

# General Lecture

## *Chandrayaan-1 and Beyond*

DR. K.N. SHANKARA  
SATISH DHAWAN PROFESSOR  
INDIAN SPACE RESEARCH ORGANIZATION  
BANGALORE

***Sunday, 1<sup>st</sup> November, 2009; Time: 12:00 Noon, Venue: L-15, New Lecture Hall Complex***

### **Abstract**

The talk covers an introduction to the Chandrayaan-1 Mission of ISRO along with the satellite description of Indian and foreign payloads carried by it. A documentary film on Chandrayaan-1 of 22 minutes duration is included. The talk covers future possibilities of commercialization of lunar missions, lunar helium as a safe energy source for the 21st century and the recent discovery of water on the moon. Hypothesis for the origin of water and NASA's LCROSS Mission will be discussed.

### ***About the speaker***

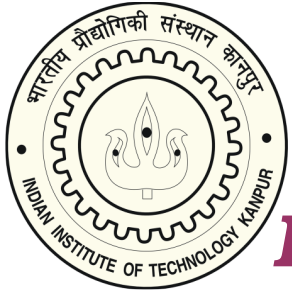
After obtaining a doctorate in Electrical Communication Engineering from Indian Institute of Science Bangalore, Dr. K. N. Shankara joined the Indian Space Research Organization in 1971 at Ahmedabad. Till recently, Dr. Shankara was the Director of ISRO Satellite Centre – the lead Centre of Indian Space Research Organisation, for realizing the satellite programs in the areas of communication, remote sensing and space sciences. He was also Director, SATCOM Programme and Programme Director for Disaster Management Support at ISRO Headquarters, Bangalore. Before assuming this responsibility, Dr Shankara held the post of Director, Space Applications Centre, Ahmedabad (November 2002 - June 2005). He has made extensive contributions to the development of communication payloads for INSAT satellites and to programs such as telemedicine, tele-education and disaster management. Dr. Shankara was a Board Member of International Charter on Space & Major Disasters.

At present, Dr Shankara is Satish Dhawan Professor at ISRO Headquarters, Bangalore. He is Fellow of the Institution of Telecommunication Engineers India, Fellow of Astronautical Society of India, life member of International Microelectronics and Packaging Society and also an Associate of National Institute of Advanced Studies. He was awarded ISRO/DOS Distinguished Award for contribution towards the first Indian satellite, *Aryabhata*. Dr. Shankara is the recipient of the IETE-IRSI (83) award for the year 1995-96. He was awarded the Om Prakash Bhasin award for Space and Aerospace research (1998), Ramlal Wadwa Gold Medal for outstanding contributions in Electronics during the year 2000 and Astronautical Society of India award for Space System Management, the same year. He was awarded PADMASHRI by the Government of India in 2004 for his contributions to the field of satellite technology. Dr Shankara recently delivered the Ramanujan Memorial Lecture for the Systems Society of India (2007).

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**All interested are welcome.**

K. Muralidhar  
Dean: Research and Development



# Institute Lecture

## *Life and death of mountain ranges*

Dr. Jerome Lave  
Director, CRPG-CNRS at Nancy (France)

**Monday, 26<sup>th</sup> October, 2009; Time: 6:00 PM, Venue: L-1, Lecture Hall Complex**

### **Abstract**

How do mountain ranges grow and decay? How long do their topography last? What sets the elevation of the high peaks of the Himalayas and of the other mountains on Earth? How do large orogenic plateau like the Tibetan plateau form, and why some other ranges are much narrower? If the emergence of the plate tectonics theory in the 60's has permitted to explain the primary engine or internal forces that contribute to building topographies, the progressive recognition in the 90's of the role of erosion in the evolution of the mountain ranges has revolutionized the tectonics and geomorphology fields. The erosion not only controls the decay of the mountain topography during post-orogenic periods when collisional tectonics has stopped, but it also contributes during the active phase of mountain building to stabilize the topography toward a dynamic equilibrium through several positive feedback loops or coupling between internal and external processes. This coupling arises because erosion depends on topography while denudation influences tectonic processes by modifying the Earth's surface through mass redistribution, i.e. by changing the stress state in the orogenic wedge, which in turn induces an internal (or tectonic) response to try to restore the initial wedge geometry. The evolution of a mountain range, its mean and maximum elevation, as well as its width or its eventual shape asymmetry, are all dictated by this subtle balance between mass addition from tectonic processes and mass removal from erosion. As a consequence, the characteristics of any mountain range reflect the tectonic convergence rates across the collision zone, but also the climate intensity, the precipitation distribution, the type rock exposed at the surface or the thermal state of the deforming crust.

For twenty years, major advances in physical arguments, in experiments, in data acquisition or in numerical modelling have brought new quantitative understanding on how mountain ranges evolve modulated by the feedbacks between tectonics, climate and erosion. These recent views, putting a particular emphasis on the Himalaya-Tibet collision zone will be presented.

### **About the speaker:**

Jérôme Lavé is an most active researcher in erosion and active tectonics in France. After school in engineering sciences, he started to study geophysics at the Institut de Physique du Globe in Paris. He got his PhD in geophysics in 1997, then worked as a post-doctoral scholar at Pennstate University before getting a permanent position at CNRS in 1999. Until 2007 he has been working at the Laboratoire des Chaînes Alpines (LGCA) in Grenoble, and recently joined the Centre de Recherches Pétrographiques et Géochimiques (CRPG) in Nancy, where he recently get hired as Research Director. He is presently working at Boulder University (Colorado, USA) as a visiting scholar during a sabbatical year until summer 2009.

Over the last decade, Lavé has been leading several projects on experimental erosion, Himalayan erosion and paleoseismology, Zagros tectonics, or on paleoaltimetry development. In parallel, he has been co-organizing several international workshops (Himalaya-Karakoram-Tibet HKT20 workshop held in Aussois (France) on March 2005; workshop held in IFP-Paris (France, December 2005) dedicated to the "Thrustbelts and foreland basins"). He has been directing or co-directing seven PhD students, sharing with them his passion for the study of the Earth processes, pushing them to go back and forth from observations to models, and to follow their own creative path. He has published more than 30 articles in major journals (Nature, Science, EPSL, JGR, GRL, GJI), and the quality of his work in Himalaya has been acknowledged in 2003 by the Geological Society of America with the *Best paper award* (in structural geology and tectonics).

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**All interested are welcome.**

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Dean: Research and Development



# Institute Lecture

## *Internet Based Experiments: Exploring a New Paradigm in Distance Education*

Professor Joseph John  
Department of Electrical Engineering  
Indian Institute of Technology Kanpur  
Kanpur 208016 India

in association with

Dr. Sameer Khandekar, Dr. Anjan Kumar Gupta, Dr. K. P. Rajeev,  
Dr. Anish Upadhyaya and Dr. Sandeep Sangal

**Wednesday, 21<sup>st</sup> October, 2009; Time: 6:00 PM, Venue: L-1, Lecture Hall Complex**

### **Abstract**

World Wide Web is a vital element of human activity in modern times. Arguably no other technology has made such an impact as the internet. It forms one of the core foundations of a successful information technology-based society.

Computer-aided data acquisition, web-based experiments, virtual instrumentation and control applications have been an active area of interest in recent years. Similarly researchers along with educational groups have been working in the area of development of remote control systems suitable for classroom teaching. Technology enhanced learning is slowly becoming a new standard in which universities and academic institutions are formulating academic courses of the next generation.

In this lecture, we will give a live demonstration of a few virtual laboratory experiments which have been developed under a pilot project sanctioned by the Ministry of Human Resource Development. The virtual laboratory concept encompasses real-time data acquisition on the experiment, storage, post-processing and its online transmission to multiple users logged on to their respective web-browsers. Control of the experimental process parameters from remote stations over the web in real-time is also incorporated. An interactive academic platform has been envisioned (including audio /video /chatting /SMS messaging) wherein demonstration as well as research experiments can be carried out online in real time. Salient features of this platform will be discussed and demonstrated.

The concept opens up a new paradigm of training, education and research in engineering sciences.

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**All interested are welcome.**

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# Institute Lecture

## *The Rise of Carbon: Nanotubes and Graphene*

**A.K. Sood**

**Department of Physics  
Indian Institute of Science  
Bangalore, India**

***Monday, 03<sup>rd</sup> August, 2009; Time: 6:00 PM, Venue: L-1, Lecture Hall Complex***

### **Abstract**

Carbon nanotubes and graphene are the one and two-dimensional forms of carbon discovered in the last few years. These have many fascinating physical properties translating into new devices and applications. The talk will discuss the new science being done with these nano-systems in our laboratory with a realizable potential for applications. Examples from our work will include new results on generation of voltage by the flow of air on carbon nanotubes, how water behaves inside nanotubes and graphene based field effect transistors.

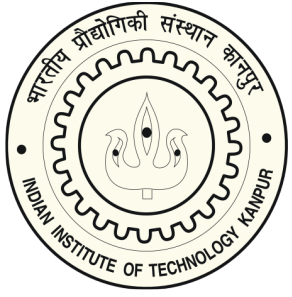
### **Biosketch**

A.K. Sood is Professor in the Department of Physics at Indian Institute of Science, Bangalore. He was Chairman of Division of Physical and Mathematical Sciences at IISc from 1999 till March 2008. His research interests include Physics of Nano systems like nanotubes and graphene, strongly electron correlated systems and physics of soft condensed matter. He has published more than 240 papers in refereed international journals and holds 2 US patents and 4 Indian patents. The patent on the gas flow induced voltage generation on semiconductors and nanotubes, an effect popularly known as Sood Effect has been licensed to a US company. His work has been recognized by way of many honors and awards. These include Fellowships of Indian Academy of Sciences, Indian National Science Academy, and The World Academy of Sciences (TWAS). He is recipient of many awards which include the G.D. Birla Award, S.S. Bhatnagar Prize, TWAS Prize in Physics, FICCI Prize, Goyal Prize, M.N. Saha Award and Millennium Gold Medal of Indian Science Congress, Sir C.V. Raman Award of UGC, Homi Bhabha Medal of Indian National Science Academy, DAE Raja Ramanna Award and the National Award in Nanoscience and Nanotechnology. He is one of the Executive Editors of an International Journal Solid State Communications. He is Vice President of Indian National Science Academy and is currently holding the Bhatnagar Fellowship of CSIR.

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# Institute Lecture

## *The Role of Science Fiction in the Present Age of Science*

**Jayant V. Narlikar**

**Inter-University Centre for Astronomy and Astrophysics**

**Ganeshkhind, Pune 411 007 India**

**Wednesday, 24<sup>th</sup> June, 2009; Time: 6:00 PM, Venue: L-1, Lecture Hall Complex**

### **Abstract**

Starting with different categories of science writing, this lecture will identify science fiction (SF) as a special category whose merit is judged by literary as well as scientific criteria. Unlike some literary critics, the present speaker does not believe that a piece of literature loses merit if it is written with a motive. He, for one, feels that SF can be written to bring science to the masses, make them science friendly and make them informed citizens in today's environment. Good SF can make projections into the future and alert the society against possible dangers. The lecture cites the example of Fred Hoyle's SF novel *The Black Cloud* which was written to introduce the idea of a molecular cloud. Good SF can anticipate real science as this one did. The lecture cites other examples of this anticipation. The author narrates his personal recollection of a debate between Fred Hoyle and Ray Bradbury on *The Message of Science Fiction: Prophetic or Profane?*

While good SF can play a useful role as a bridge between science and society, bad SF can take arbitrary and unjustified liberties with established science, be a horror story or a fairy tale in a different garb, or promote superstitious beliefs. Examples will be given of these different characteristics. SF will be appreciated as a respectable form of literature if the literary aspect of SF is of high quality. It is suggested that one way of achieving this goal is to encourage writers of good literature to take up SF writing in consultation with a scientist.

### **Biosketch**

Jayant Narlikar was born on July 19, 1938 in Kolhapur, Maharashtra and received his early education in the campus of Banaras Hindu University (BHU). He got his Cambridge degrees in mathematics: B.A. (1960), Ph.D. (1963), M.A. (1964) and Sc.D. (1976), but specialized in astronomy and astrophysics. He distinguished himself at Cambridge with the Smith's Prize in 1962 and the Adams Prize in 1967. He later stayed on at Cambridge till 1972, as Fellow of King's College (1963-72) and Founder Staff Member of the Institute of Theoretical Astronomy (1966-72).

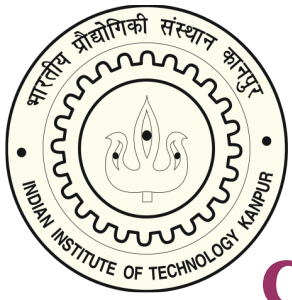
Narlikar is internationally known for his work in cosmology, in championing models alternative to the popularly believed big bang model. His work has been on the frontiers of gravity and Mach's Principle, quantum cosmology and action at distance physics. He is a Bhatnagar awardee, as well as recipient of the M.P. Birla award, the Prix Janssen of the French Astronomical Society and an Associate of the Royal Astronomical Society of London. He is Fellow of the three national science academies as well as of the Third World Academy of Sciences. Apart from his scientific research, Narlikar has been well known as a science communicator through his books, articles, and radio/TV programmes. For these efforts, he was honoured by the UNESCO in 1996 with the Kalinga Award. Narlikar broke new grounds in space research, when during 1999-2003 he headed an international team in a pioneering experiment designed to sample air for microorganisms in the atmosphere at heights of up to 41 km. Biological studies of the samples collected led to the findings of live cells and bacteria, thus opening out the intriguing possibility that the Earth is being bombarded by microorganisms some of which might have seeded life itself here. Narlikar was decorated Padmabhushan in 1965, at the young age of 26. In 2004 he was awarded Padmavibhushan.

Professor Narlikar's has also been engaged actively in efforts of science popularization, which includes the writing of both popular science books as well as science fiction in Hindi, Marathi and English. These books have been translated in other Indian languages also. His Marathi book *Akashashi Jadale Nate* on astronomy for the lay reader became an instant success. His popular books in English include *The Lighter Side of Gravity* and the *Seven Wonders of the Cosmos*. In his science fiction writing, Narlikar has tried to depict the Indian environment and highlighted the ongoing interaction between society and science, besides projecting it into the future. His science fiction story *Dhoomaketu (the Comet)* has been made into a 2-hour film by the Children's Film Society of India.

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**All interested are welcome.**

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Dean: Research and Development



# Institute Lecture

## IGNOU-NPTEL Proficiency Certificate Courses and Professional Diploma Programs

**K.R.Srivathsan**  
**Pro-Vice Chancellor**  
**IGNOU, New Delhi**

**Thursday, 26<sup>th</sup> February, 2009; Venue: L-1, Lecture Hall Complex Time: 6:00 PM**

### Abstract

The presentation will cover the following topics:

- (i) **IGNOU-NPTEL Proficiency Certificate Courses and Professional Diploma Programs using NPTEL Content** for teachers in Engineering Colleges.
- (ii) Tutored Video Instruction methodology.
- (iii) IGNOU Online Study Guide for students taking the IGNOU-NPTEL Courses.
- (iv) Technology Enhanced Course Management process - Role of Faculty Anchor.
- (v) Advanced Centre for Informatics and Innovative Learning.
- (vi) Request for interested faculty participation - their role in the course management.

### Biosketch

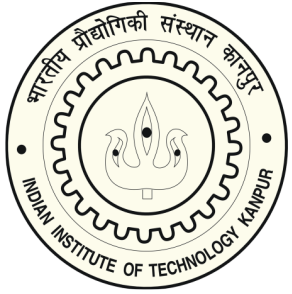
Professor K.R. Srivathsan obtained his Bachelor's degree from the Regional Engineering College, Durgapur, M.Tech. from IIT Kanpur and Ph.D. from Queen's University, Canada – all in Electrical Engineering. He was Professor and Head of the Electrical Engineering Department at the Indian Institute of Technology Kanpur. Since Dec. 2000, Prof. Srivathsan took over as the first Director of the Indian Institute of Information Technology and Management – Kerala. Prof. Srivathsan has been associated with India's developments in Networking, Internet and IT from the mid-1980s. He was a founding member and coordinator of ERNET in the 80s and early 90s. He was a core team member that established the first campus-wide LAN in the country in the 80s. One of his significant contributions was the planning, installation, configuration and commissioning of a large multi-segment LAN and network services for the CAD/CAM and Computing team of Engineers and Scientists of the LCA Project under the Aeronautical Development Agency (ADA) and associated organizations such as NAL. Since then he has been a regular visitor to ADA and NAL, particularly the Varsha Atmospheric Sciences and NAL's Computer Services Groups and helped mentor their networking and information systems related developments. As Director of IITM-K, Prof. Srivathsan guided development and applications of several advanced network and e-learning services for technology enhanced education. His Education Grid team recently set up facilities packaged with NPTEL content in the Nagaland University. Over the last six years, he has been actively pioneering and guiding several developments in the applications of IT in Education, Knowledge Management, Enterprise Applications Integration, Digital Libraries, Distributed Information Systems and Technology Enhanced Learning and Teaching. Three of the projects that IITM-K initiated under his guidance have won Manthan Awards from the Digital Empowerment Foundation and two citations of PC Quest in the category of best e-implementations.

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# Institute Lecture

## Simulation of multiphase flows with Volume-of-Fluid method

**Prof Stéphane Zaleski**

Université Pierre et Marie Curie, Paris,  
France

**Wednesday, 25<sup>th</sup> February, 2009; Venue: L-1, Lecture Hall Complex  
Time: 6:00 PM**

### **Abstract:**

Many multiphase flows are critical in industrial and natural processes. Recent improvements in multiphase flow simulation, as well as the increase in CPU power of typical computer architectures, allow ever more detailed simulations of such flows. Recently, improved Volume-of-Fluid methods have been developed and adapted to efficient spatial discretisations such as oct-tree adaptive mesh refinement. These discretisations are combined with a full Direct Numerical Simulation (DNS) of the Navier-Stokes equations with embedded solid bodies. The result is that simulations of three-dimensional jets, for instance of diesel fuels in high pressure air, become about to be feasible. We show some examples of atomising jets with and without the simulation of flow inside the injectors upstream. Probability Distribution Functions of droplet sizes and the influence of upstream conditions on the atomization are shown.

### **Biosketch:**

- 1990 Junior prize of Délégation Générale à l'Armement.
- 1993 Special prize Seymour Cray France.
- 1995 Plumey Prize of the Academy of Sciences
- 2002 Prize Victor Noury of l'Académie des Sciences.
- 2005 CNRS silver medal (secteur SPI)
- 2005 Fellow of the American Physical Society, Division of Fluid Dynamics.

Presently Professor Zaleski Director of the Institute Jean Le Rond d'Alembert, Paris. Drops, bubbles and interfaces we investigate phenomena involving free surfaces and interfaces between fluids. We rely on numerical methods, parallel computing, and theoretical analysis. Experimental studies are under way. Professor Zaleski holds the view that it is beneficial for scientists to share their ideas and techniques freely. Recently he wrote an opinion article on Open Source and CFD, entitled. Science and fluid dynamics should have more open sources. It describes in about 8 pages why scientists are reluctant to let others see their code. The intended audience is academics like me, who write medium size research software and collaborate with a small group of graduate students as well as a few collaborators in other universities or companies. Professor Zaleski provides an explanation based on the different ways in which academics and programmers gain reputation. He then advises a change of minds: science should be more open.

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**All interested are welcome.**

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# Institute Lecture

## WHY DID SCIENTIFIC RENAISSANCE TAKE PLACE IN PRE-MODERN EUROPE AND NOT IN INDIA

**Arun Kumar Biswas**

Professor(Retired)

Department of Materials & Metallurgical Engineering  
Indian Institute of Technology Kanpur

**Wednesday, 18<sup>th</sup> February, 2009 Venue: L-1, Lecture Hall Complex  
Time: 6:00 PM**

### **Abstract:**

Some work has been done on this subject by reputed scholars. The speaker has investigated *Mineral Processing to Elemental Science* transition in Europe (1500-1800 A.D), history of science in ancient and medieval India, and the Bengal Renaissance (1784-1930). The Indian National Science Academy (INSA) has sponsored his various research projects.

The complex causality factors underlying the progress of science and its occasional hindrance have been studied. The positive and negative (why, and why not) questions are equally relevant, although the answers are tentative and not definitive. Such investigations should in principle, aid in our deliberations on science and its planning in modern India.

### **Biosketch:**

Professor Dr. Arun Kumar Biswas (1934- ) studied at the Calcutta University (1952-60) and the Massachusetts Institute of Technology, USA (1960-63). He served the Indian Institute of Technology Kanpur for thirty two years since 1963. On retirement, he was appointed as the Mahendralal Sircar Research Professor in History of Science in the renowned Asiatic Society, Kolkata (1995-2000). He has also served as an Emeritus Professor in the Jadavpur University and the Indian Institute of Advanced Studies, Shimla.

Professor Biswas specialized in Applied Chemistry, Mineral Engineering and Metallurgy, and later moved into the fields of Archaeo-Metallurgy and History of Science and Civilization. He is also a specialist in the Ramkrishna-Vivekananda literature, author of over 100 original papers and 20 books. He is a member of the INSA National Committee on History of Science.

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**All interested are welcome.**

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Dean: Research and Development





# Institute Lecture

## Mega floods on Mars: new results from the high resolution stereo camera onboard Mars express

**Sanjeev Gupta**

Department of Earth Science & Engineering,  
Imperial College London,  
South Kensington Campus, London, SW7 2AZ

*Monday, 2nd February, 2009 Venue: L-1, Lecture Hall Complex Time: 6:00 PM*

### **Abstract:**

The circum-Chryse outflow channel systems of Mars are the largest known fluvial-eroded planetary landscapes in the Solar System, and are widely considered to have formed by catastrophic floods released from groundwater aquifers. Understanding their history of water discharge is important in reconstructing the global hydrological cycle on Mars, and in establishing the occurrence of putative oceans. Despite numerous observational and numerical modelling studies the mechanisms of water release from the martian subsurface and the discharges involved remain uncertain. The previous lack of high-resolution topographic data over the outflow channels has hindered reconstruction of their detailed history of flooding. We use recently acquired stereo and colour images and derived topographic data from the High Resolution Stereo Camera (HRSC) onboard Mars Express to constrain the detailed morphology of Ares Vallis, one of the largest outflow channels. We find distinct evidence that channel erosion was achieved by multiple episodes of catastrophic flooding suggesting that abrupt release of water from subsurface aquifers occurred at repeated intervals but with lower discharges, thus supporting recent numerical modelling studies. If replicated in other circum-Chryse outflow channels, this implies that channel activity may not have discharged sufficient volatiles to initiate and maintain a northern ocean. Furthermore, the more sustained activity of the channels than previously inferred enhances the astrobiological potential of the chaos regions from which they are sourced.

### **Biosketch:**

Sanjeev Gupta is a Reader in Sedimentology at Imperial College London and currently a Royal Society Leverhulme Trust Senior Research Fellow. Born in Agra, he studied for a BA and DPhil at Oxford University before postdoctoral appointments at Columbia University and Edinburgh University. His research interests include the role of active faulting on river systems, catastrophic flooding in the English Channel and on Mars, and the evolution of Quaternary river systems in the western Ganga Plains.

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**All interested are welcome.**

**K.Muralidhar**

Dean: Research and Development