

## Marine environmental survey on Nankai Trough

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The Marine Environment Survey and Assessment Subgroup analyzed marine environmental properties of the Nankai Trough based on the existing literature and observational data obtained from the marine environmental survey that was conducted from FY2003 to FY2007.

Among results that were obtained from the previous surveys and studies, the main aspects of various characteristics of the marine environment in the study area are summarized in the following.

Topography of seabed and oceanographic structure; 1) Topography of the seabed in the study area is extremely complicated: off the Tokai coast and Daini-Atsumi Knoll, it is very uneven, but the Sea of Kumano is characterized by a vast and flat basin. It is suggested that the complexity of the seabed off the Tokai coast has a great influence on the current field. Therefore, consideration of seabed topography is essential in a hydrodynamic model used to analyze the behavior of various substances in the water column. 2) The oceanographic structure of the study area is composed of four types of water mass: coastal water, Kuroshio Current water, sub arctic water, and Pacific Ocean deep water. In addition, the Kuroshio Current has a great influence on shallow sites off the Tokai Coast.

Chemical constituents in the water column and their flux; 1) Dissolved methane concentrations in the water mass of the study area is 0.1-10 nmol. The amount of nutrients and primary production levels are low on the whole reflecting the oligotrophic characteristics of the open sea. 2) Flux of sinking particles to the seabed was recognized to have a distinct seasonal variation. This temporal change in flux was considered highly dependent on the seasonal variation in primary production at the surface layer.

Surface sediment deposition effects on the seabed and benthic ecosystem; 1) The property of sediments around the knoll in shallower areas is dominated by sand, but in deep water areas, it becomes dominated by soft-mud or silt. 2) The structure of the benthic ecosystem onsite varies according to the sediment properties. Benthic organisms appeared within a 7 cm depth of the sediment. Therefore, disturbance of sediments could greatly impact the benthic community, even if the depth range of the disturbance is very shallow.

This information is important and valuable to the marine environmental impact assessment on the activities associated with future methane hydrate development. However, because of the complexity of seabed topography, more detailed analysis is required on the current field, and more observations are necessary on the onsite current at the benthic boundary layer as well as on the seabed topography. Though environmental concentrations of dissolved methane in the water column were measured, and dissolved methane that was considered to be released from seafloor was detected, the process of these methane distributions in ambient water is still unknown. Furthermore, in order to pre-evaluate the offshore methane hydrate production test that is planned to be conducted with lower impact to the marine environment in phase2, more detailed marine environmental information around the FY2003 MH exploration drilling area such as the T site (off the Tokai coast) and A site (Daini-Atsumi Knoll) should be obtained. This information is also essential to analyze the behavior of environmental factors such as water released into the aquatic environment when methane hydrate dissociates and gas plumes from deep ocean during production.