

19th October 2020



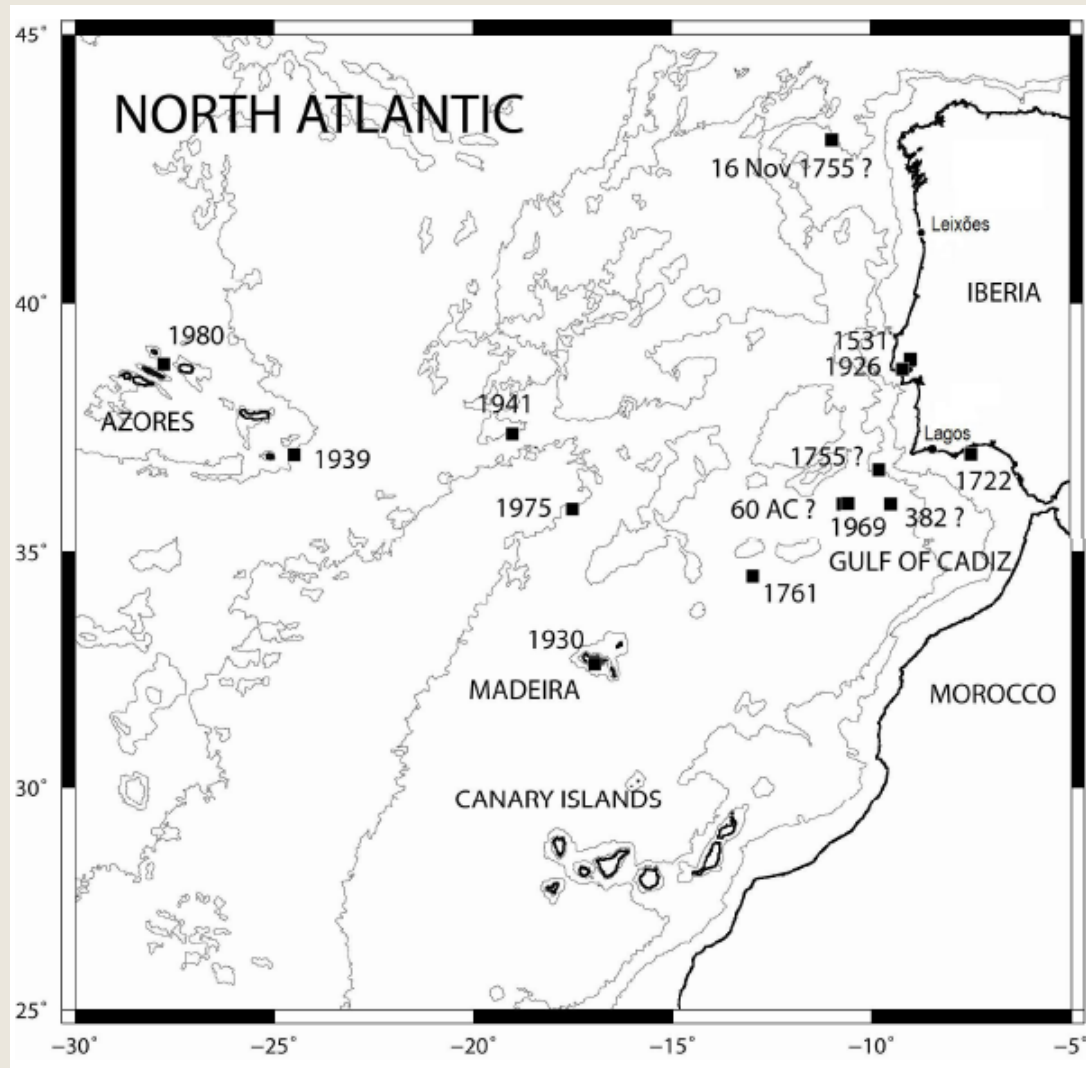
Using Portuguese palaeotsunami deposits to better define tsunami risk

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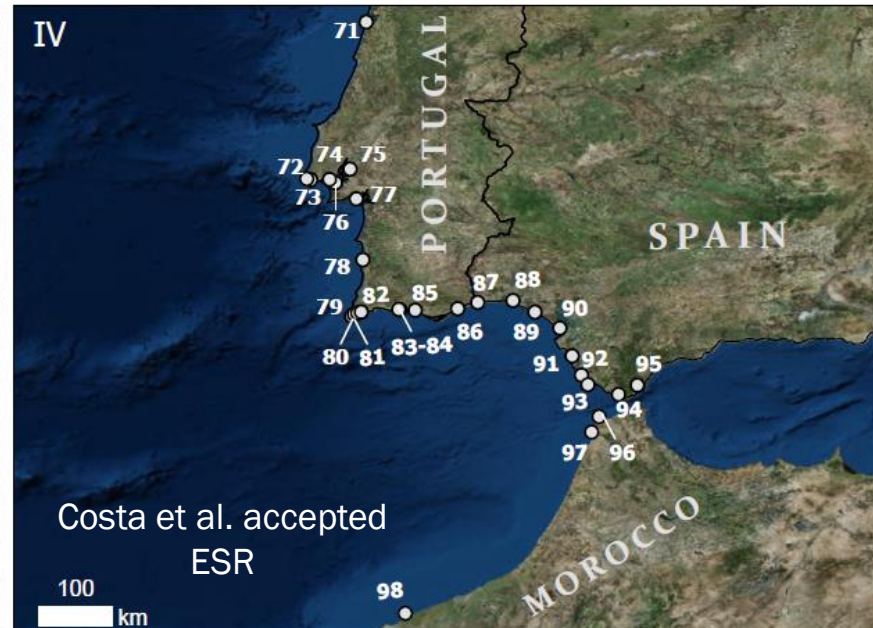
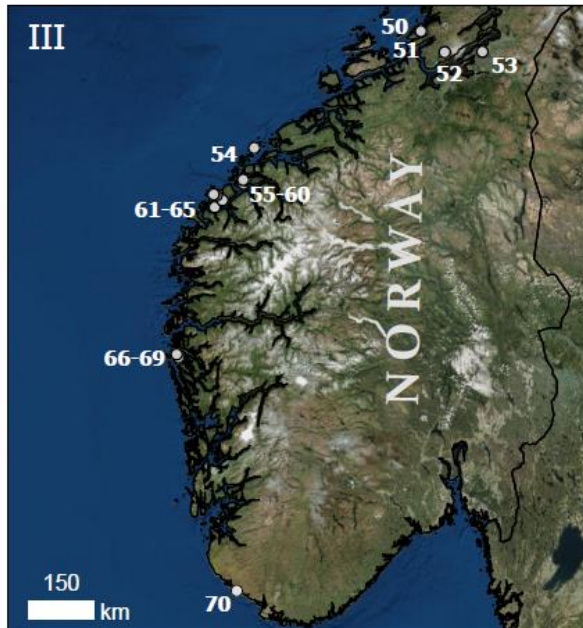
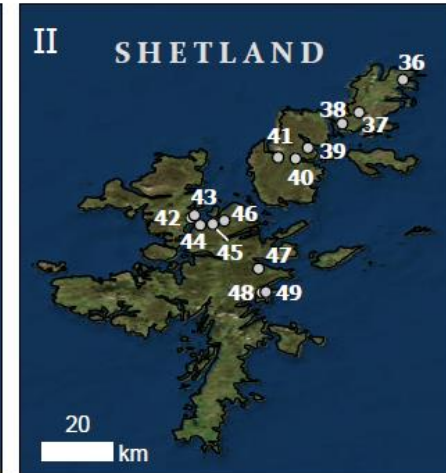
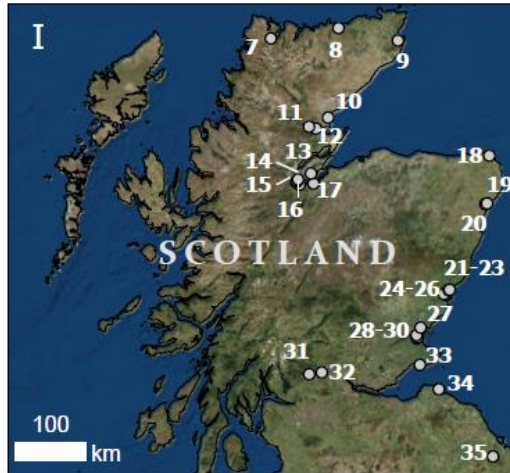
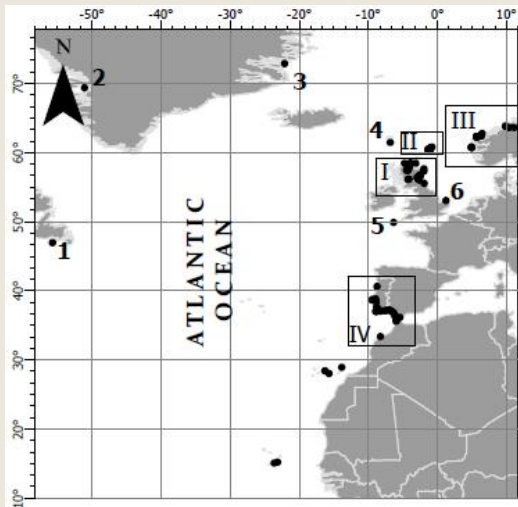
Tsunami deposits in Portugal



Baptista and Miranda (2009)

Tsunami deposits in the NE Atlantic

<http://tsunami.campus.ciencias.ulisboa.pt/>

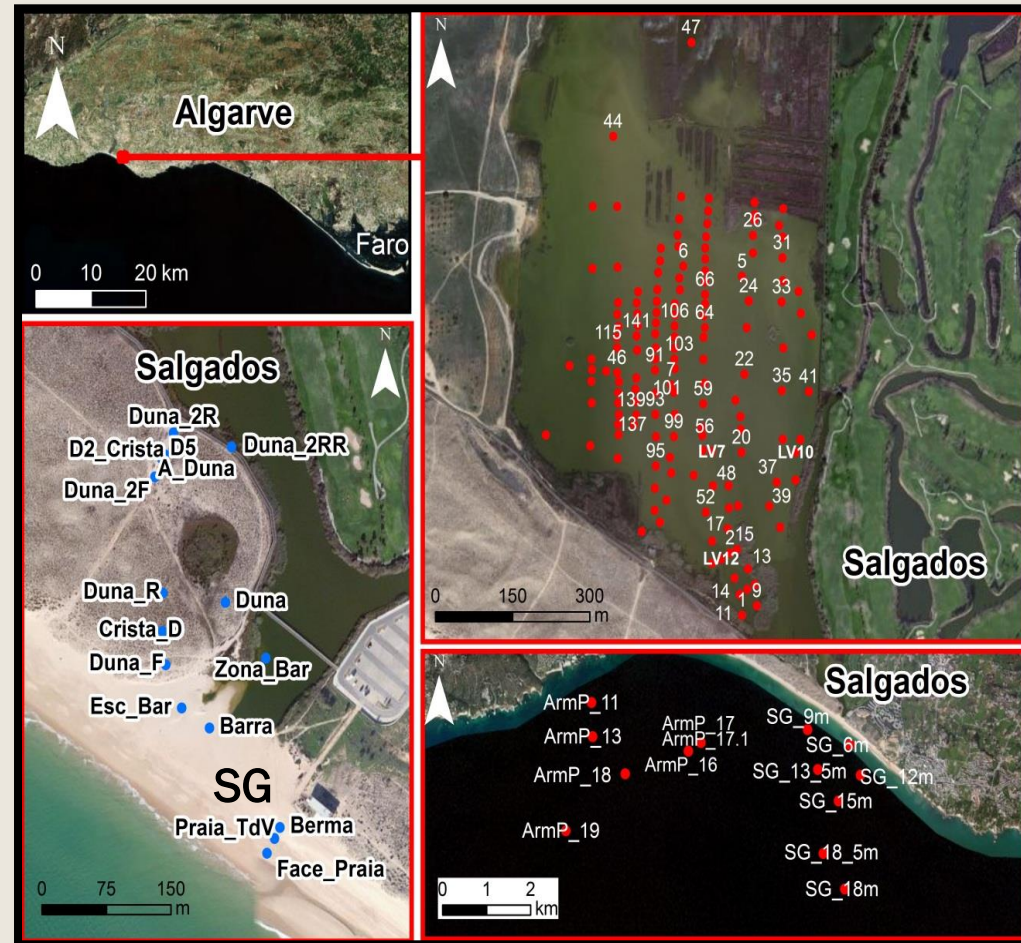


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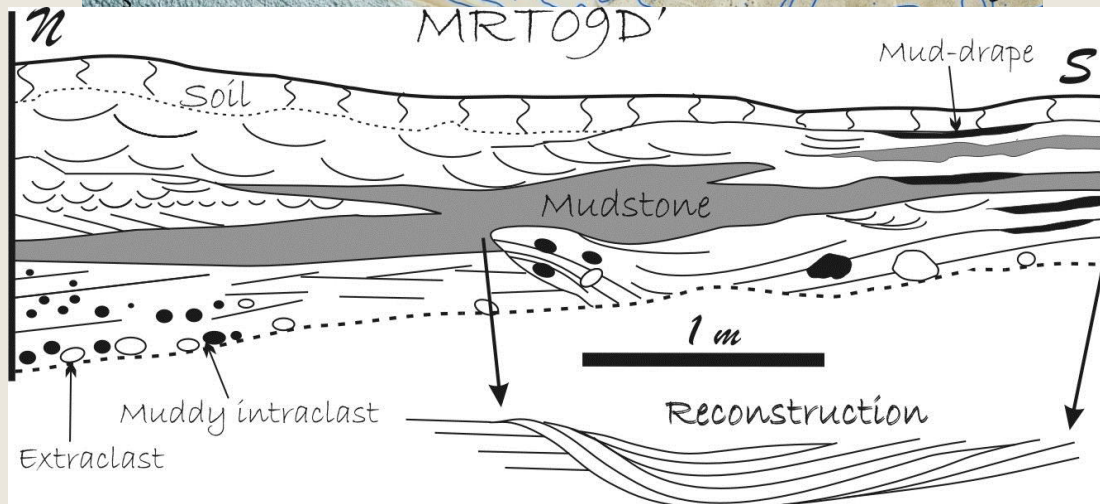
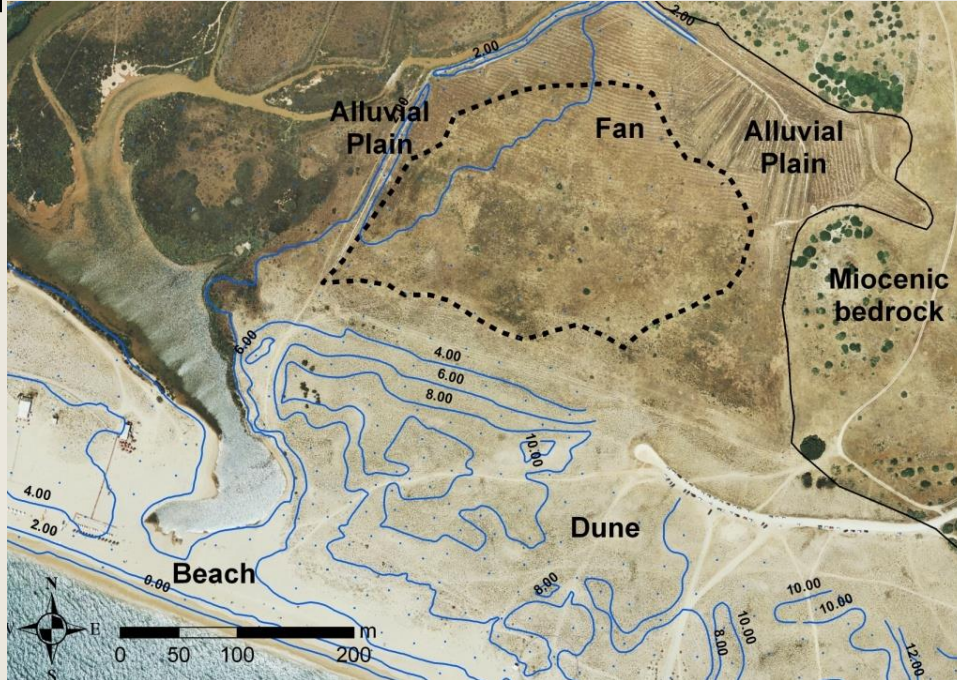
Mosaic.pt
safe coastal communities



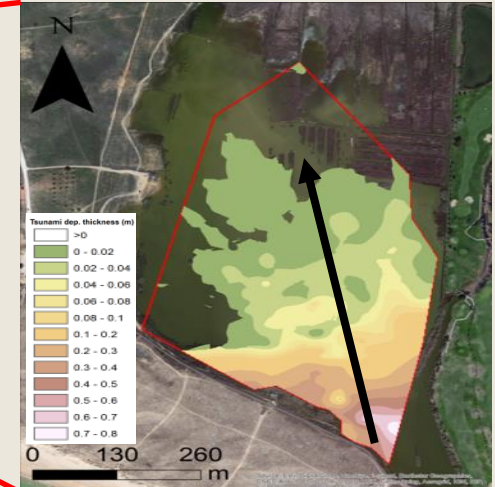
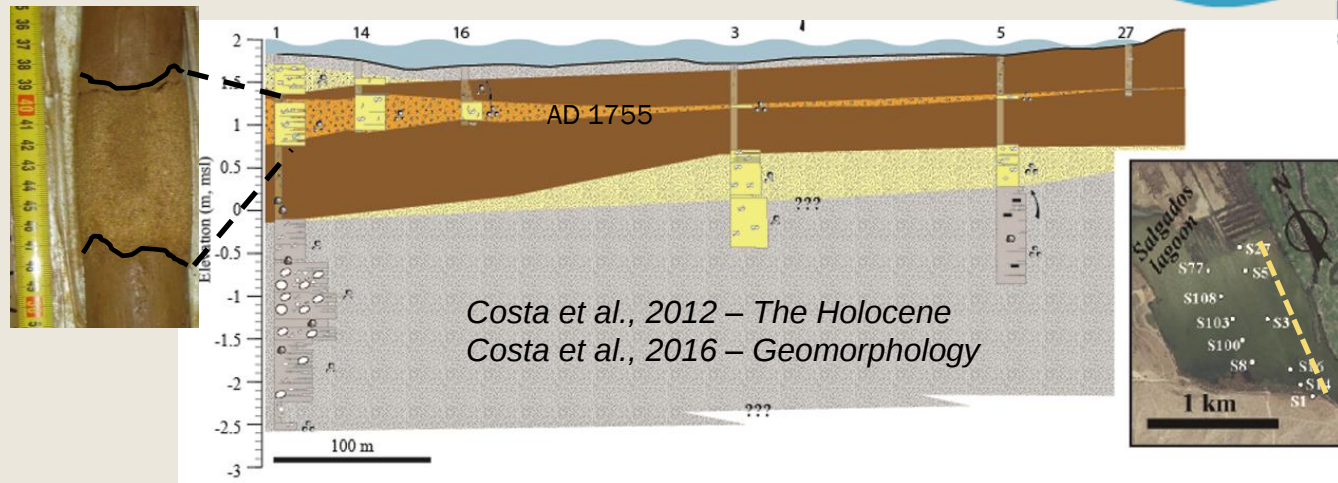
Salgados, Boca do Rio, Martinhal...



Geomorphological and trench-scale imprints



Run-up inferred from deposits



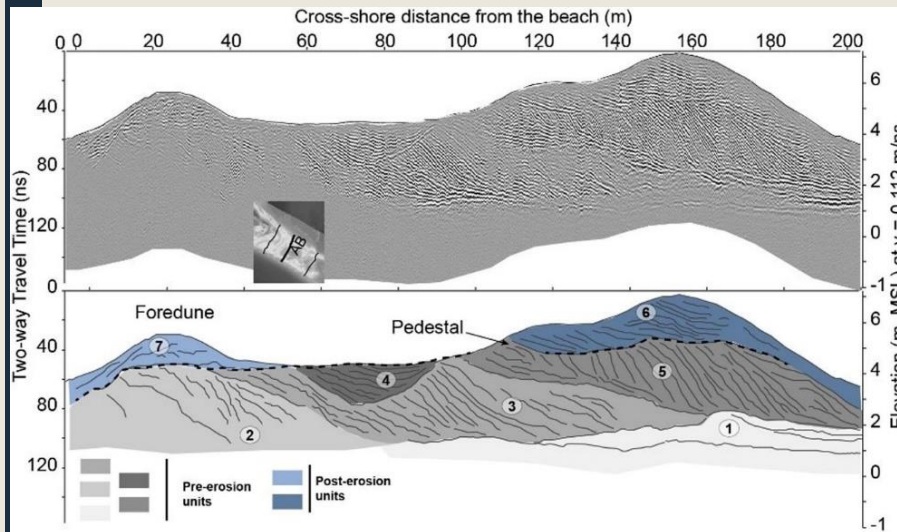
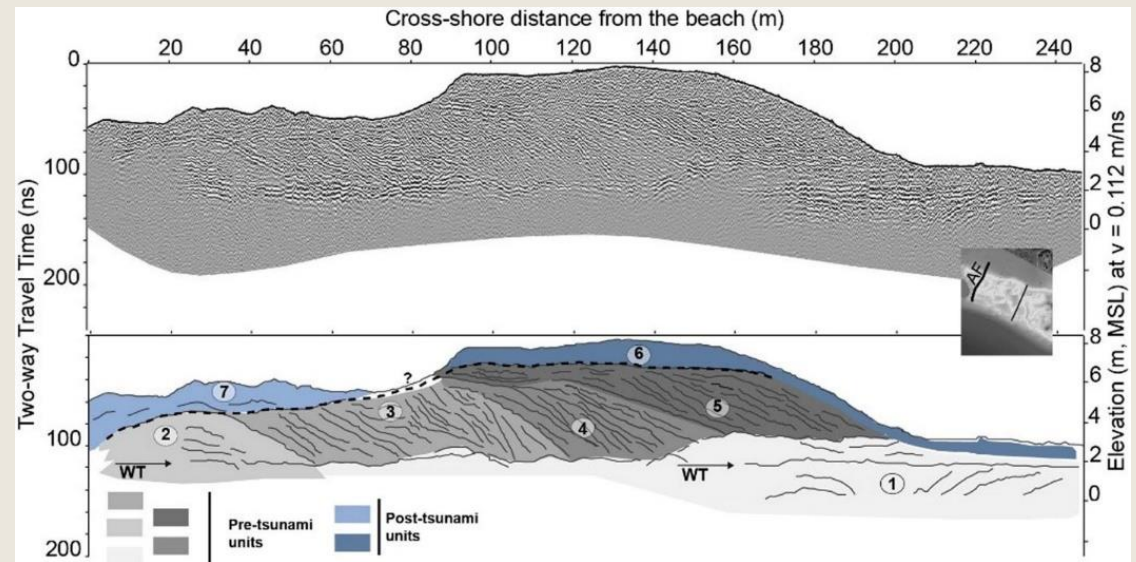
Research paper

A tsunami record in the sedimentary archive of the central Algarve coast, Portugal: Characterizing sediment, reconstructing sources and inundation paths

The Holocene
22(8) 899–914
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DOI: 10.1177/0959633411434227
hcl.sagepub.com
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PJM Costa,¹ C Andrade,¹ MC Freitas,¹ MA Oliveira,¹ V Lopes,¹
AG Dawson,² J Moreno,¹ F Fatela¹ and J-M Jouanneau³

Run-up inferred from erosional features



Geomorphology 268 (2016) 296–311

Contents lists available at ScienceDirect

Geomorphology

journal homepage: www.elsevier.com/locate/geomorph

How did the AD 1755 tsunami impact on sand barriers across the southern coast of Portugal?

Pedro J.M. Costa ^{a,*}, Susana Costas ^b, R. González-Villanueva ^{a,c}, M.A. Oliveira ^a, D. Roelvink ^d, C. Andrade ^a, M.C. Freitas ^a, P.P. Cunha ^e, A. Martins ^f, J.-P. Buylaert ^{g,h}, A. Murray ^g

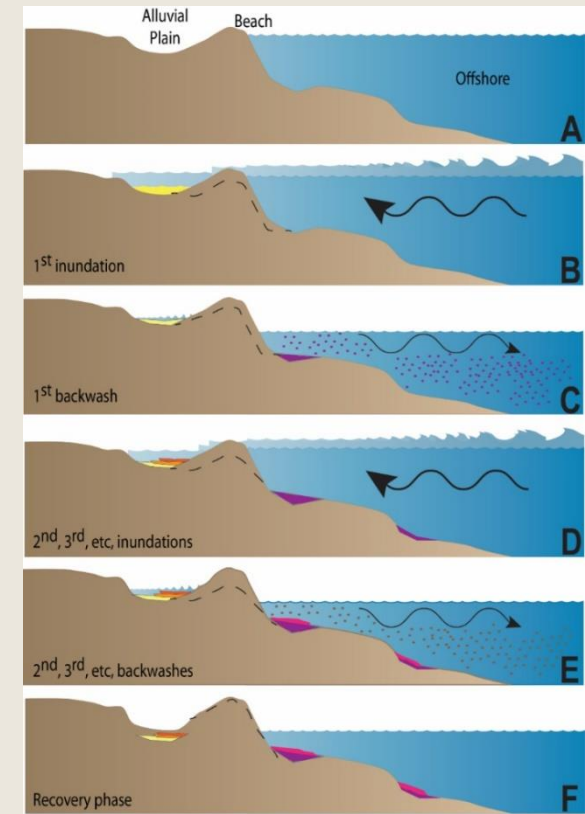
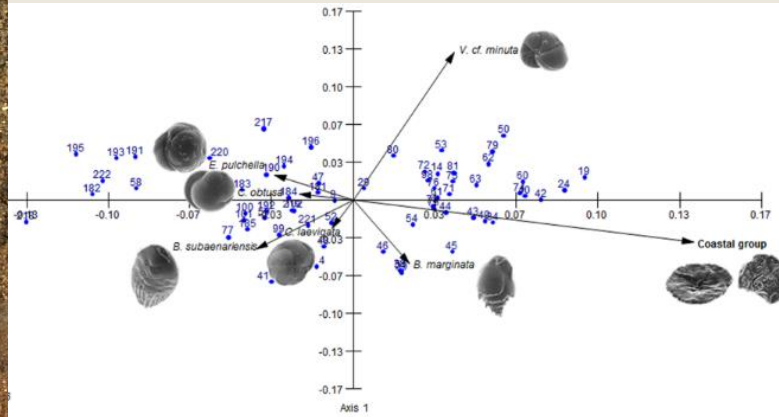
Run-up - 6 m above msl

Number of inundation phases



High resolution:

Geochemistry
Micropalaeontology
Grain-size



Quaternary International 408 (2016) 123–138

Contents lists available at ScienceDirect

Quaternary International

journal homepage: www.elsevier.com/locate/quaint



The AD 1755 tsunami deposits onshore and offshore of Algarve (south Portugal): Sediment transport interpretations based on the study of Foraminifera assemblages

Maria Quintela^a, Pedro J.M. Costa^{a,*}, Francisco Fatela^{a,*}, Teresa Drago^b, Natalia Hoska^a, César Andrade^a, Maria C. Freitas^a

^a Universidade de Lisboa, Faculdade de Ciências, IDL and Departamento de Geologia, Faculdade de Ciências da Universidade de Lisboa, Edifício C6, Campo Grande, 1749-016, Lisboa, Portugal

^b IIR and Instituto Nacional de Recursos Biológicos, IPIMAR, 8700-305, Olhão, Portugal



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Marine Geology

journal homepage: www.elsevier.com/locate/margo



High resolution geochemical and grain-size analysis of the AD 1755 tsunami deposit: Insights into the inland extent and inundation phases

Sandra Moreira^{a,b,*}, Pedro J.M. Costa^{a,b,c}, César Andrade^a, Cristina Ponte Lira^a, Maria Conceição Freitas^a, Maria Alexandra Oliveira^a, Gert-Jan Reichert^{c,d}

^a Instituto Dom João and Departamento de Geologia, Faculdade de Ciências, Universidade de Lisboa, Edifício C6, Campo Grande, 1749-016 Lisboa, Portugal

^b Instituto Hidrográfico - Marinha, Rua das Trindades, 49, 1249-078 Lisboa, Portugal

^c NIOZ Royal Netherlands Institute for Sea Research, Texel, The Netherlands

^d Department of Earth Sciences, Geoscience Faculty, Utrecht University, Utrecht, The Netherlands



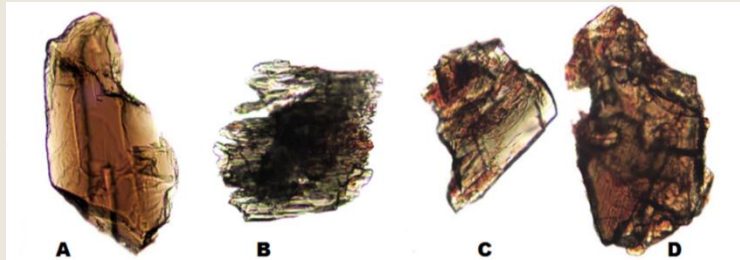
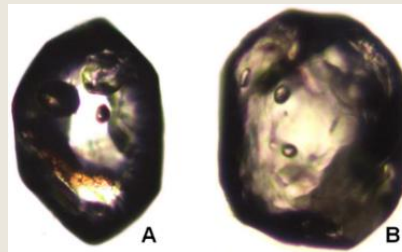
Sediment source

Research paper

Onshore tsunami sediment transport mechanisms inferred from heavy mineral assemblages

Pedro JM Costa,^{1,2} Cesar Andrade,¹ João Cascalho,^{1,3}
Alastair G Dawson,⁴ Maria C Freitas,¹
Raphael Paris⁵ and Sue Dawson²

The Holocene
2015, Vol. 25(5) 795–809
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DOI: 10.1177/0959683615569322
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Sedimentary Geology 334 (2016) 21–33

Contents lists available at ScienceDirect

Sedimentary Geology

journal homepage: www.elsevier.com/locate/sedgeo

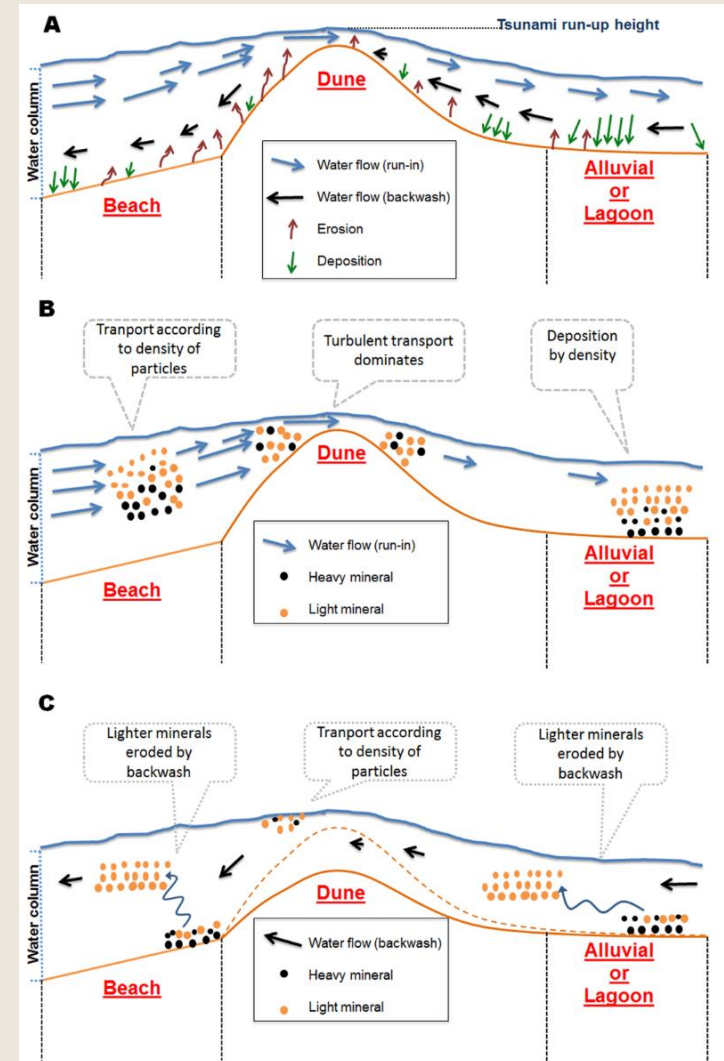
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Heavy mineral assemblages of the Storegga tsunami deposit

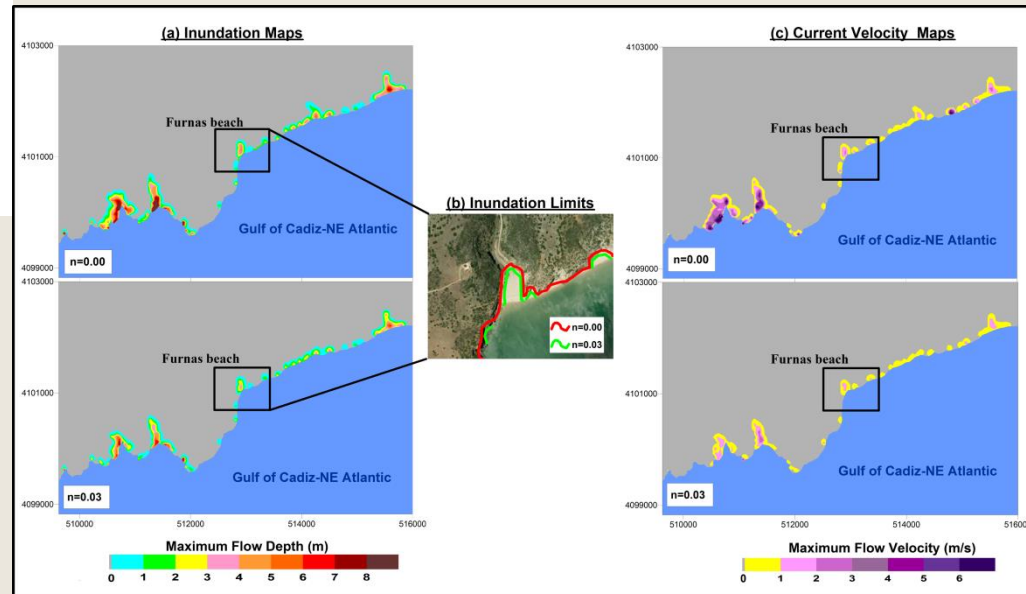
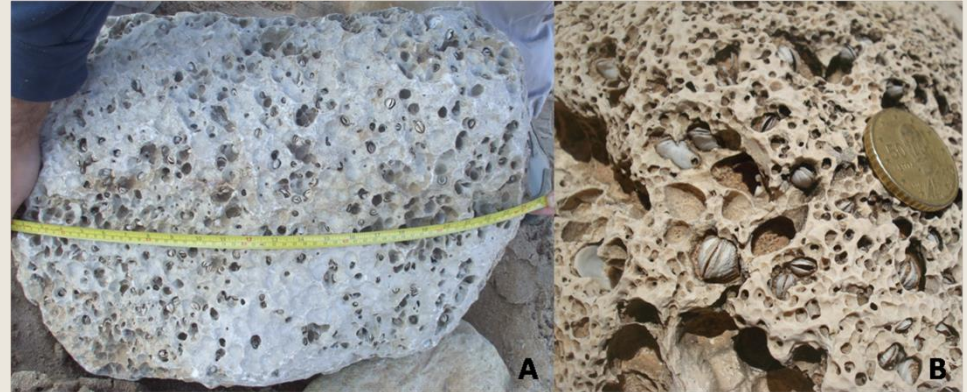
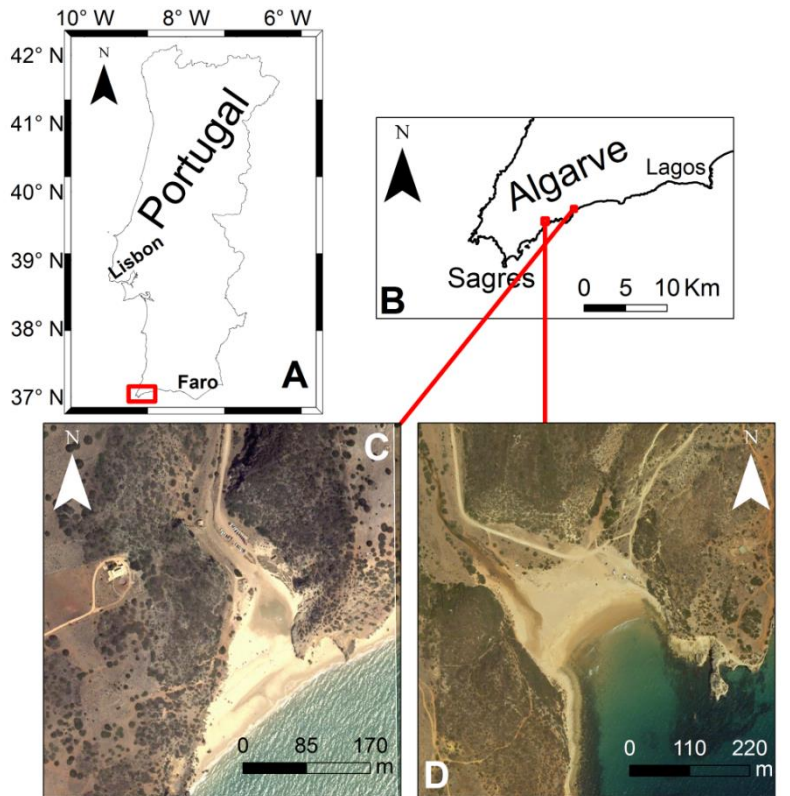
J. Cascalho ^{a,b}, P. Costa ^{b,*}, S. Dawson ^c, F. Milne ^c, A. Rocha ^b

^a Museu Nacional de História Natural e da Ciência (MUHNAC-UL), Rua da Escola Politécnica 56/58, 1250-102, Lisboa, Portugal
^b Instituto Dom Luiz and Departamento de Geologia, Faculdade de Ciências da Universidade de Lisboa, Edifício C5, Campo Grande, 1749-016, Lisboa, Portugal
^c Geography, School of Social Science, University of Dundee, Nethergate, Dundee DD1 4HN, Scotland

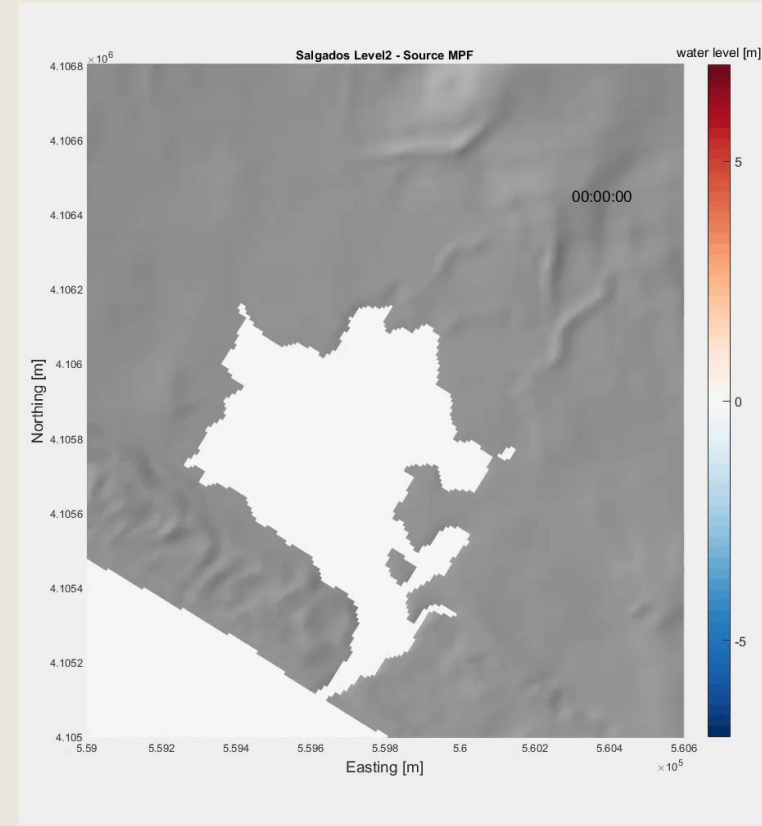
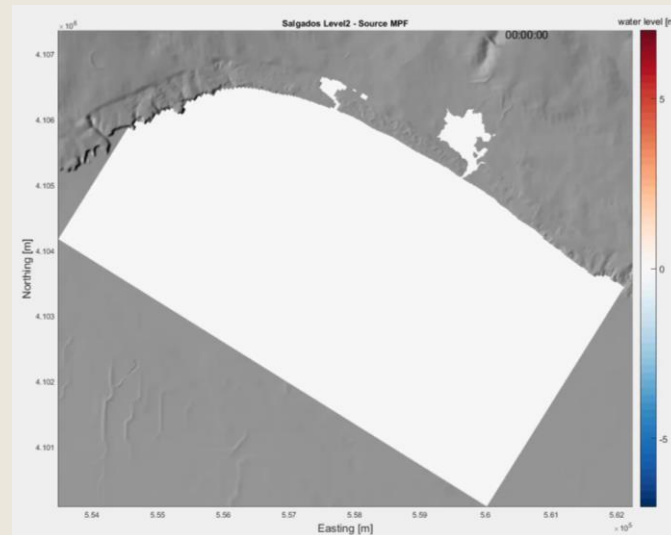
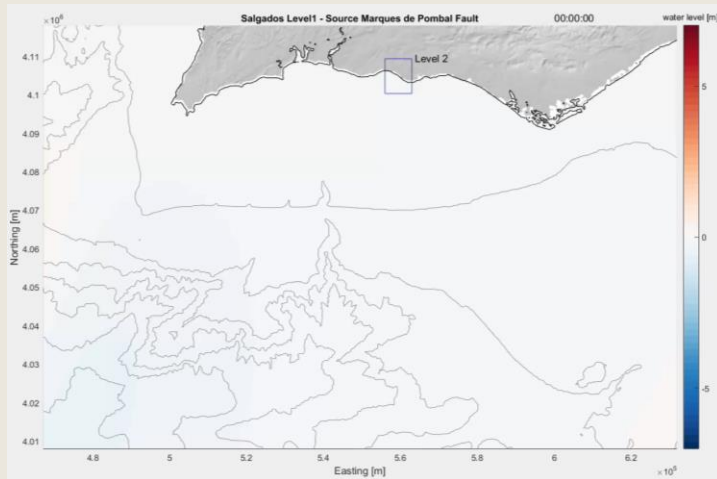
 CrossMark



Flow depth and velocity

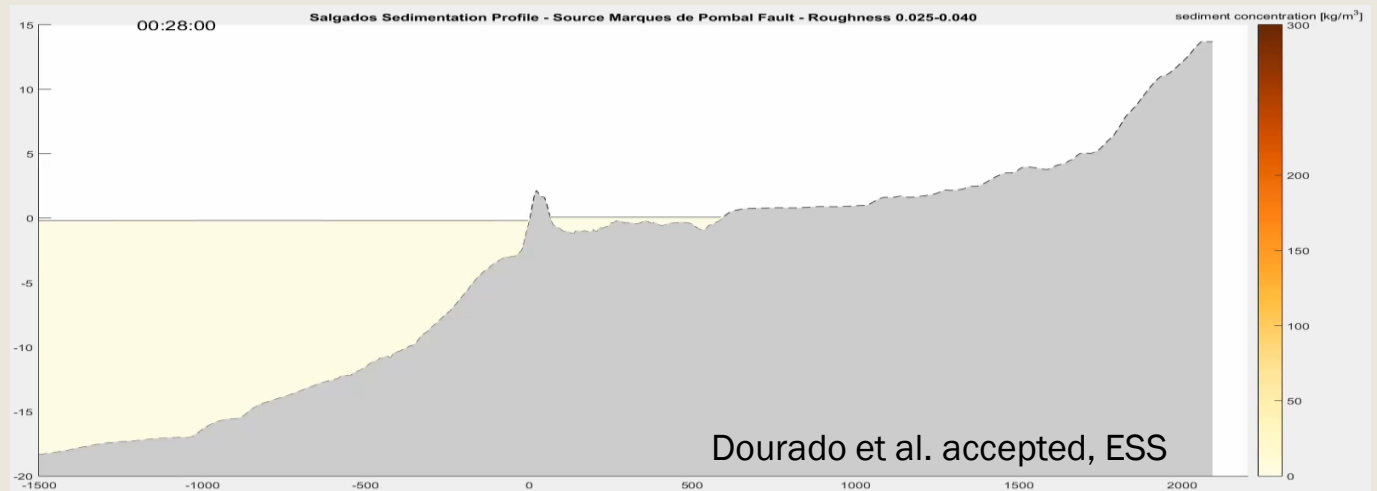
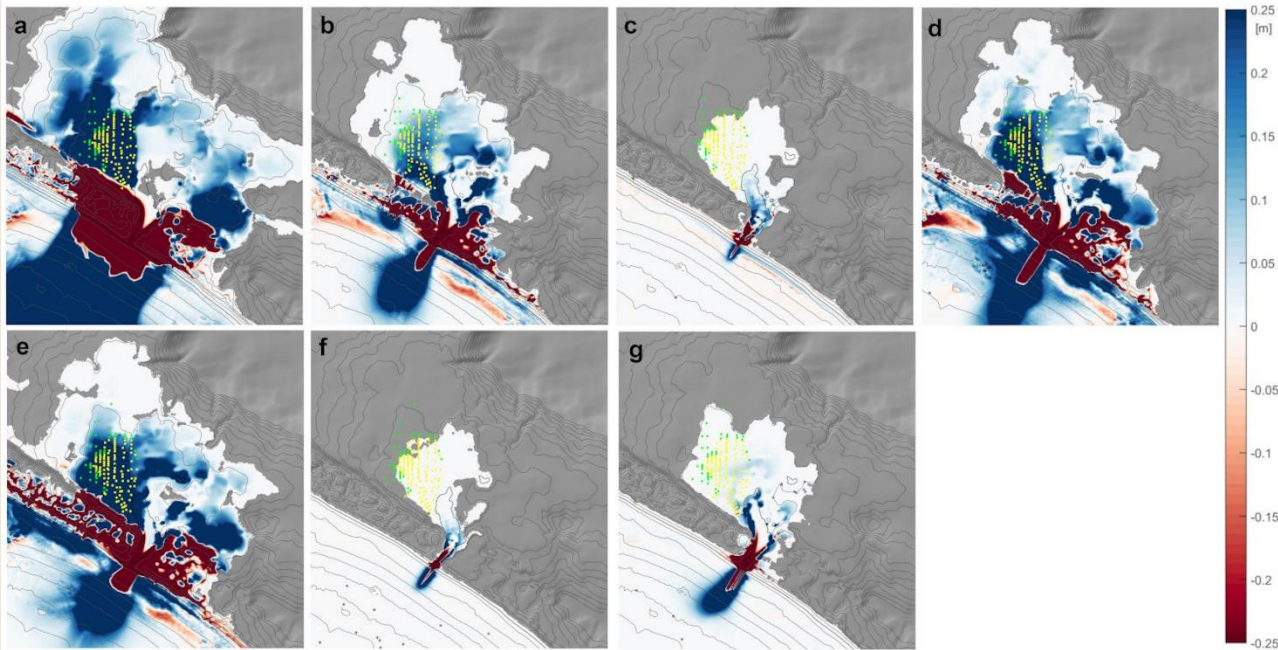


Numerical modeling



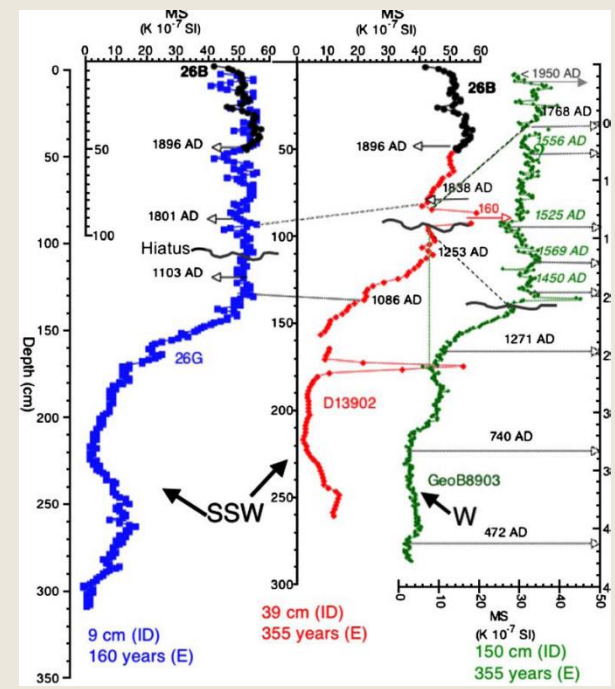
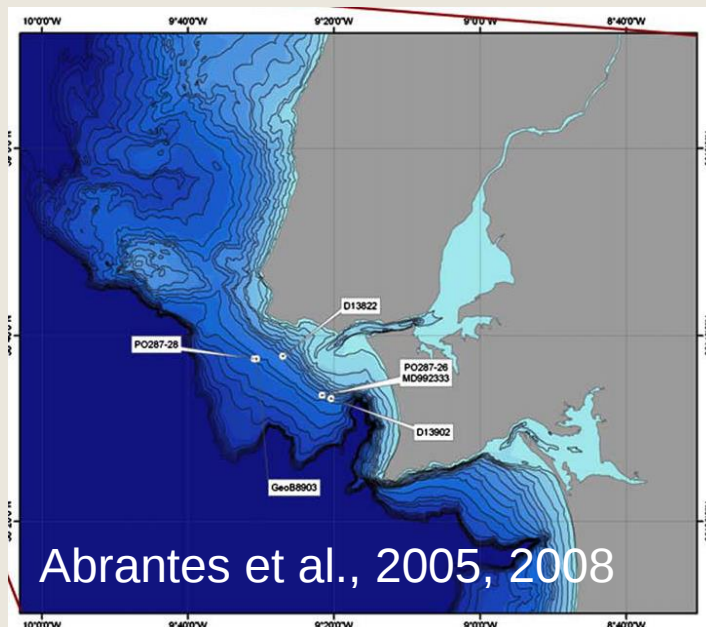
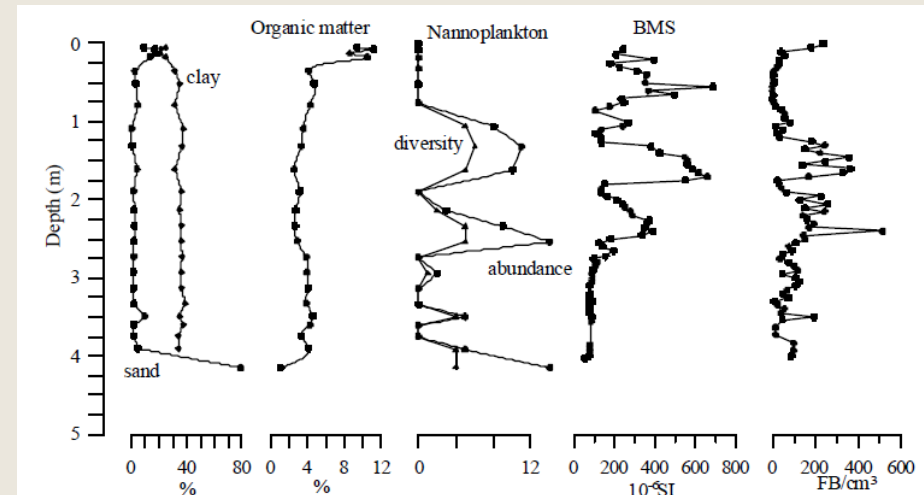
Dourado et al. accepted, ESS

AD 1755 epicenter?

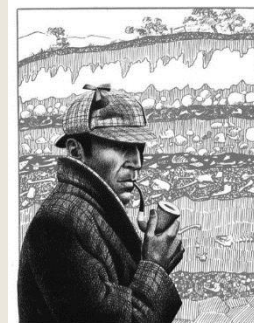
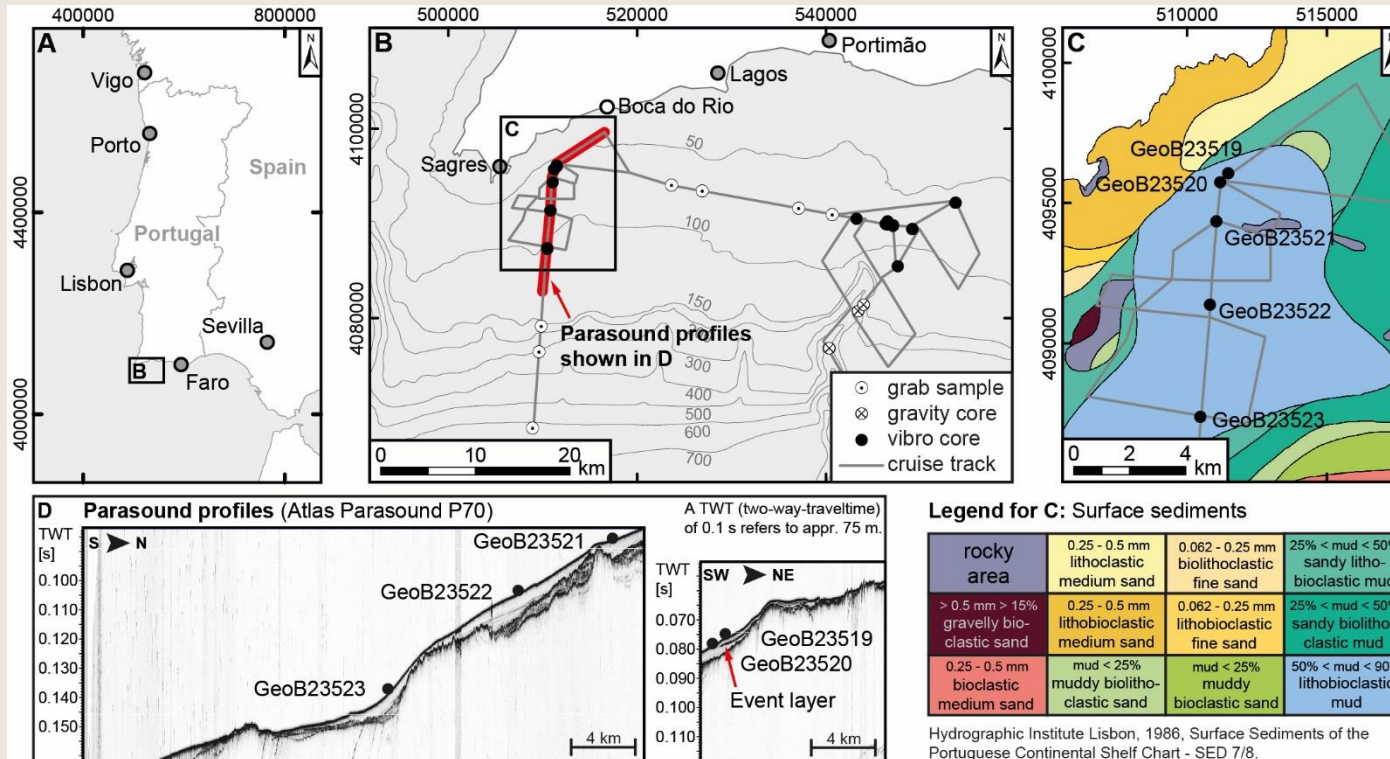


Dourado et al. accepted, ESS

Tagus – onshore and offshore finer sediment

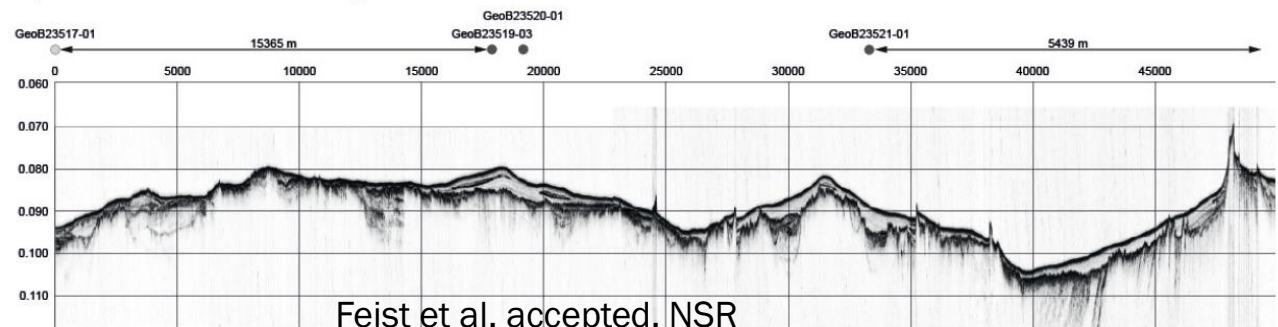


Offshore tsunami record

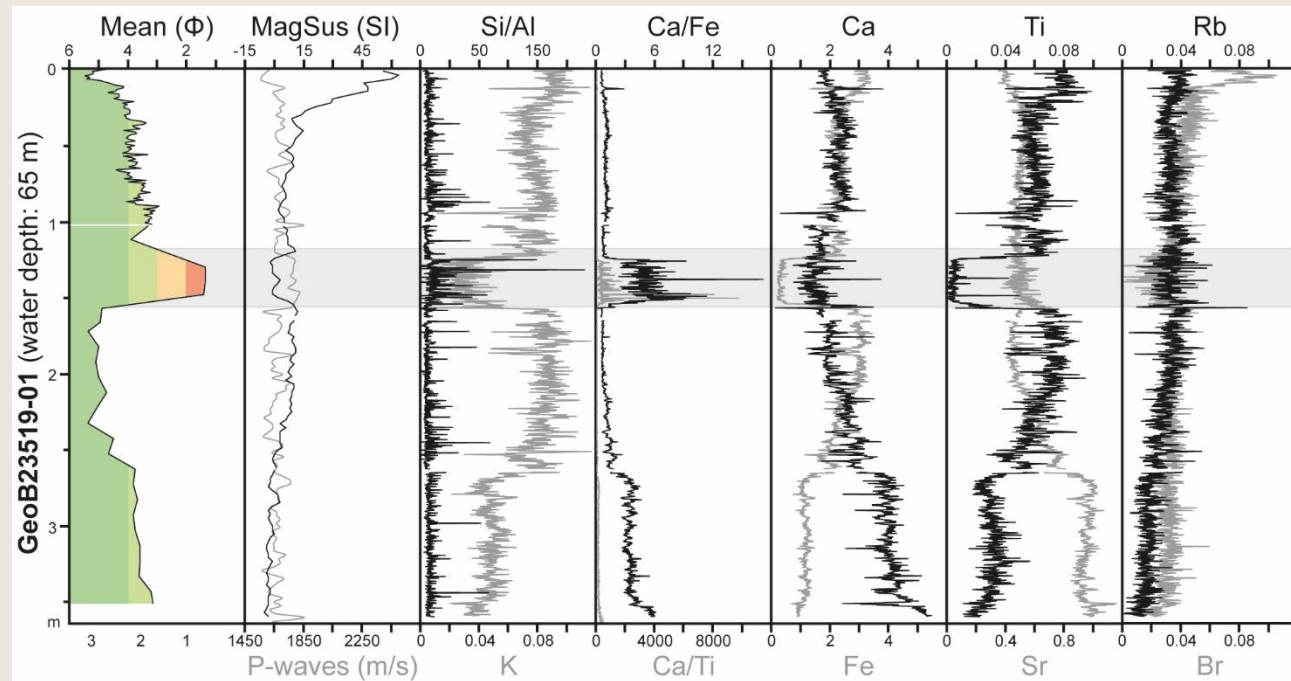
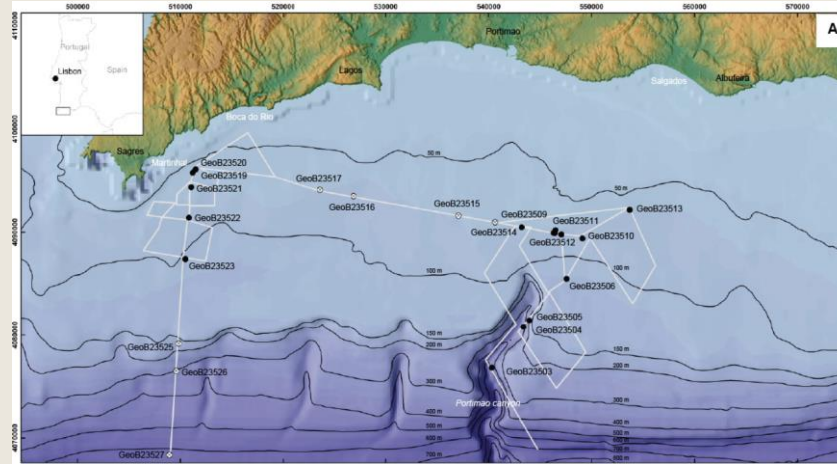


Sedimentary, my dear Watson.

Hydroacoustic Profiling

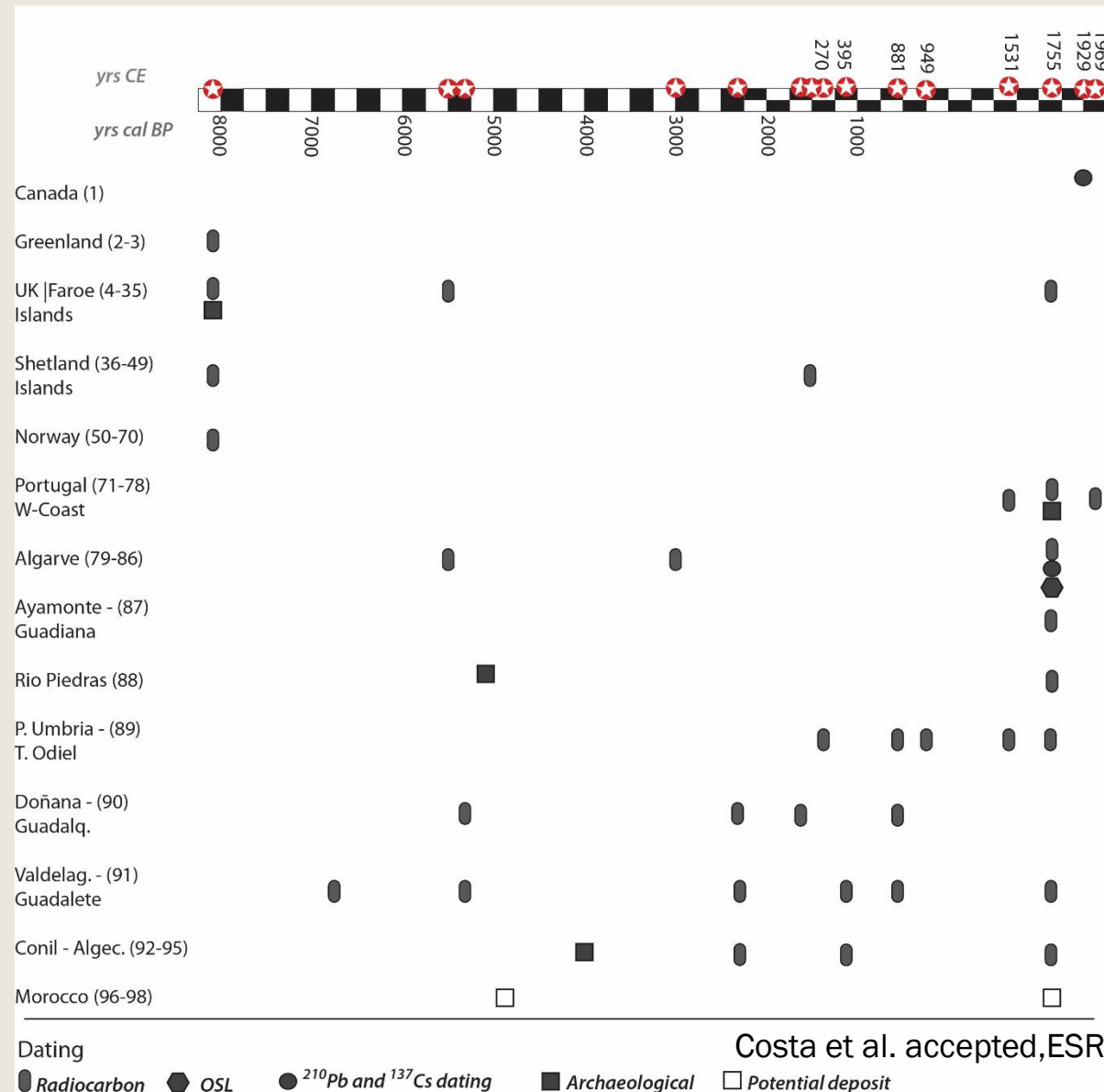


Some quantitative data



Feist et al. accepted, NSR

Tsunami deposits in the Atlantic and in PT



❖ 1755 and 3700 yrs BP

❖ Height of t-waves

❖ Flow depth and vel.

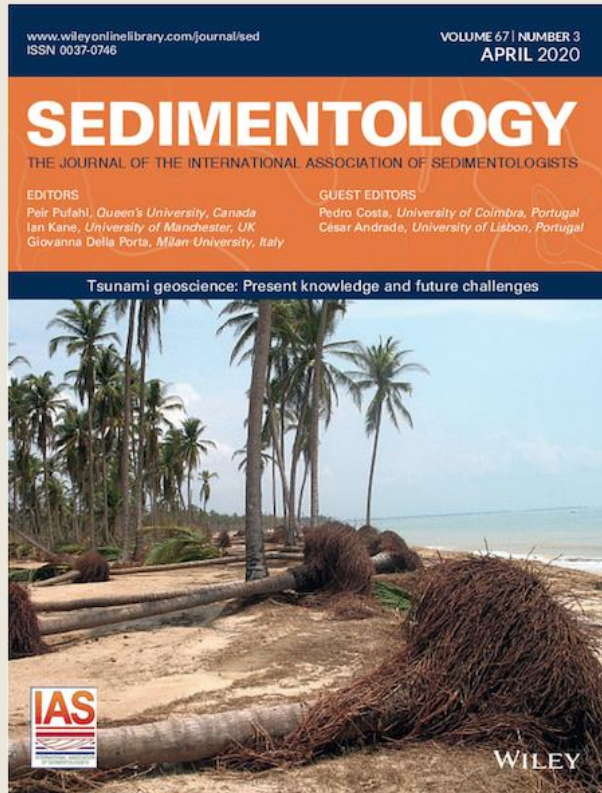
❖ Inundation paths

❖ Eroded volumes

❖ Generation mechanism

❖ And other...

Key future challenges in Portugal



- Hazard vs Risk
- Vulnerability and social indexes
- Offshore
- Internal structure
- Age-estimation
- Numerical modeling
- Empirical tests
- And so many more...

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the journal of the
International Association of Sedimentologists

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Tsunami deposits: Present knowledge and future challenges

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STATE OF THE SCIENCE

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