

Editorial

Preface to the MISR Special Issue

This special issue of *Remote Sensing of Environment* brings together a collection of papers highlighting recent science, algorithm development, and validation results from the Multi-angle Imaging SpectroRadiometer (MISR). MISR was launched on 18 December 1999 as one of five scientific instruments aboard NASA's Earth Observing System (EOS) Terra spacecraft. Until Terra, no instrument like MISR had ever been flown in space. MISR uses a unique combination of attributes (near-simultaneous views over a wide angular range, at moderately high spatial resolution, in several spectral bands, and with high radiometric/geometric fidelity) to generate global data products for studying Earth's aerosols, clouds, and surfaces with accuracies relevant to improving our understanding of the Earth's climate system and its changing environment. The instrument combines a three-dimensional spatial perspective with time-lapse imagery over scales ranging from minutes (the interval between camera views) to years. By looking at multiple angles upon optically scattering and absorbing media that interact with solar radiation (e.g., clouds, aerosols, forest canopies, ice sheets, and water bodies), MISR has motivated the development of innovative approaches for identifying atmospheric and surface physical structure and the partitioning of solar energy in the Earth system.

Since opening of the instrument's cover on 24 February 2000, MISR has been functioning almost flawlessly, with practically continuous data collection for close to seven years. Thus, the time dimension of MISR's measurements over the long term is becoming increasingly significant. Careful calibration has kept radiometric drift to nearly undetectable levels and angle-to-angle image co-registration has been maintained to sub-pixel accuracies. Many applications of MISR data were anticipated prior to launch, and have been factored into mission planning and data

product specifications. Others have been discovered during the course of the mission, consistent with the exploratory nature of the novel measurement approach. Both anticipated and unexpected uses of MISR data are opening new frontiers in studying the Earth system, and the papers in this special issue illustrate the breadth of applications in which MISR data are being employed. MISR's airborne counterpart, AirMISR, has also been a vital research and validation tool, and results from this sensor appear in some of the special issue papers.

Scientific results from 33 studies involving MISR and AirMISR data are presented in this special issue. We are grateful to the team of hardware and software engineers at the Jet Propulsion Laboratory and other institutions who have made this possible, and appreciate the efforts of our colleagues on the MISR science team and their many associates in guiding the course of the experiment. The efforts of many individuals at the NASA Langley Atmospheric Sciences Data Center, where MISR data are routinely processed, archived and made available to the public, and the NASA Goddard Space Flight Center, where lead responsibility for the Terra mission resides, are gratefully acknowledged. Special thanks are due to Betty Schiefelbein and Marvin Bauer for their assistance in assembling this collection of papers. Most of all, we thank all of the authors and peer reviewers for their valuable contributions to this diverse body of work.

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Guest Editors