THE 51st ANNUAL CONVENTION OF INDIAN GEOPHYSICAL UNION (IGU): A REPORT

The 51st Annual convention of Indian Geophysical Union (IGU) was organized jointly by the Kurukshetra University and the IGU during November 19-21, 2014 at Kurukshetra University, Kurukshetra, Haryana state. The annual convention was conducted to provide a platform to discuss the societal problems and to guide the Indian Geo-scientific community to focus on the most relevant problems and respond effectively to the risks and challenges of presently witnessed global change that is directly affecting the society. All the basic needs of the society - air, water, food, energy, shelter – are directly related to the optimal use of natural resources and knowledge of Earth system dynamics. The Earth and its inhabitants face different types of challenges today: development of new sources of energy; exploration of new sources of minerals and metals; change in climate; detail knowledge of surface and sub-surface water resources; preventive measures to face natural hazards such as the earthquakes, tsunamis, landslides, cyclones, floods, droughts, avalanches and volcanic activity etc. The understanding of different branches of Earth Sciences can help us in taking up apt measures to resolve many of these issues. However, "Earth Sciences and Society" is the focal theme of the convention in order to strengthen the society. The disciplines of Atmospheric, Space and Planetary Sciences; Marine Geosciences and Solid Earth Sciences were covered during the three days convention. After having welcomed the delegates the Local Organising Convener, Dr. Kalachand Sain, Honorary Secretary of IGU, presented the secretary's report. Lt. Gen. (Dr) D.D.S. Sandhu, Vice Chancellor, Kurukshetra University, the guest of honour, welcomed the gathering to the university and highlighted the importance of Earth Sciences and its influence on the exploration of natural resources, climate change, pollution control etc.,

Prof. Shailesh Nayak, President of IGU & Secretary, MoES, highlighted the significance of various branches of the Earth System Sciences and the need of integrating the Atmosphere, Geosphere and Biosphere. He also informed the gathering about various aspects of Koyna Deep Drilling, Institute of Borehole Geophysics at Karad, evolution of Himalayas, Climate change, Earthquake monitoring, services to fishermen, farmers, navigators etc. He has underlined the urgent need of unified approach in education, building human resources, establishing the state-of-the-art-infrastructure like SHRIMP etc., developing international collaborations, monsoon prediction, the requirement of adequate funds and finally converting the science to the service of the Society.

Prof. Manik Talwani of Rice University, USA, the Chief Guest of the function inaugurated the convention. He appreciated the spectacular progress and the great advances of Geophysics that has taken place in India in terms of instrumentation, seismic investigations and so on. He advised the young researchers to achieve excellence through hard work and come out with innovations which would help India in her development.

There were about 150 participants in total from different parts of the country. Apart from the award lectures, about 60 oral papers and about 70 student posters presentations were presented during the three days convention. Different topics on atmospheric sciences, solid earth sciences including seismology, marine geosciences and climate change were covered.

It is heartening to note that the three day annual convention provided ample opportunity to the participants, especially the students and young researchers, to better understand the importance of scientific endeavours meant to help the society and the environment. After the inaugural function the IGU-2014 awardees delivered their lectures. In the first technical session on Atmospheric, Space & Planetary Sciences. Results on aerosol gaseous interactions, chemical characteristics of dust aerosols due to Anthropogenic emission in Delhi, the vertical component (Z) of the Earth's main magnetic field, Plasma density irregularities in the ionosphere, seasonal and annual variations in the atmospheric during the monsoon in India, magnitude of floods and atmospheric storms and depressions due to Zenith total delay variations were presented. In the second session on Young Researcher Program, different approaches such as the seismic and seismological

data analysis, regional earthquake studies in and around Indian subcontinent, ocean acidification in southeastern and effects of atmospheric CO_2 concentration in eastern Arabian Sea were discussed. In the third session, on Marine Geosciences topics like the tectonic evolution of oceanic ridges, continental margins and the mineral wealth of the oceans were covered. In the last session on Solid Earth Geosciences, recent studies deep earth, exploration of sedimentary basins, geo-tectonics of several provinces, theoretical and basic fields of geosciene research were discussed. Before each technical session, IGU arranged for invited talks and memorial lectures in the relevant fields reputed scientists like Prof Manik Talwani, Dr. N. Indra Gupta, Prof. B.N. Goswami, Dr. S. Rajan, Prof. Nibir Mandal and Dr. Y.J. Bhaskar Rao. Young researchers and students showed lot of enthusiasm in presenting their scientific results through posters.

A special feature of the convention is the Young Researcher Programme organized for the benefit of young researchers, project assistants and the post graduate students from different universities and institutes of India. Best poster presentation awards were given to research scholars and students, while the best oral presentation awards were handed over to young researchers. This is to encourage the young brains in Earth sciences to stimulate their thinking and to motivate them to come into the realm of Earth sciences. The delegates thoroughly enjoyed the scientific proceedings and the excellent hospitality provided by the local organizers. In this regard, Prof. Dinesh Kumar and his team deserve the compliments.

The following IGU awards were presented by Prof. Shailesh Nayak, President, IGU, during the inaugural function and the citations of different recipients are given below:

IGU- HARI NARAIN LIFETIME ACHIEVEMENT AWARD-2014

Dr. Vijay Prasad Dimri, INSA Senior Scientist at the CSIR-National Geophysical Research Institute, Hyderabad has made original contributions in the field of Geophysics by reformulating geophysical problems for realistic scaling geology. He is the pioneer of well-known Scaling Spectral Method. His remarkable work includes extension of fractal theory to address problems related to the Earth Science like Seismology, Exploration, Aquifer mapping, Enhanced oil recovery and Crustal studies etc. Dr. Dimri developed a new method for modeling of complex objects lying beneath the Earth surface by using fractal geometry. This work has been granted a US patent. Dr. Dimri has made exceptional contributions in the field of geophysical signal processing by establishing a parallelism between deconvolution and inversion and published a book on 'Deconvolution and Inverse Theory' for Elsevier, in 1992.

KRISHNAN MEDAL-2014

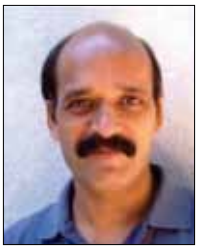
Gas hydrates is considered to be an alternative energy resource as well as a potential natural hazard. Dr. Pawan Dewangan, Senior Scientist at the of CSIR-National Institute of Oceanography, Goa contributed towards understanding the gas hydrate system in Krishna-Godavari (KG) offshore basin. The analysis of high resolution seismic data shows active migration of methane through the fault system. Methane seeps lead to dissolution of primary magnetic minerals and formation of authigenic magnetic minerals such as greigite.

ANNI TALWANI MEMORIAL PRIZE- 2014

Dr. Kalachand Sain, Senior Principal Scientist at the CSIR-National Geophysical Research Institute, visited Cambridge University,UK and Rice University, USA as a post-doctoral fellow. At present, he is the Head of Gas-Hydrate Group at CSIR-NGRI. Dr. Sain has developed innovative approaches for the delineation and assessment of gas-hydrates, and identified potential zones in the Mahanadi, KG and Andaman offshore, where gas-hydrates were later recovered by drilling. He has overcome the challenge of quantifying gas-hydrates in fractures, and assessed, for the first time, 32% average gas-hydrates in 120m fracture shale in KG basin. He has established the 'Centre for Gas Hydrates Research' at CSIR-NGRI to pursue cutting-edge research, and acquired high-quality seismic data in the Bay of Bengal by designing a specific experiment that has revealed new prospective zones of gas-hydrates in KG and Mahanadi basins.

Dr. Sain has published ~150 research articles. He has received number of awards and fellowships, few are:

Fellow of National Academy of Sciences, Allahabad, AP Scientist Award, National Mineral Award, Raman Fellowship of CSIR, Krishnan Medal of IGU, CSIR Young Scientist Award, Best Paper Award by International Association of Gondwana Research, Best Poster Presentation Award by International Conference on Oil & Gas by PETROTECH. He is a Bureau Member of International Lithosphere Program under IUGG. He served as a Guest Editor in 'Marine & Petroleum Geology' in 2011 and 2014 and as a member of Editorial Board for the 'Encyclopedia of Solid Earth Geophysics'.



ANNI TALWANI MEMORIAL PRIZE- 2014

Dr. Vineet K Gahalaut, Principal Scientist at the CSIR-National Geophysical Research Institute, Hyderabad has immensely contributed in seismology and tectonic geodesy. He has provided significant insight into the intraplate and interplate earthquakes of the Indian subcontinent using GPS measurements of crustal deformation. In the Himalayan region, his analyses of the available geodetic data in constraining the great earthquake ruptures of past 200 years and in inferring the present day process of crustal shortening, and slip partitioning are amongst some of the important highlights of his contributions. In the Andaman Sumatra subduction zone he has used the crustal deformation data to understand the earthquake cycle and the deformation associated with it. In the Indo-Burmese arc he has provided the first unequivocal evidence of an active plate boundary fault between the India and Burma plates. He has also demonstrated how the deformation in the intraplate region is different from that in the plate boundary regions.

PROF. K.R. RAMANATHAN MEMORIAL LECTURE-2014

Prof.B.N. Goswami, Former Director, Indian Institute of Tropical Meteorology, Pune has been selected for delivering the Prof. K. R. Ramanathan Memorial Lecture of IGU for the Year, 2014 for his pioneering contributions in the area of atmospheric dynamics and climate studies and the discovery of Indian ocean dipole mode. This opened a new area of research in air-sea interactions. Professor Goswami's major scientific contributions include physical mechanisms identified for scale selection of monsoon intra-seasonal oscillations. Using a zonally symmetric general circulation model, for the first time, Professor Goswami identified a radiative-convective-dynamical feedback mechanism for generating the northward propagating 30-50 day mode. He was the first to show that a convectively coupled gravest Rossby wave is responsible for the observed quasi-biweekly oscillation of monsoon. He developed a technique for prediction of active-break spells of monsoon 3 weeks in advance, and was the first to make a quantitative estimate of the potential predictability of the tropical coupled ocean-atmosphere system. His unique work has been the discovery of a new mode of variability in the Indian Ocean, namely, the Indian Ocean Dipole Mode. His identification of a new extratropical teleconnection pathway through which EL Nino's influence the Indian monsoon rainfall has led to a new objective definition of the length of monsoon season. His scientific leadership has led to the development of the first Earth System Model by India at IITM.

Professor Goswami is a Fellow of the Indian Academy of Sciences, Bangalore, Indian National Science Academy, New Delhi, National Academy of Sciences (India), Allahabad and the Third World Academy of Sciences, Trieste. He is also the recipient of Hari Om Ashram Prerit Vikram Sarabhai Award (1994) and SS Bhatnagar Award (1995).

DR. H.N. SIDDIQUIE MEMORIAL LECTURE -2014

Dr. S. Rajan, Director, National Centre for Antarctic and Ocean Research, Goa obtained Ph.D in Geology and Geophysics from the University of Hawaii, USA. Dr. Rajan has over 33 years of scientific and administrative experience in various facets of geosciences, initially in the Geological Survey of India (1979 to 1997) and since then at the National Centre for Antarctic and Ocean Research (NCAOR), Goa. He has been involved in marine geoscience surveys and continental margin research specializing in maritime boundary delineation since 1984. Leader of the Indian Continental Shelf Program between 1999 and 2012, Dr. Rajan has been responsible for collecting, processing and interpreting the geoscientific data to define the outer limits of the country's extended continental shelf under the provisions of the United Nations Convention on the Law of the Sea (UNCLOS).

Dr. Rajan was India's elected representative to the United Nations Commission on the Limits of the Continental Shelf (CLCS) from 2007-12, and is re-elected. Dr. Rajan is also the Member-Secretary of the Indian National Scientific Committee for Integrated Ocean Drilling Program (IODP), and the Vice-Chairman of the Ocean and Atmospheric Sciences and Technology Cells of the Ministry of Earth Sciences at the Universities of Mangalore and Goa. On the polar front, Dr. Rajan was a member of the four-member team which visited Antarctica during 2003-04 to identify a site for India's new Antarctic research base. The research station named "Bharati" has since been commissioned. He has also visited the Arctic many times and till assuming the charges of Director, he had been the principal investigator of a project to study the seasonal and annual responses of an Arctic fjord to climate variabilities. Dr. Rajan has been recognized with the National Geoscience Award-2010 for his remarkable contribution in the field of Ocean Development.

SRI L.N. KAILASAM MEMORIAL LECTURE- 2014

The scientific work of Prof. Nibir Mandal of Jadavpur University, Kolkata primarily aims at theorizing deformational and flow processes, and testing them through physical experiments. One of his mathematical models enumerates the curvilinear trajectories of syntectonic porphyroblasts as a function of their rotation and growth rates. Similarly, he has shown different types of particle motion on faults involving both rotation and translation. Using experimental models different interfering fold structures have been explained in his study by invoking the mechanics of superposed buckling. A direction of his work dealt with the kinematic analysis of ductile shear zones. His theoretical model predicts the amount of transpression possible in a ductile shear zone. Prof. Mandal has proposed hydrodynamic models for characterizing the flow perturbations around rigid as well as deformable bodies. Using both theory and experiments he has also shown the process of flaw-controlled shear localization in heterogeneous rocks. Prof. Mandal's current work targets at understanding some of the outstanding geodynamic issues, like MOR evolution and plume dynamics through numerical modeling in the framework of geophysical fluid mechanics. His major programme currently intends to develop a high-pressure and temperature rock deformation laboratory facility.

ELECTROTEK & GEOMETRICS ENDOWMENT LECTURE-2014

Dr. Y.J. Bhaskar Rao, Chief Scientist and the Acting Director of CSIR-National Geophysical Research Institute, Hyderabad is a highly reputed geochronologist of the country. He obtained his M.Sc. degree in Geology in 1975 and Ph.D. (supervised by late Dr. S.M. Naqvi) in 1982 from the Osmania University. Dr. Rao was introduced into the world of mass spectrometry, isotope geochemistry and geochronology by late Prof. Ramamurthy at the University of Minnesota, USA where he worked as a Post-Doctoral researcher during 1981-82. His pioneering work on the oldest rocks of the Dharwar Craton and Southern Granulite Terrain, southern India as well as putting fundamental chronological limits on the major thermal, magmatic and metamorphic events made him one of the highly cited (> 65 publications and 1100 citations) researchers in the field of Precambrian geology of India. He was instrumental in establishing the first Laser Ablation Microprobe - Multi Collector-ICPMS laboratory in India at the CSIR-NGRI for zircon geochronology and multiple isotope systematics. As an Acting Director in two spells (2010-12 and January, 2014) he positioned CSIR-NGRI for an accelerated growth in terms of bringing new funding opportunities as well as forging new scientific collaborations. He is also a member of several key national committees of the DST, MoES, GSI etc. helping to formulate the national geosciences programs and funding individuals as well as organizations.

PROF. D.LAL BEST PAPER AWARD-2014

Dr. Talari Ramakrishnaiah Chetty, obtained M.Sc., (Geology) in 1972 from Sri Venkateswara University, Tirupati, joined the CSIR-National Geophysical Research Institute, Hyderabad in 1974, obtained Ph.D. in 1983, and superannuated as Scientist 'G' in April 2011. He continued as CSIR-Emeritus scientist at NGRI till the end of April, 2014. His commitment and

untiring efforts led to many novel discoveries leading to new concepts that provide profound influence in understanding the Indian Precambrian Geology. Dr. Chetty was instrumental in the discovery of the richest diamondiferous Kimberlite pipe in Andhra Pradesh. His discovery of Kimberlite and the novel concepts proposed by him provided an impetus for Kimberlite exploration leading to the discovery of over 150 kimberlite occurrences in India in recent years.

Dr. Chetty has been awarded National Mineral Award by the Ministry of Mines (2006). His outstanding research contributions to the reconstruction models of Rodinia and Gondwana Supercontinent earned him the prestigious international Australian Endeavour Executive Award (2008). Dr. Chetty is honored with INSA-JSPS Fellowship, Fellow of Andhra Pradesh Academy of Sciences; CSIR-DAAD (Senior) Exchange Fellowship, 1997; INSA-Royal Society Visiting Fellowship, 1987; and visiting professor in many universities of India and abroad. Dr. Chetty has published over 150 scientific publications dealing with structural geology and shear zones, in journals of repute and edited two important special issues as the Chief Guest editor: Gondwana Research (August, 2006; 8.12 IF), Journal of Asian Earth Sciences (August, 2011; IF 2.8).Dr. T.R.K. Chetty is the first Indian to be elected as the President of the International Association of Gondwana Research (IAGR), an international forum for earth scientists.

Along with the above mentioned awards for the year 2014, ONGC- IGU best Oral and Poster presentations for Young Researchers program, best Poster for Students and Prof. Jagdeo Singh & Dr. S. Balakrishna Memorial Grant for university toppers in Geophysics are also awarded. The awardees are as follows:

ONGC-IGU Best Oral presentation award under Research Scholar category:

Dr. Manisha Sandhu, Kurukshetra University
Mr. Rekapalli Rajesh, CSIR-NGRI, Hyderabad

ONGC-IGU Best Poster presentation award under Research Scholar category:

Mr. Nara Damodara, CSIR-NGRI, Hyderabad
Mr. Sandeep Arora, IIT, Rookee
Miss. Adilakshmi, CSIR-NGRI, Hyderabad

ONGC- IGU Best Poster Presentation award under students' category:

Miss. Prerna Gaba, Kurukshetra University
Mr. J.K. Bhardwaj, Kurukshetra University
Miss. Alka Rani, Kurukshetra University

Prof. Jagdeo Singh & Dr. S. Balakrishna Memorial Grant for student toppers from different universities:

Osmania University (Geophysics), Hyderabad
K. Navitha
D. Raghavendar

Andhra University (Geophysics), Visakhapatnam\
T. Mohan Kumar- III M.sc (Tech.), Geophysics
S. Chittipapa- II M.sc (Marine Geophysics

IIT (Applied Geophysics), Bombay
Sakhshi Singhal, M.Sc Applied Geophysics
Vikas Gupta, M.Sc Applied Geophysics

ISM (Geophysics), Dhanbad
Abir Baneerjee
Mohit Ayani

Kurukshetra University (Geophysics), Kurukshetra
Anjali Sharma
Anchal Mehra

IGU places on record the support received from local organizing committee (Profs/Drs. Dinesh Kumar, S.S. Teotia, R.C. Patel, RBS Yadav, Mr. Sushil Kumar, Ms Manisha Sandhu, Mr. Pardeep Kumar) and sponsors (INCOIS, NCAOR, ONGC, Electrotek Intl. Inc.& DMT, NRSC,ISRO,IIG, CSIR-NGRI, CSIR-NIO, NPICL, Aimil Ltd., CGG, CSIR-NEERI and all session chairpersons.

Releasing the abstract volume by Chief Guest, Prof. Manik Talwani, Research Professor, Rice University, USA. Prof. Dinesh Kumar, LOC- Convener, Lt. Gen. (Dr) D.D.S. Sandhu Vice Chancellor, Kurukshetra University, Prof. Shailesh Nayak, President, IGU & Secretary, MoES, Dr. Kalachand Sain, Hon. Secretary, IGU and Prof. S.S. Teotia, LOC- Member, Kurukshetra University are also seen on dais.

Dr. D.D.S. Sandhu, Prof. Shailesh Nayak and Prof. Manik Talwani during the inaugural function.

Valedictory function: Prof. Raghuvendra Tanwar, Dean, Academic Affairs, Kurukshetra University Kurukshetra, Prof. Manik Talwani, , Prof. Dinesh Kumar, and Dr. Kalachand Sain.

T.R.K. Chetty, Kalachand Sain & ASSSRS Prasad