Geophysical Research Abstracts
Vol. 19, EGU2017-9936, 2017
EGU General Assembly 2017

Tsunami in the Arctic

Evgueni Kulikov (1), Igor Medvedev (1,2), and Alexey Ivaschenko (1)

(1) P.P. Shirshov Institute of Oceanology, Russian Academy of Sciences, Moscow, Russia, (2) Fedorov Institute of Applied Geophysics, Moscow, Russia

The severity of the climate and sparsely populated coastal regions are the reason why the Russian part of the Arctic Ocean belongs to the least studied areas of the World Ocean. In the same time intensive economic development of the Arctic region, specifically oil and gas industry, require studies of potential thread natural disasters that can cause environmental and technical damage of the coastal and maritime infrastructure of energy industry complex (FEC). Despite the fact that the seismic activity in the Arctic can be attributed to a moderate level, we cannot exclude the occurrence of destructive tsunami waves, directly threatening the FEC. According to the IAEA requirements, in the construction of nuclear power plants it is necessary to take into account the impact of all natural disasters with frequency more than 10^{-5} per year. Planned accommodation in the polar regions of the Russian floating nuclear power plants certainly requires an adequate risk assessment of the tsunami hazard in the areas of their location. Develop the concept of tsunami hazard assessment would be based on the numerical simulation of different scenarios in which reproduced the hypothetical seismic sources and generated tsunamis.

The analysis of available geological, geophysical and seismological data for the period of instrumental observations (1918-2015) shows that the highest earthquake potential within the Arctic region is associated with the underwater Mid-Arctic zone of ocean bottom spreading (interplate boundary between Eurasia and North American plates) as well as with some areas of continental slope within the marginal seas. For the Arctic coast of Russia and the adjacent shelf area, the greatest tsunami danger of seismotectonic origin comes from the earthquakes occurring in the underwater Gakkel Ridge zone, the north-eastern part of the Mid-Arctic zone. In this area, one may expect earthquakes of magnitude Mw $\sim$ 6.5-7.0 at a rate of 10^{-2} per year and of magnitude Mw $\sim$ 7.5 at a rate of 10^{-3} per year. Additional tsunami threat might arise from rare earthquake occurrences within the continental slope of deep-sea basin of the Arctic Ocean and near the coast of the continent, where high probability of triggering submarine landslides exists that can generate even more dangerous tsunamis than those of seismotectonic origin.

The most reliable information about the manifestation of the tsunami in the Arctic is associated with submarine landslide Storegga located on the continental slope of the Norwegian Sea and collapsed 8,200 years ago. Traces of sediment left behind by the tsunami waves on the coast, show that the maximum vertical tsunami runup could reach 20 meters.

Factors causing the potential tsunami thread of landslides in Russian Arctic are sedimentation processes that can be associated with the formation of the alluvial fans of the great Siberian rivers Ob, Yenisei and Lena.