



Elastic oscillations of water layer in tsunami source: observations and numerical modeling

M. Nosov, S. Kolesov, A. Alekseev, A. Ostroukhova

Faculty of Physics, M.V.Lomonosov Moscow State University

As it has been shown in our recent publications [1, 2], from the physical standpoint, the problem of tsunami excitement by seismic bottom motions must be considered in the framework of the model of a compressible fluid. The behavior of a real compressible ocean differs from that of an incompressible one mostly by the formation of elastic oscillations of water layer with the dominating period $4H/c$, where H is ocean depth, c is sound velocity in water. Until recently, this result remained pure theoretical one. The strongest earthquake of 2003 was the Tokachi-Oki earthquake, which generated tsunami with a maximum wave height of 4 meters along the south-eastern coast of Hokkaido. Japan Agency for Marine-Earth Science and Technology successfully recorded the bottom pressure variations in source area of the tsunami. It was the first time of recording vertical bottom displacements in tsunami source by pressure gauges [3]. However, the first registration of bottom displacements is not the only unique result. We also processed the pressure data and managed to single out the elastic oscillations of water layer. The main maximum of the of pressure variations spectrum corresponds to the range of minimal normal frequency of the elastic oscillations of water layer. More exact coincidence of the position of spectrum maximum and theoretical frequency range is reached considering coupled oscillations of water and sediments layers. 3D numerical modeling was used to explain observed particular features of the elastic oscillations during the Tokachi-Oki earthquake.

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