

Testing Rock Magnetic and AMS Methods in Tsunami- and Storm-induced Deposits

Eric Font^{a*}, Cristina Veiga-Pires^b, Francisco Ruiz Muñoz^c, Manuel Pozo^d, Manuel Abad^c, Silvia Duarte^a, Nuno Simões^b, Silvia Nave^e, Susana Costa^e, Luis Rebelo^e.

^a IDL-FCGUL, Faculdade de Ciências de Lisboa, Ed. C3.3.22, Campo Grande, 1749-016, Portugal

^b CIMA-FCMA, Universidade do Algarve, Campus de Gambelas, 8005-139 Faro, Portugal.

^c Departamento de Geodinámica y Paleontología, Facultad de Ciencias Experimentales, Campus de El Carmen, Avda. Tres de Marzo, 21071-Huelva, Spain

^d Departamento de Geología y Geoquímica, Universidad Autónoma de Madrid, 28049-Madrid, Spain

^e Laboratório Nacional de Energia e Geologia (LNEG), Apartado 7586, 2721-866 Alfragide, Portugal

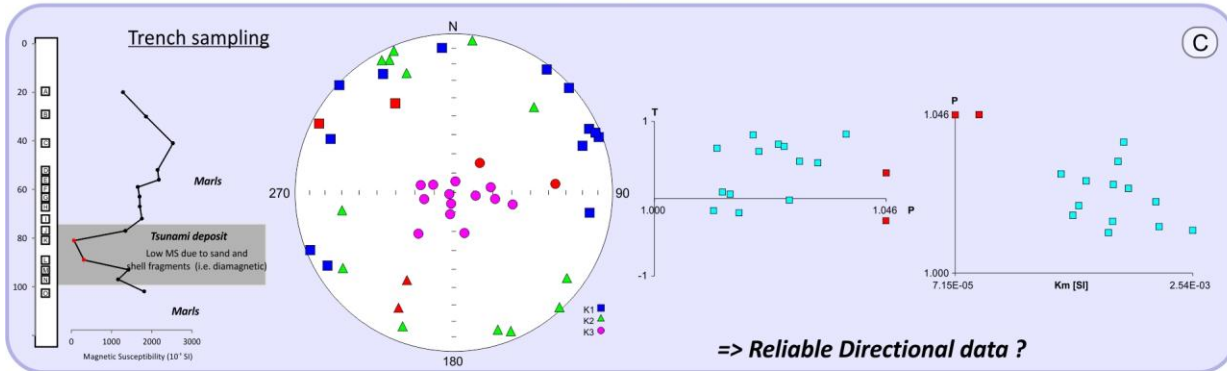
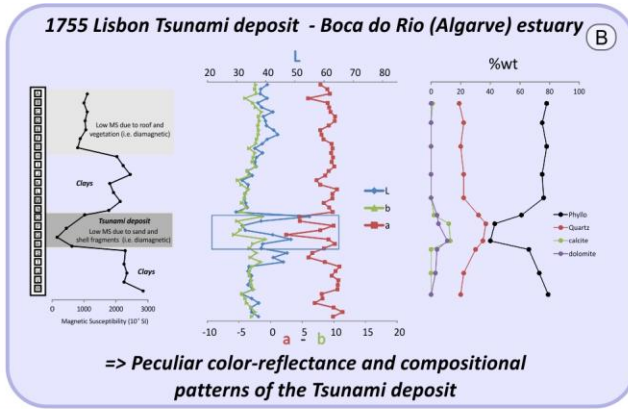
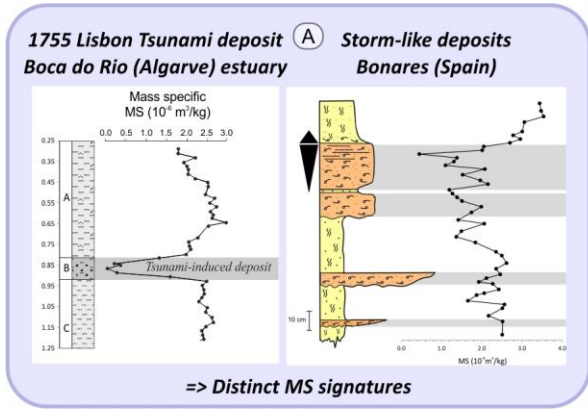
***Corresponding author:** Eric Font, IDL-FCGUL, Faculdade de Ciências de Lisboa, Edifício C8 -8.3.22, Campo Grande, 1749-016, Lisboa, PORTUGAL.

Phone: +351 217500811; e-mail: font_eric@hotmail.com

Abstract

Storm- and tsunami-deposits are generated by similar depositional mechanisms making their discrimination hard to establish using classic sedimentologic methods. A promising approach is to use rock magnetism techniques to search for new physical benchmarks of tsunami deposits and to integrate them into a multi-disciplinary study. To test our method, we investigate the 1755 Lisbon tsunami deposit from the Boca do Rio estuary and other Tsunami-induced deposits from Algarve (Portugal) and Huelva (Spain), as well as storm-like deposits for comparison. Magnetic methods repose on bulk (magnetic susceptibility, SIRM, Hc) and directional (AMS, paleomagnetism) magnetic properties. Results show that in most cases, the tsunami-induced deposit is featured by a low MS signal due to admixture of quartz (i.e. diamagnetic) from the littoral pit. The similarity of magnetic properties of the tsunami deposit and underlying sediments suggest that the source of the iron oxides is very proximate and issued from the erosion of the latter. Directional data are more problematic, since it depends on the techniques used during sampling, but show coherent AMS patterns when collecting samples from trench or using non-rotating vertical core sampler. In comparison, storm-like deposit has a significantly distinct pattern with no abrupt shift of MS. These results provide new benchmarks for tsunami-induced deposit and their discrimination with storm-like deposits. However, directional results need to be improved by testing other sampling techniques.

Keywords: rock magnetism, AMS, tsunami deposit, storm deposit.



A) Comparison of MS patterns in tsunami- and storm-induced deposits; **B)** Color-reflectance data of the 1755 Lisbon deposit; and **C)** AMS data of the 1755 Lisbon tsunami deposit from samples collected in trenches.