

Title: Boulder deposition during major tsunami events

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Abstract: A remarkable accumulation of marine boulders located above the present spring tide level has occurred in two coastal lowlands of the Algarve (Portugal). The size-interval of the particles studied here is seldom reported in the literature in association with extreme events of coastal inundation, thus making this study of relevance to many other coasts worldwide. The spreads of boulders extend several hundred meters inland and well beyond the present landward limit of storm activity. The marine origin of the boulders is demonstrated by well-developed macro-bioerosion sculpturing and in situ skeletal remains of endolithic shallow marine bivalves. The good state preservation of the fossils within the boulders indicates that abrasion during transport and redeposition was not significant. We envisage boulder deposition as having taken place during the Lisbon tsunami of ad 1755 through the simultaneous landward entrainment of coarse particles from nearshore followed by rapid shoreward suspended-dominated transport and non-graded redeposition that excluded significant sorting by weight or boulder dimensions. We use numerical hydrodynamic modeling of tsunami (and storm) waves to test the observational data on boulder dimensions (density, size, distribution) on the most likely processes of sediment deposition. This work demonstrates the effectiveness of the study of boulder deposits in tsunami reconstruction. Copyright (C) 2011 John Wiley & Sons, Ltd.

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