



Probabilistic submarine landslide hazard map of the Gulf of Cadiz

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The Gulf of Cadiz (SW Iberian margin) is well recognized as a tectonically active area with major canyons and profuse evidence of mass wasting. Resulting tsunami from earthquakes and submarine landslides may pose potential catastrophic damage to bordering countries. In this context, submarine landslide hazard mapping becomes a major priority for risk assessment and regional mitigation risk strategy. The aim of this work is to provide a probabilistic regional hazard map as a first step for risk model updating. In particular, a pseudo-static probabilistic slope stability analysis within a normalized approach is carried out for the interested area. To better represent inherent variability of geotechnical parameters, the limited number of geotechnical data of the area is integrated with geotechnical global database in a probabilistic manner. Normalized soil strength, slope geometry and pseudo-static horizontal acceleration coefficients are generated using random field theory for a probabilistic evaluation of the factor of safety. A pre-failure geometry of listed failed slopes is reconstructed to calibrate the model with the help of the commercial geographical information system ArcGIS. Results in terms of probability of failure are compared with available deterministic ones, derived using the same dataset. Effects of the horizontal spatial correlation of the mobilized undrained shear strength are also analyzed and discussed, underlying the conservative nature of the deterministic approach. The reliability of prediction of the hazard map developed is finally tested through an updated submarine landslide catalogue of the Gulf of Cadiz area.