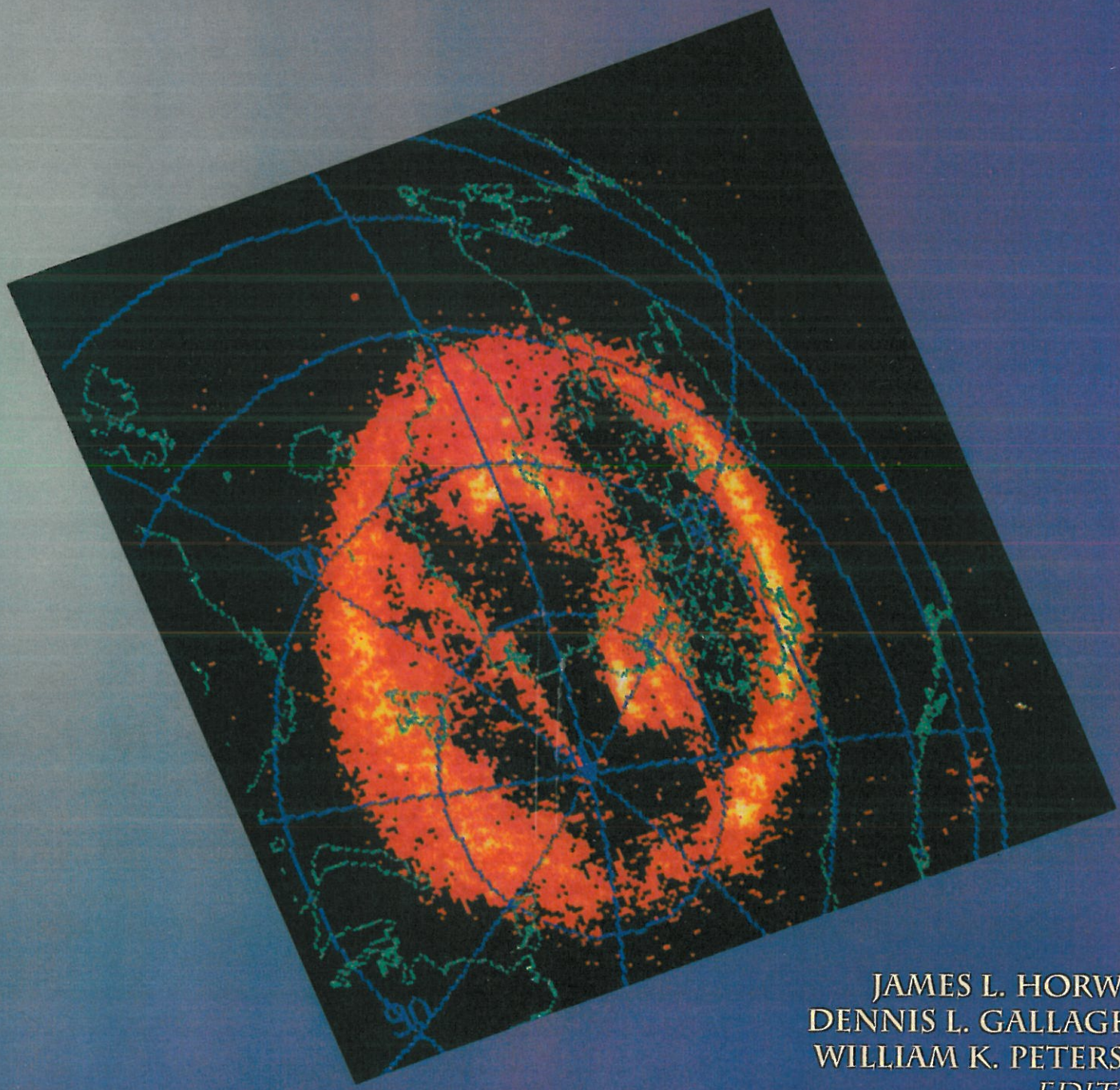
GEOSPACE MASS AND ENERGY FLOW

Results From the International Solar-Terrestrial Physics Program



JAMES L. HORWITZ
DENNIS L. GALLAGHER
WILLIAM K. PETERSON
EDITORS

Geophysical Monograph 104

Geospace Mass and Energy Flow

Results From the International Solar-Terrestrial Physics Program

James L. Horwitz
Dennis L. Gallagher
William K. Peterson
Editors

American Geophysical Union
Washington, D.C.

Published under the aegis of the AGU Books Board

Library of Congress Cataloging-in-Publication Data
Geospace mass and energy flow : results from the International Solar
-Terrestrial Physics Program / James L. Horwitz, Dennis L.
Gallagher, William K. Peterson.
p. cm. -- (Geophysical monograph series ; 104)
Includes bibliographical references.
ISBN 0-87590-087-9
1. Magnetosphere. 2. Ionosphere. 3. Cosmic physics.
4. International Solar-Terrestrial Program. I. Horwitz, James L.
II. Gallagher, Dennis L. III. Peterson, William M. IV. Series.
QC809.M35G49 1998 98-36221
551.51'4--dc21 CIP

ISBN 0-87590-087-9
ISSN 0065-8448

Printed in the United States of America

Contents

Magnetotail/Plasma Sheet/Substorms

Inner Magnetosphere

Magnetic Field Models

PREFACE

The International Solar-Terrestrial Program (ISTP) was conceived by the space agencies of numerous countries as a coordinated effort to determine the global flow of mass, energy and momentum through the solar-terrestrial system. The physical region of interest extends from the Sun through the solar wind, to the terrestrial magnetosphere, down to the ionosphere, with the principal focus on the magnetosphere and its coupling with the solar wind and ionosphere. With the launch of NASA's POLAR spacecraft in February 1996, the major elements of the ISTP program were in place. This volume is one of the very first compendiums of both new observations and new modeling results either directly or indirectly deriving from this major ISTP undertaking.

This monograph is organized into sections associated with the following regions and phenomena, which comprise the major topics impacted by the ISTP program: the solar wind, the dayside magnetosphere, the high-latitude ionosphere, the aurora, the magnetotail/plasma sheet/substorms, the inner magnetosphere, and models of the magnetic field. Among the major highlights are research papers describing new global auroral imaging results from POLAR and comparisons of these images with particle and field data from POLAR and other ISTP spacecraft; multiple ISTP spacecraft and ground observations of magnetospheric substorms; and global scale magnetohydrodynamic and particle trajectory simulations of ISTP observations of substorms and particle distributions.

The impetus for this monograph grew out of a workshop in Guntersville, Alabama, in September 1996. The workshop, entitled "Encounter between Global Observations and Models in the ISTP Era," was originally conceived by Tom Moore, and was convened by D. L. Gallagher and J. L. Horwitz. The success of this volume is due in part to the members of the workshop organizing committee: T. E. Moore, R. H. Comfort, R. Carovillano, M. Mellott, R. Robinson, W. Burke, M. Acuna, R. Hoffman, J. Slavin, A. Nishida, L. Zelenyi, R. Schmidt, R. Greenwald, S. Curtis, R. Zwickl, and R. Lopez. We also must thank M. Hargrave, A. Haller, P. Moss, and J. Christensen of the Center for Space Plasma and Aeronomic Research for their assistance with the conference and this volume. Finally, financial support from NASA Headquarters and the Alabama Space Grant consortium is gratefully acknowledged.

James L. Horwitz
Dennis L. Gallagher
William K. Peterson
Editors