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Sophistication of coastal tsunami height real-time prediction system by sparse modeling

KEN-ICHIRO, Sato[1*] ; IGARASHI, Yasuhiko[2] ; OKADA, Masato[2] ; HORI, Takane[1] ; BABA, Toshitaka[3] ; TAKAHASHI, Narumi[1]

[1]R&D Center for Earthquake and Tsunami, Japan Agency for Marine-Earth Science and Technology, [2]Graduate School of Frontier Sciences, The University of Tokyo, [3]The University of Tokushima Faculty of Engineering

From the correlation of tsunami heights and DONET observation data in the Nankai Trough from coastal to offshore, relationship between the average waveform of tsunami height and DONET observation data of the coastal area is revealed (Baba et al. 2013). However, when compare calculated from the tomographic model and actual tsunami height, evaluation becomes excessive case exists.

Therefore, we propose a new way from the previous method to predict the tsunami heights of each point. The previous approach is to integrate data from multiple observation points in one by taking average of the absolute amplitude data, and to predict the tsunami heights of each point at coast line. The new method, in view of individual relationships between tsunami heights prediction point and the observation point. And weighted data of all stations are superimposed. Thereby, predict a tsunami height in accordance to the characteristics of each point.

To be specific, expressed by sparse modeling the relationship of the observed data and the coastal tsunami heights. Then, it is used to predict the tsunami heights as a weighting of the observation data at each heights tsunami prediction point. By performing individually optimization of the weight for each prediction point, the prediction accuracy can be ensured in tsunami scenarios that are used to validate the system. However, for tsunami outside the scenarios there is a possibility that the prediction accuracy is reduced. Therefore, so as not to excessively adapt to the scenarios that are used in the verification, not only the prediction point of interest, also to ensure a proper prediction accuracy in the neighborhood of the predicted point. As a result, it can be predicted in consideration of continuity of the location on the map.

Keywords: sparse modeling, real-time prediction, tsunami