Functions of Real-time Tsunami Inundation Forecast System Using S-net Pressure Data

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We have developed real-time tsunami inundation forecast system using S-net ocean bottom pressure data (Aoi et al., 2019, JDR). The forecast methodology of the system is mainly based on the multi-index method (Yamamoto et al., 2016, EPS) coupled with tsunami scenario bank (Chikasada et al., 2019, Technical Note NIED). In addition, the system has many functions to perform appropriate forecast considering a nature of the observed S-net pressure data, additional seismological data, regression targeted for specific region and alerting for tsunami without search for tsunami scenario bank. In this presentation, we introduce the developed forecast system focusing on these various functions.

The system has a redundancy and robustness in processing the observed S-net data by receiving the data from dual receiver with quality check. The pressure data are corrected for offset, band-pass filtered to extract the tsunami components. It was found that high waves due to typhoon or storm cause noises even in the ocean bottom pressure data and scenarios are selected by multi-index method. Therefore, the system does not make forecast information if no stations have larger amplitude than criterion value.

Forecast information, i.e., coastal tsunami heights and inundation depth distribution, is produced from the selected scenarios from the multi-index method by taking the maximum and average value of the selected scenarios. The scenario with the largest variance reduction between the observed and scenario data can be forecast information too. Standard deviation can be used to present the scattering of the forecast. As additional information, the system imposes the consistency with the hypocenter information on the selected scenarios by the multi-index method. This works well for the tsunamis generated at the edge or outside of S-net region. Moreover, most possible tsunami scenario for specific region can be derived from the selected scenarios in comparison with the forecast tsunami inundation depth at representative points based on neural network regression. The system also has functions to alert the tsunami by detecting the large pressure changes as well as using the tsunami warnings issued by the Japan Meteorological Agency. Detailed information based on the tsunami simulation based on 10-m mesh topography model is output for Kujukuri-Sotobo region of Chiba prefecture and rough and limited information is output from Ibaraki prefecture to Pacific coast of Hokkaido.

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