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PREFACE

From Guest Editors' Desk

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The Indian Remote Sensing Satellite 1C (IRS-1C) mission was a 'turning point' for the Indian Space Program. It was launched way back in December 1995. Many following IRS missions were certainly benefited from the experience gained from the IRS-1C in terms of conceptualisation of objectives and realisation of imaging instruments. Many unique features of the IRS-1C paved way to include remote sensing data as vital inputs for decision-making especially related to natural resources management by national agencies and departments.

The Foreword written by Dr. Kasturirangan and Dr. V. Jayaraman has brought out salient features of this mission both in terms of national drive for using earth observation data and its uniqueness of multi-resolution multispectral imagery combined with a panchromatic camera of 5.8 m which was the finest civilian remote sensing sensor available to the user community then. They also highlighted how global attention could be drawn on Indian Space Program in technological and diplomatic fronts.

In this note, therefore, we focus on the structure of this special issue briefly.

The article on *Remembering IRS-1C Mission—The "Game Changer" of Indian Earth Observation Program* by A. Senthil Kumar, N. Aparna and S. Nayak presents an overview on various elements that made the IRS 1C an overall accomplished mission. It also deliberated how its successful operationalisation of data products and services have opened up commercial marketing and further established 36 ground stations across the globe.

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The following article by D.R.M. Samudraiah and A.S. Kiran Kumar on *Remembering IRS-1C Imaging payloads: A giant leap in Indian Space imaging system evolution* brings out many interesting aspects covering many intricacies in every stage of the sensor development and how innovative solutions were arrived at to overcome these challenges by adopting new indigenous technologies. It also summarises how the payloads of this mission have had a significant impact on advanced missions that followed this mission.

The paper by P.K. Srivastava and B.G. Krishna entitled *Developments in Digital mapping from Indian Space Indian space-borne line scanner imagery: IRS-1C to Cartosats* has brought out the use of payload steering built with the PAN sensor to realise stereo pairs required for generating digital elevation models which in turn help to realise highly accurate ortho-rectified imagery to use with other land surveyed data. They have also pointed out scientific exploitation of the IRS-1C stereo pair imagery that has led to preparation of the later exclusive Indian cartographic missions to come.

The articles that followed highlight how IRS-1C has made dents in respective applications fields and has become indispensable in establishing operational systems as part of national natural resources management program.

A. The article by Ashutosh and P.S. Roy on *Three Decades of Nation-wide Forest Cover Mapping Using Indian Remote Sensing Satellite Data: A Success Story of Monitoring Forests for Conservation in India* summarises effort made to establish a robust and scientifically proven forest monitoring system based on ground and remote sensing data. They have highlighted that LISS III sensor Data onboard IRS-1C/D missions extensively used to serve as the primary input data for time series forest cover mapping on a regular basis by the Forest Survey of India.
B. The paper by S.S. Ray and co-workers on *Contribution of IRS-1C Data to Agricultural Monitoring: A Review* describes in detail as how 5-day rapid imaging with 188 m spatial resolution wide field sensor (WIFS)

helped in continuous monitoring of agricultural inventories at national level, while the 23.8 m multispectral LISS-III sensor with inclusion of the short-wave infrared band has helped even at village level in crop classification and for monitoring both mono-cropped and multi-cropped regions.

C. In the paper on *Himalayan Cryospheric Science: A paradigm shift by IRS-1C/D data,* Anil Kulkarni and co-workers described how the use of IRS-1C data has helped in erroneous conclusions drawn earlier with scanty field data in all important glaciological program over the Himalayan region. In addition, systematic coverage of IRS-1C with different resolution sensors data could help to extract information on glacier retreat, glacier lakes, etc., with analytical techniques that are still being used to study the Himalayan cryospheric dynamics.

D. In a paper on *IRS-1C Application in Land use/Land cover studies: Indian experience,* Dr. Nagaraja and co-workers highlighted the benefits gained by having multiple resolution multispectral cameras onboard IRS-1C that has helped national agencies in producing reliable land use/land cover maps in different scales required for different users. They have shared the successful implementation of national watershed programmes with the maps generated with IRS-1C data information.

E. Das and co-workers discussed the application of IRS-1C for groundwater resource mapping in their paper on *IRS-1C satellite data utilization for Ground water prospects mapping for the entire country under NRDWP*. They have shown that a comprehensive database created with IRS IC LISS III satellite data was used extensively to map groundwater resources for the entire India under the National Rural Drinking Water Program (NRDWP) with an aim to carry out groundwater prospects mapping at 1:50,000 scale using IRS-1C/D IRS LISS III satellite data.

F. S.K. Srivastav and co-workers brought out an important study on the use of IRS-1C and its follow-on missions for geological applications. They have shown the advantage of wide coverage provided by the WiFS imagery that could be used for studying regional features like geological and geomorphic provinces and mega lineaments/fractures while the PAN-sharpened LISS-III imagery for facilitating large-scale mapping.

G. Continuing on water security in planar water bodies, the paper by A. Hakeem and co-workers on *Role of IRS-1C in developing Remote Sensing applications for Water Management in India* explains that how the IRS-1C has served as important supplementary data along with ground monitoring systems to making water management decisions. Its three-tier imaging capabilities have helped to improve the utilisation of information from space for various facets such as mapping water bodies, inventory and monitoring of irrigation usage, assessment of sedimentation in reservoirs and watershed developmental planning, as part of national water management program.

H. The urban and regional level studies have been highly benefited with 5.8 m Panchromatic data onboard IRS-1C. In their paper on *A Review of IRS-1C Applications in Urban and Regional Studies, and Infrastructure Planning*, Pramod Kumar and co-workers have emphasised that the IRS-1C imagery either independently or in combination with other contemporary satellite data has been found beneficial for base map generation, growth modelling, environment and hazards analysis, utilities and infrastructure planning, etc. This paper also highlights the scale and mapping potential of IRS-1C data for urban and regional areas, data fusion methods, and information retrieval based on visual or digital image processing techniques.

These are not the only applications that received considerable boost after IRS-1C satellite data could be exploited. Applications of the IRS-1C data in national disaster management system, coastal zone management and in studies of ocean coastal dynamics are noteworthy to mention here.

It is our great privilege to thankfully acknowledge Dr. George Joseph, Editor-in-Chief of JISRS, for having invited us to take up this pleasant task of editing this Special Issue. We take this opportunity to thank Dr. Kasturirangan and Dr. V. Jayaraman for providing an excellent Foreword to this issue. We thankfully acknowledge all the authors of this issue without whom this issue would not have been possible. We are indebted to the dedicated reviewers who took keen interest to provide valuable comments on these lengthy articles on time to improve the quality of the papers.