

Paper ID: CMT-045

Petrogenesis of dolerite dykes in Sri Lankan basement

<u>S.A. Munasinghe¹</u>, P.L. Dharmapriya^{1*}, S.P.K. Malaviarachchi¹, R. Kleinschrodt², S.A.T.D. Kumarasiri³, S.A. Samaranayake⁴, B. Spiering⁵, M. Hellers², N.D. Subasinghe⁶

¹Department of Geology, University of Peradeniya, Sri Lanka
²Institute for Geology and Mineralogy, University of Cologne, Germany
³Wimpey Laboratories, Muscat, Oman
⁴National Ocean Affairs Committee, Ministry of Foreign Affairs, Sri Lanka
⁵Steinmann Institutfür Geologie, University of Bonn, Germany
⁶National Institute of Fundamental Studies, Kandy, Sri Lanka

*prasanad@sci.pdn.ac.lk

Dolerite dykes represent the youngest post-tectonic intrusions in the Sri Lankan basement. To this day, dolerites have mainly been reported from the Vijayan Complex (VC). Other than a few published literatures on those occurrences, no regional survey of dolerites in Sri Lanka has been conducted. Study of representative samples from five (05) localities in the VC (two samples each from Wahawa, Rukkamputur, and Gallodai) and one each in the Highland Complex (HC) (close to Badulla) and Wanni Complex (WC) (close to Kurunegala) is presented here. Mineralogy, mineral textures, mineral chemistry and petrography of the dolerite at these localities have been used to characterize composition of their parent magma, probable crystallization temperature, and petrogenesis. Mineral chemical data of four (04) samples (from Wahawa, Rukkamputur, Badulla, and Kurunegala) were obtained by Electron Probe Microanalysis (EPMA). The dolerites are composed of plagioclase (An₄₀₋₇₉, Ab₂₁₋₅₅), Fe-Tioxides, clinopyroxene (mainly augite: Fs_{10-30} - En_{37-51} - Wo_{20-40}), \pm orthopyroxene (Fs_{15-42} - En_{60-10}) $_{80}$ -Wo₄₋₉), \pm olivine (Fo₈₂₋₈₄-Fa₁₆₋₁₇-Tp₁₋₃). Studied dolerites can be divided into two groups: namely, olivine-bearing dolerites (HC and WC) and olivine-absent dolerites (all from VC). Both groups contain porphyritic, ophitic, sub-ophitic, and inter-granular textures, typical of mafic igneous rocks. Serpentine, biotite, and quartz occur as secondary mineral phases in all dolerites while Hornblende only found in Wahawa samples. Both groups host dendritic and skeletal Fe-Ti oxides, and are characterized by orthopyroxene, outlined by a thin, discontinuous clinopyroxene rim. Based on Ol-Spl and two-pyroxene thermometers, it is estimated that the crystallization of olivine from parent magma commenced at temperature (T)~1300 °C, and dolerites have been crystallized at $T \sim 1100-1200$ °C respectively. The absence of primary hydrous minerals in the dolerites indicates the dry nature of the parent magma. The olivinebearing HC and WC dolerites are likely to represent an earlier stage of fractional crystallization compared to those from the VC. The presence of chromite inclusions within olivine phenocrysts provides evidence for the linkage of parent magma with a mantle source.

Keywords: Dolerites, crystalline temperature, parent magma, petrogenesis

Acknowledgements: The National Research Council, Sri Lanka Grant No. 19-092 and the German Academic Exchange Service Fellowship for Research stay for University Academics and Scientists, 2021 (grant no. 5755233) are acknowledged