

Active shallow structures of the Nankai forearc region off Hyuga

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Active deformation structures have been well investigated by swath bathymetry survey, submersible dive, MCS survey and deepsea drilling in the Nankai subduction zone. However, few studies have focused on the structure off Hyuga, the western tip of the Nankai Trough, due to limited research activity. The general trend of the Nankai accretionary prism is NE-SW to ENE-WSW from off Tokai to off Ashizuri. In contrast, the trend of the forearc basin and the prism slope off Hyuga is NNE-SSW, which is the same trend as the Ryukyu trench. The Hyuga basin located between the Ashizuri spur and the Kyushu-Palau Ridge apparently shows no distinct trenchward limit such as the outer ridges observed at the other regions of the Nankai margin. Our objective of this study is to obtain high resolution subsurface structures of the Hyuga forearc region and to evaluate recent tectonic activity.

We carried out deep-towed subbottom profiler (SBP) survey by ROV NSS (Navigable Sampling System) during R/V Hakuho-maru KH-15-2 cruise. High resolution profiling was successfully conducted by a chirp system of EdgeTech DW-106. The first target is the NNE-SSW trending Oyodo Knoll developed eastward of the Hyuga basin. The SBP shows the almost symmetrical ridge morphology cut by active flexures on both sides suggesting compressional deformation. Although faults are not detected at the surface sequence at least down to 60 meter except for two minor reverse faults, sediment thickness changes across the flexures indicate continuous deformation to the present. The second target is the western margin of the Hyuga basin where steep slopes suggestive of fault control are distributed from north to south. Two transects of SBP surveys are conducted at the southern and central regions of the western margin. SBP records of both transects show active flexures with relative landward uplift. The southern site is characterized by a V-shaped depression landward of the flexure and its sediment fill indicative of transtensional deformation. The central site also shows undulation of basin sedimentary layers landward of the flexure suggesting strike slip deformation. Our high-resolution subbottom profiles of the Hyuga forearc region revealed that the topographic framework have been formed by ongoing active deformations under high sedimentation rate.

Keywords: subbottom profiler, active flexure, active fault