Geophysical Research Abstracts
Vol. 21, EGU2019-10621, 2019
EGU General Assembly 2019

Mass failures scenarios from the flanks of the Marsili submarine volcano, Tyrrhenian sea, and consequent tsunami hazard

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The Marsili Seamount (MS) is the biggest volcanic structure in Europe, located in the axial portion of the Marsili Basin, in the southern part of the Tyrrhenian sea. The MS is 70 km long, 30 km wide and about 3000 m high, arising from a depth of - 3500 m to - 500 m. In this work, we present a number of scenarios of possible mass failures occurring on the eastern flank of this structure, covering a broad range of volumes. The landslides are simulated by means of two different numerical models. In one model, that is a new original mechanical model and is implemented in the numerical code UBO-Inter, the moving body is represented by a number of point masses that can be seen as the projection on the sliding surface of the center of mass of the elements the system is discretized into. The other (implemented in the code UBO-Block) is based on the partition of the landslide into a matrix of blocks whose dynamics is computed through a Lagrangian approach.
The mass failures modelled for the Marsili have the potential to be tsunamigenic and hence our study may be also seen as a significant contribution to tsunami hazard assessment in the pery-Tyrrhenian region. To this purpose, we compute the associated tsunami scenarios through the numerical code UBO-TSUFD, solving the shallow water equations via a finite difference technique, and show that the hypothesized largest mass failure could trigger waves impacting the eastern coasts of the Tyrrhenian sea with height even larger than 20 m.