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Ahmedabad Chapter

# INDIAN METEOROLOGICAL SOCIETY AHMEDABAD CHAPTER



**THE OCEAN,  
OUR CLIMATE  
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WORLD METEOROLOGICAL DAY

23 MARCH 2021

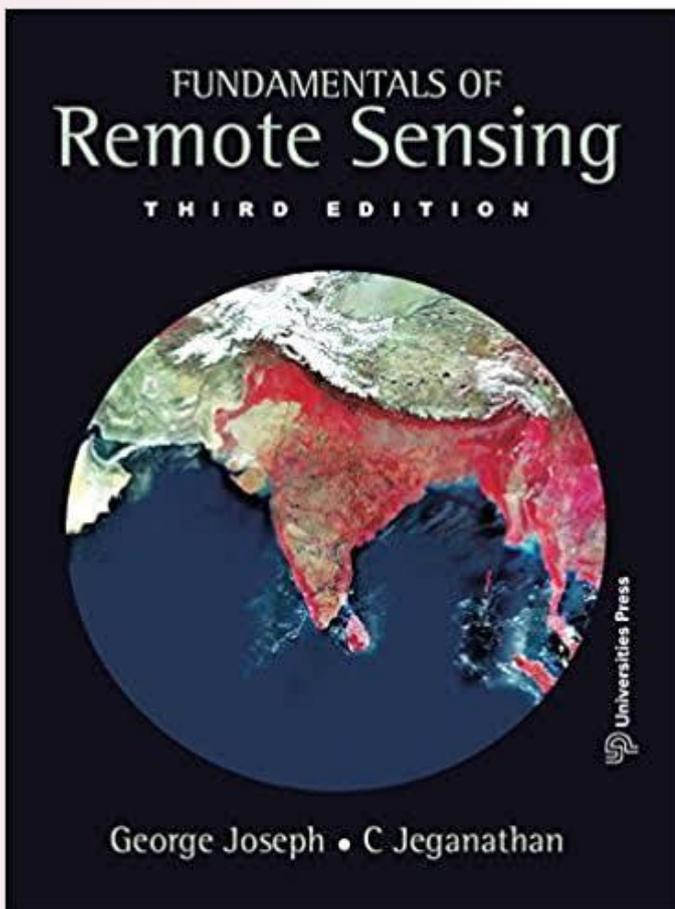
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# **“Fundamentals of Remote Sensing” (Third Edition)**

**by**

**Dr. George Joseph and Prof. C Jeganathan**



At the outset, I congratulate the authors, Dr. George Joseph, a doyen in the field of remote sensing with pioneering contributions in realization of space-based electro-optical sensors in ISRO and Prof. C Jeganathan, an accomplished academician at BIT Mesra, Ranchi, with vast experience of research and teaching in remote sensing and its applications, in bringing out the third edition of the book titled “Fundamentals of Remote Sensing” in 2018.

The previous editions of this book were released in 2003 and 2005, respectively, which were authored by Dr. George Joseph alone. Over the period of these thirteen years, there have been several developments in the field of remote sensing payload technology, processing and applications. And it was appropriate that the authors did think of bringing out a new edition with incorporation of chapters and appendices on the newer developments to make the book not only voluminous but also in sync with the time. The collaboration with Prof. C. Jeganathan for the current edition itself shows a great need and wider popularity that earlier editions had, and now the current edition of the book shall have, as I wish it does, in academic institutions across India and in other countries. This edition has a total of 12 chapters and 8 appendices and a section of color plates containing examples of colored satellite images of different features for visual analysis. It holds on to the chapters on fundamental concept such as radiometry, photonic interaction with matter, spectral signatures etc. from the first and the second editions while at the same time it is enriched with addition of newer elements on remote sensing measurement techniques, sensors and geospatial technologies.

The focus of this review is accordingly to emphasize the novel aspects of remote sensing introduced in the revised edition and what more could be added in the future edition.

A new concept of defining spectral bandwidth along with specification matrix for complete characterization of electro-optical sensors is included in the chapter on overview of Earth observation sensors. A large number of earth observation systems use linear arrays for pushbroom scanning and for the benefit of the reader, this has been dealt with at length in a simplified manner in the chapter on optical-infrared sensors (Chapter-6) illustrating with examples from LANDSAT, LISS and SPOT. Inclusion of separate sections on hyper-spectral imager and hybrid array as well as active pixel detector adds to the comprehensiveness of this edition. What more can one ask for! The chapter-7 on microwave sensors has two important updates in terms of summarized yet simplified explanation of RISAT-1 and a relatively detailed exposition of the ground penetrating radar (GPR)- instrument aspects, operational details and linkages to parameters setting the performance criteria of GPR. In the chapter on platforms, the addition of spacecraft subsystems and a section on global navigation satellite system (GNSS) are two striking and much-sought for inclusions. A separate appendix on GNSS remote sensing with bifurcated sections on GNSS Meteorology and GNSS Reflectometry gives beginner-level descriptions to the two newer approaches to remote sensing of atmosphere and ocean using GNSS. Chapters-9 and 10 deal with data reception and data products, and data analysis with retention of conventional visual and digital interpretation techniques. Some novel concepts like image fusion, which is a contemporary technique for merging low resolution with high resolution remotely sensed data and object-based classification technique which is a multi-scale integration of the contextual classification approach and more efficient for high resolution data will prove to be beneficial at the working and research level. The applications of remote sensing for earth resources management spanning from agriculture to water and desertification to archaeology are discussed systematically and in sufficient detail in chapter-11 with many new aspects such as assessment of agricultural drought, remote sensing for earth system science studies, a simplified flowchart of crop production and discussing ways to decipher buried archaeological sites using remote sensing data. The advantages of WebGIS and need for spatial data infrastructure in modern times of e-Governance are vital inclusions in the last chapter of the book apart from the basics on geographical information system (GIS). The concepts are well-illustrated with diagrams, that are mostly in black and white, and appropriate formulae. Apart from the 8 appendices, the book has a list of acronyms and over 700 references including several web URLs (for digital savvy readers!) for additional reading.

However, addition of some sections on satellite constellations, Sentinel data processing and analysis, on NavIC (popular name for Indian Regional Navigation Satellite System (IRNSS)) constellations and applications, more recent classification systems etc. seems to be desirable. Nevertheless, the absence of these does not take away the purpose of the book to educate and make it a reference book for all sections of readers. The authors have surely benefited the readers across a vast spectrum of undergraduate and post-graduate students, academicians as well as professional careerists in remote sensing with a single repository of knowledge base in remote sensing technology, data analysis and applications that this edition has come out to be. I am sure it will be well-received by all of the above stakeholders.

With Best Wishes!