

Space Sciences Series of ISSI
Volume 52

For further volumes:
www.springer.com/series/6592

Andrew F. Nagy • Michel Blanc •
Charles R. Chappell • Norbert Krupp
Editors

Plasma Sources of Solar System Magnetospheres

Previously published in *Space Science Reviews* Volume 192,
Issues 1–4, 2015

 Springer

Editors

Andrew F. Nagy
University of Michigan
Ann Arbor, MI, USA

Charles R. Chappell
Vanderbilt University
Nashville, TN, USA

Michel Blanc
Institut de Recherche en Astrophysique
et Planétologie
Toulouse, France

Norbert Krupp
Max-Planck Institut für Sonnensystem
Göttingen, Germany

ISSN 1385-7525 Space Sciences Series of ISSI

ISBN 978-1-4939-3543-7

ISBN 978-1-4939-3544-4 (eBook)

DOI 10.1007/978-1-4939-3544-4

Library of Congress Control Number: 2016931193

Springer New York Heidelberg Dordrecht London
© Springer Science+Business Media New York 2016

This work is subject to copyright. All rights are reserved by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.

The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

The publisher, the authors and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, express or implied, with respect to the material contained herein or for any errors or omissions that may have been made.

Cover Image: Enceladus as a major source for Saturn's magnetosphere. Credit: Margaret Kivelson et al., Does Enceladus govern magnetospheric dynamics at Saturn? *Science* 311, 1391 (2006)

Printed on acid-free paper

Springer is part of Springer Science+Business Media (www.springer.com)

Contents

Foreword

M. Blanc · A.F. Nagy 1

The Role of the Ionosphere in Providing Plasma to the Terrestrial Magnetosphere—An Historical Overview

C.R. Chappell 5

A Review of General Physical and Chemical Processes Related to Plasma Sources and Losses for Solar System Magnetospheres

K. Seki · A. Nagy · C.M. Jackman · F. Crary · D. Fontaine · P. Zarka · P. Wurz · A. Milillo · J.A. Slavin · D.C. Delcourt · M. Wiltberger · R. Ilie · X. Jia · S.A. Ledvina · M.W. Liemohn · R.W. Schunk 27

Plasma Sources in Planetary Magnetospheres: Mercury

J.M. Raines · G.A. DiBraccio · T.A. Cassidy · D.C. Delcourt · M. Fujimoto · X. Jia · V. Mangano · A. Milillo · M. Sarantos · J.A. Slavin · P. Wurz 91

The Earth: Plasma Sources, Losses, and Transport Processes

D.T. Welling · M. André · I. Dandouras · D. Delcourt · A. Fazakerley · D. Fontaine · J. Foster · R. Ilie · L. Kistler · J.H. Lee · M.W. Liemohn · J.A. Slavin · C.-P. Wang · M. Wiltberger · A. Yau 145

Jupiter's Magnetosphere: Plasma Sources and Transport

S.J. Bolton · F. Bagenal · M. Blanc · T. Cassidy · E. Chané · C. Jackman · X. Jia · A. Kotova · N. Krupp · A. Milillo · C. Plainaki · H.T. Smith · H. Waite 209

Saturn Plasma Sources and Associated Transport Processes

M. Blanc · D.J. Andrews · A.J. Coates · D.C. Hamilton · C.M. Jackman · X. Jia · A. Kotova · M. Morooka · H.T. Smith · J.H. Westlake 237

Comparison of Plasma Sources in Solar System Magnetospheres

N. Krupp 285