

***Marine Authigenesis: From Global to Microbial*, edited by C.R. Glenn, L. Prévôt-Lucas & J. Lucas, 2000. SEPM Special Publication 66. SEPM, 1741 E 71st Street, Tulsa OK 74136-5108, USA; 536 pp. Hardbound, US\$ 150.00 (SEPM members), US\$ 211.00 (non-members). ISBN 1-56576-064-6.**

Many aspects of marine authigenesis, such as the origin of phosphorites, dolomite cements and verdine facies are, despite the enormous volume of papers available in the literature, still poorly understood. This volume edited by Glenn *et al.* intends to provide a wide diversity of viewpoints, hypotheses and mechanisms, operating from “global to microbial” scales, to elucidate some of these aspects. It is, in this sense, a holistic approach on marine authigenesis. The title of the volume is, however, somewhat misleading, as almost 2/3 of the book is devoted to phosphate authigenesis and associated facies.

The volume consists of 33 papers (18 review papers and 15 case studies), which are grouped into five sections. The volume is arranged in a way that the reader does not necessarily need to start with the first and to finish with the last section.

Section I (Global Models and Experimental Studies of Authigenic Mineral Genesis and Cycling Through Time) emphasizes large-scale tectonic processes (e.g., mid-ocean ridges activity, subduction rates) and their effects (e.g., first- and second-order sea-level changes, ‘icehouse’ and ‘greenhouse’ periods, changes in weathering rates, composition of the atmosphere and seawater) on the formation and spatial and temporal distribution of marine authigenic minerals (dolomite, phosphorites). The reader will find: (i) two papers using different lines of evidence, the coupled changes in the composition of atmosphere and seawater and the presence of microbial benthic communities, to present new models for dolomite formation in sediments (Arvidson *et al.* and Wright), (ii) six papers discussing the possible origin and cycling of authigenic phosphate from tectonic, geochemical and biological viewpoints (Compton *et al.*, Guidry *et al.*, Colman and Holland, Subramanian, Rasmussen, Shields *et al.*), (iii) two papers deciphering the geochemical and stratigraphic significance of phosphorite-limestone and phosphorite-ooidal ironstones occurrences (Lucas and Prévôt-Lucas, Van Houten), (iv) one paper on hydrothermal biomineralization as present-day analogs for Banded Iron Formations (Konhauser), and (v) a paper on controls on massive, bedded barite formation in the geological record (Jewell).

Papers in Sections II and III are linked according to the authigenic minerals they deal with. Section II (Phosphorites, Glauconites and Associated Facies on the Modern Seafloor) contains mainly case studies, as follows: (i) four papers constraining the origin and evolution of phosphorites using mineralogical, geochemical and isotope evidence from occurrences in the Peru margin (Burnett *et al.*), Namibian shelf (Baturin), west Florida slope (Fountain and McClellan), and continental margin of India (Nath *et al.*), and (ii) one paper on the spatial distribution of verdine and glaucony facies as a function of iron influx to the basin, paleogeography and subsidence history in the western continental margin of India (Thamban and Rao). Section III (Seamount Phosphorites and Fe-Mn Deposits) explores various aspects of the diagenesis of phosphorites and Fe-Mn deposits. It contains four papers, in which (i) one explores factors controlling formation and diagenetic evolution of seamount phosphorites (Benninger and Hein), (ii) one presents an experimental work on the diagenesis of Fe-Mn crusts (Bertram and Cowen) and (iii) two others deal with rare earth elements (De Carlo *et al.*) and platinum group elements (VonderHaar *et al.*) distribution in Fe-Mn crusts.

Papers in Section IV (Stratigraphic, Sequence Stratigraphic and Chronostratigraphic Studies of Marine Authigenesis) aims mainly to unravel the distribution of authigenic minerals in a sequence stratigraphic framework and/or sea-level change cycles. Emphasis is made on the relationship between condensed intervals and the occurrence of marine authigenic minerals. It contains: (i) one paper that constrains the sequence stratigraphic distribution of authigenic berthierine and carbonates (siderite and dolomite) in shallow-marine environments (Taylor and Macquaker), (ii) three papers dealing with the spatial and temporal distribution of phosphorites (Grimm; Hendrix and Byers; and Riggs *et al.*), and (iii) two papers dealing with the spatial distribution of verdine facies and glaucony in shelf environments (by Kronen and Glenn, and by Amorosi and Centineo, respectively).

The last section (Section V - Origin of Phosphorites, Glauconites and Associated Facies Through Time) is entirely devoted to case studies. It contains: (i) one paper dealing with the origin and significance of carbonate micrite in phosphorite deposits of Israel (Soudry), (ii) one paper showing the role of organic matter diagenesis in the formation of black shales or phosphorites in Morocco (Benalioulhaj *et al.*), (iii) one paper constraining the role of depositional environment, diagenetic and biological processes on the rare earth element behavior in phosphates and organic-rich shales in Mid-continent North America (Cruse *et al.*), (iv) one paper on depositional environment and early diagenetic conditions controlling deposition of phosphates in California, U.S.A. (Fonseca), (v) one paper showing examples from the Cambrian of China, Pliocene of Mexico, and present-day of French-Polynesia atolls, to constrain environmental and early diagenetic conditions favorable for phosphogenesis in shallow marine deposits (Schwennicke *et al.*), and (vi) one last paper demonstrating the role of bacterial activity in mediating the precipitation of authigenic francolite, goethite, hematite, barite, pyrite, glaucony, in association with stromatolites (Martín-Algarra and Sánchez-Navas).

At the end of the volume, the reader will find a 10-page index that provides easy access to the key topics. However, terms like 'phosphorus', 'particles', and 'sediment' are unnecessarily included in the index. One aspect that certainly surprises and somehow disappoints the reader is the fact that marine authigenic minerals such as calcite, dolomite and chert receive much less attention they deserve. Topics that are recently growing in importance in the literature and could be better explored in the volume include: (i) the distribution of marine carbonate cements in a sequence-stratigraphic framework, and (ii) the role of detrital composition of sediments on marine authigenesis. Despite these shortcomings, one can say that the volume edited by Glenn *et al.* is an ambitious initiative and an excellent, not to say indispensable, book for researchers and students dealing with the diagenesis of marine sediments and sedimentary rocks.

J. Marcelo Ketzer
Department of Earth Sciences
Uppsala University
Villavägen 16
SE 752 73 - Uppsala
Sweden