

Constructing an empirical envelope function of seismic waveforms for the improvement of the IPFx method

IPFx 法改良のための地震波形の経験的エンベロープ関数の構築

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The earthquake early warning (EEW) system, which analyzes the data from seismic networks for real-time ground prediction of on-going earthquakes, has been widely applied in many countries (e.g., Japan and California). In Japan, there are two main EEW systems: the integrated particle filter (IPF) and propagation of local undamped motion (PLUM). The two systems work simultaneously during the occurrence of earthquakes. Currently, the Japan Meteorological Agency (JMA) adopts the seismic information with the largest seismic intensity (SI) from them as the final hazard notification. However, there are some particular cases where both of the two systems can be inaccurate. Thus, it is pressing to propose a real-time method/system capable of evaluating the results from different EEW systems. In this study, we propose to use the seismic waveform data from JMA, K-NET and KiK-net in the past 20 years to develop an empirical function that fits an envelope to the real-time waveforms. By comparing the predicted envelope of EEW algorithms and the observed waveform envelope, we construct a real-time evaluation criteria of EEW, allowing us to compare the prediction performance of IPF and PLUM systems in real-time. Our function fitting will be based on a million seismic events which is much greater than any other studies that only included tens of thousands events.

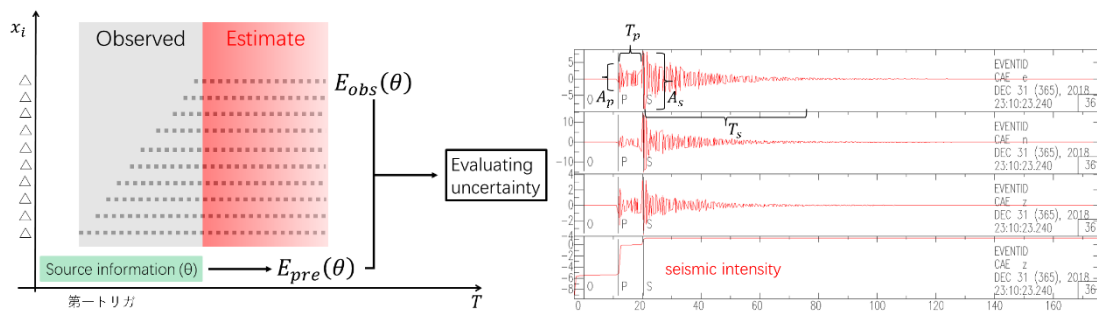


Fig. 1 The parameterization and envelope of the GMPE