite involves physical fragmentation and mineralogical transformations. Chloritic minerals in the coarse fractions were the most affected by physical breakdown, while micas were generally preserved. As a consequence, a concentration of mica layers occurred in the coarse clay fraction, while chloritic residues accumulated in the fine clays. These residues exhibited the typical XRD pattern of hydroxy-interlayered intergrade minerals, but the interlayered contaminants were found to be mainly hydroxy-Mg cations. Further mineralogical transformations of the intergrade minerals involved the progressive removal of the hydroxide interlayered sheet and dissolution of chloritic layers. Illite/smectite mixed-layers were formed in the surface horizon of the soil profile. These processes were associated with a strong decrease in Fe and Mg contents in the clay fractions.

Key Words: Chlorite • Hydroxy-interlayered intergrades • Illite/smectite mixed-layers • Soil clays • Spodosol

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