

**Fundamentals of Remote Sensing.**

George Joseph. Universities Press (India) Pvt Ltd, 3-5-819 Hyderguda, Hyderabad 500 029. 2003. 433 pp. Price: Rs 375.

Remote sensing, an eye in the sky, has evolved both as a science and technology in the last 40 years, and has been established as a major tool for identifying what is where and how much, on the surface of the earth. In the past 20 years, the subject has matured and become operational for natural resources survey, monitoring and management. India, one of the major space-faring nations of the world, has developed this specially after the successful implementation of Indian Remote Sensing Satellite Series. The applications of remote sensing in India are user-driven, and have made a dent also in the international scenario, both from the point of varied applications and the execution of the novel National Natural Resource Management System (NNRMS). Some of the remote sensing applications in India were eye-openers, e.g. the forest cover mapping in 1982, the saline/alkaline soil mapping in Punjab/Haryana and the monitoring of the effectiveness of the remedial measures for it, realistic estimates of flood and drought-affected areas, wasteland, land use and land-cover mapping, etc. Remote-sensing pictures provide unbiased and objective assessment of the ground scenario and are effective for monitoring. Historically, remote sensing is also used for defence applications, but has been limited to those countries who could afford it. Nowadays, remote sensing is within the reach of most countries. In most recent wars like the Kuwait, Afghanistan and Iraq wars, satellite data were used extensively. The versatility of remote sensing lies in its multiple uses, providing spatial and temporal information and bringing intangible benefits, over a long period of time, to many downstream users in different disciplines. Although the tenets of any operational remote-sensing programme in the world have to emerge through the established knowledge on radiometry, opto-mechanical instrumentation, physics and orbital dynamics, each space programme in the world generates its own indigenous skill and customization. As a result, the Indian remote-sensing programme also possesses its own uniqueness in the scientific application of remote-sensing principles. Even as the science of remote

sensing matures in India, it is imminent that we groom a generation of students with the help of these unique applications, so that the long-term sustenance of the indigenous nature of our space programme is guaranteed. In that sense, there is a significant vacuum in the availability of textbooks and guiding literature on remote sensing, with focused orientation on Indian techniques and examples.

The book under review is intended for undergraduate and postgraduate students, in the context of remote sensing being introduced as a subject in the universities across the country. The author has provided fundamental concepts covering various stages of remote sensing from data collection to end utilization, which could be appreciated by the reader, regardless of the discipline from which he/she has graduated.

At the outset, the book appears to have established a unique niche for itself by its strong orientation to the Indian Space Programme. Since the author directed significant programmes in the field of remote-sensing sensor development for over three decades in the country, he has drawn examples and concepts based on his experience and lectures of the past. For the students who are used to reading Western textbooks, this one appears to be the first comprehensive treatise on fundamentals of remote sensing, drawing predominantly from Indian experience and context. The book has abundant illustrations of the geometry of sensors such as LISS, the calibration curves drawn from these sensors and optical response of OCM, WIFs, etc. recorded from Indian lands and waters. Similarly, the orbital characterization of Indian platforms, generation sequence of IRS data, opto-mechanical scanning from INSAT in the geo-stationary orbit and other native concepts are profusely used to demonstrate the effective development of remote-sensing science and technology in India. This will surely inspire the students besides serving the purpose of a comprehensive reading material. However, the list of references and further reading could also have included more Indian literature, as in the recent decades Indian scientists have published a large number of papers in peer-reviewed journals.

The strength of the book is in its first seven chapters that deal with the concepts of EMR, radiometry and the optical and microwave sensors. To some extent,

chapter 8 that dwells on principles of satellite motion and platforms is also lucidly brought out. However, the scientific tenor of the book begins to suffer from chapter 9 on data reception, and further weakens in data analysis and applications of remote sensing for earth resources management. In other words, these terminal chapters that elucidate the use of satellite data are not as comprehensively brought out as the earlier chapters. This may be due to the greater experience of the author in the physical basis of remote sensing, rather than in data analysis and applications. Perhaps, it would have been better not to include these terminal chapters, as the students will have to migrate to another textbook on applications, if they need to obtain as deeper knowledge as they would get in satellite sensors and physics of radiation from this book. Similarly, the appendices on decibels, map projection and visual interpretation key also provide a random resource in them, while many other worthy appendices covering the sensor characteristics and platforms could have been provided. While the book strongly provides knowledge on current status of remote sensing in India, emphasis on visual interpretation could have been avoided, and modern principles like automated interpretation, fuzzy logic, data mining, etc. could have been added. Similarly, a comprehensive glossary of terms would definitely help the student community, if provided in a textbook. All these give an impression that the book has been hurried towards the end.

Nevertheless, painstaking contributions in the physical principles of remote sensing are highly commendable. Some unique inclusions like legal and ethical aspects, influence of atmosphere on remote sensing, quality of image in optical systems provide a new paradigm of understanding. Surely, the book is the first authentic treatise from an Indian author on the subject. However, the shortfalls definitely prompt the need for a revised second edition or a second volume that elaborates the terminal chapters. The font size of the print in the book is slightly annoying.

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