



DISTINGUISHED LECTURE

Deciphering ocean language

GATEWAY MEDIA NEWS BUREAU

*“How inappropriate to call this planet Earth when it is quite clearly ocean”
- Arthur C. Clarke*

Oceans occupy approximately 70 per cent of the earth's surface and are a major source of food, minerals and energy. Though we live on land it is the oceans that dictate the quality of our life. Hence, it becomes

imperative to study and monitor the oceans and their impact on terrestrial life. As part of the distinguished lecture series, Dr Shailesh Nayak, Secretary, Ministry of Earth Sciences, spoke on the 'National Agenda on Stewardship of Oceans.'

His lecture revolved around three points: exploration of oceans, the role of oceans in the entire ecosystem and the consequences of interaction between other components of ecosystem with the oceans. He said knowledge about oceans can be extensively used for public good such as in weather forecasting, exploring resources in the ocean bed and for providing a safe environment for trade & commerce.

Ocean observation can help in understanding monsoon, seasonal variations, inter-annual variations and ocean circulations. A number of programmes are in progress to understand ocean biology using satellite technology. One of the factors being observed is the impact of growing CO₂ emissions into the atmosphere and its impact on monsoon. Systems are being developed to project the effect of growing pollution on rainfalls over

the next decade. A feedback system to study formation of clouds and variability of sea needs to be developed. The origin of monsoon and the role of the Himalayas in monsoon also need to be understood.

Talking about the variations happening in the oceans he said that an increase in the levels of chlorophyll has been observed in the Arabian Sea. This calls for monitoring the proportion of phytoplanktons and the amount of photosynthesis performed by them. Change in ocean colour also need to be checked. A number of observation stations have been installed in the Indian Ocean to collect time series data on oceans.

Taking a note of the impact of oceans on food and energy supply he said, a primary model has been developed to check fish production in oceans. Fish breeding takes place in monsoon and oceans effect monsoon. In general, a rise in fish production has been observed after cyclones. Based on satellite information fishermen are being advised on fish harvesting and in identifying fishing zones. Oceans are also a potential source for thermal energy. Approximately 5000 terra watt of thermal energy

can be harnessed on an annual basis from the Indian Ocean.

Disaster management is one of the pressing issues for the global society. There is a dire need to increase resilience to disasters. Approximately 2 to 3 cyclones strike the Bay of Bengal and the Arabian Sea every year. Hence, systems for predicting rainfall, wind velocity and inundation need to be improved. One of the major initiatives on this front is the Tsunami warning system developed in India. Global Positioning Systems (GPS) technology needs to be improved to detect magnitude of earthquakes and for developing better warning systems.

In conclusion, Dr Shailesh mentioned about the growing concern over the rise in sea levels, causing coastal erosion. Coastal inundation mapping needs to be done which will be critical in mitigating the impact of rise in sea levels and in protecting the lives of people living in coastal areas. Sensors are being developed for monitoring ocean colour and other parameters. He drew the attention of delegates to the fact that a large database of satellite information on oceans is available at INCOIS for researchers benefit. [AOGS](#)



Dr Shailesh R Nayak, Secretary, Ministry of Earth Science delivering a distinguished lecture at the AOGS conference

Each year, whenever a storm threatens to strike, it appears as if Bangladesh's tryst with disaster has begun. The country, which is highly susceptible and vulnerable to such a disaster, is because the way it is placed strategically. This was one of the highlights of a talk, presented by Shishir Kumar Dube, director of atmospheric sciences at IIT Delhi at the third day of the AOGS conference in Hyderabad on Wednesday.

The former director of IIT Kharagpur also spoke about how storm surge causes the maximum damage whenever it strikes. "It has been found that 90 per cent of loss of life and property is due to the storm surge and only 10 per cent is due to winds and precipitation," Prof Dube revealed.

Elucidating about the deaths in tropical cyclones and how storm surges cause vast destruction, he cited the instance of how many lives were lost in previous instances. "About 300,000 people died in one of the most severe cyclones that hit Bangladesh (then East Pakistan) in



Prof Dube addresses the audience at the third day of the AOGS meet in Hyderabad on Wednesday

November 1970. In April 1991, the Chittagong cyclone killed over 130,000 people in Bangladesh. At the Orissa coast, a severe cyclonic storm in October 1999 killed more than 15,000 people, besides enormous loss to the property in the region."

Explaining why most of the storm surges occur in the Bay of Bengal, he explained, "Firstly, it is due to the convergence of the Bay of Bengal. Secondly, the shallow water, since there is a large bottom friction which retards return undercurrents and leads to water piling up in the

Battling the storm surge

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Bay of Bengal. Also, since the area has a thick population, low lying islands get submerged whenever there is a storm surge. The socio-economic factor plays an important role too. Since people are very poor, they are reluctant to move out, even though they are aware about the lurking danger. And then, high astronomical tides, inlets and distributaries are a deciding factor too."

Some of the cyclones that have struck in the recent past:

- Gonu: June 17, 2007.
- Sidr: November 11 to 16, 2007.
- Nargis: April 27 to May 3, 2008.
- Aila: May 2009
- Phyan: November 9 to 12, 2009.
- Pak cyclone: May 16 to 22, 1999.

Prediction system

Dube, who along with others has been working for the last 30 years to bring out a storm surge prediction system at IIT, (also called the IIT model), spoke about the various aspects it consists of. They are:

- Meteorological input: These are winds associated with the tropical cyclone. For this, the vector motion of the storm is very important. The place of landfall, duration of the storm and radius of maximum sustainment (RMax) are used to observe in which direction the storm is moving. Satellite imagery or GIS can also be used to ascertain this factor.
- Local specific inputs, which consist of basis characteristics and coastal geometry, play a significant role as well.
- Oceanographic data and hydrological input: This consists of

bathymetry, astronomical tides and inshore currents in closed regions. Hydrological input on the other hand, is the river discharge in the sea and rainfall distribution.

"Till now, the IIT model has been used by Bangladesh, Myanmar, Thailand, Sri Lanka, Pakistan and Oman," Prof Dube stated.

The IIT model, he added, has the ability to investigate multiple forecast scenario in real time and updates cyclone track (as the cyclonic storm approaches the coast). Hence, the meteorological forecast becomes more accurate, averred Prof Dube who co-authored a book on the Global Storm Surges, which was published in 2001. Since then, many studies have been carried out on storms and how they impact lives, he concluded. [AOGS](#)

5 QUICK

The National Centre for Antarctic and Ocean Research has been in the forefront of research in Antarctica; Thamban Meloth sheds light on how it is likely to affect climate change studies in India and the world at large.

1 To what extent is the observation of Antarctica helpful in the study of climate change?

Antarctica is so huge that the ice sheets cover about 90 per cent of the world's permanent ice and 70 per cent of its fresh water. The region exerts a lot of control on global climate. The ocean surrounding Antarctica is an area where large amount of ocean water sinks; joining the global conveyor belt. Also, since the currents constantly move in this belt, it is but natural that they affect climate systems. Therefore, it is the focal point for the study of the global climate system.

2 Isn't it paradoxical that despite the lack of habitation, it plays such a important role in controlling the climate system?

It's not that Antarctica is stripped of life, there's a large amount of life that exists here in various forms, but it is different from how we see it in other parts of the world. It is more at the micro level. These are all microscopic organisms that exist in the ice, the water, sediments and the little amount of soil that at times gets exposed. However, they have learned to survive in difficult conditions. It is important to study them because they have an implication on the climate surrounding the region. Some of these bacteria, micro algae for that matter, contribute to some amount of chemical releases like halogens, which have a clear implication on the ozone hole. Also, there are biological organisms which release bromo carbons that are nothing but halogen compounds that add to temperature variations. However, some of these organisms also play an important role in carbon recycling.

3 Could you tell us about the National Centre for Antarctica and Ocean Research?

It is one of its kind in the country and is totally dedicated to research on Antarctica. We also undertake research in the Arctic region and the oceans. The institute is a diversified organisation which co-ordinates with various institutions that conduct research and carry out expeditions. A large amount of data is generated and shared with institutes around the world which would help research in the long run.

4 How difficult is it to conduct research in Antarctica considering the inhospitable conditions?

It definitely requires a strong will to do research out there. It is not for those who would like to do their research in comfort. It's a challenge and the conditions are quite bad. Since I do ice drilling, there are times when we have to camp on an ice sheet for over a month, bearing strong winds and extreme cold. However, the kind of information you get and the samples you collect, encourage you to go back again and again.

5 Will the research have a direct bearing on climate change studies in India?

Yes, certainly it would. This is because when we talk of Antarctica, it's not just that particular area, it's a global system and plays a major role in the climate, especially in terms of atmospheric processes. In fact, we are trying to find the connectivity between the various systems that form a network in the southern region. This would help in studying the patterns in India, which is a tropical country and where variations get reflected immediately, unlike in Antarctica where even a degree rise in temperature would mean more comfort. **AOGS**

For the complete interview, read the August 2010 issue of Planet Earth www.planetearth-india.com



The various moods of Thamban Meloth during the interview

GEOHOST awardees 2010

In an effort to encourage young students, AOGS has come up with the GEOHOST Programme where in select students below the age of 35 are given an opportunity to participate in the annual conference. This is the first time that such an initiative has been undertaken under the aegis of AOGS and Dr Harsh K Gupta, Elect President, AOGS has been instrumental in starting the GEOHOST programme, which takes care of the travel expenses, registration and accommodation of the awardees. Thirteen students from the Asia Oceania region were chosen for the 2010 conference. **AOGS**



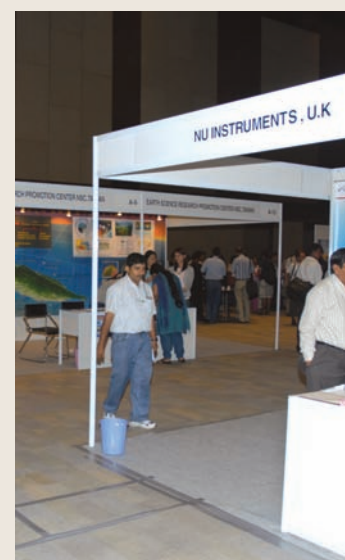
Standing NAC/LOC Committee members: (L to R) Dr B Rajendra Prasad, Sec, IGU, Dr M Sudhakar, Advisor, MOES, Dr V P Dimri, IGU President, Chairman LOC, AOGS, Dr Shailesh Nayak, Secretary, Ministry of Earth Sciences, Govt of India, D K Lee, President, AOGS, Dr Harsh K Gupta, Elect President, AOGS, Iver Cairns, Gen Sec, AOGS, Dr P Koteswara Rao, Organising Secretary & Tr, IGU and an awardee student.

The list of students chosen for 2010 is:

Sitting: Dinesh Chandra Saha, Korea, Maxim Klimenko, Russia, Mohan Kumar Das, Bangladesh, Sanat Kumar Das, Maldives, Tulasi ram, Taiwan, JungYoo-Rim, Korea, S M A Abdullah, Bangladesh, Jeong-Hoon Jeong, Korea, Keun-Ok LEE, Korea, Sanjeev Rajput, Australia, Kandaga Pujiana, Columbia, Ara Koh, S. Korea and Ackley Lane, Hong Kong



The Earth Science Research Promotion Centre attracted quite a few delegates ▲



Exhibition extraordinaire



ISRO stall was a huge hit with its models of launch vehicles ▼



▲ Young researchers having a look at Trimble's latest offering