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Tsunami Observer: automatic system for estimate of tsunamigenicity of an earthquake

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In this talk the fully automatic system for estimate of tsunamigenicity of an earthquake is presented. The system is focused on simplicity and speed with usage of minimum of input data. The input dataset for the system includes (1) earthquake coordinates, (2) earthquake depth, (3) seismic moment, (4) focal mechanism. We use datasets provided by USGS and GEOFON. Upon receiving earthquake data the system performs the following consecutive actions. At first, the vector field of co-seismic bottom deformation is obtained using earthquake fault parameters and empirical relationships. Then the initial elevation in tsunami source is calculated and estimation of Soloviev-Imamura tsunami intensity is performed. Initial elevation is calculated taking into account vertical and horizontal components of bottom deformation, local bathymetry (GEBCO) and smoothing effect of water layer. An auxiliary study was conducted to obtain relationship between potential energy of initial elevation of water in tsunami source and intensity of resulting tsunami. More than 200 historical events from HTDB/WLD and NGDC/WDS databases was statistically processed. The obtained relationship is used to assess the intensity of tsunami generated by earthquake under consideration. Finally, if event is considered significant (energy > 10^9 J), the numerical simulation of propagation of tsunami waves is performed. As a result of numerical simulation, animations of wave propagation, distribution of maximum tsunami heights, and water surface time-histories in a number of given points are produced. Details of implementation, physical constraints, future development of system as well as 2-years experience of the system operation will be discussed during the talk.

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