

Deep Sea Research Activities of JAMSTEC

Hajimu Kinoshita
Director, Deep Sea Research Department
JAMSTEC

On behalf of Deep Sea Research group of JAMSTEC, I am pleased to tell all the participants to this symposium followed by a small size Workshop that our science meeting is starting quite in a good shape. I apologize, however, that there is a number of small discrepancy and incoherence in number of things in formalizing this meeting. One of our malfunction is that we did not distribute our announcement of this meeting wide enough to cover every corner of the world. Some of foreign groups complain that they should have known this occasion much earlier and in detail. We, JAMSTEC, should be much more careful to handle our logistics in our future international meeting.

Now I am going to describe the present activities of our Deep Sea Research Department from a little bit wider aspect of geoscience frame.

The development of the seafaring projects from 1980s to the present has been promoted by a number of interdisciplinary thematic programs. The International Lithosphere Program (ILP) under International Commission of the Lithosphere Program (ICL) was run from 1985 through 1991. Its initiatives had provided an incentive to raise a number of international program since then, such as multinational InterRidge Program and several other scientific activities. Study of the Earth's Deep Interior (SEDI) under the auspices of International Union of Geodesy and Geophysics (IUGG) has been run primarily to study the dynamics of the interior of the earth and the origin of geomagnetism. The Ocean Drilling Program (ODP) to which Japan makes a significant contribution, has been and still is a most active program in multidisciplinary geosciences. Pacific Orient Seismic Digital Observatory Network (POSEIDON) for a global seismology was initialized early in 1990's. This program proposes a large scale deployment of the global seismic networks in and around the western part of the Pacific.

Recently in 1995, Japanese legislature started re-focusing the national interest in the earthquake prediction program and asks our scientific communities to reform its strategies soon after the Awaji-Hyogo (Kobe) tremor of 1995 January. The former Earthquake Prediction Program under the auspices of Geodesy Council of Japan is being put under a critical review. It is publicly understood that the former scheme of this program has to be modified to a large extent. One of the main concerns of our nation is to extend its seismic and geodetic studies further into sea waters. The seagoing program has to be activated with the least amount of time delay due to the fact that Japanese islands are entirely encircled by a number of convergent margins where number of big hazardous earthquakes and tsunamis occurred.

International Lithosphere Program was run under Japanese project name DELP (Dynamics and Evolution of Lithosphere Program) from 1985 to 1991 officially funded by Monbusho. The program was extended voluntarily until present and helped us to send number of large scientific cruises to various part of the western Pacific. Deep seismic structure of the Pacific Plate, dynamics of convergent margins, formation of the backarc basins are the main themes of the ILP. We visited NW Pacific, Trench-trench-trench Triple Junction, Japan Sea in cooperation with Russia, Okinawa backarc basin, South China Sea in cooperation with Peoples Republic of China, and Ogasawara region.

InterRidge initiatives were planned and staged by tremendous efforts of US scientists, such as John Delaney. Japanese initiative on this theme was initialized in 1993 under the title Ridge Flux. JAMSTEC joins the program from early stage of Ridge Flux, by sending subs and research vessels in cooperation with other institutions. We sent out our fleet to the southern part of the Pacific (number of basins), East Pacific Rise, and Mid-

Atlantic Ridge and fracture zones in cooperation with Woods Hole Oceanographic Institution. Some of the geothermal measuring tools were newly devised and successfully deployed and recovered during our mission.

Northern and southern part of the Philippine Sea Plate are frequently visited by our subs and collect a large volume of geological and biological data. Most of the cruises in this area are conducted by JAMSTEC scientists. Specifically the visits of Ogasawara, Yap, Palau and Central Basin Fault (our preference to put it: Southern Cross cruises, though officially not approved yet) have accumulated a indispensable data-set for elucidation on the formation and evolution of these tectonic units.

Earthquake Potentiality Evaluation Program (EPEP)

The new direction of the earthquake and tsunami hazard prevention program, in general, is reviewed and re-considered by Seismology Research Division of STA. Number of institutions such as National Research Institute for Earth Science and Disaster Prevention (NIED) and Geological Survey of Japan (GSJ) are the leading part of this program. STA has established a New Earthquake Frontier Initiative to promote further this program. As to JAMSTEC, we have organized EPEP with ten researchers from October this year.

Seafaring part of EPEP consists of three themes, i.e.,

1 Deep seismic structure in the convergent margin

2 Long-term monitoring of crustal environment
and

3 Simulation studies on the stress accumulation and deformation of the

Japanese land-mass.

In terms of developing the first part of these themes, we have just started collaborating with number of experienced institution to build anew version of Ocean Bottom Seismographs (OBS) by collecting every best part of the individual instruments. This way we are going to have a stable and easy-to-handle and accurate OBS to challenge convergent margin initiative.

For the long-term observation of seafloor tectonic and seismic variation, we already have an advanced tool, i.e., cable-connected ocean bottom seimological stations (COBOSS). Deployment of COBOSS had started long before, first by Japan Meteorological Agency (1978) to the south and to the east of Kanto plain. Since then University of Tokyo deployed two sets, NIED deployed 1 set, and JAMSTEC has 1 set working and another one being deployed to the south of Shikoku.

Another type of ocean bottom coaxial conductor cable systems retired from commercial service are donated to university groups from number of telecommunication companies. They compose a part of global seismic and environmental observation systems (VENUS and Geo-TOC programs). If number of downhole instruments in ODP holes are connected to these cables, they will send us a bunch of invaluable data from remote ocean areas back to land stations.

The third item of the program has to be performed specifically in tight coordination with a large group of institutions to collect data, to resort data-set, to build a new type of simulation software and then to start actual simulation business.

New facilities for seagoing programs of JAMSTEC

In addition to two subs (2K, 6.5K), one ROV(3K) and their surface mother ships, we are going to have two of newly built surface ships. One of them, KAIREI, carries swath system, 120-channel MCS, ROV 10K with other necessary geophysical tools. The volume of this ship is similar to YOKOSUKA home to Shinkai 6500. Another one is a conversion of an experimental vessel for development of nuke engines. The nuke engines were removed to replace with ordinarily diesel powered motor to meet scientific purposes. Her water displacement is 8600 tons and she is capable of achieving her cruise in polar regions.

Her main purpose is to do number of businesses of physical oceanography but about 1/5 of her ship time will be released for solid earth science community. One of the advantages to use this vessel is, for example, to do some pre-site survey in high latitude for future ODP drilling.

OD21

STA and JAMSTEC are proposing in concert to establish ocean drilling program in 21st century. Originally this proposal had been discussed in isolated atmosphere within Japan. There seems to grow a national consensus that we are to work on it with close coordination with MONBUSHO and Ocean Research Institute, University of Tokyo (ORI). The point of this program is to build first a drill ship armored with 16-inch petroleum production riser 2500 meter long. Drill strings can be extendible as long as to 11000 meters. The new region and theme we can challenge with this tool are:

1 Drill into continental shelf of high sedimentation rate where some hydrocarbon potentiality will be met (super-high resolution paleo-environment and sea level change).

2 Drill into unstable formations such as plate convergent front and layer 2/3 boundary (seismic nucleation and nature of oceanic crust).

3 Reach for mantle (nature and substance of the mantle).

We need to have an international recognition of our program through number of occasions. Not to mention a close relation with on-going ODP, continental drilling groups, earthquake hazard prevention program and methane hydrate program is inevitable. We have had two international conferences only this year in terms of its development. In February, we called number of funding agencies from US, ES and Japan to make our basic idea all clear to them. Engineering Workshop on Drilling and Riser capability and their designing was held in October with a certain success. It is mostly important that we have an international science workshop in terms of thematic and technological foundation of OD21. We have obtained an agreement from JOIDES, ODP, that we can go ahead to organize a truly international congress, CONFERENCE on Concerted Ocean Riser Drilling (CONCORD) late in July next year in Tokyo. Co-chairs of the conference are Prof. H. C. Larsen, Denmark and Prof. I. Kushiro, Japan who may be well familiar to most of you.

Now in conclusion, I believe that our present symposium is quite important for promoting not only Japanese seagoing programs but also for furthering international pure and environmental sciences based on ocean floor surveys. In this respect we JAMSTEC researchers are determined to educate ourselves through number of occasions with a good deal of assistance from our colleagues.