In past seismic faults Strain analysis: Cretaceous Shimanto belt, Yokonami mélange

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Strain analysis by Anisotropy of Magnetic Susceptibility (AMS) is useful for understanding the relationship between past stress and deformation mechanism. In previous studies, wide-area AMS analysis in land adducts and high-density AMS analysis of IODP cores have been performed. However, there is no example of high-density AMS analysis across a fault in a land accretionary prism. Therefore, in this study, high-density AMS analysis is performed on the Goshiki-no-hama fault at the northern edge of the Cretaceous Shimanto belt and transverse wave melange.
Magnetic susceptibility is the ratio of the magnetization strength obtained when a certain external magnetic field is applied. This three-dimensional magnetic susceptibility intensity distribution can be expressed as an anisotropic ellipsoid having three components, a long axis (Kmax), a middle axis (Kint), and a short axis (Kmin). The shape parameter T and the anisotropic strength parameter P' are obtained from these three components, and the strain is evaluated together with the orientation of the three components. T shows the strain shape from cigar type to flattening in the range of -1 to +1. P is the amount of change from the initial state assuming that the magnetic susceptibility ellipsoid is spherical.
As a result of the analysis, Kmin was slightly concentrated in the NE-SW direction at a low angle, and Kmax and Kint were distributed in a girdle shape in the NW-SE direction. It can be said that this records the consolidation during deposition. Furthermore, most of the T-P' diagrams showed flatness. Looking at the relationship between the T value and the distance, it is flat outside the crush zone, and flatness and planar strain are widely present inside the crush zone.
In the crush zone, the lower the T value, the more the orientation varied. In the shatter zone, the T value drops to 0 and the P' value drops to 1. This suggests that the flat strain due to consolidation was overwritten by the cigar-shaped strain due to shear deformation. In the crush zone, a muddy substrate is fluidly sheared and deformed around the crushed particles, which is considered to contribute to overwriting the cigar-shaped strain. In addition, the fact that the orientation varied toward the cigar type means that the rotation of the particles in the crush zone was due to brittle fracture, and no ductile strain corresponding to the stress was recorded. The heterogeneous structure of the shatter zone is thought to be related to the results of such AMS. The future task is to compare the strain parameters with the deformed structure and examine whether there is a structure that supports the interpretation.

Keywords: Subduction zone, Accretionary prism, Seismic fault, Anisotropy of magnetic susceptibility

