

## Numerical estimation of tsunami size using boulders deposited by the 2011 Tohoku-oki tsunami at Settai, Miyako city, Japan

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Tsunami boulders are important geological evidence to understand paleotsunami activity. Previous studies have intended to extract the information about tsunami size from the distribution of tsunami boulders. However, although several numerical methods have been proposed to estimate tsunami size using tsunami boulders, there have been no studies validating the estimated tsunami size by comparing with the actual tsunami size. Also, it is important to consider the methodology of the estimation of tsunami size using boulders. In this study, we estimated local size of the 2011 Tohoku-oki tsunami at Settai, Miyako City, Japan based on the numerical modeling of boulder transport. We search an incident wave condition of sin waves which could explain the distribution of boulders well. We then compared the estimated results with the tsunami size calculated by existing well-validated tsunami source model. As a result of the simulation, we estimated that the tsunami size was ranging from 9 m to 21 m in wave height and from 60 s to 300 s in period at the point of 5200 m offshore of Settai. This range covers the actual tsunami size; so the tsunami size can be estimated from the boulders in Settai. According to the above results, the method that we proposed was effective. On the other hand, we found that assumption of the initial position of boulders are critically important and it should be constrained by multiple information such as topographic condition and composition of the boulders.

Keywords: Tsunami boulder, Tsunami size, numerical model, simulation