

## Determination of arrival times of diffracted P and S-waves by comparison of observed seismograms with synthetic waveforms

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Traveltime analysis of P and S-waves diffracted along the core-mantle boundary (CMB) is useful to study the velocity structure near the CMB by the nature of the propagation of these waves. For the same reasoning, however, they rapidly lose their high-frequency energy as they proceed, and therefore, it becomes increasingly difficult to determine directly their arrival times as epicentral distance increases. With this situation we have to use waveforms of large earthquakes, for which the effect of source time function may not be ignored. In this study, we determine the arrival times of diffracted waves by a correlation method: (1) select a deep-generating direct P wave in the closest azimuth to the targeted station, (2) read its arrival time from the original broadband record, (3) calculate the synthetic P waveform for a delta source time function by the direct solution method (DSM), (4) deconvolve the observed P waveform with the synthetic P waveform with a non-negative constraint to obtain a comb-like source time function, (5) calculate the synthetic seismogram including the diffracted P and S wave parts for a delta source time function at the targeted station, (6) convolve this seismogram with the comb-like source time function to obtain the synthetic diffracted P and S waves, and (7) correlate these synthetic waveforms to the observed waveforms to determine the arrival times of the diffracted P and S waves with the aid of the arrival time data obtained at step (2).