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Book Reviews / Critique

Book Reviews

Satellite Images of Carbonate Depositional Settings

By P.M. Harris and W.S. Kowalik
American Association of Petroleum Geologists
Methods in Exploration Series No. 11
147 p.
US$65.00 (AAPG member price)
US$99.00 (non-member price)

Reviewed by Noel P. James
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This is a soft-cover, ring-bound volume of colour satellite images with a set of 16 stereo slides and three field overlays in a back pocket. The book is an outgrowth of the authors' attempt at Chevron Oil Company to provide petroleum geologists with analog examples for their work in exploration and production.

The book is divided into two parts. The first is a 28-page introduction to the acquisition, processing and interpretation of satellite images. This is enormously useful and clear, and written from a geological perspective. It outlines the types of satellites and how they aquire information, describes how the images are processed, and illustrates it all with an example from the Caicos Bank and then variations using other areas.

Part 2 is a set of mostly colour images from modern carbonate depositional environments in South Florida, the Bahamas, Caicos Bank, Yucatan, Belize, Northern Great Barrier Reef, Shark Bay, Abu Dhabi and one famous ancient example, the Permian Reef Complex of the Guadalupe Mountains, west Texas. The images of each area are preceded by a 1-2 page concise overview of the area and its important attributes, and includes a set of selected references. Most areas have five or six images except the Bahamas, which has 19. Some of these photographs are truly arresting and for anyone interested in carbonate depositional systems, it is a humbling exercise to see the small- and large-scale variability in what are often familiar settings. The colors themselves are enough to make you want to pack your bags and go immediately. In most cases the images are organized from the large scale to the small scale, with the most magnified illustrating areas about 10 km x 10 km. The distant views are superb; the "subscenes" sometimes lack desired crispness, while spot views of the same enlarged areas are generally excellent.

An enormously useful part of this book is the set of several transparent oil field overlays where the reader can place the outline of a well-known field on top of the satellite image and so get a geological-scale impression of the modern environment.

Who is best served by this book? It is not needed on the shelf of every academic — a library copy will do — but it should be on the shelf of every practising petroleum geologist who deals with carbonate plays. It is from these images that the concepts of heterogeneous reservoirs can be illustrated to reservoir engineers. As the focus shifts from exploration to production in North America, the notion of reservoir anisotropy is nowhere better illustrated than in this book.

Stochastic Modelling and Geostatistics: Priciples, Methods, and Case Studies

Edited by Jeffrey M. Yarus
and Richard L. Chambers
American Association of Petroleum Geologists
Computer Applications in Geology
No.3, 1995, 379 p.
US$99.00 (AAPG member price)
US$149.00 (non-member price)

Reviewed by Gerard V. Middleton
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Geostatistics does not generally mean the geological equivalent of biostatistics, *i.e.*, the application of statistical methods to geology. Most authors use the term to refer to a particular approach to spatial statistics, pioneered as a practical method for predicting ore grades in South Africa, and given a strong mathematical basis in France by G. Matheron. In North America, it has been expounded largely, but not exclusively, by the Stanford school, which includes (or included) R. Mohan Srivastava and André G. Journel, both of whom have written introductory articles for this book.

Stochastic models are mathematical models that incorporate one or more random variables as part of the model equations. This means that the model returns a different answer each time it is run. In his article, Srivastava records an exchange between an industry sedimentologist and an academic geostatistician, which illustrates disciplinary biases (no doubt fast disappearing) towards such models:

> Sedimentologist: Of what earthly value to me is any procedure that involves a random number generator when I know that the geologic processes I study are not, in fact, random but merely quite complicated?!
>
> Academic: Any suitably complicated process can be simulated by probabilistic methods — even your sacred geology!

These days I expect there are few sedimentologists who would not admit that deterministic models have their limitations. For example, one can now make rather sophisticated hydraulic models of sediment transport by meandering rivers, but real meandering rivers display irregularities of depositional environment and sediment distribution not found in such models because they do not take into account the full complexity of natural history and processes. The volume under review is concerned with the production of models that come closer to predicting the variability of natural reservoirs than is possible using deterministic models, particularly when one bears in mind the very limited amount of geological information that is generally available to the modeler. Such models are required by engineers who are given the unenviable task of predicting how a particular reservoir may behave when it produces oil or gas.

R.M. Srivastava gives a readable overview of such stochastic methods, and A.G. Journel explains, rather too briefly, the role of geostatistics in interpolating from known well data to other regions of interest. Ricardo Olea is the first author in the volume to get down to basics, and describe in some detail how geostatistics actually works, by describing how to calculate a semivarigram and fit a model to well data. Next, Y. Anguy *et al.* give an interesting discussion of the problems raised by the extreme variability in scale and place of permeability. This is, of course, the main property of reservoirs of interest to production engineers. For sandstone reservoirs, these authors argue that the main problem arises from spatial variation in grain packing. Loosely packed domains, which may be inadequately sampled for measurement, can account for as much as 80 % of the flow. John Doveton illustrates the use of Markov analysis to model vertical variability, and John Mansoori discusses the "upscaling" problem: outcrops, core and well logs mainly provide information about small-scale local variability in permeability; what is the right way to extrapolate this to the much larger scales of interest to reservoir engineers?

Most of the rest of the book consists of case studies illustrating some of the themes explored briefly by the introductory papers. This is the part of the book that will be of special interest to practitioners. In addition, Thomas Hewitt, and M. Kelbar and S. Shibli introduce the use of fractals for characterizing fractures and reservoir properties, a technique not discussed by most of the other authors, but much used for simulation in other applications. The book ends with a very useful section describing and comparing five public domain geostatistical software pacakages.

Most geologists who have any knowledge at all of geostatistics are probably familiar with the use of kriging techniques to interpolate grid estimates for contouring, or for ore grade estimation. This AAPG volume, although not cheap, gives a good introduction for those who would like to learn how to go beyond interpolation to stochastic modelling.

The Geology of Earthquakes

By Robert S. Yeats, Kerry Sieh and Clarence R. Allen
Oxford University Press
New York, Oxford
1997, 568 pages, US$65.00

Reviewed by John Adams
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Earthquakes are one of the more damaging natural phenomena, and at present can not be predicted. Thus, most of the effort of the past 60 years (since 1935 Long Beach earthquake in California) has gone into a two-pronged approach of mitigating the damage by designing more robust buildings, and quantifying how often strong earthquake shaking will happen through improved understanding of the earthquakes themselves. Our understanding of the seismology of earthquakes has improved markedly from early written descriptions of earthquake effects through to detailed analysis of their digital seismograms. In parallel, the geology of earthquakes has evolved from descriptions of historical ruptures into a geological understanding of "active fault" processes (a major part of neotectonics). Recent developments in paleoseismology, the study of earthquakes in the geological record (often, but not exclusively, prehistoric earthquakes), have added greatly to answering questions like "how often will shaking recur?". Finally, the geodesy of earthquakes is increasingly aiding understanding of the earthquake-cycle through its inter-, co- and post-seismic movements, and may ultimately lead to successful earthquake forecasts.

The authors suggest that their textbook is the first attempt to survey all aspects of the geological investigation of earthquakes. The book is organized into seven background chapters which introduce rock deformation, seismic waves, tectonic geodesy, Quaternary dating, and tectonic geomorphology, and five chapters on earthquake geology organized by the style of faulting — strike-slip, normal, reverse, and subduction zone deformation — and earthquake effects. A final chapter on seismic hazards shows how the knowledge obtained can be applied to reduce risk.

The Geology of Earthquakes includes an extensive 50-page bibliography (commendably up-to-date; a third of the references are from the 1990s), an appendix cataloguing the surface ruptures of historical earthquakes which acts as a quick guide to the regional literature, a 14-page glossary (which could have been set in a smaller font), and a comprehensive index. Each chapter is accompanied by suggestions for further reading. Seven vignettes put into context the historical contributions of key international scientists to the geology of earthquakes.

The authors have tried to include many non-North American examples, and have succeeded well in my estimation (however California still takes one-and-a-half pages (!) in the 18-page index). Canada comes off rather poorly, reflecting a paucity of relevant research here. Two errors of interest to Canadians are the continued attribution of the 1929 Grand Banks earthquake to a submarine landslide and the supposed

earthquake-triggering of the Hope Slide (the submarine/ landslide was triggered by a magnitude 7.2 strike-slip earthquake, and the "earthquakes" at the time of the Hope slide appear to have been the seismic signature of the landslide(s) themselves).

The text is readable and is complemented by a large number of photographs and figures (most taken or adapted from scientific papers) that will encourage readers to delve into the original papers cited. The layout is attractive, with a two-column format that allowed great flexibility in displaying figures and placing them near the relevant text (this failed in a few places, *e.g.*, p. 283-284, and p. 275-280). From their preface, the authors aimed for a book suitable for teaching a graduate course but accessible to a general readership of geologists, engineers and planners. I suspect that even undergraduate geology students will be entranced, not intimidated, by this book. It fills an empty niche, does so extremely well, and will remain close at hand on my bookshelf.

Hydrocarbon Habitat in Rift Basins

Edited by J. J. Lambiase
Geological Society of London
Special Publication No. 80
1995, 381 p.
US$65.00 (AAPG member price)
US$108.00 (non-member price)

Reviewed by Anthony P. Hamblin
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Research, exploration and understanding of the structural controls, sedimentary successions, and resource potential of rift basins have progressed rapidly over the past 15 years. This was spurred initially by the recognition of lacustrine mudstone as a common, excellent hydrocarbon source rock, and that the half-graben structural unit is the fundamental building block of all rifts. The realization that rifts contain 5% of the world's sedimentary volume, but 10-20% of the world's hydrocarbon resource (to say nothing of sediment-hosted metallic and industrial minerals) fuelled an unprecedented international effort to understand these closed and confined basins. *Hydrocarbon Habitat in Rift Basins*, an outgrowth of a 1993 conference sponsored by the Petroleum Group of the Geological Society, is the latest in a string of volumes of collected papers concentrating on various aspects of these basins. Sixteen contributions from some of the most active researchers in the field (representing industry, government and academia) present a broad spectrum of topics, from theoretical models to case studies, from outcrop to subsurface studies, from many geographic locations and geologic ages.

The book is astutely organized into four broad sections which reflect the main themes of research influencing our understanding of hydrocarbon potential: trapping mechanisms, reservoir rocks, source rocks, and productive analogues. Each of the first three sections is introduced by a keynote summary of knowledge-to-date by recognized experts in that aspect of rift research, followed by several local studies which illustrate the principles. The fourth section presents four case studies of Asian and African rifts with hydrocarbon production or potential.

The first section, concerning the tectonic setting and structural evolution of rifts, is introduced with a very detailed and well-illustrated summary by C.K. Morley. This is followed by an observational-based treatise on the methodology, parameters and results of forward and reverse modelling by N. Kuszinir, A. Roberts and C.K. Morley. Three papers discussing specific examples are also included, with an outcrop/drillhole/seismic integration of the southern Gulf of Suez by W.A. Bosworth being particularly noteworthy.

The second section, concerning the stratigraphic development and sedimentologic characterization of reservoir facies, is introduced with a comprehensive ("required reading") summary of the structural controls on sedimentation in rifts by J.J. Lambiase and W. Bosworth, two of the most active researchers over the last decade. This is followed by example studies of the stratigraphic response to structural geome-tries of regional and local succession architecture, and reservoir development, in coastal and deeper lacustrine settings. Included is a fine summary of Canada's own Jeanne d'Arc basin (offshore Newfoundland) based on seismic, well and core data, by N.W. Driscoll and J.R. Hogg.

The third section of the book is devoted to the characterization of lacustrine and marine hydrocarbon source rocks in rifts. It is introduced by an exhaustive summary by B.J. Katz of the distribution, deposition, attributes and quality of organic-rich deposits and their relation to the structural and stratigraphic evolution of these basins. A second paper, by H.H. Williams, M. Fowler and R.T. Eubank, describes in encyclopaedic detail the geochemical characteristics of lacustrine algal-rich source rocks in several important rift basins of China, Thailand and Indonesia.

Section Four collects four case studies to be compared and contrasted. There are two studies of non-productive, but highly prospective, Permian to Jurassic rift basins of East Africa, by N.L. Banks, K.A. Bardwell and S. Musiwa, and by T. Kreuser. These are followed by two extensive and well-illustrated papers detailing several of the phenomenally oil-rich Mesozoic rifts of China (by Li Desheng) and Tertiary rifts of Sumatra (by H.H. Williams and R.T. Eubank). These tantalizing examples should prompt us to reflect on the meagre, but expanding, knowledge base of the resource potential of our own Canadian rift basins.

Overall, I find this book to be a fund of information, primarily because of the editorial decisions to organize the volume into themes and include keynote summary papers by world experts to lead off each section. This pays dividends in the multidisciplinary study of petroleum geology. Text, illustrations and editing are of uniformly high quality, as we have come to expect from the Geological Society Special Publications. I recommend this volume as an exceptionally fine reference for anyone interested in the geology of rifts and/or frontier petroleum exploration.

Paleogeography, Paleoclimate, and Source Rocks

Edited by Alain-Yves Huc
American Association of Petroleum Geologists
Studies in Geology No.40
1995, 347 p., softcover
US$89 (AAPG member price)
US$134 (non-member price)

Reviewed by John Bloch
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The adage "never judge a book by its cover" is certainly appropriate in the case of *Paleogeography, Paleoclimate, and Source Rocks,* the latest in the AAPG Studies in Geology series (#40) edited by Alain-Yves Huc. Behind a garish softbound cover more fitting for airport kiosk paperback racks is a fine collection of papers that discusses the mechanisms of formation and present case studies of some of the world's best studied source rocks. Source-rock researchers, explorationists, basin-modelers as well as teachers and students should familiarize themselves with the contents of this volume.

Understanding the genesis and evolution of fine-grained sediments is essential in developing comprehensive basin models that enhance exploration efforts and reduce exploration and production risk. As suggested by the editor, the rationale for this volume is to develop an integrated, multidisciplinary approach to understanding petroleum systems and basin evolution. In the last decade, abundant data that quantitatively characterize fine-grained sediments with respect to organic matter content and distribution has been generated, and is now being used to calibrate and constrain modeling efforts, particularly general circulation models (GCM). This volume offers a number of excellent examples of how GCM modeling efforts can be "ground truthed" with careful and comprehensive geological observations. The integrated results provide snapshots of the Earth's past climate and geography.

Paleogeography, Paleoclimate, and Source Rocks comprises 13 chapters loosely organized into two sections. Chapters 1-4 discuss environmental and mechanistic aspects of source rock deposition. These topics, in chapter sequence, include productivity versus preservation (J.T. Parrish), paleooceanography (W.W. Hay), lacustrine source-rock development, (B.J. Katz) and the organic geochemistry of depositional environments dominated by terrestrial organic matter (G.H. Isaksen). Together, these chapters provide an overview of the factors that are thought to control most source-rock deposition.

Subsequent chapters evaluate empirical data and modeling results to determine controls on source-rock deposition. Chapters five through eleven are organized by age beginning with Devonian source rocks (Ormiston and Oglesby) and finishing with Cretaceous and Tertiary source-rocks of Brazil (Mello et al.). The nature and distribution of Late Paleozoic carbonate sedimentation (Chapter 6, Walker *et al.*) and Kimmeridgian (Chapter 7, Moore *et al.*), Neocomian–Barremian (Chapter 8, Moore *et al.*) and Cenomanian–Turonian (Chapters 9, F. Baudin; and 10, Kuhnt and Wiedmann) source-rocks are discussed in detail. Chapter 12 (Bessereau *et al.*) is a sequence-stratigraphic study of the Lias of the Paris Basin and Chapter 13 (van Buchem *et al.*) discusses the influence of orbital climatic cycles on Mesozoic source-rock distribution in the United Kingdom and western North Atlantic.

Particularly appealing components of this volume are paleo-environmental maps of Tethys compiled by Francois Baudin (Chapter 8) that reflect a new understanding of the effects of tectonics and paleogeography on sediment and source-rock distribution. North American source-rock enthusiasts will appreciate the large amount of information from Europe, Africa, South America and the Atlantic that this volume contains. The illustrations and line drawings are of high quality and this reviewer found very few typographic errors. There are more than 1200 references on all aspects of source rocks.

On the down side, the computer-generated colour illustrations of modeling results are of very poor quality and the legends are unreadable. In addition, characteristic of this AAPG series, the binding quality is poor and loose pages will proliferate with frequent use.

Paleogeography, Paleoclimate, and Source Rocks is a current, comprehensive compilation that well-illustrates the advancements of modeling efforts and our understanding of source-rock quality and distribution. Despite the cost, his book should be in the hands of all earth scientists interested in fine-grained sediments.

Holocene Cycles: Climate, Sea Levels and Sedimentation, A Jubilee Volume in Celebration of the 80th Birthday of Rhodes Fairbridge

Edited by Charles W. Finkl, Jr.
Journal of Coastal Research
An International Forum for the Littoral Sciences
Special Issue No. 17, 1995, 402 p.
published by The Coastal Education and Research Foundation (CERF)
US$60.00

Reviewed by Dale Leckie
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This book is a jubilee volume in celebration of the 80th birthday of Rhodes W. Fairbridge, addressing many of the original Fairbridge concepts of eustasy and related topics. The premise behind the volume is that the Holocene Epoch is considered as the critical element linking the present and the past. The volume is an eclectic collection of broad and diverse papers. Topics range from short global syntheses of the role of sea-level change influencing basin margin sequences (A.G. Warne and D.J. Stanley) to more localized topics such as Holocene Archeological Occupation Cycles in Southern France (P.G. Salvadore and J.P. Bravard). I cannot review all the titles in the volume, but other examples include Holocene Sea-level Changes in the South and West Pacific (P.D. Nunn); A Combined Lunisolar Tidal-current Forcing Function, Enhanced Calving of Coastal Icebergs, and the Sinking of the Titanic (F.J. Wood); Holocene Fluvial Cycles in the Rhine Delta (H.J.A. Berend-

sen); and Twenty Cyclic Pulses of Drought and Humidity During the Holocene (R.R. Paepe, M.E. Hadzoitis, and E.S. Van Overloop).

The book is a 402-page collection of 49 chapters (short papers) arranged into four themes: 1) Climate, proxies and chronology; 2) Holocene and Late Pleistocene Eustasy and Climate; 3) Sea-level, Neotectonics and Tectono-eustasy; and 4) Solar, Luni-solar, and Planetary Cycles. Chapter 1 summarizes the contents of the volume where we see Charles Finkl, Jr. use descriptors such as "planetary fate," "exogenetic," "dynamic randomness," "courageous attempt," and "yet to be gleaned". These descriptions give you an idea what is in store for the reader. Throughout the volume there is a lot of time-series analyses of various features. Interestingly, I only saw two photographs in the volume; I wonder why so few. The volume is well produced with abundant crisp, clear graphics. I couldn't see any production-related errors.

There really are a lot of interesting and diverse papers on a broad range of topics related to the Holocene. For anyone interested in climate, sea level and sedimentation, this volume is must to have, or at least to be aware of. Anyone making paleogeographic, paleoclimatic or paleoenvironmental interpretations from the ancient record should definitely examine this volume. The book is a fine and just tribute to Rhodes W. Fairbridge.

Characterization of Deep Marine Clastic Systems

Edited by A. J. Hartley
and D. J. Prosser
Geological Society of London
Special Publication No. 94
1995, 247 p.
US$55.00 (AAPG member price),
US$93.00 (non-member price)

Reviewed by Andrew D. Miall
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Deep-marine turbidite systems have become very important to the British petroleum industry, because of the significant hydrocarbon resources that are contained in these deposits in the North Sea Basin, particularly the large gas reserves that have been found in the Viking-Central Graben. Developments in the understanding of deep-marine sandstones were reviewed at a conference entitled Reservoir Characterization of Deep Marine Clastic Systems, held at the University of Aberdeen (an institution highly regarded in the field of petroleum geology) in 1993. This book is an outcome of that meeting. As explained by the editors in their introduction, the intent was not to develop a textbook providing complete documentation of deep marine clastic systems, but to highlight current developments, particularly in areas of concern to the petroleum industry.

This is, indeed, a very specialized book, focussing on some remarkable new discoveries about deep-marine clastic systems, and employing some of the latest technologies in their investigation, ranging from sonar surveys of modern fans to probe permeametry of permeability heterogeneity as studied in core slabs. This is not, therefore, a book for the average sedimentary geologist, but will be of considerable interest to the specialist. The focus is very much on offshore British examples, but other papers dealing with experimental studies, and outcrop studies in Spain, provide some variety.

The first paper, by R. Anderton, a well-known curmudgeon and sceptic in the field of facies studies, provides a much-needed cautionary essay regarding the simple facies models for deep-marine clastic systems that have gradually become entrenched during the last two decades. Anderton is very dubious about the reality of facies cyclicity in turbidite systems, and the processes that have been interpreted to be the cause of such cyclicity. He makes a convincing case for the predominance of random processes in fan deposition. A companion paper, by S. Ouchi and colleagues, including F. G. Ethridge and S. A. Schumm, attempts to recreate in subaqueous fan studies the success of the Colorado State University experimental approach to the exploration of subaerial fan deposition that won the team a major award from SEPM a few years ago. The pictures are pretty and the experiments neat, but this reader is left with an uneasy feeling about the relevance of this completely unscaled series of experiments to the interpretation of the real thing. A third theoretical study, by B. Kneller, explores some of the expected complexities in the flow of turbidity currents, and the likely sedimentary products-facies and facies successions that do not fit the classic Bouma model. The effects of variations in the flow triggering process, topographic variability in the path of the flow, flow diversion around obstacles, and the development of internal waves within turbidity currents, are amongst the complexities examined in this interesting paper. S. R. Hughes and colleagues then examine the development of grain fabrics in turbidites. Owing to practical difficulties in the study of typical ancient turbidites they examined, instead, an unconsolidated volcaniclastic surge deposit, and an experimental deposit generated in a laboratory tank. The results of these observations can be applied to the study of paleocurrent patterns in ancient deep-marine deposits.

There follow three papers dealing with postdepositional liquefaction and injection features in turbidites. Such structures have long been known, but it appears that they occur on a large scale in some North Sea turbidite units, and have a considerable effect on reservoir geometry and hydrocarbon migration paths. R. Nichols examines the mechanisms of liquefaction, including fluidization by pore fluid movement, and grain agitation during shear stress. He carried out some experiments to model these processes, and described the resulting geometries of the liquefied bodies. The next paper, by R. Dixon and colleagues, examines the sandstone diapirism and clastic intrusions in the Tertiary submarine fan deposits of the Bruce-Beryl Embayment in the Viking Graben. A remarkable array of intrusive features has been documented in these beds using seismic and core data. The authors point out the effects these structures have on the seismic mappability of reservoir sandstones, and their effects on permeability pathways for fluids moving through the sandstones. This is a nicely illustrated paper, except that few of the diagrams have scales, so that it is difficult to assess the size of the structures being described. The third of this suite of papers, by C. M. Candace and colleagues, describes mounded, gas-bearing sandstone bodies produced by sediment liquification and upward mobilization following gas migration.

The remainder of the book is a collection of case studies documenting a wide

variety of sedimentary features. J. C. Pauley describes Tertiary sandstone megabeds in drill core from the Central Graben, and discusses their origins as the product of large-scale turbidity-current events. Insufficient drill data are available to establish the lateral extent of these spectacular units. B. T. Cronin illustrates two deep-sea channel deposits: a Miocene example exposed in southeast Spain, which he subjected to an architectural-element analysis using outcrop photomosaics, and a modern example on the sea floor off southern Spain. Next, sediment-dispersal patterns in a Cretaceous–Tertiary back-arc basin in Antarctica are explored by J. R. Browne and D. Pirrie using heavy-mineral analysis. It is shown that this technique could be useful for testing the correlation and continuity of individual sandstone lobes, a matter of some importance from the point of view of reservoir development. Next, I. Verstralen and colleagues provide a straightforward basin analysis of a Jurassic turbidite unit in a poorly-known offshore basin beneath the West Shetland Platform. No surprises here. Following this there is a microscopic and isotopic analysis of carbonate cements in two oil fields in the Viking Graben, which demonstrates that the cements were generated by an influx of meteoric water which caused biodegradation of in-place oil. D. J. Prosser and colleagues then apply the technique of probe minipermeametry to core samples in order to explore permeability heterogeneities in a massive fan sandstone in the northern North Sea. Although the data collected by this technique are best interpreted in terms of relative rather than absolute values, a great deal more information can be obtained on small-scale permeability structure using this technique than by conventional plug analysis. The last paper is a detailed study of shale clasts in deep-water sandstones by M. Johansson and D.A.V. Stow. A surprising amount of information can be obtained from the size, fabric, and facies associations of these deposits. Like trace fossils, they are easy to observe and document in core, and their study therefore has the potential to become a useful supplement to a subsurface analysis.

There are no synthesis or overview papers in this book, except for Anderton's introductory essay. This is a book not for the beginning student but for the expert to plunge right into, especially those concerned with the detailed stratigraphic, facies and petrographic analyses required by subsurface petroleum-exploration work. As usual, the Geological Society of London has done an excellent job on editing and production.

Sedimentation of Organic Particles

Edited by Alfred Traverse
Cambridge University Press
Press Syndicate
University of Cambridge
Cambridge, New York, Melbourne
1994, 544 p., US$140.00

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The past decade has shown an ever increasing interest in dispersed organic matter (DOM; *e.g.*, leaf cuticles, spores, algae, wood) within sedimentary rocks as related to paleodepositional systems, and in particular, the relationship between DOM in organic-rich, fine-grained rocks and the generation of oil and gas within petroliferous sedimentary basins. This interest has clearly been reflected in the number of scientific journal publications dealing with incident and transmitted light microscopic characterization of DOM, but unfortunately for students and academics of the subject, this has not been reflected in major comprehensive textbook works or compilations. As such, the collection of 23 multi-authored chapters in Sedimentation of Organic Particles is a welcome contribution.

The book is subdivided into four major sections: an Introduction to the concept (Chapter 1; I would also include Chapter 2 as a good introduction to process); Studies of palynosedimentation in modern environments (Chapters 2-12); Reconstruction of late Cenozoic vegetation and sedimentary environments from palynological data (Chapters 13-15); and Application of data on palynosedimentation to solution of geological problems (Chapters 16-23; *e.g.*, sequence stratigraphy, depositional environments, K–T boundary). The contents of the book are somewhat skewed to the application of microscopic-based palynological techniques and their use in understanding, modeling, and predicting DOM paleosedimentation and paleoenvironments, but a refreshing diversity is also presented.

The diversity in research objectives and in the backgrounds of contributors other than geology (*e.g.*, geography & environmental engineering, forestry, archaeology, biology, marine biogeochemistry, anthropology) is a rather pleasing aspect and an important thematic component of this book. To read of the "non-geologist" approach to studying sedimentation of organic particles should inspire new methodology and application initiatives from geoscientists.

Unfortunately, the quality of the chapters in *Sedimentation of Organic Particles* is exceedingly variable, ranging from poor to excellent. In addition, the reader should be aware of dated reference lists (post-1990 citations are rare), as well as key references made to difficult to obtain "publications" (*e.g.* petroleum company consulting reports). Other irritants such as photomicrographs without scales, x-y graphs and maps without adequate labelling occur throughout the chapters. The reader should heed caution where coal maceral nomenclature is "blended" with palynological nomenclature, frequently the coal maceral terminology (*e.g.*, International Committee for Coal and Organic Petrology) is incorrectly applied.

The only other recent comprehensive work on the subject of organic matter, although single authored in comparison, is *Sedimentary Organic Matter, Organic Facies and Palynofacies* by R.V. Tyson (1994; ~US$170). I would favor the Tyson edition as a comprehensive "text" of reference for geoscience students of palynology and organic petrology (*e.g.*, queries concerning maceral and palynomorph terminology and nomenclature). For those interested in case studies spanning diversity in methodology, application and discipline, however, I would strongly recommend seeking out *Sedimentation of Organic Particles.*

REFERENCES

Tyson, R.V. 1995, Sedimentary Organic Matter, Organic Facies and Palynofacies: Chapman and Hall, London, 615 p.