SEISMOLOGICAL NETWORK IN SOUTHERN PART OF THE RUSSIAN FAR EAST AND SOME RESULTS OF JOINT INVESTIGATIONS AT THE SAKHALIN ISLAND

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A high seismic potential of the Sakhalin Island and adjacent shelves has been proved by several disastrous earthquakes of Ms greater than 7 occurred in the past 30-35 years. The most disastrous was the Mw7.0 Neftegorsk earthquake of May 27, 1995 which caused a great damage and killed about 2000 people. However, the regional seismological network at the Island as well as in the entire southern part of the Russian Far East is very sparse and poorly equipped in view of recent technical progress to provide high quality data for modern earthquake research.

We present a state-of-art description of the regional seismological network for southern part of the Russian Far East. Within the region, the only modern broadband seismic station is the IRIS-2 system established by USGS at Yuzhno-Sakhalinsk in 1992. All other seismic stations are equipped with the old type Russian analogous instruments with galvanometric registration. At present time, 3 such stations are in operation at Kuril Islands, 4 stations - at Sakhalin Island, and 3 stations - at the vast area of Khabarovsky and Primorsky regions. Neither the total number, nor the quality of network instruments allows performing any serious present-day study such as seismic tomography of deep structures, anisotropy, earthquake source dynamics, etc.

In this view, since 1995 a close cooperation in seismological research has been established between the Institute of Marine Geology and Geophysics (IMGG) and Sakhalin Department of Geophysical Service (SDGS) and the Institute of Seismology and Volcanology (ISV). Japanese side provided a great technical support for joint research at the Sakhalin Island by supplying modern portable digital seismic stations DATAMARK and DAT. Due to this support detailed seismological observations were regularly performed in the northern, central and southern parts of the Island which provided a lot of new high quality data for better understanding the nature of large earthquake occurrences and the structure of the upper crust within the Sakhalin Island.

We summarize here and briefly present the main results of our joint seismological investigations since 1995 including a detailed characterization in space and time of source zone evolution for the 1995 Mw7.0 Neftegorsk earthquake in Northern Sakhalin, the 2000 Mw6.8 Uglegorsk earthquake in Central Sakhalin, and the 2001 Mw5.6 Takoisky earthquake (swarm) in Southern Sakhalin. The results of seismological observations are compared with the data of geodetic and paleoseismological studies performed within the aftershock areas of mentioned events by other researchers. All these data suggest a close relation between disastrous earthquake occurrences and deformation along the major active faults of the Sakhalin Island.

Based on results of detailed observations in Southern Sakhalin during the last years we present some data supporting a hypothesis of a seismic gap formed offshore the south-western Sakhalin and capable to produce a large earthquake of Ms ˜7 or greater within the next 3-5 years.

However, the deep crustal and mantle structure beneath the Island and beneath the adjacent part of mainland is still poorly studied which prevents studying of plate geodynamics in this region, the key issue for earthquake prediction and earthquake hazard assessment. To supply high quality seismological data for solving these problems, we agreed to establish a new seismological network in the Far East of Russia consisting of 12 broadband seismic stations. We believe the new network shall considerably improve the whole system of seismological observations at the Far East of Russia and provide valuable data for seismological research.