

# ***SEPM Concepts in Sedimentology and Paleontology # 7 Siliciclastic Sequence Stratigraphy - Concepts and Applications***

by **Henry W. Posamentier** and **George P. Allen**, 1999, published by the Society of Economic Petrologists and Paleontologists, ISBN 1-56576-070-0, 216 pages, hardbound. Member price \$48.00. List price \$67.00.

## **Review by Christopher G. Kendall**

The intention of the authors of this book was to provide an in-depth understanding and unambiguous description of sequence stratigraphy as it pertains to siliciclastic depositional systems. The text uses in numerous beautifully colored and well-drawn diagrams and ties these to examples of both ancient and modern depositional settings. Though this book is probably targeted at an audience of specialists and mature students who have an interest in sequence stratigraphy, it should also appeal to earth scientists who is unfamiliar with the basic premises behind sequence stratigraphy and need a text that takes time to explain most of these in considerable detail.

The book is divided into six chapters and a preface. The first chapter provides an overview that gives a general introduction that sets the stage for the rest of book. The authors revisit sequence stratigraphy from its origins to its current usage. They provide numerous definitions for terms often used by sequence stratigraphers including basic ones like: flooding surface, drowning surface, transgressive surface, versus maximum flooding surface; and unconformities and sequence boundaries. The authors advise their readers to take a flexible approach to the use of sequence stratigraphy terminology, recognizing that sequence stratigraphy is a tool which not only enables one to examine and interpret depositional sequences but also is also a mechanism that provides a framework to which practical hydrocarbon reservoir and exploration models of sedimentary facies can be tied. The authors emphasize that sequence stratigraphy links lithostratigraphy to chrono-stratigraphy.

The second chapter deals with the fundamental concepts of sequence stratigraphy. It considers accommodation; the difference between fluvial, coastal, and slope settings; the role of sediment supply; the effects of basin physiography; and the differences normal and forced regressions on sediment geometries. It then considers how sequences are defined and their relationship to tectonic accommodation versus that produced by changes in eustatic sea level. It describes the difference between type 1 and type 2 unconformities and how these can be produced during the sea same sea level events and owe their different character to the local rates of tectonic movement for that depositional environment. It describes in considerable detail the difference between lowstand, transgressive and high stand system tracts. It considers the effects of the early lowstand phase versus the late lowstand phase, referencing 'falling stage system tracts' and 'forced regressive wedge system tracts', taking the position that early and late are more appropriate terms since they refer to time rather than a mechanism. They discuss cycles versus sequences, sequences versus parasequences, position and the timing of the sequence boundary, and sequence hierarchies.

Chapter 3 deals with attributes of key surfaces focusing on the identification of sequence boundaries, maximum flooding surfaces, and transgressive surfaces in alluvial and marine settings, particularly the coastal and shelf environment. This chapter focuses on the important ambiguities related to identifying the erosion associated with fluvial channel development at late low stand, late high stand, and the falling base level associated with the sequence boundary.

Chapter 4 concerns sedimentary facies and the log expression of the different system tracts. As in the other chapters of the book this chapter is illustrated with beautiful examples from log cross-sections and seismic, showing the effects produced by differences in the balance between sediment flux and rate of change of accommodation, or base level particularly in fluvial, estuarine and deltaic settings, and within low stand system tracts, transgressive systems tracts and high stand systems tracts.

Chapter 5 deals with practical methodology of how the interpretation of well logs seismic, outcrop and seismic are used to make sequence stratigraphic interpretations. Chapter 6 deals with misconceptions confusion and pitfalls in the application of sequence stratigraphy reiterating and re-emphasizing many of the same points made earlier in the book. Chapter 7 provides a concluding statement.

This book will be a valuable addition to the library of any geologists who has an interest in sequence stratigraphy. It is not an easy book to read because the information is so detailed and the authors have been concerned to provide an unambiguous definition of the terminology that they use. I also found it difficult to keep referring back to their detailed diagrams while also reading the text related to these, since the text often came much later in than their associated diagrams. I'm not sure how the authors or the publishers of the text could have handled the location of these diagrams any differently, but it was annoying when reading detailed and complex information, to have to page back and forth between the diagrams and the text.

This is not the kind the book that you can page through quickly and understand the information the authors are trying to convey. However reading the text carefully one finds a wealth of tightly written information on the topic of siliciclastics and sequence stratigraphy which I would guess the average reader would find heavy going, but well worth the read if you really want to understand the principles behind this system for dealing with stratigraphic data. The problem is that the authors are dealing with an extremely complex topic that combines three dimensions and time, forcing the reader to think about these three-dimensional relationships and the effects of time. I enjoyed this book and think the authors and SEPM should be congratulated on a very fine product.