Ductile shear train localization along a planar anisotropy in granitic rocks

Hideo Takagi[1]; Hiromichi Kano[2]; Yusuke Arai[1]

[1] Earth Sci., Waseda Univ.; [2] none

Large scale sinistral mylonite zone in the Ryoke Belt extends mainly from Chubu to Kinki regions, however, it become ambiguous and not strongly deformed to the west of Kinki Region. We have discovered strongly mylonitized granitic porphyry along the intrusion surface of dykes in the Ryoke granite in Awaji Island, and strongly mylonitized granite along quartz veins in the Ryoke granite in Teshima Island. The occurrence of these small-scale shear zones is significant to consider the mechanism of strain localization, kinematic and paleo-stress history in the Ryoke belt. We present current results of structural analyses on these small-scale shear zones.

Awaji: The small-scale mylonite zones within the granitic porphyry along the intrusion surface of dykes are distributed in the middle of island from Shio on the eastern coast to Tsushi on the western coast. The mylonite zones strikes NW subparallel to the intrusion surface, however not extend to the surrounding older granitic body. In the coast of Shio area, the shear zone core occurs along the center of the dyke. The shear sense is dextral, and aspect ratio X/Z of quartz porphyroclastic phenocryst ranges from 3 to 27.

Teshima: The small-scale mylonite zones within the Ryoke granite are distributed on the southernmost coast of the island. The shear zone strikes WNW, and dips vertically. The mylonite zones are commonly associated with quartz veins along the core, in which quartz grains are strongly recrystallized to form very-fine grained aggregate showing strong mylonitic fabrics.

The characteristics of the mylonite zones in the Awaji and Teshima islands are summarized as follows; (1) the mylonites constitute small-scale shear zones commonly less than one meter thick, (2) Shear zones are generated along an intrusion surface of dykes (Awaji) or along quartz veins (Teshima), (3) Shear sense is dextral. (1) and (2) suggest that the ductile shear strain was localized along a previously existed planar anisotropy in the granitic body. Especially in Teshima, the quartz veins are highly mylonitized and constitute core of the shear zone, suggesting the brittle fractures predates ductile shear. (3) suggests that the regional stress axes were similar in both Awaji and Teshima. Before the rotation of SW Japan in the Miocene time (15 Ma), the NW-WNW shear zones probably had a strike of E-W to ENE-WSW, and thus dextral shear on that surface were brought about the sigma-1 trending NW.