

## GEOOTHERMOMETRY ON LOW-TEMPERATURE METAMORPHIC AREAS: PRELIMINARY RESULTS OF CLAY MINERALOGY IN THE BUÇACO SYNCLINE, CENTRAL PORTUGAL

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Different geothermometers can be used on areas affected by low-temperature metamorphism. Fluid inclusion data, illite or chlorite "crystallinities" and vitrinite reflectance are quite widely used parameters. A scientific program for the assessment of the above mentioned geothermometer data consistency in various Portuguese low grade metamorphic formations has been established and is under development. In Buçaco syncline, Central Portugal, the first results obtained on graptolite remains and fluid inclusions proved a general good agreement of different geothermometric parameters and established some of the general features of the metamorphic framework (Dória et al., 2002).

The main goal of this work is to present recent data concerning clay mineralogy (in particular, illite and chlorite "crystallinities") and to compare these results with those from organic petrology and fluid inclusion study of these metapelitic materials.

In the Central Iberian zone (CIZ) of Portugal, several anticlines and synclines occur in which a Lower Palaeozoic sequence overlays Precambrian-Cambrian metasediments. The Early Ordovician to Early Devonian rocks were affected by very low to low-temperature metamorphism during the Variscan orogeny. The stratigraphical sequence comprises a series of detrital rocks (conglomerates, quartzites, slates and black shales) in a general transgressive sequence. In the Upper Ordovician a volcanic succession of diabases and intrusive dolerites is also present. The Buçaco syncline, in Central Portugal, presents an almost continuous sequence from Lower Ordovician to Silurian. Above an unconformity upper Carboniferous terrestrial sediments also occurs. Several Cretaceous and Quaternary sediments cover part of the syncline.

For the development of the scientific program of testing geothermometer data consistency, a first sampling campaign was carried out in lithologies of different ages in the Buçaco syncline. A total of 30 samples from 5 geological sections (Dornes, Penacova, Poiães, Ceira and Buçaco) were collected. For each sample the mineralogical composition of

both total rock and clay fraction (separated by sedimentation, according to Stokes law), was determined by X-ray diffraction (CuK $\alpha$ -radiation) on Philips PW1130/90 and X'Pert PW3040/60 equipments. The clay fraction (< 2  $\mu$ m) was analysed on oriented aggregates. Qualitative and semi-quantitative mineralogical analyses followed criteria recommended by Schultz (1964), Thorez (1976), Mellinger (1979) and Pevear and Mumpton (1989). Illite "crystallinity" was assessed through the Kübler (1964) index, according to Kisch (1991). Esquevin (1969) index was also assessed.

The results show some consistency with a range of temperatures from 150°C to 200°C in the Lower to Middle Ordovician and of 100°C to 150°C in the upper Ordovician to Silurian. In the near future, the investigation will proceed on the basis of additional sampling for statistical validation of the preliminary results herein presented.

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