

## Data selection method for restoring a tsunami source form

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**Abstract.** The reconstruction of a tsunami source as a solution to the inverse problem in mathematical physics relies on the use of the truncated singular value decomposition method (a variant of the least squares method) for inverting remote records of the tsunami wave. The proposed method allows one to overcome the inevitable instability of the numerical solution. The result of inversion depends on the choice of the observation system, actual bathymetry and data noise level. Within the developed approach, a methodology for choosing key inversion options and an optimal dataset which provide the best accuracy of a tsunami source recovery is discussed. It is based on analyzing the distribution of the specific energy generated by all spatial modes at the locations of the active sensors. The peculiarity of the algorithm is that the use of the most informative data allows one without re-computation of the direct problem to obtain wave amplitudes at the points of interest (let us call them as “fictitious” stations) where there were no observations, but those that were considered in preliminary calculations. Three real-life events, the Chilean Illapel tsunami on September 16, 2015, the tsunami near the Solomon Islands on February 6, 2013, and the Shikotan tsunami on October 5, 1994, are used as examples of the proposed approach. The results obtained allow one hope for using of this approach in practice.

**Keywords:**

**inverse ill-posed problem, singular value decomposition, specific energy, numerical modeling**

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