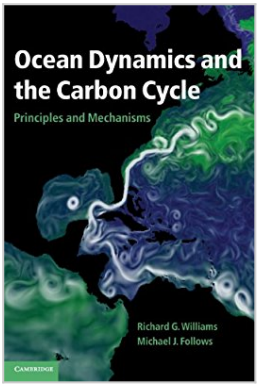

Ocean Dynamics and the Carbon Cycle: Principles and Mechanisms

By Professor Richard G. Williams, Michael J. Follows

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This textbook for advanced undergraduate and graduate students presents a multidisciplinary approach to understanding ocean circulation and how it drives and controls marine biogeochemistry and biological productivity at a global scale. Background chapters on ocean physics, chemistry and biology provide students with the tools to examine the range of large-scale physical and dynamic phenomena that control the ocean carbon cycle and its interaction with the atmosphere. Throughout the text observational data is integrated with basic physical theory to address cutting-edge research questions in ocean biogeochemistry. Simple theoretical models, data plots and schematic illustrations summarise key results and connect the physical theory to real observations. Advanced mathematics is provided in boxes and appendices where it can be drawn on to assist with the worked examples and homework exercises available online. Further reading lists for each chapter and a comprehensive glossary provide students and instructors with a complete learning package.

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Editorial Review

Review
"This is an outstanding book, likely to become a standard text for those needing to know about both ocean physics and biogeochemistry. Its main achievement is to cover both aspects in sufficient depth to provide a genuinely useful treatment of key concept, but at a sufficiently gentle technical and mathematical level to remain accessible to both communities. The excellent sets of problems (and solutions) will help readers to increase their understanding of the topics covered. I can see the book being widely adopted for upper-level undergraduate and graduate courses, as well as being used by more experienced researchers needing to increase their knowledge and understanding of the other discipline." - Professor David Marshall, University of Oxford

"For the last half century the study of ocean science has been fractured along disciplinary lines, but the contemporary challenge of understanding the ocean's role in and response to climate variability has laid bare the weakness of studying aspects of the ocean in isolation. Here, by carefully interweaving the physical, biological and chemical fundamentals needed to understand the ocean's circulation and carbon cycle, Williams and Follows have made the ocean whole again. As such, this text is ideal for students and instructors interested in a modern approach to the study of the oceans." - Professor Susan Lozier, Duke University

"This textbook presents a very thorough yet concise illustration of the current state of our understanding of the ocean's role in the global carbon cycle. It is excellent reading and provides a fresh approach that will be of immense value to future generations of students and new researchers. I congratulate the authors on this very fine work!" - Professor Andreas Oschlies, IFM-GEOMAR, University of Kiel

About the Author
Ric Williams is a Professor of Ocean Sciences at Liverpool University. He has worked on a wide range of research problems in Ocean Sciences: how the ocean circulates, how heat is transported, how the supply of nutrients sustains phytoplankton growth and how carbon is partitioned between the atmosphere and ocean. He teaches two courses to undergraduates, 'Climate, Atmospheres and Oceans' and 'Ocean Dynamics'.

Mick Follows obtained a Ph.D. in Atmospheric Sciences from the University of East Anglia in 1991. After a year as a Royal Society Post-Doctoral Fellow at the Max Planck Institute for Chemistry in Mainz, Germany, he moved to the Massachusetts Institute of Technology where he is now a Senior Research Scientist in the Department for Earth, Atmospheric and Planetary Sciences. His research is focused on understanding the interplay of physical, chemical and biological processes which determines the distributions and fluxes of elements in the ocean.

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