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Modeling of potential slide generated tsunamis at La Palma Island

F. Løvholt (1), G. Gisler (2), G. Pedersen (3) and X. Cai (4)

(1) Norwegian Geotechnical Institute, (2) University of Oslo, Department of Physics, (3) University of Oslo, Department of Mathematics, (4) Simula Research Laboratory, (flo@ngi.no, +47 22 23 04 48)

A numerical study of tsunamis generated by a potential landslide from the Cumbra Vieja volcano at La Palma Island has been conducted. The aim of this work has been threefold: i, to investigate the effects of the (extreme case) tsunami that may be generated in its own right, ii; to study the mechanism of tsunami generation by the landslide; and iii, to model the tsunami propagation by combining different numerical models both in two and three dimensions. The applied landslide volume is 375 km3, and is modified from a previous study of Ward and Day (2001); however, the possibility for mobilizing this slide volume in one event is highly questioned. Yet, the extreme La Palma event deserves attention due to the potential disasterous consequences and the attention it has received in media. For the combined modeling of the landslide motion and tsunami generation, the multi-material hydrocode SAGE was applied, showing that a tsunami of initial surface elevation in the order of 100 m is generated (Gisler et al., 2006). It is not currently possible to employ the SAGE model for the far-field propagation because of the very large grid required. The generated waves are moderately short, and thus genuinely dispersive. Hence, standard tsunami models, based on the shallow water equations, are not applicable. Instead we employ a Boussinesq type model and assumptions concerning the asymptotic evolution at large distances from the source. The generated tsunami will of course be destructive in the Canary Island region. However, preliminary results indicate that the amplitudes will be much smaller than reported previously (Ward and Day 2001).