

Revisiting the sedimentary record of a high-energy marine-inundation at Martinhal (Algarve, Portugal)

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The Holocene sedimentary infill of the Martinhal coastal lowland (southern Algarve, Portugal) has been reported in the literature (Kortekaas and Dawson, 2007) as hosting a sandy deposit attributed to the AD 1755 Lisbon tsunami event. In these studies the sedimentary succession consists of a basal medium-sand of marine facies overlain by ca. 2 m of brown to black estuarine/lagoonal mud, grading upwards into alternating laminae of terrestrial mud and marine sand of varying thickness, reflecting the present-day pattern of sedimentation in the coastal basin; the AD 1755 tsunami deposit is located between the lower mud and the top layered unit and occurs as a widespread layer of coarse to very coarse sand with many shell fragments, sand-armoured mud balls and limestone pebbles. Grain size characteristics of the sediments, their foraminiferal content and also the presence/absence of rip-up clasts and large pebbles were used to reconstruct distinct sedimentary sub-environments and to distinguish between coarser materials deposited by either tsunamis or storms within the more recent part of the sequence. An older episode of coarse sedimentation is embedded in the lower mud unit, which, though ubiquitous along the lowland and with an extension similar to the tsunami sand sheet, does not share compositional neither textural similarities with both the AD 1755 tsunami sand or the present-day sediments accumulating within this lowland and in the beach-dune confining system. We recently opened six exploration trenches at Martinhal, which allowed us to revisit the depositional history of this lowland. Samples were collected to produce large and small (2 mm) aliquot quartz OSL dating of sand laminae, lenses or layers representing the coarse sedimentation episodes present in all lithostratigraphic units of the Holocene infill in order to time-constrain and to complement the correlation between different sedimentation episodes. The observation and interpretation of the depositional architecture suggest a more complex picture for the sedimentation of the sandy units resting upon the lower mud unit, namely due to emphatic lateral changes in facies between trenches located at short distances from each other. In the back-barrier area, the marine deposits that we correlate to the tsunami unit exhibit only a planar lamination dipping seaward, indicating post-tsunami beach accretion by reworking of the sand originally emplaced by the high-energy marine inundation. Further inland, several wedging out sand units and small-scale sedimentary structures (lamination) suggest post-depositional reactivation of the tsunami deposit; such remobilization is associated with either marine- processes acting in the onshore direction or, in contrast, backwash activity, as indicated by directional features looking seaward. Field observations also suggest that the landward limit of the inundation was most probably located further inland than inferred from previous biostratigraphical and lithostratigraphical studies; the inundation invaded the small canyons outletting in the lowland and fluvial and colluvial sediments were moved into the lowland to build the topmost section of the high-energy deposit.

Kortekaas, S. and Dawson, A. G. (2007) Distinguishing tsunami and storm deposits: an example from Martinhal, SW Portugal, *Sedimentary Geology*, 200 (3-4), 208-221.

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