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P-T-t PATH OF THE SOUTHWESTERN HIGHLAND COMPLEX AROUND BALANGODA, SRI LANKA

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Mineral reaction textures in calc-silicate gneisses and siliceous dolomitic marbles are important to understand the P-T-t path of high-grade gneiss terrains. To-date, only one such study has been undertaken in Sri Lanka from the Southeast of the Highland Complex (HC), although the P-T-t path of the granulite-facies terrain has been determined using pelitic and mafic rocks. In the present study, mineral reaction textures in calc-silicate rocks and siliceous dolomitic marbles around Balangoda have been investigated to understand the P-T-t path of the HC in the Southwest.

In the studied calc-silicate rocks, zones of medium to coarse-grained (4-6 mm) anorthite + wollastonite, and scapolite + wollastonite occur between very coarse-grains of grossularite garnet (7 cms) and quartz (3 cms) suggesting the prograde reaction, grossularite + quartz = anorthite or scapolite + wollastonite (1). Fine-grained (0.05-0.1 mm) rims of retrograde grossularite + quartz around the product anorthite + wollastonite, and scapolite + wollastonite suggest reversal of the prograde reaction (1). In siliceous dolomitic marbles, areas between coarse-grains (8-15 mm) of corundum and dolomite are occupied by coarse-grains (5-10 mm) of spinel occurring in a medium-grained (2-4 mm) calcite + dolomite matrix suggesting the prograde reaction, corundum + dolomite = spinel + calcite + CO_2 (2). Formation of medium grained (2-4 mm) corundum between product spinel in the calcite + dolomite matrix suggests reversal of prograde reaction (2). In addition, retrograde formation of diopside after forsterite, and tremolite after diopside in siliceous dolomitic marbles, and wollastonite after calcite + quartz, and garnet + quartz after diopside + plagioclase have been observed in the calc-silicate rocks of the study area.

The reaction (1) is discontinuous in P, T space, and therefore, is critical in assessing the maximum temperature attained during granulite-facies metamorphism in the HC. According to available experimental data, the reaction (1) occurs at 600^{o}C, 700^{o}C, 800^{o}C and 900^{o}C at pressures of ~2kb, ~5kb, ~7kb and ~9kb, respectively. Thus, reaction (1) in the study area suggests that prograde decompression may have occurred from a pressure of at least a few hundred bars above a given reaction temperature to the maximum temperature of metamorphism, which is at least a few tens of degrees higher than the reaction temperature. Reversal of the prograde reactions (1) and (2), taken together with formation of garnet + quartz after diopside + plagioclase suggests near-isobaric cooling after reaching the metamorphic peak. The retrograde formation of diopside after forsterite, and tremolite after diopside in siliceous dolomitic marbles suggest continued cooling towards a lower temperature. Local presence of thin wollastonite rims after calcite + quartz suggests isothermal decompression at high temperature following near-isobaric cooling. The above prograde and retrograde reaction textures suggest that the P-T-t path of the HC in the Southwest around Balangoda is similar to that of the Central and Southeastern HC. Particularly, the reaction (1) and its reversal have been noted in calc-silicate rocks from the HC in the Southeast too.

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