Geophysical Research Abstracts,
Vol. 11, EGU2009-7501-1, 2009
EGU General Assembly 2009

Paleomagnetic and rock magnetic study of sediments from Boca do Rio (Portugal): Inference for the emplacement of the 1755 tsunamigenic layer

L. Vigliotti (1), A. Gallerani (1), C. Andrade (2), and M.C. Freitas (2)

(1) CNR, Istituto di Scienze Marine, Bologna, Italy (luigi.vigliotti@bo.ismar.cnr.it), (2) CeGUL, University of Lisbon, Lisbon, Purtugal

In the framework of the EU project NEAREST a detailed paleomagnetic and rock magnetic study was carried out, on sediments collected in the area of Boca do Rio (Algarve, South Portugal) known to have been stricken by a tsunami wave during the 1755 Lisbon earthquake. The natural remanent magnetization (NRM), magnetic susceptibility and artificial magnetizations (anhysteretic remanence, ARM; isothermal remanence, IRM) were measured on 6 U-channel and 56 hand-oriented samples collected across the tsunami layer in 3 trenches opened in the field. The targets of the study were:
1) to reconstruct an age/depth model of the deposits based on the secular variation record of the magnetic field in order to evaluate and quantify the possible erosion related to the tsunami wave;
2) to investigate the source of the magnetic minerals carrying the remanence;
3) to check possible environmental changes occurring in the area after the occurrence of the tsunami.
The rock magnetic data (X, ARM, SIRM) indicate high magnetic contents with susceptibility values exceeding 3000x10-6 SI units, except for the tsunami deposit that exhibits a distinctive magnetic signature representing allochtonous material. The magnetic mineral assemblage is dominated by multidomain ferrimagnetic grains with a significant contribution (5-9%) of ultra-fine (SP) magnetic particles probably related to the presence of pedogenetic magnetite created during soil development. The amount of this component seems to increase with depth and it may be related to changing environmental/climatic conditions in the area.
The paleomagnetic directions obtained after alternating field (AF) cleaning allowed to reconstruct the characteristic remanent magnetization (ChRM) of the remanence. However, both a very low coercivity (MDF of NRM <10mT) and differences in the directions observed between sampled sites complicate the interpretation of the results. It is unclear if the timing of the magnetization lock-in is variable among the sites with remagnetization processes occurring at different rates. If the pedogenetic process is responsible for the magnetite formation and the process is not constant throughout the area, it is possible that the results reflect different environmental changes. The observed discrepancies hampered the possibility to stack the results in a reference curve for the site. Comparison of the paleomagnetic directions with the master curve for Iberia, relocated to the Algarve geographical position, indicates that less than hundred years could be missing in the sediments associated with the tsunami layer.