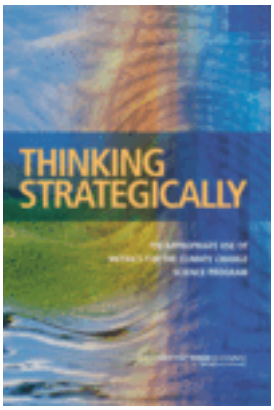

Thinking Strategically: The Appropriate Use of Metrics for the Climate Change Science Program

Committee on Metrics for Global Change Research, Climate Research Committee, National Research Council

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Board on Atmospheric Sciences and Climate
Division on Earth and Life Studies

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Acknowledgments

This report has been reviewed by individuals chosen for their diverse perspectives and technical expertise, in accordance with procedures approved by the National Research Council's Report Review Committee. The purpose of this independent review is to provide candid and critical comments that will assist the institution in making its published report as sound as possible and to ensure that the report meets institutional standards for objectivity, evidence, and responsiveness to the study charge. The review comments and draft manuscript remain confidential to protect the integrity of the deliberative process. We wish to thank the following individuals for their review of this report:

Jack Azar, XEROX Corporation, Webster, New York
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Although the individuals listed above have provided many constructive comments and suggestions, they were not asked to endorse the conclusions and recommendations nor did they see the final draft of the report before its release. The review of this report was overseen by Robert Frosch, Harvard University, and Thomas Graedel, Yale University. Appointed by the National Research Council, they were responsible for making certain that an independent examination of this report was carried out in accordance with institutional procedures and that all review comments were carefully considered. Responsibility for the final content of this report rests entirely with the authoring committee and the institution.

Preface

Federal agencies are increasingly being asked to document progress and measure performance to improve their accountability to Congress and the public and to provide information useful for making budget decisions. This task can be difficult to accomplish, especially in a program as complex as the Climate Change Science Program (CCSP), which spans all of the environmental and related social science disciplines and includes activities ranging from basic research to decision making in 13 federal agencies. Current approaches to evaluate progress (e.g., peer review of basic research, reduction of uncertainty) focus on particular aspects of the CCSP and/or have other limitations. For example, gaining improved understanding of the climate system can lead to increased uncertainties about some aspects of the system, yet progress has clearly been made. So, the question remains: How can progress in climate science be demonstrated after nearly 15 years of sponsored research and observations?

At the request of Dr. James Mahoney, director of the U.S. Climate Change Science Program and chair of the Subcommittee on Global Change Research, the National Research Council established a committee to develop quantitative metrics and performance measures for documenting progress and evaluating future performance for selected areas of global change and climate change research. Committee membership included researchers drawn from a wide range of global change disciplines and experts from industry and government with practical experience in developing and using metrics.

The Committee on Metrics for Global Change Research held three meetings from December 2003 to June 2004 to discuss the issues and to gather input in three major areas:

1. the different types of metrics (e.g., input, outcome) and the different scales of programs that can be evaluated usefully by such measures;
2. the experience of industry, academia, and federal government agencies in measuring performance; and
3. lessons learned from retrospective analysis of science programs.

A fourth meeting (September-October 2004) was devoted to writing this report. In preparing its report the committee strove to provide practical advice on the applicability of performance measures across the full range of CCSP goals and approaches—from discovery science, to modeling and assessment, to communicating results and managing risk.

The committee thanks the following individuals for making presentations or providing other input: David Bader, Susan Cozzens, James Hack, Richard Hallgren, Jack Kaye, Charles Kennel, Mike MacCracken, James Mahoney, Richard Moss, Franklin Nutter, Cheryl Oros, John Parascandola, Craig Robinson, Jason Rothenberg, Sherwood Rowland, and Spencer Weart. Thanks also go to members of the Climate Research Committee and Board on Atmospheric Sciences and Climate—particularly Anthony Busalacchi, James Coakley, David Karoly, Robert Serafin, and Lynne Talley—for their input and guidance throughout the study. Finally, the committee extends its appreciation to the NRC staff, particularly study director Anne Linn, for their highly professional contributions to this report.

Eric Barron
Chair

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