



SAMUDRIKA

NIOT Online News Letter, October 2021

Honorable Minister Dr. Jitendra Singh presides over foundation Day celebration at NIOT



National Institute of Ocean Technology (NIOT) celebrated foundation day on 29th October 2021 in the august presence of Hon'ble Minister of State (Independent Charge) of the Ministry of Earth Sciences and Ministry of Science & Technology

Dr. Jitendra Singh and Dr. M. Ravichandran, Secretary, Ministry of Earth Sciences. Hon'ble Minister delivered the foundation day lecture and Secretary, MOES addressed the gathering.

Greetings on the occasion

Greetings on the occasion of Foundation Day 2021.

I am glad to inform you that NIOT has developed and demonstrated technologies to support the nation towards energy and freshwater, climate change, deepwater research, coastal protection, ocean monitoring, marine sensors, electronics acoustics and biotechnology. One of the significant achievements during this year is the demonstration of locomotion capability of the Deep-Sea Mining machine at a depth of 5270m in the Central Indian Ocean. Development of the Indian Manned Submersible MATSYA 6000, capable of carrying three human beings to 6000 meters depth, is progressing well. While the three NIOT desalination plants established in Lakshadweep have been functioning well quenching the thirst of the islanders, work on 1.5 Lakh litres per day capacity plants at 6 more islands are in progress. Efforts are on for the establishment of OTEC powered desalination plant in Lakshadweep. The moored buoy systems deployed in the Bay of Bengal and Arabian Sea have been of great support to IMD by providing real time observations of meteorological & oceanographic parameters. The vessels operated by NIOT serve as the backbone for all the operations in the sea.

Hoping this journey will continue for NIOT to reach greater heights in the years to come.

Dr. G.A.Ramadass
Director, ESSO – NIOT)

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Foundation Day lecture
by
Hon'ble Minister Dr.
Jitendra Singh,

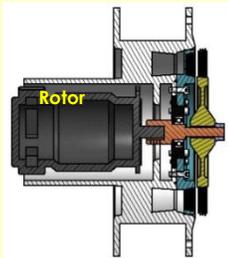
Tidings :Happenings at NIOT.....

Ocean Thermal Energy Conversion (OTEC) Desalination Laboratory at NIOT

The studies in Open Cycle (OC) OTEC laboratory were continued to gain deeper insight in to OC OTEC and LTDD systems. Tests were conducted to characterize turbine and generator combinations and assess its performance at various speed ranges. These studies will help in design of high capacity OTEC and desalination equipment.

International Collaboration

India is coordinating a subtask on OTEC for the Ocean Energy Systems (OES) Technology Collaboration Program (TCP) under International Energy Agency (IEA) for the preparation of a white paper on OTEC for policy makers. Dr. Purnima Jalihal, Head Energy and Freshwater was elected as Vice-Chair of the OES TCP Executive Committee, becoming the first Indian to become part of the cabinet.



Turbine-generator stator



Establishment of Desalination plants in UT Lakshadweep islands

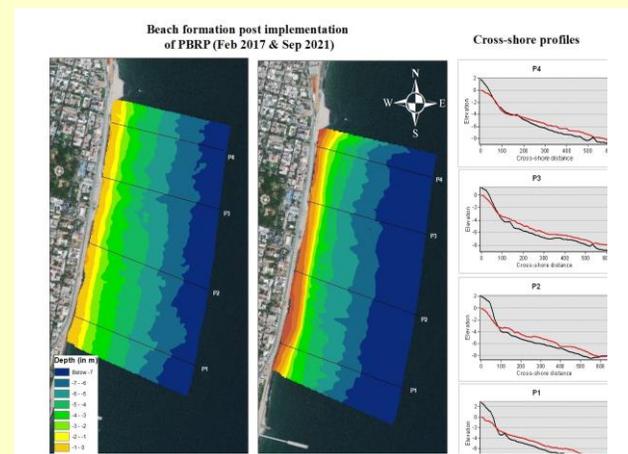
Due to the increasing demand for Low Temperature Thermal Desalination (LTDD) plants from other islands, NIOT is in the process of establishing 6 plants at Amini, Androth, Chetlat, Kadamat, Kalpeni and Kiltan islands of UT Lakshadweep. Construction and installation of all components of the plant at Kalpeni Island have been completed and drinking water has been produced. Works at Amini, Kadamat and Chetlat islands are in an advanced stage of completion.

Ocean Thermal Energy Conversion (OTEC) Powered Desalination Project at Kavaratti

This project is the first ever where the desalination will be powered by OTEC. The manufacture of components and other works are being commenced shortly.

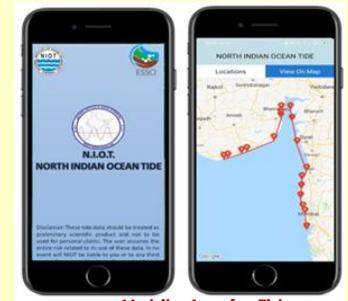
Puducherry Beach Restoration

Coastal processes were monitored along Puducherry coast during Northeast and Southwest monsoon. The reef along with beach nourishment has resulted in the formation of a wide beach to the south of the reef. NIOT organized a workshop for officials of the Puducherry government to improve their understanding of the project and a public event was presided over the Hon'ble Minister of Earth Sciences, dedicating the restored beach to the public. The project site is being regularly monitored post-implementation through field measurements of bathymetry, topography and wave climate, and the response of the coast is in line with the numerical simulations.



North Indian Ocean Tide (N.I.O.T) Mobile App

Mobile App N.I.O.T was developed with observation data along the Indian Ocean. A ready to use wave atlas for the Indian coast (mainland) is developed using 22 years of wind data as model input and validation from observations. Presently, the inclusion of islands is in progress. Indian Coastal Ocean Radar Network operates and maintains 10 systems along the coast of India including two systems in the Andaman Islands. Velocity data from the HF radar Network are combined on standard grids, and this data is disseminated through Central servers at NIOT and INCOIS for operational and academic use.



Mobile App for Tide

Restoration of beach at Kadalur villages

NIOT has carried out the restoration of eroded beaches along the Kadalur coast near Kalpakkam in Tamil Nadu. Kadalur villages were affected by erosion due to high energy cyclonic waves induced by climate changes. The innovative shore protection measure constructed (segmented submerged breakwaters made of sand filled geosynthetic tubes) is the first time in India in open coastal waters. The entire project was designed and demonstrated in-house by NIOT. The performance monitoring indicates sediment deposition immediately behind the breakwater segments, and settlement of the structure is noticed in some areas due to scouring. The submerged breakwater has enhanced ecology by supporting a wide variety of marine life



Marine microbial Biotechnology

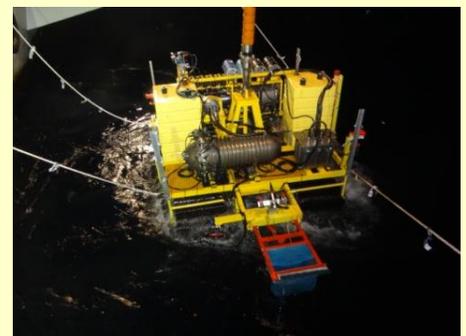
Several hydrocarbonoclastic bacteria capable of utilizing petroleum hydrocarbon (PHC) as sole carbon (food) source have been identified and isolated. Technology for biodegradation of PHC through marine microbial consortia is developed and transferred to industry through NRDC. Whole genome sequence of petroleum hydrocarbon degrading bacteria *B. subtilis* EB1 is developed and functional coding genes revealed 34 genes associated with degradation of xenobiotics.



Biodegradation of PHC Technology transfer

Integrated mining system for mining of Polymetallic Nodules from a depth of 6000m

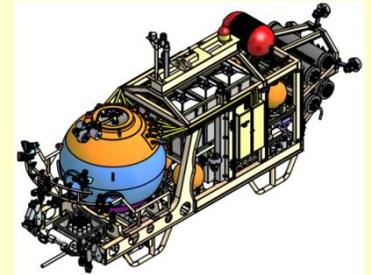
Seabed locomotion trials of the experimental undercarriage system of underwater mining system (Varaha-I and II) was successfully undertaken on water-saturated soft soil at 5270 m depth in the Central Indian Ocean (CIO) during March – April 2021. Locomotion of the mining machine on soft sea bed over a distance of 120m was undertaken during this sea trial. This is the deepest trials ever so far, for a seabed mining system. These trials are stage level tests in the eventual development of an integrated deep water poly-metallic mining system for collecting nodules from depths upto 6000 m.



Deployment of Mining Machine from ORV SagarNidhi

6000 m depth rated Manned Submersible

Indigenous design for the development of a 6000m depth rated Manned Submersible is under progress. General arrangement of subsystems for achieving the hydrostatic stability and hydrodynamic shape, considering dimensions and weight of the subsystems is completed to proceed for scale down model studies. Preliminary design phase is complete and shifted critical design phase. Qualification trial for 6000 m depth rated Autonomous Underwater Vehicle (Ocean Mineral Explorer 6000 - OME 6000) at 1270 m water depth at Norway is completed for its realization and usage for deep sea exploration in Indian Ocean.



General Arrangement and Conceptual view of the Manned Submersible

NOAA Renews Decade-Long Partnership with MoES of India and Launches New Joint Oceanographic Data Portal

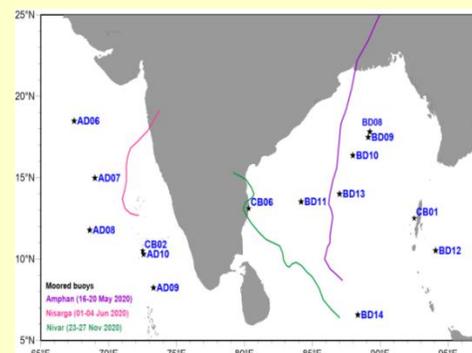
Ocean Observation System (OOS) team has Implemented Arrangement for Technical Cooperation in Development of the Research moored Array for African-Asian-Australian Monsoon Analysis and prediction (RAMA) and the Ocean Moored buoy Network in the northern Indian ocean (OMNI) for Improving Weather and Monsoon Forecasts. A partnership agreement between the National Oceanic and Atmospheric Administration (NOAA) Department of Commerce of the United States of America and the NIOT, Ministry of Earth Sciences (MoES) of the Government of India took place on 09th August 2021



Dr. Craig McLean and Director NIOT hold up their signed partnership agreement pages during the virtual ceremony on August 9, 2021.

Data Buoy Observations during Cyclones

During this reporting period, the moored buoys deployed by the OOS team captured the signals of three cyclones namely severe cyclone Yaas & Nivar in the Bay of Bengal and extremely severe cyclone Tauktae in the Arabian Sea. Four OMNI buoys BD08, BD09, BD10 and BD13 recorded the SLP drop during the Yaas cyclone. Maximum SLP drop was observed in BD08 and BD09 (~976 hPa). Wind speed of ~112 km/hr recorded in BD08. BD08 also recorded significant wave height (~8 m) and maximum wave height (~11.5 m).



Track of cyclones Yaas, Tauktae, Nivar and moored buoys

Deep sea AUPD

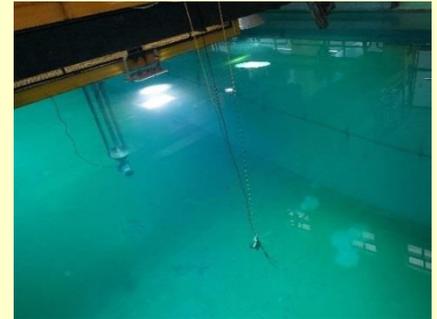
500m workable Deep Sea Autonomous Underwater Profiler is developed in-house using 1000CC variable buoyancy engine which suits operations in the Bay of Bengal. Two units have been integrated and tested for basic functionality at sea conditions and are ready for field deployment.



Deep sea AUPD

Underwater Acoustic Telephone (UAT)

Marine Sensor Systems group has initiated development of indigenous Underwater Acoustic Telephone (UAT). Underwater voice communication can be realized using either analogue or digital modulation techniques. The Single Side Band (SSB) Modulation Technique for underwater voice communication has been implemented with 12.5kHz carrier frequency and demonstrated at ATF.



Underwater telephone test at ATF

Deep Water Ambient Noise Measurement System (DANMS)

The indigenously developed Deep Water Ambient Noise Measurement System has been successfully tested and deployed in Bay of Bengal as part of OMNI buoy BD11 (13.53 N & 84.17 E) at 3250 m depth during February 2021. DANMS has been positioned at 510 m depth from the ocean surface



DANMS deployment in Bay of Bengal in Feb 2021

Vector Sensor Array (VSA) for Coastal Surveillance Applications

The indigenously developed Vector Sensor Array (VSA) has been tested in the Acoustic Test Facility for different azimuth positions and Direction of arrival (DoA) estimation compared well with the actual azimuth. Subsequently sea trial of VSA was carried out by deploying it as an autonomous system at 17m water depth for three days during first week of September 2021. DoA estimation for a ship noise source is being carried out.

Commendable contributions of NIOT Research Vessels

NIOT has been bestowed with the "Best Innovative Practices Award" and "Certificate of Appreciation" by Confederation of Indian Industry CII-Excellence Awards 2020 in recognition for developing & implementing green technology solutions through Innovative & cost-effective ways onboard NIOT Ships.



Appreciation from Confederation of Indian Industry CII

Patents Awarded

- An Indian patent (Patent No. 357273) has been granted for An autonomous Ambient Noise System for Acoustic Field characterization in shallow waters on 29th January 2021.
- An Indian patent has been granted for NIOT-OOS for the invention titled 'Real Time Tsunami Monitoring System', patent No. 369964 on 22nd June 2021.
- An Indian patent has been awarded to @Moes, NIOT for the invention titled "A system and method for calibrating acoustic tide gauge", patent No. 371442 on 08th July 2021.

Conferences /Events

- An International Conference on New strategies in water treatment and desalination (NSWTD-2021) was organized online jointly by NIOT, SRM University and InDA (SZ) during 21-23 March 2021.
- An online workshop was organized by NIOT on 14 Aug 2020 towards synergy in OTEC activities worldwide and formation of International OTEC Association
- NIOT was the principal coordinator in 'water segment' event at India International Science Festival (IISF) held online during 22-25 Dec 2020.
- NIOT celebrated the 27th Foundation day on 5th November 2020. Dr.G.Madhavan Nair, Former Chairman, Indian Space Research Organization (ISRO) delivered the foundation day lecture.



NSWTD-2021



An International Workshop on OTEC



Speakers at Water Segment event at IISF 2020

Towards Quality....

- Accreditation for testing chemical parameters in ballast water samples is obtained from National Accreditation Board of Laboratory (New Delhi).
- Renewal of accreditation for Acoustic Test Facility has been successfully carried out for calibration and testing of underwater acoustic transducers and certified by NABL ,New Delhi
- ISO 9001:2015 has been completed and implemented successfully for all administrative processes of NIOT.



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