

# Two-Day Workshop on Data Science and Curation: Spatial Data Science



Organized by

**Technology Innovation Hub**  
**Indian Statistical Institute**

24<sup>th</sup> – 25<sup>th</sup> June, 2021



<https://www.isical.ac.in/~tihisi>

We are glad to inform you that the TIH @ ISI and IEEE GRSS Bangalore Chapter are jointly hosting a two-day online workshop on "Spatial Data Sciences" during June 24-25, 2021 at the Indian Statistical Institute - Bangalore Centre, India.

National Mission on Interdisciplinary Cyber-Physical Systems (NM-ICPS) is an initiative by the Government of India. Under this mission, the Indian Statistical Institute (ISI) was sanctioned a major project to establish a Technology Innovation Hub (TIH) on Data Science, Big Data Analytics, and Data Curation. One of the numerous activities that are being targeted by this TIH @ ISI, is to address the task of skill development. Towards this aim, the TIH @ ISI organizes a Workshop series on Data Science and Curation. This time the Hub is organizing a two-day Workshop on Spatial Data Science where world-renowned pioneers would speak on topics related to Spatial Data Science.

Data available at multiple spatial/spectral/temporal scales pose numerous challenges to the data scientists. Of late researchers paid wide attention to handling such data acquired through various sensing mechanisms to address intertwined topics—like pattern retrieval, pattern analysis, quantitative reasoning, and simulation and modeling—for better understanding spatiotemporal behaviors of several spatial phenomena and spatial processes. Spatial Data Science deals with the aforementioned intertwined topics. Various original algorithms and techniques that have been developed and demonstrated in the context of Spatial Data Science. This workshop is an opportunity to listen to world-leaders who have provided foundations to the Spatial data Science as well as geospatial data sciences. The popular talks by these thought-leaders would be useful for those with research interests in image processing and analysis, remote sensing and geosciences, geographical information sciences, spatial statistics, and mathematical morphology, mapping of earth-like planetary surfaces, etc.

**Location:** All talks will be delivered online and the schedule will be given in due time.

**Event Dates and Timings:** 24 – 25 June, 2021, 08:00 hrs. to 19:00 hrs. (Indian Standard Time)

## Intended Participants

- Students at all levels - Ph.D./M.Tech./M.Sc./B.Tech. (3<sup>rd</sup> Year)
- Faculty members from academic institutions.
- Engineers and researchers from Industry organizations including R&D laboratories

## List of Confirmed Speakers

- Prof. Shashi Shekhar, University of Minnesota
- Prof. Michael Goodchild, University of Santa Barbara
- Prof. Peter M. Atkinson, University of Lancaster
- Prof. Micahel Gastner, National University of Singapore
- Dr. Stefano Nativi, JRC-European Union
- Prof. Michael Batty, University College London
- Dr. Lauren Bennet, ESRI
- Dr. C. B. S. Dutt, NRSC-ISRO
- Prof. Avik Bhattacharya, IIT Bombay
- Prof. Rama Rao, IIST-Trivandrum
- Dr. Jaya Sreevalsan Nair, IIIT Bangalore
- Prof. Ashish Ghosh, Project Director, TIH@ISI
- Prof. B. S. Daya Sagar, Member, TIH@ISI

**Registration link:** <https://forms.gle/XyQ8p4rDVm7rNk5R7>

### Important dates

- Last date for course registration: **June 21, 2021**
- Notification of selected participants: **June 22, 2021**
- Workshop Dates: 24-25 June, 2021, from 08.00 hrs to 19.30 hrs IST

### More information at:

- **URL:** <https://www.isical.ac.in/~tihisi/Seminars.html>
- **E-mail:** [bsdsagar@isibang.ac.in](mailto:bsdsagar@isibang.ac.in), [raja@isibang.ac.in](mailto:raja@isibang.ac.in)

### Contact:

- |  |   |
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| <ul style="list-style-type: none"><li>➤ Prof. B. S. Daya Sagar<br/>Workshop Coordinator</li></ul> <p>Systems Science and Informatics Unit<br/>Indian Statistical Institute-Bangalore Centre<br/>8th Mile, Mysore Road, R.V.C.E. P.O.<br/>Bangalore-560059, India<br/>Official E-mail: <a href="mailto:bsdsagar@isibang.ac.in">bsdsagar@isibang.ac.in</a><br/>Private E-mail: <a href="mailto:bsdsagar@yahoo.co.uk">bsdsagar@yahoo.co.uk</a><br/>Tel. Ph (O): +91-(0)80-26985540, H/P: +91-9880893291</p> | <ul style="list-style-type: none"><li>➤ Dr. H. M. Rajashekar<br/>Workshop Co-Coordinator</li></ul> <p>Economic Analysis Unit (EAU)<br/>Indian Statistical Institute-Bangalore Centre<br/>8th Mile, Mysore Road, R.V.C.E. P.O.<br/>Bangalore-560059, India<br/>E-mail: <a href="mailto:raja@isibang.ac.in">raja@isibang.ac.in</a><br/>Mobile: +91-9449908747</p> |
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## Lecture topics and Speakers

**Topic:** The Impact of Big Data on the Development of Smart Cities



**Professor Michael Batty, CBE, FRS, FBA**  
Chairman, Centre for Advanced Spatial Analysis (CASA)  
University College London  
90 Tottenham Court Road, London W1T 4TJ  
<http://www.complexcity.info/t@jmichaelbatty>  
Homepage: <https://www.ucl.ac.uk/bartlett/casa/prof-michael-batty>

**Brief bio:** Michael Batty is Bartlett Professor of Planning at University College London where he is Chair of the Centre for Advanced Spatial Analysis (CASA). He has worked on computer models of cities and their visualisation since the 1970s and has published several books, such as *Cities and Complexity* (MIT Press, 2005) which won the Alonso Prize of the Regional Science Association in 2011, and most recently *The New Science of Cities* (MIT Press, 2013). His blogs [www.complexcity.info](http://www.complexcity.info) cover the science underpinning the technology of cities and his posts and lectures on big data and smart cities are at [www.spatialcomplexity.info](http://www.spatialcomplexity.info). His research group is working on simulating long term structural change and dynamics in cities as well as their visualisation. Prior to his current position, he was Professor of City Planning and Dean at the University of Wales at Cardiff and then Director of the National Center for Geographic Information and Analysis at the State University of New York at Buffalo. He is a Fellow of the British Academy (FBA), the Academy of Social Sciences (FACSS) and the Royal Society (FRS), was awarded the CBE in the Queen's Birthday Honours in 2004 and the 2013 recipient of the Lauréat Prix International de Géographie Vautrin Lud (generally known as the 'Nobel de Géographie'). This year 2015 he received the Founders Medal of the Royal Geographical Society for his work on the science of cities. In 2016 he received the Gold Medal of the Royal Town Planning Institute, and the Senior Scholars Award of the Complex Systems Society. He has Honorary Doctorates from the State University of New York and from the University of Leicester.

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**Topic:** The Landscape of GIScience

**Abstract:** GIScience can be defined as the systematic study of the fundamental issues raised by geospatial data and implemented in geospatial technologies. I review some of those issues, including uncertainty, spatial heterogeneity, the modifiable areal unit problem, and spatial dependence. Recent trends in Big Data, finer spatial resolution, the Fourth Paradigm, and consumerization have brought greater emphasis to these issues, and demonstrated once again that "spatial is special."



**Professor Michael F Goodchild, FRS, Member NAS (USA)**

Emeritus Professor of Geography  
University of California, Santa Barbara  
3334 NE Blakeley St  
Seattle, WA 98105, USA

**Brief Bio:** Michael F. Goodchild is Emeritus Professor of Geography at the University of California, Santa Barbara. He received his BA degree from Cambridge University in Physics in 1965 and his PhD in geography from McMaster University in 1969, and has received five honorary doctorates. He was elected member of the National Academy of Sciences and Foreign Member of the Royal Society of Canada in 2002, member of the American Academy of Arts and Sciences in 2006, and Foreign Member of the Royal Society and Corresponding Fellow of the British Academy in 2010; and in 2007 he received the Prix Vautrin Lud. He was editor of *Geographical Analysis* between 1987 and 1990 and editor of the *Methods, Models, and Geographic Information Sciences* section of the *Annals of the Association of American Geographers* from 2000 to 2006. He serves on the editorial boards of ten other journals and book series, and has published over 15 books and 550 articles. He was Chair of the National Research Council's Mapping Science Committee from 1997 to 1999, and of the National Science Foundation's Advisory Committee on Social, Behavioral, and Economic Sciences from 2008 to 2010. His current research interests center on geographic information science, spatial analysis, and uncertainty in geographic data.

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**Topic:** The Importance of Representations for Spatial Data Science



**Professor Peter M. Atkinson**

Distinguished Professor  
Dean of the Faculty of Science and Technology  
Lancaster University  
Bailrigg, Lancaster LA1 4YW  
Home page: <https://www.lancaster.ac.uk/people-profiles/peter-atkinson>

**Bio:** Professor Peter M. Atkinson is Dean of the Faculty of Science and Technology at Lancaster University, a role he has held since 2015. He was previously Dean of the Faculty of Health and Medicine (a role he held simultaneously with being Dean of FST, 2018-19) at Lancaster, and Chair of the University's successful Athena SWAN institutional submission (2018-19). Previously, Peter was Head of School (Geography) at the University of Southampton (2007-12). At Southampton he was also Director REF Strategy (the academic lead for Southampton's REF2014 submission). Peter is a Distinguished Professor of Spatial Data Science at Lancaster University, and an interdisciplinary scientist. Specifically, Peter's research involves the application of space-time statistics and geostatistics, machine learning and AI, and dynamic numerical modeling, to Earth observation (EO) and other spatio-temporal data, to answer a wide range of science and social science questions. Peter's scientific research is highly inter-disciplinary and spans a wide range of methods, and science and social science domains. Peter has published over 300 peer-reviewed international scientific journal articles on these topics, and authored or edited nine books. He has also published around 50 refereed book chapters, and edited nine journal special issues. He has chaired or co-chaired several major international conferences including GeoComputation in 2003, GeoENV in 2008, RSPSoc in 2015 and Spatial Statistics in 2017. He has led multiple large grants and supervised around 60 PhD students. Peter's H-index=75 in Google Scholar and H-index=56 in Thompson ISI Web of Knowledge. Peter is currently Visiting Professor at the University of Southampton, UK and at the Chinese Academy of Sciences in Beijing, China. Peter was the holder of the Belle van Zuylen Chair at Utrecht University (2015-16), and Visiting Fellow at Green-Templeton College, Oxford University (2012-14). He is the 2016 recipient of the Peter Burrough Medal of the International Spatial Accuracy Research Association (ISARA). Peter is Editor-in-Chief of *Science of Remote Sensing* and Associate Editor of *Environmetrics* and sits on the editorial boards of many leading disciplinary journals.

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**Topic:** What is special about spatial data science and GeoAI?

**Abstract:** The importance of spatial data science and Geo-AI is growing with the rise of spatial and spatiotemporal big data (e.g., trajectories, remote-sensing images, census and geo-social media). Societal use cases include Agriculture (global crop monitoring, precision agriculture), Location-based services (e.g., navigation, ride-sharing), Public Health (e.g., monitoring disease spread), Environment and Climate (change detection, land-cover classification), Smart Cities (e.g., mapping buildings), etc. Classical data science and AI (e.g., machine learning) often perform poorly when applied to spatial data sets because of the many reasons. First, spatial data is embedded in a continuous space and classical statistics (e.g., correlation) are not robust to the modifiable areal unit problem. Second, spatial data-items have extended footprints (e.g., line strings, polygons) and implicit relationships (e.g., distance, touch). Third, high cost of spurious patterns requires guardrails (e.g., statistical significance tests) to reduce false positives. Furthermore, spatial autocorrelation and variability violate the classical assumption of data samples being generated independently from identical distributions, which risk models that are either inaccurate or inconsistent with the data. Thus, new methods are needed to analyze spatial data. This talk surveys common and emerging methods for spatial classification and prediction (e.g., spatial autoregression, spatial variability aware neural networks), as well as techniques for discovering interesting, useful and non-trivial patterns such as hotspots (e.g., circular, linear, arbitrary shapes), interactions (e.g., co-locations, cascade, tele-connections), spatial outliers, and their spatio-temporal counterparts.



**Professor Shashi Shekhar**

McKnight Distinguished University Professor  
University of Minnesota  
<http://www.cs.umn.edu/~shekhar>

**Bio:** Shashi Shekhar, a McKnight Distinguished University Professor at the University of Minnesota and an U.C. Berkeley alumnus, is a leading scholar of spatial computing and Geographic Information Systems (GIS). He is serving on the Computing Research Association (CRA) board, and as a co-Editor-in-Chief of Geo-Informatica journal (Springer). Earlier, he served as the President of the University Consortium for GIS (UCGIS), and on many National Academies' committees. Recognitions include IEEE-CS Technical Achievement Award, UCGIS Education Award, IEEE Fellow and AAAS Fellow. Contributions include scalable algorithms for planning evacuation route planning and mining spatial pattern (e.g., colocation, linear hotspots, spatial variability aware neural networks), an Encyclopedia of GIS (Springer 2017), a Spatial Databases textbook (Prentice Hall 2003), and a spatial computing book (MIT Press 2020) for professionals.

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**Topic:** Cartograms for spatiotemporal visualization

**Abstract:** Cartograms are maps in which areas (e.g. countries or provinces) are rescaled in proportion to a thematic mapping variable (e.g. population size or gross domestic product). Unlike conventional bar or pie charts, cartograms can represent correctly which regions share common borders, resulting in visualisations that can be the basis for further spatial statistical analysis. Cartograms have a long tradition, dating back to the 19th century. In the 1970s, computer algorithms were developed to automate the production of cartograms, but the procedure remained cumbersome and slow. Dr Gastner has developed a faster algorithm that computes cartograms in a matter of seconds. He is now working on an intuitive user interface for cartograms. His objective is to share free open-source cartogram software that is accessible to the general public.



**Dr. Michael Gastner**

Yale-NUS College, 16 College Avenue West, Singapore 138527  
email: [michael.gastner@yale-nus.edu.sg](mailto:michael.gastner@yale-nus.edu.sg)  
www: <http://www.michaelgastner.com>

**Bio:** Assistant Professor Michael Gastner received his PhD in physics from the University of Michigan. He was postdoctoral fellow at the Santa Fe Institute, a multi-disciplinary research centre devoted to the study of complex systems, and the Computer Science Department of the University of New Mexico. Moving back to his native Europe, he first worked in Germany at the University of Oldenburg's Institute for Chemistry and Biology of the Marine Environment, supported by a fellowship of the Volkswagen Foundation. Afterwards, he became Junior Research Fellow in the Mathematics Department of Imperial College London before holding a lectureship in Engineering Mathematics at the University of Bristol. Prior to joining Yale-NUS College, Asst Prof Gastner spent two years as a Marie Curie Fellow at the Hungarian Academy of Sciences in Budapest.

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**Topic:** Geospatial Digital Ecosystem for Developing Digital Twins of the Earth



**Dr. Stefano Nativi**

Big Data Lead Scientist, European Commission DG Joint Research Centre  
Unit B6, Via E. Fermi 749, 21027 Ispra VA (Italy)  
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email stefano.nativi@ec.europa.eu

**Brief Bio:** Stefano Nativi is the Big Data Lead Scientist of the Joint Research Centre of the European Commission. He is co-chair of the GEOSS Development Task Team (GIDTT) and of the Data Ethics-Law-Policy Subgroup of the Data WG. He funded and chaired the Earth and Space Sciences Informatics (ESSI) Division of the European Geosciences Union (EGU). He is member of the Council of the International Society for Digital Earth (ISDE), associate editor of the "Big Earth Data" journal (T&F), and co-editor of the "AI section" of the "Remote Sensing" journal (MDPI). He is the JRC contact point with the ISO JTC1 -Information Technology and co-chairs the ITU-T Focus Group on "Environmental Efficiency for Artificial Intelligence and other Emerging Technologies" (FG-AI4EE). He is also co-chair of the OGC ESS (Earth Systems Science) Domain WG. He was Head of Unit for the National Research Council of Italy and professor at the Universities of: Padua, Florence, and Friedrich Schiller in Jena. He received the EGU Ian McHarg medal (2019), the Geospatial Innovation Award of the Geospatial World Forum (2014); and the Meritorious Service Medal of the IEEE Committee on Earth Observation (2009).

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**Topic:** Machine Learning Explained: Finding Spatial Clusters

**Abstract:** Come learn about some of the most widely adopted machine learning methods used for clustering of spatial data. This session will illustrate how the algorithms work, how to interpret the results, and how and when to apply them. We'll go beyond the basics of several key spatial data science techniques, including density-based clustering and multivariate clustering, and equip you with the knowledge necessary to do great analysis.



**Dr. Lauren Bennett**

Lead Scientist and Spatial Statistician  
ESRI, USA  
Homepage: <https://www.esri.com/arcgis-blog/author/lbennett/>

**Brief Bio:** Lauren Bennett leads the Spatial Analysis and Data Science software development team at Esri. In her role, she oversees the R&D of the ArcGIS analytical framework, which includes spatial and spatiotemporal statistics, raster and multidimensional analysis, machine learning and big data analytics. She directs releases of new spatial data science capabilities across a wide range of products and applications including desktop, enterprise and SaaS. Lauren received a BA in Geography from McGill University, an MS in Geographic and Cartographic Science from George Mason University, and her PhD in Information Systems and Technology from Claremont Graduate University.

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**Topic:** Radar Data Analysis for EO: Perspectives & Applications

**Abstract:** Active microwave remote sensing has demonstrated its importance across several science disciplines and practical applications. The unique capabilities and global coverage provided by spaceborne radar sensors are acquiring critical contributions to understanding and explaining the mechanisms of long-term climate change and its impacts. From the standpoint of spectral management, active sensors designed to measure land surface processes routinely utilize a wide range of frequencies. Diverse types of radar systems have been used to study the land surface. A polarimetric radar sensor measures the extent to which a surface produces backscatter as a function of the electromagnetic wave polarization. Such polarimetric measurements provide a unique way to characterize the Earth's surface. This talk will briefly discuss the characteristics of this new technology and its enormous opportunities for the future.



**Dr. Avik Bhattacharya**

Professor

Microwave Remote Sensing Lab

Centre of Studies in Resources Engineering (CSRE)

Indian Institute of Technology Bombay

Powai, Mumbai - 400 076, India

URL: <http://mrslab.in/Avik>

**Brief Bio:** Avik Bhattacharya received the integrated M.Sc. degree in Mathematics from the Indian Institute of Technology, Kharagpur, India, in 2000 and the Ph.D. degree in remote sensing image processing and analysis from Télécom ParisTech, Paris, France, and the Ariana Research Group, Institut National de Recherche en Informatique et en Automatique (INRIA), Sophia Antipolis, Nice, France, in 2007. He is a Professor at the Centre of Studies in Resources Engineering, Indian Institute of Technology Bombay (CSRE, IITB), Mumbai, India. Before joining IITB, he was a Canadian Government Research Fellow at the Canadian Centre for Remote Sensing (CCRS) in Ottawa, ON, Canada. He received the Natural Sciences and Engineering Research Council of Canada prestigious visiting scientist fellowship at the Canadian national laboratories, from 2008 to 2011. His current research interests include Imaging Radar polarimetry, statistical analysis of polarimetric Synthetic Aperture Radar (SAR) images, applications of Radar Remote Sensing in Agriculture, Cryosphere, Urban and Planetary studies. Dr. Bhattacharya is the Editor-in-Chief of IEEE Geoscience and Remote Sensing Letters (GRSL). He is an Associate Editor of the Journal of Remote Sensing, A Science Partner Journal. He served as an Associate Editor of IEEE GRSL from 2016 to 2018. In 2017, he established the IEEE GRSS chapter of the Bombay section. He was a guest editor of the special issue on Applied Earth Observations and Remote Sensing in India in the IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing (JSTARS), 2017. He was a guest editor of the Special Stream in IEEE GRSL on Advanced Statistical Techniques in SAR Image Processing and Analysis, 2018. He was the Publication Chair of the IEEE Geoscience and Remote Sensing Conference: Recent Advances in Geoscience and Remote Sensing (TENGARSS), 2019. He is the Publication Chair of the IEEE International India Geoscience and Remote Sensing Symposium (InGARSS), 2020 and 2021. He was the scientific committee member of the ESA POLINSAR 2021 workshop. He is a member of the International Steering Committee and the International Advisory Committee Member of the Asia-Pacific Conference on Synthetic Aperture Radar (APSAR) 2021 and BIGSAR DATA 2021. He is the Scientific Advisor on Earth Observation at Cropin Technology Solutions Private Limited, India.

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**Topic:** Multiscale Methods in Spatial Data Science

**Abstract:** In several spatial data applications across several domains, including geoscience, biomedicine, and demographic studies, we encounter the need to use validation from the data itself given the absence of ground truth. Uncertainty in the data that manifests in several analytical operations must also be derived from the data itself, in several cases. Thus, time and again, the use of multiple scales in both space and time has been a useful tool in understanding spatial data better. The definition of scale itself changes depending on the application and the data type. In this talk we look at various examples where scales are used for a varied set of applications, to show how multiscale methods continue to be relevant.



**Dr. Jaya Sreevalsan Nair**

Associate Professor

International Institute of Information Technology-Bangalore (IIITB)

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**Brief Bio:** Jaya Sreevalsan Nair is currently a faculty member at the International Institute of Information Technology Bangalore (IIITB). She leads the Graphics-Visualization-Computing Lab and is one of the core team members of the E-Health Research Center at IIITB. Jaya has research interests in data visualization, scientific computing, computer graphics, and computational topology. She

works on modeling data for effective visualizations and identifying appropriate visualizations for complex datasets in data science workflows. She focuses on data modeling using second-order tensors, matrices, and networks for varied applications. Some of her recent work includes uncertainty analysis of the semantic classification of LiDAR point clouds, spatial and statistical analysis of population surveys, automated data extraction from chart images, and community detection in biological and brain networks. Her work has been supported by grants from SERB, DST, GoK, Intel, IBM, to name a few. She is an ACM member and IEEE Senior member. Jaya is currently serving as an Associate Editor of IEEE Transactions on Circuits and Systems for Video Technology (TCSVT) and the Chair of the IEEE GRSS Bangalore Section Slate. Prior to joining IIITB, she had worked as a scientific programmer at Enthought Inc. Austin and as a research associate at Texas Advanced Computing Center, the University of Texas at Austin. Jaya has obtained her Ph.D. in Computer Science from the University of California, Davis; after a B.Tech from IIT Madras and an M.S. from Mississippi State University.

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**Topic:** Terrestrial multi-model remote sensing: potential object reference database for automatic geospatial data analysis

**Abstract:** Automatic geospatial data analysis, computer algorithm based identification and description various types landscape objects from remote sensing data with minimal human intervention, has vital applications in operational decision making using remote sensing data. Thanks to the enormous developments in HPC computing, cloud computing and big data analytics tools, operational and industrial-scale use of geospatial data has gained momentum. Common to most of the algorithm selection and model developing, availability of reference database, aka, ground truth datasets, is the primary determinant for the viability and quality of results. Developments in the terrestrial remote sensing, (hyperspectral, LiDAR and multispectral sensors mounted on ground or drones) has the potential to acquire imagery at sub-centimetre resolution in various spectral bands. In this lecture, the status of high-resolution imagery acquisition, and object detection, and localization for further development as object-based libraries will be presented.



**Dr. Rama Rao Nidamanuri**

Professor (Remote Sensing & Image Processing)

Department of Earth and Space Sciences

Indian Institute of Space Science and Technology

Thiruvananthapuram – 695 547, India

<https://www.iist.ac.in/ess/rao>

**Brief Bio:** Dr. Rama Rao Nidamanuri is a Full Professor at the Department of Earth and Space Sciences, Indian Institute of Space Science and Technology (IIST, Trivandrum, India). He is specialized Remote Sensing Image Processing. He had his education, M.Sc (Space Physics), M.Tech (Remote Sensing), and PhD (Remote Sensing and Image Processing) respectively from the Andhra University, Birla Institute of Technology (Mesra), and the Indian Institute of Technology (Roorkee). He has been a Visiting Professor to University of Kassel, Germany, and University of Kassel, Germany. He has published widely on the topics of remote sensing and hyperspectral image classification. He is the founding chair of the Kerala GRSS Chapter, and is an IEEE Senior Member.

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**Topic:** Natural Resources Surveillance and Assessment- Remote Sensing Approach

**Abstract:** India has a vast geographical extent of 3.278 million km<sup>2</sup> with a coast line of 7512 Km length. It has 16 agroclimatic regions covering in both tropical and temperate climates. India has huge population of 1379 million with an agricultural land area of 160 million hectares of which gross irrigated area is 82.6 million ha and forested area is about 22.7% of TGA. Indian agriculture is largely depends on success of ISM and NEM facilitate rainfed agriculture. The irrigated farms are supported by the extent of reservoirs inflow and perennial rivers. There are snow fed rivers in the Northern India from snow melt run off from Indian Himalaya. Considering such a diverse environment ISRO, GoI have opted the Remote Sensing for surveillance and assessment of country's natural resources. The journey of Remote sensing infrastructure and capacity building started way back in 1980s and now country has vibrant nationally relevant application programmes. The legacy programmes on Nation wide wasteland mapping, forest cover mapping (ISFR), Agro climatic zoning, Land use Land cover assessment (LULC), Crop Acreage and Production Estimation (CAPE), FASAL (Forecasting Agricultural Output using Space, Agro-meteorology and Land based Observations) for pre-harvest multiple production forecasts of nine field crops in the country. 'Coordinated programme on Horticulture Assessment & Management using geoinformatics (CHAMAN)' for Crop Inventory of 7 Major horticultural crops in selected districts of major states (185 districts in 12 states); Agricultural drought In season assessment for 13 states; Cropping System Analysis for Crop intensification and Crop rotation performance; Nation wide Hydrogeological Prospect Mapping and analysis to meet GW requirement of all the 6.5 lakh villages in the country needing potable water with in 1.5 Kms radius studies; National Wetlands and Desertification assessments; In season forest fire locations; Natural disaster like floods, cyclone damages; Land slide Hazard zonation studies etc.. form the composition of present talk. However, all these efforts are by Multi Institutional, departmental effort built over 3 decades and stands for support in the governance of decision making and resources amelioration studies.



**Dr. C.B.S. Dutt**

Deputy Director-Sci-"H" (Earth and Climate Sciences Area)  
National Remote Sensing Center (NRSC)/ ISRO, Balanagar  
Hyderabad-500032  
Email: CBSDUTT55@gmail.com

**Brief Bio:** Dr. C.B.S. Dutt has received his M.Sc (Botany) and Ph.D (Phyto Chemistry-Botany) from The Maharaja Sayajirao University of Baroda, Vadodara, Gujarat, India, Diploma Certificate in Photogrammetry, Remote Sensing & Cartography from IPI (IIRS), Dehradun. Presently serving as Environmental Assessor for Quality council of India (QCI) as well as an expert committee member for various research committees of MOESS-GOI for INCOIS, NCAOR and NCESS. He is also serving as a Visiting Professor at Hyderabad Central University (HCU). His extensive working experience is on institutional coordination, programme planning and review of the projects of a large scale in Indian context, Climate change, Natural resources, High altitude balloon experiments and Origin of Life, EIA /EMP and Environmental Assessments etc. He has successfully coordinated an International ISRO-CNES MeghaTropiques satellite programme. He has practical experience in executing National Projects at ISRO. Dr. Dutt has a demonstrated skills in Research and Scientific Programmes development, in the area of Earth and climate Sciences, Satellite Remote Sensing and effective implementation of large scale projects through participation of several institutions in the country. The core expertise covering Satellite Remote Sensing, experimental land surface, Atmosphere and coastal Ocean Productivity process studies. Adequate skill exists in the development of Climate related research through multidisciplinary multi institutional participation very successfully.

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**Zoom Meeting Link:** <https://us02web.zoom.us/j/89534171330?pwd=Y1FIZ29hV25aRnFySjZoV1IyaUhDUT09>

## Schedule

Date	Time as per the		Speaker	Topic
	Speaker's Location	Indian Standard Time		
24-06-2021	08.20 hrs (Kolkata Time)	<b>08.20 hrs</b>	Ashish Ghosh	Introduction to Technology Innovation Hub (TIH)
24-06-2021	08.25 hrs (Bangalore Time)	<b>08.25 hrs</b>	B. S. Daya Sagar	Introduction to the Workshop on "Spatial Data Sciences"
24-06-2021	20.00 hrs on 23 <sup>rd</sup> June (Seattle Time)	<b>08.30 hrs</b>	Michael Goodchild	The Landscape of GiScience
24-06-2021	10.00 hrs (Trivandrum Time)	<b>10.00 hrs</b>	Rama Rao Nidamanuri	Terrestrial multi-model remote sensing: potential object reference database for automatic geospatial data analysis
24-06-2021	11.30 hrs (Bangalore Time)	<b>11.30 hrs</b>	Jaya Sreevalsan Nair	Multiscale Methods in Spatial Data Science
24-06-2021	11.00 hrs (BST)	<b>15.30 hrs</b>	Peter Atkinson	The Importance of Representations for Spatial Data Science
24-06-2021	08.00 hrs (BST)	<b>18.30 hrs</b>	Shashi Shekhar	What is special about spatial data science and GeoAI?
25-06-2021	20.00 hrs on 24 <sup>th</sup> June (California Time)	<b>08.30 hrs</b>	Lauren Bennett	Machine Learning Explained: Finding Spatial Clusters
25-06-2021	10.00 hrs (Mumbai Time)	<b>10.00 hrs</b>	Avik Bhattacharya	Radar Data Analysis for EO: Perspectives & Applications
25-06-2021	13.30 hrs (Singapore Time)	<b>11.00 hrs</b>	Michael Gastner	Cartograms for spatiotemporal visualization
25-06-2021	12.15 hrs (Hyderabad Time)	<b>12.15 hrs</b>	C. B. S. Dutt	Natural Resources Surveillance and Assessment- Remote Sensing Approach
25-06-2021	11.00 hrs (Italian Time)	<b>14.30 hrs</b>	Stefano Nativi	Geospatial digital ecosystem for Developing Digital Twins of the Earth
25-06-2021	11.30 hrs (London Time)	<b>16.00 hrs</b>	Michael Batty	The Impact of Big Data on the Development of Smart Cities

**(N.B.:** The Zoom Link would be sent to all the Registrants and the Speakers to their Emails)