SAMUDRIKA

NIOT Online News Letter

November 2011

Volume 1 Issue 1

Inside.....

Dr. R. Chidambaram graces 18th NIOT Foundation day

National Institute of Ocean Technology (NIOT) celebrated 18th Foundation day on 4th November 2011 in the august presence of Dr. R. Chidambaram, Principal Scientific Advisor to Prime Minister, Government of India. Dr. Chidambaram inspired the NIOTians with his foundation day lecture on "Sustainable Development and Energy Security". He released the inaugural issue of NIOT quarterly online News Letter SAMUDRIKA. The National Competition on Student Autonomous underwater Vehicle (SAVe) for the year 2012 was announced by the chief guest. Dr. Chidambaram also presented the NIOT awards for exemplary services to the selected employees and distributed prizes to the winners of various competitions

Foundation Lecture "Sustainable Development and Energy Security".

From the deep: Message from the Director

NIOT is no more an eager teenager set out to establish its name in the field of Ocean Technology. With the support of Ministry of Earth Sciences, NIOT has matured into an Institute with a reputation. A reputation that is to be zealously maintained. It is very apt that an inspirational personality like Dr. Chidambaram has been with us on this occasion.

It is the last phase of the 11th five year plan. No doubt it is an occasion to celebrate our successes which are not small in number. But it is also true that some objectives are still yet to be achieved and there are still a few more commitments to be honored. In short it is the time for the introspection and planning. The ambitious proposals for the 12th plan are being prepared. Our past successes raised the bar for us.

Let us not rest on our laurels. At the same time let us not be burdened by the expectations either. Let us work with knowledge and courage tempered with realism

I congratulate the members of the NIOT family on the occasion of the foundation day and wish them the best for the future.

I thank Dr. R.Chidambaram for releasing the first issue of NIOT newsletter.

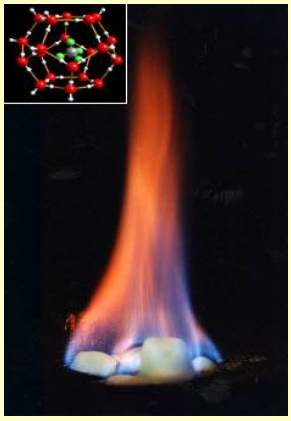
Hope to see more in the coming issues.

Dr. M. A. Atmanand

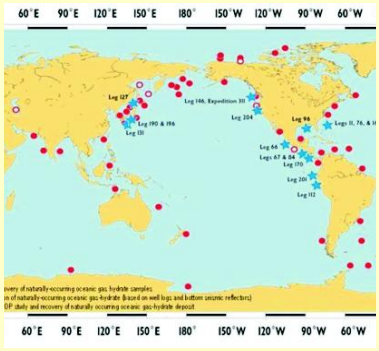
National Competition on Student Autonomous underwater Vehicle (SAVe) for 2012 announced

Gas Hydrates: Future Energy Resource?

Fire in the Ice. Is it usable resource?



Source : USGS



Global occurrences of gas-hydrates (after Kvenvolden and Lorenson, 2000)

Gas hydrates (also known as clathrates, methane hydrates or hydrates) are naturally occurring solids comprise of water molecules forming rigid lattice of cages containing a molecule of natural gas. Gas hydrates occurs under particular thermo baric condition (<4° C and 8 to 20 MPa) and each cubic volume of solid gas hydrate contains 168 cubic volume of gas (90% methane). The world-wide carbon in gas-hydrates is estimated to be 10,000 $X10^{15}$ g, which is double the carbon content in total fossil fuel (crude oil, natural gas and coal) reserves of the world (Kvenvolden, 1998). India is spending about Rs. 100,000 crores every year towards the import-bill of oil. To meet this burgeoning demand of energy, efforts are on to look for an alternative form of energy. In this direction, gas-hydrates are emerging as a viable source of energy because of their probable existence in the vast areas of Indian offshore and potential as cleanest fuel. But, globally no field proven technology is available at present for exploitation gas hydrates from oceanic sediments.

Where do they occur

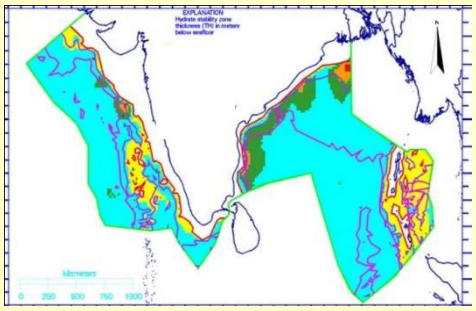
Unlike conventional natural gas, the methane in gas hydrates is largely the result of anaerobic bacteria acting on organic matter in the sediments below the sea floor. In areas of where the sedimentation rate and organic content are high, the environment becomes anoxic (deficient in oxygen) at shallow sediment depths and anaerobic bacteria acting on organic matter generate methane. In certain of these environments, low temperature and high pressure act in concert to create the frozen hydrates. Gas hydrates occur naturally where combinations of temperature and pressure favour the stability of gas hydrate over a gas-water mixture. Gas hydrates are stable in two settings; one, in very cold regions, such as in the Canadian north, where temperatures at the surface of the earth are low enough that gas hydrates are stable to a depth of about one kilometre, and two, at the bottom of the sea, where the water temperature is above freezing but the pressure of the overlying water column creates conditions where gas hydrates are stable.

How to explore

Natural gas hydrates is metastable and affected by changes in pressure and temperature makes its observation and study difficult under laboratory conditions. Geographical extent of hydrate deposits are explored using single and multi channel seismic method. Effect of methane flux through sea bed can be identified using side scan sonar. The strong impedance contrast reflector at the base of the layer – the bottom simulating reflector or BSR – is normally seen where free methane is present beneath the hydrate. Logging While Drilling (LWD) with insitu probes gives fair idea on gas hydrate presence in sub- sea floor sediments. Sulphide – Methane interface study in vertical profile of a sediment core gives an indication of gas hydrate presence. Sine the exploration is in deep waters and all the techniques mentioned are indirect geophysical techniques narrow down to a potential region and quantity estimates are still a puzzle.

Can they be harvested?

Even though gas hydrates are known to occur in numerous marine and Arctic settings, little is known about the technology necessary to produce gas hydrate. Most of the studies carried out for resource assessment doesn't talk about the recoverability of gas hydrate. Since hydrates are in solid form and occurs in continental margin sediments existing technologies on petroleum and natural gas cannot be applied. Exploitation technology has to take care of over-burden collapse and continuous dissociation of hydrates either by changing the pressure or temperature. Discussion is also in progress to replace methane from the clathrate with suitable gas. Third world countries like which are in demand of crude oil such as Japan, Korea, China, India are investing more energy on gas hydrate research to find suitable technology. Most of the studies at present are concentrating on exploration strategies and quantity estimate. Studies are carried out in the direction of associated sea bed characteristics, ecological disturbances etc. With the present day global scenario the question of exploitation of gas hydrates is difficult to answer. Constant efforts are needed and technological breakthrough for exploitation in sustainable way.



Expected regions of gas hydrates in Indian margins

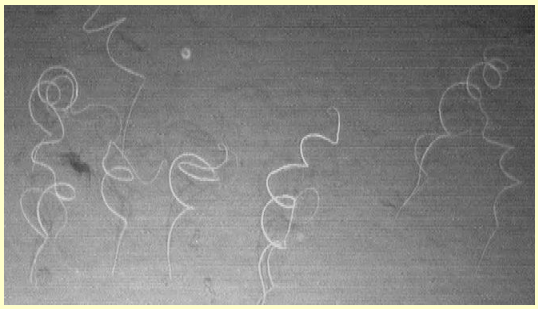
Indian Scenario

In India National Gas Hydrate Program under the aegis of Ministry of Petroleum and Natural Gas is involved in gas hydrate research with the support of oil industries such as ONGC, OIL, GAIL, Reliance etc. NGHP had chartered JOIDES resolution research vessel and drilled at Arabian Sea, Bay of Bengal and Andaman region and recovered gas hydrates from KG basin and Andaman region.

National Institute of Ocean Technology under the aegis of Ministry of earth Sciences involved in Gas Hydrate program on exploration strategy with the support of NIO, Goa and NGRI, Hyderabad. NIOT is involved development of technology for the exploration of gas hydrates. For the given mandate NIOT had developed Support Submersible 2500 (ROV) with suitable scientific sensor and Coring system for ground truth validation of hydrate occurrences.

Krishna – Godavari basin and Mahanadi basin region are the initial target region for the exploration studies. NGHP expedition had proved occurrence of gas hydrates at a depth of 1035 m water depth and 40 m below sea floor. From 40 m to 160 m hydrates presence are recorded and it occurs in fractured clays. ROV expedition at gas hydrate site of KG basin by NIOT brought out chemosynthetic habitats presence with deep sea animals. NIO, Goa based on the results on geological, geochemical and seismic observation brought out basin model of KG basin. NGRI had established geophysical modeling techniques for indirect identification and quantification of gas hydrates.

A total volume of 1894 TCM of gas has been predicted from gas-hydrates reserves within the Indian exclusive economic zone EEZ (http:// www.dghindia.org), which is 1,900 times the country's current gas reserve.



Seabed organisms at gas hydrate site in Bay of Bengal (ROV photograph)

Tidings- Happenings at NIOT

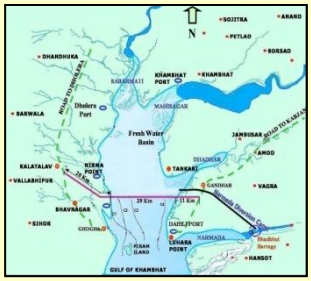
Soil Tester trials at CIOB

Deep Sea Mining Group successfully deployed and tested Remotely Operable In-situ Soil Tester at a depth of 5462 metres depth in the Central Indian Ocean Basin on board NIOT Technology Demonstration Vessel 'Sagar Nidhi during October 2011.

Establishment of Agatti Desalination Plant

NIOT Desalination Plant at Kavaratti, established in May, 2005, has been generating fresh water continuously for the people of Kavaratti. Based on performance plant, UT Lakshadweep administration approached NIOT to set-up similar plants in the rest of the 8 islands. Minicoy plant Plant was inaugurated by Honorable Minister for Science & Technology, Earth Sciences and Parliamentary Affairs Shri.Pawan Kumar Bansal on 22nd of April 2011 and has been working successfully. The Plant in Agatti is operational and will be inaugurated shortly.

Geo-Engineering investigation for Kalapsar



Kalpasar project involves construction of a dam across the Gulf of Khambhat to create a fresh water reservoir in the upstream regions by storing the waters from the rivers Narmada, Mahi, Sabarmati and Dhadar. Kalpasar Prabhag department of Gujarat Govt. has selected Coastal and Environmental Engineering group of National Institute of Ocean Technology (NIOT) as a nodal agency and technical consultant for the Kalpasar Project. NIOT has partially completed the engineering investigations and is in the process of numerical simulation studies for hydrodynamic and sedimentation pattern in the gulf.

Testing of indigenous Drifter Buoys

Ocean Electronics group of NIOT has developed indigenous drifter buoys. The special feature of the buoy is the communication through INSAT. Drifter buoy was deployed off Chennai coast and the performance was found to be satisfactory. Temperature profile observed by drifter is comparable to that of standard mesurementsTrial production in on for the long term deployment.

National Competition on Student Autonomous underwater Vehicle (SAVe)

The team of Students of Indian Institute of Technology Kharagpur from Mechanical, Electrical, Electronics and Ocean Engineering departments won the national Student's Autonomous Underwater Vehicle (SAVe) competition in India in June 2011 after passing 3 stages of the competition from a initial set of 150 teams to a final round of 5 teams. They represented the country with the sponsorship from NIOT for the first time at the 14th Robosub competition of the Association of Unmanned Vehicle Systems International at San Diego, USA this July 2011. The efforts and the vehicle design attracted attention in terms of its streamlined shape and manufacturing efforts and scored well for a team participating for the first time at international level.

Open Sea Cage Culture

Marine Bio Technology group of NIOT fabricated and deployed 9m dia HDPE cages at Kothachathram off Andhra pradesh coast and seabass seeds were stocked. The harvested Sea bass after 110 days of culture period, yielded 263g average growth from its 14g stocking weight.

Trials of Autonomous Coring System

Deep Sea Trials of ACS were conducted on board Sagar Nidhi off Chennai coast. Winch with enhanced capacity, new umbilical cable and termination were successfully tested. Efforts are on to solve the hydraulic problems encountered

OMNI Buoy Network

The Ocean Moored buoy Network for Indian monsoon called OMNI buoy system with suite of sub surface sensors up to 500m depth with additional meteorological sensors are deployed in Bay of Bengal and are transmitting real-time hourly mode through INMARSAT to NIOT data reception centre. These systems were ordered from M/s.Fugro Oceanor AS, Norway These buoys which were established before the onset of North-East Monsoon could capture JAL cyclone with the onset of low pressure and its effects of atmosphere and ocean, which gave a new insight into this phenomenon. These data sets would be useful not only for monsoonal prediction but,also for climate change, storm surge, and to understand earth system as a whole.

Hindi fortnight

Hindi Fortnight was observed from 14 - 28, September 2011 at NIOT. On this occasion a workshop on 'Noting, Drafting and Grammar' was conducted. A kavisammelan was organized. Various competitions were held for the staff of NIOT and prizes were distributed.

National Institute of Ocean Technology

(An autonomous organization under Ministry of Earth Sciences, Govt of India)

Velachery Thambaram Road, Pallikaranai

Chennai 600100 India

Email: postmaster@niot.res.in

www.niot.res.in