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Genesis of Talc Bodies in Relation to the Mafic-Ultramafic Rocks around Wonu, Ibadan-Apomu Area, Southwestern Nigeria

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Abstract : The genesis of talc bodies around Wonu, Ibadan-Apomu area, southwestern Nigeria, has been speculative due to inadequate compositional data on the talc and the mafic-ultramafic protoliths. Petrography, morphology, using scanning electron microscope, mineral chemistry, X-ray diffraction, and major, trace and rare-earth element compositions of the talc and the mafic-ultramafic in the area were undertaken with a view to determine the genesis of the talc bodies. Fine-grained amphibolite and lherzolite are the major mafic-ultramafic rocks in the study area. The amphibolite is fine-grained, composed of amphiboles, pyroxenes plagioclase, K-feldspar, ilmenite, magnetite, and garnet. The lherzolite and talc are composed of olivines, pyroxenes, amphiboles, and plagioclase. Alteration minerals include serpentine, amesite, talc, Cr-bearing clinochlore, and ferritchromite. Cr-spinel, pyrite, and magnetite are the accessory minerals present. Alteration of olivines, pyroxenes, and amphiboles to talc and chlinochlore; and spinel to ferritchchromite by hydrothermal (H_2O-CO_2-Cl-HF) fluids, provided by the granitic intrusions in the area, showed retrograde metasomatism of amphibolites to greenschist facies at 500-550ºC. This led to the formation of talc, amesite, anthophyllite, actinolite, and tremolite. The Al_2O_3-Fe_2O_3+TiO_2-MgO discrimination diagram suggests tholeiitic protolith for the amphibolite and komatitic protolith for the lherzolite. The lherzolite has flat rare-earth element patterns typical of komatiites and dunites. The Al_2O_3/TiO_2 ratios, Ce/Nb vs. Th/Nb, Cr-TiO_2, TiO_2 vs. Al_2O_3, and Nd vs. Nb discrimination diagrams indicated that the talcs are from two-parent sources: altered metacarbonates and tholeiitic basalts (amphibolites) to komatitic basalts (lherzolites).

Keywords : amphibolites, lherzolites, talc, komatiite
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