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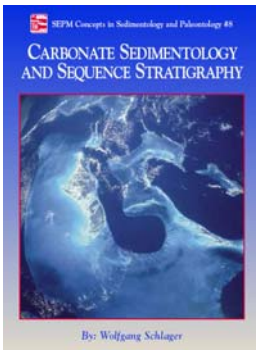
Carbonate Sedimentology and Sequence Stratigraphy, by Wolfgang Schlager, 2005. SEPM, Concepts in Sedimentology and Paleontology 8. Society for Sedimentary Geology (SEPM), 6128 East 38th Street, Suite 308, Tulsa, OK 74135-5814, USA. Hardback, 200 pp., 215 figures. Price US$ 77.00; SEPM members US$ 55.00; Students US$ 38.00. ISBN 1-56576-116-2.



This very welcome book contains four chapters on carbonate sedimentology and three chapters on sequence stratigraphy. They are linked by a chapter on carbonate stratigraphy rhythms and events. Three appendixes, two indexes and some 470 up-to-date references complete the book.

Carbonate sedimentology has been extensively discussed since the 1960s. It is therefore a pleasant surprise to see old concepts meaningfully renewed. Schlager first reviews the position of carbonate sedimentology between neighbouring disciplines like oceanography, mineralogy, chemistry, and ecology, and focuses on circulation systems and characteristics of marine population growth.

Modes of carbonate production include biotically induced/controlled hetero- or autotropic carbonate precipitation. These give rise to three production systems (termed “factory”) that are coded T (tropical water), C (cool water) and M (micritic). Sedimentation/erosion rates and growth potential for these factories are reviewed. A summary of description criteria of carbonate rocks seems somewhat out of place. However, the review of trends in carbonate accumulations in which platform and ramp settings are separated, is very welcome. In such settings, localised or associated carbonate bodies yield reefs, mounds and platform geometries. These are the result of the three “factories”. Carbonate platforms and ramps are separated on the basis of (curvature of) slope, rise and basin floor characteristics; each of the factories T, C and M, have their own characteristic geometries.

Environments are reflected by facies belts that were already introduced by Wilson’s standard system (1975). Schlager, however, comments upon these and places the facies in the context of the factories. The neglected topic “facies belts in epeiric seas” is also addressed, as are stability of - and bias in - facies patterns. Terrestrial exposure facies are newly introduced.

A discussion of rhythms and events in carbonate stratigraphy bridge the gap between carbonate sedimentology and sequence stratigraphy. The latter topic is introduced with a brief review of its fundamentals. Sequence boundaries separate intervals with abrupt changes of sediment input/dispersal. Depositional systems form system tracts. Schlager introduces a “falling-stage” systems tract, referring to a relative fall in sealevel as deduced from sediment geometry or facies patters. He discusses stratigraphic time lines and seismic reflections as well as unconformities in outcrop and in seismic data. Interestingly, he also introduces orders (of magnitude) versus fractals in sequence records and defines standard sequences and parasequences solely by the nature

of their boundaries. Finally, Schlager comments on the origin of sequences. Some of this is somewhat theoretical and reflection of the logical thought process of the author could have benefited from a looser style of writing and language.

In chapter 7, the theories of the two preceding chapters are fleshed out in a lengthy discussion of sequence stratigraphy of the T-factory. Key attributes such as sequence anatomy in shoals waters in the well-studied Bahama platform and Florida environments are analysed and to some extent compared with ancient system tracts. Rules of thumb are presented to recognise system tracts and facies. A similar approach is followed for deeper water settings, from which settings the development of megabreccias is commented upon. Bounding surfaces include three types of sequence boundaries, transgressive and maximum flooding surfaces.

Schlager focuses on pseudo-unconformities and presents seismic examples. This lengthy chapter is concluded with two Neogene case stories in carbonate sequence stratigraphy from the north-western Bahamas and from the Upper Miocene of Mallorca. The considerably shorter chapter 8 treats the C and the M factories in a comparable manner as the T factory.

Schlager concludes with a chapter in which past developments in carbonate sedimentology are reviewed, and he outlines the need to devote more research to geometric and time scaling of sequences and system tracts. Scaling laws in sedimentology and stratigraphy are presented as a challenge and an opportunity. They could lead to important new insights into the quantitative prediction of sediment bodies, they might reveal fundamental principles governing sedimentation, erosion and formation of the stratigraphic record, and they may give rise to discussions on laws governing life processes.

In summary: this 200-page new book is packed with fresh insights, new approaches and vigorous arguments that revive many aspects of a discipline that has undergone rapid progress during the last four decades but has still a long way to go. Wholeheartedly recommended to geologists involved in research and in practical (oil geological) work, and to graduate students who want to proceed with new approaches and insights.

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