The features of submarine landslides on northwest slope of Daini-Atsumi Knoll, and its cover sediments.

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Daini-Atsumi knoll is placed near northeast Nankai trough, where is 60km distance from Daioh-zaki at Shima peninsula of Mie prefecture, and 80km distance from Atsumi-peninsula of Aichi prefecture. The knoll is one of outer rises that were formed by subduction of Philippine sea plate, which is on Eurasia plate. We, JOGMEC, had been carried out detailed survey using Autonomous Underwater Vehicle (AUV), to obtain geological information of surface sediments, and to make high resolution-bathymetry map of northwest slope on Daini-Atsumi knoll. The AUV has a unique feature of positioning system using Ultra Short Base Line (USBL) combined with Global Positioning System (GPS) of ship. Therefore, after the survey and analysis, we have obtained high-resolution bathymetry map and information of sediments with their deformation structures from sub bottom profiler (SBP).
On the basis of the analysis, we divided northwest slope as three areas according to their features as following; i.e., (1)erosional area near the knoll top, (2)landslide area on northwest slope, and (3)re-depositional area at deeper part of northwest slope. The first area has strong reflector on SBP records would be interpreted as consolidated base sediments. The second area showed many structural features as like as steps and mounds formed by gravitational and tectonic stresses. The third area was described as layered sediments. In some area, acoustic blanking layers that showed intruded shape into upper layers were laid in the layered sediments, and more acoustic translucent layers covered them. These SBP features could be explained by the layered sediments upon the acoustic blanking layer were deposited after the submarine landslide had occurred, as re-depositional sediments. As the setting of the knoll, these clastic fragments could be supplied from upper slope regions around area(1) and area(2).
We would like to present these structures and features on northwest slope of Daini-Atsumi knoll, and consider its stability of sediments.

Keywords: submarine landslide, acoustical blanking, Daini-Atsumi Knoll

Pore-size zonation of submarine landslide sediments of Northwest slope on Daini-Atsumi knoll near Northeast Nankai Trough; on the basis of AUV survey data, 3D seismic data, and LWD logging data

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We, JOGMEC, had been carried out detailed survey using Autonomous Underwater Vehicle (AUV), to obtain geological information of surface sediments, and to make high resolution-bathymetry map of northwest slope on Daini-Atsumi knoll. We had found several liner structures that could be interpreted as faults on the high resolution-bathymetry map. However, we could not distinguish their continuity with depth from sub bottom profiler (SBP) records of AUV. Thus, we carried out analysis of the result with combining to three-dimensional seismic data, which contained information of tectonic structures in deeper depth, and we finally found several faults indicated as liner structures placed on eastern side of study area. Then, we found that acoustic blanking layer and acoustic translucent layer observed on SBP records were corresponded with two surface sediments, which were distinguished with remarkable differences of T2 distributions of NMR logging data. Moreover, depth of anomalies of T2 distributions were corresponded with deformation structures depth observed on resistivity image. Hence, we could obtain porosity (density) and pore-size distribution of deformation zones, which were useful to estimate permeability. We will report these data to describe features of the submarine-landslide sediments.

Keywords: Submarine landslide, AUV, 3D seismic survey, Sub Bottom Profiler, NMR logging data

Porosity and permeability changes due to shear zone development in sandy sediment -Evaluation of reservoirs and submarine landslides-

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As a part of a Japanese National hydrate research program (MH21, funded by METI), we performed a study of porosity and permeability changes due to shear zone development in sandy sediment. It is key factor to investigate the characteristics of fault and slip surface in seafloor for the evaluation of gas/oil reservoir and landslide. In this study, to reveal the relationship shear zone development and porosity/permeability change in sand, the shear and permeability tests under constant normal stress were carried out by ring-shear device, and microstructures and grain size analyses were conducted in the samples taken from the shear zone of the specimens after shearing tests. The permeability and porosity after shearing decreased with increasing effective normal stress values in the range of 0.5-8.0 MPa and stress dependency of permeability and porosity was clearly found. On the other hands, the change of permeability and porosity during shear at the effective normal stress of 8.0 MPa was investigated. The permeability and porosity drastically decrease with increasing shear displacement. And the examinations of shear rate effect on permeability at 8.0 MPa were conducted by 2-20 mm/min. The shear rate effect was not significant at tested shear rate range. These are reflected by the porosity reduction, pore size distribution and grain size reduction due to grain crushing in a localized shear zone.

Keywords: Shear zone, Porosity, Permeability, Pore size distribution, Sandy layer, Ring-shear test

Magnetic fabrics in the mass transport deposits in the Nankai Trough

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We review the results of magnetic fabric analysis in the sediments recovered in the Nankai subduction margin off the Kii Peninsula, Japan using the anisotropy of magnetic susceptibility measurements. Samples were taken from the cores at IODP Sites C0011 and C0012 recovered during IODP Expeditions 322 and 333, which retrieved sediments from the seafloor to just above the basalts. The samples exhibit different behavior from those expected for undeformed deep-sea sediments. The degree of anisotropy of the magnetic ellipsoids is small and constant from the surface down to ~250 and ~80 mbsf at Sites C0011 and C0012, respectively. The flattening parameter F start increasing with depth in Unit II indicating flattening in the lower units. A zone of anomalously constant porosity is noted in the upper portion of the sites. These observations suggest that compaction is obstructed in the shallow sediments. This supposedly rigid sediment interval may influence the initiation of deformation when the sediments reach the deformation front. Such pre-existing heterogeneity may be one constraint on the deformation along the plate boundary from the trench through the seismogenic zone.

Keywords: mass transport deposits (MTD), anisotropy of magnetic susceptibility, accretionary prism

