want to know how to obtain them, will find *Geophysical Equations* extremely useful. Although it possible to compile these derivations from original sources, more advanced texts, or others' lecture notes, anyone who has attempted this (for example, in the preparation of lecture notes) soon finds that clear and concise solutions can be difficult to assemble from readily available sources. This book makes this significantly easier, and thus will find an audience from instructors as well as the students referenced in its title. I wish this book had been available when I was preparing my own set of geophysics lecture notes!

Each solution starts with a brief discussion of the basic physics of a problem and an outline of the first principles needed to solve it. Even the relevant mathematical background is included (vector calculus and linear algebra; there is even a nice discussion of spherical harmonics). This introduction is followed, in a self-contained way, by all the steps and diagrams needed to obtain the important geophysical equations. Note that many 'applications' of these geophysical equations are left untreated. Thus, many geodynamics problems such as plate rotations on a sphere, viscous convection, postglacial rebound, and elastic plate bending, are omitted despite the fact that the continuum mechanics framework needed to solve these problems is already developed to introduce seismology. Nevertheless, the 'fundamental' geophysical equations are presented here in an informative and intuitive way, which makes this relatively inexpensive book an excellent investment for any geophysicist's library.

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Reference

LOWRIE, W. 2007. *Fundamentals of Geophysics*, 2nd edition. Cambridge University Press, 392 pp.

TALENT, J. (ed.) 2012. *Earth and Life: Global Diversity, Extinction Intervals and Biogeographic Perturbations Through Time*. xxviii + 1100 pp. Springer. Price £90.00, US$129.00 (HB). ISBN 9789048134274.
doi:10.1017/S0016756812000489

This huge volume was published as part of the UNESCO International Year of Planet Earth (IYPE) scientific programme, a joint initiative of UNESCO and the International Union of Geosciences. The core year for the IYPE was initially 2008, but grew to 2007–2009. Volumes already published in the series are Geophysical Hazards (2009), New Frontiers in Integrated Solid Earth Sciences (2009), and Medical Geology (2009), and it appears that other volumes are to be released in 2012. The present volume is said to be aimed at Earth Science professionals and students.

The text in the nicely finished, extremely weighty hardback volume is in two columns, each page being 190 × 260 mm; the volume is lavishly sprinkled with colour illustrations. There are six parts to this tome: general articles (9 contributions); evolution exemplified by specific phyla or classes (9); global extinction events and biocrises (9); palaeogeography (5); Cenozoic era (3); and an editorial epilogue.

Perhaps the first step is to assess broadly how the volume has met the stated aims. At the mega-level, the IYPE programme hopes to 'go some way toward helping to establish an improved equilibrium between human society and its home planet'. In his preface to the volume John Talent says 'The volume was directed towards considering the broad pattern of increasing biodiversity through time, and recurrent events of minor and major ecosphere re-organisation . . .'; in other words, to scrutinise life crises throughout geologic time.

Seventy four authors contributed to 36 papers. With all due respect to the skilled editor and his cast of stars, given the vast number of taxonomic groups, one volume cannot hope to cover every last group, event, crisis or extinction. So what do we get? We find a volume packed with information and interpretation, large and small papers, with a heavy emphasis on invertebrates (my count is: invertebrates [25], vertebrates [8], plants and fungi [2]). To me it seems that the first four papers in the general section are those which best address fundamental questions of biodiversity (Aberhan & Kiessling; Brett); astronomical phenomena (Lieberman & Melott); and climate (Dodson). Most other papers focus on individual taxonomic groups, time intervals, events or particular environments. A most spectacularly illustrated and substantial paper (Jun-Juan Chen, pp. 239–379), with its main focus on South China, discusses the early history of the animal kingdom, including early 'vertebrates' from the Maotianshan biota. For me, another valuable contribution is that by Black *et al*. (pp. 983–1078) on 'The rise of Australian marsupials: a synopsis of biostratigraphic, phylogenetic, palaeoecologic and palaeobiogeographic understanding'.

Assessment of the other contributions is hardly a feasible option, given the wide range of subject material. There is a huge wealth of important material in the volume, which is a must for Earth Science libraries.

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MISRA, K. C. 2012. *Introduction to Geochemistry*. xiv + 438 pp. Wiley-Blackwell. Price £85.00, €102.00, US$149.95 (HB); £37.50, €45.00, US$89.00 (PB). ISBN 9781444350951 (HB); 9781405121422 (PB).
doi:10.1017/S0016756812000519

In the early parts of the book, the basic chemistry required in geochemistry is reviewed: units of measurement; atomic structure; the nature of chemical bonding. This is both thorough and lucid and also explains some of the historical context to the development of these ideas. This continues in Part II of the book with an introduction to thermodynamic concepts, followed by chapters on the thermodynamics of solutions, geothemometry and geobarometry, aqueous solutions, redox reactions and chemical kinetics.

Applications of radiogenic and stable isotopes are covered in two chapters that comprise the third section of the book. These chapters provide a thorough treatment of the theoretical basis of radioactive decay and isotope fractionation and cover key applications in the geosciences. The stable isotope chapter contains material that is very up-to-date. For example, it includes Fe isotopes and mass independent fractionation of S isotopes, but surprisingly little on carbon isotopes.

The final section 'The Earth Supersystem' deals with the evolution of the earth. The first of two chapters in this section deals with the solid earth, from its beginnings in nucleosynthetic processes and accretion and through geological history. The second chapter deals with the hydrosphere

and atmosphere and takes a similar perspective on their evolution over our planet's history. This chapter is up-to-date, incorporating recent research on, for example, the 'Great Oxidation Event' and continuing through to anthropogenic impacts on the atmosphere and hydrosphere such as smogs, acid deposition, ozone depletion and greenhouse warming. A last short section of this chapter covers the basics of the major global cycles of the biological essential elements: carbon, oxygen, nitrogen, sulphur and phosphorous.

I would describe the coverage as very 'geological'; for instance, whilst the uses of radiogenic isotopes in petrogenetic studies are covered well, their applications as tracers in weathering, oceanography and palaeo-oceanography are not. Furthermore, there is only basic coverage of biological involvement in global element cycles. The book is what it says: an introduction to geochemistry (and not biogeochemistry).

Throughout the book there are numerous 'asides', e.g. details of derivations and worked examples. These can easily be skipped to provide an unbroken overview from the main text alone, or used to provide key additional detail on subject areas of particular interest. This structure helps enormously to make a very comprehensive text more accessible and readable and yet still incorporate a huge amount of useful detail.

The level at which this book is pitched would suit students on more advanced undergraduate geochemistry courses and be ideal at Masters or early stages of PhD. Overall this is an impressively thorough and up-to-date text that is aimed at the 'geological' geochemist and I would certainly recommend it to such an audience.

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