



Residual hydrodynamic fields in the ocean due to tsunamigenic earthquakes

Mikhail Nosov and Anastasiya Moshenceva

M.V.Lomonosov Moscow State University, Faculty of Physics, Moscow, Russian Federation (m.a.nosov@mail.ru)

The most effective mechanism of tsunami generation is associated with the so called co-seismic (residual) deformation of ocean bottom which results from strong bottom earthquake. The co-seismic deformation implies that during the generation process of a tsunami a huge volume of water (up to tens of cubic kilometers) is been displaced from its equilibrium position. The spreading of this huge volume of water in the vicinity of tsunami source has certainly to result in a horizontal displacement of water particles from their initial positions. At the same time, due to the earth rotation, a geostrophic vortex should arise in the vicinity of tsunami source. We shall call the horizontal displacements of water particles and the geostrophic vortex the "residual hydrodynamic fields". In fact, along with seismic data, deep-water and coastal tsunami measurements, the residual hydrodynamic fields represent an additional set of parameters which may be useful in tsunami warning system. In this study, we develop a practical method of calculation of the residual hydrodynamic fields from co-seismic deformation of ocean bottom and bathymetry. With use of this method we estimate residual hydrodynamic fields for some recent tsunamis. It is shown that the residual horizontal displacements of water particles often exceed hundreds of meters, whereas velocity in geostrophic vortex rarely reaches tens of centimeters per second. Methods of in-situ registration of the residual hydrodynamic fields, such as GPS drifters, bottom ADCPs, sequential satellite imagery (maximum cross correlation technique), are discussed.