GEOLOGICAL SOCIETY OF SRI LANKA
(GSSL)

Proceedings of the 35th Annual Technical Sessions

"Emerging Trends in Geoscience & Geology of Sri Lanka"

22nd February 2019

At the Oak Ray Hotel, Kandy

ABSTRACTS

Joint Editors

Nadeesha H. Koralegedara
Nanda Balasooriya

Proceedings of the 35th Technical Session of Geological Society of Sri Lanka, 2019
Published Online – 22nd February 2019 (http://www.gsslweb.org)

GSSL-2019-T1-S1/06

PETROLOGY AND GEOCHEMISTRY OF KADUGANNAWA COMPLEX, SRI LANKA

A.M.A.M. Abeysinghe[1], P.L. Dharmapriya[1], Sanjeewa P.K. Malaviarachchi[1], Sajeev Krishnan[2], M. Satish-Kumar[3], N.D. Subasinghe[4]

[1]Department of Geology, Faculty of Science, University of Peradeniya, Sri Lanka

[2]Centre for Earth Sciences, Indian Institute of Science, Bangalore, India

[3]Department of Geology, Faculty of Science, Niigata University, Niigata, Japan,

[4]National Institute of Fundamental Studies, Hantana Road, Kandy, Sri Lanka

**Corresponding Author Email: dharmapriya1985@gmail.com*

Kadugannawa Complex (KC) crops out as doubly plunging upright folds marginal to the boundary between the Highland and the Wanni Complexes in central Sri Lanka. A number of researchers studied the geochemical signatures of the KC gneisses, but the P-T and tectonic evolution of the KC is little known compared to that of the adjacent Highland Complex (HC). This research made a detailed petrographical study of mineral assemblages and reaction textures of samples collected systematically across Balana antiform and Aranayake synform to understand the petrogenesis and tectonic evolution of the KC samples. Point analysis and Wavelength dispersive X-ray area mapping on selected rock thin-sections were performed under the Electron Probe Micro Analyser (EPMA) to determine mineral chemistry. Restitic parts of the studied rocks were selected for whole-rock major and trace element analysis using Inductively Coupled Plasma Mass Spectrometry (ICP-MS). Inclusion phases preserved in mineral porphyroblasts of garnet-clinopyroxene-hornblende-biotite gneiss, two-pyroxene-hornblende-biotite gneiss and garnet-sillimanite-biotite gneiss provide evidence for prograde dehydration reactions of Hbl+Pl+Qz -> Grt+Cpx+Fluid/Melt, Hbl+Pl+Qz-> Opx+Cpx+Fluid/Melt and Bt+Sil+Qz -> Grt+Kfs+Fluid/Melt, respectively. During retrogression, garnet has been overprinted by biotite in the garnet-bearing rocks. In garnet-clinopyroxene-hornblende-biotite gneiss, garnet is broken down by the decompression reaction Grt+Cpx±Qz -> Opx+Pl. The conventional thermobarometric estimates indicate that the rocks have experienced temperature ~775-825 ºC and at pressure 7-8 kbar during the peak metamorphic conditions. The biotite that overprinted garnet has formed around a temperature of 730-750 ºC, probably during a cooling stage after peak metamorphism. Subsequently, rocks have experienced a stage of rapid decompression stage which corresponds to the formation of Opx+Pl after garnet. According to whole rock SiO2 and total alkali (Na2O+K2O) content, the protoliths of the rocks can be classified as granite, granodiorite, diorite, gabbro, and syenite. A majority of rocks studied show a trend of calc-alkaline magmatism. In tectonic discrimination diagrams, the meta-granitic and meta-granodiorite rocks indicate subduction-related syncollisional and volcanic arc signatures. Rocks having meta-gabbroic composition present mainly arc-related magmatism. In Nb/Yb vs Th/Yb discrimination diagrams, a majority of samples suggest an origin from enriched sources at a subduction-related active continental margin. These results suggest that the KC rocks have also experienced prograde metamorphism producing garnet through dehydration

reactions, and after the peak metamorphic conditions the rocks may have undergone a stage of cooling and then followed a stage of rapid decompression. However, lower P and T conditions of metamorphism of the KC compared to the adjacent HC around Kandy suggest that their present exposures have metamorphosed at different crustal levels. The protoliths of meta-igneous rocks of the KC were derived from arc-related magmas in a subduction-related continental margin.