

Seismological investigation of deep heterogeneous structure of the Atotsugawa fault system, central Japan

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The Atotsugawa fault is one of the most active strike-slip faults in Japan, lying in the Niigata-Kobe tectonic zone. Also it is only the inland active fault in Japan that shows creep movements of 1.0-1.5 mm/y in its central part. Microseismicity is low at the shallow part, down to ~10km, below the creeping segment of the fault, while the western-adjacent locked segment is accompanied by high microseismicity. We have deployed 6 temporary seismic stations in 2001-2003 just on and around the Atotsugawa fault, in order to investigate the differences of fault-zone structure between creeping and locked segments, and also the relationships between the fault-zone structure and earthquake generating properties.

We estimated attenuation quality factors (Q_s) of S waves from frequency-domain analysis of SH waves recorded at temporary and routine stations. 2-D spatial distribution of Q_s values were obtained by averaging the Q_s values passing through respective small blocks assigned in the entire analysis area. We have estimated relatively low Q_s values (~150-200) along the Atotsugawa fault, especially low at the central part, compared with the higher Q_s (~300-400) in the surrounding area.

We observed fault-zone trapped waves at the station installed just on the creeping segment of the fault, for the earthquakes that occurred in the eastern part of the Atotsugawa fault, not for those occurring in the western part of the fault. We suppose that there exists a discontinuity of low-velocity fault-zone around the boundary of creeping and locked segments. We will also discuss the scattering intensity along the fault estimated by 3-D scattering tomography of coda waves.