Weathering of Chlorite and Vermiculite in Ultramafic Rocks of Cabo Ortegal, Northwestern Spain[1]

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Abstract: Chloritic veins in serpentinite and their weathering products were analyzed by X-ray powder diffraction (XRD) and X-ray fluorescence spectrometry (XRF). Chlorite formed during the Hercynianage orogenesis had apparently been partly transformed to high-charge vermiculite during subsequent metamorphism of the rocks. The idealized structural formulae for these minerals are $(Al_{1.9}Fe^{3+}_{0.2}Fe^{2+}_{0.4}Mg_{9.2}Cr_{0.2})(Si^{5.8}Al_{2.2})O^{20}(OH)_{16}$ and $X_{1.3}(Fe^{3+}_{0.7}Fe^{2+}_{0.1}Mg_{5.2}Ni_{0.1})(Si_{5.8}Al_{2.2})O_{20}(OH)_4$, respectively. This transformation appears to have taken place by the removal of the hydroxy-interlayer from the chlorite without major effect on the rest of the structure. It is not clear whether other hydroxy-interlayered vermiculites containing less tetrahedral aluminum were intermediate weathering products or inherited minerals. The ultimate weathering product of chlorite and vermiculites was a Fe^{3+}-rich smectite, which probably formed by precipitation from solution.

Key Words: Chlorite • Hydroxy-Al • Serpentinite • Smectite • Vermiculite • Weathering • X-ray powder diffraction

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