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BOOK REVIEWS

Structural Mineralogy: An Introduction. By J. Lima-de-Faria. Kluwer Academic Publishers Group, P.O. Box 989, 3300AZ, Dordrecht, The Netherlands, 1994, 346 pages. U$150.00 hardbound (ISBN 0-7923-2821-3).

The first seven chapters in 75 pages cover the following themes: structural classification of minerals, anatomy of crystal structures, architecture of crystal structures, stability of crystal structures, structure and properties, representation of crystal structures, and nomenclature of crystal structures. Chapter 8 in 251 pages contains the systematics of minerals on structural grounds, and then come references and indices on minerals, subjects, and authors.

The first chapter develops the theme that classification has moved from practical uses to physical properties, then to chemical properties, and now should move to structures. The next six chapters show why the term "an introduction" was used in the title.

Like the classification of silicates, the structures are subdivided into close-packed structures (83 pages), group structures (29 pages), chain structures (19 pages), sheet structures (27 pages), framework structures (48 pages), and structures not classified (24 pages). Each structure has a complete page and, in a few cases, two pages (*e.g.*, chlorite-1*M*, kaolinite-1*A*). The information given includes structural formula, crystallographic data, physical properties, structure description, multiple figures (*e.g.*, polyhedral, packing, ball and spoke, atomic content of the unit cell, and condensed model), isostructural minerals, and references.

A comment in the foreword of the book caught my eye; "It seems to me that mineralogy today is far from a dead science, although most mineralogists may fall into that category. These are really exciting times!"

The book is a useful compilation of crystal-structure data, with uniformity in the descriptions of crystal structures, which is a step forward from many poorly described structures in the literature. The data could be used as a secondary source for the calculation of powder X-ray-diffraction data. The 24 minerals in the structures left unclassified show that the scheme is difficult to use. Within each section, the minerals are basically arranged in the order of a chemical structural classification. Therefore, this classification is not a purely structural classification. The alternative methods involving a purely structural classification, a unit-cell classification or a Pearson Symbol appear able to suggest isostructural relationships.

Pages 166 to 168, pages 198 to 200, pages 220 to 222, and pages 250 to 252 contain only "8.4.2. Group structures", "8.4.3. Chain structures", "8.4.4. Sheet structures" and "8.4.5. Framework structures", respectively. Eight words and four numbers on 12 pages is excessive white space in a book with a high price tag. IMA nomenclature is not followed, with pyrrhotine for pyrrhotite, niccolite for niccoline, and 1*Tc* for 1*A*. Cobaltite (orthorhombic) is incorrectly given as isostructural with pyrite (cubic).

The price appears too high to justify a copy for personal use; however, Earth Science libraries will find a copy useful as a reference text.

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Standard Catalog of Gem Values (second edition). By A.M. Miller and J. Sinkankas. Geoscience Press, Inc., 645 Cree Circle, Boulder, Colorado 80803, 1994. 271 pages. US$24 softcover (ISBN 0-945005-16-4).

The introductory chapter to this second edition of the Standard Catalog focuses on two ingredients, namely definitions, and the factors influencing the esteem in which a gem is held. Although the term "gem" means different things to different people, the catalog uses it to denote finished top-quality stones ready to wear in jewelry, whereas "gemstone" or "rough" designates little-worked rough material. With respect to the all-important objective of ornamentation, the key factors that decide the subjective quality of "esteem" are: attractiveness, durability, rarity, fashion and size.

Chapter 2, "Supply and Marketing Information", supplies valuable insights into the disposition of rough gemstone materials, the sale of cut stones, aspects of investment, the feast-or-famine fashions that beset the marketing of most gems, and the maze of regulations and double dealings that commonly confront would-be gem importers.

Despite the merits of the introductory chapters, the true value of this publication is that it demystifies the business of gem pricing and provides a much-needed update to Sinkankas's 1968 "Standard Catalog of Gem Values". The bulk of the text (Chapters 3 through 7) consists of listings of, respectively, "Rough Gemstones", "Faceted and Cabochon Gems", "Engraved Gems", "Carvings and Miscellaneous Gemstone Objects", and "Pearls". Prices quoted are current (1993) average retail values in US dollars. But

these are listings with a difference, because each category is prefaced by a succinct analysis of factors, technical and otherwise, involved in the evaluation process. For example, written into the listings of gems (cut and uncut) are brief informative sketches (not elsewhere readily available) concerning available varieties, relative value by colors and cut, rules for choosing colorless or colored gems, valuable hints for assessing gem value, and comments on sources. As a result, the reader is more likely than not to get thoroughly caught up in the whole learning process.

Thus, updated and entirely revised, this benchmark text of gem values will be welcomed by gem collectors, buyers, miners, processors, appraisers, jewelers, lapidaries, and indeed by anyone interested in the value of gems and minerals. Authoritative, informative, and entirely readable, it represents an excellent buy.

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Systematics of Minerals. By Evgeniy I. Semenov. Nedra, Moscow. 1991, 334 pages. In Russian, with minerals names also in English. ISBN 5-247-01449-9.

A two-page introduction (in Russian) precedes a tabulated collection of data on some 3500 mineral species known in 1989. The table format, which presents each mineral species in a line or two, is divided into columns as follows: #1 the number assigned the mineral according to the Universal Decimal Classification, and the year of discovery; #2 the name in Russian and English; #3 a simplified chemical formula; #4 optical parameters; #5–7 unit-cell parameters; #8 additional chemical or structural information.

The presentation is organized in nine chemical classes: Metals – Arsenosulfides, Sulfides – Chlorides, Oxides, Borates – Carbonates, Silicates of Na–Fe, Silicates of (Fe–U) – Tellurites, B5+ (N, P, As, I) compounds, Phosphoarsenates of Fe^{3+} – U^{6+}, B^{6+} (S, Te) compounds, and subdivided into 97 subclasses indicated by generalized theoretical formulae. Isomorphic species within the subclasses are indicated by brackets emphasizing affinities and substitutions.

It is estimated that 46% of all the minerals are present in the former USSR, whereas 39% occur in Russia, but no locality information is given.

This reference book should be useful to professional mineralogists with the transliteration and the translation of some mineral names into English especially helpful. Unfortunately, the index is in Cyrillic.

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Crystal Identification with the Polarizing Microscope. By Richard E. Stoiber and Stearns A. Morse. Chapman & Hall, 29 West 35th Street, New York, N.Y. 10001, U.S.A., 1994, 358 p. $US39.95 softcover (ISBN 0-412-04831-0).

How I wish this text had been available when I took Optical Mineralogy! Forty years ago, I was taught the subject by a paleontologist using an impossibly opaque (pun intended) text. I learned little. A lucid treatment of the subject in Dana's "Textbook of Mineralogy" revised by W.E. Ford and published in 1932 got me through graduate school. Later, when I taught the subject, I used my own "text" – a series of mimeographed notes and lab exercises based on Dana and a growing personal experience.

Crystal Identification with the Polarizing Microscope is a wonderful, "user-friendly" book. The authors state that their emphasis is practical but with enough theory to make rigorous understanding possible. This is a fair statement, and as such the book is suitable over the entire range from an undergraduate text to a guide for advanced graduate students. The two strong points of the book are that it conveys the vast and varied experience of its authors, and that it uses immersion techniques to teach theory. Thin sections are treated in detail only on the last three pages of the text.

The order of topics is logical, beginning with basic principles and theory, followed by the identification of isotropic crystals. Uniaxial and biaxial crystal optics come next, with the required theory intercalated in a germane manner. Concluding chapters cover optic orientation in stereo (using stereograms, diagrams from Tröger, drawing of principal sections, and sketches of corresponding interference figures); special orientation methods (U- and spindle stages); the dispersion method (a technique upgraded by Prof. Morse over the past three decades); and crystal-identification recipes. Two appendices follow, one on optical properties of common rock-forming minerals (a bare-bones outline at best), and one on the identification of fibrous asbestos (a hot topic in the U.S.). References, more than a hundred of them and ranging over three centuries (1690 to 1994), are sandwiched between the appendices and the index. Bold figures give the pages where each reference is cited in the text.

This book is logical and generally clearly written. The novel treatment of interference figures and the worksheets and worked examples will be as welcome to the teacher as to the student. A supplementary source on the optical characteristics of rock-forming minerals is required, however, if this book is to be used as a text.

Shortfalls? Well yes, there are a few. Labeling on Figure 11–15 is incomplete, and the significance of the circles in Figure 11–1 is unclear at first glance. The caption is hard to relate to Figure 8–7, and dropping perpendiculars from the vectors to the E–W axis would

clarify Figures 5–5 and 5–7. Having the substance of greater index of refraction uniformly below the substance of lesser index of refraction in Figures 1–12 and 1–13 would aid the reader. The mix of 0 with w and E with e is unfortunate, and the mix of fast with D1 and slow with Dh is even worse. Why not just w , e, fast, and slow? The illustrations of the Becke line (Figures 3–2 and 3–3) are poor, and "equation" 1–12 is impossible. "Foveal cones" defies all dictionaries at my disposal, and I was surprised to see that Prof. Morse, a scientist who probably has seen more grains of olivine in grain mounts and thin sections than any geologist alive, would allow the term "common olivine" (p. 208).

A few words on the opaque minerals would be helpful, as would mention of the weird edge-effects in thin sections produced by certain epoxy cements. These can bewilder the novice. Also on the subject of edge effects, the 4-cm margins of this book are far too wide and constitute a waste of paper in our age of supposed environmental consciousness.

En bref, I applaud this outstanding book. Without hesitation I can recommend it to students at all levels and to researchers who use the polarizing microscope routinely. Chapeau!

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Petrogenesis of Metamorphic Rocks (6th edition). Complete revision of Winkler's Textbook by Kurt Bucher and Martin Frey. Springer Verlag, 175 Fifth Avenue, New York, N.Y. 10010, 1994, 318 pages, US$39.95 hardbound (ISBN 0-387-57567-7).

This is not a sixth edition of Winkler's textbook, regardless of what the cover says! Winkler was a distinctive voice in metamorphic petrology. He did not accept the facies classification, and treated anatexis extensively and systematically, the only major textbook to do so. Both these features are gone from this book. Winkler also treated experimental data with considerable skepticism. He accepted experiments as necessary for calibration, but as an accomplished experimentalist himself, he knew the pitfalls, and declined to use experiments as a basis for extensive numerical calculation. Skepticism and the absence of number-crunching are gone from this book. Winkler had a practical, "engineering" approach to the subject of metamorphism that many field-based geologists found congenial. This has also gone from this book, which is much closer in style to the theoretically based, number-crunching style prevalent in, for example, the *Journal of Metamorphic Geology*. Since the approach has changed so radically, we might expect some explanation in a preface as to why various features were dropped, and what is the thread that connects this edition to previous ones. However, the Preface says nothing at all about the connection of this edition to previous ones, and the prefaces of previous editions are not included, as they commonly are in multi-edition textbooks. Experience shows that classic textbooks, such as "Principles of Geology" by Holmes, can be continued after the death of the author, but great and loving care is required to preserve the style and flavor while updating the facts. The radical change in style and lack of explanation in this volume suggest that both authors and publisher hope to benefit from Winkler's name on the cover without bothering to include Winkler's insights in the text.

Having disposed of the pretence that this is an edition of Winkler's book, we may now consider the merits of the volume. The book is divided into two parts, Basic Principles (144 pages) and Metamorphism of Different Rock Compositions (160 pages). Chapters 1–2 of the section on principles cover standard definitions, rock classification and nomenclature, as well as standard graphical representations. The subdivisions roughly follow those of Winkler's fifth edition, but in some cases the discussion seems to be a reaction to, rather than an updating of Winkler's position. For example, the authors stress that metamorphism is a major process in the mantle, and that pressure should therefore be considered as a variable independent of temperature, in contrast to Winkler's position, that temperature is the main extensive variable in metamorphism, a position based on the assumption that metamorphism is a crustal process. This material is well and clearly presented, but an annoying, and at times serious defect, repeated throughout the book, is that the bibliographies at the end of the chapters are generally not specifically referenced to the text material.

The book runs into problems in chapters 3–4, which attempt to cover metamorphic processes, including not only metamorphic reactions complete with thermodynamic analysis, but also heat flow, geothermal modeling, P–T–t paths, kinetics (all in chapter 3!), the facies concept and geobarometry (chapter 4). This amount of material is too vast for the space available, and hence is covered superficially. The lack of specific attribution of references is particularly damaging. The material is too condensed for a student to learn the subject or for the more experienced practitioner to use it as a "cookbook". The authors would have been wiser to follow Winkler, who stated specifically in his successive prefaces that thermodynamics and tectonics were not treated in his text.

The section on the facies concept and geobarometry is interesting. The authors list the numerous difficulties with the facies concept, but credit it with some utility

for regional correlation. I concluded that Winkler's original position was still valid! The section on geobarometry has a very useful (referenced!) list of geobarometers. Like most field-oriented workers, the authors are much less sanguine about accuracy and precision of thermobarometry than experimentalists and computer-oriented workers.

The second part of the book follows quite faithfully the outline of Winkler's fifth edition, systematically discussing field examples by composition. The sections on ultrabasic rocks and mafic rocks have been greatly expanded to cover metamorphism of mantle rocks and also blueschist- and eclogite-facies rocks, in accordance with Winkler's views on metamorphism. In all cases, metamorphism has been referenced to model chemical systems (CMASH, KFASH and the like) rather than to specific reactions, as they were by Winkler. In most cases, the treatment is less clear and incisive than in previous editions, but the sections on blueschist- and eclogite-facies metamorphism are clearly the best in the book. The book concludes with a thin and disappointing section on metamorphism of granites, an unsatisfactory replacement for the vanished section on anatexis.

It is not clear to whom book is addressed. In addition to neglecting petrography almost entirely, it requires a substantial background in thermodynamics and experimental petrology to be read at all smoothly, and is therefore hardly suitable as an introductory text. The theoretically based discussion will not appeal to the previous field-based audience for Winkler's book. They are looking for something quick and dirty. It would be most appealing to post-graduate students or professionals who are looking for a book linking field observations, theoretical petrology, and related subjects such as thermal modeling and plate tectonic theory. It would be even more appealing to this group if the bibliography was better integrated with the text.

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Metamorphic Crystallization. By Ralph Kretz. John Wiley and Sons Inc., 605 Third Avenue, New York, N.Y. 10158-0012, 1994. 507 p. (paperback), (ISBN 0-471-94214-6).

For almost 40 years, Ralph Kretz has followed "a road less travelled" in metamorphic petrology, investigating problems which others found too difficult or simply ignored. This book revisits most of these problems. As with many of Kretz's other writings, the reader will be simultaneously enlightened and impressed by the depth of insight, and irritated by the idiosyncracies.

The book consists of five long chapters titled "The Geological Background", "Mineral Thermodynamics", "Phase Equilibrium", "Chemical Kinetics" and "Granular Microstructures and Crystallization Mechanisms". The first, relatively short (52 p.) chapter covers the definition of metamorphism, metamorphic mineral, facies, isograds, mineral zones, experimental petrology, and relations of metamorphism to tectonics. Since any of these topics requires more than 47 pages for a thorough exposition, the coverage of topics is necessarily skimpy. It also seems perfunctory, as though the author were not really interested. This impression is heightened by some curious choices of references. For example, only the first edition of Winkler's "Petrogenesis of Metamorphic Rocks" is referenced, although the simplified subdivision of metamorphic facies proposed by Kretz bears a considerable resemblance to the "high grade – medium grade – low grade" subdivision adopted by Winkler in later editions of his book. Chapter 2 attempts to cover thermodynamics in 72 pages. Such summaries unfortunately seem to have become obligatory in textbooks on metamorphism, even though they are of little use either to learn thermodynamics or to use as a reference. This example is no more successful than other recent attempts, for example by Nordstrom and Munoz. It also contains some dubious statements, for example "... the entropy ... depends on the arrangement of atoms and molecules..." (p. 53), and espouses a solution model (van Laar model) rarely used in metamorphic petrology except by Kretz himself and not suitable for multicomponent solutions.

The merit of this book begins to appear in Chapter 3, 137 pages devoted to various aspects of equilibrium as exemplified by a large number of examples using both field and experimental data. Various principles and techniques, such as Schreinemakers analysis, are explained along the way, but the emphasis is definitely on manipulation and interpretation of data. The application of the distribution coefficient is handled in unusual detail. Those familiar with Kretz's work will recognize many of the examples, which in some cases seem to have been lifted bodily from the literature, complete with badly dated references. However, a large amount of new work is included, and every practising metamorphic petrologist will benefit from reading this chapter and pondering the examples. One wonders, however, what students will make of it. Although geothermobarometry underlies many examples, the subject is never systematically addressed, and possible errors are discussed either not at all or in a superficial way.

Chapter 4, 66 pages, is somewhat of an interlude, covering an introduction to chemical kinetics as applied to diffusion and crystal nucleation and growth,

in much the same way as Chapter 2 covers chemical thermodynamics. There is a lot of useful material in this chapter, but it is insufficient to either learn or practise chemical kinetics. It really serves as a bridge to the final long chapter (128 pages) on applications of kinetics to crystallization. This chapter treats eight examples in unusual depth, ranging from nucleation and growth of aluminosilicates, to distribution and shape of crystals in metamorphic rocks, to the origin of metamorphic layering and differentiation. The emphasis is on treatment of results using kinetic, thermodynamic and statistical tools from other disciplines, notably metallurgy. The methodology for obtaining the data in the first place, such as the three-dimensional location of every crystal in a cube of rock, are not discussed. In some cases, the work seems to contradict earlier sections of the book. Kretz earlier considered calcite–dolomite to offer a reliable geothermometer. However, his study of the nucleation process, and considerations of chemical balance, make this doubtful.

The book has been well produced, according to Wiley's usual high standards, and contains few typos or poor illustrations. The book is well organized, and reads smoothly for a technical textbook. However, I do question the editing, which left erratic capitalization for Big Subjects such as Physics and Chemistry. According to the preface, this book is intended as an introduction to metamorphism for senior undergraduate and graduate students. It is unsatisfactory for such a role because of its very uneven coverage, idiosyncratic choice of emphases and models, erratic bibliographic coverage and lack of coverage of relations of metamorphism to tectonics. However, for the reader well versed in metamorphism, and able to select what is novel and useful, the book is a treasure trove of ideas and techniques. It contains an entry into metallurgical and related literature unusual in a geological text. It also offers an unusually complete record of a career devoted to some of the more exotic areas of metamorphism. I recommend it to those interested in metamorphism.

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Volcanism Associated with Extension at Consuming Plate Margins. Edited by J.L Smellie. Geological Society, Special Publication 81, 1995, 293 pages, $US100.00 hardbound (ISBN 1-897799-17-9).

Extension-related volcanism in arc settings has received relatively little attention until recently, although it is fundamental to the understanding of the tectonic evolution of convergent-plate-boundary regions. Within the last several years, however, there has been a small outpouring of studies that highlight the complex tectonics and petrology of these plate margins. This collection of fourteen papers from international contributors presents a comprehensive overview of current ideas on extensional magmatism at consuming plate-margins. The book documents extension and coeval volcanism using mainly Cenozoic case-histories for oceanic and continental margin arcs. Most papers are geochemically oriented, although sufficient information on the regional geology and tectonic setting is given in each paper to allow each one to be a self-contained study.

The collection is divided into three sections. The introductory section (Tectonics and Magmatism) provides an overview of subduction systems and magmatism (Hamilton). The second section contains seven papers dealing with oceanic arc systems. Most papers in this section focus on the western Pacific, a classic area for the study of convergent-plate-margin processes, including those of the intraoceanic arc/back-arc systems. The two opening papers concern the Lau back-arc basin system, which includes volcanic rocks typical of both extensional and oceanic arcs. Clift *et al.* discuss volcanism and sedimentation in the basin, whereas Pearce *et al.* emphasize the geochemistry of dredged volcanic rocks. Three other geochemically oriented papers consider extensional volcanism in the Taiwan–Luzon island arc (Knittel & Oles), an Oligocene–Miocene arc from Viti Levu, Fiji (Wharton *et al.*) and the New Hebrides (Picard *et al.*). Taylor & Nesbitt use geochemical data to discuss the origin of rocks from an Eocene volcanic center of the Izu–Bonin arc. The last paper of this section (Aitchison & Flood) deals with the Devonian Gamilaroi terrane, a part of the New England orogen of eastern Australia. On the basis of the geochemical and microfossil data, the terrane is interpreted to be a rifted intra-oceanic island arc.

The third section contains six contributions that focus on continental margin arcs. It opens with a comprehensive geochemical study (Pouclet *et al.*) on volcanic rocks of the back-arc region from the eastern Eurasian continental margin. Cretaceous to Cenozoic volcanism in south Korea and in the Sea of Japan is correlated with the geodynamic evolution of the margin, particularly with the opening of the back-arc basin. It is followed by a study by Gamble *et al.* on the geochemistry of arc and back-arc basalts dredged north of New Zealand. These rocks document the transition from the oceanic Kermadec arc – Ngatoro basin across the continental edge of New Zealand. Cenozoic back-arc volcanism from the Aegean Sea is described by Pe-Piper *et al.* Their geochemical study focuses on the island of Chios, Greece, and is accompanied by a discussion on the Neogene evolution of Aegean volcanism. Petford & Atherton report on

Cretaceous–Tertiary volcanism in northern central Peru and discuss the role of crustal extension during the contemporaneous subduction. In the paper by Kepezhinskas on the high-K magma from the Kamchatka arc, the suite of low-Ti shoshonite is related to the subduction zone, whereas the high-Ti types are associated with intra-arc rifting. Finally, Hole *et al.* discuss the association between subduction-related calc-alkaline magmatism and "within plate" alkaline basalts that occur along the Pacific margin of the Antarctic Peninsula.

The book is well produced and carefully edited; the seven pages of index are very useful and enhance the value of the book. The writing style is smooth and readable. As an overview of current research on extension-related arc volcanism, it is particularly appropriate for the library of specialists in igneous petrology, geochemistry and volcanology, but it could also be easily grasped by those with only a general geochemical background. It will stimulate dicussion in graduate seminars where emphasis is on the broad topic of igneous petrology and tectonics of plate margins. The Special Publication series of the Geological Society generally provides good value for money, and this volume is no exception. The list price is reasonable for a book of its size and quality. Considering the wealth of current information in the book and the quality of its production, it is well worth the investment.

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Geostatistics for the Next Century. Edited by R. Dimitrakopoulos. Volume 6 of the Series "Quantitative Geology and Geostatistics". Kluwer Academic Publishers, Dordrecht, The Netherlands, 1994, 497 p. ISBN 0-7923-2650-4.

It is not an easy task to review a volume of conference proceedings. This volume is a compilation of papers for a forum in honor of Michel David and tackles different theoretical and practical issues on the broad subject: how will geostatistics enter the next century? The papers represent a snapshot of a part of the scientific developments in this rapidly evolving branch of applied mathematics.

The volume is subdivided into seven sections, three of them with vague titles such as "Modeling Practices, Needs, Directions and Concerns", "Information Measures, Integration and Geostatistical Analysis", and "New Methods, Alternative Frameworks and Directions in Modeling". The four other sections cover the following topics: conditional simulation, change of support/scale, mining geostatistics, and petroleum/hydrogeological applications. The reader will have difficulty finding his/her way through the volume, as the papers are in no sensible order, and no index is provided.

The book starts off with a paper by O. Dubrulé on "Estimating or choosing a geostatistical model?", a title inspired by G. Matheron's book on the philosophy of geostatistics. Dubrulé discusses several viewpoints concerning the choice of a probabilistic model and its parameters. He mentions the Bayesian approach as an attractive solution for quantifying the uncertainty on the parameters, a theme which is developed by a discussant, M.S. Handcock, and subsequently in several papers scattered throughout the volume: J. Pilz (on robust Bayes linear prediction), M.S. Handcock (on measuring the uncertainty in kriging), A.R. Solow & S.J. Ratick (with a comment by R.M. Srivastava on the objectiveness of a space of uncertainty) and A.G. Journel (with a critical comment by R.M. Srivastava). The theme of integration of *a priori* information is also developed by M. Kacewicz (on fuzzy geostatistics), and in the context of petroleum exploration, both by C. Daly & G.W. Verly and A. Track, J.H. Meyer, S. Zurquiyah & J.P. Delhomme. C.V. Deutsch discusses algorithmically defined techniques, arguing that their flexibility can compensate for lack of consistency.

The practice and the future of mining estimation are questioned in the contributions of M.E. Rossi and H.M. Parker (Is it hopeless to try and estimate recoverable reserves?) and of M. Armstrong (Is research in mining geostatistics as dead as a dodo?), with a discussion by P. Dowd.

There are also papers on the themes of fractals (five), indicator kriging (three), sampling (two), space–time modeling (two), neural networks (one), and image compression (one). Many papers in the volume deal with conditional simulation.

A problem faced by the geostatistical community is that it lacks its own journal. As the applications of the techniques are now spread in numerous fields, the proceedings of international congresses are the only means to follow the evolution of the discipline. Kluwer Academic has published this volume in its series "Quantitative Geology and Geostatistics", where the proceedings of the two previous international congresses (held in Avignon, France, 1988 and in Troia, Portugal, 1992) have already appeared. This series can be considered at the present time as a gathering point of geostatistical publishing activity, which was formerly located in the NATO Advanced Studies Institute Series for the international congresses held at Lake Tahoe in 1983 and in Rome in 1975.

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