

The authors' guiding idea for this web site is to create a web-based, continually growing, community resource that addresses both the education and reference needs of the broad optical oceanography and ocean color remote sensing communities and that will be freely accessible to all. We intend that the presentation eventually will span single particles to ecosystems, and theory to observations to instruments, at user-selectable levels of detail. We modestly hope that this site will become a new paradigm for education.

Philosophy

Why did we choose a web-based book format as opposed to a hardcover book? Because we wish to

- **Make the material freely available to all.** University professors and commercial publishers are increasingly using electronic and on-line text books. However, those on-line resources are often either limited in scope (such as lecture notes on a particular topic or for a particular course) or have unacceptable license restrictions (such as being able to view a given page only a few times or being able to view the book only on one computer). We make our material freely available to everyone under a Creative Commons License.
- **Allow for on-going updates of the material.** As new results (be they observations, theory, techniques, or instrument designs) become available, they can be readily incorporated into the web book, so that the material does not go out of date. New material is being added as time goes on. *We have no intention that the website will ever be complete.*
- **Go beyond static black and white.** A web book can make extensive use of color figures, spreadsheet files, video loops, Java applets, and executable codes that a user can run to illustrate certain concepts or investigate selected problems. The entire web site is searchable using key words so that particular topics can be easily located. There are also extensive embedded links to references, many of which can be downloaded from the web book (copyright restrictions permitting).
- **Allow for community input.** This web book can become a community learning center with other people contributing additional material after the "first edition," as with the open source software world. We (or others as time passes) would then fill the role of editors of material submitted by others for incorporation into the web site.

Levels of Presentation

The web book has three levels of presentation:

- **Level 1: Introductory and Basic Material.** This level presents the basic definitions, concepts, example data, and accepted facts of optical oceanography. The intended audience is people new to the field, and those who want just a summary presentation of the subject matter. The page you are now reading is at Level 1.
- **Level 2: In-depth Examination of the Material of Level 1.** This level goes into the details (at the level of widely used texts such as *Light and Water* and *Light and Photosynthesis in Aquatic Ecosystems*) of the various level 1 topics so as to bring the reader up to the level of current research. The intended audience is people who plan to do research in optical oceanography, and researchers who are expert in one area and desire to learn the details of

another area. For example, the radiative transfer equation is derived in Level 1, and solution methods and related topics are discussed in level 2. This chapter has level 2 pages showing other web resources for optical oceanography. and text books on optical oceanography..

- **Level 3: Ancillary Material.** Level 3 is used to discuss the design, calibration, and data processing for various instruments, or link to websites with such information (e.g., to a particular company’s website for information about their instruments, or to NASA protocol documents). Tabulated numerical data as needed for research or as used to generate some of the figures in Levels 1 and 2 can also be found in Level 3.

All levels contain links to available software and other resources such as NASA’s *SeaBASS* data archive.

We invite others to contribute material to the book to expand our initial offerings.

However, we did not choose a wiki format in which anyone can add or modify material without restriction. This is first because we wish, at least initially, to retain editorial control over the organization of the book and quality of its content. Second, technical details related to how material such as complicated equations must be formatted for good appearance when translated for display in a web browser go beyond the abilities of standard text-based wiki syntax.

Indeed, generating complex material with equations, tables, and figures on a format that can be easily moved to the web site while preserving its appearance on any browser requires that all material be formatted as LaTeX files, which can then be automatically translated into HTML code using the underlying software (currently Concrete5 and MathJax). Concrete5 and MathJax are very powerful and automatically convert LaTeX equations into web pages that properly display math symbols and equations on any browser. There is, however, a bit of a learning curve in this process, even if you are already familiar with LaTeX. If you wish to add material to the web site, let us know and we will provide documentation and examples showing how to prepare your material in LaTeX format for uploading to this website.

The Mechanics of Usage.

The content is ordered by chapters, pages, and files. A chapter discusses a general topic, such as absorption. A page is the amount of material that can be scrolled through on the browser without clicking to go to another page. A page usually presents the details on a specific subject, e.g., black body radiation or absorption by CDOM. Level 3 material is often files, which can be downloaded or opened outside of the current browser window.

When viewing a particular page of the book, a chapter-level table of contents is always seen at the left side of the window. Clicking on a chapter title expands the contents to show all Level 1 pages in the chapter and a Level 2 button, which can be expanded to show all Level 2 pages for that chapter. Clicking again collapses the contents back to the original level.

The information bar at the top of each page contains a search box at the upper right. If you enter a key word or phrase in the box and click on the “go” button, a page (there can be more than one page) appears showing snippets of the text where the phrase occurs along with links to those pages. Clicking on any of these links takes you to the appropriate page. You can also right click on the link and select to open the page in a new browser window or tab, in the customary fashion. The search string is taken exactly as typed. If you enter “volume scattering functions” (without the quotes) the search will find only that exact phrase and will not show occurrences of “volume scattering function” or just ”scattering.” A search on “scattering” would find any of these strings.

If you wish to print a page, just use your browser's print feature. The page will be reformatted for printing and can be viewed via the browser's "print preview" option.

The bottom of each page contains buttons to move to the next or preceding page. There is also an option to "comment on this page." This opens a window where you can enter your name, email address, and comment. Your comment will go to the "principal author" of the page, who is named at the upper right of each page. Each page has a principle author who generated the original material and who is responsible for maintaining the page. That person will act on your comment as needed, e.g., by correcting an error or adding new material and, if appropriate (and with your permission) adding your name as a contributor to the page.

History

The idea for a web book grew out of the 2004 Summer Course in Optical Oceanography and Remote Sensing, which was taught at the University of Maine Darling Marine Center. Funding to develop the website software and initial content was generously provided by the Ocean Biology and Biogeochemistry Program of the National Aeronautics and Space Administration. The first year of that work involved developing sophisticated content-management software (called SiteTurbine, developed by Rainstorm Consulting) that could convert LaTeX files into HTML web pages. LaTeX was (and remains) the standard software for creating documents with complicated mathematics. However, at the start of the work, there was no software to conveniently convert a LaTeX file to HTML. SiteTurbine converted any symbol (such as a Greek letter) or equation into a PNG image, so that the symbol or equation displayed properly on any web browser. The initial content (version 1.0) went online in time for use during the 2007 Summer Course at the University of Maine. Many more pages were added over the next decade.

After a decade of use, SiteTurbine was showing its age. In particular, it did not satisfy modern standards for web security and was no longer supported, and RainStorm Consulting had sold its web development work of this type to Sozo Technologies. The content-management software underlying the web site was therefore completely redone in 2019 and 2020 by Sozo Technologies. The present web book (version 2.0) uses the Concrete5 content-management software and MathJax for conversion of LaTeX files to web pages. Both of these are open-source software and bring the web book up to modern standards.

Acknowledgments

Funding to develop the website software and initial content was generously provided by the Ocean Biology and Biogeochemistry Program of the National Aeronautics and Space Administration. The NASA OBB program has funded subsequent summer courses, which often included support for Curtis Mobley to add new material to the web book. The scientific material itself has of course been developed over many decades with support from NASA, the Office of Naval Research (in particular, the ONR Ocean Optics program, regardless of its exact name at any given time), the National Science Foundation, and other agencies in the US and abroad. This funding went to the web site authors and to the numerous scientists whose work is presented here in one form or another.