

of Pleistocene climatic change and environments of the mid to high latitudes. Whilst a very well-written account, there are questionable statements, such as 'In Europe, MIS 6 (the Riss/Saale glaciation) is regarded as representing the maximum spread of ice'. This may be true in some parts of Europe but in places MIS 12 is often regarded as the maximum extent of Pleistocene glaciers and in some areas MIS 16. Chapter 4 provides an excellent account of Pleistocene environments at lower latitudes. Lower latitudes are often overlooked in Quaternary textbooks, which often focus on the temperate and polar regions. Chapter 5 describes environmental change in post-glacial times. Whole books have been dedicated to the Holocene and thus it is not surprising that this book struggles to accommodate sufficient detail in one chapter. Nevertheless, as with all the chapters, the text is clear and concise. Chapter 6 outlines environmental change during the period of meteorological records. Such a chapter is rare in Quaternary textbooks, although it is entirely warranted given that we are still in the Quaternary. This chapter and the clear linkage throughout this book of the contemporary environmental change with longer term Quaternary climate change is one of the book's main appeals.

Chapter 7 goes off on a tangent to discuss sea-level changes of the Quaternary. Why it is placed in this order is puzzling, and it would perhaps have been better placed after Chapter 4. Chapter 8 discusses links between environmental change and human evolution. This is a particularly interesting chapter and makes clear the relevance of environmental change to humans. Chapter 9 describes the possible causes of climatic change. Again, this chapter is out of place. The causes of climatic change would have been better placed towards the beginning of this book, perhaps as Chapter 2. This chapter reads as an afterthought, which distracts from the fact that climatic change was the main driver of environmental change over the Pleistocene, though perhaps less so for the Holocene.

Overall, this is an excellent all-round textbook on environmental change. However, because it attempts to be all-encompassing this makes it a rather weaker Quaternary textbook. Still, it is well worth a purchase – essential for libraries – and is a welcome addition to the Quaternary literature.

Philip D. Hughes

BERGAYA, F., THENG, B. K. G. & LAGALY, G. (eds) 2006. *Handbook of Clay Science*. Developments in Clay Science Series Volume 1. xxi + 1224 pp. Amsterdam: Elsevier. Price £105, US \$165, Euros 150 (hard covers). ISBN 0 08 044183 1. doi:10.1017/S001675680800438X

This compilation of review papers is an attempt to bring together as a handbook the 'core information on the varied and diverse aspects that make up the discipline of clay science, ranging from the fundamental structure and surface properties of clays and clay minerals to their industrial and environmental applications'. The attempt is timely not only because information about applied clay mineralogy is widely distributed throughout the literature, but also because there is the belief – at least among the editors of this volume – that clays and clay minerals in their natural or modified forms will be heralded as the material of the twenty-first century as they are abundant, inexpensive and environment friendly. There are 66 authors and 39 review articles arranged into 16 chapters under the editorial guidance of F. Bergaya, B. K. G. Theng and G. Lagaly. The editors themselves

are authors of many of the review articles. Each review article has its own list of references, but, rather unhelpfully, does not have an introductory contents list to guide the reader.

The title of the volume suggests that it covers all of clay science; in fact it is heavily slanted towards applied clay mineralogy, particularly those aspects that are fashionable at the moment – acid-activation, catalysts, pillared clays, nanocomposites, fillers, barriers, etc. – whereas soils and the geological aspects are given scant attention. The reviews on the colloidal properties, organic interactions, and surface and interfacial chemistry of clays are of considerable relevance to geologists. There is a paper on the biomineralization of clay that is particularly well illustrated. Amidst the review articles on applied clay science there are papers (Chapter 7.4; Chapters 9, 13–16) that are little related to the main thrust of the book: however interesting, they would have been better omitted. There are some surprising omissions. For example, the discovery and successful synthesis of Laponite, the first synthetic clay of economic importance, is a milestone in applied clay mineralogy. The nature of Laponite and the circumstances of its discovery by Barbara Neumann are surely matters of scientific and historical importance.

A handbook must be easy to use, particularly if it is nearly 2½ kilos in weight. A very comprehensive index or series of indexes is a must, otherwise a simple enquiry becomes a major task with 1196 pages to search through. Unfortunately the index is woefully inadequate. Some headings (e.g. bentonite, interlayer space, kaolinite) have 50 or more entries with no indication to which topics individual entries refer. This is a general failing throughout the index and detracts seriously from the usefulness of this book.

The *Handbook of Clay Science* can be recommended with reservation to professional applied clay mineralogists as well as those teaching or researching at postgraduate level.

C. V. Jeans

POWELL, A. J. & RIDING, J. B. 2006. *Recent Developments in Applied Biostratigraphy*. The Micropalaeontological Society, Special Publications. v + 245 pp. London, Bath: Geological Society of London, for the Micropalaeontological Society. Price £85.00, US \$153.00; TMS member price £42.50, US \$77.00; GSL member price £51.00, US \$92.00 (hard covers). ISBN 1 86239 187 4. doi:10.1017/S0016756808004391

This volume contains twelve papers presented at a joint meeting of The Micropalaeontological Society, the American Association of Stratigraphic Palynologists and the North American Micropaleontology Section of SEPM, held at University College London in September 2002. The main theme of the meeting was the same as the title of the volume, *Recent Developments in Applied Biostratigraphy*, but given the audience, it should come as no surprise to learn that the biostratigraphy covered in the volume is micropalaeontological, in its broadest sense, and that it is applied almost exclusively to exploration and production problems in the hydrocarbons industry. The meeting itself attracted 78 oral presentations and almost 40 posters, so the twelve papers published here represent about 10% of the whole. Nevertheless, they give a flavour of themes that are extant in micropalaeontology and palynology, especially applied to hydrocarbons' exploration and production.

Four of the papers offer insights into original or relatively new concepts and techniques, or demonstrate new

applications of existing techniques. All cite case histories as examples, but the applications are potentially broader. Monteil introduces the concept of morphostratigraphy, a non-taxonomic biostratigraphical technique based on the stratigraphical occurrence of morphological characteristics, regardless of their taxonomic attribution. Gary *et al.* describe a method for two-well correlation based on calculating a sample-by-sample similarity/dissimilarity matrix that may better mimic how many biostratigraphers would approach the problem, namely by solving a series of smaller problems rather than searching for an optimal global solution. Dale *et al.* used ecological signals and correspondence analysis to determine ecological shifts in successions in the Paleocene of the Norwegian North Sea, correlating these shifts between wells and so linking the ecological signal to sequence stratigraphy. All these approaches have potential for further development and application in biostratigraphy. The fourth paper, by Williams *et al.*, describes the development of a non-acid technique for preparing palynological samples, avoiding the use of chemicals such as hydrofluoric and other acids. Given the significant risks for health and safety and the environment that these chemicals pose, especially at the well-site, the ongoing development of alternative methods is welcome.

The remaining papers are mainly case studies applying more traditional biostratigraphical methods. Three provide new data and zonations on various stratigraphical intervals: Ilyina *et al.* on the foraminiferal and dinoflagellate cyst zonation of the Callovian–Volgian reference section in the Tyumenskaya superdeep well, West Siberia; Stead & Awad on a palynological zonation of Cenozoic non-marine sediments in the Muglad Basin, Sudan; and Jaramillo *et al.* on the Paleocene of the Llanos foothills, Colombia, using graphic correlation. Payne *et al.* and Butler *et al.* both demonstrate the value of revisiting existing data. The first provides a ‘salutary tale (of) . . . biostratigraphy in complex terrains’, namely a reinterpretation of the stratigraphical and structural model of the Paleocene–Eocene succession in the Mungo Field, central North Sea, based on a reinterpretation of biostratigraphy combined with heavy mineral analysis. The second, data from the Middle Jurassic Ravenscar Group, Cleveland Basin, combined with sedimentary facies, offers new insights into the stratigraphical architecture of successions in the North Sea. The remaining three papers, by Jones *et al.* on the Eocene Ainsa System of the Spanish Pyrenees, by Hughes on the Shu’aiba Formation reservoir of Saudi Arabia and on the Permo-Triassic (Khuff Formation) of Saudi Arabia, look at the micropalaeontological discrimination of environments at reservoir scale.

One of the problems with conference volumes, especially those that contain a subset rather than the whole conference proceedings, as in this case, is that the range of topics covered is dictated by the papers submitted. This volume, however, provides plenty of interest biostratigraphers and those using biostratigraphical data in industry, research and academia, from case studies for teaching and analogous successions, to new data from frontier exploration areas, to new ideas and innovative approaches. The volume is generally well produced, with many diagrams in full colour or incorporating colour. Herein lies the only problem. Some of the other figures would clearly have benefited from either redrafting or publication in colour (what might work well in a PowerPoint presentation does not necessarily work at all in print, especially when reproduced in shades of grey), and others suffer from inadequate labelling or poor captioning. It is a pity about this, but the number of figures involved is

relatively small and does not detract overall from the value of the book.

Stewart Molyneux

LYKOUSIS, V., SAKELLARIOU, D. & LOCAT, J. (eds) 2007. *Submarine Mass Movements and Their Consequences*. Advances in Natural and Technological Hazards Series, Volume 27. xi + 424 pp. + CD-ROM. Berlin, Heidelberg, New York: Springer-Verlag. Price Euros 169.95, SFr 296.00, US \$229.00, £130.50 (hard covers). ISBN 9781 4020 6511 8. doi:10.1017/S0016756808004408

Considering its substantial price, this is a remarkably plain-looking volume. At 23 × 15 cm and a thickness of less than a couple of centimetres it is smallish and uses no colour. A DVD in the back pocket provides some colour illustrations together with larger versions of all the text-figures, which is just as well as a number of those in the book are decidedly spidery and on the margins of legibility.

The book is a collection of 43 papers derived from the Third International Symposium on Submarine Mass Movements and Their Consequences, held in Santorini in 2007. The miscellany of topics and standards is typical of conference volumes, though this does serve to illustrate the breadth of current approaches. However, as the book has no supporting material other than a one-page Foreword (e.g. no chapter commentaries, no attempt at synthesis, no index), it lacks context and cohesion. Thus I feel that while it provides a synopsis of current activities, the content is unlikely to excite those not working in the subject.

The papers are divided into seven thematic sections, of very uneven lengths. The first, entitled ‘Role of submarine slides in margin development’, is the longest. It has ten papers, containing a lot of bathymetric imagery and seismic sections from places as diverse as the E Indian, NW African and W Iberian margins, and the Storegga and Grand Banks slides. The second section deals with the evolution of slides into debris flows, etc., partly descriptively but also through laboratory and numerical modelling. The third section has a long title, ‘New techniques, approaches and challenges in submarine slope instability and analysis’, but only two papers totaling nine pages. Section 4 (five papers) focuses on geotechnical aspects; Section 5 provides eight case histories of slides in lakes and coastal areas such as estuaries. Section 6 is another short section (two papers, eight pages), this one on volcanic island settings. (And for some reason this section calls slides submarine landslides.) Presumably the final section (ten papers) is meant to address the ‘consequences’ of the book title as it is labelled ‘Submarine mass movements and tsunamis’. However, few of the papers have much to say about tsunamis other than passing remarks about the slides being ‘tsunamigenic’. There is some identification of areas at greater risk (e.g. Alexandria, Egypt; Long Island and New Jersey, USA) and a likely tsunami scenario for the Gulf of Corinth but there is very little for anyone concerned about practical mitigation of the consequences.

The Foreword tells us that the symposium provided an ‘opportunity to review the state of the art in risk evaluation. . . and its implication for coastal and offshore development’. This is hardly reflected in the content of the book’s papers. Neither am I convinced that ‘the interdisciplinary views gathered in this book. . . help identify future challenges, mitigation strategies and better management of the seafloor’. The majority of the papers are essentially descriptive case