

BOOK REVIEWS

Appreciating Geological Maps

Moseley, F. 1979. *Advanced Geological Map Interpretation* Edward Arnold, London. 80 pp., 21 maps, 19 figs. Price: £3.25, softcover.

The step from the interpretation of simple geological problem maps to that of much more complex 'real' maps should be made easier with the publication of this book. It is intended for students who have already been initiated into geological map interpretation and it aims to illustrate important geological principles and to give an insight into the three-dimensional relationships of rocks.

In order to achieve this the author has drawn twenty-one maps, based mainly on published ones which he has simplified in some cases and added complications to in others. Almost all are of areas with which he is familiar. The maps have been drawn to scales ranging from approximately 1 : 200 to 1 : 181,000 and units of measurement are either in yards, feet, miles, metres or even metros (one map having been left with its original Spanish legend). The author excuses this variation in units because of the wide range of good maps available from both metric and non-metric areas.

The scope of the book is impressive from the point of view of geographical coverage, geological content and problems to be solved. The relations of igneous rocks to their country rock and to each other are illustrated by an ophiolite/mélange complex in the Oman, a Tertiary ring intrusion and a dyke/sill area from Scotland and a Pleistocene to Recent volcanic complex from the Gregory Rift. The latter also has related archaeological problems.

Large-scale structural topics include salt-dome tectonics based on a Texan example, disharmonic folding from southeast Spain and polyphase folding and thrusting from Spain and the English Lake District. On a smaller scale there are structural/sedimentological problems to be solved by stereographic projection to sort out current directions from sole marks in a tightly folded sequence of greywackes.

The author's wide experience is also reflected in his choice of problems in the applied aspects of geology. These include the assessment of coal reserves and barren ground in Lancashire, reserves of basalt roadstone in Derbyshire, sand resources in glacial terrains in Cheshire and water supply prospects in Saudi Arabia. All of these, of course, have associated geological problems to be solved.

The value of the study of land-forms and topography is also recognized as is that of quick reconnaissance surveys and 'geology at a distance'. They are illustrated by the Gregory Rift example already mentioned and by one from the French Alps.

The final exercise is based on the Cross Fell area in the north of England, and here the student has to draw a finished map and complete a stratigraphic succession from a detailed field map on a scale of about 1 : 12,000.

The book is in two parts: the first contains the maps with brief outlines of the regional geology and a statement of the problems to be solved; the second contains comments on each of the maps with suggestions on how the interpretation might be tackled and diagrams and sections to show critical areas. Occasionally the answer is completely given but usually the student is left with plenty of thinking to do himself.

On the whole the maps are clearly drawn and easy to read with rare draughting errors. There is no uniformity of ornament, scale or contour interval, but this reflects the variety of sources from which they are derived. The text is clear with few misprints.

This is a well balanced series of maps which should be most useful as a class text but especially so to those students who have to work on their own or with minimal tuition. The author seems to have achieved his stated intentions of giving the student a wider experience by leading him along the right paths without holding his hand too firmly. The book can be strongly recommended and is reasonably priced.

R. Bradshaw

Exploiting Earthquakes

Bolt, B. A. 1978. *Earthquakes: A Primer*. Freeman, San Francisco. 241 pp., 66 illustrations. Price: hardcover £7.60, US\$14.40; softcover £4.10, US\$7.70.

Booth, B. & Fitch, F. 1979. *Earthshock*. Dent & Sons, London. 256 pp., 39 Figs, 26 Plates. Price: hardcover £6.95.

Verney, P. 1979. *The Earthquake Handbook*. Paddington Press, London. 224 pp., 15 Figs, 105 black and white photographs. Price: hardcover £5.50.

During recent years earthquakes have generated more than their usual share of excitement among scientists and the general public; authors and publishers have not been slow to exploit this interest. The books reviewed here are only three examples of those published in the last five years which are aimed at a non-professional readership ranging from the informed amateur to the inquisitive. As might be anticipated considering their intended market, all three books are readable, even journalistic.

The specialist readers of this Journal may also find these books interesting and enjoyable. Unlike the sedimentologist or volcanologist, who can readily visit sites of depositional or volcanic processes, the opportunities for the structural geologist to witness the effects of present-day deformation are more limited, and hence he is distanced from the surface manifestations of the processes which interest him. From these books, especially Verney's, some idea of what it is like to be present during an earthquake may be acquired. In addition, worthwhile practical hints about taking precautions before, during or after an earthquake are contained in *Earthquakes: A Primer* and *The Earthquake Handbook*. As a source of second-hand anecdotes with which to spice lectures, the books may also appeal to some teachers of tectonics, especially those working in seismically inactive areas.

Of the three books, *Earthquakes: A Primer* displays the most serious purpose, presents the most scientific information, as opposed to historical/sociological reportage, and is the best looking. Bruce Bolt, Professor of Seismology at the Berkeley campus of the University of California, reviews the causes of seismicity, the recording of earthquakes, measurement of magnitude and intensity, the effects of earthquakes on man and engineering structures, and the possibilities for earthquake prediction and control. The influence of fluid pressures in overcoming resistance to shearing during faulting is more clearly explained than in the other three books. As we have come to expect from the publishers of *Scientific American* the diagrams and tabulated summaries of information are imaginative models of clarity. For example, fig. 5 of Chapter 2 is especially pleasing, and in common with several other illustrations is derived from Bolt's earlier book *Nuclear Explosions and Earthquakes: The Parted Veil* (Freeman). Eight appendices, an earthquake quiz, a glossary, a bibliography and a comprehensive index occupy the final 50 pages of the 240 page book. Ground surface and superficial deformation features are mentioned only in passing, although treated more thoroughly than in the two other books. There is as yet no book, popular or academic, other than conference proceedings, which emphasises these visible, if transient, structural phenomena. Geologists wishing to compare ancient structures with those related to known seismic events continue to be dependent upon research articles.

Earthshock by Basil Booth and Frank Fitch, both British geologists, although a more obviously 'popular' book, contains in a well-packaged narrative style much scientific information, and some thoughtful proposals for greater international cooperation; they suggest the foundation of a World Disaster Authority. The authors discuss a variety of natural catastrophes, some instantaneous like earthquakes or extra-terrestrial impact, others slower like volcanic eruption, and others longer term like the effects of climatic change. In early chapters they outline the historical development of tectonic and other geological

ideas, and refer informally to some of the personalities and socio-political factors involved in their creation. Much less than half the book is devoted to earthquakes and related tectonic matters. Knowing the experience of the authors it is not surprising that volcanic phenomena are more thoroughly treated. One chapter deals with possible climatic changes and the consequential hazards of, for example, a renewal of continental glaciation, sea-level rises up to 330 ft or the spread of deserts. Another chapter considers the effects which might result from bombardment by large extraterrestrial bodies. The final chapter headed 'Catastrophe or Survival?' is more thoughtful than might be imagined from the sensationalism of the presumably related statement 'Upheavals from within, bombardment from without — can the Earth Survive?' which is printed on the rear of the lurid dust jacket. The authors deliberately exclude a bibliography or scholarly citations, but there is a comprehensive index. Many of the half-tones are poorly reproduced.

The final book, *The Earthquake Handbook* by Peter Verney, a professional non-fiction writer, is the least technical of the three and devotes proportionately more space to human-interest stories of past catastrophes. Verney's accounts of earthquakes in recent historical times, early seismological investigations, and the development of ideas about the causes of earthquakes are all well-handled and enlivened by little-known examples. Nicholas Ambraseys is acknowledged for his advice during the writing of the book and thus it is no surprise that the

discussion of earthquake engineering is more comprehensive than that in the other two books. It is to be regretted that in his penultimate chapter on earthquake prediction Verney does not also tell us about Ambraseys' pioneering work on the search for potentially active seismic zones using historical and archaeological sources. *The Earthquake Handbook* is completed by an index and a short bibliography which includes some references to pre-20th century literature. The appearance of the book is generally good but the reviewer's copy contained some damaged pages. Some of the historical details of people's reactions to past earthquakes conflict with those given by Booth and Fitch.

With the exception of *Earthquakes: A Primer*, professional geologists are unlikely to acquire much new technical information from these books, but they are enjoyable to read and contain some fascinating supplementary material. Considering the present price of essential books it is doubtful if many individuals would wish to pay £6.95 for *Earthshock*, or £5.50 for *The Earthquake Handbook*, but those living where there are public libraries might like to recommend that these books be added to their shelves. They may enhance public awareness of the potential benefits to be gained from government supported geological and geophysical research.

P. L. Hancock