Mineralogical and geochemical evidence of serpentinization in Cabeço de Vide mafic – ultramafic complex, Central Portugal

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Mineralogical and geochemical studies were carried out on hydrothermally altered rocks from the Cabeço de Vide ultramafic complex. The study region is situated in the Ossa Morena Zone of the Iberian Hercynian belt. The Lower Cambrian carbonate sequence was metamorphosed by mafic and ultramafic intrusions forming a NW-SE cumulate-type structure of Ordovician age. Sampling was performed along 2 cores drilled at Cabeço de Vide Spa. For this study, 20 samples were chosen among those showing greater degree of visible alteration. The more altered section of each sample was cutted and milled down to 90 mesh. The clay fractions were obtained by sedimentation according to Stokes law. Geochemical composition of the whole rock was assessed by X-ray fluorescence spectroscopy (XRF) using an Axios PANalytical spectrometer equipped with Rh tube, argon/methane gas and IQ + (major elements) and Pro-Trace (minor elements) data processing programs. Mineralogical studies were carried out through X-ray diffraction (XRD) on X'Pert PW 3040/60 equipment using Cu Kα radiation. Studied samples showed a geochemical composition characterized by very high contents of MgO and Fe_2O_3, on almost all samples, being a fewer very rich on CaO (and Lost on Ignition - LOI). Mineralogical composition is dominated by antigorite, lizardite, amphiboles (inc. anthophyllite), and calcite. The clay fractions are dominated by serpentines and chlorite. The presence of anthophyllite is an evidence of prograde metamorphic reactions while scarbroite reflects the water circulation along fissur surfaces. On the clay associations, the almost total absence of illites reflects the high degree of serpentinization. Thus, the mineralogical zoning along the sampled boreholes may be a result of hydrothermal signatures of the system, reflecting different evolution stages.