Geophysical Research Abstracts
Vol. 17, EGU2015-1239, 2015
EGU General Assembly 2015

Study on tsunami generation and propagation in a large scale wave flume

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In this paper we study very long, i.e. real tsunami-like wave generation in a large scale wave flume using a piston type wave maker. Waves of periods between 30 s and more than 100 s were generated at 1 m water depth using two different approaches: (i) deriving the wave board motion directly by integration of the water surface elevation, composed of a different number of solitons (sech2 waves) and (ii) using an iterative self correcting method (SCM). The importance of very long wave generation instead of solitary waves and the necessity for long testing facilities is discussed and results from GWK experiments are presented for single pulses (elongated solitons), N-waves and real tsunami records, either approximated as a combination of solitons or applying the SCM to the time series directly.
The possibility to study propagation, shoaling and run-up of these waves over a slope in a 300-meter long large wave flume (GWK), Hannover is dicsussed. Experimental data of long wave propagation in the flume are compared with numerical simulations performed within the fully nonlinear potential flow theory and KdV equations. Shoaling and run-up of waves on different mild slopes is studied hypothetically using nonlinear shallow water theory. The paper ends with the conclusions about the feasibility of using large scale experimental facility (GWK) to study tsunami wave propagation and run-up.