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SeaWiFS Technical Report Series

Stanford B. Hooker and
Elaine R. Firestone, Editors

Volume 43, SeaWiFS Technical Report Series
Final Index: Volumes 1–43

Elaine R. Firestone and Stanford B. Hooker

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1998

PREFACE

The SeaWiFS Project was officially established at Goddard Space Flight Center (GSFC) on March 29, 1991 with the award of an Ocean Color Data Mission contract to Orbital Sciences Corporation (OSC). It was originated as a cooperative effort between the government and industry, and had a spacecraft launch date of 31 July 1993. In this case, GSFC and OSC would share the costs of the mission. GSFC would specify the data that was needed and buy the research rights to these data, maintaining insight, but not oversight rights, with their industrial partner. GSFC would also provide calibration and validation for these data. OSC would provide the spacecraft and instrument, launch services, and spacecraft operations to provide data for five years at a fixed price of $43 million. OSC would retain the operational and commercial rights to these data. In order to protect OSC's data rights, research data release would be delayed, unless timely release is necessary for calibration and validation activities.

Because of the focus on data products, the Project structure is different from classic flight projects at GSFC. It is housed within the Earth science organization, where the majority of the staff are scientists. The majority of the engineering support is matrixed into the organization on an as-needed basis. During the development and early operations phase, the Project was under team leadership by the Project Manager (an engineer), and the Project Scientist (an oceanographer). After the spacecraft was launched and it entered routine operations, the Project management was turned over to the Project Scientist. Data collection is specified by the Mission Operations Element, who control the SeaWiFS instrument on the spacecraft. The global data are received at Wallops Flight Facility and are then transferred to GSFC. At GSFC, the Data Processing Element receives these data and generates standard global ocean color data products. This process includes calibration and validation of these data and quality assurance, which is provided by the Calibration and Validation Element, which also includes a Field Program for *in situ* work. Local area coverage data and back-up global data are also collected at GSFC. The Project Office Staff provide support and a buffer for the technical staff. The Project Office is virtually located on the World Wide Web, and that has made coordination of a global project infinitely easier.

The original schedule specified certified data delivery by December 1, 1993. During spacecraft development, numerous delays were encountered, and data delivery was delayed until December 20, 1997. The delay was extremely painful for everyone involved, but it did allow for significant refinement and documentation of our work. This prelaunch technical memorandum series will conclude with this 43rd volume, considerably larger than was originally anticipated. The excellence of the series was recognized by a NASA Group Achievement Award presented to the Series Editors, Stanford B. Hooker and Elaine R. Firestone. Although the instrument was optimized for ocean imaging, the SeaWiFS instrument was modified to decrease stray light effects. That change allowed the instrument to produce good land imagery as well. With the addition of the land data, the Project that was tasked with providing regular global ocean color data, was able to produce regular global biospheric data for the first time in history.

The Project thanks everyone who invested their time and energy in this effort. The research facilitated by these data will hopefully exceed all expectations—those same expectations that kept everyone going through the development phase.

"With that said, I will now turn the SeaWiFS Project over to the Project Scientist, Chuck McClain. It has been a pleasure and an inspiration to work with all of you."

Greenbelt, Maryland
February 1998

—M. L. Cleave
Project Manager

Abstract

The Sea-viewing Wide Field-of-view Sensor (SeaWiFS) is the follow-on ocean color instrument to the Coastal Zone Color Scanner (CZCS), which ceased operations in 1986, after an eight-year mission. SeaWiFS was launched on 1 August 1997, on the OrbView-2 satellite, built by Orbital Sciences Corporation (OSC). The SeaWiFS Project at the National Aeronautics and Space Administration (NASA) Goddard Space Flight Center (GSFC), undertook the responsibility of documenting all aspects of this mission, which is critical to the ocean color and marine science communities. This documentation, entitled the *SeaWiFS Technical Report Series,* is in the form of NASA Technical Memorandum Number 104566 and 1998–104566. All reports published are volumes within the series. This particular volume, which is the last of the so-called *Prelaunch Series* serves as a reference, or guidebook, to the previous 42 volumes and consists of 6 sections including: an addenda, an errata, an index to key words and phrases, lists of acronyms and symbols used, and a list of all references cited. The editors have published a cumulative index of this type after every five volumes. Each index covers the reference topics published in all previous editions, that is, each new index includes all of the information contained in the preceeding indexes with the exception of any addenda.

1. INTRODUCTION

This is the seventh, and final volume, in a series of indexes, published as a separate volume in the Sea-viewing Wide Field-of-view Sensor (SeaWiFS) Technical Report Series, and includes information found in the first 42 volumes of the series. The Report Series was written under the National Aeronautics and Space Administration's (NASA) Technical Memorandum (TM) Number 104566 and 1998–104566. The volume numbers, authors, and titles of the volumes covered in this index are:

Vol. 1: Hooker, S.B., W.E. Esaias, G.C. Feldman, W.W. Gregg, and C.R. McClain, *An Overview of SeaWiFS and Ocean Color.*

Vol. 2: Gregg, W.W., *Analysis of Orbit Selection for SeaWiFS: Ascending vs. Descending Node.*

Vol. 3: McClain, C.R., W.E. Esaias, W. Barnes, B. Guenther, D. Endres, S.B. Hooker, B.G. Mitchell, and R. Barnes, *SeaWiFS Calibration and Validation Plan.*

Vol. 4: McClain, C.R., E. Yeh, and G. Fu, *An Analysis of GAC Sampling Algorithms: A Case Study.*

Vol. 5: Mueller, J.L., and R.W. Austin, *Ocean Optics Protocols for SeaWiFS Validation.*

Vol. 6: Firestone, E.R., and S.B. Hooker, *SeaWiFS Technical Report Series Cumulative Index: Volumes 1–5.*

Vol. 7: Darzi, M., *Cloud Screening for Polar Orbiting Visible and IR Satellite Sensors.*

Vol. 8: Hooker, S.B., W.E. Esaias, and L.A. Rexrode, *Proceedings of the First SeaWiFS Science Team Meeting.*

Vol. 9: Gregg, W.W., F. Chen, A. Mezaache, J. Chen, and J. Whiting, *The Simulated SeaWiFS Data Set.*

Vol. 10: Woodward, R.H., R.A. Barnes, W.E. Esaias, W.L. Barnes, A.T. Mecherikunnel, *Modeling of the SeaWiFS Solar and Lunar Observations.*

Vol. 11: Patt, F.S., C.M. Hoisington, W.W. Gregg, and P.L. Coronado, *Analysis of Selected Orbit Propagation Models.*

Vol. 12: Firestone, E.R., and S.B. Hooker, *SeaWiFS Technical Report Series Cumulative Index: Volumes 1–11.*

Vol. 13: McClain, C.R., J.C. Comiso, R.S. Fraser, J.K. Firestone, B.D. Schieber, E-n. Yeh, K.R. Arrigo, and C.W. Sullivan, *Case Studies for SeaWiFS Calibration and Validation, Part 1.*

Vol. 14: Mueller, J.L., *The First SeaWiFS Intercalibration Round-Robin Experiment, SIRREX-1, July 1992.*

Vol. 15: Gregg, W.W., F.S. Patt, and R.H. Woodward, *The Simulated SeaWiFS Data Set, Version 2.*

Vol. 16: Mueller, J.L., B.C. Johnson, C.L. Cromer, J.W. Cooper, J.T. McLean, S.B. Hooker, and T.L. Westphal, *The Second SeaWiFS Intercalibration Round-Robin Experiment, SIRREX-2, June 1993.*

Vol. 17: Abbott, M.R., O.B. Brown, H.R. Gordon, K.L. Carder, R.E. Evans, F.E. Müller-Karger, and W.E. Esaias, *Ocean Color in the 21st Century: A Strategy for a 20-Year Time Series.*

Vol. 18: Firestone, E.R., and S.B. Hooker, *SeaWiFS Technical Report Series Summary Index: Volumes 1–17.*

Vol. 19: McClain, C.R., R.S. Fraser, J.T. McLean, M. Darzi, J.K. Firestone, F.S. Patt, B.D. Schieber, R.H. Woodward, E-n. Yeh, S. Mattoo, S.F. Biggar, P.N. Slater, K.J. Thome, A.W. Holmes, R.A. Barnes, and K.J. Voss, *Case Studies for SeaWiFS Calibration and Validation, Part 2.*

Vol. 20: Hooker, S.B., C.R. McClain, J.K. Firestone, T.L. Westphal, E-n. Yeh, and Y. Ge, *The SeaWiFS Bio-Optical Archive and Storage System (SeaBASS), Part 1.*

Vol. 21: Acker, J.G., *The Heritage of SeaWiFS: A Retrospective on the CZCS NIMBUS Experiment Team (NET) Program.*

Vol. 22: Barnes, R.A., W.L. Barnes, W.E. Esaias, and C.R. McClain, *Prelaunch Acceptance Report for the SeaWiFS Radiometer.*

Vol. 23: Barnes, R.A., A.W. Holmes, W.L. Barnes, W.E. Esaias, C.R. McClain, and T. Svitek, *SeaWiFS Prelaunch Radiometric Calibration and Spectral Characterization.*

Vol. 24: Firestone, E.R., and S.B. Hooker, *SeaWiFS Technical Report Series Summary Index: Volumes 1–23.*

Vol. 25: Mueller, J.L., and R.W. Austin, *Ocean Optics Protocols for SeaWiFS Validation, Revision 1.*

Vol. 26: Siegel, D.A., M.C. O'Brien, J.C. Sorensen, D.A. Konnoff, E.A. Brody, J.L. Mueller, C.O. Davis, W.J. Rhea, and S.B. Hooker, *Results of the SeaWiFS Data Analysis Round-Robin (DARR-94), July 1994.*

Vol. 27: Mueller, J.L., R.S. Fraser, S.F. Biggar, K.J. Thome, P.N. Slater, A.W. Holmes, R.A. Barnes, C.T. Weir, D.A. Siegel, D.W. Menzies, A.F. Michaels, and G. Podesta, *Case Studies for SeaWiFS Calibration and Validation, Part 3.*

Vol. 28: McClain, C.R., K.R. Arrigo, W.E. Esaias, M. Darzi, F.S. Patt, R.H. Evans, J.W. Brown, C.W. Brown, R.A. Barnes, and L. Kumar, *SeaWiFS Algorithms, Part 1.*

Vol. 29: Aiken, J., G.F. Moore, C.C. Trees, S.B. Hooker, and D.K. Clark, *The SeaWiFS CZCS-Type Pigment Algorithm.*

Vol. 30: Firestone, E.R., and S.B. Hooker, *SeaWiFS Technical Report Series Summary Index: Volumes 1–29.*

Vol. 31: Barnes, R.A., A.W. Holmes, and W.E. Esaias, *Stray Light in the SeaWiFS Radiometer.*

Vol. 32: Campbell, J.W., J.M. Blaisdell, and M. Darzi, *Level-3 SeaWiFS Data Products: Spatial and Temporal Binning Algorithms.*

Vol. 33: Moore, G.F., and S.B. Hooker, *Proceedings of the First SeaWiFS Exploitation Initiative (SEI) Team Meeting.*

Vol. 34: Mueller, J.L., B.C. Johnson, C.L. Cromer, S.B. Hooker, J.T. McLean, and S.F. Biggar, *The Third SeaWiFS Intercalibration Round-Robin Experiment (SIRREX-3), 19–30 September 1994.*

Vol. 35: Robins, D.B., A.J. Bale, G.F. Moore, N.W. Rees, S.B. Hooker, C.P. Gallienne, A.G. Westbrook, E. Marañón, W.H. Spooner, and S.R. Laney, *AMT-1 Cruise Report and Preliminary Results.*

Vol. 36: Firestone, E.R., and S.B. Hooker, 1996: *SeaWiFS Technical Report Series Cumulative Index: Volumes 1–35.*

Vol. 37: Johnson, B.C., S.S. Bruce, E.A. Early, J.M. Houston, T.R. O'Brian, A. Thompson, S.B. Hooker, and J.L. Mueller, 1996: *The Fourth SeaWiFS Intercalibration Round-Robin Experiment (SIRREX-4), May 1995.*

Vol. 38: McClain, C.R., M. Darzi, R.A. Barnes, R.E. Eplee, J.K. Firestone, F.S. Patt, W.D. Robinson, B.D. Schieber, R.H. Woodward, and E-n. Yeh, 1996: *SeaWiFS Calibration and Validation Quality Control Procedures.*

Vol. 39: Barnes, R.A., E-n. Yeh, and R.E. Eplee, 1996: *SeaWiFS Calibration Topics, Part 1.*

Vol. 40: Barnes, R.A., R.E. Eplee, Jr., E-n. Yeh, and W.E. Esaias, 1997: *SeaWiFS Calibration Topics, Part 2.*

Vol. 41: Yeh, E-n., R.A. Barnes, M. Darzi, L. Kumar, E.A. Early, B.C. Johnson, and J.L. Mueller, 1997: *Case Studies for SeaWiFS Calibration and Validation, Part 4.*

Vol. 42: Falkowski, P.G., M.J. Behrenfeld, W.E. Esaias, W. Balch, J.W. Campbell, R.L. Iverson, D.A. Kiefer, A. Morel, and J.A. Yoder, 1998: *Satellite Primary Productivity Data and Algorithm Development: A Science Plan for Mission to Planet Earth.*

Vol. 43: Firestone, E.R., and S.B. Hooker, 1998: *SeaWiFS Prelaunch Technical Report Series Final Cumulative Index.*

This final volume serves as a reference, or guidebook, to the entire Prelaunch Series. It consists of the four main sections included with the all of the indexes published: a cumulative index to key words and phrases, a glossary of acronyms, a list of symbols used, and a bibliography of all references cited in the series. In addition, as in some of the other index volumes, an errata section has been added to address issues and needed corrections which have come to the editors' attention since the volumes were first published. Also, an addenda section has been added to include the proceedings of various workshops, which are too short in length to warrant a separate volume within the series.

The nomenclature of the index is a familiar one, in the sense that it is a sequence of alphabetical entries, but it utilizes a unique format since multiple volumes are involved. Unless indicated otherwise, the index entries refer to some aspect of the SeaWiFS instrument or project, for example, the *mission overview* index entry refers to an overview of the SeaWiFS mission. An index entry is composed of a keyword or phrase followed by an entry field that directs the reader to the possible locations where a discussion of the keyword can be found. The entry field is normally made up of a volume identifier shown in bold face, followed by a page identifier, which is always enclosed in parentheses:

keyword, **volume**(pages).

If an entry is the subject of an entire volume, the volume field is shown in slanted type without a page field:

keyword, *Vol. #.*

An entry can also be the subject of a complete chapter. In this instance, both the volume number and chapter number appear without a page field:

keyword, **volume**(ch. #).

Figures or tables that provide particularly important summary information are also indicated as separate entries in the page field (even if they fall within an already specified page range). In this case, the figure or table number is given with the page number on which it appears.

keyword, **volume**(Fig. # *p.* #).

or

keyword, **volume**(Table # *p.* #).

2. ERRATA

Note: Since the issuance of previous volumes, a number of the references cited have changed their publication status, e.g., they have gone from "submitted" or "in press" to printed matter. In other instances, some part (or parts) of the citation, e.g., the title or year of publication, has changed or was printed incorrectly. Listed below are the references in question as they were cited in one or more of the first 42 volumes in the series, along with how they now appear in the references section of *this* volume.

Original Citation

Behrenfeld, M.J., and P.G. Falkowski, 1997: A consumers guide to primary productivity models. *Limnol. Oceanogr.,* (submitted).

Revised Citation

Behrenfeld, M.J., and P.G. Falkowski, 1997: A consumers guide to primary productivity models. *Limnol. Oceanogr.,* **42,** 1,479–1,491.

Original Citation

Bidigare, R.R., L. Campbell, M.E. Ondrusek, R. Letelier, D. Vaulot and D.M. Karl, 1995: Phytoplankton community structure at station ALOHA (22° 45' N, 158° W) during fall 1991. *Deep-Sea Res.,* (submitted).

Revised Citation

Andersen, R.A., R.R. Bidigare, M.D. Keller, and M. Latasa, 1996: A comparison of HPLC pigment signatures and electron microscopic observations for oligotrophic waters of the North Atlantic and Pacific Oceans. *Deep-Sea Res.,* **43,** 517–537.

Original Citation

Carder, K.L., S.K. Hawes, and Z. Lee, 1996: SeaWiFS algorithm for chlorophyll *a* and colored dissolved organic matter in subtropical environments. *J. Geophys. Res.,* (submitted).

Revised Citation

Carder, K.L., S.K. Hawes, Z. Lee, and F.R. Chen 1997: *MODIS Ocean Science Team Algorithm Theoretical Basis Document Case 2 chlorophyll a.* ATBD-Mod. 19, Version 4, 15 August 1997 [World Wide Web page.] From URL: `http://ltpwww.gsfc.nasa.gov/MODIS/MODIS.html` NASA Goddard Space Flight Center, Greenbelt, Maryland.

Original Citation

Early, E.A., and B.C. Johnson, 1996: Calibration and Characterization of the Goddard Space Flight Center Sphere. *NASA Tech. Memo. 104566,* S.B. Hooker and E.R. Firestone, Eds., NASA Goddard Space Flight Center, Greenbelt, Maryland, (accepted).

Revised Citation

Early, E.A., and B.C. Johnson, 1997: "Calibration and Characterization of the GSFC Sphere." In: E-n. Yeh, R.A. Barnes, M. Darzi, L. Kumar, E.A. Early, B. Carol Johnson, J.L. Mueller, and C.C. Trees, 1997: Case Studies for SeaWiFS Calibration and Validation, Part 4 *NASA Tech. Memo. 104566, Vol. 41,* S.B. Hooker and E.R. Firestone, Eds., NASA Goddard Space Flight Center, Greenbelt, Maryland, 3–17.

Original Citation

Johnson, B.C., C.L. Cromer, and J.B. Fowler, 1996: The SeaWiFS Transfer Radiometer (SXR). *NASA Tech. Memo. 104566,* S.B. Hooker and E.R. Firestone, Eds., NASA Goddard Space Flight Center, Greenbelt, Maryland, (accepted).

Revised Citation

Johnson, B.C., C.L. Cromer, and J.B. Fowler, 1998: The SeaWiFS Transfer Radiometer (SXR). *SeaWiFS PostLaunch Technical Report Series,* S.B. Hooker and E.R. Firestone, Eds., NASA Goddard Space Flight Center, Greenbelt, Maryland, (accepted).

Original Citation

Proctor, J., and Y.P. Barnes, 1996: NIST High Accuracy Reference Reflectometer-spectrophotometer. *J. Res. Natl. Inst. Stand. Technol.,* **101,** (accepted).

Revised Citation

Proctor, J., and Y.P. Barnes, 1996: NIST High Accuracy Reference Reflectometer-spectrophotometer. *J. Res. Natl. Inst. Stand. Technol.,* **101,** 619–627.

Original Citation

Soffer, R.J., J.W. Harron, and J.R. Miller, 1995: Characterization of Kodak grey cards as reflectance reference panels in support of BOREAS field activities. *Proc. Canadian Remote Sens. Symp.,* (submitted).

Revised Citation

Soffer, R.J., J.W. Harron and J.R. Miller, 1995: Characterization of Kodak grey cards as reflectance reference panels in support of BOREAS field activities. *Proc. 17th Canadian Symp. Remote Sens.,* Saskatoon, Saskatchewan, Canadian Remote Sensing Society, Canadian Aeronautics and Space Institute, Ottawa, Ontario, 357–362.

3. ADDENDA

This section presents a summary of the SeaWiFS Bio-optical Algorithm Mini-workshop (SeaBAM) which was held 21–24 January 1997; submitted by C. McClain. In addition, it presents a summary of the proceedings from the Second SeaWiFS Science Team Meeting held at the Omni Hotel in Baltimore, Maryland, 6–8 January 1998.

3.1 SeaBAM Abstract

One of the primary goals of the SeaWiFS Project is to routinely generate global chlorophyll *a* and Coastal Zone Color Scanner (CZCS) pigment concentrations with an accuracy of ±35% (Hooker et al. 1992). Since its inception in 1991, the SeaWiFS Calibration and Validation Program has undertaken a number of initiatives to help ensure that this goal is met, e.g., measurement protocol development, calibration round-robins, a bio-optical data archive, and bio-optical algorithm workshops. After the seventh bio-optical algorithm workshop held in Halifax, Nova Scotia on 21 October 1996, it was clear that algorithm and data quality issues remained that could not be adequately addressed in the standard workshop format. A more interactive analysis (data sets and algorithms) workshop was deemed necessary in order to focus on specific problems. As a result, the first SeaWiFS Bio-optical Algorithm Mini-workshop (SeaBAM) was hosted by D. Siegel at the University of California at Santa Barbara (UCSB) during 21–24 January 1997. This chapter provides an overview of the workshop background, organization, approach, and results from the workshop and other associated activities.

3.1.1 Introduction

The rationale behind the CZCS pigment product (chlorophyll *a* plus phaeophytin) is to provide a data set that can be compared to products derived from CZCS for studies of decadal scale variability. Early comparisons of *in situ* and CZCS global products (Balch et al. 1992) indicated that this goal was feasible for most of the global ocean. Subsequent studies, however, noted significant differences even in clear water environments (Arrigo et al. 1994). The CZCS algorithm was based on 55 bio-optical stations in coastal US waters (Clark 1981; usually referred to as the Nimbus Experiment Team, or NET, data set) and even by 1991, that data set was the only data set generally available for algorithm development. As a result, the SeaWiFS Calibration and Validation Program initiated several activities directed at improving the quality of bio-optical data collected by the ocean optics community. These activities included the establishment of measurement protocols (Mueller and Austin 1992 and 1995), the SeaWiFS Intercalibration Round-Robin Experiments (SIRREXs, e.g., Johnson et al. 1996), the SeaWiFS Bio-optical Archive and Storage System (SeaBASS; Hooker et al. 1994), the SeaWiFS Transfer Radiometer (SXR) and the SeaWiFS Quality Monitor (SQM, Shaw et al. 1996, Hooker and Aiken 1998, and Johnson et al. 1998). In addition, seven bio-optical algorithm workshops have been held, brief proceedings of which are published in the *SeaWiFS Technical Report Series* cumulative indexes Volumes 12, 18, 24, and 36 (Firestone and Hooker 1993, 1994, 1995, and 1996).

The bio-optical algorithm workshops have been open events and have provided a forum for presentation and detailed discussions on protocols, data collection, and algorithm issues. Early in the deliberations on algorithm development, it was decided to avoid switching algorithms, such as was used in the global CZCS reprocessing (Gordon et al. 1983) and to use a semi-analytical chlorophyll algorithm. Switching algorithms tend to produce bimodal frequency distributions as an artifact of the switching logic (Denman and Abbott 1988 and Müller-Karger et al. 1990). Semi-analytical algorithms (Carder et al. 1991, Garver and Siegel 1997, and Carder et al. 1997) would allow more physical insight into the optical processes that determine oceanic reflectance, thus providing a mechanism for incorporating strategies to account for regional and temporal variability in the algorithm.

The discussions at the workshops were very constructive in highlighting the differences in perceptions and approaches to algorithm development. The CZCS pigment product, for example, raised several questions. Should the algorithm be chlorophyll *a*, or chlorophyll *a* plus phaeophytin [as it was just as easy to develop an empirical algorithm for chlorophyll *a* (Aiken et al. 1995)]. If just chlorophyll *a*, why is a CZCS pigment product needed? Should the CZCS pigment product be based only on CZCS bands (SeaWiFS equivalents), and should it be derived using a CZCS atmospheric correction? The issue is that if the CZCS atmospheric correction scheme (uses 670 nm) and bio-optical band limitations (443, 520, and 550 nm) introduce a systematic bias in the pigment product that is not reproduced in subsequent ocean color data sets, the interpretation of decadal-scale change will be compromised. Another question is what measurements of pigments should be used in defining the CZCS pigment product given the evolution in measurement techniques [fluorometric, high performance liquid chromatography (HPLC), etc.], and is consistency with the original NET CZCS data set necessary? In the end, the general concensus, though not unanimous, was to continue using the original product definition, but to use the best algorithms possible, i.e., the SeaWiFS atmospheric correction and no restriction on the bands to be used for the bio-optical algorithms.

With regard to the bio-optics subgroup's recommendation to pursue semi-analytical algorithms for operational use, it has become clear that the existing semi-analytical algorithms are limited to Case-1, relatively low pigment waters. The main issues are a paucity of data on scattering and the variability in spectral absorption. While new methods and instrumentation for measuring the backscattering coefficient hold promise, little is currently available. Also, the measurement of spectral absorption, let alone a way of parameterizing its variability, remains an issue. In response to this problem, the SeaWiFS Calibration and Validation Program funded a workshop at the Scripps Institute of Oceanography, hosted by G. Mitchell and A. Bricaud in December 1996, to compare and evaluate different methods. The results of the workshop are not available as yet; thus, at the present time, the semi-analytical algorithms are inherently empirical, at a different level, and some resort to strictly empirical relationships at high concentrations (Carder et al. 1997). The limitations, at the present time, reside in the determination of the various absorption and backscattering coefficients, i.e., measurement methodologies, parameterizations, etc. Despite these limitations, semi-analytical algorithms do generate *reasonable* chlorophyll *a* values for most of the global ocean as well as a number of other quantities that could be routinely produced by the SeaWiFS Project, if required by the science community. Also, they can be easily adapted to any combination of wavelengths commensurate with any satellite sensor. Therefore, whether or not the initial SeaWiFS algorithms are semi-analytical, their development should continue because the original rationale remains valid and justified.

Finally, another issue which complicates the algorithm evaluation process stems from differences in reflectance measurement methodologies, i.e., above- versus below surface. Both methods have limitations. Above-surface measurements are contaminated by skylight, glint, polarization, and plaque bidirectional reflectance effects. Below-surface measurements require absolute radiance calibrations, an extrapolation through the air–sea interface, and a correction for instrument self-shading in turbid water. The Carder et al. (1997) algorithm uses above-surface measurements, but the bulk of the data available for independent algorithm verification are below-surface observations. No systematic comparison of the two methods has been conducted; the protocol for making above-surface reflectance measurements (Mueller and Austin 1995) is considered by many to be inadequate. The SeaWiFS Project sponsored a workshop on Case-2 measurement protocols in the spring of 1996 (Firestone and Hooker 1996) with the objective of refining the existing protocols, but the workshop coordinators have not completed the document that was outlined at the meeting. The Sensor Intercomparison and Merger for Biological and Interdisciplinary Studies (SIMBIOS) Project plans to sponsor focused field experiments designed to clarify, and hopefully, resolve this issue.

After the seventh bio-optical algorithm meeting in October 1996, it was clear that convergence on the operational algorithms was not happening in a satisfactory manner. Indeed, the primary candidate algorithms for chlorophyll *a* (Carder et al. 1997) and CZCS pigment (Aiken et al. 1995) were seriously inconsistent at moderate and high concentrations, i.e., chlorophyll $a \gg$ CZCS pigment. It is with all the above-mentioned considerations in mind that SeaBAM was initiated. The consensus was that further progress would result only if the participants work collectively with open access to data and codes (data processing and algorithm codes) in a similar fashion to the data analysis round-robin held at UCSB in 1994 (Siegel et al. 1995c). The following sections outline the workshop strategy including pre- and post-workshop activities and a summary of the findings derived as a result of the SeaBAM process. It is the philosophy of the SeaWiFS Project not to develop the operational algorithms, but to expedite algorithm development via whatever mechanisms are possible and to provide an independent and objective evaluation. From the SeaWiFS Project's perspective, SeaBAM has achieved more than was initially hoped for because of the enthusiasm and openness of all the participants. Data and software were freely exchanged, errors were revealed and corrected (without angst), and substantial improvements in almost all the evaluated algorithms were made. Last, but not least, a consistent set of chlorophyll *a* and CZCS pigment algorithms were identified using a large bio-optical data set representing a diversity of bio-optical provinces.

Table 1. Participants in SeaBAM held 21–24 January 1997 at UCSB in Santa Barbara, California.

Participants	*Affiliation*
K. Carder	Univ. of South Florida
S. Garver†	Univ. of California, Santa Barbara
S. Hawes	Univ. of South Florida
M. Kahru	Scripps Institution of Oceanography
S. Maritorena	SeaWiFS Project, NASA/GSFC
C. McClain	SeaWiFS Project, NASA/GSFC
G. Mitchell	Scripps Institution of Oceanography
G. Moore	Plymouth Marine Laboratory
J. Mueller	San Diego State University
J. O'Rielly	NOAA/National Marine Fisheries Service
D. Siegel	Univ. of California, Santa Barbara
B. Schieber	SeaWiFS Project, NASA/GSFC

† S. Garver is now affiliated with California State Polytechnic University, Pomona, California.

3.1.3 Objectives and Approach

Given that the primary objective was to finalize and deliver the operational SeaWiFS chlorophyll *a* and CZCS pigment algorithms in a relatively short time, it was agreed by the participants (Table 1) that a successful workshop would require a substantial amount of pre-workshop preparation, and the free and rapid dissemination of data, code, and results. It also required that all those involved be willing to assist one another, work out problems and differences of opinion internally, and to recognize that all options were open with regard to the final algorithm selections. The strategy was to have a balanced, but small, group of participants, including representatives from the SeaWiFS Project and others who had been active in the bio-optics subgroup as algorithm developers (empirical and semi-analytic), and bio-optical data providers. It was also agreed that D. Siegel would host the workshop at UCSB and that he would assume responsibility for providing a workshop environment that efficiently accommodated both group discussion and presentation sessions and a heterogenous computing and data storage environment. GSFC would coordinate pre- and post-workshop activities including maintenance of an access-restricted SeaBAM web page where data, results, and electronic mail (e-mail) would be posted and archived. Both S. Maritorena (GSFC) and S. Garver (UCSB) had been developing data sets of water-leaving radiances (and other related quantities) with associated pigment data for the purposes of independent evaluation and algorithm development, respectively (Garver and Siegel 1997 and O'Reilly et al. 1998). They would continue the refinement and expansion of these data sets, coordinate their activities, e.g., exchange data, in preparation for the mini-workshop, and provide the data sets to the other participants. The initial version of the O'Reilly et al. data set, which was presented at the Halifax workshop, consisted of approximately 90–100 clear-sky stations. It was agreed that this condition was too restrictive and that other data should be incorporated. Finally, it was agreed that all groups would provide documentation on their evaluations, and results would be combined into a SeaWiFS technical memorandum.

To establish a framework for SeaBAM, an initial set of issues, tasks and goals were outlined, which included the following:

1) Settle on the definition of "CZCS pigments." This question is the result of the differences in measurement methodologies.
2) Establish a clear definition of accuracy and identify the appropriate statistical parameter(s) for quantification of accuracy as it applies to algorithms.
3) Establish criteria for final selection of the "best" algorithm for both pigment parameters.
4) Identify the algorithms to be compared and identify probable reasons for differences. Ultimately, the algorithms included the following:
    a) Aiken et al. (1995);
    b) Carder et al. (1997);
    c) Clark (1997);
    d) Garver and Siegel (1997);
    e) Mitchell and Kahru (Calfornia Cooperative Fisheries Institute [CalCOFI], unpublished);
    f) Morel (1996);
    g) New empirical (e.g., one based on the evaluation data set);
    h) Gordon et al. (1983);
    i) Ocean Color and Temperature Scanner (OCTS) operational chlorophyll *a*; and
    j) Polarization and Directionality of the Earth's Reflectance (POLDER) operational algorithm.
5) Establish data set selection guidelines. Considerations included:
    a) Blending of HPLC pigments with fluorometric pigments;

 b) SeaWiFS measurement protocols compliance;
 c) Blending of in-water and above-water estimates of R_{rs} or L_{WN}; and
 d) Consistency in analyses used to derive L_W from in-water measurements.

6) Select the data sets to be used for the comparisons. The individual data sets were:
 a) Carder et al. (above-water observations);
 b) Garver and Siegel (in-water observations);
 c) O'Reilly et al. evaluation data set (in-water observations); and
 d) Mitchell and Kahru (CalCOFI, in-water observations)

All issues were eventually addressed.

3.1.4 The UCSB Meeting

Prior to the workshop, a global evaluation data set was assembled by combining a number of data sets contributed, primarily, by the participants. J. O'Reilly and S. Maritorena used this data set to complete an initial comparison of all algorithms prior to the meeting. The first day of the meeting consisted of briefings by all of the groups to provide updates on all preparations and results stemming from pre-workshop activities. During the presentations, an issues and analysis action item list was developed and reviewed at the end of the session. Thereafter, the groups conducted hands-on analyses to address the action items and periodically reconvened to report their progress and register any additional issues that needed to be tracked. On the last day, a plenary session was held to review the final status of all action items and to outline the post-workshop activities and schedule. To provide some insight into what the action items were and how they were resolved, several are described in Section 3.1.6.

3.1.5 Final Results and Conclusions

As discussed above, all the original issues were addressed, as well as a number of others that developed during SeaBAM. Conducting algorithm development in this fashion greatly expedited resolution of many questions. Most of the algorithms and the evaluation data set were improved as a result of SeaBAM. The most important results are the final recommendations on the operational SeaWiFS algorithms which are summarized below.

1. *Chlorophyll a*: Because the evaluation data set has the most bio-optical diversity of the data sets listed above, and was quality controlled and processed in a consistent manner (O'Reilly et al. 1998), it was used to obtain the "best" algorithm possible. Therefore, it evolved from being an independent data set to one used to develop empirical algorithms as well. Not only were all final versions of the algorithms as submitted by the developers considered, but also, for the empirical algorithms, these and other algorithmic forms (band ratio combinations) were fit to the evaluation data to see what improvements were possible. The algorithm that gave the best overall result, based on the selection criteria outlined in O'Reilly et al. (1998), uses only a ratio of 490 nm to 555 nm, i.e.,

$$C = -0.040 + 10^{(0.341-3.001X+2.811X^2-2.041X^3)}, \qquad (1)$$

where C is defined as chlorophyll a pigment concentration, and where

$$X = \log_{10} \frac{R_{rs}(490)}{R_{rs}(555)}. \qquad (2)$$

This result is consistent with the Aiken et al. (1995) finding that a 490:555 band ratio yielded the highest correlation ($R^2 = 0.95$) for the data sets in their analysis.

2. *CZCS pigment*: As discussed in O'Reilly et al. (1998), there are a number of options for this product, not all of which follow the original guideline of using an algorithm that uses only the CZCS bands. Clearly, there should be reasonable consistency between the two pigment products. Also, an evaluation data set for CZCS, comparable to the one just completed for SeaWiFS, needs to be generated. For the at-launch algorithm, the recommendation is the following relationship which is based on a empirical relationship of chlorophyll a, and chlorophyll a plus phaeophytin, concentrations derived from the SeaBASS pigment database, i.e.,

$$\mathrm{CZCS}_{\mathrm{pigment}} = 1.34\, C^{0.98}. \qquad (3)$$

It is important to note that the SeaWiFS Project plans to periodically reprocess the entire SeaWiFS data set as algorithms (atmospheric, bio-optical, mask, and flag), sensor calibration, and product suites are updated. Thus, it is critical that the SeaBAM activity be continued.

3.1.6 Workshop Action Items

In order to emphasize the benefits of conducting workshops that are oriented around data analysis and real-time algorithm evaluation, the following list of results stemming from action items are provided below. This meeting format expedited, even forced, the resolution of questions and issues, usually at the meeting. In the typical meeting format, questions often go unresolved resulting in continued debate and misunderstanding.

> *Action Item:* 1. State succinctly the practical definitions of CZCS pigments and chlorophyll a with rationale for the choices.

Definition of CZCS pigment: A fluorometric pigment concentration (chlorophyll a plus phaeopigments) that can be calculated using bands comparable to the CZCS wavelengths (443, 520, and 550). Note that the SeaWiFS protocols need to be more detailed on this topic. The purpose of generating this product is to provide a means of comparing products that can be derived from CZCS to those from later missions for examining decadal scale variability. Restricting the algorithm to the CZCS wavelengths minimizes biases introduced in the products that are artifacts of the algorithm form. It is assumed that the global CZCS data set will be reprocessed using an updated pigment algorithm that is consistent with the SeaWiFS pigment algorithm. S. Maritorena will evaluate the assumption that the differences between fluorometric and HPLC bio-optical data sets are indistinquishable using the evaluation data set.

The issue of how to validate the reprocessed CZCS products using simultaneous measurements was discussed. Given that algorithms being developed at this time are based on different pigment measurement methodologies which yield different values, validation using historical data will require some adjustment in the historical values.

Status: Post-workshop examination of the SeaBASS data sets showed that there are a very limited number of stations available having the CZCS bands and chlorophyll *a* plus phaeophytin concentrations on which to base a *global* algorithm (O'Reilly et al. 1998) and alternative strategies are outlined in O'Reilly et al. (1998).

Definition of Chlorophyll a: Any fluorometric or HPLC concentration identified as chlorophyll *a* by the provider. While there are differences in the values obtained by the two techniques, globally the difference has been shown to be of the order of 10% (analysis by C. Trees). Also, at least for the time being, both HPLC and fluorometric data have been combined in order to have a data set sufficiently large, with enough diversity, to cover the broad range of chlorophyll concentrations required for development of a general chlorophyll algorithm. Debate continues as to what pigments should be, or are being, summed and reported as "chlorophyll" concentration in the data sets being submitted to SeaBASS.

Status: Because other sources of variability in the bio-optical data sets (e.g., data processing methods and calibration) have been found to be as great, and in order to have enough data over a large dynamic range to develop and evaluate algorithms, this definition was adopted.

> *Action Item 2.* Reconcile the differences in the L_W spectral shapes of CalCOFI-2, as obtained independently by S. Garver and M. Kahru. The problem is an elevated shoulder at 490 nm relative to 443 nm in the Kahru analysis.

Status: The anomalous spectral shoulder was found to be a typographical error in a table used in the transformation of subsurface $L_u(443)$ to the above-surface $L_W(443)$.

> *Action Item 3.* Resolve a problem S. Garver and D. Siegel observed with some of C. Trees' North Atlantic Bloom Experiment (NABE) optical data.

Status: J. Mueller checked the scaling factor Garver and Siegel were using and the problem was a misinterpretation of the scaling factor format. NABE is consistent with other data sets.

> *Action Item 4.* Determine the reason why the 412 nm surface reference values in G. Cota's Resolute Bay data are inconsistent with values in the profile data (a 2–4 fold difference was found in all profiles for all three cruises, each in a different year).

Status: G. Cota was contacted and will try to develop a time series of his calibration data. The 412 nm filters were replaced in both instruments after the 1995 field campaign. As a result, the 1994 and 1995 data were excluded from the evaluation data set, but the 1996 data were retained.

> *Action Item 5.* Verify a constant offset between the evaluation data set and D. Clark's algorithm (the algorithm had the highest R^2 when compared with the evaluation data set).

Status: J. Mueller and S. Maritorena spoke with D. Clark after the workshop. The source of the offset could not be readily identified, so further evaluation of the Clark algorithm was deferred until an update is made available.

> *Action Item 6.* Examine the impact of data with 565 nm rather than 555 nm on the algorithm comparisons. The World Ocean Circulation Experiment (WOCE) and the early Bermuda Atlantic Time-Series Station (BATS) data have 565 nm measurements rather than 555 nm. Both data sets are from low pigment waters. Given the significant slope in water absorption spectrum at these wavelengths, the data should be corrected or omitted from the SeaWiFS algorithm evaluations.

Status: S. Maritorena analyzed several data sets and derived a correction factor for transforming 565 nm to 555 nm radiances. The corrected data were retained in the evaluation data set.

> *Action Item 7.* Investigate what appears to be anomalous 412 nm data in J. Marra's WOCE data set. Some 412 nm data appears to be very high, even for very clear water.

Status: J. Mueller did the calibration on J. Marra's marine environmental radiometer (MER) and followed up on this question. As a result, the 1991 data was removed from the evaluation data set because of concerns about the calibration, but the data from 1993 and 1994 were retained.

3.2 SeaWiFS Science Team Meeting

The Second SeaWiFS Science Team Meeting was held at the Omni Hotel in Baltimore, Maryland, 6–8 January 1998. The team members and invited guests are listed in Table 2.

The objectives of the meeting were to:

1) Heighten the awareness of the science team as to the organization and functionality of the SeaWiFS Project,
2) Inform the science team of the quality and availability of the SeaWiFS data set, and
3) Encourage information exchange and collaboration among science team members.

The first day was dedicated to briefings by members of the SeaWiFS Project, and other related activities. The remainder of the meeting consisted of break-out sessions on a variety of topics so as to get input from the science community and to help focus on particular issues confronting the Project and the NASA Biogeochemistry Program. All investigators were invited to display posters in the foyer of the meeting complex for the entire duration of the meeting; most investigators took advantage of the opportunity.

A. Tuesday Morning: General Session
  1. Introductory Talks
    a. Welcome and Meeting Schedule/Objectives (C. McClain)
    b. Meeting Logistics (G. Valenti)
    c. NASA Biogeochemistry Program Status and HQ Perspective (J. Campbell)
    d. Overview of science team investigations (J. Campbell)
  2. Project Report
    a. SeaWiFS Project Overview (M. Cleave)
    b. Data Processing Overview (G. Feldman)
    c. Calibration and Validation Program Overview (C. McClain)
    d. Real-Time Cruise Support (A. Isaacman)
B. Tuesday Afternoon
  1. Project Reports (continued)
    a. Project Science (C. McClain)
    b. Science Team Working Groups and Executive Council (C. McClain)
    c. Report by the GSFC Distributed Active Archive Center (DAAC) (G. Leptoukh)
    d. Discussion on SeaWiFS Data Policy (M. Cleave)
  2. Reports from Other Projects
    a. MODIS (W. Esaias)
    b. SIMBIOS Project (C. McClain)
    c. SeaWiFS Data Applications in Other Disciplines
      i. Land (C.J. Tucker)
      ii. Clouds (M. Wang)
      iii. Smoke Index (E. Vermote)
C. Wednesday Morning: Working Sessions
  1. General Plenary and Organization Session (C. McClain)
  2. Break-out session on algorithm performance and product validation (Chair: C. McClain)
  3. SeaDAS and SeaBASS updates and demonstrations (Chair: M. Darzi)
  4. Break-out session of the Primary Productivity Working Group (Chair: W. Esaias)
D. Wednesday Afternoon
  1. Break-out session on revising the archive product suite (Chair: G. Feldman)
  2. SeaDAS and SeaBASS updates and demonstrations (Chair: M. Darzi)
  3. Break-out session of the Executive Council (Chair: J. Campbell)
E. Thursday Morning
  1. General session on science team coordination and organization (Chair: J. Campbell)
  2. General session on OCTS and CZCS reprocessing (Chair: J. Yoder)
  3. Meeting wrap-up and break-out session summaries (Chair: C. McClain)
  4. Break-out session reports
    a. Algorithm evaluation (C. McClain)
    b. Primary Productivity (W. Esaias)
    c. Data products (G. Feldman and M. Darzi)
    d. CZCS and OCTS processing (J. Yoder)
    e. Working groups and team coordination (J. Campbell and C. McClain)
    f. Executive Council (C. McClain)

3.2.1 SeaWiFS Executive Council

Because of the size of the Science Team, both NASA HQ and the SeaWiFS Project felt that a smaller group to serve as advisors to the SeaWiFS Project and the Biogeochemistry Program was needed. Specifically, the group would:

1) Work with the Ocean Biogeochemistry Program (OBP) Manager to represent the SeaWiFS Science Team interests within NASA and at the national and international program levels;
2) Preserve, promote, and wherever possible, expand mission science goals;
3) Foster interaction between the SeaWiFS Project and the science community;
4) Enhance public awareness of scientific results derived from SeaWiFS data products;
5) Provide timely advice on issues concerning the Project, e.g., data products;
6) Present science community issues and desires to the Project and the OBP;
7) Assist in representing the Project and the OBP at national and international meetings; and

Table 2. The team members of the Second SeaWiFS Science Team Meeting, held 6–8 January 1998 at the Omni Hotel in Baltimore, Maryland. Participants are identified with a checkmark (✓).

Team Members	*Present*	*Team Members*	*Present*	*Team Members*	*Present*	*Team Members*	*Present*
S. Ackleson	✓	P. Falkowski	✓	D. Kiefer		J. O'Reilly	✓
R. Arnone	✓	M. Fang		M. Kishino		D. Robinson	✓
K. Arrigo	✓	R. Frouin	✓	O. Kopelevich		K. Shifrin	✓
R. Barber		H. Fukushima	✓	R. Kudela	✓	D. Siegel	✓
M. Behrenfeld	✓	S. Gallegos	✓	J. Marra	✓	H. Sosik	✓
R. Bidigare	✓	C. Garcias	✓	J. Marshall		P. Stegmann	✓
J. Bisagni	✓	G. Gaxiola-Castro	✓	C. McClain	✓	A. Thomas	✓
J. Bishop	✓	R. Glazman	✓	D. McGillicuddy	✓	U. Ünlüata	
P. Bissett	✓	D. Glover	✓	A. Miller		C. Vorosmarty	✓
J. Brock	✓	J. Gower	✓	B.G. Mitchell	✓	A. Weidemann	✓
C. Brown	✓	W. Gregg	✓	B. Monger	✓	C. Yentsch	✓
J. Campbell	✓	D. Halpern	✓	A. Morel	✓	J. Yoder	✓
M-E. Carr	✓	L. Harding	✓	J. Mueller	✓	S. Yvon-Lewis	✓
P. Coble	✓	E. Hofmann	✓	F. Müller-Karger	✓	E. Zalewski	✓
G. Cota	✓	F. Hoge		R. Najjar	✓	J.R. Zaneveld	✓
A. Cracknell	✓	J. Irish	✓	J. Nelson	✓	G. Zibordi	✓
C. Davis		R. Iturriaga	✓	N. Nelson	✓		
S. Doney		P. Kamykowski		J. Nihoul			
W. Esaias	✓	L. Kantha	✓	P. Niiler (J. Moison)	✓		

8) Serve as liaisons to other science programs on behalf of the SeaWiFS Project and the OBP.

The initial Executive Council membership is meant to represent a cross-section of the science team with flexible tenures based on participation and interest. The members include representatives from NASA activities and the larger ocean color community (Table 3).

3.2.2 Working Groups

The SeaWiFS Science Team, consisting of 88 members, represents a large community with diverse scientific interests. Since the whole team will meet at most once a year (probably less frequently), most activities within the team will need to be carried out by smaller working groups.

A number of focus areas were identified that had sufficient interest to warrant the formation of a working group, and a leader was appointed who will be responsible for soliciting members and coordinating the first meeting of the group. Working groups will meet as frequently as necessary to carry out their respective goals. Reports from the various working groups will be presented at SeaWiFS Science Team meetings as appropriate.

The purpose of a working group is to facilitate team interaction and coordination in an area of special interest. There are two types of working groups:

1) Formal working groups whose objectives are necessary for the SeaWiFS Project; and
2) Ad hoc working groups whose objectives are largely of value to its members.

Working groups focusing on regional activites would be ad hoc, whereas groups such as the Ocean Primary Productivity Working Group (OPPWG) belong to the former. Ad hoc working groups can be more flexible in terms of how frequently they meet or whether their activities are largely carried out via electronic mail. Formal working groups will act in an advisory capacity to the SeaWiFS Project, and will be expected to make formal recommendations on issues to be decided by the Science Team.

At this time, the OPPWG is the only formal working group. The identified ad hoc groups are the following (the chairs are listed in parentheses):

a) Modeling and Data Assimilation (E. Hofmann)
b) CZCS Reprocessing (J. Yoder)
c) Gulf of Maine and Georges Bank (A. Thomas)
d) North Atlantic (D. Siegel)
e) Continental Margins (F. Müller-Karger)
f) Eastern North Pacific and Gulf of Alaska (B.G. Mitchell)
g) Absorption and Pigments (B.G. Mitchell and R. Bidigare)
h) Surface photosynthetically available radiation (PAR) (J. Bishop)
i) Biogenic Gas Fluxes (to be determined)

3.2.2.1 Ad Hoc Group Descriptions

The following descriptions of two of the ad hoc working groups were provided by their chairs.

Table 3. Participants in SeaWiFS Executive Council Meeting held during the SeaWiFS Science Team Meeting in January 1998, in Baltimore, Maryland.

	Participants	*Affiliation*
NASA Members	J. Cambell	NASA HQ
	W. Esaias	MODIS Project
	C. McClain	SeaWiFS Project
External Members	R. Barber	Duke University
	J. Brock	NOAA
	M.E. Carr	Jet Propulsion Laboratory
	P. Falkowski	Brookhaven National Laboratory
	E. Hoffmann	Old Dominion University
	B.G. Mitchell	Scripps Institution of Oceanography
	D. Siegel	Univ. of California, Santa Barbara
	A. Thomas	Univ. of Maine
	C. Yentsch	Bigelow Laboratory
	J. Yoder	Univ. of Rhode Island

1. Gulf of Maine Ocean Color Working Group

The Gulf of Maine Ocean Color Working Group was formed at the January 1998 SeaWiFS Science Team Meeting, as a forum in which ocean color interests with a geographic focus on the greater Gulf of Maine region could communicate. The purpose of the Working Group will be interactive and elastic, defined by the Working Group members. The overall goals are to:

1) Facilitate communication among principal investigators carrying out ocean color related research in the Gulf of Maine region; and
2) Where possible or desirable, foster collaboration (i.e., share geographically specific knowledge, data sets, and onerous data processing and archiving tasks).

As initial goals, the following modest strawmen were posed:

a) To identify the community carrying out ocean color related research in the Gulf of Maine;
b) To communicate the goals and approaches of their respective research efforts; and
c) To identify available data sets and data processing activities.

These are just a starting point. Input is welcome and encouraged. The Working Group can be as active or as inactive as the members choose. The SeaWiFS Project is simply looking for mechanisms to maximize the scientific output and productivity resulting from satellite ocean color data.

A World Wide Web site has been established as a point of reference and communication. Through this site, the members will first aim at the above goals and proceed from there. The universal resource locator (URL) `http://wavy.umeoce.maine.edu/seawifs.html` is active, although it is still under construction.

The membership is completely open, but carries the assumption of a willingness to communicate and interact. As there are a plethora of other science working groups related to Gulf of Maine research, this Working Group will stay closely focused on issues, data, and people with active ocean color interests and research. Being a NASA funded principal investigator (PI) is not a prerequisite.

An initial list of members was started at the Second SeaWiFS Science Team Meeting and are listed below, however, it is not a complete list. If other researchers would like to be a participant in this Working Group, please send an e-mail message to A. Thomas (`thomas@maine.maine.edu`) with a brief note including: name, address, telephone number, e-mail address, and URL, along with a few notes (in bullet-form) on the title, goals, and focus of the ocean color related research. In addition, the researchers should send a few notes on the approach, and the satellite data or ocean color related data sets they have, or will create. The current members are W. Balch, J. Bisagni, J. Irish, B. Monger, J. O'Reilly, J. Salisbury, A. Thomas, and C. Yentsch.

2. Continental Margins

This forum serves to exchange information on continental margins and coastal zones. The goal is to define scientific goals for remote sensing of continental margins. The geographical domain includes global continental margins, coastal zones, zones of riverine influence, upwelling zones, marginal seas, island waters, and Great Lakes and other major inland waters. Among topics of discussion may be the relevance of continental margins in global cycles of carbon and other elements, general oceanography, resource management, advantages and limitations of remote sensing technologies and applications, developing time series of *in situ* observations, and planning joint research efforts. A goal is to generate feedback for various international satellite missions and projects on regional and time-dependent algorithms for ocean color products, atmospheric correction, and developing strategies for merging various data (satellite and *in situ*) into coherent scientific products.

The Land Ocean Margins Server (LOMAS) was established for exchanging e-mail for this forum. The forum is open to anyone interested in the topic outlined above. To subscribe, please send an e-mail message to `listproc@marine.usf.edu`, with the message `subscribe lomas FirstName LastName` in the *body* of the text (not in the subject area).

Please note that the *live* feature of the list server is disabled, so disregard the password offered by the list server in reply to an initial request for subscription.

Some initial topics of discussion were proposed:

a. The ultimate goal of this discussion group is to enable global analyses of continental margins in a remote sensing context.
b. Should the group aim at defining provinces for enabling such analyses?
c. How will the group identify provinces?
d. The group needs to link up and establish a liaison with regional groups, both those defined as SeaWiFS Science Team discussion groups (e.g., Gulf of Maine and Gulf of California), and others. The group may develop a strategy of using such areas as validation for global studies.
e. How will the group include time series data, and can the group develop a strategy to support additional series in continental margins? The group currently has the Carbon Retention in a Colored Ocean (CARIACO), CalCOFI, and the European series in the Adriatic.
f. What testable hypotheses can be defined?

3.4 Participants' Addresses

Following are the names and addresses of participants of the SeaBAM workshop and/or the SeaWiFS Science Team Meeting. Members of the various teams and panels are identified with their team names(s) shown in *slanted* type face.

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Cumulative Index

Unless otherwise indicated, the index entries that follow refer to some aspect of the SeaWiFS instrument or project. For example, the *mission overview* index entry refers to an overview of the SeaWiFS mission.

Glossary

– A –

A-band	Absorption Band
A/D	Analog-to-Digital (also written as AD)
A&M	(Texas) Agriculture and Mechanics (University)
AC	Alternating Current
ACC	Antarctic Circumpolar Current
ACRIM	Active Cavity Radiometer Irradiance Monitor
ACS	Attitude Control System
ADC	Analog-to-Digital Converter
ADCP	Acoustic Doppler Current Profiler
ADEOS	Advanced Earth Observation Satellite (Japan)
AE	Ångström Exponent
AIBOP	Automated and Interactive Bio-Optical Processing
ALSCAT	ALPHA and Scattering Meter [Note: the symbol α corresponds to $c(\lambda)$, the beam attenuation coefficient, in present usage.]
AM-1	Not an acronym, used to designate the morning platform of EOS.
AMC	Angular Momentum Compensation
AMT	Atlantic Meridional Transect
AMT-1	The First AMT Cruise
ANSI	American National Standards Institute
AOCI	Airborne Ocean Color Imager
AOL	Airborne Oceanographic Lidar
AOP	Apparent Optical Property
AOS/LOS	Acquisition of Signal/Loss of Signal
APL	Applied Physics Laboratory
APT	Automatic Picture Transmission
ARGOS	Not an acronym, but the name given to the data collection and location system on the NOAA Operational Satellites.
ARI	Accelerated Research Initiative
ARS	Airborne Remote Sensing
ASCII	American Standard Code for Information Interchange
ASI	Italian Space Agency
ASR	Absolute Spectral Response
AT	Along-Track
ATBD	Algorithm Theoretical Basis Document
ATLAS	Auto-Tracking Land and Atmosphere Sensor
ATM	Airborne Thematic Mapper
ATSR	Along-Track Scanning Radiometer
AU	Astronomical Unit
AVHRR	Advanced Very High Resolution Radiometer
AVIRIS	Advanced Visible and Infrared Imaging Spectrometer
AXBT	Airborne Expendable Bathythermograph

– B –

BAOPW-1	First Bio-optical Algorithm and Optical Protocols Workshop
BAOPW-2	Second Bio-optical Algorithm and Optical Protocols Workshop
BAOPW-3	Third Bio-optical Algorithm and Optical Protocols Workshop
BAOPW-4	Fourth Bio-optical Algorithm and Optical Protocols Workshop
BAOPW-5	Fifth Bio-optical Algorithm and Optical Protocols Workshop
BAOPW-6	Sixth Bio-optical Algorithm and Optical Protocols Workshop
BAOPW-7	Seventh Bio-optical Algorithm and Optical Protocols Workshop
BAS	British Antarctic Survey
BATS	Bermuda Atlantic Time-Series Station
BBOP	Bermuda Bio-Optical Profiler
BBR	Band-to-Band Registration
BCRS	Dutch Remote Sensing Board
BEP	Benguela Ecology Programme
BER	Bit Error Rate
BIOS	Biophysical Interactions and Ocean Structure (NERC research program)
BMFT	Minister for Research and Technology (Germany)
BNL	Brookhaven National Laboratory
BNSC	British National Space Center
BOAWG	Bio-Optical Algorithm Working Group
BODC	British Oceanic Data Center
BOFS	British Ocean Flux Study
BOMS	Bio-Optical Moored Systems
BOPS	Bio-Optical Profiling System
bpi	bits per inch
BPM	Bedford Production Model
BRDF	Bidirectional Reflectance Distribution Function
BSI	Biospherical Instruments, Incorporated
BSIXR	BSI's Transfer Radiometer
BSM	Bio-Optical Synthetic Model
BTD	Bright Target Detection
BTR	Bright Target Recovery
BUV	Backscatter Ultraviolet Spectrometer
BWI	Baltimore-Washington International (airport)

– C –

C/N	Carbon-to-Nitrogen (ratio)
CalCOFI	California Cooperative Fisheries Institute
Cal/Val	Calibration and Validation
CALVAL	Calibration and Validation
Case-1	Water whose reflectance is determined solely by absorption.
Case-2	Water whose reflectance is significantly influenced by scattering.
CASI	Compact Airborne Spectrographic Imager
CCD	Charge Coupled Device
CCPO	Center for Coastal Physical Oceanography (Old Dominion University)
CDF	(NASA) Common Data Format
CDOM	Colored Dissolved Organic Material
CD-ROM	Compact Disk–Read Only Memory
CDR	Critical Design Review
CEC	Commission of the European Communities
CENR	Committee on Environment and Natural Resources
CHN	Carbon, Hydrogen, and Nitrogen
CHORS	Center for Hydro-Optics and Remote Sensing (San Diego State University)
c.i.	confidence interval
CICESE	*Centro de Investigación Científica y de Educación Superior de Ensenada* (Mexico)
CIMEL	Not an acronym, but the name of a sun photometer manufacturer.
CIRES	Cooperative Institute for Research in Environmental Sciences

COADS	Comprehensive Ocean–Atmosphere Data Set
COARE	Coupled Ocean–Atmosphere Response Experiment
COAST	Coastal Earth Observation Application for Sediment Transport
COOP	Coastal Ocean Optics Program
COTS	Commercial Off-The-Shelf (software)
CPR	Continuous Plankton Recorder
cpu	Central Processing Unit
CRM	Contrast Reduction Meter
CRN	Italian Research Council
CRSEO	Center for Remote Sensing and Environmental Optics (University of California at Santa Barbara)
CRT	Calibrated Radiance Tapes or Cathode Ray Tube (depending on usage).
CRTT	CZCS Radiation and Temperature Tape
CSIRO	Commonwealth Scientific and Industrial Research Organization (of Australia)
CSC	Computer Sciences Corporation
CSL	Computer Systems Laboratory
CT	Cross-Track
CTD	Conductivity, Temperature, and Depth
c.v.	coefficient of variation
CVT	Calibration and Validation Team
CW	Continuous Wave
CWL	Center Wavelength
CWR	Clear Water Radiance
CXR	CHORS Transfer Radiometer
CZCS	Coastal Zone Color Scanner

– D –

DAAC	Distributed Active Archive Center
DAO	Data Assimilation Office
DARR	Data Analysis Round-Robin
DARR-94	First Data Analysis Round-Robin
DARR-2	Second Data Analysis Round-Robin
DAT	Digital Audio Tape
DC	Direct Current or Digital Count (depending on usage).
DCF	Data Capture Facility
DCM	Deep Chlorophyll Maximum
DCOM	Dissolved Colored Organic Material
DCP	Data Collection Platform
DEC	Digital Equipment Corporation
DIM	Depth Integrated Model
DIN	Dissolved Inorganic Nitrogen
DIP	Dissolved Inorganic Phosphate
DIW	Distilled Water
DML	Dunstaffnage Marine Laboratory (Scotland)
DMS	dimethyl sulfide
DOC	Dissolved Organic Carbon
DoD	Department of Defense
DOE	Department of Energy
DOM	Dissolved Organic Matter
DON	Dissolved Organic Nitrogen
DOS	Disk Operating System
DSP	Not an acronym, but an image display and analysis package developed at RSMAS—University of Miami.
DU	Dobson Units
DUT	Device Under Test
DXW	Not an acronym, but a lamp designator.

– E –

E&P	Eppley and Peterson (compilation)
E-mail	Electronic Mail
EAFB	Edwards Air Force Base
EC	Excluding CHORS (data)
ECEF	Earth-Centered Earth-Fixed
ECMWF	European Centre for Medium Range Weather Forecasts
ECS	EOSDIS Core System
ECT	Equator Crossing Time
EDMED	European Directory of Marine and Environmental Data
EDT	Eastern Daylight Time
EEZ	Exclusive Economic Zone
EG&G	Not an acronym, but a shortened form of EG&G-Gamma Scientific (now known simply as Gamma Scientific).
ENSO	El Niño Southern Oscillation
ENVISAT	Environmental Satellite
EOF	Empirical Orthogonal Function
EOS	Earth Observing System
EOSAT	Earth Observation Satellite Company
EOSDIS	EOS Data Information System
EPA	Environmental Protection Agency
EP-TOMS	Earth Probe–Total Ozone Mapping Spectroradiometer
EqPac	Equatorial Pacific (Process Study)
ER-2	Earth Resources-2
ERBE	Earth Radiation Budget Experiment
ERBS	Earth Radiation Budget Sensor
ERDAS	Not an acronym, but a trade name for an image analysis system.
ERL	(NOAA) Environmental Research Laboratories
ERS	Earth Resources Satellite
ERS-1	European Remote Sensing Satellite
ESA	European Space Agency
EST	Eastern Standard Time
EURASEP	European Association of Scientists in Environmental Pollution
EUVE	Extreme Ultraviolet Explorer

– F –

FASCAL	Fast Calibration (Facility)
FDDI	Fiber Data Distribution Interface
FEL	Not an acronym, but a lamp designator.
FGGE	First GARP Global Experiment
FLUPAC	(Geochemical) Fluxes in the Pacific (Ocean)
FNOC	Fleet Numerical Oceanography Center
FORTRAN	Formula Translation (computer language)
FOV	Field-of-View
FPA	Focal Point Assembly
FRD	Federal Republic of Deutschland (Germany)
FRRF	Fast Repetition Rate Fluorometer
ftp	File Transfer Protocol
FWHM	Full-Width at Half-Maximum
FY	Fiscal Year

– G –

GAC	Global Area Coverage, coarse resolution satellite data with a nominal ground resolution at nadir of approximately 4 km.
GARP	Global Atmospheric Research Program
GASM	General Angle Scattering Meter

`gcc`	GNU C Compiler
GF/F	Not an acronym, but a specific type of glass fiber filter manufactured by Whatman.
GIN	Greenland, Iceland, and Norwegian Seas
GIS	Geographical Information System
GISS	Goddard Institute for Space Studies
GLI	Global Imager
GLOBEC	Global Ocean Ecosystems dynamics
GMT	Greenwich Mean Time
GNU	GNU's Not UNIX
GOES	Geostationary Operational Environmental Satellite
GOFS	Global Ocean Flux Study
GOMEX	Gulf of Mexico Experiment
GP	Global Processing (algorithm)
GPM	General Perturbations Model
GPS	Global Positioning System
GRGS	Groupe de Recherche de Geodesie Spatial
GRIB	Gridded Binary
GRIDTOMS	Gridded TOMS (data set)
GSFC	Goddard Space Flight Center
GSO	Graduate School of Oceanography (University of Rhode Island)
G/T	System Gain/Total System Noise Temperature
GUI	Graphical User Interface

– H –

HAPEX	Hydrological Atmospheric Pilot Experiment
HDDT	High Density Data Tape
HDF	Hierarchical Data Format
HEI	Hoffman Engineering, Incorporated
HeNe	Helium-Neon
HHCRM	Hand-Held Contrast Reduction Meter
HIRIS	High Resolution Imaging Spectrometer
HN	(Polaroid) Not an acronym, but a linear sheet polarizer used to check the polarization sensitivity of SeaWiFS bands 7 and 8.
HOTS	Hawaiian Optical Time Series
HP	Hewlett Packard
HPGL	Hewlett Packard Graphics Language
HPLC	High Performance Liquid Chromatography
HQ	Headquarters
HR	(Polaroid) Not an acronym, but a linear sheet polarizer used to check the polarization sensitivity of SeaWiFS bands 1–6.
HRPT	High Resolution Picture Transmission
HST	Hawaii Standard Time
HYDRA	Hydrographic Data Reduction and Analysis

– I –

I/O	Input/Output
IAPSO	International Association for the Physical Sciences of the Ocean
IAU	International Astrophysical Union
IBM	International Business Machines
ICARUS	Instrumentation Characterizing Aerosol Radii Using Sun photometry
ICD	Interface Control Document
ICES	International Council on Exploration of the Seas
ICESS	Institute for Computational Earth System Science (University of California at Santa Barbara)
IDL	Interactive Data Language
IDS	Integrated Data System
IFOV	Instantaneous Field of View
IGBP	International Geosphere–Biosphere Programme
ILS	Incident Light Sensor
IMS	Information Management System
IOP	Inherent Optical Property
IOSDL	Institute of Oceanographic Sciences, Deacon Laboratory (UK)
IP	Internet Protocol
IPD	Image Processing Division
IR	Infrared
IRIX	Not an acronym, but a computer operating system.
ISA	Integrating Sphere Accessory
ISCCP	International Satellite Cloud Climatology Project
ISIC	Integrating Sphere Irradiance Collector
ISTP	International Solar Terrestrial Program
IUCRM	Inter-Union Commission on Radio Meteorology
IUE	International Ultraviolet Explorer

– J –

JAM	JYACC Application Manager
JARE	Japanese Antarctic Research Expedition
JCR	(RRS) *James Clark Ross*
JGOFS	Joint Global Ocean Flux Study
JHU	Johns Hopkins University
JOI	Joint Oceanographic Institute
JPL	Jet Propulsion Laboratory
JRC	Joint Research Center
JYACC	Not an acronym, but the name of the company that makes JAM.

– K –

KQ	K_d Quality (flag)

– L –

L&N	Leeds & Northrup
LAC	Local Area Coverage, fine resolution satellite data with a nominal ground resolution at nadir of approximately 1 km.
LAN	Local Area Network
LANDSAT	Land Resources Satellite
LCD	Least Common Denominator (file)
LDEO	Lamont–Doherty Earth Observatory (Columbia University)
LDGO	Lamont–Doherty Geological Observatory (Columbia University)
LDTNLR	Local Dynamic Threshold Nonlinear Raleigh
Level-0	Raw data.
Level-1	Calibrated radiances.
Level-2	Derived products.
Level-3	Gridded and averaged derived products.
LHCII	Light-Harvesting Complex II
LMCE	*Laboratoire de Modelisation du climat et de l'Environment* (France)
LOC	Local Time
LODYC	*Laboratoire d'Océanographie et de Dynamique du climat* (France)
LOICZ	Land Ocean Interaction in the Coastal Zone
LOIS	Land–Ocean Interaction Study
LOMAS	Land Ocean Margins Server

LPCM	*Laboratoire de Physique et Chimie Marines* (France)
LRER	Long-Range Ecological Research
LSB	Least Significant Bits
LSF	Line Spread Function
LUT	Look-Up Table

– M –

MAFF	Ministry of Agriculture, Fisheries, and Food (UK)
MARAS	Marine Radiometric Spectrometer
MAREX	Marine Resources Experiment Program
MARMAP	Marine Resources Monitoring, Assessment, and Prediction
MARS	Multispectral Airborne Radiometer System
MASSS	Multi-Agency Ship-Scheduling for SeaWiFS
MBARI	Monterey Bay Aquarium Research Institute
MCMC	Markov Chain Monte Carlo
MEM	Maximum Entropy Method
MER	Marine Environmental Radiometer
MERIS	Medium Resolution Imaging Spectrometer
METEOSAT	Meteorological Satellite
MF	Major Frame
mF	Minor Frame
MIPS	Millions of Instructions Per Second
MIT	Massachusetts Institute of Technology
MIZ	Marginal Ice Zone
MLE	Maximum Likelihood Estimator
MLML	Moss Landing Marine Laboratory (San Jose State University)
MO	Magneto-Optical
MOBY	Marine Optical Buoy
MOCE	Marine Optical Characterization Experiment
MODARCH	MODIS Document Archive
MODIS	Moderate Resolution Imaging Spectroradiometer
MODIS-N	Nadir-viewing MODIS instrument
MODIS-T	Tilted MODIS instrument to minimize sun glint
MOS	Marine Optical Spectroradiometer
MOU	Memorandum of Understanding
MRF	Meteorological Research Flight
MSB	Most Significant Bits
MS/DOS	Microsoft/Disk Operating System (also written as MS-DOS)
MTF	Modulation Transfer Function
MTPE	Mission to Planet Earth
MVDS	Multichannel Visible Detector System
Myr	Millions of Years

– N –

NABE	North Atlantic Bloom Experiment
NAS	National Academy of Science
NASA	National Aeronautics and Space Administration
NASCOM	NASA Communications
NASDA	National Space Development Agency (Japan)
NASIC	NASA Aircraft/Satellite Instrument Calibration
NAVSPASUR	Naval Space Surface Surveillance
NCAR	National Center for Atmospheric Research
NCCOSC	Navy Command, Control, and Ocean Surveillance Center
NCDC	(NOAA) National Climatic Data Center
NCDS	NASA Climate Data System
NCSA	National Center for Supercomputing Applications
NCSU	North Carolina State University
NDBC	National Data Buoy Center
NDVI	Normalized Difference Vegetation Index
NEAT	Northeast Atlantic
NECC	North Equatorial Counter Current
NEdL	Noise Equivalent Differential Spectral Radiance
NEΔT	Noise Equivalent Delta Temperature
NEδL	Noise Equivalent delta Radiance
NER	Noise Equivalent Radiance
NERC	Natural Environment Research Council (UK)
NESDIS	National Environmental Satellite Data Information Service
NESS	National Environmental Satellite Service
NET	NIMBUS Experiment Team
netCDF	(NASA) Network Common Data Format
NFS	Network File System
NGDC	National Geophysical Data Center
NIMBUS	Not an acronym, but a series of NASA experimental weather satellites containing a wide variety of atmosphere, ice, and ocean sensors.
NIR	Near-Infrared
NIST	National Institute of Standards and Technology
NMC	National Meteorological Center
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOARL	Naval Oceanographic and Atmospheric Research Laboratory
NODC	National Oceanographic Data Center
NORAD	North American Air Defense (Command)
NOPS	NIMBUS Observation Processing System
NOS	National Ocean Service
NRA	NASA Research Announcement
NRaD	Naval Research and Development
NRIFSF	National Research Institute of Far Seas Fisheries (Japan)
NRL	Naval Research Laboratory
NRT	Near-Real Time
NSCAT	NASA Scatterometer
NSF	National Science Foundation
NSSDC	National Space Science Data Center

– O –

OAM	Optically Active Materials
OBP	Ocean Biogeochemistry Program
OCDM	Ocean Color Data Mission
OCEAN	Ocean Colour European Archive Network
OCI	Ocean Color Irradiance (sensor)
OCR	Ocean Color Radiance (sensor)
OCS	Ocean Color Scanner
OCTS	Ocean Color and Temperature Sensor (Japan)
ODAS	Ocean Data Acquisition System
ODEX	Optical Dynamics Experiment
ODU	Old Dominion University
OFFI	Optical Free-Fall Instrument
OI	Original Irradiance
OL	Optronics Laboratories
OLIPAC	Oligotrophy in the Pacific (Ocean)
OMEX	Ocean Marine Exchange

OMP-8	Not an acronym, but a type of marine antibiofouling compound.
ONR	Office of Naval Research
OPC	Optical Plankton Counter
OPPWG	Ocean Primary Productivity Working Group
OPT	Ozone Processing Team
OrbView-2	Not an acronym, but the name of the satellite (formerly known as SeaStar) on which the SeaWiFS instrument was launched.
ORKA	On-line Real-time Knowledge-based Analysis
OS	Operating System
OSC	Orbital Sciences Corporation
OSFI	Optical Surface Floating Instrument
OSSA	Office of Space Science and Applications
OSU	Oregon State University

– P –

P-I	Production-Irradiance
PACE	Plymouth Atmospheric Correction Experiment (UK)
PAR	Photosynthetically Available Radiation
PC	(IBM) Personal Computer
PCASP	Passive Cavity Aerosol Spectrometer Probe (UK)
PDR	Preliminary Design Review
PDT	Pacific Daylight Time
PFF	Programmable Frame Formatter
PGS	Product Generation System
PI	Principal Investigator
PIKE	Phased Illuminated Knife Edge
PlyMBODy	Plymouth Marine Bio-Optical Data Buoy (UK)
PM-1	Not an acronym, used to designate the afternoon platform of EOS.
PMEL	Pacific Marine Environmental Laboratory
PMI	Programmable Multispectral Imager
PML	Plymouth Marine Laboratory (UK)
POC	Particulate Organic Carbon
POLDER	Polarization Detecting Environmental Radiometer (France) or Polarization and Directionality of the Earth's Reflectance (depending on usage).
PON	Particulate Organic Nitrogen
PPARR-1	First Primary Productivity Algorithm Round-Robin (October 1995)
PPARR-2	Second Primary Productivity Algorithm Round-Robin (August 1997)
PPARR-3	Third Primary Productivity Algorithm Round-Robin
PPC	Photoprotectant Carotenoids
ppm	parts per million
PR	Photo Research
PRIME	Plankton Reactivity in the Marine Environment (UK)
PRR	Profiling Reflectance Radiometer
PRT	Platinum Resistance Thermometer
PSC	Photosynthetic Carotenoids
PSII	Photosystem II
PST	Pacific Standard Time
PSU	Practical Salinity Units
PTFE	Polytetrafluoroethylene
PUR	Photosynthetically Usable Radiation
PZN	Phytoplankton, Zooplankton, and Nutrients

– Q –

QC	Quality Control
QED	Quantum Efficient Device
QUBIT	Trade name of commercial data logging system.

– R –

R&A	Research and Applications
R&D	Research and Development
R/V	Research Vessel
RACER	Research on Antarctic Coastal Ecosystem Rates
RACS(C)	Rivers Basins-Atmosphere-Coast and Estuaries Study (Coastal)
RAF	Royal Air Force (UK)
RC	Resistor-Capacitor (circuit)
RDBMS	Relational Database Management System
RDF	Radio Direction Finder
RDI	RD Instruments
RF	Radio Frequency
RFP	Request for Proposals
RISC	Reduced Instruction Set Computer
rms	root mean squared
ROSIS	Remote Sensing Imaging Spectrometer, also known as the Reflective Optics System Imaging Spectrometer (Germany)
ROV	Remotely Operated Vehicle
ROW	Reverse Osmosis Water
RR	Round-Robin
RRS	Royal Research Ship
RSADU	Remote Sensing Applications Development Unit
RSMAS	Rosenstiel School for Marine and Atmospheric Sciences (University of Miami)
RSS	Remote Sensing Systems (Inc.)
RTM	Reversing Thermometer
RTOP	Research and Technology Operation Plan

– S –

S/C	Spacecraft
S/N	Serial Number
SAC	Satellite Applications Centre
SARSAT	Search and Rescue Satellite
SBE	Sea-Bird Electronics
SBRC	(Hughes) Santa Barbara Research Center
SBRS	(Hughes) Santa Barbara Remote Sensing (new name for SBRC)
SBUV	Solar Backscatter Ultraviolet Radiometer
SBUV-2	Second Solar Backscatter Ultraviolet Radiometer
SCADP	SeaWiFS Calibration and Acceptance Data Package
SCDR	SeaWiFS Critical Design Review
SCF	Science Computing Facility
SCOR	Scientific Committee on Oceanographic Research
SDPS	SeaWiFS Data Processing System
SDS	Scientific Data Set
SDSU	San Diego State University
SDY	Sequential Day of the Year
SeaBAM	SeaWiFS Bio-Optical Algorithm Mini-workshop
SeaBASS	SeaWiFS Bio-Optical Archive and Storage System
SeaDAS	SeaWiFS Data Analysis System

SeaOPS	SeaWiFS Optical Profiling System
SEAPAK	Not an acronym, but an image display and analysis package developed at GSFC.
SeaSCOPE	SeaWiFS Study of Climate, Ocean Productivity, and Environmental Change
SeaStar	Not an acronym, but the former name of the satellite on which SeaWiFS was launched; now known as OrbView-2.
SeaWiFS	Sea-viewing Wide Field-of-view Sensor
SEEP	Shelf Edge Exchange Program
SEI	SeaWiFS Exploitation Initiative (UK)
SEIBASS	SeaWiFS Exploitation Initiative Bio-Optical Archive and Storage System (UK)
SES	Shelf Edge Study
SFP	Size-Fractionated Pigments
SGI	Silicon Graphics, Incorporated
SHP	Shaft Horsepower
SI	International System of Units or *Système International d' Unitès*
SIG	Special Interest Group
SIMBIOS	Sensor Intercomparison and Merger for Biological and Interdisciplinary Ocean Studies
SIO	Scripps Institution of Oceanography
SIO/MPL	Scripps Institution of Oceanography/Marine Physical Laboratory
SIRREX	SeaWiFS Intercalibration Round-Robin Experiment
SIRREX-1	The First SIRREX (July 1992)
SIRREX-2	The Second SIRREX (June 1993)
SIRREX-3	The Third SIRREX (September 1994)
SIRREX-4	The Fourth SIRREX (May 1995)
SIRREX-5	The Fifth SIRREX (July 1996)
SIS	Spherical Integrating Source or *Sensoren-Instrumente Système* (depending on usage).
SISSR	Submerged *In Situ* Spectral Radiometer
SJSU	San Jose State University
SMM	Solar Maximum Mission
SNR	Signal-to-Noise Ratio
SO	Southern Ocean (algorithm)
SOC	Southampton Oceanography Center (UK) or Simulation Operations Center (depending on usage).
SOGS	SeaStar Operations Ground Subsystem
SOH	State of Health
SOW	Statement of Work
SPIE	Society of Photo-Optical Instrumentation Engineers
SPM	Suspended Particulate Material or Special Perturbations Model (depending on usage).
SPMPR	SeaWiFS Post-Modification Preship Review
SPO	SeaWiFS Project Office
SPOT	*Satellite Pour l'Observation de la Terre* (France)
SPR	SeaWiFS Preship Review
SPSWG	SeaWiFS Prelaunch Science Working Group
SQL	Sequential Query Language
SRC	Satellite Receiving Station (NERC)
SRT	Sigma Research Technology, Incorporated
SSLSP	SeaWiFS Stray Light Signal Paths
SSM/I	Special Sensor for Microwave/Imaging
SST	Sea Surface Temperature or SeaWiFS Science Team (depending on usage).
ST	Science Team
Sterna	Not an acronym, but a BOFS Antarctic research project.
STM	Science Team Member
SUDS	Submersible Upwelling and Downwelling Spectrometer
SUN	Sun Microsystems
SWAP	*Sylter Wattenmeer Austausch-Prozesse*
SWG	Science Working Group
SWIR	Shortwave Infrared
SWL	Safe Working Load
SXR	SeaWiFS Transfer Radiometer

– T –

T-S	Temperature-Salinity
TAE	Transportable Applications Executive
TAO	Thermal Array for the Ocean or more recently, Tropical Atmosphere-Ocean
TBD	To Be Determined
TBUS	Not an acronym, but a NOAA orbital element.
TDI	Time-Delay and Integration
TDRSS	Tracking and Data Relay Satellite System
TIM	Time Integrated Model
TIROS	Television Infrared Observation Satellite
TLCF	Team Leader Computing Facility
TLM	Telemetry
TM	Technical Memorandum
TOA	Top of the Atmosphere
TOGA	Tropical Ocean Global Atmosphere program
TOMS	Total Ozone Mapping Spectrometer
TOPEX	Topography Experiment
TOVS	TIROS Operational Vertical Sounder
TRMM	Tropical Rainfall Measuring Mission
TSM	Total Suspended Material
TV	Thermal Vacuum

– U –

UA	University of Arizona
UARS	Upper Atmosphere Research Satellite
UAXR	University of Arizona's Transfer Radiometer
UCAR	University Consortium for Atmospheric Research
UCMBO	University of California Marine Bio-Optics
UCSB	University of California at Santa Barbara
UCSD	University of California at San Diego
UH	University of Hawaii
UIC	Underway Instrumentation and Control (room)
UIM/X	User Interface Management/X-Windows
UM	University of Miami
UNESCO	United Nations Educational, Scientific, and Cultural Organization
UNIX	Not an acronym, but a computer operating system.
UoP	University of Plymouth (UK)
UOR	Undulating Oceanographic Recorder
UPS	Uninterruptable Power System
URI	University of Rhode Island
URL	Universal Resource Locator
USC	University of Southern California
USDA	United States Department of Agriculture
USF	University of South Florida
UTC	Coordinated Universal Time (definition reflects actual usage instead of following the letters of the acronym)

UTM	Universal Transverse Mercator (projection)
UV	Ultraviolet
UVB	Ultraviolet-B
UWG	User Working Group

– V –

V0	Version 0
V1	Version 1
VAX	Virtual Address Extension
VCS	Version Control Software
VDC	Volts Direct Current
VGPM	Vertically Generalized Production Model
VHF	Very High Frequency
VHRR	Very High Resolution Radiometer
VI	Virtual Instrument
VISLAB	Visibility Laboratory (Scripps Institution of Oceanography)
VISNIR	Visible and Near Infrared
VMS	Virtual Memory System
VSF	Volume Scattering Function

– W –

WFF	Wallops Flight Facility
WHOI	Woods Hole Oceanographic Institute
WIM	Wavelength Integrated Model
WMO	World Meteorological Organization
WOCE	World Ocean Circulation Experiment
WORM	Write-Once Read-Many (times)
WP2	Not an acronym, but a standard net mesh size (200 μm).
WRM	Wavelength Resolved Model
WVS	World Vector Shoreline

– X –

XBT	Expendable Bathythermograph
XDR	External Data Representation

– Y, Z –

YBOM	Yamato Bank Optical Mooring

SYMBOLS

– A –

a	The semi-major axis of the Earth's orbit; a formulation constant; a constant equal to 0.983; a constant equal to $-20/\tanh(2)$; an exponential value in the expression relating the radiance of scattered light to wavelength; or a regression coefficient (depending on usage).
$\tilde{a}$	The measured value of a.
a'	The absorption at the Raman excitation wavelength.
$a(\lambda)$	Total absorption coefficient.
$a(z,\lambda)$	Spectral absorption coefficient.
a_a	The specific absorption of chlorophyll a.
a_{abc}	The specific absorption of chlorophylls a, b, and c.
a_b	The specific absorption of chlorophyll b.
a_c	The specific absorption of chlorophyll c.
$a_e(\lambda)$	Absorption coefficient due to substances other than water.
$a_f(z,\lambda)$	$a_p(\lambda) - a_t(z,\lambda)$.
a_g	The DOM/detritus specific absorbance.
$a_g(\lambda)$	Gelbstoff spectral absorption coefficient.
a_i	Cubic polynomial coefficients.
$a_i(\lambda_a, T)$	Initial estimate of the apparent absorption coefficient; used for determining the apparent absorption coefficient for substances other than water.
a_N	Normalized absorption coefficient.
a_{o}	Oxygen absorption coefficient.
a_{ox}	Coefficient for oxygen absorption.
a_{oz}	Coefficient for ozone absorption.
$a_p(\lambda)$	Particulate spectral absorption coefficient.
a_{PP}	The specific absorption of PPC.
$a_{ps}(\lambda)$	Photosynthetically active pigment spectral absorption coefficient.
a_{PS}	The specific absorption of PSC.
$a_s(\lambda)$	The sediment specific absorption coefficient.
$a_t(\lambda)$	Tripton spectral absorption coefficient.
$a_w(\lambda)$	The absorption coefficient for pure water.
a_{wv}	Coefficient for water vapor absorption.
a_ϕ	The DOM/chlorophyll combined absorbance.
$a_\phi(\lambda)$	Phytoplankton pigment spectral absorption coefficient.
$a_\phi^M(\lambda)$	Phytoplankton pigment spectral absorption coefficient determined in methanol extract.
A	Fitting coefficient for $P_4 - X$, or the clearance area of a filter (depending on usage).
$A(k)$	Absorptivity.
$A(\lambda)$	Coefficient for calculating $b_b(\lambda)$.
$A(\lambda_a)$	AC-9 instrument calibration factor for absorption.
$A(\lambda_c)$	AC-9 instrument calibration factor for beam attenuation.
A_0	Coefficient for the linear term in the scan modulation correction equation.
A_d	The detector aperture.
$A_d(\overline{z},\lambda)$	Linear regression intercepts at the center of a fitted depth interval for ln of $A_d(z,\lambda)$ (defined in Vol. 26).
A_f	The foam reflectance.
A_i	The intersection area, or an arbitrary constant (depending on usage).
A_i'	An arbitrary constant.
A_j	An arbitrary constant.
A_j'	An arbitrary constant.
$A_l(\overline{z},\lambda)$	Linear regression intercepts at the center of a fitted depth interval for ln of $A_l(z,\lambda)$ (defined in Vol. 26).
$A_u(\overline{z},\lambda)$	Linear regression intercepts at the center of a fitted depth interval for ln of $A_u(z,\lambda)$ (defined in Vol. 26).

– B –

b	A formulation coefficient, a constant equal to 1/3, or a regression coefficient (depending on usage).
$b(z,\lambda)$	The total scattering coefficient.
$b(\theta, z, \lambda_0)$	Volume scattering coefficient.
b_b	Backscattering coefficient.
$\tilde{b}_b(\lambda)$	The backscatter ratio (b_b/b).
$b_b(z,\lambda)$	The spectral backscattering coefficient.
$b_{bc}(\lambda)$	The spectral backscattering coefficient for phytoplankton.
b_{bp}	The particle specific backscatter coefficient (usually normalized to chlorophyll a concentration).
b_{bw}	The backscatter coefficient of water.
$b_i(\lambda)$	Initial estimate of the particle scattering coefficient; used for determining the apparent particle scattering coefficient for substances other than water.
$b_{\min}$	Scattering associated with phytoplankton (Prieur and Sathyendranath 1981).
$b_p(\lambda)$	Total particle scattering.
$b_r(\lambda)$	Total Raman scattering coefficient.
b_R	The Raman scattering coefficient.
$b_s(\lambda)$	The sediment specific scattering coefficient.
$b_w(\lambda)$	The total scattering coefficient for pure seawater.
$b1(k)$	Input data for polarization calculations for SeaWiFS band 1.
$b7(k)$	Input data for polarization calculations for SeaWiFS band 7.
B	Excess target radiance; the fitting coefficient for e^{B/P_5}; the width of band 7; a variable in the expression for limiting reflectance (R_{lim}), defined as $0.33b/K_d$; or an empirical constant (depending on usage).
$B(\lambda)$	Coefficient for calculating $b_b(\lambda)$.
B_0	Coefficient for the power term in the scan modulation correction equation.
B_1	BBOP casts 1 m from the ship's stern.
B_6	BBOP casts 6 m from the ship's stern.
B_b	An empirical constant dependent on the backscatter ratio.
$B_b(\lambda)$	Greybody radiance model.

– C –

$\tilde{c}$	The measured value of c.
$c(z,\lambda)$	Spectral beam attenuation coefficient.
$c(z,660)$	Red beam attenuation (at 660 nm).
$c_e(\lambda)$	Corrected non-water beam attenuation coefficient.
$c_i(\lambda)$	Initial estimate of the beam attenuation coefficient (used for determining the apparent beam attenuation coefficient for substances other than water).
$c_p(\lambda)$	Beam attenuation coefficient due to particles.
$c_w(\lambda)$	Beam attenuation coefficient for pure water equal to $a_w(\lambda) + b_w(\lambda)$.
$[chl.\ a]/K$	Concentration of chlorophyll a over K, the diffuse attenuation coefficient.
C	Chlorophyll a pigment, or just pigment concentration.
$C'(\lambda)$	AC-9 factory calibration coefficient.
$C_r'(\lambda)$	Additional AC-9 factory calibration coefficient.
C_1	Measured value for the flight diffuser on a given scan line in counts, or a polynomial regression factor (depending on usage).
C_2	Measured value of the flight diffuser for the scan line immediately sequential to the first scan line used to measure the flight diffuser (i.e., S_1 in counts).

C_{13}	Pigment concentration derived using CZCS bands 1 and 3.
C_{23}	Pigment concentration derived using CZCS bands 2 and 3.
C_a	The concentration of chlorophyll *a*.
C_{abc}	The concentration of chlorophylls *a*, *b*, and *c*.
C_b	The concentration of chlorophyll *b*.
C_c	The concentration of chlorophyll *c*.
C_{dark}	Instrument dark restore value, in counts.
C_{est}	Estimated chlorophyll concentration.
C_{ext}	Average total extinction cross-section of a particle.
C_F	The calibration factor.
C_K	Average chlorophyll *a* concentration within the first optical depth ($\mathrm{mgChl\,m^{-3}}$).
C_{out}	Instrument output, in counts.
C_P	Phaeopigment concentration.
C_{PP}	PPC concentration.
C_{PS}	PSC concentration.
$C_r(\lambda)$	Digital response of reference detector.
C_{ref}	Reference chlorophyll value (0.5).
C_{sat}	Satellite-based surface chlorophyll concentration ($\mathrm{mgChl\,m^{-3}}$).
C_S	Simulated C.
C_{sed}	Sediment concentration (SPM).
$C_t(\lambda)$	Digital response of water transmission detector.
C_{temp}	Temperature sensor output, in counts, represented by an 8-bit digital word in the SeaStar telemetry.
C_{TP}	Total pigment concentration.
$[C+P]$	Pigment concentration defined as milligrams of chlorophyll *a* plus phaeopigments per cubic meter.
$(\mathrm{CO_2})_{\mathrm{GLOB}}$	Global $\mathrm{CO_2}$ concentration in parts per million.

– D –

d	The distance between source and detector apertures.
$d(I(\lambda))$	An increment in detector current.
d_i	Distance from the *i*th observation point to the point of interest.
d_j	Distance from the *j*th observation point to the point of interest.
d_{PC}	Daily depth-integrated primary production ($\mathrm{mgC\ m^{-2}\,d^{-1}}$).
ds	Detector configuration datum.
$d\lambda$	An increment in wavelength.
D	Sequential day of the year.
$\vec{D}$	Orbit position difference vector.
D_{at}	Along-track position difference.
D_{ct}	Cross-track position difference.
D_{rad}	Radial position difference.
DC	Digital count (value), or direct current (depending on usage).
DC_{10}	Digital counts at 10-bit digitization.
DC_{meas}	The digital counts measured unshadowed.
DC_{scat}	The digital counts due to scattered sunlight.
DC_{TOA}	The digital counts measured at the top of the atmosphere.
DL	Day length.

– E –

e	Orbit eccentricity of the Earth.
$\hat{E}(z,m)$	A smoothed estimate of irradiance obtained by a least-squares regression fit in the center of a depth interval.
$E(\lambda)$	Spectral irradiance.
$E(\lambda,50)$	Spectral irradiance measured at 50 cm from a source.
E_0	Incident downwelling irradiance.
E_0'	The downwelling irradiance at the Raman excitation wavelength.
$E_a(\lambda)$	Irradiance in air.
E_{beg}	Beginning irradiance value.
E_{cal}	Calibration source irradiance.
$E_d(\lambda)$	Incident downwelling irradiance.
$E_d(0,\lambda)$	Surface irradiance.
$E_d(0^-,\lambda)$	Incident spectral irradiance.
$E_d(z,\lambda)$	Downwelling spectral irradiance profile.
$E_d'(z,\lambda)$	Normalized downwelled spectral irradiance.
E_{end}	Ending irradiance value.
$E_{\mathrm{meas}}(\lambda)$	Measured radiance.
$E_s(z,\lambda)$	Vertical profile of surface irradiance.
$\vec{E}_s(z_m,\lambda)$	Defined as $\mathbb{H}\vec{\overline{E}}_s(\lambda)$.
$E_s(\lambda)$	Surface irradiance.
$\vec{E}_s(\lambda)$	The measured irradiance vector of length M.
$\overline{E}_{s,i}(\lambda)$	The value of $E_s(z,\lambda)$ at node depth z_i.
$E_{\mathrm{ref}}(\lambda)$	Reference radiance.
E_{rem}	Percentage of energy removed from a wavelength band.
$E_{\mathrm{sky}}(\lambda)$	Spectral sky irradiance distribution.
$E_{\mathrm{sun}}(z,\lambda)$	Spectral sun irradiance distribution.
$E_u(z,\lambda)$	Upwelling spectral irradiance profile.
$E_u(0^-,\lambda)$	Upwelling spectral irradiance just beneath the sea surface.
$E_w(z,\lambda)$	Irradiance in water.
$E_{WN}(\lambda)$	Normalized water-leaving irradiance.

– F –

f	The fraction of the surface covered by foam, the ratio of sensor-to-instrument diameters, a factor relating IOPs to irradiance reflectance, or the ratio of new primary production to total primary production (depending on usage).
f_i	Filter number, i=0–11.
$f(T)$	Offset voltage correction from the linear function characterizing temperature response.
$f(\lambda)$	Instrument spectral response function.
f-ratio	The ratio of new to total production.
F	Fluorescence.
$\bar{F}$	Arithmetic average.
$\overline{F}(\lambda)$	A mean conversion factor.
$F(\lambda)$	A calibration factor.
$F(\lambda)$	A conversion factor to convert PR714 readings to the GSFC sphere radiance scale.
$F\bar{(}\lambda)$	Average of calibration factors.
F_0	The extraterrestrial irradiance corrected for Earth-sun distance, or initial fluorescence (depending on usage).
$\mathbb{F}_0$	The scalar value of the solar spectral irradiance at the top of the atmosphere, multiplied by a columnar matrix of the four Stokes parameters (1/2, 1/2, 0, 0).
$\overline{F}_0$	Mean solar irradiance.
F_0'	Extraterrestrial irradiance corrected for the atmosphere.
$F_0(\lambda)$	Mean extraterrestrial spectral irradiance.
$\overline{F}_0(\lambda)$	Mean extraterrestrial irradiance.
F_1	Pigment biomass loading factor.
F_2	Detritus concentration loading factor.

F_3	Carotenoid concentration (or relative pigment abundance) loading factor.
F_a	Forward scattering probability of the aerosol.
F_d	The total flux incident on the surface if it did not reflect light.
F'_d	The total flux incident on the surface, corrected for surface reflection.
$\mathbb{F}'_d$	The scalar value of the total flux incident on the surface, corrected for surface reflection, multiplied by a columnar matrix of the four Stokes parameters.
F_{GAC}	A GAC correction factor.
F_i	A correction factor, or an immersion coefficient (depending on usage).
F_m	Total sample maximal fluorescence (directly comparable to values measured by standard active fluorometers).
F_{SL}	A correction factor for stray light.
$F_v(\lambda)$	Field-of-view coefficient or variable fluorescence, $F_m - F_0$.

– G –

g	A constant that consists of the ratios of the air–sea interface effects, the effects of the light field, and the relative spectral variation of Q.
$g(T)$	Coefficient of a linear function characterizing temperature response.
g_1	A constant equal to 0.82.
g_2	A constant equal to -0.55.
g_{ij}	Integrals of γ_{ij} (defined in Vol. 26).
gs	Gain selection datum.
G	Gain factor, or the concentration of DOM and DOM-like absorbers (depending on usage).
$G(z,\lambda)$	Solid angle dependence with water depth.
$G(\lambda)$	$\grave{R}_a(\lambda_i)/\grave{R}_a(670) = (670/\lambda)^\gamma\ T_{2r}(670)/T_{2r}(\lambda_i)$.
$G(\mu_0,\lambda)$	The effect of the downwelling light field.
G_1	Gain setting 1.
G_2	Gain setting 2.
G_3	Gain setting 3.
G_4	Gain setting 4.
G_e	Gravitational constant of the Earth (398,600.5 km^3 s^{-2}).
G_n	Gain factor at gain setting n.

– H –

$h(k)$	Residual values without the calculated sinusoidal response.
$h(\lambda)$	Normalized response function.
h_{ij}	Analytic integral coefficients over the Hermitian polynomials γ_{ij}.
h_{mj}	Matrix elements (defined in Vol. 26).
$\mathbb{H}$	Matrix of coefficients h_{ij}, or $[h_{mj}]$ (depending on usage).
$H(\lambda_i{:}\lambda_j)$	Pigment calculated from the hyperbolic transform of $L_{i:j}$.
H_{GMT}	GMT in hours.
H_M	The measured moon irradiance.
H_s	Altitude of the spacecraft (for SeaStar 705 km).

– I –

i	Inclination angle, interval index, or variable infrared bands (depending on usage).
i'	Inclination angle minus 90°.
I	Rayleigh intensity.
$I(\lambda)$	Detector current.
I_0	Surface downwelling irradiance.
I_1	Radiant intensity after traversing through an absorbing medium.
I_2	Reflected radiant energy received by the satellite sensor.
$I_{\max}$	Recorded maximum instrument output in response to linearly polarized light.
$I_{\min}$	Recorded minimum instrument output in response to linearly polarized light.
ICS	Current from the current source diode.

– J –

j	Interval index, or variable infrared bands (depending on usage).
$J2$	The $J2$ gravity field term (0.0010863).
$J3$	The $J3$ gravity field term (-0.0000254).
$J4$	The $J4$ gravity field term (-0.0000161).
$J5$	The $J5$ gravity field term.

– K –

k	Wavenumber of light ($1/\lambda$), the fractional factor of total particle scattering, the molecular absorption cross-section area, or an index to two vectors of band ratios k_1 and k_2 (depending on usage).
k'	$y/\tan\theta_{0w}$.
k_1	Beginning wavenumber, or a band ratio vector (depending on usage).
k_2	Ending wavenumber, or a band ratio vector (depending on usage).
k_c	Wavelength independent fraction.
$k_c(\lambda)$	Spectral fit coefficient weighted over the SeaWiFS bands; $k'_c(\lambda)$ also used.
k_s	A constant related to a_s and b_s.
$\vec{\overline{K}}$	Vector of $\overline{K}_n$.
$K(\lambda)$	Generic irradiance attenuation coefficient.
$K(z,\lambda)$	Diffuse attenuation coefficient.
$K(440)$	Diffuse attenuation coefficient of seawater measured at 440 nm.
$K(490)$	Diffuse attenuation coefficient of seawater measured at 490 nm.
$K_0(\lambda)$	Diffuse attenuation coefficient at $z=0$.
K_1	Primary instrument sensitivity factor.
K_2	Gain factor.
K_3	Temperature dependence of detector output.
K_4	Scan modulation correction factor.
K_5	Spacecraft analog-to-digital conversion factor.
K_6	Analog-to-digital offset in spacecraft conversion.
K_7	Current from the diode at 20°C.
$K_c(\lambda)$	Attenuation coefficient for phytoplankton.
K_d	Diffuse attenuation coefficient for downwelling irradiance.
$K_d(z,\lambda)$	Vertical profile of the diffuse attenuation coefficient for the downwelling irradiance spectrum.
$K'_d(z,\lambda)$	$K_d(z,\lambda)$ determined by least squares regression over a depth interval.
$K_E(\lambda)$	Attenuation coefficient downwelled irradiance.
$K_g(\lambda)$	Attenuation coefficient for Gelbstoff.
K_i	A correction constant at the ith pixel.
$K_L(z,\lambda)$	Vertical profile of the diffuse attenuation coefficient for the upwelling radiance spectrum.

$K'_L(z,\lambda)$	$K_L(z,\lambda)$ determined by least squares regression over a depth interval.
$\overline{K}_n$	K at node depth z_n determined, with its vertical derivative by least-squares fit to radiometric profiles.
$K_s(z,\lambda')$	Apparent attenuation coefficient measured in a homogenous water column.
$K_u(z,\lambda)$	Vertical attenuation coefficient for upwelled irradiance.
$K'_u(z,\lambda)$	$K_u(z,\lambda)$ determined by least squares regression over a depth interval.
$K_w(\lambda)$	Attenuation coefficient for pure seawater.
KPUR	A temperature-dependent variable in the productivity model of Morel (1991) that defines the shape of the photosynthesis–irradiance relationship.

– L –

l	Cuvette pathlength.
l_s	Nominal absorption pathlength.
L	Radiance of light transmitted through absorbing oxygen.
$L(0,0)$	Spectral radiance measured at the point closest to the center of a sphere.
$L(411.5)$	Spectral radiance at 411.5 nm.
$L(532)$	Spectral radiance at 532 nm.
$L(z,\theta,\phi)$	Submerged upwelled radiance.
$L(\lambda)$	Spectral radiance.
$L(\lambda_m)$	The radiance of a calibration sphere at the nominal peak wavelength of a filter.
$L^{(}\lambda,\theta,\phi)$	Atmospheric path radiance at flight altitude.
L_0	The radiance of the atmosphere.
$L_1(\lambda)$	Apparent radiance response to a linearly polarized source.
$L_2(\lambda)$	Orthogonal apparent radiance response to a linearly polarized source.
L_a	Atmospheric path radiance due to aerosols.
$L_{\rm atm}$	Radiance of light reflected from the atmosphere.
$L_c(\lambda)$	Cloud radiance threshold.
$L_{\rm cal}$	Calibration source radiance.
$L_{\rm cloud}$	The maximum radiance from reflected light off of clouds.
$\mathbb{L}_d$	A matrix of the four Stokes parameters for radiance incident on the surface.
$L_g(\lambda)$	Sun glint radiance.
L_i	Incident light, or the length of the ith element (depending on usage).
$L_i(\lambda)$	Spectral radiance for run number i, or radiance, where i may represent any of the following: m for measured; *LU* for look-up table; 0 for light scattered by the atmosphere; sfc for reflection from the sea surface; and w for water-leaving radiance.
$L_{i:j}$	The ratio of normalized water-leaving radiances at wavelengths i (λ_i) to j (λ_j): $L_{WN}(\lambda_i)/L_{WN}(\lambda_j)$.
L_{LU}	The radiance calculated for the look-up tables.
L_m	The radiance of the ocean–atmosphere system measured at a satellite.
L_M	The radiance of the moon.
$L_{\max}$	Maximum saturation radiance.
$L_{\rm nadir}$	Measured radiance at nadir.
$L_{\rm NER}(\lambda)$	Noise equivalent radiance.
$L_r(\lambda)$	Atmospheric path radiance due to Rayleigh scattering.
$L_{r0}(\lambda)$	Rayleigh radiance at standard atmospheric pressure, P_0.
$L_s(\lambda)$	Subsurface water radiance.
L_{sa}	$L_0 + L_{\rm sfc}$.
$L_{\rm sat}(\lambda)$	Saturation radiance for the sensor.
$L_{\rm scan}$	Measured radiance at any pixel in a scan.
$L_{\rm sfc}$	The radiance of the light reflected from the sea surface.
$\mathbb{L}_{\rm sfc}$	The columnar matrix of the four Stokes parameters ($L_{u,1}$, $L_{u,2}$, $L_{u,3}$, $L_{u,4}$).
$L_{\rm sky}(\lambda)$	Spectral sky radiance distribution.
$L_t(\lambda)$	Total radiance at the top of the atmosphere (where a satellite sensor is located).
$L_{\rm toa}$	Radiance emerging at the top of the atmosphere.
$L_{\rm typical}$	Expected radiance from the ocean measured on orbit.
$L_u(z,\lambda)$	Upwelling spectral radiance profile.
$L_u(0^-,\lambda)$	Upwelling spectral radiance just beneath the sea surface.
$\hat{L}_u(\lambda)$	True upwelled spectral radiance.
$\tilde{L}_u(\lambda)$	Measured upwelled spectral radiance.
$\mathbb{L}_{\rm up}$	The columnar matrix of light leaving the surface containing the values $L_{{\rm up},1}$, $L_{{\rm up},2}$, $L_{{\rm up},3}$, and $L_{{\rm up},4}$.
$L_{{\rm up},i}$	The `RADTRAN` radiance parameters (for $i = 1,4$).
$\mathbb{L}_w$	The scalar value of the water-leaving radiance multiplied by a columnar matrix of the four Stokes parameters.
L_W	The water-leaving radiance of light scattered from beneath the surface and penetrating it.
$L_W(443)$	Water-leaving radiance at 443 nm.
$L_W(520)$	Water-leaving radiance at 520 nm.
$L_W(550)$	Water-leaving radiance at 550 nm.
$L_W(670)$	Water-leaving radiance at 670 nm.
L'_{WN}	Normalized water-leaving radiance at the Raman excitation wavelength.
$L_{WN}(\lambda)$	Normalized water-leaving radiance.
LS_1	Measured radiance for mirror side 1.
LS_2	Measured radiance for mirror side 2.

– M –

m	Index of refraction, or an air mass (depending on usage).
M	Path length through the atmosphere, or the total number of discrete data points in a vertical radiometeric profile (depending on usage).
M'_m	The corrected mean orbit anomaly of the Earth, which is a function of date, and refers to an imaginary moon in a circular orbit.
$M_{\rm oz}$	Path length for ozone transmittance.

– N –

n	The index of refraction, the mean orbital motion in revolutions per day, the gain setting, or the starting index in a measurement for angular measurements, or node index for the integral K analysis (depending on usage).
$n(\lambda)$	An exponent conceptually similar to the Ångström exponent.
$n_g(\lambda)$	Index of refraction of Plexiglas™.
$n_w(\lambda)$	Index of refraction of water.
N	The total number of something, or the ending index in a measurement sequence for angular measurements, or total number density (depending on usage).
N_D	The compensation factor for a 4 log neutral density filter.
N_i	Total number density of either the first or second aerosol model when $i = 1$ or 2, respectively.

– O –

$\vec{O}$	$\vec{P} \times \vec{V}$.
$(O_2/N_2)_{\mathrm{ref}}$	The referenced amount of O_2/N_2.
$(O_2/N_2)_{\mathrm{samp}}$	The sampled amount of O_2/N_2.
O_{20}	OFFI casts 20 m from the ship's stern.
$\mathrm{OD}_b(\lambda)$	Baseline optical density spectrum.
$\mathrm{OD}_g(\lambda)$	Optical density of soluble material (Gelbstoff).
$\mathrm{OD}_p(\lambda)$	Optical density spectra of filtered particles.
$\mathrm{OD}_r(\lambda)$	Optical density reference for filtered or distilled water.
$\mathrm{OD}_t(\lambda)$	Optical density of non-pigmented particulates (tripton).

– P –

p	Surface pressure.
p_a	A factor to account for the probability of scattering to the spacecraft for three different paths from the sun.
$p_a/(4\pi)$	Aerosol albedo of the scattering phase function.
$p\mathrm{CO}_2$	The partial pressure of CO_2.
p_{dev}	Pressure deviation between the minimum and maximum surface pressures compared to 1,013 mb.
p_{ref}	Reference pressure.
p_w	The probability of seeing sun glitter in the direction θ, Φ given the sun in position θ_0, Φ_0 as a function of wind speed (W).
P	Nodal period, phaeopigment concentration, local surface pressure, or the particulate concentration including detrital material (depending on usage).
$\vec{P}$	Orbit position vector.
$P(\theta^+)$	Phase function for forward scattering.
$P(\theta^-)$	Phase function for backward scattering.
$P(\lambda)$	Polarization sensitivity.
P_0	Standard atmospheric pressure (1,013.25 mb).
P_a	Probability of scattering to the spacecraft.
P_{edge}	A pixel located on the exact edge of a bright source in a GAC scene.
P_G	Gross photosynthesis is defined as the number of electrons photochemically produced from the splitting of water.
P_i	PR714 raw radiance, the fitting coefficient for $i = 1$–5, or the ith pixel under correction (depending on usage).
P_n	Net photosynthesis is defined as $P_G - R_l$.
P_{PC}	Annual average phytoplankton particulate organic carbon production ($\mathrm{gC\,m^{-2}\,yr^{-1}}$).
P_S	Simulated $C_a + C_P$ (q.v.).
P_{slit}	Designates the number of pixels after the slit for the instrument to return to the residual counts allowed in the specification.
P_T	Depth-integrated primary production.
P_W	Probability of seeing sun glint in the spacecraft direction.
Pxl	Pixel number, i.e., the numerical designation of a pixel in a scan line.
P_{zero}	Designates the number of pixels required for the instrument to settle to a level of zero residual counts.
$P^b(z)$	Chlorophyll-specific photosynthetic rate at depth z.
P^b_{opt}	Maximum chlorophyll-specific carbon fixation rate within a water column.
P^B	Chlorophyll normalized photosynthesis.
$P^B_{\max}$	$P_{\max}$ normalized to chlorophyll concentration.
$PB_{\max}$	Maximum biomass-specific photosynthetic rate.
PF	Polarization factor.
PP	Primary productivity.
P_Δ	The location of the pixel to be corrected in GAC pixels relative to the (bright target) edge pixel.
P_σ	Phaeopigment concentration.

– Q –

q	Water transmittance factor.
Q	The ratio of upwelling irradiance to radiance, which varies with the angular distribution of the upwelling light field, and is π for an isotropic distribution.
$Q(\lambda)$	$L_u(0^-,\lambda)$ to $E_u(0^-,\lambda)$ relation factor (equal to π for a Lambertian surface).

– R –

r	Water–air reflectance for totally diffuse irradiance, the radius coordinate, the Earth–sun distance, or the lamp-to-plaque distance in centimeters (depending on usage).
r_1	The radius of circle one, or source aperture (depending on usage).
r_2	The radius of circle two, or detector aperture (depending on usage).
r_i	The geometric mean radii of either the first or second aerosol model when $i = 1$ or 2, respectively.
R	Reflectance, the linear correlation coefficient, or phytoplankton respiration (depending on usage).
$\mathbb{R}$	The reflection matrix.
$\overline{R}$	Mean Earth–sun distance.
R^2	The square of the linear correlation coefficient.
$R(0^-,\lambda)$	Irradiance reflectance just below the sea surface.
$R(\lambda)$	The irradiance reflectance at a particular wavelength.
R_1	A multiplier for mirror side 1.
R_2	A multiplier for mirror side 2.
R_a	Aerosol reflectance.
$\grave{R}_a$	$R_a/(qT_{2r})$.
R_B	Bidirectional reflectance distribution function.
R_d	Dark respiration by the photosynthetic organism.
R_e	Mean Earth radius (6,378.137 km).
R_E	Effective resistance for the thermistor–resistor pair.
R_i	Radiance of the ith pixel.
R_l	All the losses of fixed carbon due to respiratory processes of the photosynthetic organism in the light.
R'_L	Reflectance from an uncalibrated radiometer.
$R_L(z,\lambda)$	Spectral reflectance.
$R_{\lim}$	Limiting reflectance for defining Case-1 water.
R_r	Rayleigh reflectance.
R_{rs}	Remote sensing reflectance.
$R_{rs}(z,\lambda)$	Spectral remote sensing reflectance profile.
R_s	Subsurface reflectance.
R_t	Total reflectance at the sensor.
$\grave{R}_t$	$(R_t - R_r)/(qT_{2r})$.
R_T	Resistance of the thermistor.
R_z	Sunspot number.

– S –

s	The reflectance of the atmosphere for isotropic radiance incident at its base.
$s(\lambda)$	The slope for the range 0–1,023.
s_{xy}	Residual standard deviation.
S	The solar constant, or the slope of a line (depending on usage).

$S(\lambda)$	The solar spectral irradiance, or $L_a(\lambda)/L_a(670)$ (depending on usage).
$S(\lambda_r)$	A coefficient of water temperature variation in $a_w(\lambda,T)$.
$S_G(\lambda)$	Radiometer signal (uncalibrated) measured viewing a reflectance plaque.
S_i	Initial detector signal.
S_n	Detector signal with gain.
S_{sky}	Radiometer signal (uncalibrated) measured viewing the sky.
$S_W(\lambda)$	Radiometer signal (uncalibrated) measured viewing the water.

– T –

t	Time variable, or the transmission of L_{sfc} through the atmosphere (depending on usage).
t'	The transmission of L_W through the atmosphere.
$t(k)$	Spectral transmission as a function of wavenumber.
$t(\lambda)$	Diffuse transmittance of the atmosphere.
$t(750,\theta)$	Diffuse transmittance between the ocean surface and the sensor at 750 nm.
t_0	Initial time, or the sum of the direct and diffuse transmission of sunlight through the atmosphere (depending on usage).
t_1	First observation time.
t_2	Second observation time.
t_a	Aerosol transmittance after absorption.
t_{as}	Aerosol transmittance after scattering.
t_d	Direct component of transmittance after absorption by the gaseous components of the atmosphere, scattering and absorption by aerosols, and scattering by Rayleigh.
$t_d(z,\lambda)$	Downward spectral irradiance transmittance from flight altitude z to the surface.
t_e	Time difference in hours between present position and most recent equator crossing.
t_{EC}	Equator crossing time.
t_{oz}	Transmittance after absorption by ozone.
t_r	Transmittance after Rayleigh scattering.
t_s	Diffuse component of transmittance after absorption by the gaseous components of the atmosphere, scattering and absorption by aerosols, and scattering by Rayleigh.
t_{wv}	Transmittance after absorption by water vapor.
T	Tilt position.
T'	Instrument temperature during calibration.
T°	Levitus climatological median upper ocean temperature (18.1°C) as computed by Antoine et al. (1996).
$T(\lambda)$	The transmittance along the slant path to the sun.
$T(\lambda,\theta)$	Total transmittance (direct plus diffuse) from the ocean through the atmosphere to the spacecraft along the path determined by the spacecraft zenith angle θ.
$T(\lambda,\theta,\theta_0)$	Two-way transmission through oxygen in the model layer in terms of zenith angle (θ), and solar angle (θ_0).
$T_0(\lambda,\theta_0)$	Total downward transmittance of irradiance.
T_{2r}	Two-way diffuse transmittance for Rayleigh attenuation.
T_e	Equation of time.
$T_g(\lambda)$	Transmittance through a glass window.
T_{ox}	Transmittance of oxygen (O_2).
T_{oz}	Transmittance of ozone (O_3).
$T_s(\lambda)$	Transmittance through the surface.
$T_w(\lambda)$	Transmittance through a water path.
T_{wv}	Transmittance of water vapor (H_2O).

– U, V –

V	Volume of water filtered.
$\vec{V}$	Orbit velocity vector.
$\hat{V}$	True voltage.
$\tilde{V}$	Measured voltage.
$V(z)$	Transmissometer voltage.
$V(\theta)$	Normalized measured value for a cosine collector.
$\overline{V}(\theta_i)$	Mean normalized measured value of instrument response.
V_{air}	Factory transmissometer air calibration voltage.
V'_{air}	Current transmissometer air calibration voltage.
V_{dark}	Transmissometer dark response.
$V_i(t_j)$	The ith spatial location at observation time t_j.
V_M	The radiance detector voltage while viewing the moon.
V_S	The irradiance detector voltage while viewing the sun.
V_T	Focal plane temperature sensor voltage output.

– W –

w_m	The weighting coefficient at each depth z_m.
W	Wind speed, or equivalent bandwidth (depending on usage).
W_d	Direct irradiance divided by the total irradiance at the surface.
W_s	Diffuse irradiance divided by the total irradiance.
W_θ	Weighting function.

– X –

x	The abscissa or longitudinal coordinate, or the pixel number within a scan line (depending on usage).
X	ECEF x component of orbit position, or depth in meters (depending on usage).
$\dot{X}$	ECEF X component of orbit velocity.

– Y –

y	The ordinate, meridional coordinate, or an empirical factor (depending on usage).
Y	ECEF y component of orbit position; or the base 10 logarithm of the radiometric measurement E_d, E_u, or L_u (depending on usage).
$\dot{Y}$	ECEF Y component of orbit velocity.

– Z –

z	The vertical coordinate (frequently water depth).
z'	Corrected depth for pressure transducer depth offset relative to a sensor.
z_{eu}	Depth of the euphotic zone.
z_i	The depth of a particular node.
z_m	Centered depth, or the depth of the mth data point in a vertical radiometric profile (depending on usage).
z_n	The node depth number ($n=0,\ldots,N-1$).
z_r	Shallow depth.
z_s	Exclusion depth due to data contamination.
Z	ECEF z component of orbit position, or a substrate (depending on usage).
$\dot{Z}$	ECEF Z component of orbit velocity.

– OTHER –

*	Normalization-to-chlorophyll concentration.

– GREEK –

α	Percent albedo, tilt angle, formulation coefficient (intercept), the power constant in the Ångström formulation, the exponential value in the expression relating the extinction coefficient to wavelength, the off-axis angle, or the light-limited slope of the photosynthesis–irradiance relationship (depending on usage).
α'	A power law constant.
$\alpha^*(\lambda)$	Chlorophyll-specific, spectral absorption coefficient for phytoplankton.
α_0	A curve fitting constant.
α_1	A curve fitting constant.
α_2	A curve fitting constant.
α_{750}	Albedo at 750 nm.
α^B	Chlorophyll normalized α.
β	A formulation coefficent (slope), a constant in the Ångström formulation, or the correction method for pathlength amplification (depending on usage).
$\beta(z,\lambda,\theta)$	Spectral volume scattering function.
$\tilde{\beta}(\theta)$	The normalized scattering phase function ($\beta(\theta)/b$).
$\overline{\beta}_b$	The measured integral of the volume scattering function in the backward direction.
β_i	The extinction coefficient of either the first or second aerosol model when $i = 1$ or 2, respectively; or the filter absorption correction factor for scattering within the filter.
γ	The Ångström exponent.
$\gamma(\lambda)$	The ratio of the aerosol optical thickness at wavelength λ to the aerosol optical thickness at 670 nm.
$\gamma_{ij}(\xi)$	Hermitian cubic polynomial.
δ	The great circle distance from $\Psi_s(t_0)$ to $\Psi_s(t - t_0)$, the departure of each individual conversion factor from the mean, a relative difference, the absorption coefficient, or the cosine response asymmetry (depending on usage).
Δk	Equivalent bandwidth.
ΔL	The difference between L and L_0.
$\Delta L_W(670)$	The error in the water-leaving radiance for the red channel.
$\delta(\mathrm{O_2{:}N_2})_{\mathrm{GLOB}}$	The changes in the global O_2:N_2.
Δp	The difference in atmospheric pressure.
$\Delta p\mathrm{CO_2}$	The difference in the partial pressure of CO_2 in the air and in the sea.
ΔP	The difference in successive pixels, or the pressure deviation from standard pressure, P_0 (depending on usage).
Δt	Time difference.
ΔT	Changes in temperature.
$\Delta T(\lambda)$	The error in transmittance.
Δz	Half-interval depth increment.
$\Delta\theta$	Angular increment.
$\Delta\theta_s$	The error (in radians) in the knowledge of θ_s.
$\Delta\lambda$	An interval in wavelength.
$\Delta\rho_w(\lambda)$	The error in the water-leaving reflectance for the red channel.
$\Delta\sigma(\lambda)$	The absolute error in spectral optical depth.
$\Delta\tau_a$	The error in the aerosol optical thickness.
$\Delta\Phi_{\max}$	The ratio F_v/F_m which corresponds to the (normalized) maximum number of reaction centers in the chlorophyll population which are capable of photosynthesis.
$\Delta\omega$	The longitude difference from the subsatellite point to the pixel.
$\Delta\omega_s$	Longitude difference.
ϵ	Cosine collector response error or an atmospheric correction parameter (depending on usage).
$\epsilon(i,j)$	The ratio of L_a in two bands i and j.
ϵ_{sky}	Self-shading error for E_{sky}.
ϵ_{sun}	Self-shading error for E_{sun}.
$\varepsilon(\lambda)$	$1 - e^{-k' a(\lambda) r}$.
η	The bearing from the sub-satellite point to the pixel along the direction of motion of the satellite.
θ	The spacecraft zenith angle, spacecraft pitch, the polar angle of the line-of-sight at a spacecraft, the centroid angle of the scattering measurement, or a generalized angle (depending on usage).
$\dot{\theta}$	Pitch rate.
θ_0	Polar angle of the direct sunlight, or solar zenith angle (depending on usage).
θ_{0w}	Refracted solar zenith angle.
θ_1	The intersection angle of circle one or the lower integration limit (depending on usage).
θ_2	The intersection angle of circle two or the upper integration limit (depending on usage).
θ_a	In-air measurement angle.
θ_i	Any nominal angle.
θ_n	The zenith angle of the vector normal to the surface vector for which glint will be observed, or an angular origin (depending on usage).
θ_N	The angle with respect to nadir that the sea surface slopes to produce a reflection angle to the spacecraft or an angular terminus (depending on usage).
θ_s	Scan angle of sensor or the solar zenith angle (depending on usage).
θ'_s	Scan angle of sensor adjusted for tilt.
θ_t	Tilt angle.
θ_w	In-water measurement angle.
κ	An integration constant: $\kappa = A_d \pi r_1^2 (r_1^2 + r_2^2 + d^2)^{-1}$.
κ'	Self-shading coefficients.
λ	Wavelength of light.
λ'	A channel of nominal wavelength, or the Raman excitation wavelength (depending on usage).
λ_0	Center wavelength.
λ_1	Starting wavelength.
λ_2	Ending wavelength.
λ_i	A wavelength of light at a particular band.
λ_j	A wavelength of light at a particular band.
λ_m	Nominal center wavelength.
λ_n	Any nominal wavelength.
λ_r	Near-IR wavelength.
μ	Mean value, or cosine of the satellite zenith angle (depending on usage).
μ_0	Cosine of the solar zenith angle.
$\overline{\mu}_d(z,\lambda)$	Spectral mean cosine for downwelling radiance at depth z.
$\overline{\mu}_d(0^+,\lambda)$	Spectral mean cosine for downwelling radiance at the sea surface.
μ_s	The reciprocal of the effective optical length to the top of the atmosphere, along the line of sight to the sun.

ν_j	The jth temporal weighting factor.
ξ	A local depth coordinate ranging from -1 at node z_{i-1} to $+1$ at node z_i, or actual deployment distance (depending on usage).
$\xi(\lambda)$	Minimum ship-shadow avoidance distance.
ξ_d	The calculated deployment distance for downwelling irradiance measurements.
ξ_{EM}	The distance between the Earth and the moon.
ξ_L	The calculated deployment distance for upwelling radiance measurements.
ξ_u	The calculated deployment distance for upwelling irradiance measurements.
Π	Depth-integrated primary production.
ρ	The Fresnel reflectivity, the weighted direct plus diffuse reflectance, or the average reflectance of the sea (depending on usage).
$\tilde{\rho}$	The Fresnel reflectance for sun and sky irradiance.
$\rho(\theta)$	Fresnel reflectance for viewing geometry.
$\rho(\theta_0)$	Fresnel reflectance for solar geometry.
$\rho(\lambda)$	The bidirectional reflectance.
$\rho_{c,i}$	Reflectance of clouds and ice.
$\rho_g(\lambda)$	Gray card or plaque reflectance.
ρ_i	The reflectance of the sea of either the first or second aerosol model when $i = 1$ or 2, respectively.
$\rho_i(\lambda)$	The reflectance where i may represent any of the following: m for measured; LU for look-up table; o for light scattered by the atmosphere; sfc for reflection from the sea surface; or w for water-leaving radiance.
ρ_n	Sea surface reflectance for direct irradiance at normal incidence for a flat sea.
ρ_N	Reflectance for diffuse irradiance.
σ	One standard deviation of a set of data values.
σ^2	The mean square surface slope distribution.
$\sigma(\lambda)$	The spectral optical depth.
σ_i^2	$\sigma_i^2 = \langle(\log r - \log r_i)^2\rangle$.
ΣPP	Classification system for primary productivity models based on implicit levels of integration.
σ_t	The density of sea water determined from the *in situ* salinity and temperature, but at atmospheric pressure.
σ_θ	The density of sea water determined from the *in situ* salinity and the potential temperature (θ), but at atmospheric pressure.
$\vec{\tau}$	Vector of measured optical depths.
$\tau(z,\lambda)$	Vertical profile of the spectral optical depth.
$\hat{\tau}(z,\lambda)$	The estimated vertical profile of the spectral optical depth.
τ_a	Aerosol optical thickness.
$\tau_g(\lambda)$	Uniform mixed gas optical thickness.
$\tau_o(\lambda)$	Ozone optical thickness.
τ_{ox}	Oxygen optical thickness at 750 nm.
$\tau_{\mathrm{ox}}(\lambda)$	Optical thickness due to oxygen absorption.
τ_{oz}	The optical thickness of ozone.
τ_r	Rayleigh optical thickness (due to scattering by the standard molecular atmosphere).
τ_r'	Pressure corrected Rayleigh optical thickness.
$\tau_R(\lambda)$	Rayleigh optical thickness.
τ_{r0}	Rayleigh optical thickness at standard atmospheric pressure, P_0.
τ_{ro}	Rayleigh optical thickness weighted by the SeaWiFS spectral response.
$\tau_s(\lambda)$	Spectral solar atmospheric transmission.
τ_{wv}	The absorption optical thickness of water vapor.
$\tau_w v(\lambda)$	Water vapor optical thickness.
ϕ	Azimuth angle of the line-of-sight at a spacecraft.
ϕ_0	Azimuth angle of the direct sunlight.
Φ	Spacecraft azimuth angle or roll (depending on usage).
Φ	A photoadaptive variable which is a chlorophyll-specific quantum yield for absorbed PAR.
$\dot{\Phi}$	Roll rate.
Φ_0	Solar azimuth angle.
Φ_D	The detector solid angle.
Φ_M	The solid angle subtended by the moon at the measuring instrument.
φ	A photoadaptive variable which is a chlorophyll-specific quantum yield for available PAR.
χ	Proportionality constant.
Ψ	The pixel latitude, yaw, or the ratio of depth-integrated primary production to the product of depth-integrated chlorophyll *a* and time-integrated radiant energy $[\mathrm{gC\,(gChl)^{-1}\,Ein^{-1}\,m^{-2}}]$ (depending on usage).
$\dot{\Psi}$	Yaw rate.
Ψ_d	Solar declination latitude.
$\Psi_s(t)$	Subsatellite latitude as a function of time.
ω	Longitude variable, the surface reflection angle, or the single scattering albedo (depending on usage).
ω_0	Old longitude value.
ω_a	Single scattering albedo of the aerosol.
ω_e	Equator crossing longitude.
ω_i	Spatial weighting factor.
ω_s	Longitude variable.
Ω	Solar hour angle, or the amount of ozone in Dobson units (depending on usage).

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13. ABSTRACT *(Maximum 200 words)*

The Sea-viewing Wide Field-of-view Sensor (SeaWiFS) is the follow-on ocean color instrument to the Coastal Zone Color Scanner (CZCS), which ceased operations in 1986, after an eight-year mission. SeaWiFS was launched on 1 August 1997, on the SeaStar satellite, built by Orbital Sciences Corporation (OSC). The SeaWiFS Project at the National Aeronautics and Space Administration (NASA) Goddard Space Flight Center (GSFC), undertook the responsibility of documenting all aspects of this mission, which is critical to the ocean color and marine science communities. This documentation, entitled the *SeaWiFS Technical Report Series*, is in the form of NASA Technical Memorandum Number 104566 and 1998–104566. All reports published are volumes within the series. This particular volume, which is the last of the so-called *Prelaunch Series* serves as a reference, or guidebook, to the previous 42 volumes and consists of 6 sections including: an addenda, an errata, an index to key words and phrases, lists of acronyms and symbols used, and a list of all references cited. The editors have published a cumulative index of this type after every five volumes. Each index covers the reference topics published in all previous editions, that is, each new index includes all of the information contained in the preceeding indexes with the exception of any addenda.

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