February 27, 2010 Chilean Tsunami in Pacific and its Arrival to North East Asia

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The outskirts of the fault plane broken by the strong earthquake on February 27, 2010 in Chili with a magnitude 8.8 at the 35km depth of 35.909°S, 72.733°W coordinates generated a moderate size tsunami. The initial amplitude of the tsunami source is not so high because of the major area of the plane was at land. The tsunami waves propagated far distances in South and North directions to East Asia and Wet America coasts. The waves are also recorded by several gauges in Pacific during its propagation and arrival to coastal areas. The recorded and observed amplitudes of tsunami waves are important for the potential effects with the threatening amplitudes. The event also showed that a moderate size tsunami can be effective even if it propagates far distances in any ocean or a marginal sea.

The far east coasts of Russia at North East Asia (Sakhalin, Kuriles, Kamchatka) are one of the important source (i.e. November 15, 2006, Kuril Island Tsunami) and target (i.e. February, 27, 2010 Chilean tsunami) areas of the Pacific tsunamis. Many efforts have been spent for establishment of the monitoring system and assessment of tsunamis and development of the mitigation strategies against tsunamis and other hazards in the region. Development of the computer technologies provided the advances in data collection, transfer, and processing. Furthermore it also contributed new developments in computational tools and made the computer modeling to be an efficient tool in tsunami warning systems.

In this study the tsunami numerical model NAMI DANCE Nested version is used. NAMI-DANCE solves Nonlinear form of Long Wave (Shallow water) equations (with or without dispersion) using finite difference model in nested grid domains from the source to target areas in multiprocessor hardware environment. It is applied to 2010 Chilean tsunami and its propagation and coastal behavior at far distances near Sakhalin, Kuril and Kamchatka coasts. The main tide gauge records used in this study are from Petropavlosk (Kamchatka), Severo-Kurilsk (Paramushir), Kurilsk (Iturup, coast of the Okhotsk sea), Malokurilskoe (Shikotan), Korsakov, Kholmsk and Aniva Bay (Sakhalin). These records and also other offshore DART records are analyzed and used for comparison of the modeling results with offshore and nearshore records. The transmission of tsunami waves through Sakhalin and Kuril straits and their propagation to nearby coasts are investigated. The spectral analysis of records in settlements of Sakhalin and Kurile Islands are investigated. The performance and capabilities of NAMI DANCE is also presented together with comparisons between the model, observations and discussions.