

# GEOMORPHOLOGICAL EVIDENCES OF CATASTROPHIC WAVES IMPACT IN SOUTHERN LESVOS (NE AEGEAN SEA)

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## Abstract

Eastern Mediterranean and in particular the Aegean Sea have been often affected by catastrophic events such as strong earthquakes and related tsunamis. However, field evidences of tsunamis from the late Holocene are quite rare. This study, carried out in southern Lesvos Island (NE Aegean), individuated a large accumulation of boulders dislocated by tsunami events providing important information concerning the current coastal hazard of the area.

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Geomorphological evidences of past catastrophic events represent an important tool to assess the current hazards, especially in coastal areas. In particular, large boulder deposits have been often used to determine wave heights, age of deposition, magnitude and frequency of extreme waves or tsunami events along the Mediterranean coasts [1]; [2]; [3]. Due to its tectonic setting, the Aegean Sea region is particularly susceptible to earthquakes and related tsunamis but few field evidences of the impacts of these catastrophic waves are reported in literature [4]. This study was carried out in Lesvos Island (NE Aegean), the third largest Greek island with an area of 1,630 km<sup>2</sup> and about 300 kilometres of coastline. In particular, the study area is located in the southern part of the island, between the towns of Plomari and Vatera, where the coastline develops for more than 30 km, being characterised by high cliffs and large sandy beaches, often interrupted by beachrocks outcrops. Here, a big amount of large boulders (up to almost 15 t) were individuated in four sites having different geomorphologic and geological frameworks. Direct observations on each boulder were carried out in order to measure it (size and weight, distance and elevation respect the shoreline) and individuate the pre-transport setting (underwater or sub-aerial position) [5]. A further survey of their long axis orientation and distribution was carried out in order to recognise the geographical origin of the waves. The Nott [5] approach was applied to understand if the boulders displacement was compatible with the local storm wave regime or if they were dislocated by tsunami events. The orientation of elongated boulders allowed to detect two main provenience of the catastrophic waves, one comprised between 150N and 180N and the second between 210N and 240N. The study of wind-wave climate of the area excluded a surge storm origin as cause of the large boulder accumulation. A tsunamitic origin was then attributed to the studied blocks. Moreover, the bimodal distribution suggested that two different events could have affected the area and further datation on the fossil material found on the boulders (bryozoa, vermitids, serpulids) could confirm this hypothesis. The radiometric datation will also allow to confront the events with the historical ones present in different Greek and Mediterranean tsunamis catalogues [6]; [7]. In conclusion, this study provided new and important information in terms of current level of coastal hazard in southern Lesvos and, in particular, in Plomari, the second largest town of the island, with almost 5000 inhabitants where the results should be converted to recommendations for the local governments in order to plan different activities for the mitigation of the vulnerability.

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