

GEOLOGICAL AND GEOCHEMICAL CHARACTERISTICS OF CALCITE DEPOSITS AT BALANGODA, SRI LANKA: IMPLICATIONS FOR ORIGIN

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Economically important, unique calcite deposits occur in high-grade marbles near the lithotectonic boundary between the Highland Complex (HC) and Vijayan Complex (VC) around Balangoda. The aim of the present study was to characterize trace element geochemistry of the differently colored calcite of these deposits to postulate their possible origin. Combined field, structural, geological, mineralogical, and geochemical investigations were carried out during the research. The mineralogical analysis was carried out primarily on petrographic microscope with further refinements using X-ray diffractometer (XRD). Chemical analysis was carried out with wavelength dispersive X-ray fluorescence spectrometer and inductively coupled plasma mass spectrometer. The calcite deposits occur as bands and isolated pockets with variably coloured coarse-grained calcite crystals in the high-grade marbles, adjacent to angular-shaped mafic and calc-silicate enclaves. Among the colored calcites, the most common are yellow and white, while blue, green, and rose coloured varieties are intermittently found. The yellow, white, and rose-colored varieties usually occur closer to the enclaves whereas blue colored calcite occurs away from those. The contact between enclaves and calcites is sharp and coloured calcite bands and enclaves show subparallel alignment to the foliation of the marble. The length of a single calcite band extends from 0.3 - 30 m and the width varies from few centimeters to several decimeters. The surficial distribution of the calcite bands is irregular; however, they may appear as concordant vein-like structures in the host marble. The XRD data revealed that all calcite occurrences are monomineralic. The commonest mineral assemblage of the host marble is dolomite+calcite+forsterite±phlogopite±apatite±graphite±pyrite with a high dolomite (85% modal) content. The major constituents of the calcite deposits are Ca (39.11 wt.%) with subordinate Mg (0.36 wt.%) and the common trace elements are V, Co, Ni, Zn, Sr, Y, Zr, Ba, Ti, and Mn. The concentrations of Mg, Al, and Si as well as trace elements of colored calcites do not show significant variation. However, Fe and Mn concentrations in rose and yellow calcites are higher than that of other coloured calcites. The Rare Earth Element (REE) concentrations of coloured calcites are much lower than those of carbonatites in Sri Lanka and the chondrite normalized REE pattern of colored calcites is more similar to that of the host marble. It indicates that the calcite deposits may have been derived from partial melting of the host marble with fluid activities along the thrust zone between HC and VC. Moreover, the concordant vein-like occurrence of calcite supports the hypothesis of syntectonic crystallization of coarse-grained calcite possibly during the thrusting of the HC over the VC.

Keywords: Balangoda calcite deposit, Coloured calcite, Enclaves, Trace elements