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# Block-in-matrix fabric by frictional grain-boundary sliding of the Hioki melange of Shimanto belt, Shikoku, Japan

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We report lithology, deformation structures, and clay mineral contents of the Hioki melange, which constitutes part of the youngest (late Oligocene to early Miocene) portion of the Shimanto accretionary complex, Shikoku, Japan. The Hioki melange is comprised essentially of a dark gray shaly matrix that envelops blocks and large rafts of mainly sedimentary rock. Although it is regarded as accreted within a few kilometers below the surface (e.g., Hibbard et al., 1993; Underwood et al., 1993), the deformation process of the melange still remains unclear. The deformation mechanism of the melange is essential information to understand this problem.

The lithology and deformation structures are observed using core samples and outcrops along coastline at Muroto, Kochi, Japan. The core samples were collected at two localities (HK01 and HK02) and are about 40 m length, respectively. The whole of the samples show block?in?matrix fabrics. The ratios of the blocks change irregularly between 0 to 40 %. Furthermore, some fracture zones are observed throughout the samples. Some of these fracture zones contain clay minerals. In the field, block?in?matrix fabrics are also observed throughout the study area. The size of blocks ranges from millimeter to meter scale. There were three shapes in the blocks, which are brecciated, boudinage, and layered blocks. Some blocks are injected by shale. The matrix, which is partly folded, is composed of dark gray shale and some green tuff and dark brown shale. Microscopic observation revealed that the shear displacement of the matrix has been achieved by grain boundary sliding and some pressure solution. Attitudes of bedding plane, cleavage foliation, and major axis of boudinage blocks are parallel in many cases.

Clay mineral contents were investigated by XRD analysis on 23 samples (7 samples for HK01, 5 samples for HK02, and 11 samples for outcrops) throughout the study area. The result shows that illite is the major mineral in all samples. In addition, chlorite is contained in the samples of HK02 and the northern half of outcrop, and kaolin minerals are contained in the fracture zone.

Two possible explanation are concerned for the process of the block-in-matrix fabric of the Hioki melange. One explanation is that this fabric has formed under the condition that the contrast in competence between the sand (block) and the shale (matrix) is relatively high. In this case the sand layers have consolidated and deformed by brittle failure, although the shale layers have deformed by grain boundary sliding. In this case, blocks from same layer should form a line. It is a future problem to confirm. Another explanation is that host strata of the Hioki melange have deposited as mud layer with some boulders. In this explanation, sandstone blocks may have been transported by debris flow and/or submarine landslide. On the other hand, the fracture zones have formed in the consolidated melange, which have been uplifted to shallower part of the accretionary prism.

Keywords: block-in-matrix fabric, grain boundary sliding, Shimanto belt, melange