
The institute main building was designed in the form of a spiral to portray its dynamic and expanding nature. The design is also a recall of the cyclonic circulation generated over the oceans. It has quiet centre manifested through the information processing centre that is primary strength of the institute's activities. The spiraling character also creates a very coherent and compact campus with all the components closely linked around the information block and all other blocks around it. The spiraling circulation pattern emanating from the circulated corridor connects all the other functions of the campus. The internal courtyards offer excellent natural circulation of air as well as shaded quiet ambience. The design recalls all traditional built form in hot arid regions of India which are manifested around courtyards and are tight and well knit built forms.

A Laboratory in the Information Block

Library

Board Room in the Conference Block

The total plinth area of the building is about 7600 Sq. m covering the Main Building, Amenity Building, Sub-Station, Car Parking, Covered Pathway, Amphi-theatre, Security Building, Sump and Pump House, Over Head Tank and Sewage Treatment Plant.

The Main Building houses Information Block, Director and Administration Block, Library and Tsunami Early Warning Centre Block, Conference Block, Auditorium Block. The Information Block comprises various laboratories viz. PFZ, OSF, Ocean Modelling & Argo Data Centre, Coastal Oceanography, Web-based Services in addition to a specially designed glass chamber for the High Performance Computing Facility and Storage Systems. The Amenity Building houses Canteen, Multipurpose Hall, Guest / Transit Rooms, room for Bank and First Aid facilities.

Technical services comprises of High Tension Power Supply, Transformers with High Voltage / Low Voltage Switchgears, Diesel Generator Sets, Uninterruptible Power Supply, Air Conditioning, Water Supply, Sewage Treatment and Recycling Plant, etc. which included advanced and high end specifications for further expansion in near future. State-of-the-art Access Control System, Building Management System and Fire Safety System and Public Address System are the important technical features of the Building. The Fire Safety System, Air Conditioning System, Access Control System and Public Addressing System are connected to the Building Management System. The system facilitates automatic attendance and controlled access to various facilities in the Campus. Video Conferencing facility was also set up at INCOIS which facilitates Video Conferencing with the MoES Head Quarters, NIOT and NCAOR.

Auditorium with seating capacity of 175

Amenities Block

Sub-Station

Extensive floor trunking network to avoid open wiring was provided in all areas of the Main Building for Local Area Network (LAN), Data Cable wiring etc. The Main Building is equipped with the lightning arrestor system and lightning interceptors were installed on Over Head Tank and Sub-Station for protection from the lightning.

Intensive landscaping activities were taken up and an artificial lake is being developed to create a good environment in the campus. INCOIS has now plans for extension of INCOIS Building, construction of residential quarters, guest house and hostel accommodation.

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INCOIS

# Ocean News

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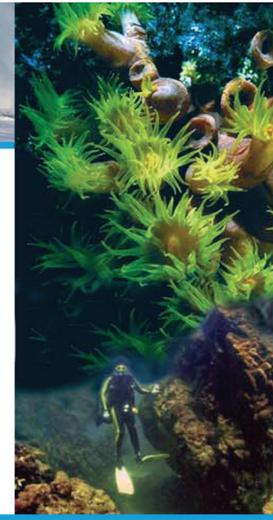


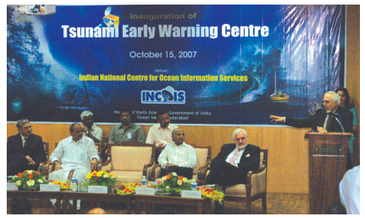
# Indian Tsunami Early Warning Centre inaugurated

Recognising the imperative to put in place an Early Warning System for mitigation of Oceanogenic Disasters that cause severe threat to nearly 400 million of our population that live in the coastal belt with devastation of life and property, and further driven by the national calamity due to the Indian Ocean Tsunami of December 26, 2004, the Ministry of Earth Sciences (MoES) has taken up the responsibility of establishing the National Tsunami Early Warning System. The Warning System has been established by MoES as the nodal ministry at a cost of Rs.125 Crore in collaboration with Department of Science and Technology (DST), Department of Space (DOS) and the Council of Scientific and Industrial Research (CSIR). The National Tsunami Early Warning Centre has been set up at INCOIS, Hyderabad.

The Hon. Minister for Science, Technology and Earth Sciences, Shri. Kapil Sibal inaugurated the National Tsunami Early Warning System that has been set up at the Indian National Centre for Ocean Information Services (INCOIS), Hyderabad on October 15, 2007. Hon. Chief Minister of Andhra Pradesh, Dr. Y. S. Raja Sekhar Reddy has graced the occasion. Dr. P S Goel, Secretary, Ministry of Earth Sciences gave welcome remarks and spoke about Tsunami Early Warning System at INCOIS.

The Early Warning Centre receives real-time Seismic data from the national seismic network of the India Meteorological Department (IMD) and other International seismic networks. The system detects all earthquake events of more than 6 Magnitude occurring in the Indian Ocean in less than 20 minutes of occurrence. BPRs installed in the Deep Ocean are the key sensors to confirm the triggering of a Tsunami. The National Institute of Ocean Technology (NIOT) has installed 4 BPRs in the Bay of Bengal and the 2 BPRs in Arabian Sea. In addition, NIOT and Survey of India (SOI) have installed 30 Tide Gauges to monitor the progress of tsunami waves. Integrated Coastal and Marine Area Management (ICMAM) has customised and ran the Tsunami Model for 5 historical earthquakes and predicted inundation areas. The inundated areas are being overlaid on cadastral level maps of 1:5000 scale. These community-level inundation maps are extremely useful for assessing the population and infrastructure at risk. High-Resolution Coastal Topography data required for modelling is generated by the National Remote Sensing Agency (NRSA) using ALTM and Cartosat Data. INCOIS has also generated a large database of model scenarios for different earthquakes that are being used for operational tsunami early warning.

The Hon. Union Minister for Science, Technology and Earth Sciences, Shri Kapil Sibal Inaugurating the Indian Tsunami Early Warning Centre




Inaugural address by Shri. Kapil Sibal, Hon'ble Minister of Science & Technology & Earth Sciences

Tsunami Early Warning Center at INCOIS

Communication of real-time data from seismic stations, tide gauges and BPR's to the early warning centre is very critical for generating timely tsunami warnings. A host of communication methods are employed for timely reception of data from the sensors as well as for dissemination of alerts. Indian Space Research Organisation (ISRO) has made an end-to-end communication plan using INSAT. A high level of redundancy is being built into the communication system to avoid single point failures.

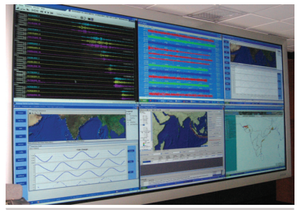
Communication facilities to receive data from seismic stations, tide gauges and BPRs in realtime

## Standard Operating Procedure at the Early Warning Centre

By monitoring the seismic activities in the two tsunamigenic source regions of the Indian Ocean, tsunami warning / alert / watches are generated based on pre-set decision support rules. These warnings / alerts / watches are then disseminated to the concerned authorities for action, following a Standard Operating Procedure (SOP). The criteria for generation of different types of message bulletins (Warning / Alert / Watch) for a particular region of the coast are to be based on the available travel time (i.e. time taken by the tsunami wave to reach the particular coast). These are based on the premise that coastal areas falling within 60 minutes travel time from a tsunamigenic earthquake source need to be warned based solely on earthquake information, since enough time will not be available for confirmation of water levels from BPRs and Tide Gauges. Those coastal areas falling outside the 60 minutes travel time from a tsunamigenic earthquake source could be put under a watch status and upgraded to a warning only upon confirmation of water-level data. To reduce the rate of false alarms even in the near source regions, alerts are generated by analysing the pre-run model scenarios, so that, the warnings are issued only to those coastal locations that are at risk.

Computational facilities at Tsunami Early Warning Centre

A State-of-the art technology has been adopted for establishment of all necessary computational and communication infrastructure that enables reception of real-time data from all the sensors, analysis of the data, generation and dissemination of tsunami advisories following a standard operating procedure. Seismic and sea-level data are continuously monitored in the Early Warning Centre using a customised software application jointly developed with M/s Tata Consultancy Services (TCS). This application generates alarms/alerts in the warning centre whenever a pre-set threshold is crossed. Tsunami warnings/watches are then generated based on pre-set decision support rules and disseminated to the concerned authorities for action, following a Standard Operating Procedure. The National Early Warning Centre will generate and disseminate timely advisories to the Control Room of the Ministry of Home Affairs for further dissemination to the Public.



Tsunami Early Warning Centre

Communication facilities for Virtual Private Network forDisaster Management Support (VPN DMS)



## Response of the Interim Tsunami Warning Centre (ITWC) to the Earthquakes of September 12, 2007

The interim tsunami warning centre, which was operational at INCOIS before setting up of TEWC, once again proved to be effective as it responded quickly to a potential tsunamigenic earthquake occurred in the Andaman-Sumatra subduction zone at 16.40 hrs on 12th September 2007. The magnitude of the earthquake was 8.4. The ITWC team went into action as soon as the centre received the earthquake information. The centre monitored the water level changes at different locations using the real-time tide gauge data and issued the first tsunami information bulletin which contained an 'alert' for Andaman and Nicobar islands within 30 minutes after the occurrence of the earthquake. The second tsunami information bulletin issued at 18.28 hrs also contained alert signals for Andaman and Nicobar islands as the observed water level at Padang (60 cm) and Cocos Island (50cm) indicated that a minor tsunami was generated. In the third information bulletin issued at 19.35 hrs the alert for Andaman and Nicobar islands continued and a watch signal was issued for Orissa, Andhra Pradesh and Tamilnadu. Since the water level deservating showed only minor variations, later an "all clear bulletin" was issued at 21.15 hrs. The efficiency of the end-to-end system was successfully proved during this event.

# INCOIS campus dedicated to the Nation

Hon'ble Union Minister for Science, Technology and Earth Sciences, Shri. Kapil Sibal formally dedicated the Indian Natoinal Centre for Ocean Information Services (INCOIS) to the nation on October 15, 2007. Dr. P. S. Goel, Secretary, Ministry of Earth Sciences and Dr. Shailesh Nayak, Director, INCOIS, were present on the occasion.


Hon'ble Union Minister for Science, Technology and Earth Sciences, Shri. Kapil Sibal dedicated the INCOIS campus to the Nation

The permanent campus for INCOIS was developed in a 50 acre land (acquired from the Government of Andhra Pradesh in 1999) at Gajularamaram, Quthubullapur Mandal, Ranga Reddy District, Hyderabad) with state-of-the-art facilities and the right ambience for an S&T institution. This campus, named as "Ocean Valley", has been conceived with a vision and realized within a short span of two years. The construction of the building with state-of-the-art technical support facilities commenced in March 2003 with 18 months-schedule for its commissioning i.e. August 2004. INCOIS started functioning from its permanent campus from August 19, 2004. The Civil Engineering Division of the Department of Space (CED/DOS) carried out the project management of the construction activity.

## Dissemination of Tsunami Advisories

The TEWC will generate and disseminate timely advisories to the Control Room of the MHA as well as the State Emergency Operations Centres for further dissemination to the Public. A satellite-based virtual private network for disaster management support (VPN DMS). In addition, messages will also be sent by Phone, Fax, SMS and e-mails to authorised officials. In case of confirmed warnings, the TEWC is being equipped with necessary facilities to disseminate the advisories directly to the administrators, media and public through SMS, e-mail, Fax, etc. The cyclone warning network of IMD and electronic ocean information boards of INCOIS which are being used for Potential Fishing Zone (PFZ) and Ocean State Forecast (OSF) advisories could be effectively used for dissemination of warnings directly to the public.

Periodic workshops will be organized for the user community to familiarize them with the use of tsunami and storm surge advisories as well as inundation maps. Easily understandable publicity material on earthquake, tsunami and storm surges have been prepared and will be distributed to the general public. DST, DoS and CSIR would give timely advisories to the MHA to disseminate warnings to the public as well as to the state emergency operations centres. A red alert relayed by warning system requires the citizens and the administration to be prepared for evacuation while in the event of an orange alert the administration has to remain vigilant.