NIFS

NIFS-YSA

Scientia et Innovatio: Vision to Venture

YSCMR 2025

Proceedings of the

YOUNG SCIENTISTS' CONFERENCE ON MULTIDISCIPLINARY RESEARCH

VIRTUAL INTERNATIONAL CONFERENCE

2025

ISSN 2815-0260
Proceedings of the Young Scientists' Conference on Multidisciplinary Research-2025
Young Scientists' Association, National Institute of Fundamental Studies, Sri Lanka
27th November 2025

Paper ID: CMT_174

Petrogenetic significance of Cordierite in the southwestern and central highland complex, Sri Lanka

K.H. Senevirathne[1], P.L. Dharmapriya[1]*, S.P.K. Malaviarachchi[1], G. Wickramasinghe[2], N.D. Subasinghe[3]

[1]*Department of Geology, Faculty of Science, University of Peradeniya, Sri Lanka*
[2]*Faculty of Applied Sciences, Ouvil University, Sri Lanka*
[3]*National Institute of Fundamental Studies, Kandy, Sri Lanka*

prasannad@sci.pdn.ac.lk

Sri Lanka is a high-grade metamorphic fragment of central Gondwana comprising four geological complexes: the Highland (HC), Wanni (WC), Kadugannawa, and Vijayan. Peak conditions in the south-western Highland Complex (SWHC) were ~5–7 kbar at 800–900 °C, whereas the central, southern, and eastern HC reached ~8–10 kbar at 800–950 °C. Following peak metamorphism, HC granulites underwent near-isobaric cooling (IBC) and near-isothermal decompression (ITD). Cordierite-bearing gneisses occur in the SWHC and southern WC near the HC–WC boundary but are scarce in the central HC, where their significance remains uncertain. Cordierite stability reflects bulk composition, temperature, pressure, and fluid activities. To investigate cordierite abundance in the SWHC versus central HC, we sampled the SWHC (Horana, Ingiriya, Homagama, Meegoda) and central Sri Lanka (Kotmale, Gampola, Ramboda). Petrography constrained mineralogy and microtextures, and Electron Probe Microanalysis (EPMA) determined mineral chemistry. In the SWHC, cordierite occurs in prograde, peak, and retrograde assemblages; melt patches indicate syn-migmatitic growth. In the central HC, cordierite is typically restricted to decompression reaction textures and melt patches. At Gampola and Kotmale, cordierite forms orthopyroxene–cordierite symplectites after garnet and as a breakdown product after orthopyroxene–sillimanite–quartz. At Ramboda, garnet-hosted melt inclusions contain cordierite, biotite, and quartz, although cordierite is absent from the matrix. In SWHC samples, cordierite is present in the matrix and melt patches, and at Ingiriya and Meegoda, cordierite–spinel motes replace garnet. EPMA indicates X_{Mg} of 0.88–0.99 at Gampola and Kotmale, ~0.76–0.77 at Ingiriya, and ~0.84–0.86 in Ramboda melt inclusions. Cordierite in peak/retrograde assemblages and melt patches in the SWHC reflects high-T, low-to-medium-P metamorphism with partial melting, followed by retrograde cooling and decompression. Conversely, its absence from peak assemblages in the central HC implies high-T and relatively higher-P metamorphism, with later retrograde cooling and ITD-related decompression permitting limited retrograde cordierite growth. Targeted thermobarometry and geochronology will refine these interpretations.

Keywords: *Cordierite-bearing gneisses, highland complex, pressure-temperature-time (P–T–t) evolution, partial melting (anatexis)*

Acknowledgment: University Research Grant (Grant No. URG/2024/40/S) is acknowledged for funding for field visits.