

Climate Change Modeling Methodology

This volume collects selected topical entries from the *Encyclopedia of Sustainability Science and Technology* (ESST). ESST addresses the grand challenges for science and engineering today. It provides unprecedented, peer-reviewed coverage of sustainability science and technology with contributions from nearly 1,000 of the world's leading scientists and engineers, who write on more than 600 separate topics in 38 sections. ESST establishes a foundation for the research, engineering, and economics supporting the many sustainability and policy evaluations being performed in institutions worldwide.

Editor-in-Chief

ROBERT A. MEYERS, RAMTECH LIMITED, Larkspur, CA, USA

Editorial Board

RITA R. COLWELL, Distinguished University Professor, Center for Bioinformatics and Computational Biology, University of Maryland, College Park, MD, USA

ANDREAS FISCHLIN, Terrestrial Systems Ecology, ETH-Zentrum, Zürich, Switzerland

DONALD A. GLASER, Glaser Lab, University of California, Berkeley, Department of Molecular & Cell Biology, Berkeley, CA, USA

TIMOTHY L. KILLEEN, National Science Foundation, Arlington, VA, USA

HAROLD W. KROTO, Francis Eppes Professor of Chemistry, Department of Chemistry and Biochemistry, The Florida State University, Tallahassee, FL, USA

AMORY B. LOVINS, Chairman & Chief Scientist, Rocky Mountain Institute, Snowmass, USA

LORD ROBERT MAY, Department of Zoology, University of Oxford, Oxford, OX1 3PS, UK

DANIEL L. MCFADDEN, Director of Econometrics Laboratory, University of California, Berkeley, CA, USA

THOMAS C. SCHELLING, 3105 Tydings Hall, Department of Economics, University of Maryland, College Park, MD, USA

CHARLES H. TOWNES, 557 Birge, University of California, Berkeley, CA, USA

EMILIO AMBASZ, Emilio Ambasz & Associates, Inc., New York, NY, USA

CLARE BRADSHAW, Department of Systems Ecology, Stockholm University, Stockholm, Sweden

TERRY COFFELT, Research Geneticist, Arid Land Agricultural Research Center, Maricopa, AZ, USA

MEHRDAD EHSANI, Department of Electrical & Computer Engineering, Texas A&M University, College Station, TX, USA

ALI EMADI, Electrical and Computer Engineering Department, Illinois Institute of Technology, Chicago, IL, USA

CHARLES A. S. HALL, College of Environmental Science & Forestry, State University of New York, Syracuse, NY, USA

RIK LEEMANS, Environmental Systems Analysis Group, Wageningen University, Wageningen, The Netherlands

KEITH LOVEGROVE, Department of Engineering (Bldg 32), The Australian National University, Canberra, Australia

TIMOTHY D. SEARCHINGER, Woodrow Wilson School, Princeton University, Princeton, NJ, USA

Philip J. Rasch
Editor

Climate Change Modeling Methodology

Selected Entries from the Encyclopedia
of Sustainability Science and Technology

 Springer

Editor

Philip J. Rasch
Pacific Northwest National Laboratory
Richland, WA, USA

This book consists of selections from the Encyclopedia of Sustainability Science and Technology edited by Robert A. Meyers, originally published by Springer Science+Business Media New York in 2012.

ISBN 978-1-4614-5766-4 ISBN 978-1-4614-5767-1 (eBook)
DOI 10.1007/978-1-4614-5767-1
Springer New York Heidelberg Dordrecht London

Library of Congress Control Number: 2012954280

© Springer Science+Business Media New York 2012

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. Exempted from this legal reservation are brief excerpts in connection with reviews or scholarly analysis or material supplied specifically for the purpose of being entered and executed on a computer system, for exclusive use by the purchaser of the work. Duplication of this publication or parts thereof is permitted only under the provisions of the Copyright Law of the Publisher's location, in its current version, and permission for use must always be obtained from Springer. Permissions for use may be obtained through RightsLink at the Copyright Clearance Center. Violations are liable to prosecution under the respective Copyright Law.

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.

While the advice and information in this book are believed to be true and accurate at the date of publication, neither the authors nor the editors nor the publisher can accept any legal responsibility for any errors or omissions that may be made. The publisher makes no warranty, express or implied, with respect to the material contained herein.

Printed on acid-free paper

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

Contents

1	Climate Change Modeling Methodology, Introduction	1
	Philip J. Rasch	
2	Coupled Climate and Earth System Models	5
	Peter R. Gent	
3	Cryosphere, Modeling of	31
	Cecilia M. Bitz and Shawn J. Marshall	
4	Oceanic General Circulation Models	63
	Jin-Ho Yoon and Po-Lun Ma	
5	Weather Prediction Models	89
	Julio T. Bacmeister	
6	Atmospheric General Circulation Modeling	115
	Philip J. Rasch	
7	Earth System Model, Modeling the Land Component of	139
	Guo-Yue Niu and Xubin Zeng	
8	Integrated Assessment Modeling	169
	James A. Edmonds, Katherine V. Calvin, Leon E. Clarke, Anthony C. Janetos, Son H. Kim, Marshall A. Wise, and Haewon C. McJeon	
9	Regional Climate Models	211
	L. Ruby Leung	
10	Climate Change Projections: Characterizing Uncertainty Using Climate Models	235
	Ben Sanderson and Reto Knutti	

11 Climate Predictions, Seasonal-to-Decadal	261
Lisa Goddard	
12 Monsoon Systems, Modeling of	303
Chien Wang and William K.M. Lau	
Index	331

Para tener acceso completo a este libro usted debe solicitarlo de manera formal a la Coordinación del Programa de Doctorado Interinstitucional en Ciencias Ambientales mediante el **Formato de Préstamo Bibliográfico** ([descargar formato](#)) y remitirlo al siguiente correo:

dicambientales@unicauca.edu.co



DOCTORADO INTERINSTITUCIONAL EN
CIENCIAS AMBIENTALES

