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MAJOR ELEMENT GEOCHEMISTRY OF CHARNOCKITIC ROCKS IN HIGHLAND AND WANNI COMPLEXES OF SRI LANKA

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Wanni Complex (WC) contains upper amphibolite to granulite-facies meta-igneous rocks and minor meta-sedimentary rocks whereas Highland Complex (HC) contains both meta-sedimentary and meta-igneous rocks formed under granulite-facies conditions. Charnockitic rocks are orthopyroxene-bearing gneisses having a characteristic greenish colour and greasy appearance ranging in composition from granitic to mafic and making–up one of the important components of the lower continental crust in many high-grade terrains including Highland and Wanni Complexes of Sri Lanka. Whole-rock geochemical analysis of major elements is helpful to understand basic geochemical characteristics related to their source rocks, tectonic environment and petrogenetic process. The aim of the present study was to resolve these aspects of HC and WC charnockitic rocks for a better understanding of their petrogenesis. Thirty eight (38) charnockitic rock samples covering both HC and WC were analyzed for major elements by X-Ray Fluorescence (XRF) spectrometry on fused glass discs using a PANalytical AXIOS Minerals instrument at the Rock-Mineral Preparation and Analysis Lab at the Institute of Geology and Geophysics, Chinese Academy of Sciences (IGGCAS). Harker diagrams and discrimination plots were prepared for geochemical interpretation of the analytical data. As shown by K_2O/Al_2O_3 vs. Na_2O/Al_2O_3 and MgO vs. Al_2O_3 diagrams, all the WC charnockitic rocks and a majority of the HC charnockitic rocks are orthogenesis. The TiO_2, total Fe_2O_3, MnO, CaO, P_2O_5 and MgO contents in charnockitic orthogneisses display a negative correlation with increasing SiO_2 composition with little scatter suggesting fractional crystallization of the protolith magma. Negative correlation of CaO, MgO and total Fe_2O_3 vs. increasing SiO_2 the formation of biotite and plagioclase during fractional crystallization. AFM and SiO_2 vs. Na_2O+K_2O-CaO diagrams represent the calc-alkaline nature in source magma of majority of both HC and WC charnockitic rocks. SiO_2 vs. Na_2O+K_2O diagram indicates that most of the samples have granitic and granodioritic protoliths of sub-alkaline affinity in both complexes. As depicted by K_2O, CaO and Na_2O ternary diagram, majority of the WC charnockitic rocks have had granodioritic to tonalitic protoliths. P_2O_5 and TiO_2 oxide saturation temperature in the WC is about 800 °C, and in the HC it is 800 - 950 °C as shown by the thermometric observations.

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