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Kornerupine – Corundum – Sapphirine bearing rocks in the contact granulites-peridotites at the Beni Bousera massif (Internal Rif, Morocco)

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The Beni Bousera peridotite massif (Internal Rif , Morocco) is formed in a major part of Spinel-bearing lherzolite rimed by a layer 100m thick of garnet-bearing peridotite which is in direct contact with HP-HT granulite metamorphic rocks (16Kbar, 860°C). According to detailed recent study, this shearing contact between these two formations shows the presence of metamorphic ultramafic intercalations underneath the deformed granulites. Foliation is well distinct and allocate in both rocks with a succession of metamorphic micro-zones with very diverse mineral assemblages. Its originality comes from the spatial arrangement of 3 centimetric zones separating garnet-spinel bearing peridoties from garnet-kyanite bearing granulites:
- Phlogopite, orthopyroxene, spinel zone.
- Corundum, sapphirine, kornerupine zone.
- Sillimanite, spinel zone.
Geochemistry of the different phases shows peraluminous (corundum, kornerupine sapphirine, spinel) and magnesian (phlogopite, enstatite) assemblages, the P-T conditions estimated using thermocalc are 9 to 10Kbars and 700 to 900°C in the saphirine – sillimanite – corundum stability domain.
These thermobarometric conditions reveal that these rocks -forming the top of the peridotite massif- have incurred a metamorphic evolution at high temperatures, which is related to an isothermal decompression after or during the setting up of these rocks at the base of the crust (60 km thick). However, the kornerupine could have formed sequentially under nearly constant P–T conditions (sillimanite stability field) during the infiltration of fluid in the rocks. These hydrothermal processes are also involved and drive the peridotites to a metasomatic contamination at the contact with fluid-rich crustal rocks that leads to crystallization of phlogopite and amphiboles. This contact is possibly a shear zone crossing the limit crust- mantle.
The data show that in the Rif mountains the granulites and formerly diamond bearing ultrabasic mantle rocks are uplifted in the same geodynamic environment and give very strong constraints on the Alpine metamorphic evolution of the whole Alboran domain.

Key words: Phlogopite, Kornerupine, Corundum, Sapphirine, Metasomatism, Peridotites, Rif