

Tectonic Geomorphology in and around Yoron Island Based on Analysis of Topographic Anaglyphs Derived from Digital Elevation Model

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Topographic anaglyph images were viewed with red-cyan glasses, making it possible to recognize topographic relief features readily. Anaglyphs produced from digital elevation model (DEM) data are a very effective way of identifying tectonic geomorphology. This paper aims to re-examine tectonic geomorphology and to present new tectonic maps for the late Quaternary in and around the Yoron Islands, based on the interpretation of the topographic anaglyph derived from the 3-m mesh digital surface model (DSM) of inland as well as the 0.6-s to 2-s-mesh DEM of the seafloor. The DSM of inland is produced from vintage aerial photographs, and the DEM of the seafloor is processed from cloud point data of multi-beam echo-sounding devices provided by the Geological Survey of Japan as well as the Japan Agency for Marine-Earth Science and Technology.

As a result, four emerged coral reefs with the old reef crest were identified on the northeastern part of Yoron island. The old reef crests at the north are higher than those at the south along the each emerged coral reef. The northeastern part of Yoron island estimated to tilt to the south during late Quaternary. We also identified two submarine terrace surface to the northeast of Yoron island. These surfaces are deformed by the anticline whose axis is parallel to the eastern margin of the Yoron ocean basin. These features are similar to the geomorphology of reverse fault on inland.

The Miyanotsuji fault is the NNW-SSE trending left-lateral strike-slip fault across the central part of Yoron island. We recognized the small fault scarp at the north of the island cut the present coral reefs based on the analysis of DSM produced from the vintage aerial photographs. The fault scarps at the further north extension of the Miyanotsuji fault were also recognized on the sea floor of the Yoron ocean basin. These fault scarps should be formed by the strike-slip fault because of the geomorphic features such as the narrow small hills and grabens along the fault scarp.

Late Quaternary tectonic geomorphology in and around Yoron island like the NNW-SSE trending left-lateral strike-slip fault as well as the surface deformation associated with the arc-parallel anticline is estimated to be formed under E-W to WNW-ESE trending compressive stress field. This stress field would be related to the subduction of the Philippine Sea plate beneath Eurasian plate along the Nanseiyo trench.

Keywords: topographic anaglyph, tectonic geomorphology, emerged coral reef, Yoron island, Digital Elevation Model (DEM)