

Optimization of Preset Parameters for Source Process Analysis with Teleseismic Body-Wave

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1. INTRODUCTION

The Japan Meteorological Agency (JMA) analyzes source process of earthquakes in the world larger than Mw7.0 with teleseismic body-wave. The results are published on the website. It is generally difficult to determine optimum preset parameters for source process analysis, because there are so many parameters for the analysis. Therefore, it takes a long time until publish the results.

We examined optimized preset parameters to automate source process analysis with teleseismic body-wave. Here, we analyze some events using parameters which are determined automatically, and compare them with the results which were analyzed through trial and error by the analyst. Then, we extract problems which arises in automatic parameter determination and seek the solutions.

2. Methods

We use the same program package as Iwakiri et al. (2014) for analyzing source process with teleseismic body-wave. We use broadband waveform data which are downloaded from IRIS DMC HP, and apply band-pass filter (from 0.002Hz to 0.125Hz) to them. We use epicenter data of JMA for events in and around Japan, we use epicenter data of USGS for events in other areas. We use depth of CMT solutions of JMA for the depth of starting point. Hypocenter is set at center of assumed fault plane, and subfault parameters (size and number) are set by scaling law. Strike, dip and rake parameters are set from CMT solutions of JMA. Velocity structure for Green's functions are set based on the IASP91 model, and CRUST2.0 model for near hypocenter. Source-time functions are set with triangle functions. The number of function is changed based on event magnitude. And rise time is set at 2.0sec. We use ABIC (Akaike (1980)) for temporal and spatial smoothing constraints, and set hyperparameters as ABIC value become the minimum. Max rupture speed is set at 0.72 times of S-wave velocity from empirical relationship of Geller (1976).

Keywords: source process, optimized preset parameters, automation