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Status Report on Deep Sea Drilling Vessel *"CHIKYU"* -Design and SIT Operation-

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ABSTRACT

JAMSTEC developed the deep sea scientific drilling vessel *CHIKYU* to drill the sea floor, recover core samples, and analyze these on board to obtain important scientific information.. The most important of these information, previously targeted by Integrated Ocean Drilling Program (IODP), includes the studies of deep biosphere, environmental change, and solid earth cycle. *CHIKYU* was delivered to JAMSTEC in July 2005 and the shakedown, training, System Integration Tests (SITs) were initiated shortly thereafter. JAMSTEC will start the scientific drilling operation for IODP beginning in September 2007. The first site for drilling is planned at the Nankai Trough where the subduction plate boundary was the source of many great earthquakes repeatedly. This paper describes basic characteristics of *CHIKYU* and the planned functions, summarizes soon to be completed SIT results and lists the planned technological enhancements for *CHIKYU*.

KEY WORDS: deep sea scientific drilling vessel; IODP; *CHIKYU*; SIT; NanTroSEIZE

INTRODUCTION

The original concept for scientific ocean drilling was born at one academic association breakfast from a casual remark made by Prof. Walter Munk of Scripps Institution of Oceanography. He mentioned that if the attending members were willing to drill into shallow oceanic crust of some 4 km, they would be able to get core samples from earth's mantle. Professor Munk's remark was taken a step further at the first International Oceanographic Congress in 1959. During the conference Roger Revelle announced the Mohole Project, a plan for the world's first deep sea drilling operation to penetrate through the Moholovicic Discontinuity in the Eastern Pacific Ocean. They prepared a 3,000 tons class vessel, CUSSI, modified the vessel and equipped it with the drilling equipments, and drilled to a penetration of 171 m sediments and 6 m basalt at the 3,560 m water depth. However, the full Mohole project objectives were not achieved until another research idea of the paleo-environment utilizing ocean drilling operation and the implementation of the next Deep Sea Drilling Project (DSDP) with a 10,000 tons class vessel, Glomar Challenger in 1968. One of the great achievements of DSDP through 96 expeditions was to recover the evidences to prove the plate tectonics theory.

Fig. 1. *CHIKYU*

In 1985, the United States started the new Ocean Drilling Program (ODP) funded by the U.S. and 22 international partners. ODP planned to conduct 111 expeditions for the basic research into the history of the ocean basins and the overall nature of the crust beneath the ocean floor using the scientific drilling vessel JOIDES Resolution. This vessel (143 m long, 21 m wide) achieved a record penetration of 2,111 m beneath the sea floor. In parallel to ODP, Japan started to investigate another scientific plan named as OD21 (Ocean Drilling in the 21st century) for far deeper penetration beyond the ability of JOIDES Resolution. To achieve the OD21 objectives, it was decided that a new drilling vessel equipped with the mud circulation system utilized in drilling for oil exploration had to be developed. As a result, the basic design of this vessel became the most advanced and efficient scientific ocean drilling vessel in the world. This basic design incorporated various recommendations and requirements obtained through