

# Journal of Sedimentary Research

## An International Journal of SEPM

Colin P. North and Kitty L. Milliken, Editors

A.J. (Tom) van Loon, Associate Editor for Book Reviews

Review accepted 22 August 2007

DOI: 10.2110/jsr.2007.BR006



*Marine Geochemistry* (2nd revised, updated and extended edition), edited by Horst D. Schulz & Matthias Zabel, 2006. Springer-Verlag, Tiergartenstrasse 17, D-69121 Heidelberg, Germany. Hardcover, xx + 574 pages, 303 figures (49 in color). Price EUR 89.95; USD 119.00. ISBN 3-540-32143-9.



Since the 1980s, scientific research on the geochemistry of marine sediments has intensified. The geochemistry group at the University of Bremen (Germany) has actively explored the geochemical processes in deep-sea sediments for many years and their studies have provided the backbone for the first edition of *Marine Geochemistry*, which was published in 1999. Since then, a tremendous amount of new data has been collected during numerous expeditions. The results of new methods and techniques have motivated the authors to prepare this second edition. It has strong competitors: the revised edition of Chester's *Marine Geochemistry* (2003), the new textbook *Geochemistry of Marine Sediments* by Burdige (2006) and *The Oceans and Marine Geochemistry* volume of the *Treatise on Geochemistry* (2006). The authors have therefore had to find their own place and audience. Investigation of marine sediments and the (bio)geochemical processes taking place within them is the clear focus of this book.

This volume will provide a high-level reference book in marine geochemistry for post-graduates and post-doctoral researchers in the earth sciences. The editors have assembled an impressive team of authors who have revised, updated and enlarged their chapters from the first edition. The result is a very useful text spanning all aspects of the geochemistry of marine sediments. The book synthesizes the results and ideas that have emerged during the last 20 years, and summarizes the state-of-the-art in this field of research. The text is well-organized, balanced, thoroughly referenced and readable. It offers a systematic discussion of the geochemical processes governing sediment composition based on present-day insights. The book is therefore a valuable contribution to this field and would be a worthy addition to any earth-science library.

The editors consider marine geochemistry to be a part of marine geology, and open the book with two chapters on the composition, development, distribution and classification of marine sediments, their physical properties, and sediment magnetism in a marine-geophysical context. These can be regarded as introductory chapters that provide the basis for understanding early-diagenetic processes in marine sediments. The third chapter focuses on the quantification of early diagenesis and offers a description of methods for collecting marine sediments, extracting sediment pore water, analyzing chemical constituents, and calculating diffusive fluxes and diagenetic-reaction rates. The fourth chapter provides an overview of basic chemical properties of organic matter contained in sediments, which is the driving force of early diagenesis. The fifth chapter reviews the principal role of bacteria in marine biogeochemistry. Chapters 6-8 discuss the agents involved in the oxidation of sedimentary organic matter: oxygen, nitrate, iron, and sulfate. They elucidate the basic reactions that occur during the early diagenesis of marine sediments. I was particularly impressed by the concise review on the formation and destruction of marine carbonates considered as a part of the global carbon cycle (Chapter 9), the comprehensive description of the diagenetic processes controlling manganese distribution in marine sediments

with emphasis on the formation of manganese nodules and crusts (Chapter 11), and metal enrichments in hot vents and cold seeps on the sea-floor (Chapter 13). Chapter 10 discusses the principles of stable-isotope geochemistry of oxygen, carbon, nitrogen, and sulfur as proxies for paleoclimatic and paleoceanographic reconstructions. An interesting description of how regional patterns of sediment metabolism can be inferred from the large database is presented in Chapter 12. A new chapter (14) describes the properties, occurrence and formation of gas hydrates in marine sediments. The final chapter (15) describes conceptual and computer models used to quantify the processes of early diagenesis.

In summary, this book provides a broad coverage of marine-sediment (bio)geochemistry. It is clearly written and well illustrated, with excellent diagrams and graphs. The quality of photographs, figures and layout is high. The price is affordable for students. I have no doubt that it will be useful to any student who wishes to learn about marine geochemistry, and I recommend it to all those entering this field at the M.Sc. level or higher.

Vesselin Dekov  
Dept. of Geology & Paleontology  
University of Sofia  
15 Tzar Osvoboditel Blvd.  
1000 Sofia  
Bulgaria  
e-mail: [dekov@gea.uni-sofia.bg](mailto:dekov@gea.uni-sofia.bg)



SEPM - The Society for Sedimentary Geology