Geophysical Research Abstracts
Vol. 14, EGU2012-2833-3, 2012
EGU General Assembly 2012

Statistics of surface waves off the south-eastern coast of the Sakhalin Island on a base of the data of instrumental measurements in 2006 - 2008

K.I. Kuznetsov (1,2,3), G.V. Shevchenko (1), P.D. Kovalev (1), and A.A. Kurkin (3)

(1) Institute of Marine Geology and Geophysics FEB RAS, Yuzhno-Sakhalinsk, Russia, (2) Special Design Bureau for Automation of Marine Studies, Russian Academy of Sciences, Yuzhno-Sakhalinsk, Russia, (3) R.E. Alekseev Nizhny Novgorod State Technical University, Nizhny Novgorod, Russia

Waves off the Sakhalin Island coast are well described by the data of visual observations, but insufficiently covered by instrumental field measurements data. The wider is the shelf development in connection with the increasing of oil and gas production the more important is the information about wave statistics, the mean end extreme wave height values. Institute of Marine Geology and Geophysics FEB RAS in cooperation with Nizhny Novgorod State Technical University realizes experimental field measurements in the south-eastern part of Sakhalin shelf. The experiments on surface wave measurements have been carried out with the help of bottom pressure gauges at several relatively shallow locations.

In the present study the properties of surface waves are analysed on the example of the regions off the coast near the mouth of Izmenchivoe lake (depths 12-15 m, 3 gauges), Ostry cape (depth 4-20 m 14 gauges), Vzmorie village (depth 7-8 m, 7 gauges) on a base of records in three time intervals of 240 days long during 2006-2008 of 24 bottom pressure gauge data. Due to selectivity of the process of wave damping with depth, the wave profile is recorded by the bottom pressure gauges with deformation. The reconstruction technique was tested to obtain the sea level from the records of the bottom hydrostatic pressure. For the correction of these deformations we used correcting coefficients, described in the literature.

The empirical distribution $F(h/H_s)$ showed a good agreement with Rayleigh distribution law, the distribution $F(H_s)$ is significantly more complicated and has additional peaks. Bathymetry of the region has a significant influence upon the statistical parameters of wave heights. The local wave climate reveals several well-known features of shallow basins of the Okhotsk Sea: relatively modest long-term wave heights, the most frequent heights around 0.12 m, mean significant wave height 0.5 m.

The abnormally high waves ($h \geq 2H_s$) were detected in all available records, the mean frequency of their appearance in the south-eastern Sakhalin shelf is very different from place to place: it changes from 1.8 times/day near the mouth of Izmenchivoe lake, 1.3 times/day near Vzmorie village, to 0.95 times/day near Ostry cape, what can be hypothetically connected with the special features of hydrological regime near the Terpeniya cape. It is shown that the abnormal large waves occur with almost equal probability in different wave regimes (from calm to storm). The largest measured significant wave height is around 3 m. There were totally registered about 1,400 waves satisfying the criterion of abnormal waves. For 30 of them the exceedance of H_s was 2.5 times or more.

Authors received funding from the Federal Target Program "Research and scientific-pedagogical cadres of Innovative Russia" for 2009-2013, they acknowledge as well RFBR grants 10-05-00199, 12-01-00971.