Geophysical Research Abstracts,
Vol. 11, EGU2009-7618-2, 2009
EGU General Assembly 2009

Structure of the tsunami recurrence function for the small and moderate events

V. Kaystrenko

Institute of Marine Geology and Geophysis, Rusian Academy of sciences, Yuzhno-Sakhalinsk, Russian Federation (victor@imgg.ru)

Tsunami recurrence function is the main parameter of the tsunami probability model of the Poissonian type. This model can be used as the basement for tsunami zoning and insurance strategy if tsunami recurrence function is good known. Its theoretical investigation gives some results relatively its structure.

Conclusion 1. The tsunami recurrence function $\phi(h)$ as a function of the tsunami height "threshold" h and good known log-normal tsunami height distribution along the coast in the same area are tied: tsunami recurrence function is the eigen function of integral operator which kernel is the log-normal distribution with modified parameters.

$$\varphi(H) = \frac{1}{\sigma\sqrt{2\pi}} \int_0^\infty e^{-\frac{1}{2}(\frac{\ln H\lambda - \ln Kh}{\sigma})^2} \varphi(h) \frac{dh}{h}.$$

Eigen functions of this operator are good known, there are power functions $\Phi(h)$=Ch^α. The condition of eigen value equal to 1 gives an effective tsunami height amplification factor $K = \lambda$exp(-$\alpha\sigma^2$/2).

Conclusion 2. Tsunami recurrence function should be power function for small and moderate tsunami heights. It is inner property of tsunami transformation in the shelf zone with stochastic bathimetry. Processes in source zone can definite the values of parameters C and α only.

Natural data analysis shows that α is approximalely equal to -1 for all the regions. This parameter should be considered as universal α=-1. In this case parameter C has dimension of velocity with values about several cm pro year like vertical deformation of the Earth crust deformations in active regions being tsunami source zones. This parameter can be considered as the average velocity of producing of vertical co-seismic deformations in the tsunami source zone.

Conclusion 3. Tsunami activity for small and moderate events depends generally from the distribution of single parameter C in the tsunami source zone.

The work was supported by the Russian foundation for basic research, grant 08-05-01096 .