

## BOOK REVIEWS

### Teaching geological maps

Maltman, A. 1990. *Geological Maps: An Introduction*. Open University Press, Milton Keynes. 208 pp. Price £15.95 (softback; ISBN 0-335-15215-5).

This book has clearly been written by a geology lecturer who has experienced the difficulties of teaching Earth Science students to read geological maps. The extensive use of illustrations, particularly block diagrams, enables both the novice and the more advanced student to visualize the geological features described in the book. This book is not only suitable for geology students, but could also be a useful revision and reference text for geology teachers.

Throughout the book the author has given careful thought to ways of helping the student transfer the mental picture of a two-dimensional map to an understanding of what is happening below the surface. The technique of drawing the surface geology on a plane slightly raised above an underlying block diagram is particularly effective.

The examples selected are straightforward, and the majority have been selected from U.K. geological maps, which means that they can be easily accessed by both students and teachers. The descriptions of features such as folds and faults avoid the temptation to go into detail; this enables the reader to concentrate on the map interpretation of these structures.

The order and grouping of the different topics can be difficult in this particular subject area; the author has been aware of this and has taken the student step by step through the kaleidoscope of information which is presented by a geological map. The first six chapters deal with basic but essential topics such as map scales, map availability, outcrop widths, structure contour techniques, geological cross-sections and the recognition of simple outcrop patterns. In each of these chapters there is a section of maps and questions related to the material covered. These questions help to consolidate the reader's understanding of the topic covered. The chapter on cross-sections, fence diagrams and block diagrams deals with a difficult subject area in a series of logical and clearly explained steps.

The middle of the book consists of eight plates selected from B.G.S. sheets and maps published by overseas surveys. The text guides the reader through the different geological features by means of a series of questions, which enable the student to focus on a particular geological structure and not to be overawed by the complexity of the data present. In addition to showing geological features on 'real maps', this makes the student aware of the wealth of geological information available on U.K. and overseas maps.

The second half of the book has nine chapters dealing with the recognition and description of geological features such as unconformities, faults, folds, igneous activity and mineralization. The last three chapters provide interesting and useful information on the production of maps, contributions made by eminent geologists, and new trends. The chapters are again well illustrated with extensive use of maps, block diagrams and excellent annotated diagrams. The two chapters on faulting were particularly good.

The chapter on geological history deals with a subject which can be difficult to teach. The understanding of geological history, compared with folding, etc., is more dependent on a general geological background in which the student needs some knowledge of subjects such as conditions of sedimentation and stratigraphy. This is also an area where experienced geologists emphasize different aspects; the author is clearly aware of this when he refers to the "problem of preferred interpretation". The maps and diagrams in this chapter do not guide the reader to the same extent as in the other topic areas. The geological history of the Shrewsbury sheet could provide problems to the non-supervised student due to the number of 'ifs' and 'buts' involved. Even with the aid of the cross-section, the map of the Baraboo area could prove challenging.

In conclusion, I find that this book provides a comprehensive and

clear treatment of geological maps. My only disappointment was that the author had not taken the opportunity of providing a 'type' description of one of the maps available. This would have given students a guide to the technique of writing a full report of a geological map. It is also debatable whether there should have been some discussion of superficial deposits; these are often present on geological maps and are of interest to both the geologist and the geographer.

In the present educational climate of modular degrees and very large undergraduate classes, this book provides an excellent self-learning teaching package. It also provides a good guide to staff involved in constructing modules covering the teaching of geological maps. At £15.95 for the paperback this book is very good value.

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### Teaching structures through maps

Powell, D. 1992. *Interpretation of Geological Structures Through Maps*. Longman, London, U.K. Price £13.99.

This is certainly one of the clearest and most useful books on mapwork which I have seen in recent years, and is likely to become a standard text in mapwork and structural courses at University level. It concentrates on structural aspects of map interpretation, and unlike recent books by Maltman (1990) (see preceding review) and Butler & Bell (1988), does not stress the interpretation of published geological maps. Instead, Derek Powell presents a set of clearly illustrated worked examples and problem maps, which introduce all the main types of geological structure. It is not simply an introductory text, and contains examples at the end which would test many academics, let alone final year students. A particularly welcome feature is that all the problems are matched by an exhaustive worked answer at the end of the book, so the student is never left wondering just what the author is getting at!

For many students, three dimensional thinking and map interpretation is the most difficult skill they have to learn in a geology degree. I'm sure many colleagues will have experienced the difficulty of finding or designing a set of map exercises which are at once clear and simple to understand, and at the same time can be related to real geological maps. The first criterion can be met by traditional books of strike line exercises such as that by Bennison, but the exclusive use of straight parallel strike lines tends to hinder more advanced interpretation and work on real maps. On the other hand, structure contours are widely used in industry, and are the only way to represent on a map the topology of complexly folded surfaces. I agree with Derek Powell that teaching of structure contours is an essential part of any serious map course. In his 1990 book, Alex Maltman pioneered an approach in which the ruler is never used to draw structure contours, and real field examples are used wherever possible. Derek Powell has a similar, but less extreme philosophy; there are relatively few examples which use straight structure contours, but on the other hand the problem maps are precisely drafted, and avoid the 'noise' which tends to frustrate students in their understanding of published geological maps.

At first sight the organization of the book is rather idiosyncratic. After a brief introduction, the reader is introduced to all sorts of geological surfaces through a series of nicely drawn block diagrams. These surfaces include unconformities, and both extensional and compressional faults, with discussion of geological histories. This may prove rather indigestible to students with no previous geological experience, but does, on the other hand, give a good feel for the scope of the subject. Chapter 3 gets down to business with a well illustrated introduction to structure contours on both planar and curvilinear surfaces, strike, dip and apparent dip, and drawing a simple cross-section. The tone of the book is set by the very first exercise, which