

## High resolution subbottom survey of submarine landslides on the western slope of Daini-Atsumi Knoll

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Submarine landslide is regarded as one of the significant marine geohazards because it causes tsunami destructive to coastal area when the scale is large. Although most landslides are small in the Nankai Trough area, a relatively large landslide stretching about 7 km east to west and 10 km north to south is developed in the Daini-Atsumi Knoll. Because the seismic reflection profile crossing this landslide exhibits large depth differences between methane hydrate BSRs and the landslide body, possibility of landslide along the base of methane hydrate zone is denied (Nagakubo et al., 2009, Chigaku Zasshi). Deep-towed subbottom profiler (SBP) survey using ROV NSS successfully obtained high resolution sedimentary and deformation structures of the shallow part of the landslide during the R/V Hakuho-maru cruise KH-15-2.

The landslide of this study exhibits a horseshoe-shape facing west at the western slope of the Daini-Atsumi Knoll. One SBP survey line crosses this landslide in an east-west direction. Large scarps are developed at water depth from 1240 to 1440 m with a fall of 200 m and from 1580 to 1710 m with a fall of 130 m. Normal faults are distributed at the upper slopes of these large scarps suggesting extensional deformation. In contrast, gentle undulations developed at the lower slopes of the scarps suffer from compressional deformation due to downward movements of landslide bodies. There are, moreover, acoustically transparent features subvertically intruded from the lower layers. Similar structures are reported from the northwestern slope of the knoll 7 km west of our survey area and interpreted as sliding blocks under the cover sequence (Shimura et al., 2016; Suzuki et al., 2016, JpGU abstract). Sliding blocks are also found below the thin cover sequences in the downstream region although any deposit derived from landslide is not recognized on the Anoriguchi canyon floor located at the distal part of the landslide. We concluded that the landslide occurred recently because there is no thick sedimentary sequence covering the undulations due to compressional deformations and landslide blocks.

Keywords: deep-tow subbottom profiler, landslide, Nankai Trough, outer ridge