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Characterizing Holocene Paleoseismic Record in the SW Portuguese Margin

A. Vizcaino (1), E. Gràcia (1), C. Escutia (2), A. Asioli (3), J. Garcia-Orellana (4), S. Lebreiro (5), I. Cacho (6), N. Thouveny (7), J.C. Larrasoaña (8), S. Diez (1), J.J. Dañobeitia (1)

(1) Unitat de Tecnologia Marina (CMIMA) - CSIC, Barcelona, Spain, (2) Instituto Andaluz de Ciencias de la Tierra - CSIC, Granada, Spain, (3) Istituto di Geoscienze e Georisorse del C.N.R, Padova, Italy, (4) Grup de Física de les Radiacions, Facultat de Ciències, Universitat Autònoma de Barcelona, Bellaterra, Spain, (5) INETI, Dpt. Geología Marinha, Estrada da Portela, 02720 Alfragide, Portugal (6) Facultat de Geologia, Universitat de Barcelona, Barcelona, Spain, (7) Centre Européen de Recherche et d'Enseignement de Géosciences de l'Environnement, Aix en Provence, France, (8) Institut de Ciències de la Terra "Jaume Almera" - CSIC, Barcelona, Spain, (alexis@utm.csic.es / +34 932309500)

The SW Iberian Margin is located at the convergence of the European and African Plates, where the largest magnitude earthquakes in Western Europe occur, such as the 1755 Lisbon event. Several active west-verging thrusts (i.e. Marquês de Pombal, São Vicente, and Horseshoe Faults) are potential sources of large magnitude earthquakes and tsunamis. The assessment of seismic risk in SW Iberia is largely based on the relatively short period of instrumental (about 40 years) and historically recorded (few hundred years) earthquakes, but only a turbidite paleoseismology may allow us to know the recent and past activity of these active faults and yield an earthquake recurrence rate. In the South West Portuguese Margin, where we are applying turbidite paleoseismology approach, which is based on the synchronicity between mass wasting deposits (turbidite and debris flows) filling long distance apart basins. Although a number of mechanisms may be invoked to account for landslide triggering, earthquakes are the most likely triggering mechanism in SW Iberia, at least during the Holocene, when sea level was relatively stable. With this purpose, we are studying the margin in two different views: local and regional. The local study is located in the Marquês de Pombal area where four gravity sediment cores (HITS C2, GeoB 9006-1, HITS C4, and SWIM 37) were sampled to characterize and control the age of the

Marquês de Pombal slides and to control the age of the slope failures. Correlation between mass wasting events from sediment cores is based on lithostratigraphic criteria, facies analysis (detailed description, grainsize textural and MST physical properties) and radiocarbon 14C dating on selected samples. The analysed sediment cores reveal four main turbidite events (T) and three debris flow events (DF) corresponding to 2293±35 cal yr BP (T2), 3552±50 cal yr BP (DF1) and 5488±98 cal yr BP (T3). The first one correlates with the tsunami deposits formed onshore in Cadiz marshes. In addition, to characterize near-surface sediments, a multicore was collected and 210Pb dating of two thin layers (2.25 and 5.5 cm depth) corresponding to 1968±1 AD and 1909±2 AD, which match with Benavente and Horseshoe Earthquakes. Thus, the estimated recurrence rate is of ≈2kyr In the regional study, four CALYPSO sediment cores were obtained in the Tagus Abyssal Plain, Infante Don Henrique slope basin, and Horseshoe Abyssal Plain. Isotopic, paleomagnetic and geochemical analyses have been carried out in these cores giving us information about the terrigenous vs biogenic sedimentation (mainly Ca, K and Ti), and magnetic grainsize fraction (ARM/IRM). Up to seven Turbidites have been identified in the Holocene sections of the CALYPSO cores obtained from both abyssal plains. However, more uniform and continuous Holocene record is found on the Infante Don Henrique basin with only 3 turbidites in the Holocene. Radiogenic ages has been also obtained from the hemipelagic sediment underlying the turbidites. A plausible correlation between turbidites and historical and instrumental seismic events suggests that the turbidite record can be used as a paleoseismic indicator, becoming a valuable tool to establish earthquake recurrence of large magnitude events (M>6) in the SW Iberian region.