

Chemical, Stable Isotope and Petrographic Studies of Granulite Facies Marbles from Madurai Region, Southern India.

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Marbles from the Madurai region, in the South Indian granulite terrain have been analysed for major, trace, rare earth element and carbon and oxygen isotopic composition. The geochemical and isotopic data of these marbles is discussed in terms of the deposition of the primary carbonates and the later metamorphic changes. The samples are predominantly composed of calcite, scapolite and diopside with minor proportions of quartz, dolomite, idocrase, micas and forsterite. Spinel and apatite are present as accessory minerals.

The presence of the silicate rich and other non-carbonate impurities in the chemogenic protoliths of these marbles and their reconstitution during high grade metamorphism has led to the enrichment of Al_2O_3 , TiO_2 , K_2O , SiO_2 , Zr, Rb, Nb, Y and REE. Sr was added with the carbonate fraction during deposition. The abundance of the REE in these rocks are also controlled largely by original variations in the amount of silicate phases admixed with carbonate during deposition. The carbon and oxygen isotope ratios which span a range of 0.19 to 5.13‰ $\delta^{13}\text{C}$ (PDB) and 16.88 to 20.91‰ $\delta^{18}\text{O}$ (SMOW) respectively are nearly compatible with the isotopic composition of unmetamorphosed impure carbonates of similar age and appear to be primary or diagenetic signatures which have not been significantly influenced by the granulite grade metamorphism indicating the probable absence of any pervasive fluid activity in these metacarbonates.