Geophysical Research Abstracts
Vol. 12, EGU2010-507, 2010
EGU General Assembly 2010

3D numerical investigation on landslide generated tsunamis around a conical island

Francesca Montagna (1) and Giorgio Bellotti (2)
(1) DSIC,University of Roma Tre, Rome, Italy (fmontagna@uniroma3.it), (2) DSIC,University of Roma Tre, Rome, Italy

This paper presents numerical computations of tsunamis generated by subaerial and submerged landslides falling along the flank of a conical island. The study is inspired by the tsunamis that on 30th December 2002 attacked the coast of the volcanic island of Stromboli (South Tyrrhenian sea, Italy). In particular this paper analyzes the important feature of the lateral spreading of landside generated tsunamis and the associated flooding hazard.
The numerical model used in this study is the full three dimensional commercial code FLOW-3D. The model has already been successfully used (Choi et al., 2007; 2008; Chopakatla et al, 2008) to study the interaction of waves and structures. In the simulations carried out in this work a particular feature of the code has been employed: the GMO (General Moving Object) algorithm. It allows to reproduce the interaction between moving objects, as a landslide, and the water.
FLOW-3D has been firstly validated using available 3D experiments reproducing tsunamis generated by landslides at the flank of a conical island. The experiments have been carried out in the LIC laboratory of the Polytechnic of Bari, Italy (Di Risio et al., 2009). Numerical and experimental time series of run-up and sea level recorded at gauges located at the flanks of the island and offshore have been successfully compared. This analysis shows that the model can accurately represent the generation, the propagation and the inundation of landslide generated tsunamis and suggests the use of the numerical model as a tool for preparing inundation maps.
At the conference we will present the validation of the model and parametric analyses aimed to investigate how wave properties depend on the landslide kinematic and on further parameters such as the landslide volume and shape, as well as the radius of the island. The expected final results of the research are precomputed inundation maps that depend on the characteristics of the landslide and of the island.
Finally we will try to apply the code to a real life case i.e. the landslide tsunamis at the coast of the Stromboli island (Italy).

SELECTED REFERENCES

Choi, B.H. and D. C. Kim and E. Pelinovsky and S. B. Woo, 2007. Three dimensional simulation of tsunami run-up around conical island. Coastal Engineering 54,374 pp. 618-629.
Chopakatla, S.C. and T.C. Lipmann and J.E. Richardson, 2008. Field verification of a computational fluid dynamics model for wave transformation and breaking in the surf zone. Journal of Waterway, Port, Coastal, and Ocean Engineering 134(2), pp. 71-80
Di Risio, M., P. De Girolamo, G. Bellotti, A. Panizzo, F. Aristodemo, M. G.Molfetta, and A. F. Petrillo (2009), Landslidegenerated tsunamis runup at the coast of a conical island: New physical model experiments. J. Geophys. Res., 114, C01009, doi:10.1029/2008JC004858
Flow Science, Inc, 2007. FLOW-3D User's Manual.