Overview of the Research Activities by the Marine Environment Survey and Assessment Subgroup for MH21 project

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Introduction

Recently development of cheaper and cleaner energy sources has become a more important and urgent issue, because of the soaring crude oil price and environmental problems such as global warming. In this social context, to establish basic technologies and solve fundamental issues associated with environmental impact assessments, the Environmental Impact Assessment Group of the MH21consortium has conducted a number of research and development activities since FY2001. These activities include: 1) surveys of the marine environment that will form the basis of environmental impact assessments associated with methane hydrate development; 2) the development of core technologies to monitor deep-sea environments; 3)research of major issues related to environmental impact assessments; and 4) the development of numerical models to predict the deformation of seafloor sediments containing methane hydrates.

Marine Environment Survey and Assessment subgroups activities

To identify the characteristics of the marine environment around the East Nankai Trough including the FY2003 MH exploration drilling sites in the Sea of Kumano, off the Tokai coast, we analyzed various marine environmental properties based on the existing literature and observational data obtained from the marine environment survey that was conducted from FY2003 to FY2007. For two sites in particular, site T(off the Tokai coast) and site A (Daini-Atsumi Knoll) where full core samples were collected among the FY2003 MH exploration drilling sites, we colleted and analyzed data on the sediment properties, pelagic and benthic organisms and their biomass, and the concentrations of dissolved methane. We also summarized all of this information with the acquired seafloor topography and geological structure at this deep area.

Before developing a methane hydrate resource, it is important in the environmental impact assessment process to predict and evaluate the potential effect of leaked methane to the marine environment. For this reason, we have started to examine the methodology available to predict and assess this impact. We examined numerical models that are considered effective at predicting and evaluating the behaviors of methane in the aquatic environment. In order to further develop these models, the model parameter and observation data were required to the model refine and validation of the model results. Data on the methane flux and the environmental factors involved in the phase changes of methane (dissolved oxygen, hydrogen sulfide, and water temperature) at the benthic boundary layer are essential. Therefore, we prepared equipment to measure the in situ methane flux in the marine environment.

As for the development of simulation model which predict the environmental impacts of the discharged water during methane hydrate dissociation, based on the existing literature and the surveyed results, the prototype physical model were established to assess the diffusion process of the water which released from the seabed or water column. By using this physical model, researchers can execute trial simulations considering seafloor topography and analyze the onsite marine environment properties. We managed the information obtained from these surveys and studies by constructing a database with storage to server.

At the same time, we processed the data collected in FY2003 and FY2007 and programmed a web application for a web site that was started FY2005 by Marine Environment Survey and Assessment Subgroup so that members of the subgroup could share the information.