Variation of AMS and of Bulk Magnetic Properties in Sedimentary Host-rocks as a Function of the Degree of Contact Metamorphism: Case Study of the Foum Zguid Dyke (Southern Morocco).

P.F. Silva (1,2), B. Henry (3), F.O. Marques (4), A. Mateus (5), P. Madureira (6), N. Lourenço (2, 7) and J.M. Miranda (2)

(1) ISEL Lisboa, Portugal, (2) Dep. Física and CGUL, Lisboa, Portugal, (3) IPGP, Saint-Maur, France, (4) Dep. Geologia and CGUL, Lisboa, Portugal, (5) Dep. Geologia and CREMINER, Lisboa, Portugal, (6) Centro de Geofísica, Évora, Portugal, (7) Centro de Investigação Marinha e Ambiental da Universidade do Algarve, Portugal. pmfsilva@fc.ul.pt

We investigate the magnetic signature displayed by the sedimentary rocks affected by contact metamorphism around the Foum Zguid dykes. Samples were collected in the host-rocks along cross-sections perpendicular to dykes. Petrographic analysis points out recrystallization and important Fe-metasomatism. The latter process is mainly recorded by the development of widespread, fine-grained hematite disseminations. AMS and bulk magnetic parameters show important variations related to the intensity of contact metamorphism. The latter can affect the composition and/or the distribution of primary magnetic carriers and leads to development of new magnetic phases. Close to Foum Zguid dykes, variation of the bulk magnetic parameters seems related to the observed Fe-metasomatism.

Determination of the magnetic fabric variation during stepwise heating treatments performed in laboratory complemented our study. Magnetic fabric of the samples the less-affected by contact metamorphism becomes similar to that of the most affected ones. Our experiments show that the minimum temperature range required for the beginning of this magnetic fabric transformation is 300 – 400ºC, which was then the minimum temperature reached by host-rocks very close to the dyke during intrusion. They indicate that heat alone could be responsible for these measured variations on the magnetic fabric. The evolution of the magnetic fabric close to the dyke clearly results here from thermal effects and not from a particular stress field due to the intrusion.

Magnetic studies prove to be a very sensitive tool to assess the variable intensity of the Fe–metasomatism and recrystallization processes, and the thermal behavior induced by dyke intrusion.