



Photo: A Ravindranath

AOGS -7 off to a steady start

GATEWAY MEDIA NEWS BUREAU

Asia Oceania Geosciences Society (AOGS) got off to a steady start here in the city of minarets, Hyderabad. Unlike the usual conferences that begin with an inaugural ceremony, AOGS-7 annual meet started in right earnest quite early in the morning, 8:30 am to be precise in the numerous halls of the plush Hyderabad International Convention Centre (HICC).

The welcome reception, hosted by the Indian Geophysical Union was held at Sampradaya Vedika, Shilparamam Crafts Village, Madhapur, Hyderabad. The chief guest on the occasion was Prithviraj Chavan, Ministry of Science & Technology and Earth Sciences. The guests of honour included Dr Shailesh Nayak, Secretary, Ministry of Earth Sciences.

The Who's Who in Geosciences under one roof

Around 1,200 delegates from over 51 countries have descended in Hyderabad. A staggering number of 1,500 oral and poster sessions covering topics ranging from

Atmospheric Science, Hydrological Science, Ocean Science, Planetary Science, Solar and Terrestrial Science and Solid Earth Science will be presented over a period of five days.

Hyderabad, a geosciences hub

Dong-Kyou Lee, President, AOGS, said of the event, "The Asia Oceania region has the world's largest population and it has its own unique issues. A major geo-sciences society is needed here in the region."

It is only appropriate that the annual meeting is being held here in Hyderabad as the city, which also houses the Gnome Valley, is host to a number of geo-sciences research institutes such as National Geophysical Research Institute (NGRI), Indian National Centre for Information and Ocean Services (INCOIS) and National Remote Sensing Centre (NRSC).

India tops in participation

Out of the 1,200 delegates the Indian participation is an astounding 612 which accounts for

30 per cent. Since the inception of AOGS in 2003, each year, the number of participants have grown.

Catching 'em young

AOGS has come up with a novel idea of reaching out to the student community. As an initiative, the 7th AOGS conference will also have public lectures by eminent scientists, at various schools and educational institutions in the city. The aim, as the organisers said, was to instill a sense of scientific temper among them.

Some of the lectures that will be held are: Global warming and climate change, which will be delivered by Dr C B S Dutt (ISRO), at the Oakridge International School, Role of oceans in global warming by Dr Francis Pavanathara at the Bharatiya Vidya Bhavan, Jubilee Hills School and The first mission to Pluto by

Dr Randall Gladstone at the Geethanjali High School, to name a few. 🍷

Know AOGS



Represents the galaxy, signifies the spiral arm of the galaxies and its various cosmic inhabitants.



Signifies the Earth, Moon or any planet for that matter. Also, the grid of spatial technology.



It's the circle of life, its creation and how life has developed. And, the spiral waves bursting out from the Sun.



Denotes the wave motion of the oceans, also means Asia and the world.

GROUNDWATER POLLUTION

Testing times for groundwater

GATEWAY MEDIA NEWS BUREAU

Expanding cities and shrinking water bodies have increased the dependence on groundwater. To add to that, growing industrialisation and an increasing population are leading to a rise in waste disposal, which is in turn contaminating water. To ensure the availability of clean water, checking the concentration of various minerals and pollutants in it becomes inevitable.

During his presentation, Dr Shakeel Ahmed, Director Grade scientist, NGRI, spoke about optimising the observation network for groundwater quality using the principal component analysis along with geo-statistics. He also discussed a study which was conducted to check groundwater quality, using a cross validation test on 60 water samples that were collected from various areas.

Based on the tests conducted, the contamination level for various minerals, heavy metals and pollutants in the groundwater at several locations was obtained. This helped in streamlining the study by sorting the regions based on the intensity of contamination. Wells with the highest priority were

ranked No 1 and those with the least priority were ranked 60. Gradually, wells with the least priority were eliminated from the study. This technique helped in maintaining the size of monitoring the network, based on the available resources.

On the optimisation of geo-chemical data using the statistical and geo-statistical approach, Dr Shakeel discussed an approach that involves selecting a set of factors for monitoring concentration of various chemicals such as calcium, nitrates, phosphate in groundwater. Based on the level of concentration, points are awarded to samples collected across various regions. Depending on the priority, the water samples are observed and the causes of contamination are studied, following which they are calculated and compared. This approach helps in optimum monitoring of groundwater.

Dr Vandana Parth, a senior research fellow at NGRI, shared her views on the contamination of groundwater due to percolation of pollutants from discarded waste at three sites in Hyderabad – Jawahar Nagar, Dundigal and Autonagar.

Approximately, 3,000 tonnes of

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5 QUICK

Gateway media team caught up with **Michel Ramonet**, *Laboratoire des Sciences du Climat et l'Environnement, France*, **Dr P S Swathi** and **Dr N K Indira** from CSIR Centre for Mathematical modelling & Computer Simulation, Bengaluru for a QUICK 5.

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1 How helpful will the data that is collected be in reducing the concentration of greenhouse gases in India?

We are in the process of observing and collecting data and would be furnishing the same for declaration to the government. We have been collecting it for verification and the work started in 2005. It will take us time to declare it though because the modelling is still being worked upon. Data is being collected at regular intervals.

2 The observations that you have been conducting are based on surface, airborne and satellite monitoring. Which of the three has produced optimum data that can be depended upon?

We have been doing surface monitoring at Ladakh, Andaman and Puducherry. Japan is making some airborne measurements over India and we are a part of that project. Then we have CO₂ and CH₄ measurements, which can be combined with surface measurements. But for CO₂, precise satellite measurements are difficult. Surface measurements are more precise because airborne measurements will have to be made continuously with the aircraft flying at low levels, say at a height of 10 km. Since they are far from source, variations are many.

3 Of all the greenhouse gases that you have been observing, which is the most worrying?

In India, I think it is the CH₄ which is the most worrying aspect, for it affects the atmosphere in more ways than one. Though it is present only in trace amounts when compared to CO₂ and has a shorter lifespan, it is more potent in terms of its atmospheric ramifications.

4 The terrain where the Hanle observatory is situated is very difficult. What are the various problems you have faced while carrying out experiments and observational tasks?

Initially we had expected some problems, but surprisingly there haven't been many. It is perhaps limited to the human living conditions.

5 Why was this particular spot chosen to base the observatory?

We do not have too many local variations like in Puducherry. Since the atmosphere here is not disturbed by too many local variations – which may contaminate the observations – it was the ideal site. It also helps us understand the continental reach of the emissions and gives a fair idea of which air mass carries more trace gases. 🌍

TRACE GASES

Taking GHG measurements, a level ahead

GATEWAY MEDIA NEWS BUREAU

One of the greatest concerns to have gripped us in modern times, is that of greenhouse gases emissions and their escalating levels. Scientists around the world have been attempting to devise ways to monitor them and keep track of the factors that cause them to burgeon and dip. Of special concern are the GHG levels in Asia and Oceania and their measurements. Each country has taken initiatives to set up observatories and monitoring units to achieve this end, and India is definitely racing with the baton to collect data that would help in the long run.

The presentations given as part of the *Radiatively and Chemically Active Trace gases Over Asia and Oceania* session at the **7th Annual Meeting of the Asia Oceania Geosciences Society** at the Hyderabad International Convention Centre, highlighted the research efforts that have been targeted in this area. “Atmospheric carbon dioxide monitoring is an essential part of GHGs monitoring because it is one of the most widely prevalent and potent gases, which may remain in the atmosphere for a long time,” stated Michel Ramonet, scientist and researcher at *laboratoire des Sciences du Climat et de l'Environnement, France*, who

presented the *In-situ Greenhouse Gases Monitoring in India* paper.

Highlighting the fact that there were various GHG monitoring programmes which have been initiated the world over; North American Carbon Programme Plan (NACP) and Integrated CO₂ Observing System (ICOS) in particular, India has its own programme since 2005, which is being supported by 11 observation and monitoring stations spread across the country, which amounts to a ‘pretty good’ coverage of area, according to the presenters. Of the important stations that form a part of the emerging Indian monitoring network of GHGs, are the ones located in Nainital, Sinhadgad in Pune, Cape Rama and Puducherry. However, it's the Hanle observatory at Leh that has been undertaking a lot of specialised observational tasks. Having been chosen for its maximum SF₆ traces, the remote controlled station at Hanle is equipped with CO₂ and CH₄ analysers too and is capable of



taking high precision measurements. The Puducherry and Port Blair stations on the other hand, are used to observe and monitor levels during the mean seasonal cycles, especially signals relating to the monsoons.

While most observatories depend on glass flask and CDRS methods to measure CO₂ levels, Mukai Hitoshi of the National Institute for Environmental Studies, Japan and team, have chosen to observe trace gases levels using cargo ships; it's a different matter though that cargo ships themselves could possibly be a source of CO₂ emissions, a point that a member of the audience raised during the presentation of *GHG Observation Over the Sea in the Asian region Using Cargo Ships*.

The presentation focussed on long term variations in GHGs that are measured through CO analysers, Ozone monitors and Optical Black Carbon Monitors (some of the sophisticated equipment used in research). Dr Hitoshi attempted to highlight the differences between data in South-east Asia and the background data collected over the Pacific.

Results hinted at peaks in winter and a clearly marked influence of forest fires on the levels in the dry season. Interestingly, the observations carried through these cargo ships have also revealed the presence of an unusual layer of something that the researchers are yet to figure out between latitude N0 and S10.

The third presentation in the session discussed the Australian Regional High Precision GHG Observation Network by Marcel Van Der Schoot from CSIRO Marine & Atmospheric Research, Australia. He answered the question that perhaps had been troubling some of the attendees who belonged to other scientific streams; Why are the tropics so important to make such observations? “In addition to playing a major role in the global climate processes, the tropics are also home to over half the global population and have both minimum and maximum CH₄ variables,” he observed.

According to the researcher, land-sea interactions are highly marked in South-east Asia, which is why, data collected from observatories here could play an important role in studying the GHGs patterns. Other presentations in the session included talks by N K Indira and P S Swathi of the Centre for Mathematical Modelling and Computer Simulation, India, Chinmay Mallik from Physical Research laboratory, India and Chenghai Wang of the Lanzhou University, China. 🌍

Testing times for groundwater

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waste is disposed at the site in Jawahar Nagar on a daily basis, while 300 tonnes and around 3000 tonnes of waste is disposed on a daily basis at the Dundigal and Autonagar sites respectively. Disposal of waste at these open sites results in percolation of pollutants into the soil contaminating

the groundwater with minerals and heavy metals. At these sites, the geo-chemistry of groundwater is checked to gauge whether the presence of various elements such as sodium, magnesium and calcium exceeds the prescribed limit set by World Health Organisation (WHO). Tests for heavy metals

such as manganese, nickel, zinc, cadmium, aluminum and arsenic were also performed to see whether their presence is more than that is stipulated by WHO. The tests revealed contamination of groundwater with high levels of nitrate due to leachate. Polythene bags, empty paint containers and used batteries were cited as the main sources of contamination.

Recommendations to control contamination include development of securing landfill sites,

implementation of proper measures for waste segregation and treatment of landfill leachate before it is discharged.

Ranjeet Prasad, a senior research scholar at NGRI, concluded the session with his presentation on deciphering groundwater quality using GIS. The study was conducted at the Kalpeni Island in Lakshadweep. Chemical analysis of the groundwater quality of this island was conducted and pH maps were developed using GIS to

analyse the alkalinity of groundwater at various sites in the island. The water tests showed a correlation with sodium, potassium and magnesium. Tests were also performed to check the concentration of the level of chlorides and the co-relation with alkali and alkaline earth metals in groundwater. Subsequently, a water quality index was developed and contamination of water at various locations was measured on a scale to classify them into good, average and bad water resources. 🌍