Contents

FOREWORD

Foreword

R.-M. Bonnet · M. Blanc 1

PREFACE

Planetary Atmospheric Electricity

R.G. Harrison · K.L. Aplin · F. Leblanc · Y. Yair 5

INTRODUCTORY OVERVIEWS

Investigating Earth's Atmospheric Electricity: a Role Model for Planetary Studies

K.L. Aplin · R.G. Harrison · M.J. Rycroft 11

Updated Review of Planetary Atmospheric Electricity

Y. Yair · G. Fischer · F. Simões · N. Renno · P. Zarka 29

Physical Processes Related to Discharges in Planetary Atmospheres

R. Roussel-Dupré · J.J. Colman · E. Symbalisty · D. Sentman · V.P. Pasko 51

An Overview of Earth's Global Electric Circuit and Atmospheric Conductivity

M.J. Rycroft · R.G. Harrison · K.A. Nicoll · E.A. Mareev 83

Ions in the Terrestrial Atmosphere and Other Solar System Atmospheres

R.G. Harrison · H. Tammet 107

Charge Generation and Separation Processes

Y. Yair 119

Physics of Electric Discharges in Atmospheric Gases: An Informal Introduction

R.A. Treumann · Z. Kłos · M. Parrot 133

IONISATION PROCESSES IN PLANETARY ATMOSPHERES

Cosmic Ray Induced Ion Production in the Atmosphere

G.A. Bazilevskaya · I.G. Usoskin · E.O. Flückiger · R.G. Harrison · L. Desorgher ·
R. Bütkofer · M.B. Krainev · V.S. Makhmutov · Y.I. Stozhkov · A.K. Svirzhevskaya ·
N.S. Svirzhevsky · G.A. Kovaltsov 149

Meteoroid Layers in Planetary Atmospheres

J.G. Molina-Cuberos · J.J. López-Moreno · F. Arnold 175

Profiles of Ion and Aerosol Interactions in Planetary Atmospheres

S.N. Tripathi · M. Michael · R.G. Harrison 193

Composition and Measurement of Charged Atmospheric Clusters

K.L. Aplin 213

Atmospheric Ions and Aerosol Formation

F. Arnold 225

Tropospheric New Particle Formation and the Role of Ions

J. Kazil · R.G. Harrison · E.R. Lovejoy 241

MEASUREMENTS EFFECTS AND HAZARDS OF THUNDERSTORMS AND LIGHTNING

Ground-Based and Space-Based Radio Observations of Planetary Lightning

P. Zarka · W. Farrell · G. Fischer · A. Konovalenko 257

Atmospheric Electricity at Saturn

G. Fischer · D.A. Gurnett · W.S. Kurth · F. Akalin · P. Zarka · U.A. Dyudina ·
W.M. Farrell · M.L. Kaiser 271

Atmospheric Electricity Hazards

R.D. Lorenz 287

Electrical Effects on Atmospheric Chemistry

R.D. Lorenz 295

NEW MISSIONS

TARANIS—A Satellite Project Dedicated to the Physics of TLEs and TGFs

F. Lefeuve · E. Blanc · J.-L. Pinçon · R. Roussel-Dupré · D. Lawrence · J.-A. Sauvaud ·
J.-L. Rauch · H. de Feraudy · D. Lagoutte 301

Lightning Detection by LAC Onboard the Japanese Venus Climate Orbiter, Planet-C

Y. Takahashi · J. Yoshida · Y. Yair · T. Imamura · M. Nakamura 317

CHARGE GENERATION AND SEPARATION

Charge Separation Mechanisms in Clouds

C. Saunders 335

Charge Structure and Dynamics in Thunderstorms

M. Stolzenburg · T.C. Marshall 355

Formation of Charge Layers in the Planetary Atmospheres

E.A. Mareev 373

Electrical Charging of Volcanic Plumes

M.R. James · L. Wilson · S.J. Lane · J.S. Gilbert · T.A. Mather · R.G. Harrison ·
R.S. Martin 399

Electrical Activity and Dust Lifting on Earth, Mars, and Beyond

N.O. Renno · J.F. Kok 419

The Charging of Planetary Rings

A.L. Graps · G.H. Jones · A. Juhász · M. Horányi · O. Havnes 435

Schumann Resonances as a Means of Investigating the Electromagnetic Environment in the Solar System

F. Simões · M. Rycroft · N. Renno · Y. Yair · K.L. Aplin · Y. Takahashi **455**

Blue Jets: Upward Lightning

E.V. Mishin · G.M. Milikh **473**

VLF Studies During TLE Occurrences in Europe: A Summary of New Findings

Á. Mika · C. Haldoupis **489**

DEMETER Observations of EM Emissions Related to Thunderstorms

M. Parrot · J.J. Berthelier · J.P. Lebreton · R. Treumann · J.L. Rauch **511**

On ULF Signatures of Lightning Discharges

T. Bösinger · S.L. Shalimov **521**