

NASA/TM-2003-

**Ocean Optics Protocols For Satellite Ocean Color Sensor
Validation, Revision 4, Volume II:**

Instrument Specifications, Characterization and Calibration

*James L. Mueller, CHORS, San Diego State University, San Diego, California
Giulietta S. Fargion, Science Applications International Corporation, Beltsville, Maryland
Charles R. McClain, Goddard Space Flight Center, Greenbelt, Maryland, Editors*

*J. L. Mueller, and R.W. Austin
CHORS, San Diego State University, San Diego, California
Christophe Pietras
Science Applications International Corporation, Beltsville, Maryland
Stanford B. Hooker and Brent Holben
NASA Goddard Space Flight Center, Greenbelt, Maryland
Mark Miller
Department of Applied Science, Brookhaven National Laboratory, Upton, New York
Kirk D. Knobelspiesse
Science Systems and Applications, Inc., Greenbelt, Maryland
Robert Frouin
Scripps Institution of Oceanography, University of California, San Diego, California
Ken Voss
Physics Department, University of Miami, Florida*

National Aeronautical and
Space administration

Goddard Space Flight Space Center
Greenbelt, Maryland 20771

January 2003

Preface

This document stipulates protocols for measuring bio-optical and radiometric data for the Sensor Intercomparison and Merger for Biological and Interdisciplinary Oceanic Studies (SIMBIOS) Project activities and algorithm development. The document is organized into 7 separate volumes as:

Ocean Optics Protocols for Satellite Ocean Color Sensor Validation, Revision 4

Volume I: Introduction, Background and Conventions

Volume II: Instrument Specifications, Characterization and Calibration

Volume III: Radiometric Measurements and Data Analysis Methods

Volume IV: Inherent Optical Properties: Instruments, Characterization, Field Measurements and Data Analysis Protocols

Volume V: Biogeochemical and Bio-Optical Measurements and Data Analysis Methods

Volume VI: Special Topics in Ocean Optics Protocols

Volume VII: Appendices

The earlier version of *Ocean Optics Protocols for Satellite Ocean Color Sensor Validation, Revision 3* (Mueller and Fargion 2002, Volumes 1 and 2) is entirely superseded by the seven Volumes of Revision 4 listed above.

The new multi-volume format for publishing the ocean optics protocols is intended to allow timely future revisions to be made reflecting important evolution of instruments and methods in some areas, without reissuing the entire document. Over the years, as existing protocols were revised, or expanded for clarification, and new protocol topics were added, the ocean optics protocol document has grown from 45pp (Mueller and Austin 1992) to 308pp in Revision 3 (Mueller and Fargion 2002). This rate of growth continues in Revision 4. The writing and editorial tasks needed to publish each revised version of the protocol manual as a single document has become progressively more difficult as its size increases. Chapters that change but little, must nevertheless be rewritten for each revision to reflect relatively minor changes in, *e.g.*, cross-referencing and to maintain self-contained consistency in the protocol manual. More critically, as it grows bigger, the book becomes more difficult to use by its intended audience. A massive new protocol manual is difficult for a reader to peruse thoroughly enough to stay current with and apply important new material and revisions it may contain. Many people simply find it too time consuming to keep up with changing protocols presented in this format - which may explain why some relatively recent technical reports and journal articles cite Mueller and Austin (1995), rather than the then current, more correct protocol document. It is hoped that the new format will improve community access to current protocols by stabilizing those volumes and chapters that do not change significantly over periods of several years, and introducing most new major revisions as new chapters to be added to an existing volume without revision of its previous contents.

The relationships between the Revision 4 chapters of each protocol volume and those of Revision 3 (Mueller and Fargion 2002), and the topics new chapters, are briefly summarized below:

Volume I: This volume covers perspectives on ocean color research and validation (Chapter 1), fundamental definitions, terminology, relationships and conventions used throughout the protocol document (Chapter 2), requirements for specific *in situ* observations (Chapter 3), and general protocols for field measurements, metadata, logbooks, sampling strategies, and data archival (Chapter 4). Chapters 1, 2 and 3 of Volume I correspond directly to Chapters 1, 2 and 3 of Revision 3 with no substantive changes. Two new variables, Particulate Organic Carbon (POC) and Particle Size Distribution (PSD) have been added to Tables 3.1 and 3.2 and the related discussion in Section 3.4; protocols covering these measurements will be added in a subsequent revision to Volume V (see below). Chapter 4 of Volume I combines material from Chapter 9 of Revision 3 with a brief summary of SeaBASS policy and archival requirements (detailed SeaBASS information in Chapter 18 and Appendix B of Revision 3 has been separated from the optics protocols).

Volume II: The chapters of this volume review instrument performance characteristics required for *in situ* observations to support validation (Chapter 1), detailed instrument specifications and underlying rationale (Chapter 2) and protocols for instrument calibration and characterization standards and methods (Chapters 3 through 5). Chapters 1 through 5 of Volume II correspond directly to Revision 3 chapters 4 through 8, respectively, with only minor modifications.