

Large boulder deposits along the Maltese coasts

Biolchi S.¹, Furlani S.¹, Baldassini N.*², Antonioli F.³, Cucchi F.¹, Devoto S.¹, Di Stefano A.², Gambin T.⁴,
Gauci R.⁵, Monaco C.² & Scicchitano G.⁶

1. Dipartimento di Matematica e Geoscienze-Università di Trieste. 2. Dipartimento di Scienze Biologiche, Geologiche e Ambientali-Università degli Studi di Catania. 3. ENEA, Roma. 4. Department of Classic and Archaeology-University of Malta. 5. Department of Geography-University of Malta. 6. Studio Geologi Associati T.S.T., Catania.

Corresponding email: nbaldas@unict.it

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The accumulation of large boulders related to large waves generated by tsunami and extreme storm events have been observed in different areas of the Mediterranean Sea. Along the NE and E low-lying rocky coasts of Malta a tens of large boulder deposits have been observed (Furlani et al., 2011; Mottershead et al., 2014). In the Sicily-Malta channel heavy seas are frequent and are originated by the NE and NW winds. Few severe earthquakes and tsunamis hit historically the Maltese Archipelago, where the seismicity is related mainly to the Malta Escarpment, the Sicily Channel Rift Zone and the Hellenic Arc.

A multidisciplinary study has been carried out on a large boulder deposit located between Armier Bay and Ahrax Point on the NE coast of Malta.

The boulder accumulation is 100 m wide and is located on a gently sloping coast, at an altitude ranging between 0 and 5 m asl. The boulders, metric in size, are made up by limestones and are Miocene in age.

An underwater surveying allowed to describe the submerged scenario, where fresh detachment scarps and isolated boulders can be observed.

Three different hydrodynamic equations (Nott, 2003; Pignatelli et al., 2009; Nandasena et al., 2011) were applied to assess the wave heights required to carry the boulders out of the sea in a joint-bounded scenario. The axis sizes were determined by means of 3D models achieved by digital photogrammetric technique. The rock densities were calculated by field campaigns using N-type Schmidt Hammer. The application of the formula developed by Katz et al. (2000) permitted to correlate sclerometer outputs and limestone densities of boulders.

Moreover Radiocarbon datings were performed on a tens of *Serpulides* samples.

The combination of the hydrodynamic equations and the Radiocarbon outputs suggests that most of the large boulders has been detached and moved by intense storm waves; conversely some of them have been transported by one or more tsunami events.

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