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ABSTRACTS

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PETROLOGY GEOCHEMISTRY AND GEOCHRONOLOGYOF CHARNOCKITESACROSS THE NORTHERN HIGHLANDCOMPLEX - WANNI COMPLEX BOUNDARY, SRI LANKA

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Here we present petrology, major and trace element geochemistry and U-Pb zircon geochronology of charnockites along two traverses (Traverse 1 - Maradankadawala to Girithale and Traverse 2 - Trincomalee to Pulmoddai) across the inferred northern Highland Complex (HC)-Wanni Complex (WC) model age boundary, Sri Lanka as an aid to resolve the position of the HC-WC boundary. The charnockites are described as WC and HC charnockites with respect to their location from the HC-WC boundary. The WC charnockites contain both prograde {*Clinopyroxene + Quartz -> Garnet + Plagioclase (1)*} and retrograde garnet {*Orthopyroxnene + Plagioclase -> Garnet + Quartz (2)}* formation reactions. According to Electron Probe Micro Analysis (EPMA), Mg-rich, amphiboles and pyroxenes are present in the HC charnockites while the WC charnockites contain Fe-rich, amphiboles and pyroxenes. At a nominal pressure of 7 to 8 kbars, HC charnockites gave an average peak metamorphic condition around 770 to 780^{0}C and WC charnockites around 700 to 705^{0}C. Laser Ablation Inductively Coupled Plasma Mass Spectrometry (LA-ICP-MS) $^{238}U/^{206}Pb$ zircon geochronology of three WC charnockites gave Late Neoproterozoic metamorphic ages around 545±9 to 576±38 Ma and middle to early Neoproterozoic protolith crystallization ages around 722±53 to 1011±47 Ma. Magma discrimination diagrams suggested a tholeiitic trend for protoliths of all the WC charnockites and a calc-alkaline trend for those of the HC. Unlike the HC samples, the WC samples are frequently clustered together in many major and trace element geochemical discrimination diagrams. A majority of HC samples can be classified as volcanic arc granites (VRG) the WC samples were classified as within plate granites (WPG) or close to VAG-WPG boundary in tectonic discrimination diagrams. The protoliths of WC charnockites have characteristics of A-type granites while a majority of the protoliths of the HC charnockites represent I and/or S type granites. In Nb/Yb vs Th/Yb tectonic discrimination diagrams, all HC and WC charnockites indicate their origin at an active continental margin.

The reaction (2) evident that the WC also experienced a stage of near isobaric cooling after the peak metamorphism similar to the HC. Tholeiitic trend, A-type and WPG characteristics of the majority of WC charnockites suggest some form of extensional tectonics in a continental environment which may have played a major role during the early geological evolution. Three HC samples collected around Trincomalee share the geochemical signatures of WC charnockite protoliths and may be interpreted as belonging to the WC. Hence our observations suggest that the inferred HC-WC boundary should be shifted southwards around the Trincomalee area.

Keywords: *Geochemistry, Zircon geochronology, Charnockites, Sri Lanka*

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