



INSTITUTE FOR ADVANCED
RESEARCH IN SCIENCE

KNOW THE ATMOSPHERE YOU LIVE IN



IARSC PROGRAMME ON SCIENCE, TECHNOLOGY,
RESEARCH AND APPLICATIONS
(IPSTRA)

VENUE: Choksi Hall, IISc, Bengaluru
December 20, 2019



The background of the slide is a dark, starry space. At the top, there are two large, light-colored circular shapes representing planets or moons. On the right side, there is a planet with a prominent ring system, similar to Saturn. At the bottom, there are two more circular shapes: one is a plain light-colored circle, and the other is a detailed image of the Earth showing continents and clouds.

INTRODUCTION

Educational Outreach programme is included as a primary thrust area of IARSc, Bangalore. Recently, IARSc launched a National Level 'IARSc Programme on Science, Technology, Research and Applications (IPSTRA)' for Teachers, Young Scientists and Students on Satellite & Radar Data utilization in the areas of Space and Atmospheric Sciences. This Outreach Programme will be streamlined in the areas of 1. Atmosphere and Climate, 2. Astronomy and Astrophysics, 3. Planetary Science and Exploration, 4. Solar-Terrestrial Physics. The outreach programme is designed for Lecturers/Teachers/Young scientists in Universities, Institutes, Colleges and Schools; also, for motivated Engineering, postgraduate and doctoral students. The Scope of the programme is to create awareness about the 'mysteries' of the Universe and to impart an understanding. The programme gives impetus to teachers for academic excellence and educate students for future success providing a choice of opportunities. The programme will be executed by conducting exposure programmes, basic and advanced courses for students and teachers, and by facilitating with pilot projects in collaboration IARSc faculty.

As first initiative in the area on Atmosphere and Climate, IARSc is conducting the event on 'Know the Atmosphere you Live in' on Dec 20-21, 2019 in Bangalore focussed on Education & Training towards Skill Development. The programme will be Inaugurated on Dec 20 by the Chief Guest, Prof Roddam Narasimha, JACASR, Bangalore and Prof Sandeep Shastri, Jain University, Bangalore. The programme will continue with Lectures by Eminent Speakers on Dec 20. An Interactive session on Dec 21 on 'INSTRUMENTATION and MEASUREMENTS' will be conducted.



INAUGURAL PROGRAMME

Welcome & Opening Address

Dr. Kusuma G Rao IARSc,

9:30 -9:40

Keynote address by Chief Guest

Prof. Roddam Narasimha, JNCASR

‘Fluid Dynamics of Clouds’

9:40 -10:10

Prof. Sandeep Shastri, Jain University

‘Indian Education system: A New Perspective

10:10 -10:25

Concluding Address

Prof N K S Rajan IISc & IARSc,

10:25 -10:30



PROGRAMME COMMITTEE

Dr. Kusuma G Rao, Director, IARSc
& Former Principal Scientist, ISRO HQ

Prof. Prabhu Aradhya, Former Professor,
Aerospace Dept & CAOS, IISc
Member, Founding Council, IARSc

Prof. N K S Rajan, Chief Scientist,
Aerospace Dept, IISc & Adjunct Faculty, IARSc

Dr. K J Ramesh, DGM,
IMD, New Delhi

Prof. P S Kulkarni, Chief Scientist,
Aerospace Dept, IISc

Dr. R Venkatesan, Head,
Radiological and Environmental Safety Division, IGCAR

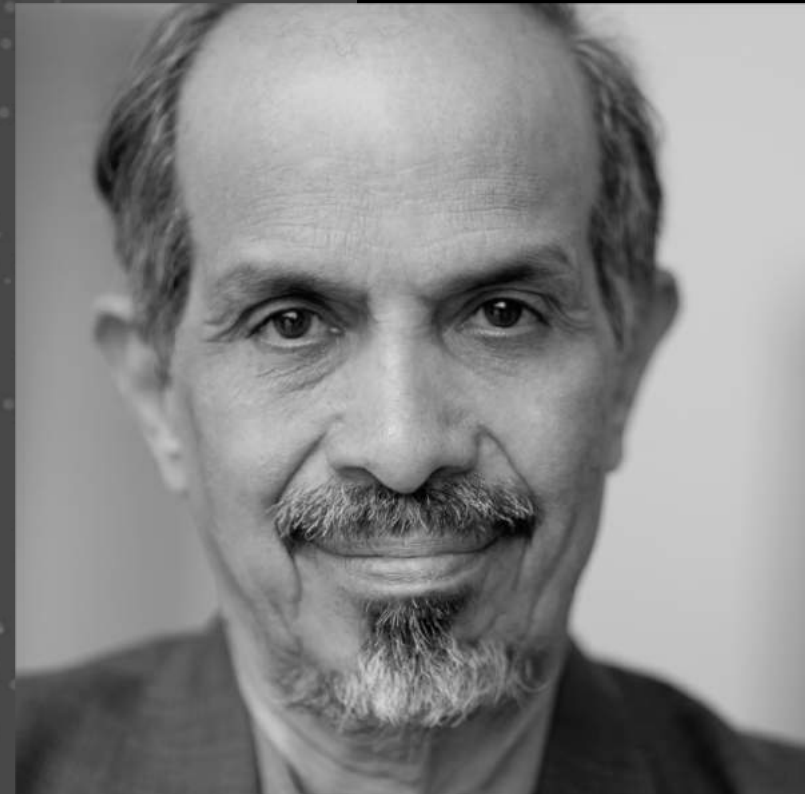


Roddam Narasimha was educated at **Mysore University and at the Indian Institute of Science**, both at Bangalore, and his **PhD at Caltech**. In 1962, he joined IISc as faculty at the Department of Aeronautical **Engineering and built up a fluid mechanics group**. After serving as Chairman, **AE Department and Dean (Engineering)**, and founding a Centre for Atmospheric Sciences at **IISc and spending two years in industry** leading a design team on a variant of an earlier aircraft made in Bangalore, he was appointed Director, National Aerospace Laboratories (NAL) in 1984. He was closely involved in the aircraft industry serving on the Board of Directors of Hindustan Aeronautics during 1985-98. After retirement from NAL in 1993 he continued at CAS, IISc, occupying endowed chairs, and carried out research on atmospheric boundary layers and cloud flows. He then went on to head the National Institute of Advanced Studies from 1997 to 2004. In 1989 he set up an Engineering Mechanics Unit at the Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR), Bangalore, where he was DST Year-of-Science Professor from 2013 to 2018, and is currently an Honorary Professor. He has served on several national policy making bodies over the years, including the Space Commission and the Science Advisory Council to the Prime Minister.

He had held positions abroad at various times including, at Caltech as a Senior Research Associate every summer during the early 60's, and as Sherman Fairchild Distinguished Scholar or Clark B Millikan Professor during the 70's and 80's; Leverhulme Fellow at the University of Adelaide in 1975; Nehru Professor at Cambridge during 1989-90, and consultant at NASA Langley in 1990 and 1993; for ten years as Indian Coordinator for Aerodynamics of the Commonwealth Aeronautical Advisory Research Council.

He has been honoured with the Bhatnagar Prize, fellowships of all the academies in science and engineering; was President of the Indian Academy of Sciences (1992-94), and was awarded the Padma Vibhushan by the President of India in 2013, and from abroad Fellowship of the Royal Society London (1992), Foreign Associateship of the NAE (1989) and the NAS (2000), Honorary Fellowship of the American Academy of Arts and Sciences (1999), and Fellowship of the World Academy of Sciences (1989). **He won the Fluid Dynamics Award of AIAA in 2000, and the Trieste Science Prize in Engineering Sciences in 2008.**

Prof. Roddam
Narasimha



Dr. Sandeep Shastri

Dr Sandeep Shastri is the Pro Vice Chancellor of JAIN – a Deemed to be University and heads its Centre for Research in Social Sciences and Education (CERSSE). He prefers to call himself a researcher by training, a teacher by passion, a trainer by practice and above all a life long learner. His research has focussed on understanding Indian politics from the prism of citizens perspectives. His writings have largely been on Electoral politics, Karnataka politics and Federalism. He has authored over seven books, written over fifty chapters in edited books and over seventy five articles in referred journals. He is the Co- Chair of the Research Committee of the International Political Science Association (IPSA) that focuses on Comparative Survey Research. As the National Coordinator of the Lokniti network, he has been part of the team that has undertaken the National Election Study for the last quarter century. Dr Shastri has served as a Consultant to prestigious international agencies. He has been a United Nations Consultant on Political Parties Reform in the Pacific Rim countries. He was the World Bank Consultant on Governance in Nepal. He leads the Forum of Federations Consultancy Project in Myanmar on Capacity Building for Transition to Democracy. He was also part of the Forum of Federations team that was involved in Consultancy on Constitutional Making in South Sudan and Federalism reform in Sudan. Dr Shastri is a leading election analyst and features regularly on the electronic media and is currently the Election Analyst for India Today TV. Dr Shastri writes for the print media in Kannada, Hindi and English and more than 200 of his OpEd page articles have appeared in well known newspapers. Dr Shastri was privileged to play a key role in drafting Karnataka's Youth Policy by serving as the Chairman of the Drafting Committee of the said policy. Dr Shastri has lectured at prestigious universities across the world in over 50 countries in all the inhabited continents.



Kusuma G Rao, a Doctorate in Atmospheric **Sciences from Department of Aerospace**, Indian Institute of Science (IISc) is currently **the Director of IARSc (Institute for Advanced Research in Science)**, Bangalore. **She was holding Adjunct Faculty position** at Space Physics Laboratory, Vikram Sarabhai Space Center, Trivandrum, India during 2008-2012 while she served Indian Space Research Organization. She was Research Advisor at Cochin University of Science and Technology (CUSAT), Kochi.

Dr. Kusuma has made fundamental contributions in furthering our understanding on the monsoon boundary layer turbulence. She has proposed new parameterization scheme for surface transports from both the land and water surfaces for use in numerical simulations of monsoon climate.

She was responsible for initiating Mesoscale Weather Prediction project, “PRWONAM” in ISRO (Indian Space Research Organization), Bangalore. She was pivotal in creating “Operational Weather Prediction System” at SDSC (Satish Dhawan Space Center), Sriharikota and supported successfully several ISRO satellites launched from Sriharikota under PRWONAM project. She was at USSR Academy of Sciences to develop collaboration on Atmospheric Boundary Layer modeling for the Indian summer monsoon as part of the DST-ILTP program between India and USSR.

She was at Laboratoire Meteorologie Dynamique, Palaiseau, Paris, France and at Hydrospheric Atmospheric Research Center, Nagoya University, Japan to carry out pre-launch studies related to space missions, TRMM, METEOSAT and Megha-Tropiques. She was involved as Chief Scientist in a major project GEMSS of ISRO (GPS based Experiments for Meteorology and Space Sciences) and in CAWSES-India programme (Climate and Weather of Sun-Earth System).

She served WCRP (World Climate Research Programme) as a member of the SPARC **Scientific Steering Group during 2012-2015.**

Dr. Kusuma G Rao



A Prabhu, a Doctorate in Aerospace **Engineering** from **Indian Institute of Science (IISc)**, Bangalore, India, was a Professor in **Aerospace department at IISc and is currently**, the Managing Director, M/S. Sunshine **Measurements (P) Ltd. Prof Prabhu is an eminent** teacher, instrument specialist, experimentalist and an expert in theory of Fluid dynamics. He has produced 22 Ph. Ds in aerospace engineering and was research supervisor for 10 M.Sc/M.Tech students. He was an associate guide for Ph. D/M.S. students from University of Sydney, Australia and University of Iowa, U.S.A. He was research guide to B.E./M.E. students He taught Gas Dynamics and Experimental Methods, Helicopter dynamics and aerodynamics, Turbulent boundary layers, Systems analysis, Meteorological instruments, Experimental methods in Aerospace Engineering.

He was a specialist delegate from India to Novosibirsk, Siberia and Moscow USSR to develop collaborative programs in turbulence and its control and transition under the ILTP program; and at CAARC meeting on Experimental Aerodynamics and Test Techniques in Farnborough, UK. He presented papers and invited talks in various conferences in University of Christ Church, New Zealand, Beijing, China (1983), Chengdu, China (1991). Taejon, Korea, Sendai, Japan (1994), Caracas, Venezuela (1995).

He was a Member of various committees, namely, the American Institute of Aeronautics and Astronautics (1981-83), the International steering committee for Asian Symposium on Visualization (ASV), Beijing, China, Aerodynamics Panel of AR & DB, 1990-1997, the Divisional review committee of Experimental Aerodynamics Division and Aerospace Electronics Division of National Aerospace laboratories. He was coordinator of the Aerodynamics panel of AR & DB 1997-2001. At present, he is an Associate Member, Aeronautical Society of India.

He has offered consultancy to projects on Wind tunnel for anemometer calibration, Ceiling Fan Torque Balance, Flow measuring Instrument, Smoke tunnel and accessories, Model for predicting cell pressure of rocket test facility, High speed aerodynamics and Longitudinal aerodynamic characteristics of Agni Model.

Dr. A Prabhu



Rajan N K S is a doctorate in **Combustion and Propulsion at the Department of Aerospace** Engineering, Indian Institute of Science (IISc) Bangalore. He holds his basic Engineering degree in Mechanical Engineering from University of Mysore. He is currently a **faculty at the Dept. of Aerospace Engg, IISc, as** Chief Research Scientist.

In his research and academic activities for **the past three decades, Dr. Rajan has guided** many PhD students and has led teams in **carrying out many Government** and Industry sponsored projects. His areas of research interest include Combustion; Heat Transfer; Fluid Dynamics (Experimental and Computational); Biomass Gasification; Renewable Energy; Advanced CFD Simulations, Instrumentation; Numerical Modelling (Analysis and Simulation); Analysis of Remote Sensed Data; GIS Application Development; Application Software Development. He has guided twenty students for their PhD degree and at present, four PhD students are working with him for their PhD degree. He has guided several ME and BE students for their dissertation projects.

Contributions he has made in the areas of Renewable Energy and Waste-To-Wealth include development of new technologies for Biomass Gasification for Power Generation; Scrubbing of H₂S from Biogases from Industrial Liquid Wastes; Generation of High-Quality Silica from Rice Husk Ash. These contributions are well accepted industrial applications. He has about 20 National and International Patents covering these technologies and these patents have been licensed for entrepreneurs to commercialize them for public utilization. He has led a project on digitization and generation of an electronic Biomass Resource Atlas of India that embedded processing of remote sensing data derived from satellite imagery, ground truth correlations, modelling and dynamic query-based data interpretations. He has received four National Awards - FICCI (2004), CII (2007), Nina Saxena-IITKG (2011), MNRE (2016), in recognition of the excellence in technological break-throughs of national relevance. He has published about 80 research papers in National and International Journals and have attended technical papers in 40 National and International Conferences. He has given invited talks and chaired sessions in many conferences

He has worked in many committees of high-profile activities of the Institute (IISc), that include Computerization of Administration, Establishing of Purchase Rate Contracts for Computers and Peripherals, Staff Evaluations, Selection Committees, Project Reviews and many of the kind. He has been expert member on Board of Studies of **four Autonomous Engineering Collages**. He is serving as management trustee in four charitable organizations **working towards enhancements in education**, social causes and human values.

Prof. N K S Rajan



Prof. Prakash
Kulkarni

Prakash Kulkarni obtained his master's and doctorate degrees from the Department of Aerospace Engineering, Indian Institute of Science Bangalore in 1981 and 1985 respectively. His research areas include Atmospheric Science, Algorithms and Applications in Computational Fluid Dynamics(CFD), Parallel computing. Developed numerous numerical algorithms to include high fidelity physics to improve accuracy and robustness of numerical simulations of fluid dynamics in various flow regimes. In-house CFD code development for various engineering applications to solve complex practical problems of national interest. Member of various scientific bodies like Co-Chairman, CFD Division of Aeronautical Society of India, (AeSICFD), Member, International scientific committee of ICCFD, USA and Asian CFD (ACFD), Japan. He has published more than 150 research publications in various national and international forums including reputed conferences and journals. He is a recipient of a national award from the Aeronautical Society of India for contributions to the aeronautics. He is currently a faculty member in the Department of Aerospace Engineering, IISc Bangalore.



Prof. Bala is currently a Professor at the **Center for Atmospheric and Oceanic Sciences**, Indian Institute of Science, Bangalore.

He received his Ph.D in atmospheric and oceanic sciences in 1994 from McGill University, Canada. After two years of Post-doc at the Geophysical Fluid Dynamics Laboratory, Princeton University, he served as a “Physicist” (Climate Scientist) at the Lawrence Livermore National Laboratory (LLNL) between 1996 and 2008. While at LLNL, Prof. Bala developed and used earth system models to understand the causes and effects of climate change.

Prof. Bala’s main research interests are modelling of climate change, carbon and water cycle, climatic effects of land cover change and climate engineering. He has published over 100 peer-reviewed journal papers on climate change and carbon cycle. Prof. Bala is the recipient of the 2008 Scopus young scientist award for Earth Sciences. He and his collaborators Prof. Long Cao of China and Prof. Ken Caldeira of USA won the prestigious World Meteorological Organization's (WMO) Norbert Gerbier MUMM International Award for 2014 for their research paper in ERL (Environmental Research Letters).

Prof. Bala has served as a Lead Author for the carbon cycle chapter (Chapter 6) and as a contributing author for the clouds and aerosols chapter (Chapter 7) for the 5th assessment IPCC WG1 report. For the 6th IPCC Assessment report, he is serving as a lead author for the chapter on future global climate change (Chapter 4). He is member of the “Earth Commission” constituted by Future Earth in 2019 to identify the targets for a sustainable and resilient planet. Prof. Bala serves as a member on the editorial boards of the journals “Earth System Dynamics” and “Environmental Research Letters Reviews”. He is a member of the SSC (Scientific Steering Committee) of the AIMES (Analysis, Integration and Modeling of the Earth System) global research project of “Future Earth” since 2015.

Prof. Bala has served as the National Coordinator for the “Environmental Science and Climate Change” theme of IMPRINT, a flagship program of the Ministry of Human Resource Development, Government of India. He is also a member of the Ministry of **Environment and Forest’s expert** committee on climate change since 2013.

Prof. G Bala



Dr. Y V N
Krishnamurthy



Dr. Y.V.N. Krishna Murthy, served as Distinguished Scientist, in ISRO and currently working as Sr. Professor and Registrar of Indian Institute of Space Science and Technology (IIST), Thiruvananthapuram. Earlier he has worked as Director, National Remote Sensing Centre (NRSC) and also as Scientific Secretary, ISRO.

Presently he is:

- Facilitating in building payloads/sensors, small satellites, space related systems and for Gaganyaan.
- Besides teaching & research, overall administration expanding the infrastructure and facilities to meet future demands of ISRO and industry.
- Chairman, Research Advisory Council of NCCR, Ministry of Earth Sciences

Dr. A K Mitra

Current Position: Scientist – G at National center for Medium Range Weather Forecasting (NCMRWF), Ministry of Earth Sciences, Government of India, Noida, UP.

Dr. Mitra had studied B.Sc Physics (Hons) and M.Sc in Physical Oceanography. Then he completed Ph.D in Ocean Modelling from CAS IIT Delhi. From 1989 onwards (till now) working at NCMRWF.

Dr. Mitra has worked in,

- Atmospheric/Ocean Data Assimilation
- Global Weather/Climate Modelling
- Model Verification & Diagnostics
- Monsoon processes and Modelling
- Coupled ocean-atmosphere modeling and
- Preparation of Gridded merged Satellite Gauge rainfall data at daily scale. His current works are related to Coupled Ocean-Atmosphere Modelling for prediction of days-to-season covering Medium, Extended and Seasonal scales with focus on Indian Monsoon.

Dr. Mitra was visiting scientist at

- Florida State University, USA and UK Met Office, UK, working on coupled modeling of monsoon. He has published around 90 research papers in peer reviewed national and international research journals.



Prof. S N Omkar

S.N. Omkar is the Chief Research Scientist (CRS) at the Indian Institute of Science, Bengaluru. He has a B.E in Mechanical Engineering from Bangalore University, M.Sc. and Ph.D. in Aerospace Engineering from the Indian Institute of Science, Bengaluru. His research interests include Satellite image processing, Biomechanics, Unmanned Aerials Vehicles (UAV) and bio-inspired design. S.N. Omkar has three labs under him: Computational Intelligence lab, the Unmanned Aerial vehicles lab and the Biomechanics lab. He is also pursuing several projects and research work in the area of satellite image processing. He has developed a number of algorithms and used them for a variety of applications like road extraction, flood assessment, crop classification, crop growth analysis, etc. He has also pioneered in using biomechanics for aerospace applications. This is of significance in the light of country's interest in human space mission. He has established a laboratory facility towards this. S.N. Omkar has more than 200 journal publications alone, has attended 83 conferences which includes both national and international conferences, and has imparted training to more than 250 interns. He is also a member of 10 academic committees. He has introduced three courses at IISc. He has conducted several workshops and outreach programs for students. He is also a celebrated practitioner and teacher of Yoga. S.N. Omkar has been conferred the Karnataka State Rajyothsava Award for his contributions in the field of Yoga.



Dr. C V Srinivas

Dr. Venkata Srinivas is Scientist-G & Head Radiological Impact Assessment Section, Health, Safety & Environment Group, Indira Gandhi Centre for Atomic Research, Kalpakkam. He is also Associate Professor, Homi Bhabha National Institute, Kalpakkam. He completed his M.Sc in Meteorology in 1989, M.Sc in Physics in 1996 and received his Ph.D in Boundary Layer Meteorological Studies from Andhra University, Visakhapatnam in 2001. He worked as a Post-Doctoral Research Fellow in Department of Meteorology at Jackson State University during 2006-2008 and worked in the project "Multiscale Atmospheric Dispersion Studies in the Mississippi Gulf coast". Dr. Srinivas' field of research is Atmospheric Dispersion, Air Quality modeling, Boundary Layer Studies, modeling of mesoscale systems, Tropical cyclones, development of Emergency Response Systems and studies related to monsoon etc. He participated in several inter-institutional collaborations in the field of Atmospheric Science with ISRO-Hq, ISRO-Hq, NRSC, NARL, IITM and various institutions likes IITs, Universities etc. He has guided for Ph.Ds and is presently supervising 4 research scholars.

Dr. Venkata Srinivas has contributed to 88 international journal papers, 7 book chapters, 24 international conference proceedings, 25 technical reports, and attended 70 conferences.

He has also received DAE Group Achievement Award for the Development of Nuclear Emergency Response Decision Support System and Atmospheric Dispersion Experiments.

He is life member of Professional societies like Indian Meteorological Society, Indian Society of Remote Sensing, European Geophysical Society, Indian Society of Radiation Physics, Indian Society of Radiation Protection etc.



Shri Virendra Singh obtained his M.Sc. (**Physics**) from the **D.A.V. Postgraduate Degree College**, Muzaffarnagar and M.Phil. (Physics) from the Institute of **Advanced Studies, Meerut University**. He began his carrier as a member of faculty in Physics Department of **Sanjay Gandhi Memorial Degree College, Meerut** from 1983-1984. He joined the India Meteorological department as **Assistant Meteorologist in September 1984** and since then he has served IMD in various capacities and at presently holding a **position of Scientist-F/Head in Satellite** Meteorology Division of India Meteorological Department, New Delhi.

He had served national council of 'Indian Meteorological Society' (IMS) as Joint Secretary and treasurer and involved in organizing many National and International conferences. He has been contributed in planning the capacity building activities of IMD and played a key role to set up weather radar station at Jaisalmer and two upper air (RS/RW) observatories at Manali and Sasoma for the project 'Parvat'. Mr. Singh as project director has been instrumental for planning and coordinating the implementation of the projects such as Ground Receiving & Processing System for NOAA, Met-op & MODIS satellites at Delhi, Guwahati and Chennai stations. He has been awarded Certificate of Merit by MoES in 2013 for his outstanding contributions as project Director of INSAT-3D project to set up INSAT-3D Meteorological Data Processing System (IMDPS) at Delhi. He had established the National Knowledge Network (NKN) link between IMD and SAC, Ahmedabad which enable exchange of satellite data on real time basis for operational purposes. He has served various technical committees such as INSAT-3D Payloads Comprehensive Design Review Expert Committee and Algorithm Theoretical Basis Definition (ATBD) of INSAT-3D and contributed immensely by providing relevant inputs for fine tuning of Scan strategy of payloads and processing algorithms. He is also member of Payload operation committee of INSAT-3D/3DR constituted by ISRO. He is recipient of Certificate of Excellence for development and implementation of Real-time analysis and product Information Dissemination(RAPID) tools for on line visualization of satellite data in 2015.

At Present, he is Scientist-F/Head of Satellite Meteorology Division of IMD and responsible for Receiving, Processing and Dissemination of Meteorological Data from INSAT-3D & INSAT-3DR satellites on operational basis round the clock and about 99% operational efficiency is being achieved. He is also Project Director for the project to Establishment of Multi-mission Meteorological Data Receiving and processing system(MMDRPS) in coordination with ISRO.

He has been engaged in atmospheric Science research for the last 15 years, especially in the field of **Satellite Meteorology**. He has published twenty research publications in renowned national and international journals. He is **actively involved in training activities** of satellite Meteorology Division.

Dr. Virendra Singh

