

REVIEWS

SCHROEDER-LANZ, H. *Late- and Postglacial Oscillations of Glaciers: Glacial and Periglacial Forms*. 1983. A.A. Balkema, P.O. Box 1675, 3000 BR Rotterdam. Netherlands. £19.80. ISBN 90 6191 5171.

This book is a collection of 26 papers dedicated to the memory of Hans Kinzl, Professor of Geography at the University of Innsbruck in honour of the contribution made by him to the study glacier-forelands. It is a compilation of papers read at a conference at Trier in Germany on the 15-17th May 1980, organised to coincide with a visiting Professorship of Dr. J-L. Sollid to the University of Trier. Unfortunately the meeting was beset by misfortune: Professor Sollid was badly injured doing fieldwork and could not attend, and Professor Kinzl died during its preparation. It would be a pleasure to say that despite these set-backs the published volume is a great success, making-up for earlier distress and disappointments, but unfortunately this is not the case. In many respects the book is unsatisfactory: many of the papers are trivial and some are irrelevant to the theme, there is little attempt to produce coherent synthesis, and despite a brave attempt by the publisher to produce a text suitable for readers of German, French and English language, the tri-lingual format is clumsy and far from attractive.

The aim of the book is to give "an overview of the methodological and regional state of [glacier-foreland studies]" (Editor, p IX). It is arranged into five sections dealing respectively with evidence from the Alps, Norway, the Pyrenees and Iberia, the Massif Central (which seems to include the Black Forest!), and the rest of the world outside Europe (Antarctica, Mexico, Arctic Canada, Greenland and the North American Rockies). A final section that is entitled "Chronological Questions" includes two short papers; one on secular variations in oak growth in middle Europe and the other on the establishment of lichen growth curves. Thirteen of the papers are in German, eight in English and five in French. All papers include an abstract in each of these languages and the captions to all the photographs and diagrams are similarly trilingual. Text is typeset and attractive, with a liberal use of space, proof reading has generally been good so that errors in the text are relatively few. However, many of the photographs are poorly reproduced.

Of the papers dealing with glacier variations all adopt an approach based on combinations of geomorphological mapping and dating using radiocarbon ages, topographic freshness lichenometry and historical records. Some of the geomorphological maps, like that of the French Southern Alps by Jorda (p 42), and that of the terraces of Doralen in Norway by Gehrenkemper and Treter (p 175) record precise information which is of considerable interest, but in general the treatments are far from successful. Some, such as that relating to Visdalen in the Jotunheimen by the editor, that by Hazera concerning the western Pyrenees, and that by Beeler dealing with the region of the Bernina Pass in the Alps are simply too brief to communicate the information needed by the reader. Others, such as that by Habbe and Walz concerning the glaciation of Val Viola in the Italian Alps, or that by Clapperton and Sugden on the glacier fluctuations of West Antarctica have an inadequate temporal control from radiocarbon dates. That by Muller, Kerschner and Kuttel on the Val de Switzerland is dependent largely on one virtually irrelevant pollen diagram and the perceived "freshness" of the moraines. The result is that most works succeed in fitting the glacial history of the area studied into pre-existing schemes of glacial activity without a stringent or even valid scientific test. Consequently, for the Alps, we learn on several occasions of the importance of the Egesen Advance, which is the equivalent of the Loch Lomond Readvance of the British Isles that formed during Younger Dryas time about 11,000 to 10,000 years B.P., despite the fact that Watts (1980) has shown that the atmospheric driving force for this event is much less in central Europe than in western Europe adjacent to the Atlantic ocean. Research to test the existence of such a glacial event would have been of more value than simple perpetuating an established belief. Inevitably part of this problem arises from the delay in publication, but also, it reflects the intellectually complacent tone of much of the book.

From a more positive point of view two elements do stand out. Firstly it is pleasant to see a relatively frequent use of glacier reconstructions, at least in the Alpine region of Europe, and the reference to estimations of past snow-line elevations; and secondly it is of great interest to see the frequent reference to rock glaciers emphasizing their importance as typical, rather than rare, periglacial/glacial landforms. Unfortunately, with the exception of an article examining the climate of the Younger Dryas in the western Tyrol by Kerschner, neither of these topics are considered in any detail.

However, one paper does stand out above all the rest for its content and intellectual significance. This is the consideration of lateglacial shoreline displacement by Anundsen and Fjeldskaar. This paper is detailed and

comprehensive, with information necessary to follow the scientific argument. The results demonstrate that a limited glacial readvance will cause measurable crustal loading that can be recognised in the shoreline displacement studies. An understanding of this process can therefore provide a theoretical basis for the use of shoreline displacement curves to interpret the glacial history of an adjacent region, and in particular identify otherwise unrecorded glacier readvances. The precise description, detailed chronologies and thorough treatment adopted by this study should be a standard by which to judge the rest of the papers in the book. The only problem is, that as presented, this paper is only incidentally relevant to the theme of the volume and would have been more at home in a volume on, for instance, isostatic shorelines.

All other points worth mentioning are critical of the volume. Certain of the papers are, quite simply irrelevant. For example it is very difficult to find any justification for the inclusion of the article by Schunke on the temporally independent study of thufurs and palsas, or for the inclusion of the inconsequential study of the sediments in the drained lake basin in the San Juan Mountains, Colorado. This paper gives no evidence for the existence of glaciers other than a till in one section, and the dates which form the basis of the age which is proposed for deglaciation as early as 15,000 years B.P. come from another publication. Equally unsatisfactory is the fact that several papers are concerned solely with a timescale that is beyond the range indicated in the title of the book and have no bearing on the topic. For instance, Hannss' article on the French northern Alps, and Schmidt-Thome's article on northwestern Iberia. One could go on finding more complaints, but perhaps it is worth ending with the most serious. There is no attempt to produce either a synthesis of the work included in the text or an overview of current understanding of the nature of Late- and Postglacial oscillations of glaciers. Such a review is needed from the points of view of methodology, regional development and variations, climatic reconstructions and geomorphological/geological significance. This information would have served to highlight the relevance of those papers which do at least have something to offer, and reflect the current state of knowledge. As an academic contribution this book is but a shadow of "Studies in the Scottish Lateglacial Environment" by Gray and Lowe (1977), and "Studies in the Lateglacial of North-west Europe" by Lowe, Gray and Robinson (1980). This is particularly disappointing in view of the high standards set by Professors Sollid and Kinzl, in whose honour the colloquium was initiated and the volume dedicated and for the need for a volume of this kind dealing with areas such as the Alps which are not typically represented by publications in English.

References

- Gray J.M., & Lowe, J.J. 1977. *Studies in the Scottish Lateglacial Environment*, 197 pp, Oxford, Pergamon Press.
- Lowe, J.J., Gray, J.M., & Robinson, J.E. 1980. *Studies in the Lateglacial of North-west Europe*, 204 pp, Oxford, Pergamon Press.
- Watts, W.A. 1980. Regional variation in the response of vegetation to Lateglacial climatic changes in Europe. In Lowe *et al.* (eds) *Studies in the Lateglacial of North-west Europe*, 1-21.

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CRAVEN, M., and STANLEY, M. *The Derbyshire Country House*, published by the Derbyshire Museum Service, Matlock, Derbyshire. Volume 1 (1982) 99 pages, Vol. 2, (1984) 111 pages. Vol. 1 £2.50. Vol. 2. £3.50. ISBN 0 906753 01 5.

The authors of these two volumes have out-pevsnored Pevsner's Derbyshire Volume of the "Buildings of England", (Penguin Books). Each volume catalogues some 300 stately homes, manor houses, and other large buildings such as castles, but not churches. Most of these still stand though purposes have changed and some are now offices, hotels, hostels or colleges, but a remarkable number have been demolished over the years. They mention some 700 "seats" in the introduction. The volumes are concise to say the least. There are black and white photos of three buildings on almost every page. The notes cover the present use, and give a one-paragraph summary of when the building was constructed or modified, a brief account of the family(ies) who live there and a few bibliographic references. Architectural details are summarized and, unlike most compilations of this nature, a special effort has been made to identify the building materials and their source(s). Volume 1 has an introductory section of 8 pages summarizing the geology (with emphasis on building stones), history, architecture and materials. Volume 2 adds a further 5 pages of introduction on the history of building materials, the nomenclature of country seats, and on moated sites.

The entries are arranged alphabetically and I found a little difficulty in locating some until I realised that there was an index of Grid References in the back of volume 1 (not in volume 2, presumably because so many have been demolished). Very little detail is given of contents of houses in the way of furnishings, art treasures etc.

One small criticism is the small size of print which I found difficult to read, particularly in the introductions. A few extra pages or a larger format would have solved this problem.

It is often said that the best Ph.D. thesis breeds half a dozen more by virtue of the new avenues of enquiry it opens up. Whilst this excellent compilation is not a thesis, it does open up new lines for research. The identification of building stones and the quarries which provided them is all too often uncertain as seen in the notes of these two volumes. One research line could be to look at the criteria for more accurate identification of source rocks by heavy mineral grains or detailed petrography; another could be a thorough archival study of quarries and their history. In fact, there is no comprehensive history of quarrying in our much quarried country available. These gaps in knowledge show only too well that, with rare exceptions, geologists have generally ignored the uses of the rocks they love. Why? The authors are to be congratulated on the start they have made in this task. No other county can boast such volumes.

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PARKER, A. and SELLWOOD, B. W. (eds.). *Sediment diagenesis*. NATO Advanced Sciences Institute Series C: Mathematical and Physical Sciences, vol. 115, 427 pp. D. Reidel, Dordrecht. Dfl. 140 (c. £35), hardback. ISBN 90 277 1677 3.

Diagenesis, particularly of clastic sediments, is a relatively young discipline. That sedimentary *rocks* clearly differ from recently deposited *sediments* is an obvious observation, however, the rigorous investigation of the precise mechanisms whereby unconsolidated sediments are transformed into rocks has begun in earnest in only the last 20 to 30 years. This discipline has seen especially rapid advancement in recent years with the application of new techniques such as scanning electron microscopy and cathodoluminescence to petrographic studies. Much of the impetus for this new research has been provided by the hydrocarbon industry since diagenesis is often of major importance in determining the ease with which oil and gas may be won from reservoir rocks. Consequently diagenetic studies are a rapidly expanding branch of geology with a concomitantly rapid turnover of new information and ideas. This book contains 'Keynote' papers from a NATO Advanced Study Institute held in Reading during July, 1981 and hence represents a 'state of the art' summary. As such it consists almost entirely of reviews and summaries of existing literature rather than presenting new ideas or data.

Chapters by T. Elliot and N. James respectively review terrigenous clastic and carbonate sedimentary environments and facies. Both of these reviews are useful as a guide to the existing literature for diagenetists who are unfamiliar with these subject areas, but, due principally to space constraints, lack sufficient detail to be used in isolation. G.V. Chilinganan reviews compactional diagenesis largely by synthesis of his previously published summaries. Similarly K. Bjorlykke draws largely on his own studies of North Sea hydrocarbon reservoirs in a review of sandstone diagenesis. B. Velde provides a review of clay mineral diagenesis, principally in terms of geochemical phase diagrams. H. Fuchtbauer discusses facies control of sandstone diagenesis and this is paralleled by a review of early carbonate diagenesis by R.G.C. Bathurst. The final chapter presents a review of fluvial diagenesis of limestones by H.R. Wanless. The chapter by Bathurst provides a useful update of ideas expressed in his textbook whilst the contribution by Wanless is a description largely of the effects of pressure solution and dolomitisation.

Overall the volume contains a series of sound summaries of specific subject areas. Unfortunately these remain as individual papers and little attempt has been made to synthesise these into an integral text other than the provision of an index. Perhaps a more serious failing of the book, which no doubt results from its rapid publication, are the frequent typographical errors and several 'cited but not listed' references. Despite these failings the book provides a useful reference source which many researchers will wish to use as a guide through the bewildering number of works recently published on this subject.

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N. EYLES (ed.). *Glacial Geology: An introduction for engineers and earth scientists*. Pergamon Press, Oxford. 1984. 409 pp. Price £9.95, (Flexicover). ISBN 0 08 030263 7.

The past two decades have witnessed major advances in our understanding of the relationships between cold climate processes and sediment properties and between cold climate sediments and landforms. On this basis general models of erosion, debris removal and deposition have become established, each characterised by recurring associations of landforms and sedimentary sequences (ie 'land systems'). Such models are potentially important as interpretative tools for various geological and engineering investigations in areas such as Britain and North America that were subject to a range of cold climate environments during the Pleistocene. The publication of a text embracing both the theory and practical applications of a landsystem approach in a glaciated terrain has been long overdue, and the work under review represents a timely attempt to fill the gap.

An introductory "rationale" indicates that the book was designed for mid- to senior-level undergraduates, college students and industry and government employees who need a "basic introduction to the geology of glaciated terrains". Its theme is that the comprehension of a small number of glacial landsystem models can form a suitable foundation for the successful interpretation of ground conditions in formerly glaciated areas. The book comprises 15 papers written by "active specialists in university and industry" and is considered by its editor to be "a distillation of a very large and diverse literature that crosses traditional discipline boundaries and areas of individual expertise". There is an extensive list of references amounting to 32 pages at the end of the text.

The first 9 chapters of the book are largely concerned with the 'Landsystems Approach' and include reviews of the depositional processes operating at glacier margins. An introductory overview (18 pages) is followed by papers on the subglacial (52 pages), supraglacial (20 pages) and glaciated valley (20 pages) landsystems. These precede accounts of periglacial landforms and sediments (29 pages) glaciolacustrine and glaciomarine deposition (28 pages) and glaciofluvial transport and deposition (15 pages). There are also chapters dealing with the geotechnical properties of lodgement till (29 pages) and the distribution of glacial landsystems in Britain and North America (16 pages). A notable and pleasing aspect of this first part of the book is the use of block diagrams to give a three-dimensional illustration of the associations of landforms and sedimentary sequences under discussion. However, it is unfortunate that many of these detailed diagrams have been reduced to less than half-page size which minimises their impact on the reader.

The final 6 chapters of the book focus on engineering aspects of glacial geology. These comprise papers on engineering geological mapping (18 pages), site investigation procedures (28 pages), foundation engineering (27 pages), road construction (16 pages), dam and reservoir construction (31 pages) and hydrogeology (20 pages). However, there is little attempt to follow the landsystems theme advocated in the opening part of the book. For example, the account of site investigation procedures (Chapter 11) tends to concentrate on relatively expensive methods of subsurface exploration using sophisticated engineering equipment. The potential value of employing a glacial geologist to undertake a landsystems interpretation is not discussed, although it is acknowledged that university and college departments might be able to provide detailed local information. It is a pity that, throughout the book, greater emphasis was not given to engineering case histories where a landsystems approach had been successfully used. Without such evidence, site investigation engineers of the future may remain unconvinced of the value of this new interpretative tool.

The standard of production of the text is a disappointment. This results partly from the policy of reproducing the author's original typescript (in reduced form) and partly because of inadequate proof checking. On some pages the print is uncomfortably faint, and there are instances where it is poorly aligned (e.g. p107). The readers attention is further distracted by irregular word spacings (e.g. p105), missing technical symbols (e.g. p300 and p304) and uncorrected typographic errors (e.g. three errors in the caption to Fig 9.3). On p262 a substantial passage has been omitted. A general lack of uniformity in the presentation of the diagrams detracts from the aesthetic appeal in the book. The unnecessarily large format of certain figures contrasts with the excessive reduction of others. There are wide variations in cartographic standards and styles. Some diagrams lack an indication of scale (e.g. Fig 3.8) and others have incomplete legends (e.g. Figs 1.8 and 10.3). In Fig 9.1 there is a mis-match between the map and its key because of differential reduction. In Figs 9.5, 9.6 and 9.7 the amount of information intended to be shown is inappropriate to the size of the final maps, and much detail has been lost in the reduction process. The captions to many figures fail to stand out from the text such that it is not always immediately obvious where captions end and text continues (e.g. p5 and p99). In some cases, small fragments of text are lost amongst a sequence of diagrams (e.g. p35).

Overall the book is a useful review of the field of glacial geology. The aims and objectives are commendable, but they are not fully achieved because of an unfortunate abandonment of the land systems theme in the later chapters. I have reservations about its suitability as an under-graduate text: it extends beyond the level of the "basic introduction" intended, and some of the chapters are quite heavy going. The poor standard of production is a major distraction. Nevertheless, the book is a welcome addition to the literature and it should serve as a valuable reference source for engineers and geologists alike.

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McQUILLAN, R., BACON, M. & BARCLAY, W., (with contributions by R.E. Sheriff, R. McEvoy & R. Steele). *An Introduction to Seismic Interpretation: Reflection Seismics in Petroleum Exploration*. Graham and Trotman Ltd, London, 1984. 256pp. ISBN 0 86010 455 9 (Hardback) £29.50, ISBN 0 86010 496 6 (Soft cover) £16.00.

The first edition of this title appeared in 1979. Then it was considered an excellent contribution to the subject of reflection seismics in hydrocarbon exploration and as such a very welcome addition to the bookshelves. Since its publication there have been many advances and a shift in emphasis at undergraduate level towards increased teaching of the subject. This reworked and expanded new edition is the fruit of these changes and as such again receives a warm welcome. In revising the original version the page format is smaller, while both the text and illustrations have been expanded. As such this second edition represents both a revision of the original material and a new appraisal of the subject.

The overall approach of the book remains essentially the same with sections on data acquisition, data processing, geophysical and geological interpretation, sandwiched between the basic theory and case histories. Additional chapters on the use of well-log data and other geophysical methods together with a contribution on seismic stratigraphy and hydrocarbon detection (R.E. Sheriff) are interspersed to complete the coverage. Within this scheme there is now a greater emphasis placed on the fundamental theory which should appeal to the students of applied geophysics courses, as will the appendices (8 of them!) covering everything from physical properties of rocks and the interconversion of units, to sample questions from British University and North American examination papers. Even with the reorientation of the book so that it doubles as a student text (with a greater depth being given to the theoretical aspects underlying the technique) the mathematical treatment does not dominate the book and so the less-numerical reader wishing to concentrate on the interpretation or case histories should fear little. Though on a slightly sour note the change to a smaller format is accompanied by a loss of quality in some of the diagrams which is disappointing. While the majority remain crisp and clear, and the colour reproductions excel, a small number of previously acceptable black and white diagrams are now rendered either too dark or too faint. This will cause little problem for those directly involved in the subject, but for the novice or amateur some aspects may be unclear.

The choice of case histories provides a wealth of informative reading, particularly in showing the application of the earlier chapters to real ground. The integrated application of the geophysical techniques in the Moray Firth study, the use of CDP shooting in the Rainbow Lake stratigraphic trap evaluation and the velocity problems at the Kingfish Oilfield - currently Australia's largest producing oilfield - help bring together the different elements and emphasize that all is not nearly quite so simple as we may earlier have thought. The final study of the Hewett Gas Field briefly traces the development of seismic acquisition and interpretation techniques over much of the 1960s and 1970s. The advances made over the period have improved beyond any expectation and the techniques of twenty years ago are now obsolete. If the future follows that trend we may expect further developments over the next decade and the introduction of techniques which will outdate those currently in use. Perhaps, in this, we can look forward to a third edition of this text at the end of the decade to keep us abreast of these advances.

As an introduction to the subject this new edition provides a most useful insight into the world of reflection seismics in petroleum exploration and on balance improves on the original version, itself a welcome and most useful reference. Perhaps the only reservation concerns the increase in price. The original hardback was priced at £16.50; the new hardback is £29.50. I guess for 1985 such a price is considered most reasonable and we should be grateful for a student soft cover at the same price as the 1979 original.

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BIGNOT, G. *Elements of Micropalaeontology* 1985. Graham & Trotman, London, xii + 217pp. £25 hardback (ISBN 0 86010 485 0); £9.95 soft cover ISBN 0 86010 490 7.

On those rare occasions when palaeontology hits the national headlines, it is the spectacularly large fossils, the dinosaur's claw or the Bolsover dragonfly, that are usually involved. However, as everyone's Mum used to say, the nicest things come in small packages, and nowadays there is an increasing general awareness of the beauty and importance of microscopic fossils. Most undergraduate geology courses now contain a component of micropalaeontology and evening class students are commonly introduced to several of the more accessible groups. Wash a handful of Leicestershire Lias in hot water and you can recover a rich and diverse assemblage of foraminifera and ostracods, while a block of Carboniferous Limestone from Derbyshire can be treated with dilute acetic acid to yield abundant conodont elements. These fossils can be readily examined with a basic binocular microscope, but others, such as diatoms and dinoflagellate algal cysts, require more sophisticated equipment. Some, like the coccoliths, are so small that they can only be studied adequately using electron microscopes.

The upsurge of interest in microfossils has created a need for relevant textbooks, and in recent years two rather different volumes (Brasier 1980, Haq & Boersma 1978) have ensnared the market. Now a third contender has become available with the translation of Professor Bignot's work, originally published in French in 1982. This book differs from the others in being divided into two major sections, one introducing the main microfossil groups and the other outlining the geological and palaeobiological applications of micropalaeontology. The text has been translated by Aget Language Services under the scientific guidance of Dr Sally Radford, who between them have done an excellent job in producing a flowing English text with very few patches of clumsy phraseology. There are a few curiosities, though, such as the occasional use of "carbonate" when "carbonaceous" is meant.

After an introduction and a rather unsatisfactory outline of techniques of collection, preparation and identification, the first section proceeds with a largely morphological survey of the major microfossil groups under the Chapter headings: Foraminifera, Ostracods, Calpionellids and Related Microfossils, Siliceous Microfossils, Conodonts and Palynology. There is a wealth of detail in these pages, accompanied by hundreds of line drawings, but the author shows a consistent tendency to introduce jargon without adequate definition or explanation. In places, too, the detail is unnecessarily complex. For example, is it really worthwhile presenting the formula of conodont elements as: $\text{Ca}_5\text{Na}_{0.14}(\text{PO}_4)_{3.01}(\text{CO}_3)_{0.16}\text{F}_{0.73}(\text{H}_2\text{O})_{0.85}$? The author's approach means that, while the text-book may be a useful adjunct to a taught course, it does not provide an understandable introduction for the uninitiated reader. Another shortcoming is the curious mixture of dated and up-to-the-minute information given in many chapters, giving the impression of an old text rather hurriedly revised for this edition. The updating of the bibliographies given at the end of each chapter, however, is certainly useful.

The second section of the book, dealing with applications of micropalaeontology, comprises about one-third of the text, with the topics covered including preservation, evolution, the earliest life, biostratigraphy, palaeoecology and palaeobiogeography. This set of chapters varies from the interesting to the idiosyncratic, but does contain several good examples of the uses of microfossils. Some of the arguments, though, are rather vaguely presented and I encountered one howler (unless there has been a major scientific advance of which I am unaware), on p. 163, where it is suggested that the age of Precambrian deposits has been established by radiocarbon dating.

In all, although this book contains a considerable amount of information, I found it a little disappointing. I do not think I can recommend it to most of the readership of this journal. It will have value, perhaps, for the teacher of micropalaeontology who requires quick access to detailed morphological data and to examples of applications; my thanks, therefore, to the editor of the *Mercian Geologist* for allowing me to acquire a copy by writing this review.

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N.B. *An Introduction to Seismic Interpretation* and *Elements of Micropalaeontology* may be obtained at the prices given above, plus postage, directly from Graham & Trotman Ltd, Sterling House, 66 Wilton Road, London SW1V 1DE. Telephone 01 821 1123. Telex: 298878 Gramco G.

SHIMOZURU, D. and YOKOYAMA., I. (eds.). *Arc Volcanism: Physics and Tectonics*. 1983. Terra Scientific Publ. Co. Tokyo; D. Reidel Publ. Co. Dordrecht/Boston/London; vii + 263pp. US \$65, ISBN 90 227 1612 9.

This is a selection of fifteen papers presented during the Symposium on Arc Volcanism held in Tokyo and Hakone in 1981. The volume supposedly brings together contributions on a particular aspect of the meeting though in reality the papers are linked by a somewhat slender thematic thread. Most of the papers are by Japanese authors and deal mainly with volcanoes in Japan and the western Pacific region. There are plenty of new data and several original models and ideas to satisfy the determined specialist but it is definitely not a book for the undergraduate or reader with a more general interest. Even the specialist will be deterred by the exorbitant price!

The volume is divided into two sections with seven papers under Physics and eight under Tectonics, although the division between these is not altogether clear. One of the more interesting papers in the first section is that of Yokoyama who uses gravity and drilling data on four Japanese calderas to conclude that explosion rather than collapse must be the dominant mechanism in their formation. In a study of volcanic earthquakes, Okada finds evidence that magnitude 5 events often trigger sector collapse where sufficient gravitational instability has developed. Imai proposes a mechanism for successive eruptions at Asama Volcano involving shallow implosion earthquakes with a downward first motion. One interpretation is based on two phase flow, liquid plus gas, and another involves a syphoning mechanism—the coffee percolator model. Other topics addressed in the first section of the volume include rates of magma supply; thermal energy and the ratio between intrusive and extrusive magmatism; and a theoretical model for tephra dispersion.

The second part is concerned largely with models of subduction processes and magma generation. Honda and Uyeda review the thermal structure of subduction zones, favouring the possibility that release of volatiles and mechanical weakening of the slab may be important in determining preferential paths for magma ascent. Shimozuru and Kubo examine the relationship between spacing of volcanoes along an arc system and the dip of the subducting slab. In the 'Chilean type' there is strong coupling between upper and lower plates, greater seismicity and more closely spaced volcanic centres. In contrast, in the 'Marianas type' there is more effective decoupling, little seismicity and a lower linear concentration of volcanic centres. Kobayashi discusses fore-arc volcanism and the role of boninites, which develop during the initial stages of subduction when volatiles are first introduced into the asthenosphere. Accretion and obduction may bring together fragments of oceanic crust, the fore-arc assemblage and the arc volcanics.

Ida integrates changing thermal and mechanical regimes in a model of subduction zone evolution progressing from arc to marginal basin volcanism. Honza sees an inverse relationship between the intensity of arc and marginal basin volcanism based on a convection current model. In the segmented eastern Aleutian arc (Kienle et al.) andesite predominates at intrasegment volcanoes and dacites, domes, ash flows and calderas are characteristic of segment boundaries. Volcanism ceases towards the eastern part of the Aleutian arc system, perhaps because of the development of a large fore-arc accretionary wedge. The Solomon Islands have developed in response to the complex interaction of the Australian and Pacific Plates, further complicated by the subduction of the Woodlark Basin and its spreading centre, resulting in eruption of the unusual basic lavas of the New Georgia Group (Dunkley). The final paper (Keating et al.) is concerned with palaeomagnetic studies of the Bonin and Mariana arcs. Clockwise rotation and northward drift are related to onset of subduction of the Pacific plate beneath the Philippine Sea.

The volume does not purport to give an overview of arc volcanism nor does it provide a systematic coverage of the physics and tectonics of island arcs. An assortment of loosely related papers, the only justification for publication in this form is as a record of some of the proceedings of a particular symposium. In a sense it is an unnecessary volume since most of the papers could have been readily accommodated in appropriate scientific journals.

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