

# Deformation structures of the Paleogene Muroto Formation exposed on the Muroto Peninsula, Kochi Prefecture, Japan

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The subduction of the Philippine Sea plate off Shikoku area has started in the early to the middle Miocene (about 23–16 Ma). However, the state of subduction zone around the area before that is still controversial, although there are several previous studies. To resolve the issue, Paleogene sedimentary succession in the Muroto Peninsula, southwest Japan is a key because its deformation structures should be reflected the plate subduction at that time. In this study, we conducted geological mapping and structural analysis of the Paleogene Muroto Formation in the Gyodo Cape.

The formation in the area is about 230 m thick, trends NE–SW, dips to the northwest at more than 60°, and is younging to northeastward. The strata were classified into seven lithology mainly based on the ratio of sandstone and mudstone and the deformation characteristics. In addition, some of these lithology show a certain sequence which is characterized mainly by the sandy mudstone layer at the bottom and the clastic injectite layer at the top. Layer shortening faults, which seem to have been originally as thrusts, are developed in the lower-middle part, and layer extension faults, which seem to have been originally as normal faults, are developed in the upper part. The shear direction based on the folds and thrusts in the sequence is parallel to the paleocurrent direction inferred from the sole marks on the bottom of the sandstone.

Total nine sequences were recognized in the study area. The individual thickness is about 1–25 m, accounting for 40% of the total layer thickness in the study area. Although part of the sequence is missing in thin layers and poorly exposed ones, the internal structures are similar. Therefore, all sequences were probably formed by the same mechanism. Clastic injectites, unconsolidated folds and drag faults indicate that these deformations occurred with the layers unconsolidated. The sandy mudstone layer of the bottom part indicates that the deformed layer was deposited by short-distance movement before grain separation. Based on the above, we considered that the sandstone dominant layers and the sequences are channel fill and mass transported deposits, respectively. Since the clastic injectites cut other deformed structures and does not straddle multiple sequences, most of them were probably formed immediately after the submarine landslide. Similar deformation characteristics are also observed in the Muroto Formation in other areas, and may be a key of the Paleogene plate reconstruction in the area.

Keywords: Shimanto Belt, Paleogene, Subduction zone, Mass transport deposit