

## Correlation between amplitude and duration anomalies of seismogram envelopes observed in northeastern Japan

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We have investigated the correlation between amplitude and duration anomalies of seismogram envelopes observed in northeastern Japan. The purpose of this study is to get information about the spatial variation of parameters that describe random inhomogeneities in the area. We used seismograms observed by the surface accelerometers of KiK-net for 40 events with magnitude greater than 5.9. The rms envelopes were produced from two horizontal seismograms band-pass filtered at 2, 4, 8, and 16 Hz center frequencies. Both amplitude and duration anomalies are expressed by the ratio to the empirical relation between amplitude (or duration) versus hypocentral distance.

Notable amplitude anomalies we found are; (1) anomalies by deep-focus earthquakes, (2) positive anomaly observed in areas several hundred kilometers off from the earthquakes near the plate boundary, (3) paired anomaly between the forearc and backarc sides in Tohoku. Corresponding duration anomalies are; (1) strong negative anomaly in the forearc side of Tohoku, (2) anomalies similar to (1) observed from earthquakes near the plate boundary, and (3) strong negative anomaly observed in the forearc side at frequencies lower than 4 Hz and positive anomaly in the backarc side at higher frequencies.

Generally the amplitude anomaly and duration anomaly have negative correlation, i.e., seismograms with large amplitude have short duration. This is qualitatively explained by the effect of forward scattering during the propagation within the subducting lithosphere. If scattering occurs mainly in forward direction, the scattered waves arrive at a station within a short time range, which resulted in the positive amplitude anomaly due to constructive interference. Some exceptional cases were observed from deep-focus earthquakes beneath northern Hokkaido. The strong attenuation above the subducting plate is the probable cause of this exception from the negative correlation. We need quantitative analyses to interpret the observed facts mentioned above in terms of the parameters that describe the characteristics of random media.