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POST-EMPLACEMENT EVOLUTION OF THE BEJA-ACEBUCHES OPHIOLITE COMPLEX (SOUTH PORTUGAL) *

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Between Ferreira do Alentejo-Beja (Southern Portugal) and Acebuches-Aracena (Southwest Spain) there outcrops a narrow mafic and ultramafic belt, currently interpreted as an extremely dismembered ophiolite sequence incorporated in the Variscan South Iberian Suture (the Beja-Acebuches Ophiolite Complex – BAOC). The lower and intermediate sections of the ophiolite sequence, to be found essentially in Portugal, comprise respectively ultramafic cumulates (mainly harzburgitic in nature) and gabbroic rocks (mostly gabbros and gabbronorites); the upper sections, well represented in Spain, consist essentially of amphibolites and metabasalts. Deep marine sediments and examples of sheeted dyke complexes are almost absent (Quesada *et al.*, 1994). Chemical evidence strongly suggest that BAOC rocks represent a small marginal (back-arc) basin formed during subduction under the Iberian Terrane of a normal oceanic crust to the south.

After their emplacement, BAOC's rocks were strongly retrograded under decreasing temperature conditions, sometimes strongly affected by metasomatism induced by fluids circulating along late WNW-ESE shear zones. This leads to a differential preservation of the rocks, with general serpentinization of the ultramafic cumulates and a more complete record of the geological history preserved in gabbroic rocks. The latter comprise An_{56-60} plagioclase, diopsidic clinopyroxene, and accessory Ti- and Na-rich hornblendes, ilmenite and Ti-rich magnetite; sometimes olivine, enstatite and sulphides (mostly pyrrhotite, chalcopyrite and pyrite) are also present. Widespread textural evidence for high-temperature (800-900ºC) recrystallization of these gabbroic rocks under an anisotropic stress field, suggest that BAOC has been emplaced before its total consolidation. The later history of these rocks reflects mainly the variscan metamorphism, that peaked at amphibolite facies, as shown by the basaltic part of the sequence, and its subsequent waning stages. The initial steps of this metamorphic re-equilibration are marked by inner rims of plagioclase (with andesine compositions) and pyroxene breakdown to Mg-hornblende under average temperatures of the order of 600-620ºC; the outer rims of plagioclase, of oligoclase composition, as well as the gradual transformation of primary and metamorphic hornblendes to actinolitic amphiboles, record the subsequent retrogradation under temperatures ranging from 450 to 500ºC. Silica liberated by these mineral transformations precipitates as microcrystalline quartz aggregates. In the ultramafic rocks these processes are represented mainly by widespread serpentinization, affecting both olivines and orthopyroxenes.

Further evolution is characterized by the development, in semi-ductile – semi-brittle regime, of major WNW-ESE, left-handed vertical shear zones. Probable temperatures were 350-400ºC as demonstrated by brittle deformation of plagioclase crystals and plastic deformation and recrystallization of quartz. Whenever deformation related to these shear zones is evident, further mineralogical/textural transformations are apparent, consisting of plagioclase saussuritization and more or less strong chloritization of the remaining mafic minerals, and concomitant deposition of quartz + chlorite along the brittle structures already formed. The final stages of retrogradation/alteration occur under temperatures below 300ºC and are mainly ascribable to CO_2 and SiO_2 fluids circulating along the main shear zones just mentioned, reactivated under brittle conditions with a left-lateral thrusting movement. This large volume, extremely well focused, fluid inflow induced most of the times very intense carbonatization of the adjoining rocks, with almost total destruction of their mineralogy and textures and carbonate deposition (ankerite + dolomite ± siderite ± magnesite) in subsidiary distensive structures; when affecting serpentinized ultramafic rocks, this metasomatic process leads to deserpentinization with development of strongly silicified carbonate aggregates. Later hydrothermal events are typically related to the precipitation of microcrystalline quartz and/or calcite in late veins and veinlets.

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Quesada C., Fonseca P., Munhá J., Ribeiro A., Oliveira J. (1994) The Beja-Acebuches Ophiolite (Southern Iberian Variscan Fold Belt): Geological characterization and geodynamic significance. *Bol. Geol. y Minero*, 105: 3-49.