The registration of seismic-acoustic emission form earthquake preparation area by a hydro-seismic-acoustic system

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Seismic-hydro-acoustic system (SHAS) consisted of hydro-acoustic receivers and seismometer was developed to test opportunity of earthquake preparation zone detection by using acoustic signals. Seismometer was used for attestation of received seismic signals for precise determination earthquake preparation zone.

The seismic part of system constantly records three channels (two horizontal and one vertical). The record frequency range of the signal is from 0.0017 Hz to 20 Hz, sample rate is 200 Hz. The hydro-acoustic part of system in this experiment had two hydrophones with frequency range from 1 to 70 Hz, sample rate 200 Hz.

The long-range forecast was produced for the South of the Sakhalin Island near the Kholmsk city in the end of 2005 year. The SHAS installation carried out in august 2006 in point 47.117 N 142.096 E near the forecasted area. The earthquake with magnitude 5.6 occurred 17.08.2006 time: 16:20 (GWT). The earthquake epicenter was located in 46.450 N 142.110 E near the settlement Shebunino (Kholmsk region) at the depth 8 km. The earthquake (EQ) magnitude was 5.6, (according to USGS data: Mb=5.6, depth of hypocenter 32.6 km).

The packets of the one-type signals start to register on hydro-acoustic channels of system from 16.08.2006 18:57:05.5(GWT). The beginning of the signal registration is 21hour 22 min. 40sec before the main shock. The each packet of signals consisted from several one-type signals. The packet duration varied from several seconds to several minutes. Total number of packets registered on the hydro-acoustic channel was 256. The average signal duration was 0.2 sec. The packet of signals was disappeared on the hydro-acoustic records 17.08.2006 05:13:04(11 hours 6 min before the main shock). Such type of signals did not observed after EQ too. It was registered several aftershocks after this EQ, but such signals did not observed neither before nor after aftershocks. The aftershock preparation process may be very short for surface dilatance zone creation.

We can assume that all signals within one packet were emitted from one area, whereas the signals from different packets were emitted from different sources. If we use three

hydrophones, situated in tops of equilateral triangle with side 100 m, it allows us to determine the signal source location more precise. Now the frequency range of hydroacoustic part the system did not allow us to reconstruct such parameters of microruptions as a source depth, a linear source size and an energy characteristic of microrupture (magnitude) because of high frequencies (more than 70 Hz) were coarsened in these observations.

It is more effective to install several copies of such stations, which surrounded the preparation zone of future EQ. In this case the epicenter area may be determined more strictly.