Offshore 1755 CE Lisbon Tsunami Deposit in the Southern Portuguese Continental Shelf

Vincent Kümmerer1, Teresa Drago2,3, Cristina Veiga Pires1,4, Pedro Silva2,5, Ana Lopes3, Vitor Magalhães2,3, Cristina Roque6, Ana Isabel Rodrigues7, Pedro Terrinha2,3, Anxo Mena7, Guillermo Francés7, Achim Kopf8, David Völker8, Emilia Salgueiro3,9, Ana Alberto3,9, Cristina Lopes3,9, Pedro Costa10, and Maria Ana Baptista2,5

1Universidade do Algarve, Faro, Portugal
2Instituto Dom Luiz, University of Lisbon, Lisbon, Portugal
3Instituto Português do Mar e da Atmosfera, Lisbon, Portugal
4Centro de Investigação Marinha e Ambiental, Faro, Portugal
5Instituto Politécnico de Lisboa, Instituto Superior de Engenharia de Lisboa, Lisbon, Portugal
6Estrutura de Missão para a Extensão da Plataforma Continental, Paço d’Arcos, Portugal
7University of Vigo, Vigo, Spain
8University of Bremen, Bremen, Germany
9Centro de Ciências do Mar, Faro, Portugal
10Universidade de Coimbra, Departamento de Ciências da Terra, Coimbra, Portugal

The importance of tsunami hazard assessment is only possible if a complete dataset of events is available, allowing the determination of the recurrence intervals of the tsunamis adapted to local and regional conditions. One possible way to know these intervals is to study the offshore sedimentary record, looking for sediment remobilised and transported by the incoming tsunami waves and generated backwash currents. Even if these deposits are not of easy access (and not so well studied), the tsunami depositional signature has potential to be better preserved than those located onshore.

A multidisciplinary approach was performed to detect the sedimentary imprints left by the 1755 CE Lisbon tsunami event in three cores located in southern Portuguese continental shelf at water depths between 57 and 91 m. Age models based on 14C and 210Pbxs data allowed a probable correspondence with the 1755 CE Lisbon tsunami.

The present study was based in high-resolution analyses using several methodologies such as sand composition, grain size, inorganic geochemistry and microtextural features on quartz grain surfaces. The results yielded evidences for a tsunamigenic origin although no remarkable terrigenous signal is present. Spatial depositional differences of tsunami sediments were detected in the study area by differences in grain size, sand composition and simulated horizontal surface velocities. Also, the heterogeneous and mixing character of the 1755 CE Lisbon offshore tsunami deposits indicate more complex sedimentary conditions compared to the background sedimentation.
This study shows that in fact the sediment layers corresponding to a tsunami event can be preserved in mid to outer continental shelf environments (other extreme events such as storms were excluded through hydrodynamic calculations), but its identification and characterization can be done only with a good assemblage of different proxies.

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