Deciphering ocean language

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

His lecture revolved around three pivotal explorations of oceans, the role of oceans in the entire ecosystem and the consequences of interaction between other components of ecosystems with the oceans. He said knowledge about oceans can be extensively used for public good such as in weather forecasting, exploiting 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 rainfall 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 ocean effect monsoon. In general, a rise in fish production has been observed after cyclones. Based on satellite information fisherman are being advised on fish harvesting and in identifying fishing zones. Oceans are also a potential source for thermal energy. Approximately 5000 tera 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 Shashilesh 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 oceanic 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.

Battling the storm surge

Each year, whenever a storm threatens to strike, it appears as if Bangladesh’s joy 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 AGUS 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.

Fluctuating 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 November 1970. In April 1991, the Chittagong cyclone killed over 130,000 people in Bangladesh. At the Orissa coast, a severe cyclone 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 water upcurrents and leads to water piling up in the 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, tides and distributaries are deciding factors too.”

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

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Prediction system:
Dube, who along with others has been working for the last 40 years to bring out a storm surge prediction system at IIT, also called the ITT model, spoke about the various aspects in context of Thy:en:

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 sustained (RMS) 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 basin 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 ITT model has been used by Bangladesh, Myanmar, Thailand, Sri Lanka, Pakistan and Oman,” Prof Dube stated.

The ITT model, he added, has the ability to investigate multiple forecast scenarios in real time and updates cyclic 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.
GEOHOST awardees 2010

In an effort to encourage young students, AOGS has come up with the GEOHOST Programme where select students below the age of 35 are given an opportunity to participate in the annual conference. This is the first time such an initiative has been undertaken under the aegis of AOGS and Dr Harsh K Gupta, Fiez 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.

Standing (L to R): D. Baladhar Prasad, Secy, IUG, Dr M Sayyad, Asia, MOCS; Dr S. S. Dar, S. President, Asia; Prof. M. Ravindran, Director, Outreach and Communication, IIT, Madras; Dr S. R. Jayaram, Director, IGCAR, Dr P. S. Mathur, Director, NGIO, and awardee students.

Prize money for the best presentation for 2010 was:

1st: Deok Cho, Korea; 2nd: Mao, Korea; 3rd: Korea; 4th: Korea; 5th: Korea; 6th: Korea; 7th: Korea; 8th: Korea; 9th: Korea; 10th: Korea; 11th: Korea; 12th: Korea; 13th: Korea.

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 ocean. The centre 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 in research in the long run.

Exhibition extraordinaire

ISEE stall was a huge hit with its models of launch vehicles.

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