



Padmashri R.M. Vasagam presides over Foundation day celebration at NIOT

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National Institute of Ocean Technology (NIOT) celebrated 19th Foundation Day on 06th November 2012 in the august presence of Padmashri R.M. Vasagam, Chairman National Design and Research Forum Institution of Engineers (India) and Former Vice-Chancellor, Anna University. Padmashri R.M. Vasagam inspired the NIOTians with his Foundation day lecture on " Ocean Technology In India -Challenges and Opportunities ". He released the 2nd issue of 2012 NIOT online News Letter SAMUDRIKA. Padmashri R.M. Vasagam also distributed awards and prizes to the winners of various competitions held on the occasion of Foundation day.

Greetings on the occasion of Foundation Day

I wish NIOTians a very happy 19th foundation day. NIOT completed 19 years of successful existence and It will not be an exaggeration to say that NIOT lived up to its expectation. Members of NIOT family deserve all the credit for this.

NIOT has also completed four five year plans and ready to embark on the 12th five year plan for the nation. Apart from preparing the plan and obtaining approvals NIOT continued its onward march. New blood has been infused in to NIOT and an Orientation Programme was conducted in the period May 16 – July 2, 2012, for the newly recruited scientists.

NIOT successfully developed and field tested 'Pradyu', drifter buoy with INSAT Communication. An improved autonomous ambient noise measurement system with real time communication of processed spectrum, has been deployed at 20 m depth off Chennai. The culture of sea bass in grow out cages is being continued in Olaikuda and Kothachatram. Advanced Data Reception & Analysis System (ADDRESS) was launched by the Ocean Observation Systems group. A current turbine with 3 helical blades was successfully tested during an open sea trial conducted at 5 m water depth off Ennore port. The list can go on.

The task we have set for ourselves in the next five year is well cut out and daunting. The cloak of anonymity is no longer available. NIOT is a now well known for its work and expectations are high. I am sure all of us will realize this challenge succeed in converting it in to an opportunity.

I thank Padmashri R.M. Vasagam, Chairman, National Design and Research Forum Institution of Engineers (India) and Former Vice-Chancellor, Anna University for gracing the occasion of Foundation Day celebration at NIOT and for releasing the second issue of the NIOT newsletter. He has been our well wisher since the inception of NIOT and it is only apt that we are celebrating our coming of age in his presence.

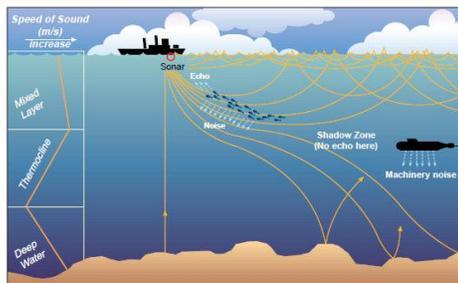
May the fair wind be behind our sails.

Technology Lecture
" Ocean Technology In
India -Challenges and
Opportunities".

Towards Sound Knowledge of Oceans...

Why Acoustics for Ocean?

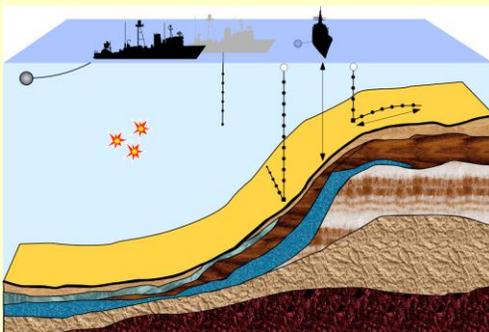
Oceans, the vast complex incredibly hostile environment remains scantily mapped by the science and technology of the day. An efficient way to study this optically opaque and acoustically transparent world is with the help of sound. Sound transport us across ocean waters and into the depths, allowing us to examine, record, and analyze their mysteries. The variations of properties of ocean waters, such as salinity and temperature, affect the sound speed variation in ocean and that in turn affect transmission of sound. Thus the study of underwater sound is central to the task of mapping the ocean space and mapping the ocean resources. The wide range of acoustic frequencies and wavelengths, covering broad spectra of space and time scales, gives rise to a variety of effects and phenomena that must be addressed by both science and technology in order to understand the ocean space and yield useful information to mankind.



Sound propagation in the sea



Submarine detects iceberg



Deep and Shallow water Environment

How it all started.....

In the centuries since Leonardo da Vinci's inspired suggestion for listening to ships underwater, many researchers have contributed to the development of techniques that take advantage of the way sound travels through water.

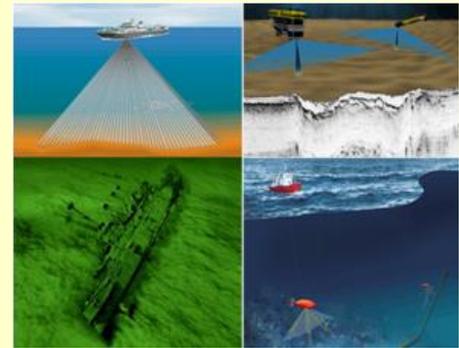
In 1912, the collision of the Titanic with an iceberg triggered man's use of sound for sensing in the sea. The field of underwater acoustics has been extensively developed over the past few decades in response to practical needs originating within both the naval sonar and the marine seismology communities.

From military uses such as submarine warfare and detecting underwater explosions to scientific endeavors such as monitoring climate change and studying ocean wildlife, we have seen how modern society benefits from the investigations of those who pursued the answers to basic questions of the workings of nature.

Deep water to Shallow water

During the two world wars, oceanographers studied both shallow- and deep-water acoustics. But during the cold war, the research emphasis shifted abruptly to deep water, where the ballistic missile submarine threat lurked. After the cold war, the onset of regional conflicts in coastal countries shifted the focus again to shallow water. Those waters encompass about 5% of the world's oceans on the continental shelves, roughly the region from the beach to the shelf break, where water depths are about 200 meters.

Shallow water is usually a noisy environment because shipping lanes exist along coastlines. Submarines typically radiate in the same frequency band as shipping noise, less than 1 kilohertz. The proliferation of quiet submarine technology has inspired the development of active sonar systems, which send out pulses and examine their echoes, rather than the stealthy, passive approach of listening and exploiting the relevant physics. However, the ultimate limits of passive acoustics in terms of signal-to noise ratio (SNR), acoustic aperture (or antenna) size, and the ocean environment are ongoing research issues.

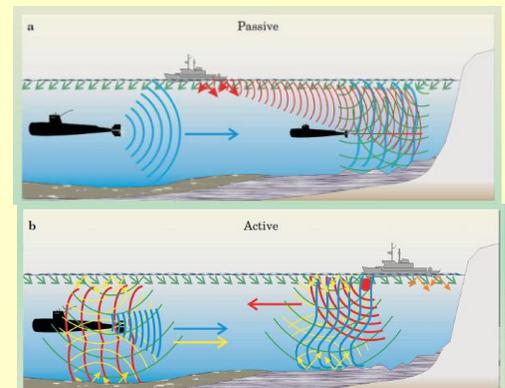


Applications of Ocean Acoustics

Applications

- SONAR
- Underwater communication
- Underwater Navigation and tracking
- Seismic Observation
- Weather and Climate Observation
- Oceanography
- Marine Biology

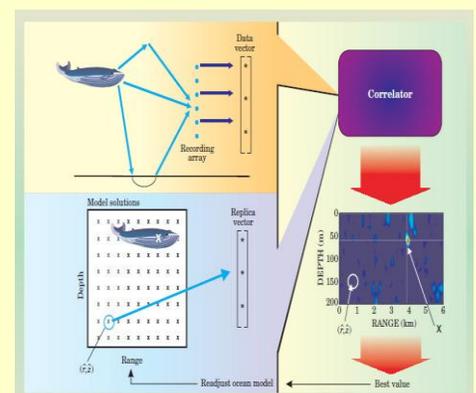
Although submarine detection has driven much of the acoustics research, other important applications have emerged, such as undersea communications, mapping of the ocean's structure and topography, locating mines or archaeological artifacts, and the study of ocean biology.



Passive and Active SONAR

Emergence of Promising tools - Inversion Methods:

- The challenge is to develop methods that use the data themselves and the physics of signal propagation through complex media as the mainstays of adaptive processing or inversion methods to determine medium properties.
- This approach is particularly appropriate in shallow water, because the ocean modulates the complexity of the acoustic field that interacts with an inhomogeneous, porous, and elastic ocean bottom.
- The complexity of the bottom interaction is of special interest in very shallow regions (tens of meters or less), in which acoustic detection of mines from a safe distance is important.
- Shallow-water noise and reverberation, conventionally thought to be nuisances, are now becoming useful information as new inversion methods are being developed.



Inversion Schemes



Ambient noise measurement stations



Testing of Automated Noise measurement system at ATF



Acoustic Test Facility

Indian Scenario

In India, underwater acoustic research is taken up by few institutes such as NPOL, NIOT, NIO, IIT Madras, IIT Delhi, IISc & NPL Delhi. Significant progress is witnessed in the recent decade with continuous improvement of computing power and technology.

In NIOT, the Ocean Acoustics Programme was started in the XI Five year plan, with projects covering on vast and varied topics such as system development for acoustic applications, sound propagation and detection, acoustic communication, sea bed characterization, acoustical oceanography and signal processing to name a few.

A fully automated subsurface noise measurement system indigenously for time series measurements in shallow waters has been developed. Currently, four ambient noise measurement locations are being maintained by the group, two each along the east and west coast of India. Along with ambient noise, parameters of interest such as wind speed, rainfall, sound speed profile, sediment samples, bathymetry etc are also collected. The data acquired is used to study the prevailing ambient noise levels and specific acoustic signatures at particular locations, the variability in the noise, direction of arrival of noise etc. The location is also modeled using sound propagation models to understand the behavior of noise under different oceanographic conditions of sound velocity profile and surface wind/waves.

The calibration facility at ATF has been accredited by National Accreditation Board for Testing and Calibration Laboratories (NABL) as per international standard ISO/IEC 17025. Measurements are performed in accordance with IEC 60565- 1977 and ANSIS1.20-1988 for the frequency range between 3 kHz and 100 kHz. Augmentation of the facility to high frequency from 100 kHz to 500 kHz is recently established to perform any underwater acoustic measurement as well as underwater transducer calibration till 500 kHz as high frequency measurements are important for imaging applications. The vibrating water column based method has been taken up for low frequency calibration below 3 kHz.

Tidings- Happenings at NIOT

Ocean current turbine

A 3 helical blades current turbine of size ϕ 300 mm \times 600 mm long, NACA 0015, Chord 100 mm successfully rotated during an open sea trial conducted at 5 m water depth off Ennore port.



Helical turbine

Design & development of prototype tow body

Fabrication of prototype tow body to accommodate all the subsystems and hydrophone array of BOSS has been completed and preliminary testing done at OEC towing test facility, IIT Madras.



Tow body

Pradyu – drifter with INSAT Communication

After completion of 3 sea trials off Chennai drifter with INSAT MSS deployed in Bay of Bengal. Drifters performance found satisfactory and Developing of 8 more systems with temperature String & Air pressure sensors.



Pradyu

Ambient noise measurement system with online communication

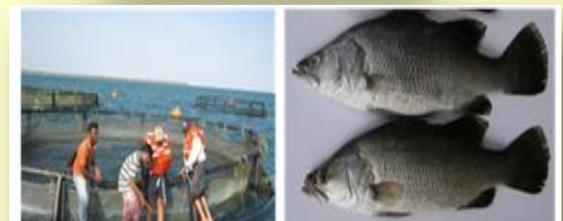
An improved autonomous ambient noise measurement system with real time communication of processed spectrum, has been deployed at 20 m depth off Chennai.



Noise measurement system

Marine Bio Technology

The fishes reared at Olaikuda and Kothachatram by the Marine Biotechnology group have reached an average weight of 250 g and 300 g in 130 and 145 days, respectively. The culture of sea bass in grow out cages is being continued in Olaikuda and Kothachatram.



Open sea cage

Sea bass

Ocean Observation system

Advanced Data Reception & Analysis System was launched by the Ocean Observation Systems group. ADDRESS is also equipped with animated aerial view to study the current & wind pattern analysis of all platforms.



ADDRESS

Orientation Programme

An Orientation Programme covering all the technological projects being handled and the administrative procedures followed by NIOT, was conducted in the period May 16 – July 2, 2012, for the newly recruited scientists.

World Ocean Day

World Ocean Day was celebrated at NIOT on 8th June 2012. Visit of school students to NIOT facilities was organized to promote awareness on the ocean, technology developed and the need on conservation.



Students At NIOT on World Ocean Day

MoES Award

Dr. Basanta Kumar Jena received the "**Certificate of Merit**" to young scientist/engineers and Mr Shijo Zacharia, Mrs R.Rathikumari, Shri K Ashok Kumar and Mr K Anandan received the "**Award of Best Employees**" for excellence and significant contribution fructified in the previous year. Awards were presented to the staff on the occasion of Foundation Day of the Ministry on 27th July 2012.



MoES Award received by NIOT Staff

Workshop on Climate Change

4th International Workshop on "Climate Change: Indian Ocean and Monsoon" was organized by NIOT during 6–7, September 2012 along with CCCR/IITM.

Hindi Fortnight

NIOT celebrated Hindi fortnight from 14th - 28th September 2012, as part of the celebrations a workshop and a lecture was organized, and various competitions in Hindi was conducted for the staff members and prizes distributed.

Vigilance Awareness Week

Vigilance Awareness Week was observed during 29th October to 3rd November, starting off with pledge administered by Director on 29th October. As part of the observation, a talk on "Transparency in Public Procurement" was delivered.



Climate Change Workshop



Workshop during Hindi fortnight



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