PROCEEDINGS ON CLIMATE & ENERGY:

IMPERATIVES FOR FUTURE NAVAL FORCES

23–24 MARCH 2010

SPONSORED BY:

L. DEAN SIMMONS, EXECUTIVE EDITOR
ACKNOWLEDGMENTS

Executive Editor: L. Dean Simmons
Managing Editor: Angela Hughes
Project Editors: Angela Hughes
Anne King
Peggy Moore
Catherine Peacock
Erin Richardson
Art Directors: George Travez
Patrice Zurvalec
Public Release: Margaret Harlow

Special thanks to our sponsors at: The Johns Hopkins University Applied Physics Laboratory (JHU/APL) and CNA (which operates the Center for Naval Analyses and the Institute for Public Research).

A complete list of symposium contributors can be found at the symposium’s website: www.jhuapl.edu/ClimateAndEnergy/

Copyright © 2010
By The Johns Hopkins University Applied Physics Laboratory
All rights reserved. No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopy, recording, or any information storage and retrieval system, without permission in writing from the publisher.

Requests for permission to make copies of any part of the work should be mailed to:
L. Dean Simmons
National Security Analysis Department
The Johns Hopkins University Applied Physics Laboratory
11100 Johns Hopkins Road
Laurel, Maryland 20723

Printed in the United States of America. 10-02733
Contents

Preface: Climate and Energy Imperatives for Future Naval Forces
Dr. L. Dean Simmons and Dr. Ronald Filadelfo...... vii

CHAPTER 1
INTRODUCTION AND KEYNOTE ADDRESS
1.1 Introduction
Dr. L. Dean Simmons...............................................1
1.2 Opening Remarks
Dr. Ronald Filadeflo.................................................9
1.3 Keynote Address
Honorable Ray Mabus...........................................13

CHAPTER 2
CLIMATE IMPERATIVES
2.1 Global Climate Change
Rear Admiral David Titley......................................27
2.2 Roundtable 1: Climate Change
Moderator’s Summary
Dr. Marcus King.....................................................45
2.3 Scientific Uncertainty and Security Risks of Climate Change
Dr. Jay Gulledge....................................................47
2.4 The Impact of Climate Change on National Security
Major General Richard Engel..................................59
2.5 The Connection Between Climate Change and National Security
Dr. Geoffrey Dabelko ............................................65

CHAPTER 3
ENERGY IMPERATIVES: PART I
3.1 EIA’s Energy Outlook and Climate Change
Ms. Phyllis Martin..................................................83
3.2 Roundtable 2: Energy Availability
Moderator’s Summary
Mr. Duncan Brown................................................103
3.3 Economic Impacts of Global Petroleum Supply Shocks
Dr. Jeffrey Werling..............................................111
3.4 DoD’s Energy Challenge as Strategic Opportunity
Mr. John Simpson ...................................................... 125

CHAPTER 4
ENERGY IMPERATIVES: PART II
4.1 Powering the Planet
Dr. Nathan Lewis...................................................... 151
4.2 Navy Task Force Energy
Rear Admiral Philip H. Cullom ................................. 175

CHAPTER 5
FUTURE NAVAL OPERATIONS IN THE AMERICAS
5.1 Roundtable 3: Naval Operations in the Americas
Moderator’s Summary
Mr. Dana Goward...................................................... 199
5.2 Climate and Energy Availability Impacts on
Operations in USNORTHCOM
Lieutenant Colonel O. Kent Strader ......................... 211
5.3 International Law and National Strategy:
Anti-Access and Area Denial
Commander James Kraska ...................................... 223
5.4 Naval Research Laboratory Research Focus in the
Arctic Ocean
Dr. Richard B. Coffin ................................................. 239
5.5 Implications for Maritime and Cross-Domain
Operations in USSOUTHCOM
Mr. John D. Perez .................................................... 251
5.6 Humanitarian Assistance/Disaster Relief and Climate
Change in USSOUTHCOM
Captain Al Collins.................................................... 259

CHAPTER 6
FUTURE NAVAL OPERATIONS IN EUROPE AND AFRICA
6.1 Energy and Climate Security
General Charles Wald .............................................. 271
6.2 Roundtable 4: Operations in Europe and Africa
Moderator’s Summary
Colonel Edward (Ted) A. Smyth .............................. 295
6.3 Naval Operations in Europe and Africa
Admiral Harry Ulrich III........................................... 301
6.4 Strategic Environment and Implications of Climate Change
   Colonel James G. Welton .................................... 307
6.5 Why Climate Change and Environment Don’t Matter
   Lieutenant Colonel Shannon Beebe ....................... 323

CHAPTER 7
FUTURE NAVAL OPERATIONS IN ASIA AND THE PACIFIC
7.1 Evolving Naval Forces to Support Operations in Asia and the Pacific
   Admiral Timothy J. Keating ............................... 339
7.2 Roundtable 5: Operations in Asia and the Pacific
   Moderator’s Summary
   Rear Admiral Michael McDevitt ........................... 353
7.3 Expeditionary Energy: The Marine Corps’ Perspective
   Colonel Bob Charette, Jr. ................................. 355
7.4 Climate Change Implications for the Royal Australian Navy
   Commander Stephen Cole................................. 359
7.5 Energy Security, Climate Change, and National Security
   Vice Admiral Dennis McGinn .............................. 375

CHAPTER 8
INTEGRATION AND SYNTHESIS
8.1 Integration and Synthesis Panel
   Moderator's Summary
   Mr. John Benedict ......................................... 395
8.2 The Who, What, Where, and When of Climate and Energy
   Dr. Ed McGrady ............................................. 403
8.3 Thinking About Climate and Energy in a System-of-Systems Manner
   Mr. Adam B. Siegel ......................................... 411
8.4 Thinking About Climate and Energy as Change
   Dr. Michael Vlahos ......................................... 417

APPENDIX A
Symposium Agenda ........................................... 431
PREFACE: CLIMATE AND ENERGY IMPERATIVES FOR FUTURE NAVAL FORCES

There is growing recognition that changes in global climate and in energy supply and demand will play important roles in shaping our nation’s overall security environment. The prospect for sea-level rise, significant changes in the nature and extent of ice coverage in the Arctic, substantial melting of the world’s glaciers, and increased international competition for energy resources seem particularly important for our nation’s naval forces—including those of the Navy, the Marine Corps, and the Coast Guard. To explore the issues related to changes in climate and energy, The Johns Hopkins University Applied Physics Laboratory and CNA, which operates the Center for Naval Analyses and the Institute for Public Research, sponsored a 2-day symposium in March 2010. The symposium featured a rich collection of recognized experts in the national security implications of climate and energy, including the Secretary of the Navy, the Directors of Navy Task Force Climate Change and Navy Task Force Energy, and senior military personnel from each of the Department of Defense’s geographical combatant commands. The proceedings that follow document the presentations, panel discussions, and question-and-answer sessions from the symposium and describe in some detail how changes in climate and energy may affect the missions and tasks that are undertaken by future U.S. naval forces and the ways in which those forces are organized and equipped to carry out their assignments.

Dr. L. Dean Simmons
JHU/APL

Dr. Ronald Filadelfo
CNA