

*Carbonate Reservoirs –
Porosity Evolution and Diagenesis in a Sequence Stratigraphic Framework*

by Clyde H. Moore, 2001. *Developments in Sedimentology*, 55. Elsevier, P.O. Box 211, 1000 AE Amsterdam, The Netherlands / Elsevier Science Inc., P.O. Box 945, Madison Square Station, New York, NY 10160-0757, USA; 460 pages. Hardbound: ISBN: 0-444-50838-4, NLG 350.00, US\$ 172.50; paperback ISBN: 0-444-50850-3, NLG 160.00, US\$ 79.00.

The book calls for a comparison with Moore's 1989 book in the same Elsevier series (*Developments in Sedimentology* 46), and invites the question: 'why again so soon'? Perusal of the book provides an answer. The subject matter has been completely refocused, and shifted from a mere discussion and interpretation of carbonate diagenesis and porosity on its own, to porosity evolution and diagenesis *driven by sequence stratigraphy* as a viable framework for prediction. Introductory chapters on the nature of the carbonate depositional system and concepts of sequence stratigraphy include also a resume of classification of carbonate porosity. The system of Choquette and Pray is contrasted to the classification of Lucia. Thus the two approaches, i.e. exploration-oriented versus production-oriented, are stressed.

The subsequent chapters present a systematic and fully updated discussion of the various diagenetic (sub)environments reflected in carbonates. Shallow- and deep-marine environments in humid and arid climates, in marginal marine and lagoonal settings, but also in isolated carbonate build-ups are systematically reviewed, and special emphasis is given to meteoric environments, both vadose and phreatic, and associated karst processes and products. All this is lavishly illustrated and exemplified with a number of case histories. This all leads up to 'the heart of the matter', the reason for this new book by Moore so soon after the previous one.

A well-designed chapter presents a comprehensive overview of early diagenesis and porosity modification in carbonate reservoirs in a sequence-stratigraphic and climatic framework. This is illustrated with a number of predictive diagenetic/ porosity models. Changes in sea level drive change the chemical composition of pore fluid, which controls early mineralogical stabilisation and porosity evolution. The discussion focuses on rimmed shelves and isolated platforms as well as on ramps, and is exemplified with detailed discussions of some case histories.

The book concludes with a chapter on the burial diagenetic environment. Three settings are contrasted: the passive- and active-margin burial regimes, and the post-tectonic diagenetic regime. Prediction of porosity with depth is the challenging conclusion of this penultimate chapter, that is followed by a discussion of porosity evolution from sediment to reservoir as illustrated by three case histories that clearly show the state of the art.

To be a successful carbonate geologist in the beginning of the 21st century, one needs to integrate results of several geological disciplines, such as seismic geophysical data with sub-seismic geological and petrophysical data, rock petrography, geochemistry and biostratigraphy. A challenge that, if met competently, will without doubt lead to new and fascinating developments in porosity evolution in a sequence-stratigraphic framework.

The book contains 537 references of which some 10 are from 1999 and later, and the majority is from the last 20 years. A comprehensive index is added as well as a CD-ROM with colour versions of all diagrams and illustrations found in the text. Some black and white field photographs in the text are too dark, but the diagrams and tables are well executed and clear.

Coming from AAPG's recipient of the 2001 Distinguished Lecturer Award, the book is useful for exploration/production geologists, and is a welcome comprehensive reference, overviewing carbonate sequences and sediments in a sequence-stratigraphic framework. It could be profitably used in advanced carbonate courses and by graduate level students. The purchase is worth the price.

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