

## **P-T-t EVOLUTION OF CALC-SILICATE ROCKS IN THE SOUTH-WESTERN HIGHLAND COMPLEX OF SRI LANKA**

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Recent studies on calc-silicate rocks from the Southwestern Highland Complex of Sri Lanka have renewed the interest on the reconstruction of the P-T-t and fluid evolution in this part of the island. Present study is another contribution to understand the P-T-t path and fluid conditions of the calc-silicate lithologies around Galle and Middeniya-Embilipitiya areas in the Southwest.

Based on petrography and mineral assemblages, the studied calc-silicate lithologies can be subdivided into three main groups; Group I – wollastonite-bearing but grossularite-absent assemblages, Group II – grossularite-bearing but wollastonite-absent assemblages, Group III - both wollastonite and grossularite-absent assemblages. Formation of different assemblages is possibly a result of peak metamorphic P, T conditions, the chemistry of protoliths, graphite precipitation and response to fluctuation of  $X_{CO_2}$  level during prograde path. Critical reaction textures in Group I lithologies indicate breakdown of, (1) wollastonite  $CO_2 \rightarrow calcite + quartz$ , (2) wollastonite + dolomite  $\rightarrow calcite + diopside$ , (3) scapolite  $\rightarrow calcite + quartz + plagioclase$ , (4) alkali feldspar + wollastonite  $\rightarrow scapolite + quartz + K^+$ , that are important in re-constructing the P-T-t evolution of the terrain. Diopside rims around quartz in Group II assemblage suggest the reaction, (5) dolomite + quartz  $\rightarrow diopside + CO_2$ . In addition, local occurrences of fluids involving reaction textures such as myrmekitic intergrowth of plagioclase + quartz between calcite + K-feldspar and replacement of diopside by hornblende have been observed in calc-silicate rocks from the study area. Peak metamorphic assemblage of the Group I suggests a stabilization temperature of about 800-850<sup>o</sup>C at 5 kbar, and  $X_{CO_2} \geq 0.2$  in the fluid phase. The retrograde reactions (1), (2) and (3) suggest isobaric cooling (IBC) following peak metamorphism during which internal fluid buffering prevailed. But the IBC reaction anorthite + wollastonite  $\rightarrow grossularite + quartz$ , noted from elsewhere was not present in the studied samples perhaps due to lower lithostatic pressure in the study area. The reactions (4) and (5) suggest isothermal decompression (ITD) following the IBC path, and other fluid involving reactions noted in the study area suggest both hydration and  $CO_2$  influx during final stages of metamorphic evolution.

The retrograde reaction textures in the studied calc-silicates and the inferred IBC and ITD P-T-t segments for the Southwestern Highland Complex correlate well with the results of previous P-T-t studies of calc-silicate, pelitic and mafic rocks in the Highland Complex. Further, presence of grossularite-absent assemblages, the reaction textures (1), (3) and (4), and the inferred P-T-t path for the study area strongly correlate well with mineral assemblages, reaction textures and P-T-t evolution in the Kerala Khondalite Belt within the Trivandrum Block of Southern India.