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Three dimensional attenuation structure in and around the source region of the 2007 Noto Hanto earthquake

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A shallow inland earthquake of M6.7 struck on the west coast of Noto Peninsula, Japan on March, 2007. Immediately after the mainshock, temporary seismic observation was deployed by members of universities and research institutes, adding to the previous seismic stations operated by NIED, JMA, Kyoto University, University of Tokyo, and Japanese University Group of the Joint Seismic Observations at Niigata-Kobe Tectonic Zone. Seismic data from such dense observation network made it possible to determine a detailed subsurface structure. Then we mapped a seismic attenuation (Q) structure in the source region of the 2007 Noto Hanto earthquake.
We applied a joint inversion method, in which the 3-dimensional attenuation structure, source effects, and site effects are deconvolved, to multiply recorded data from many microearthquakes [Tsumura et al., 2000]. Amplitude spectra were calculated by FFT for a time window of 1.0 s, beginning from the P arrivals. In this study, we used 6214 spectra data for 133 events which were recorded at 69 stations.
The results show low-Q zone in the northwestern part of the mainshock fault and high Q zone in the southeastern part beneath the western coast of the Noto Peninsula. The aftershock hypocenters are located on the plane of the boundary between high and low Q zones. The extension to the surface of this Q boundary corresponds well with the active fault (F-14). Beneath the inland area, Q distribution indicates opposite pattern from that of the western coast area; i.e., the northwestern side of the mainshock fault (footwall side) shows higher Q than that of southeastern side (hanging wall side).Q distribution pattern changed around the point (136.75E,37.25N) where aftershock activity was low just after the mainshock. Further it is reported that gravity anomalies also vary at the same region [Honda et al.,2008].In the deeper part, where another seismic activity is seen outside of the mainshock fault, Q values become low.
In conjunction with other geophysical data, these attenuation features might indicate the block-like structure beneath the Noto Peninsula.

Keywords: Noto Hanto Earthquake, inland earthquake, seismic attenuation, Q value