Book Reviews

DESIGNING OPTIMAL STRATEGIES FOR MINERAL EXPLORATION. By J. G. Geoffroy and T. K. Wignall. Plenum Press, New York and London (1985), pp. 364.

'Zero information is zero cost, but entails a large risk factor. Complete information is unattainable because of its prohibitive cost and the special nature and structure of the geo-data. Therefore, an optimal amount and quality of information has to be sought for as a compromise between the two extreme cases mentioned above'. It is with this motto that the authors of this book, representing a blend of a geologist and a mathematician have made a sincere and serious attempt to drive home the concept that optimization is eminently suited in Mineral Explorations despite the use of probabilistic methods. The thrust areas where optimization is possible are identified as survey designs for the detection of mineral deposits, and selection of target areas for test drilling.

The first five chapters are aimed at spelling out the philosophy and rationale behind the optimization concept in Mineral Exploration. The purpose and nature, *inter alia*, ways and means of quantification towards mitigation of uncertainty and risk in mineral exploration form the subject matter of Chapter-1 '(Optimizing Mineral Exploration)'. Theoretical aspects about the detection probability including optimization of field survey designs and methodology of detection in the preliminary planning phase are fully taken care of in Chapter-2 '(Evaluation of probability of detection of Mineral deposits)'. Chapter-3 and 4 dealing with the 'Cost of detection' and 'Optimizing ore detection' are a sequential follow-up of Chapter-2.

'Application of the optimization Methodology to the search for six types of Ore deposits in North America' (Chapter-5), is more or less a preamble to Chapters-6 to 11 which are essentially aimed at focussing certain important case studies. 'Designing optimal field programmes for porphyry Cu-Mo deposits of North American Cordillare Belt' (Chapter-6), 'Optimised search for four types of contact metasomatic deposits of the same belt' (Chapter-7), 'Detection of Ni-Cu ultramafic deposits of North American shield by optimised geophysical surveys and drilling programmes' (Chapter-8), 'Optimized Air borne and ground search for volcanogenic massive sulfide deposits of the North American shield and Cordillare belt' (Chapter-9). 'Optimized field programmes for the detection of Mississippi valley-type Pb-Zn deposits' (Chapter-10), 'optimized ground programmes for detection of vein gold deposits' (Chapter-11) and 'Optimal selection of exploration targets for test drilling' (Chapter-12) are the major themes covered. In the end it is announced that initial exploration planning to production has been fully computerised into an 'Expert Exploration System' comprising 18 fully tested computer programmes and those interested in them may contact the authors. The first section of the expert system is said to help in search for any type of ore deposits, anywhere in the world. The second section provides the computerised optimization.

Three kinds of elements are stated to be required for any pioneering project of this type. They are '(1) inspiration, encouragement and guidance, (2) good quality data and (3) computational facilities for the processing of the data and extraction of conclusions and inferences'. The authors demonstrate that they did possess these three elements in abundance albeit the 'good quality data' collected was restricted to a single continent. Deposits from a global cross-section have to be chosen and

such expert exploration systems developed for proving further, the efficacy of optimization in mineral explorations.

The book should prove useful to every geologist engaged in Mineral Exploration. The references and selected readings at the end of each chapter are exhaustive and relevent. It is hoped that this reasonably priced volume will facilitate many professionals to get an easy access to it.

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ARCHAEAN GEOLOGY. By C. S. Pichamuthu, Oxford and I. B. H. Publishing Co., New Delhi, 1985, p. 420, Rs. 72/-

This volume is a timely publication focussing the attention of students of Earth Science, especially in India on this important field. It takes stock of the existing status of our knowledge, and identifies some of the unresolved problems of Archaean Geology.

The book is arranged in 12 parts. The early parts (parts 1 to 7) deal with the geological record, origin, differentiation and thermal history of the earth, evolution of the atmosphere and hydrosphere and origin of life. The later parts are dedicated to a consideration of geochemistry, geochronology and continental evolution, greenstone belts, gneiss-granulite terrains and mineralization in Archaean.

The major achievement of this book is reflected in the early parts, wherein a large volume of data has been synthesized and the reader is introduced to basic concepts and models pertaining to the origin and evolution of the earth.

In the second half of the book, the author has not only reviewed existing knowledge about crustal and continental evolution, but has discussed at length gniess-granulite relation, greenstone evolution and mineralization in the Archaean. The application of geochemistry and geochronology as tools in solving Archaean geological problems has been detailed. It is somewhat surprising that the author has failed to refer to some of the useful papers in Memoir 4 ' Precambrian of South India '. There have been several excellent papers on P-T. estimates like those of Raith *et al,* 1982, 1983; Rollinson *et al,* 1981; Harris *et al,* 1982. These references are missing in an otherwise exhaustive bibliography.

A graduate or research student who is a beginner in this field finds it difficult to assimilate some of the advanced aspects which have been enumerated without much of an introduction. The excellent summaries provided at the end of each chapter, however, are extremely useful and the student finds it easy to understand if he commences reading the summary first. It would perhaps have been better to have started with summary and printed in bold type so that it would have served as an introduction to what follows.

Unfortunately the printing is not up to mark. A book intended for students should have been got up in a better and attractive format and with quality illustrations.

This is a major work by the author and reflects his erudition and wide knowledge of the subject. It is sure to be welcomed by all students of the Precambrian, especially in the Universities where Earth Science is taught. The most attractive part is its price which enables even students, apart from researchers, to possess their own copy. We recommend the publication to all libraries.

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