

1981. Consequently the book suffers from an absence of more recently published data and several contributions contain statements to this effect as footnotes. Additionally, the book contains many typographical and other errors. In a book of this size and scope this is somewhat inevitable, but more careful editing both within and between contributions would have avoided some of them. For example, *Scolithus* (Wolffhart), *Skolithus* (Klitzsch) and the correct *Skolithos* (Crimes, Laird, Rust, Spjeldnaes) is misleading to unformed readers as is the perpetuation of *Harlania* (= *Arthropycus*). References are often omitted (e.g. Klitzsch 1963—in Crimes), misquoted (e.g. S. E. Williams 1974, 1975; G. E. Williams 1974 in the text, G. E. Williams 1972, 1975 in the references—in Spjeldnaes) or misspelled (e.g. Schrenk, Scrotese (actually Schenk, Scotese)—in Spjeldnaes). The plates have generally reproduced poorly and are, on the whole, of scenic interest rather than of scientific value. The line diagrams are, however, of excellent quality and more than compensate for the unfortunate inclusion of uninformative plates.

Despite all these shortcomings I believe the book is an unparalleled and excellent summary of Lower Palaeozoic geology of northeast and southern Africa, the Middle East and Antarctica and, in addition, provides an informative overview of Lower Palaeozoic palaeoclimatology. Undoubtedly it will be a source reference for many years to come and perhaps will also encourage its readers to recognize that much research remains to be undertaken in all facets of geology in these areas. Unfortunately, its outrageous price will probably necessitate inclusion only on library shelves.

R. K. PICKERILL

CARBONATE DIAGENESIS AS A CONTROL ON STRATIGRAPHIC TRAPS, Mark W. Longman. Educations Course Note Series No. 21 of the American Association of Petroleum Geologists, 1982. No. of pages: 159. Price: U.S. \$7.00. (Soft cover).

For anyone seeking a clear, up-to-date and thoughtful introduction to the investigation of stratigraphic traps as oil and gas reservoirs in carbonate rocks, this book is to be warmly recommended. Mark Longman bases his study on examples of traps in the Ordovician-Devonian-Mississippian sequence in the Williston Basin of Montana and North Dakota. This basin has been extensively explored and provides a rich store of data. He begins by reviewing in detail the exploration and various interpretations of a well-known stratigraphic trap in the Mississippian. This leads on to a consideration of other traps, such as porous dolomite sealed up-dip by a tight limestone, or enclosed in anhydrite or in a less porous dolomite or dolomite with fracture porosity. There is an interesting note on meteorite impact reservoirs. A whole chapter is devoted to a valuable study of the interpretation of carbonate lithologies from logs, with useful discussion of the application of the older sonic and density logs and their combination with the compensated neutron-density log and lithodensity log. There follows a very full survey of carbonate petrography, texture, porosity types, with a section on controls of porosity formation and cementation and their relation to depth.

A chapter on near-surface diagenetic environments deals with marine, mixing and fresh water phreatic zones, the vadose zone and diagenetic sequence. On deep subsurface diagenesis he covers compaction and fluid expulsion, thermal maturation, stylolitization, fracturing, dolomitization, cementation and secondary porosity. There then comes a full treatment of dolomitization in which the familiar models of seepage refraction, evaporative pumping and mixing zone are described and the role of groundwater recharge in sabkhas and deep burial dolomitization. The inhibiting effect of the sulphate ion on dolomitization is touched upon. There is a case study of the Ordovician Red River dolomite. A review of modelling of stratigraphic traps includes a look at models that depend variously on climate, humid or arid, on situation in reef or reef-talus, in tidal flat deposits, in basin, platform, in oolite shoals or on fracturing or on the conservation of primary porosity in chalks.

The book is well-researched and notably up-to-date in its material and bibliography. Problems are examined always from the point of view of the practising petroleum geologist. For anyone entering this area for the first time the book offers a powerful foundation.

R. G. C. BATHURST

EARTH by F. Press and R. Siever, (3rd edn. W. H. Freeman and Co., San Francisco, 1982. No of pages: 613 (including 641 illustrations). Price: £18.50 (Hardback); £9.95 (Paperback).

Amongst the profusion of American Earth Science textbooks, *Earth* is generally regarded as being the best. I have tended to pass over books of this sort, whose coverage is rather wide for most geology

courses, in favour of British texts, narrower in scope, with British examples. However, it must be conceded that there is no up-to-date British undergraduate-level textbook covering the field of Earth Science in this way, and the Americans, Press and Siever in particular, do it so well.

The first edition of *Earth* appeared in 1974, the second four years later in 1978, and now, four years on again, the third is on the shelves. Substantial revisions since the second edition occur in the chapters on Plate Tectonics, Crustal Deformation, Planetary 'Geology' and Energy. Recent events and discoveries added since the 1978 edition include the Mt. St. Helens eruption, sea floor hot springs, thrust belts, pre-Mesozoic plate tectonics and satellites of the larger planets.

The book is divided into three sections. The first, consisting of three chapters, deals with the Earth in the Solar System, Geochronology and Earth Materials. The second part, consisting of nine chapters, covers Geomorphological Processes (six chapters), Oceanography, Sedimentology and 'Earth and Life'. The latter chapter deals not with fossils, which have no place in the book, but mainly with the evolution of the Earth's life-supporting atmosphere. The third part, consisting of ten chapters, covers Internal Processes, Metamorphism, Geophysics, Plate Tectonics, Planetary 'Geology' and Energy and Economic Minerals.

Each chapter begins with a short abstract and ends with a concise summary, exercises and bibliography. The book is profusely illustrated with black-and-white photographs, and clear diagrams utilizing the Freeman colour wash in shades of brown, which can become tiresome after a hundred pages. There are appendices giving Metric-English (U.S.) conversion factors, Earth physical data, a very useful chart of the properties of common minerals, and an introduction to the maps of the U.S. Geological Survey, of much less use. There is a glossary and an index, though the former gives no reference to the text for further explanation, and the latter is difficult to use because so many subjects are listed only once under a major key word. Integration and expansion of the two would be immensely valuable. The text reads very well indeed, and it is here that the new student could become convinced of the excitement, appeal and relevance of Geology, which is the authors' intention. Whilst not wishing to labour the point, the British reader is constantly aware of the U.S. bias in the examples and in the writing: how many students would know what to 'open a faucet just a crack' (p. 158) means?

At £9.95 for the paperback, this would be a good buy for first year undergraduate taking a broad Earth or Environmental Science course, for use as a general text. I doubt whether it could be recommended as a set book for any particular geology course unit, and some areas, such as Palaeontology and Earth History, are hardly touched on. Notwithstanding its minor irritations, the book should remain a valuable undergraduate text until its next edition—in four years time?

P. A. SELDEN

REFLECTION SEISMOLOGY—A TOOL FOR ENERGY RESOURCE EXPLORATION (2nd edn) by Kenneth H. Waters. Wiley, New York, 1981. No. of pages: xvi 453. Price: £31.50. ISBN 0 471 08224 4.

This is the second edition of a book which first appeared in 1978 and it was reviewed by the present writer in Vol. 15, Part I of this journal. The text has been extensively revised and additions appear in most chapters, so as to bring the book right up to date.

The scope of the book may be summarized briefly; for further details the reader should consult the original review. Chapters 2, 4 and 6 cover the basic theory, including wave trains, characteristics of the reflection process and seismic data processing. Sources and receivers, with the various methods of gathering seismic data are dealt with in chapters 3 and 5; the later chapters 7 to 10 discuss resolution, diffraction, migration and other topics. Interpretation problems are tackled in Chapter 11 and the book is concluded with a chapter (12) on 'new tools in the making'.

The revisions consist partly of additions to the text in Chapters 2, 4, 6 and 9, which help the reader to digest the theory; partly of brief discussions of new techniques and applications. In Chapter 2 we find that Fermat's principle, the reflection coefficient and viscous damping and solid friction are now explained more fully, with the necessary mathematics and extra figures. In Chapter 4 the author enlarges on aliasing and the Nyquist frequency, besides providing some more synthetic seismograms which illustrate conversion of P to S waves. Chapter 9 has an extra appendix on migration, using the acoustic wave equation. A valuable addition to the book is the whole new section, in Chapter 6, on matrix algebra.

Seismology is becoming increasingly important in coal exploration. A knowledge of the *local* conditions of occurrence of coal—the thickness, continuity, faulting, or local replacement by other types of rock—can often mean a great deal in ensuring uninterrupted production of coal. A seismic