exist between geocryology and glaciology and the research potential in this field.

The Special Publications of the Geological Society are notable for their high standards of presentation and publication and this volume continues that tradition. The individual papers are generally well written and the quality of the reproduction of diagrams and photos used throughout is, with only one exception, excellent. The use of colour in the paper by Etzelmuller & Hagen on glacier–permafrost interaction in Arctic and Alpine mountain environments demonstrates its effectiveness and it is a shame that more use of colour could not have been made throughout. That said, most of the black-and-white photos are excellent. In conclusion, although perhaps not fully comprehensive, this volume highlights the strong links between glaciology and geocryology, and I would recommend it to those researchers interested in the cross-over between these two fields.

Colm Ó Cofaigh

HISCOCK, K. 2005. *Hydrogeology. Principles and Practice*. xvi + 389 pp. Malden, Oxford, Carlton: Blackwell Publishing. Price £34.95 (paperback). ISBN 0 632 05763 7.
doi:10.1017/S0016756806263052

The science and application of hydrogeology continues to grow apace and hence new textbooks are always welcome on our bookshelves to sit along side the pioneering 1970s classic *Groundwater* by Freeze & Cherry, and various texts since. *Hydrogeology: Principles and Practice* will, I predict, find an honourable place on many a bookshelf. It is a comprehensive hydrogeological text that lives up to its title of providing a thorough treatment of not only the principles, but also the practice of hydrogeology. Dr Hiscock has clearly spent significant effort drawing together many case studies, largely set in text 'boxes' within his book, that provide excellent practical illustration of the principles taught. It is the diversity and high quality of these case studies drawn from all over the world that set this book apart from other texts. The book covers most aspects likely to be addressed in many undergraduate hydrogeological courses and will provide a foundational general text for postgraduate courses to be used alongside more specific hydrogeological texts. Practising hydrogeologists will find it a welcome refresher and useful resource.

Following the internationally relevant introduction, early chapters explain the fundamentals of physical and chemical hydrogeology. These are followed by chapters on environmental isotope hydrogeology, a specialist area of the author, and groundwater investigation that largely concentrates on physical hydrogeological aspects. All these chapters are well written with interesting cases, many of which have not been published in previous textbooks. Subsequent chapters cover the ever growing areas of contaminant hydrogeology and groundwater remediation and protection. Whilst these provide a comprehensive overview of these subject areas, they lack a little on detailed principles in some areas. Individual more detailed chapters on inorganic and organic contaminants would have been perhaps worthwhile. The final chapter provides an effective wide-ranging discussion of groundwater resource and environmental management issues culminating with the looming threat of climate change. Not to be overlooked, the reference listing and appendices are a valuable resource. I am sure to be directing my own students towards Appendix 10 containing very useful review questions and exercises.

Weaknesses? Although I found immense value in the many text boxes, they could be up to four pages long and at times were perhaps too disruptive of the main text flow. Some text boxes also contained specialist topic areas that perhaps could have been in the main text. Strengths? Largely indicated above, but in summary – an accessible textbook that provides a comprehensive and balanced introduction to the theoretical principles of hydrogeology and excellent illustration of its practical outworking in the real world.

Michael O. Rivett

BROWN, M. & RUSHMER, T. (eds) 2006. *Evolution and Differentiation of the Continental Crust*. vii + 553 pp. Cambridge, New York, Melbourne: Cambridge University Press. Price £80.00, US $140.00 (hard covers). ISBN 0 521 78237 6.
doi:10.1017/S0016756806273059

This is a substantial book of 553 pages, divided into 14 chapters that are a mixture of overviews and more detailed studies of particular areas and/or geological processes. In their introduction (Chapter 1), the editors stress secular evolution and pose three fundamental questions: (i) how was crust extracted from the mantle, has it changed over time and was it continuous or episodic?; (ii) how much crust went back into the mantle, by what mechanism, and what is the resultant net rate of growth through time?; and (iii) stable continental crust consists of upper, middle and lower crust and lithospheric mantle: how has the crust differentiated, has the mechanism changed over time, and what are the consequences for the Moho? The reader is asked to keep in mind whilst reading the book (a) are arcs and/or ocean plateaux the seeds of the continents and how have they changed over time (plumes versus subduction) and, (b) what is the response of the crust to melting in orogens, how is melt extracted and transported and how is asthenospheric heat transferred to the crust to make all this happen?

I must say that I found the book a little unbalanced. Whilst there are excellent review chapters – that by Hugh Rollinson (Chapter 6) on 'Crustal Generation in the Archean' clearly taking the 'gong' for its thoroughness and readability (though it could have appeared earlier in the book) – several of the 'detailed' chapters fall short of the mark and a number would have been better placed in a volume focused entirely on granitoid generation and emplacement. I also enjoyed the McLennan, Taylor and Hemming 'update' in Chapter 4, with a revised table showing elemental abundances in the continental crust. Surprisingly though, there is no comment on the significant amount of juvenile continental growth in the Phanerozoic, recently recognized by Bor-ming Jahn and co-investigators in the Central Asian Orogenic Belt. The review of melting of continental crust by John Clemens (Chapter 9) is also an excellent summary of current knowledge. Given the comments by the editors in their introduction, I would have expected to see a chapter specifically devoted to the Proterozoic, since this represents almost two billion years of Earth history, and has some globally-recognizable characteristics. The questions posed in Chapter 1 are extremely pertinent and, although partly addressed in the overviews, were not always picked up in subsequent chapters.

Mistakes in spelling, grammar and presentation are few in number, though present in all chapters, and especially so

in the figure captions and related text, where diagrams taken from previous publications are commonly incompletely integrated, leading to some confusion (especially in chapters 7 and 12). A set of colour plates also suddenly appears without adequate prior warning within Chapter 10 and adds little, if anything, to the volume, since greytone versions have already appeared at the same scale in the appropriate chapters (surely modern printing and manufacturing techniques could have accommodated them within the correct chapters?).

Granitoid magma generation in the crust is not the only mechanism leading to crustal 'differentiation', and the absence of detailed chapters on the structural mechanisms that dominate many late Archaean terranes ('thin-skinned' thrust tectonics) or on the significant mantle contribution to juvenile granitoid magmas that has recently been established in places such as the Central Asian Orogenic Belt and in eastern China, supported by hafnium isotopic studies and the application of slab break-off, delamination and basaltic underplating models, could be viewed as significant omissions from the book. Furthermore, if more than 50% of the crust evolved before the end of the Archaean (Chapter 4), then the generation of the tonalite–trondhjemite–granodiorite (TTG) suite during this period of Earth history should be at least as critical to the evolution of continental crust as the more 'recent' processes discussed so thoroughly in chapters 13 and 14.

As the editors state, 'this book represents but one stepping stone on the path to a better understanding (of the origin and evolution of continental crust)'. Indeed, notwithstanding any criticisms outlined above (I took it as my brief to be critical), this will prove to be a most useful and important book for research students interested in learning more about the evolution of continental crust. The overview chapters, in particular, provide a concise ready source of reference and I predict will become well 'finger-marked' in library copies of this book. Overall, it is a timely addition to the subject and the editors and authors are to be commended for their efforts.

Simon A. Wilde

EHLERS, J. & GIBBARD, P. 2004. *Quaternary Glaciations – Extent and Chronology. Part I: Europe. Part II: North America. Part III: South America, Asia, Africa, Australasia, Antarctica*. Developments in Quaternary Science Series Volume 2. xi + 475 pp.; x + 440 pp. + CD-ROM; x + 380 pp. + CD-ROM. Amsterdam: Elsevier. Prices Part I: US $185, Euros 185, £123.50; Part II: US $175, Euros 175, £116.50; Part III: US $165, Euros 165, £110 (all hard covers). ISBNs Part I: 0 444 51462 7; Part II: 0 444 51592 5; Part III: 0 444 51593 3.
doi:10.1017/S0016756806283055

Quaternary Glaciations is a three-volume set that forms the first contribution to Elsevier's new 'Developments in Quaternary Science' series – and what a magnificent achievement it is. Scientific understanding of Quaternary glaciations as it stood around 2002 is distilled into a series of regional articles by some 200 world experts working in 80 countries. The set arises from Working Group 5 (Extent and Chronology of Glaciations) of the INQUA Commission on Glaciation. The project to compile this set was launched at the INQUA Congress in Berlin in 1995, and now that it has concluded, it can be regarded as the most complete survey of the evidence for Quaternary glaciation ever attempted.

The compilation provides a database for the expanding fields of palaeoclimate modelling and palaeoglaciology. A strong emphasis is placed upon digital maps of glacial limits. These limits were mapped in ArcView, and a digital chart of the world was produced at a scale of 1:1M. The charts were used as a base map to show: (i) glacial limits, including the maximum limit of Pleistocene glaciation, the late Weichselian/Wisconsinan/Valdaian/Wurmian; (ii) morphologically expressed end-moraines; (iii) ice-dammed lakes; (iv) glacier-induced drainage diversions; and (v) the location of key sections through which the glacial limits are defined and dated. These maps are presented in a uniform format, and are available on CDs inserted inside the rear covers of the volumes. However, appropriate software (ArcView or ArcInfo) is needed to make full use of the CD data. Alternatively, the maps may be viewed through a browser, the ArcExplorer, which is available free via the Internet.

The text in each contribution follows a broadly similar structure, describing the evidence for glaciation from oldest to youngest. Where the extent of ice remains controversial, for example in Tibet and Siberia, the differing opinions are fully aired. This approach is important for defining the uncertainties and identifying where further work is needed. The order of papers is mainly alphabetical, ordered by country (as in Europe) or state or province (as in North America), which is not particularly logical, geologically speaking. Thus a region of interest is commonly easy to find, but occasionally one has to revert to the contents page because of the somewhat arbitrary drawing of boundaries between regions. Thus, for example, Norway and Sweden are widely separated, when ideally Scandinavia would best be treated as a whole. Nevertheless, if the reader is interested in pursuing the Quaternary history of a little-known country, there is a good chance he or she will find it in this set of volumes.

The text is well supported with numerous clear maps, lithological logs with interpretations, cross-sections, tables and conceptual models of deposition and landform generation. Some chapters also contain photographs, although they are rarely in colour; the quality of these is highly variable, and commonly inadequate, and is the only real disappointment in this three-volume set. However, overall, the A4 format of each volume well suits the presentation of the visual information. A reference list is provided at the end of each chapter, but these are not always comprehensive, probably for reasons of space. Some knowledgeable readers may feel that key references have not always been cited.

The editors have done a splendid job in making the papers easy to read, as many authors will not have had a perfect command of English. This time-consuming task is not always recognized fully, and the editors deserve credit for ensuring that the text is grammatically correct. A set of volumes like this whets the appetite for more information. An overview of the Quaternary time-scale and how the terrestrial record can be linked to marine isotope stages would have been useful, especially when the status of the Quaternary 'Period' or 'Sub-Era' has been challenged by the International Stratigraphic Commission. To my mind, this work demonstrates the cohesiveness of Quaternary research, and despite the comparatively short interval of geological time represented, the plans to subsume the Quaternary within the Neogene Period pay scant regard to the efforts of the countless workers involved in pulling such volumes together. Another benefit for a wider readership would have been to undertake a synthesis of all the papers in this volume, but perhaps the editors have in mind to write one, because if they did it would certainly be widely cited!