

ANALYTICAL SOLUTION OF GENERATION OF TSUNAMI WAVES BY SUBMARINE LANDSLIDE FOR A BASIN OF VARIABLE DEPTH IN IONIAN SEA

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Abstract

This paper presents geo-scientific evidence of beachrock-type calcarenitic tsunamites from three study areas. Calcarenitic and locally conglomeratic carbonate crusts were studied in natural outcrops along the seafront and in vibracores. High-resolution topographic survey and 3D-visualisation were carried out by differential GPS and LIDAR measurements. The impact of tsunami was dated by combined approach of radiocarbon, OSL and archaeological age determination and compared to local tsunami and earthquake chronologies. Based on our sedimentary structure of the land in sea-basin we have made an approach of tsunami waves caused by submarine landslides in variable volume and different depth. Tsunami wave generation by submarine landslides of a variable volume in a basin of variable depth is studied within the shallow-water theory. The problem of landslide induced tsunami wave generation and propagation is studied analytically for two specific convex bottom profiles ($h_x \propto 1/3$ and $h_x \propto 1/4$). In these cases the basic equations can be reduced to the constant-coefficient wave equation with the forcing determined by the landslide motion. For certain conditions on the landslide characteristics (speed and volume per unit cross-section) the wave field can be described explicitly. It is represented by one forced wave propagating with the speed of the landslide and following its offshore direction, and two free waves propagating in opposite directions with the wave celerity. For the case of a near-resonant motion of the landslide along the power bottom profile h_x the dynamics of the waves propagating offshore is studied using the asymptotic approach. If the landslide is moving in the fully resonant regime the explicit formula for the amplitude of the wave can be derived. It is demonstrated that generally tsunami wave amplitude varies non-monotonically with distance.

Key words: *tsunami waves, Ionian sea, submarine, analytical solution.*