

Chapter 1 provides a short overview of the subject matter, and within chapters 2 through 6 the authors detail the production of mud and silt, its transport and deposition, the role of oxygen, the depositional systems in which muddy sediments are commonly found and the physical and chemical changes which occur in mudrocks during burial. Chapter 7 examines methods for characterizing sediment sources, using petrographic and in particular geochemical methods of analysis. Chapter 8 looks at how the geology of muddy depositional basins can be used to characterize the mudstones themselves and provide an insight into the nature of a basin, and its wider geological context. Finally, within Chapter 9 the economic importance of mudrocks and an outline of their engineering characteristics are described. The appendices are helpful as they provide short descriptions of different methodologies and useful background for readers with little knowledge of the subject.

In considering the scope of the book, it is perhaps likely that some topics will be considered in slightly less detail than others. For example, cyclical deposition within mudrocks can be certainly be recognized on lunar tidal scales through to Milankovitch frequencies, as described by the authors. In addition, there is now a sizeable literature on image-based annual- through decadal-scale records of lamina deposition, which provide a useful insight into and archive of past climate variability. The content on this subject could perhaps have been greater than it is, given the present interest in climate studies.

In summary the book is written in a style that is easy to read and provides for rapid cross-referencing of subjects/ topics of interest to the reader. The authors have attempted to provide a useful summary of the important aspects of fine-grained argillaceous rocks, and they have achieved this.

Richard B. Pearce

AVSETH, P., MUKERJI, T. & MAVKO, G. 2005. *Quantitative Seismic Interpretation. Applying Rock Physics to Reduce Interpretation Risk*. xv + 359 pp. Cambridge, New York, Melbourne: Cambridge University Press. Price £90.00, US \$140.00 (hard covers). ISBN 0 521 81601 7. doi:10.1017/S0016756806233053

This book describes one methodology for interpretation of prestack seismic reflection data amplitudes to yield a probabilistic distribution of lithology and pore fluid information in the subsurface. The authors state that one of their principal aims is to 'improve interaction between geologically and geophysically inclined seismic interpreters'. In this respect I think the book succeeds admirably. It is relatively easy to read and is complete with over 60 colour plates, 300 references and an index. The text and figures are of excellent quality and there is only a handful of typographic errors. Pitfalls and major summary points within the text are highlighted. Graduate students who work with seismic data will find that the book provides an excellent overview of rock physics and interpretation technologies that are becoming more commonly used within the oil industry. Teachers of geophysics will be able to bolster their lecture notes by summarizing this interpretation methodology in their lectures and the online data examples provided could easily be incorporated into practical sessions.

In this book the case histories and text evangelize a workflow which can help both to reduce and to quantify interpretation risk even when there is significant overlap in acoustic impedances between different rock types. While the book is well referenced the authors could perhaps have

explained alternative potential methodologies in more detail. There are some references to new and upcoming seismic analysis techniques in Chapter 4 but a case history in 4D seismic analysis and expanded discussion on attenuation and anisotropy studies would have been beneficial.

The first two chapters are a description of the field of rock physics which attempts mathematically and empirically to parameterize rocks such that the variations of lithology, porosity and saturation can be related to seismically derived P and S velocity and density. Lithology and fluid substitutions are stressed. In the third chapter statistical rock physics is used to try and quantify uncertainty. This is the hardest chapter to follow but the basic principles are well illustrated by the applications at the end of the chapter and the case histories in Chapter 5. Chapter 4 is a welcome overview of the myriad of methods for extracting quantitative information from prestack seismic amplitudes. Seismic modelling, offset dependent amplitude analysis and acoustic and elastic impedance inversion are the principal techniques covered. A section on seismic processing is outdated but an excellent overview of interpreting AVO crossplots is included. One powerful application of the probabilistic technique is to determine the value of additional data (such as elastic impedance) in classification of key facies types from seismic data. Chapter 5 is a summary of successful case histories from West Africa and the North Sea that have been used as examples throughout the book. Chapter 6 provides workflows which recommend various stages to be applied to exploration and development of oilfields.

Reading the entire book from cover to cover is a rewarding experience and gives the reader a new understanding of the breadth and scope of this field – and how it may be used to benefit the interpretation of seismic data.

Rob Hardy

WEISHAMPEL, D. B., DODSON, P. & OSMÓLSKA, H. 2004. *The Dinosauria*, 2nd ed. xviii + 861 pp. Berkeley, Los Angeles, London: University of California Press. Price £62.00 (hard covers). ISBN 0 520 24209 2. doi:10.1017/S001675680624305X

Several changes have been made since the first edition of *The Dinosauria* (Weishampel, Dodson & Osmolska, 1990). The front cover is graced by a group of indisputably bird-like creatures. This is in contrast to the particularly reptilian cover stars of the latter publication and reflects the editors' updated perception of a bird–dinosaur relationship as the 'logical sequel of phylogenetic systematics' – a methodology that is emphatically endorsed in the new book. Other changes are the addition of a numerical cladistic analysis to each of the taxonomic chapters and some changes in authorship (the number of authors has almost doubled from 23 to 43) and chapter topics, precipitated by the clarification of theropod taxonomy and the inclusion of a new chapter on biogeography.

In Section One, some 23 taxonomic chapters summarize what is known about each group of dinosaurs seriously and effectively. The level of group considered and attention to detail for each varies wildly with nine chapters spanning 183 pages of Theropoda (giving *Herrerasaurus* and *Eoraptor* the benefit of the doubt as non-theropods for this calculation) inadequately counterbalanced by two chapters sharing 90 pages of Sauropodomorpha. Ornithischia seem similarly short-changed with ten chapters over 188 pages. But then perhaps more has become known about the ever-popular carnivorous dinosaurs. The standardized format of

preamble, definition and diagnosis, anatomy, systematics and evolution – supplemented in all cases by a cladistic analysis, taphonomy, palaeoecology and behaviour, and a listed summary of names attributed to the taxon, is successful in enabling easy access to information but runs the risk of seeming dry to the uninitiated. The addition of an absorbing section entitled ‘historical review’ in Chapter 13 (‘Sauropoda’ – Upchurch, Barrett & Dodson) goes some way to alleviate this. Quality of illustration varies between these chapters from frustratingly patchy to superb. Abbreviations used in figures are collected in a section towards the front of the book. This I find consistently irritating although to those with more developed anatomical knowledge it will not matter. The supplementary cladistic analyses add a level of rigour and testability to the taxonomic conclusions, although some data matrices have been covertly recycled between chapters. These can be accessed online and have been moved to <http://www.ucpress.edu/books/pages/2601001/2601001.supplement.html> since publication.

Section Two, entitled ‘Dinosaur Distribution and Biology’, contains chapters on distribution, taphonomy, palaeoecology, biogeography, thermal biology and extinction. ‘Dinosaur Distribution’ represents an impressive effort of compilation for all dinosaurs, on all continents through the Mesozoic. ‘Dinosaur Taphonomy’ contains no listings, but has a good and up-to-date rationalization of the sorts of studies in taphonomy that concern palaeontologists: a taxonomy of taphonomic studies. There is a nice set of examples and wide range of conclusions. It highlights critical lack of, and bias in, taphonomic studies of dinosaurs and the importance of taphonomic understanding to the interpretation of palaeontological data. ‘Dinosaur Palaeoecology’, despite being an evocative topic, is sadly not leavened by any form of illustration at all. The authors take an objective stance about the state of current knowledge and succeed in not succumbing to either the mania or speculation that have in the past blighted dinosaurian studies. This hints that the book is pitched at a well-informed, scientific audience. ‘Mesozoic Biogeography of Dinosauria’, a new chapter, takes the form of a new and wide-ranging study. It is ambitious in its comprehensive and cosmopolitan scope and fits in with tradition throughout the rest of the book with regard to bringing most available information together in one place. There is a discussion of previous studies, of which there do not seem to have been many. ‘Thermal Physiology’ and ‘Dinosaur Extinction’ are popular topics and merit sections of their own. Two chapters devoted to dinosaurian physiology offer counterpoints to the debate and give each ‘camp’ a fair hearing whilst demonstrating how the alternative viewpoints can be informed by rational scientific evidence. The, appropriately final, chapter on extinction gives a good impression of events of global importance at the time of the K–T boundary and rational assessment of timing and magnitude of their impacts.

With 861 pages in 30 chapters written by 43 separate authors, the second edition of *The Dinosauria* qualifies as a ‘big book’. A great deal of work has clearly gone into the writing and editing and it draws together a great deal of information on the state of dinosaur palaeontology today. Alongside this, new numerical algorithmic analyses give this volume value in adding to our knowledge. Information is consistently presented in an ordered and accessible format, not least in the gargantuan bibliography. It is no substitute for a well-stocked library but could act usefully as a guide to one. It is probably most suited to and accessible to dedicated enthusiasts with a high level of prior knowledge seeking dense information and not frills, workers just starting out in palaeontology and specialized experts looking to key in to

new areas of research. However, since this is the definitive reference work on the most widely popular group of fossil organisms to have ever lived I would anticipate that a lot of people who do not fall into these categories will also buy the book.

Roger Benson

HARRIS, C. & MURTON, J. B. 2005. *Cryospheric Systems. Glaciers and Permafrost*. Geological Society Special Publication no. 242. vii + 161 pp. London, Bath: Geological Society of London. Price £60.00, US \$108.00; GSL members’ price £30.00, US \$54.00; AAPG/SEPM/GSA/RAS/EFM/PESGB members’ price £36.00, US \$65.00 (hard covers). ISBN 1 86239 175 0. doi:10.1017/S0016756806253056

Researchers in the fields of geocryology and glaciology often work in isolation from each other even though the interaction between glaciers and permafrost strongly influences a range of erosional and depositional processes, as well as groundwater and surface hydrology. The publication of the volume *Cryospheric Systems: Glaciers and Permafrost*, which attempts to bring together work by glaciologists and geocryologists, is therefore timely. The editors state that the aim of the volume is to highlight the interactions between glaciers and permafrost in order to stimulate further cross-disciplinary research between the two fields. The book comprises a series of papers concerned with processes occurring at the permafrost–glacier interface, as well as papers focusing solely on either glacial systems or periglacial systems, and this forms a broad structure for the organization of the volume.

Following an introduction to the topic by the editors, the subsequent research papers are grouped into three themes. The first of these focuses on ‘Glaciers and Permafrost’ and comprises six papers on glacier–permafrost interaction in alpine and polar environments. The papers include studies of glacier–permafrost interaction at the margins of surge and non-surge type glaciers in Iceland and Greenland, investigations of the hydrological relationship between glaciers and permafrost, and several papers which deal with glacier–permafrost interaction in Peru and Norway. The second part of the book focuses on ‘Proglacial and Ice-Marginal Processes’. These ‘glacier-related’ papers include studies of paraglacial sedimentation in the coastal zone and the influence of periglacial processes on Arctic glaciofluvial sediment transfer. The third paper in this group focuses on melt rates at the calving termini of glaciers in Patagonia and does not really fit into the theme of the volume. The final section of the book is on ‘Permafrost and Frozen Ground’. It comprises three papers which focus on permafrost aggradation in Svalbard, reconstructing Holocene solifluction history using tephrochronology, and experimental investigations of ice-wedge development.

With a total of only twelve papers the volume is perhaps not as comprehensive as it could be. It would have been nice to have included some work on the relationship of ice sheet hydrology and permafrost. Another theme which would have fitted in well into the volume would have been investigations of glacial geomorphology, permafrost and glacier reconstruction such as those that have been carried out in Arctic Canada and Scandinavia by workers such as Art Dyke and Johan Kleman. These criticisms aside, several of the papers – especially in the section on glacier–permafrost interactions – present interesting and insightful studies, and I think the book does highlight nicely the strong links that