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Slip processes in exhumed deeper fault zones of southern Hidaka metamorphic belt: an example from Shimono-sawa, Samani town area

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We present a progress on survey of exhumed deeper fault zone in the Hidaka Metamorphic belt, Hokkaido, northern Japan. This project has been jointed since 2003.

Seismogenic processes can be seen as responses of materials to seismogenic environments. A snapshot of material distribution, interconnecting structure of materials and their geometry (architecture) in a seismogenic fault zone, therefore, may serve a step to more realistic understanding of seismogenic processes.

Materials accommodating the slip along the fault zone in the lower crust are mylonites or mylonitic rocks. They constitute high-strain zones with finite thicknesses. A mylonite zone behaves as a continuum as well as a slip plane between wall rocks. From the viewpoint assuming that the mylonitic shear trigger the large intraplate earthquake generation, we should analyze deformation in the mylonite zone and its effect on surrounding environments.

Architecture of mylonite zones in tonalite (mid-tonalite) is analyzed in the Shimono-sawa creek, southern Hidaka metamorphic belt. Three mylonite zones have been shown by Obara in a route of ca. 500m in length along the creek. These mylonite zones show from ca. 40 m to 120 m in thickness and two types of spatial mode of mylonitization. Qualitative higher strain, shown by conspicuous schistosity, gradually and symmetrically decrease toward both sides in the symmetric type, and strain increase toward the structurally higher boundary between the mylonite zone and weakly deformed wall rock in the asymmetric type. One asymmetric type zone with 40 m in thickness, sheets or lenticular bodies of variously strained mylonitic rocks depict interconnected, interlaced and interlayering structure in a few centimeter to a few meter-scale. Maximum thickness of intensely mylonitized zone is 2.6m. In one of these a few meter-scale asymmetric type mylonite zones, shear sense rotation between layers is observed. Normal faulting component of sense of shear increase accompanied with strain increments. This phenomenon should be analyzed more carefully in the future. The mylonitic deformation is, at least, highly heterogeneous shown by mylonitic rock distribution.

Although we need the comparative study of mylonite zones deformed in similar environment, an example of deeper fault zone architecture is coming to light a little by little. Functions of each fault rocks at each position in the architecture during seismogenic processes and environment factors giving these functions to mylonites should be clarified.