

# Tectonic evolution of the Koshikijima islands, Kagoshima Prefecture

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The Koshikijima islands in western Kyushu contain one of the best-preserved exposures of upper Cretaceous to Paleogene sedimentary successions. These stratified sedimentary sequences also contain well-preserved deformations, and these are key of surface conditions and tectonics of the Eastern part of the Asian continental margin.

The upper Cretaceous Himenoura Group is approximately 1600m thick in this area. It consists of well-rounded conglomerate, cross-bedded sandstone, and black shale and forms coarsening-upward sequence with HCS (hummocky cross stratification) containing many upper cretaceous fossils. This group had been formed in coastal zone. The Eocene Kamikoshikijima Group is approximately 1700m thick and unconformably overlies the Himenoura Group. It consists of quartz rich cross-bedded sandstone, fine laminated greenish siltstone, and red shale, which are identified as fluvial sediment.

Two fault types are identified; 1) type1: NW-SE trending normal faults composed of thick shear zone with brittle-ductile fabric, and 2) type2: NNE-SSW trending normal faults with sharp fault planes with dip-slip slickenside. The type1 faults have 10m to more than 100m of displacement. Kanoko Fault, which is the biggest type1 fault in this area, has a 10m wide shear zone containing highly foliated shale with dip-slip lineation and asymmetric fabrics. This fault was affected by top to the northeast movement. Based on the comparison between each group stratigraphy, 600-900m displacements are estimated. K-Ar ages from clay mineral in the type1 fault gouges were analyzed in two localities. One, which is the Kanoko Fault, ranged from 14.2 to 19.5 Ma in age, and another fault, which is deeper situation in Himenoura Group, ranged from 17.9 to 21.8 Ma in age. The temperature estimation from the fluid inclusions within lineated calcite veins in Kanoko Fault shows that the veins were formed at more than 166 degrees. Type2 faults contain thin fault gouge with slickenside. These faults clearly truncate the type1 faults. The direction of type2 faults is parallel to that of the Koshikijima islands and the northeastern Okinawa trough.

Three deformations (D1, D2, D3) and three igneous activities were identified in study area; 1) D1; tilting of the Himenoura Group, 2) igneous activity, 3) D2; the formation of NW-SE trending normal faults in the NE-SW extensional stress field (22-14Ma), 4) igneous activities (14.7, 7.0Ma) and 5) D3; the formation of NNE-SSW trending normal faults in WNW-ESE extensional stress field. During early to middle Miocene in southwest Japan, regional extended stress field occurred, and D2 to D3 deformations in Koshikijima islands might correspond to the changed regional stress field.