



The Central Kuril Earthquakes and Tsunamis of 15 November 2006 and 13 January 2007: Findings of a Pre-event geophysical field survey

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Following the catastrophic 2004 Sumatra earthquake and global tsunami, seismic zones around the Pacific Ocean were thoroughly examined in the context of the seismic-gap theory. The Central Kuril seismic gap of about 500 km was defined as the zone of highest risk for a possible catastrophic event. The last major earthquake in this zone was in 1780. Zones to the southwest and northeast of this region are bordered by the 1918 and 1915 earthquake source areas, respectively. A major earthquake and associated tsunami from the Central Kuril seismic gap is considered a highest risk for the coast of Russia, especially for the northeastern shelf of Sakhalin Island in the Sea of Okhotsk, an area of active oil and gas exploration. To examine the Central Kuril seismic gap, two detailed marine geophysical expeditions on R/V “Michail Lavrentiev” were conducted in 2005 and 2006 by the Russian Academy of Sciences. The main purposes of these expeditions were examination of the tectonic structure of the seismic gap, identification of cross-shelf fault areas, detection of a possible source region and determination of the expected magnitude of a major earthquake and associated tsunamis. Several seismic, gravimetric, magnetic and bathymetric surveys were undertaken in this region. The scale of the potential earthquake source area was found to be from 275 to 450 km. The $M_w = 8.3$ earthquake of 15 November 2006 and the $M_w = 8.2$ earthquake of 13 January 2007 which occurred in pre-defined zone and associated tsunamis had parameters that are in good agreement with the predicted values. This is likely the first major earthquake/tsunami events for which a thorough field survey was conducted before, not after the event.