The problem of the accuracy of the tsunami activity parameters

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Abstract. The subject of the article is the theoretical development of the probabilistic model for a Poisson-type tsunami sequence that is consistent with data on the manifestations of historical events, in order to obtain estimates of the accuracy of the tsunami activity parameters. An example of a tsunami recurrence function, which is the most important quantitative characteristic of tsunami activity for the Port of Malokurilskoye, one of the places in the South Kuril Islands region with the most reliable tsunami height dataset, was created on the basis of a theoretical essay. An explanation for the weak statistical stability of all large values of the tsunami heights, especially for the largest one in the series of observations, was given based on the probability density functions of the ranked tsunami heights. In particular, it means, for example, that the maximum tsunami height recorded at a certain location during a 30-year observation period should be correlated with a wide range of possible recurrence periods of about 10 to 100 years. Synthetic catalogs of the tsunami heights, built for the Port of Malokurilskoye, showed that the tsunami height datasets with a duration of at least 250 or 500 years without gaps are needed to obtain the tsunami activity parameters with an acceptable accuracy of 10 or 5 %. The most important results are the analytical equations for the variances of estimates of the tsunami activity parameters, which characterize the accuracy of these estimates, depending on a priori unknown values of the tsunami activity parameters and the amount of data used.

Keywords:

tsunami, run-up height, recurrence, tsunami activity, tsunami hazard,

probabilistic model, statistics

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