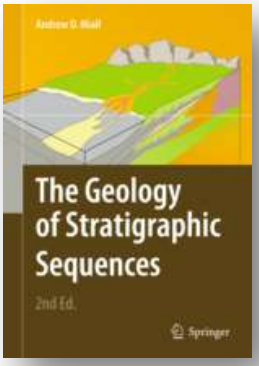

The geology of stratigraphic sequences (2nd ed.), by Andrew D. Miall, 2010. Springer, New York, Heidelberg. Hardcover, 522 pp. Price EUR 79.95. ISBN 978-3-642-05026-8.

The considerably expanded and updated second edition of this book is subdivided into four parts: "Emergence of modern concepts", "Stratigraphic framework", "Mechanisms and chronostratigraphy" and "Correlation". These four parts contain 15 chapters altogether.

The first part reviews the study of stratigraphy in the 20th century, either in an empirical, inductive or in a theoretical, deductive way. Sequence models are the required framework for ideas on the architecture of sedimentary sequences. They require accurate definitions, terminology and explanations.

Part 2 provides the reader with five types of sequences that emanate from research on origins and driving mechanisms. Miall returns here to his favorite theme, first presented in 1995, that the original hierarchical sequence order proposed by Vail et al. cannot be supported because orders overlap in time and reflect different, incompatible driving mechanisms. He supports this view with numerous case studies, ranging in scale from 10,000 years to a hundred million years, driven by climatic cycles and tectonic mechanisms, respectively. In addition, he believes that only cycles lasting less than 1 million years are mathematically periodic, whereas different mechanism drive episodic cycles with a longer duration that overlap in time..

The focus in Part 3 is on eustatic sea-level changes and the controversies that already arose early after publication of Vail's original model of global eustacy. Results from research include: (1) an improved understanding of surface elevation due to earth/mantle processes, (2) the 100 Ma "Sloss sequences" that express regional tectonics, (3) the 1-10 Ma regional to local sedimentation cycles that are driven by regional tectonics, as shown in several detailed regional mapping and correlation projects (of which the recently completed Southern Permian Basin Atlas is one), and (4) orbital forcing, which is increasingly supported by focused stable-isotope records, and which is now better understood through many high-frequency sequence stratigraphic studies of Cretaceous/Early Cenozoic rocks.

Part 4 deals with the differences in views between Miall and the Vail/Exxon "school of sequence stratigraphy". According to Miall, the Vail "global-eustacy paradigm" is a "revolution in trouble" as recognition of global eustacy, as expressed in global cycle charts, is possible only if based on global chronostratigraphic correlations. Except in some specific cases, however, such correlations are not available. In contrast, standard correlation methods have been dramatically improved by multiple correlation criteria used by international working groups on specific intervals. Several have been published by Gradstein et al. and are continuously updated on the website of the International Commission on Stratigraphy (www.stratigraphy.org). Many reviewed areal studies, on concepts and on methods, have not yet unequivocally tested the global-eustacy paradigm prior to the Neogene. Meticulous and detailed stratigraphic research should continue to test this paradigm, as well as cyclostratigraphy and other new paradigms.

For the last three decades, sequence stratigraphy has been a leading theme in sedimentological literature. However, by looking upon sequences within the broader context of geological processes, and by critically evaluating the central question of "why do sequences form?", more information can be extracted from their records in particular basins or regions. This book successfully emphasizes such critical review and is therefore an

important update from the first edition. The original Vail model, although convincing to many as a powerful guide to interpretation, is presented as dealing with practical, theoretical and methodological issues. Miall modifies the steps initially recommended by Vail to investigate the history of a regional basin by fully taking into consideration the uncertainty of the global-eustacy paradigm and the ensuing chronostratigraphic nature of the surfaces of sequence boundaries. He also points to possible future advances in cyclostratigraphy, in the analysis of tectonic mechanisms and in the understanding of orbital forcing as reflected in sequences of different magnitudes. He strongly advocates that sequence-stratigraphic approaches be standardized.

Taken all together, the book is a most welcome update and overview of the rapidly developing field of sequence stratigraphy. All students and professional geologists working in basin analysis will certainly like to have it available in their private libraries. Considering the relatively low price, I can therefore wholeheartedly recommend it.

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