



Optimal location of deep-sea detectors providing minimal registration time of tsunami wave

M.M. Lavrentiev Jr. (1), S.G. Cherny (2), **D.V. Bannikov** (3) and A.S. Astrakova (3)
(1) Sobolev Institute of Mathematics and Novosibirsk State University, Russia, (2) Institute of Computational Technologies, SB RAS, Russia (cher@ict.nsc.ru), (3) Novosibirsk State University, Russia

Consider the given subduction zone, earthquakes in which cause tsunami waves over a certain aquatoria. Suppose that the measurement system is designed to register tsunami wave for future analysis. For example, Deep ocean Assessment and Reporting Tsunami (DART) buoys, proposed and deployed by USA National Ocean and Atmosphere Administration (NOAA), could be considered. These buoys include deep-water pressure transducer, surface rider buoy and satellite based real time data transfer to tsunami warning centre for analysis.

We address the problem of optimal configuration of given number of buoys to achieve tsunami wave registration by minimal possible time T , regardless particular source location within the subduction zone considered. The corresponding nonlinear optimization problem is numerically solved by authors with the help of real-parameter Genetic Algorithm.

Software application has been developed and tested. First uniform depth profile was considered to compare calculated results with known analytic solutions. Fairly well agreement between exact solutions and calculation results were obtained. Then algorithm was tested against real bathymetry around Alaska-Aleutian subduction zone. Dependencies of available detection times versus number of measurement buoys have been obtained. As was observed, current configuration of DART stations (namely, buoys D157, D171, D165 were accounted) could be valuably optimized in terms of time, required for guaranteed tsunami detection.