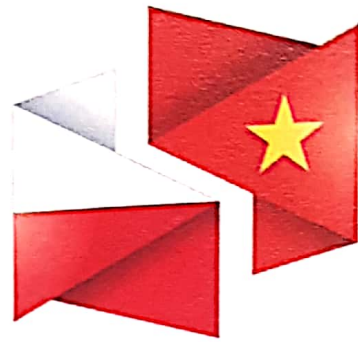




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Metacarbonate Formations in Kontum Massif (Vietnam) and their Relation to Mineral Resources

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abstract

In Vietnam, Kontum Massif locates on the southern part of Truong Son Paleozoic Orogenic Zone and the northern side of Da Lat Mesozoic Magmatic Zone. Here the carbonate and metacarbonate formations occur with small volumes, reported in the Kan Nack (NA-PPkn) Complex, Ngoc Linh Complex (PP-MPnl), Kham Duc Complex (MPkd), Phong Hanh (PZ1)ph and Ngu Hanh Son (C-Pnhs) formations. They systematically distribute and are in the relationship to the history of geological development in Southeast Asia, associated with many industrial materials and geological heritages.

The Archean metacarbonate rocks of the Kan Nack Complex (NA-PPkn) consist of small blocks in Kon Roi, Xa Nam, and Kroong areas. The beds and metacarbonate lenses including marble, olivine marble, diopside marble, calcite-bearing silicate rocks have strongly been deformed, accompanied by gneiss, crystalline schist, two pyroxene gneiss. The rocks have typical mineralogical associations: Cal + Fo ± Phg (1); Cal + Fo ± Spi (2); and Cal + Di ± Phg (3), belonging to the granulite facies of temperatures of 880-900°C, pressure of 940 -950 Mpa, corresponding to a depth of 28 to 30km. Special structures have been discovered in exposed bodies of metacarbonate in Kroong and Xa Nam areas, in the geological cross-section of Song Ba (Gia Lai province). These structures are very similar to those of described stromatolite in the world (Green River Formation in the south of the Greater Green River Catchment-Wyoming, United States; stromatolite in Kona Formation, Peninsula-Michigan, Early Proterozoic stromatolite in the Tree River -Port Epworth, Nunavut, Canada).

The Paleoproterozoic metacarbonates of Ngoc Linh Complex (PP-MPnl) with a very small volume of distribution, including lenses and pods of white marble, diopside marble, plagioclase - diopside marble. The rocks have typical mineralogical associations: Cal + Di (1) and Cal + Di + Plg60 (2), metamorphically graded at amphibolite facies.

The Neoproterozoic metacarbonates of Kham Duc Complex (MPkd) are in the form of layers and lenses intercalated with two-micas quartz schist and two-micas gneiss, mica quartzite, metamorphosed at the epidote-amphibolite to the greenschist facies. Petrographic composition includes tremolite-bearing marble, dolomitic marble. Dolomitic marble block occurred in Sa Nghia area (Kon Tum province) in a lens-shape of up to 400m thick, extending over 1000m, strongly affected by metasomatic activities. Metasomatic activity of high-temperature stage created a zoning metacarbonate body.

including: wollastonite mono-mineral zone (3), olivine calcite zone, olivine - pyroxene-calcite zone, olivine - phlogopite- dolomite zone (2)) and tremolite-dolomite marble zone (1). The low temperature hydrothermal metasomatic stage has chrysotile, lizardite, dolomite, calcite, prenite etc. that replaced the products of the previous stages (olivine, diopside etc.). The Sa Nghia metacarbonates and serpentinites having beautiful colors and good mechanic characters can be used as ornamental and decorative stones.

Early Paleozoic metacarbonates of Phong Hanh Formation (PZ1ph) distribute in Phong Hanh (Phu Yen province), Chu Se (Gia Lai province), Dac Uy and Dak Rolong (Kon Tum province). Petrographic composition comprises of marble and dolomitic marble, tremolite marble, low-grade metamorphism at level of greenschist facies. Dolomitic marble bodies in Kon Queng area (Gia Lai Province), Phong Hanh (Phu Yen province) accompanied with industrial-scale magnesite ore bodies, originated from low-temperature hydrothermal metasomatism.

Thanh My metacarbonate block (Quang Nam province) has a large size, including blue-grey marble, striped marble, which can be compared with the marble of the Ngu Hanh Son formation (C-Pnhs) containing *Petagonocyclincus* sp. relics of Carboniferous-Permian age. At the boundary contacted to the granitoid of Late Paleozoic age, Thanh My marbles have locally been thermal-contact metamorphosed, creating narrow-scale zones of silicate-calc hornfels and silicate-carbonate hornfels of thickness of 0.1-0.2 m to 1.0-2.0m. The rocks have typical associations: Cal + Wo + Q (1); Cal + Di + Wol + Phl + Q (2); Cal + Di + Wol + Q ± Phl (3); Cal + Di + Wol (4); Cal + Oli + Di ± Wol (5), metamorphically graded at hornblend hornfel facies of metamorphed temperature of 650 to 6500°C, pressure of 2-3 kbars. Thanh My blue-grey stripped marbles (Quang Nam province) has a good quality, currently being exploited as cement materials. The marble block of Ngu Hanh Son (Da Nang province) is related to beautiful cave systems and landscapes, attracting many foreign and domestic tourists.

Keywords: metacarbonate, marble, Kon Tum massif