High-temperature metamorphic process in Ciclova – Oraviţa area (Banat, Romania)

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In the Banat area, the contact metamorphism is related to various shallow level magmatic intrusions of Upper Cretaceous age, that lead in the Ciclova – Oraviţa zone to the formation of some particular, high-temperature calc-skarns deposits. Gehlenite-bearing skarns occur at the very contact between dioritic or monzodioritic bodies and carbonaceous sequences of Mesozoic.

From geochemical point of view the mineral reactions, leading mainly to the formation of carbonate and silicate minerals, can be restricted to the $CaO – SiO_2 – H_2O – Al_2O_3 – CO_2$ system, in which calcite was the principal reactant. Rare mineral parageneses, that form only at extreme temperatures of contact metamorphism, includes gehlenite, monticellite, perovskite, hydroxylellestadite, Ca-Tschermak diopside, wollastonite-2M, (Ti-bearing) grossular-andradite. The peculiarity of this skarn deposit is that magnesian (åkermanite-bearing) and no calcic skarns appear durring the magmatic (prograde) stage, due to high magma temperatures (more than 800ºC) and at very shallow depths of formation (hundred of meters). This is due to the calcium equilibrium with the calc-alkaline magma in a very wide range of CO_2 fugacity at temperatures, typical minerals of the peak metamorphic assemblage beeing wollastonite, åkermanite-rich melilite, Ti-rich calcic garnet, pyrrhotite, whereas the subsequent paragenesis (stage II) is due to local decreases in fluid pressure and includes gehlenite, Ti-poor calcic garnet, monticellite, Al-rich diopside, magnetite, perovskite, and probably a Ca-Si mineral (kilchoanite?). It seems that the disparities that arise regarding to the characteristics of the formation, structure and mineralogy of the skarns developed at the very contact between this intrusive body and a calcareous sequence, results mainly due to variations in the availability of aluminum, silicon, iron, alkalis and CO_2 at various stages of the skarnification process. An early hydrothermal stage (stage III) produced retrogression of the first two stages and a paragenesis including vesuvianite, clintonite, fukalite, katoite, hydroxylellestadite.

The wide development of the vesuvianitic skarns compared to the gehlenitic skarns, is another particularity of this skarn area.